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RCM radio control MODELER

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VOLUME 13 1976 NUMBER 11

RCM MODELER

This Months Cover

Miss Marianne Luplav Christensen, an SAS Hostess, holds Ed Miller's Cox .09 powered SAAB Draken. Cannon radio on elevator and aileron with throttle and rudder optional. Ektachrome transparency taken at Birkerod, Denmark by Edward C. Miller.

NOVEMBER

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FROM THE SHOP

Don Dewey

LES HARD

● One of the hardest working groups of individuals in this hobby and sport of radio control are the newsletter editors that serve the various clubs across the country. These editors serve as the catalyst for their fellow club members by disseminating news activities and coordinating contests and fun fly's, as well as exchanging information with other clubs throughout the country. In most cases it is a time consuming, thankless job whose only reward is the knowledge that each individual has contributed toward the advancement of our hobby. Thus, RCM would like to salute each and every newsletter editor throughout the country by periodically presenting a profile on a individual editor from a specific club. This month, RCM profiles Les Hard, AMA 4639, newsletter editor of the "Bee Line", newsletter of the Capital Area Radio Drone Squadron, Inc., of Lansing, Michigan.

Les Hard was born November 28, 1913 in Washington, Ohio and started building model planes during the Lindberg era. In fact, his first model was a solid wood version of the famous Spirit of St. Louis. The first model club that Les belonged to was the American Boy Magazine when Merrill Hamberg was in charge.

Les's first flying models were of balsa and tissue and powered by rubber bands and he had his first ROG'S at the age of 15. In 1931, when Les was 16 he moved to Lansing, Michigan and has lived there ever since. He continued to build rubber models until he built his first gas powered free-flight in early 1937, powered by a second hand Brown Jr. It was this year that Les first joined the AMA.

Designing all of his own aircraft from this point on, Les Hard won his first contest in 1940 in Class A Open with an original design which he called the Sniffer powered with an Ohlsson .19. He later built five of these models and won contests with three of them losing two of them in out-of-sight flights.

Les entered his first and only Nationals in Chicago in 1941 placing 6th in Class A Open just ahead of Carl Goldberg; and winning a gold medal for his efforts. This, too, was with an original design of the modified Sniffer. Other notables in the 1941 Nationals were W.A. Gibson, Howard T. Bonner, Ben Christiansen, Sal Taibi, Henry Struck, Chester Lanzo, Harold deBolt, Johnny Clemens, and Dick Korda, to name just a few.

Les helped organized the Lansing Balsa Buzzards and was also President of the club. In 1942,, he helped co-direct the 1942 Michigan State Model Meet, which was the biggest contest of the year anywhere in the United States.

In 1942 Les Hard enlisted in the U.S. Army Air Corps and was schooled as an Aircraft armorer at Buckley Field near Denver, Colorado. Following his basic training, he joined the 336th Bombardment Group (M), 481st Bombardment Squadron serving on air bases at Fort Myers, Florida; Avon Park, Florida; Tampa, Florida; and Lake Charles, Louisiana. During World War II he was an armorer on both B26's and A26's. Additionally, he worked on the base newspaper at Lake Charles, Louisiana both as staff artist and assistant editor and was subsequently discharged from the service at Wright-Patterson Air Force Base in February 1946.

Following his discharge, Les built and flew gas models during 1946 then dropped out of modeling until 1968 at which time he joined the Lansing Flying Aces. He was later elected vice president in 1969. Hard left this club in 1970 and joined the Capital Area Radio Drone Squadron, Inc. in January 1970 and hasn't missed a meeting since. In February 1970 he started the club newsletter and has been its editor, publisher, artist, and mailer ever since. The first issue was six pages with 35 copies reproduced on a Xerox machine. In fact, Les financed the first five months of the newsletter out of his own pocket. At the present time the Capital Area Radio Drones Squadron, Inc. is printing and mailing 170, eight to ten page newsletters a month. 43 of these go to other clubs and are exchanged, while 95 go to club members and the rest to model publications and manufacturers.

Les's first R/C aircraft was an 8' span original design sailplane. His first R/C power ship was a small high wing which he purchased in a framed-up stage and finished as a taildragger and which was powered by an OS .25. He also has an original design low winger which he calls the 'Brat' and which is powered by an OS .35. In addition, he is working on a scratch-built Aeromaster and has an Olympic sailplane that he has flown in competition and has modified substantially to meet his own demands. He owns four Kraft radios including a two channel, a three channel, a four channel and a five channel.

John Worth and Johnny Clemmens appointed Les Hard as newsletter editor for the

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SUNDAY FLIER

BY KEN WILLARD

Thirteen inch span SE-5 - - - peanut scale RC!

Well, you did it!

"Did what?" you ask.

You made the FCC back off from their proposal to first, share our 27MHz R/C frequencies with the CB'ers, then give them up entirely, and finally, up the age limit to eighteen years old instead of twelve.

By the time this appears in print, Lord only knows what will have happened, but one thing appears to be established. You can continue to operate your 27MHz equipment **legally**, even though you're under eighteen, and any interference you get from CB'ers will be illegal.

As you all undoubtedly know by the time you read this, the FCC, in recognition of the thousands they received from modelers, took an entirely different course of action from that which was originally planned. True, the model fraternity did not get new frequencies separate from the CB band, which would have been the ideal solution for the modelers. But, not losing the existing frequencies was, in itself, a major victory for such a relatively small group, when compared to the millions of CB enthusiasts.

The current program is only an "interim" solution, while the FCC evaluates other courses of action. That evaluation will take time - - - many months - - - possibly years, considering the crowded radio frequencies and the separate demands made for their use. It is doubtful if an entirely satisfactory solution, for all concerned, will ever be realized. Some compromises will have to be accepted. But you can be sure that the FCC will not again take lightly the desires of the modelers. You didn't give up, say "What's the use?" and accept defeat without a fight, and nobody likes to tangle with a scrappy fighter if there's a way to avoid it.

While I'm at it, I'd like to express a personal opinion. In the course of the campaign to get the FCC to back off, thousands of you wrote letters, like I did, to the FCC, to your congressmen, and your senators - - - and sent copies to the AMA. What was the most effective part? First, your letter to the FCC; second, the copy you sent to the AMA, which they compiled into one of the most comprehensive presentations to the FCC that has ever been made. Some of your letters were emotional - - - even rude. Humans are like that. But more of them were rational, analytical, and contained constructive suggestions, and by judicious use of the reasoning, the meetings between the FCC and the AMA avoided, at least for the most part, the heated and angry exchanges which would have occurred.

So the fight is over. Who won?

The FCC. Because they were intelligent enough to recognize that they were making a mistake, and took steps to rectify it.

The CB'ers. Because they got 17 additional frequencies.

The modelers. Because nothing was taken away from them, as had been proposed. And their needs will definitely be considered in the forthcoming studies for frequency allocation.

The AMA. Because the patient, dedicated, behind the scenes actions of the frequency committee, the legal staff, and all the headquarters personnel in compiling the presentation, and actively meeting with the FCC, paid off.

Who lost?

The defeatists who, when the FCC action was originally announced, said "Don't fight it; you're wasting your time. There's too many of them (the CB'er) and too few of us." Nuts!

A couple of interesting asides concerning all this. First, I am told that the FCC received many communications from CB enthusiasts, asking that the R/C frequencies be

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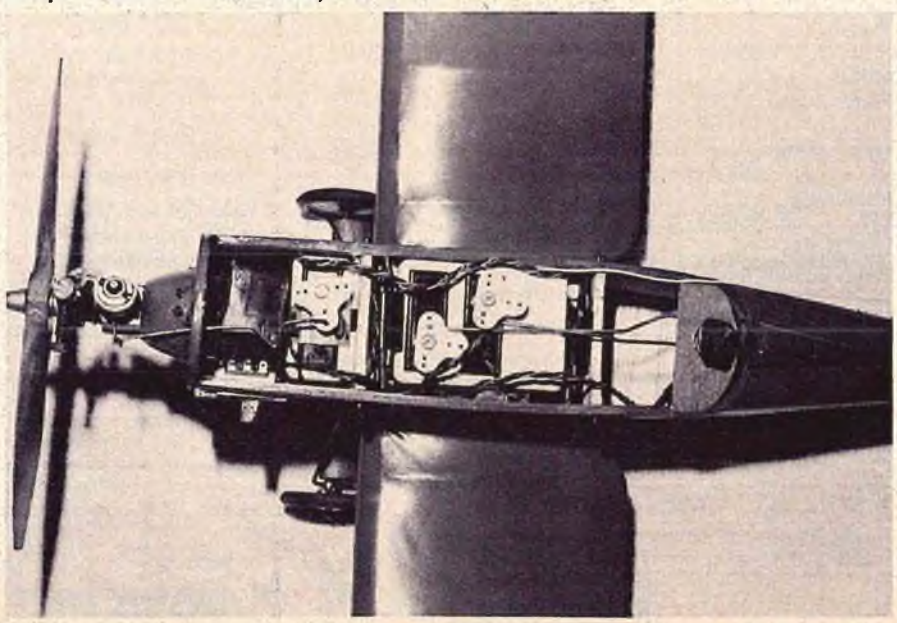
L. to R: Cox .010 with exhaust restrictor engine control. Display prop pictured, SE-5 flies with standard 3" diameter. 100 mah battery with case removed. Super-Mini engine control servo. Cannon Super-Mini Twin Block - - - receiver and two servos with pigtail connection for two more plus "Flip-Flop" units for coupled rudder and aileron, if desired.



engine clinic

By Clarence Lee

Dear Mr. Lee:

I have had considerable trouble getting a good break-in on a Veco .19 that I bought "almost brand-new" from a friend. Here's the story:

The engine had been run only once or twice, according to my friend. It had good compression and was perfectly clean inside and out except for a couple of seemingly insignificant rust spots on the lower part of the piston skirt visible through the exhaust port at TDC.

I bench-ran the engine according to the break-in procedure outlined in the Veco instruction sheet: Fox Superfuel; 9-4 prop; rich needle valve; alternating 3-minute running periods with cooling-off periods until an hour's total running time was accumulated. At the end of the process (which took an entire afternoon of my time) the engine seemed to have lost compression somewhat.

Nevertheless I installed it in my plane with a Veco muffler and flew it for a couple of months, during which time it continued to lose compression and became harder to start. Since it never developed the power I thought it should, I finally disassembled it only to find the piston and sleeve colored brown with rust. I concluded this was the result of treatment it had received before I bought it, since I use castor oil fuel for flying and 3-in-1 oil between sessions.

So I installed a new piston and sleeve plus a high-performance head, and went back to the bench. Again, I followed Veco's instructions for the first hour's running, and again the engine seemed to lose compression afterward. Once more I installed the engine in my plane (a 3½-lb. RCM Basic).

The first flights were carried out on a rather hot day, and the engine sagged and quit in the air several times despite a rich needle valve setting. Since then I've run more than a gallon and a half of 10% fuel through it, but compression is still lousy, and the engine won't turn more than 11,200 rpm on the ground with the muffler and 9-4 prop. According to Veco, it's supposed to develop .45 bhp at 12,500 rpm, and a 9-5 prop is what Veco recommends.

I've successfully broken in a bunch of engines, but have never been stumped like this before. The engine runs smoothly at all speeds, and the bearings seem OK. It just doesn't have any power. Am I expecting too much from the engine? Or am I doing something wrong?

I've just ordered another new piston/sleeve assembly. Before it gets here can you recommend a procedure that will result in success? Should I use the sport head for break-in and substitute the squish-band head later? Should I use a smaller prop? Any advice would be helpful.

Sincerely,
Dave Ritchie
Harleysville, Pa

Dave, sometimes these "almost brand new" engines are not always as new as the seller would have you believe. A few months back, when I did the report on the then new Perry Directional Porting (PDP) modification, I also said that I would incorporate the mod in K & B .61's. The engines must be new - - - no worn out or crashed junkers. You should have seen some of the supposedly new or "only-run-a-couple-of-times" engines that I got in. Some fellows conception of what is new leaves a bit to be desired. I guess this is much like purchasing an automobile. Two years and 25,000 miles later it is still referred to as "the new car". At any rate I would guess that the engine may have been used a little more than your friend let on or was sold because he, too, was having problems. Maybe the engine was near new and in excellent condition when you purchased it, which means the trouble started after you received the engine. The fact that the engine began losing compression during your bench running would indicate something wrong at this time. Your fuel and prop combination were fine. Many times fellows say they run the engine rich but seem to forget about the few times the engine started up and died lean before finding the rich setting. Or the times the engine sagged off lean towards the end of the tank without cutting clean.

In your case this may not have happened. Where did you do the bench running? Many times guys will take a box with their test stand mounted to it to the flying field and break the engine in off in the dirt somewhere with the engine only a foot or so off of the ground. It only takes a short period of running under these conditions to permanently damage the engine. It is also possible that there could have been a defect in the engine such as a burr on the sleeve that, in turn, would wear a groove in the piston, accounting for the loss of compression. Unlike ringed engines that can have compression improve with running due to the ring seating, lapped pistons seldom will improve compression with additional running. Initially a few high spots may wear off and varnish fill in the lows resulting in better compression but, if after an hour, the compression is low, additional running is not going to improve matters.

When you disassembled the engine and found the piston and sleeve covered with brown rust this would be considered perfectly normal after a few months running time, and doubt if it had anything to do with your problem. Castor oil based fuels are noted for their varnish formation.

The fact that the same problem occured again after installing the new piston and sleeve indicates that you are doing something wrong during your bench running as mentioned previously. This time check your new piston/sleeve for a smooth fit. Be sure there are no rough spots or burrs on the edges of the ports. Install in your engine and do your bench running under clean conditions if you have not been doing so before. Be sure that when the engine fires up for the first time that it does so slobbering rich. **Don't** let it start up and die lean finding the initial setting. Many engines are permanently damaged when new by allowing this to happen — and it happens to the old pros as well as the beginners.

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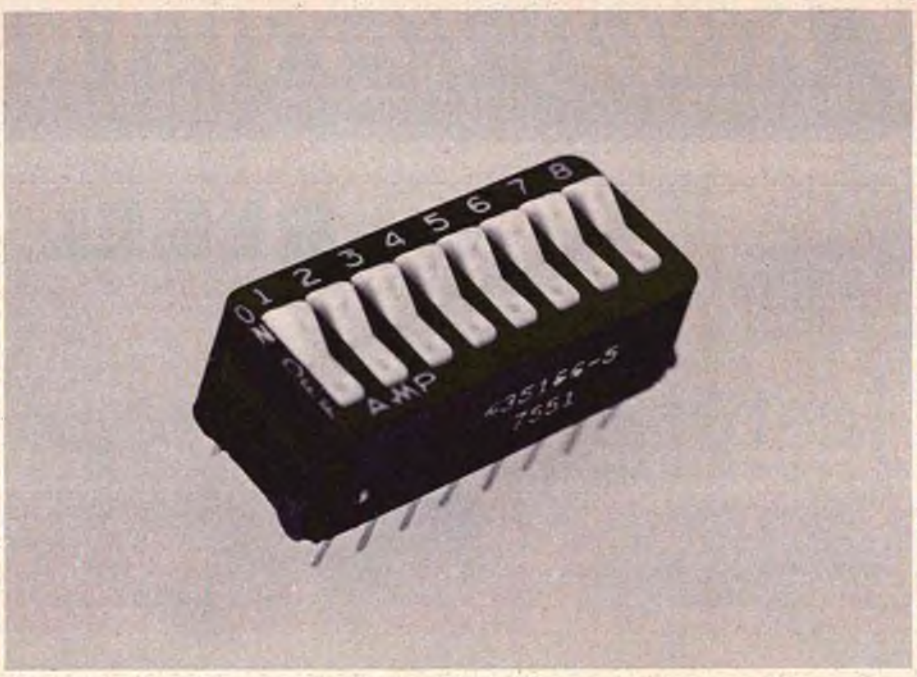
RADIO SPECTRUM

BY JIM ODDINO



● This month's column is coming to you from the beautiful Imperial House North, just North of downtown Dayton, Ohio. Wright Patterson Air Force Base here in Dayton has been the site for the Annual National Championships which reached an unprecedented size in R/C, thanks to a new format which gave the Novice and Advanced pilots the same flying time as the Expert and the Masters. I don't know the actual number of contestants that flew, but we heard when we arrived that they expected 350 in Pattern alone.

The big worry when we arrived, concerned the reported interference on six meters. Sure enough, the first thing anyone said to us at the practice field was that six meters was getting hit. We ran a few checks and flew quite successfully, although a few others were not so lucky.

On Sunday and Monday morning there was a mad scramble to switch frequencies and I'm sure the plug-in modules saved the day for many. As a result, I believe there were only about twelve of us flying on 53MHz in the Pattern event. This is really a big change from past years. I can remember when a lot of people changed to 53MHz just to be able to fly head to head in the same flight line with the big boys. Well, that wouldn't have worked this year. As 72.96 seemed to be the place to be.

There were a few radio problems in the actual contest, but I don't think any were due to interference. So whether all the frequency shifting was really necessary is anybody's guess.

Another real surprise was the distribution of systems used. At Site 2, where I flew, there were: 36 Pro-Line, 25 Kraft, 3 S & O, 2 W.E. Expert, 2 EK, 2 Royal, 1 Orbit, 1 Heath, 1 R & S, 1 Multiplex, and 1 W.E. MK II.

Notice that there were no Japanese systems. I didn't count the systems at the other sites, but it was obvious that Pro-Line and Kraft were by far the most popular. The open vs. closed stick controversy has been put to bed as virtually all of the competitors are now using open sticks. Of course, there were jillions of pushbuttons and switches sticking out of most transmitters, but the most interesting was a pushbutton on top of Roy Speights' rudder stick. I've thought of this before, but never got around to implementing it. Roy built it himself and simply ran the wires around the inner gimble on his Kraft Signature transmitter. He uses it on throttle during loops and stall turns, etc. He can also easily kill the engine during landing approach without letting go of the rudder. For a mode two flyer who wants to use the rudder for slow rolls, a pushbutton on top of the right hand stick for ailerons might be ideal. I'm sure this one ought to stir everyone's imagination and I wouldn't be surprised if you didn't see a commercial mod kit available.

Another interesting piece of electrical equipment seen at the Nats was a new trick for energizing your glow plug. This is going to make a lot of manufacturers of glow drivers and converters unhappy because it is so simple. Chuck Salkowski of Hartford, Wisconsin, put two diodes in series with his starter motor. The diodes were chosen such that they would have a .8 volt drop across each, when the starter motor is running. There is probably a few tenths of a volt drop in the wire to his glow plug clip, so he ends up with something close to 1.4 volts at the glow plug. This is usually enough to boil off any excess fuel which might flood the plug. The circuit would look like Figure 1.

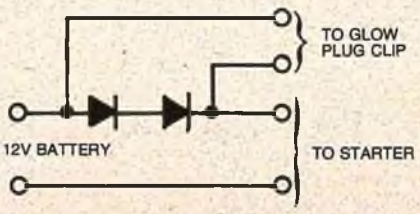


FIGURE 1

There are a couple of things to look out for. The diodes must be able to take the peak starting current, as well as the steady state motor current. The motor must also develop enough torque on ten volts because that is probably all you will end up with if you use a 12V battery. The beauty of this scheme is the fact that you don't end up burning out plugs due to leaving the glow plug energized too long. As soon as the engine starts, and you let off the starter switch, you turn off the current to the plug.

Discussions with Pattern flyers at the Nats indicated there still is a big concern over servo feedback pots. A number of competitors felt this to be the number one problem that keeps them out of the winner's circle. Some people end up cleaning the pots every fifteen to thirty flights. As it takes more flights than this to get a plane set up right, they never quite get there. I've been recommending servo mechanics with linear output racks such that the pushrods are not connected to the gear that drives the feedback pot wiper. Ron Chidgey switched about a year ago and I asked him if that took care of the problem. He felt that he could get about 200 flights without maintenance now. Dave Brown also felt that the problem was mechanical and said he had some new ideas for a servo. A modeler in Southern California has come up with a replacement for the pot and has modified a number of Pro-Line servos. His scheme uses a light emitting diode and photo transistor with a disc that controls the amount of light between the two devices as a function of servo position. For those of you who insist on a rotary output, this might be the solution.

The other big complaint heard from modelers is the high cost of repairs. My observation indicates that the honeymoon is over and most manufacturers are trying to make the repair department pay for itself. The Japanese systems are cutting prices and profits for the American manufacturers and

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they cannot subsidize the repair departments. More than one manufacturer has pointed out that he could make more money by putting his investment in the bank.

The word we got at the Nats on the 27MHz/CB problem indicates that there is no change to the R/C frequencies with the CB'ers getting new frequencies on the high end of the 27MHz band. It's too bad because with a little luck we could have got some new **usable** frequencies. There was more talk about how nice it would be to get narrow band FM approved in the U.S., as it is in Germany. Apparently it works very well. A few month's ago I talked to Carl Shwab who helped design the Don Brown System years ago. He said they had run tests on the German System in a helicopter and it looked great. Apparently, reflections from the rotor blades can be seen in the automatic gain control (AGC) in our present systems, but this effect can not be sensed in the FM systems. This means the problems of reflections on fixed wing aircraft at low altitude would probably also be minimized. Carl also had some other good ideas on modulation techniques to put more power in the sidebands, and on receivers with IF frequencies other than 455KHz. Sure wish I had time to play with all these good ideas.

I'd like to thank all those who came up to me at the Nats and thanked me for writing this column, particularly those who mentioned how young I looked compared to those pictures in RCM.

• •

While preparing for the Nats, I ran into a problem that I discussed once before. If for some reason you use only one transmitter and you have two airplanes with drastically different pitch and roll responses, you have a difficult problem setting up your high and low rates to be what you want on both airplanes. I overcame this by building a little board with an eight section dual inline switch (see photo) and a mess of trimpots. Ever since they came out with those little dual inline switches, I've been trying to think of an application in R/C. Here it is. The circuit shown in Figure 2 can give you four rates on elevator and four rates on aileron using just six of the switches.

With all switches open, you would have the highest rate available on both channels. You would use this condition for high rate on the plane with the slowest response. You would then close switches (1) and (4) and adjust the pots in series with those switches to give you low rate on that airplane when you switch the rate switches, which are mounted on the outside of the transmitter, to low rate. I mounted the board with the dual inline switch and pots inside the transmitter, so I must remove the back and open switches (1) and (4) and close switches (2), (3), (5), and (6) when switching airplanes. After programming the switches properly, adjust the pots in series with switches (3) and (6) for high rate and those in series with (2) and (5) for low rate. The 5K trimpots are adjusted so neutral doesn't change when the rate switch is thrown. Notice that the high rate achieved with switches (3) and (6) closed is less than what you get with all switches open, so the second airplane must be the more responsive of the two.

The circuit shown is for the standard half-shot type encoder, but similar techniques could be used on Kraft Signature Series transmitters. Sure is a lot cheaper than buying a second transmitter for the second plane. I put the switches and pots on a board about 1.25" x 1.25" which was no problem to mount in the transmitter.

• •

Let's take a look at a letter that is typical of many I receive involving suspected interference causing crashes.

Dear Jim,

I enjoy your articles in RCM, even though I don't know too much about electronics, but understand some things.

Lately, I had three planes spiral in (some repairable), and several failures with a boat. It's hard to say whether I had transmitter, receiver, or battery troubles, or whether my frequency (72-080/160) is being jammed from an outside source. After the crashes, the radio units checked out okay.

The purpose of this inquiry, is to ask you if you have any schematics and parts needed to build a monitoring system. This would help us eliminate one possibility.

Thank you,
Austin Velten
Ft. Thomas, Kentucky

The most likely cause of interference on our R/C frequencies is other R/C transmitters on the same frequency. There are very few other people using these frequencies, so it is other modelers you must worry about. If your field or lake is a long way from any other R/C activity, you are probably not going to have any problems unless someone at your field turns on. If you are in the air when this happens, you are in trouble and a monitor isn't going to help, in fact, your airplane with its radio is a monitor and it will let you know if there is interference. Normally, interference doesn't give you a solid hard over command, but more likely a bunch of random commands that allow some control. The best thing you can do is to call out your frequency as loud as you can and hope the offending party will turn off before you hit the earth.

The place the monitor would be useful is for the party of the second part, the turn-on-er. If **he** had a monitor he would know you were flying on his frequency and he would wait for you to come down.

The guys at the Nats had a monitor built by World Engines, that scans the R/C frequencies and illuminates a light corresponding to the frequency that is being received. If all frequencies were being used, then all lights would be illuminated. This is an ideal device for a contest or any flying session for that matter where everyone is flying from the same site. Unfortunately, it wasn't sensitive enough to pick up transmitters from sites about one-quarter mile away. You can turn your receiver on before you turn on your transmitter and watch the control surfaces. If you see movement, you can bet someone is on. However, if the offending transmitter is pretty far away, you may not have a problem until you get in the air. If this is the case, a monitor wouldn't help. So the monitor isn't the complete answer, but I agree it is better than nothing and could prevent a number of crashes caused by negligence. I'm pretty sure World Engines plans to market their scanner, which would probably be a good investment for every

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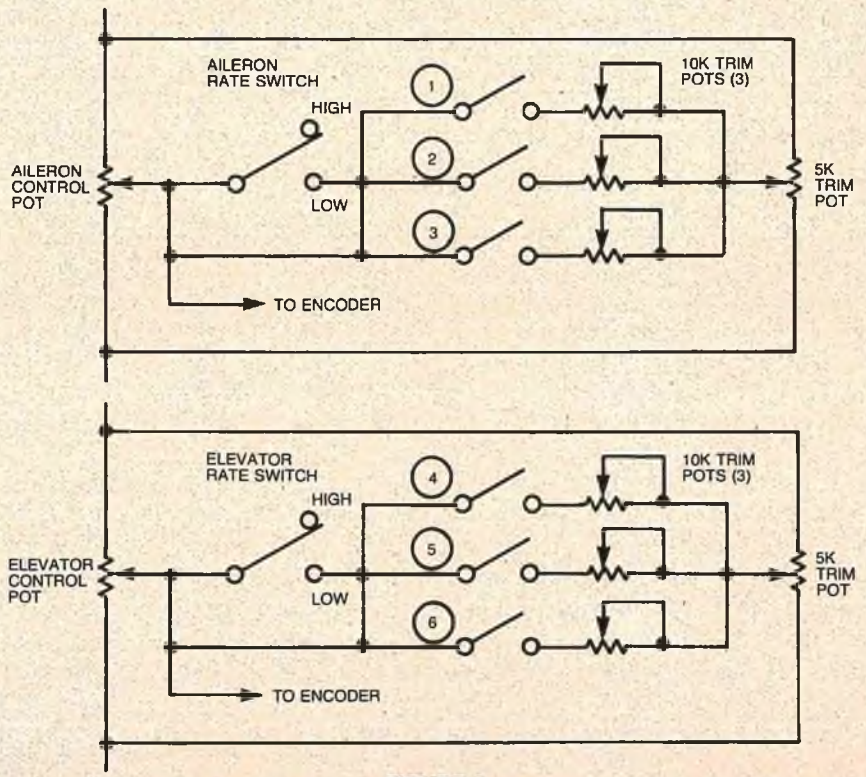

FIGURE 2

Quarter Midget

BY
DON DOMBROWSKI
AND FRED REESE

NMPRA
NATIONAL MINIATURE PYLON RACING ASSOCIATION

QUICKIE 200

RACING AT RANCHO

Howie Keefe, owner-pilot of Unlimited racer P-51, "Miss America", ready for take-off with RC trainer.

The racing glow plug, as described in this month's text, is still okay after six rounds of racing.

Howie Keefe, owner and pilot of the Cox sponsored P-51 "Miss America" Unlimited racer, had his second R/C flying session and, although he is doing very well, disorientation is still a problem. I expect this to happen with any beginning R/C pilot no matter how much full scale experience he has, but Howie is amazed that there is no established training program that could solve these problems before putting him in the air. I explained that I attempted to prepare him somewhat by having him taxi around for about 15 minutes to get used to the controls on the transmitter, as well as the use of the throttle. That short time is just not enough to get over directional disorientation while flying R/C, as this can take from one to ten hours of flight time, depending on the individual. His approach to learning from his experience as a flight instructor is making me more aware of the problems of a new pilot, even though I have taught many newcomers to fly R/C.

Howie did pass a major hurdle, as I told him I am no longer nervous during his take-offs with my airplane. Later, however, on a landing approach, just after a 180 degree turn onto final, he corrected in the wrong direction and the trainer went in. Only minor damage was sustained, but Howie wanted a picture of himself with the broken airplane as he has a similar photo with his foot on the spinner of his P-51 after a forced landing.

We are very much aware of these learning curves as we become involved with Formula I racing. The first thing we learned was that it is not as difficult as it first appeared, once the initial reaction to the increased speed had passed. With our experience from Quarter Midget and 1/2A racing, neither of us had a problem flying and racing the faster machines. In fact, Don placed Fourth in Standard in his second race. I bought a three year old Miss Dallas with a stock side port Schenurle and turned a 1:37 in my first heat with stock fuel and prop. We are certainly encouraged. I am also building a new Quarter Midget design which I hope will break up the dominance by those Root Cobras here in the West.

Howie Keefe insisted on this photo after crashing on a landing approach since he has a similar photo with his foot on the spinner of 'Miss America' after a forced landing!

We learned a new trick at the Formula I race which I tested at the following QM race. Both of our QM and FI engines ruin a glow plug with every run which, in turn, gets expensive. Don mentioned this to Dick Jensen while looking at some new props. Dick said that this was not necessary and that we should get several runs from a plug if it was distorted first before it was used. Vibration of the glow coil is the damaging factor, so by pushing the coil to one side with a straight pin, the oscillations are dampened against the inside wall of the plug and further damage is prevented. The plug is then checked with a battery before use and then again between heats. It is hard to say how many runs can be obtained this way, and I don't believe in pushing my luck, but I used only one KB long reach plug for six rounds of a QM race in my G-15 Super Tigre, including idle rounds.

◇ ◇

George Zink sent us the RCM Quarter Midget Survey results, including a secon-

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RC DESIGN MADE EASY

BY CHUCK CUNNINGHAM

PART III: BASIC SAILPLANE DESIGN PARAMETERS

● This month we are going to delve into the mysteries of that very popular part of our sport, R/C soaring aircraft. As in all of the past series, we are not going into deep discussion of aeronautics, aerodynamics, theory of flight or "you've got to do **exactly** as I say," but we are going to investigate the design theory that will make your attempt at designing a sailplane, one that will meet with success. Again, we are going to be working with averages and not exacts. We are going to find a "middle of the road" course that will insure success for you. Are you ready? Well then, let's get with it.

Currently there are two competition classes of sailplanes for normal thermal soaring, the Standard Class - - - those with a wing span less than 100" — and the Open Class for aircraft with a wing span greater than 100". A movement is now afoot to combine these two classes as most of the aircraft in the Standard Class can hold there own with an Open Class aircraft, and the real determination of who wins a contest is not how much wing span an aircraft possesses, but rather how good the pilot is. A much more realistic class breakdown would be Expert, Standard and Novice, based upon the demonstrated ability of the pilot, the same as it is in all other forms of R/C competition. With this in mind, we are going to examine a soaring aircraft in the Standard, or 100" class. You can use the same rules of thumb to make your aircraft larger or smaller - - - it's your choice.

First, let's examine the wing of our aircraft. All of my design philosophy is based upon working from wing areas and there is no reason to change this thinking when discussing an aircraft that is designed to fly silently. Since the breaking point is 100", we must stay below this span, so let us begin with a wing that has a span of 99". Next, let's think about the wing loading that we wish to achieve in our glider. Generally speaking, a wing loading, or weight to wing area ratio for a soaring aircraft should be in the range of 7 to 10 ounces per square foot. The lighter aircraft will do somewhat better on a day with no wind and moderate thermal activity, and the heavier aircraft will do better on the normal contest day, or fun flying day, which is seemingly, always windy. You need to construct your soarer from wood of sufficient strength so that it will not damage easily, and yet light enough so that you don't end up too heavy. Remember, you can always add weight with ballast, but you cannot subtract weight that you have built into the structure needlessly. While off on this tangent, build the fuselage from good strong materials, sturdy balsa reinforced with spruce, or use plywood sides, or any method that will give you a strong fuselage structure. You will need it.

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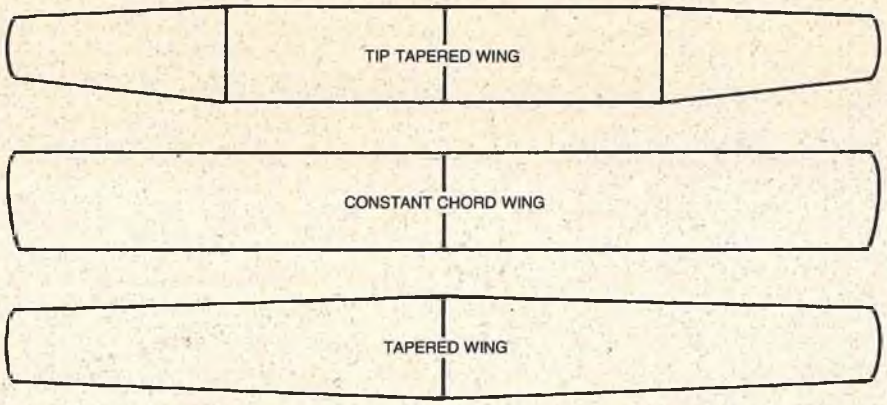
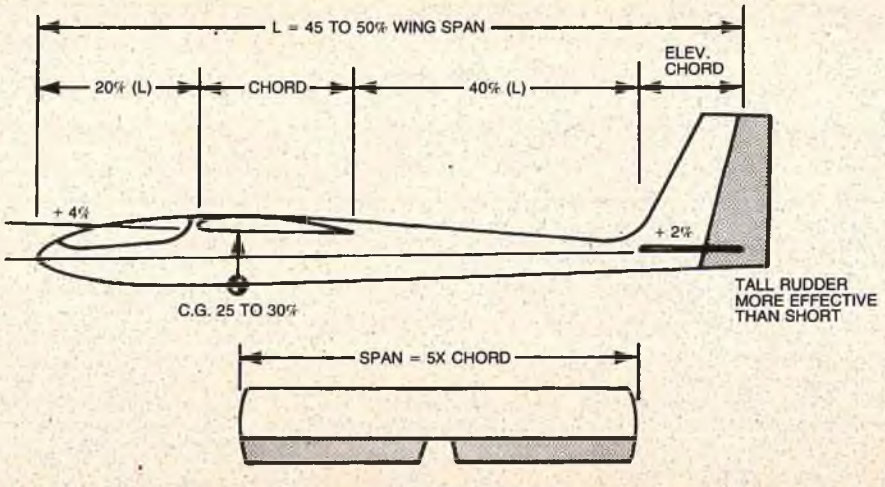
CHART #1

Weight		Wing Load. (oz./sq. ft.)		
#	Ounces	8	10	12
2	32	576	460	384
2.5	40	720	576	479
3	48	864	691	576
3.5	56	1008	806	672
4	64	1152	921	767

CHART #2

Wing Area A/R 10:1			Horiz. Stab (15%) A/R 5:1			Vert. Stab (7.5%)
Area	Chord	Span	Area	Chord	Span	Area
384	6.2	62	57	3.4	17	29
479	6.9	69	72	3.8	19	36
576	7.6	76	86	4.2	21	43
624	7.9	79	94	4.3	21.2	47
690	8.3	83	103	4.6	22.7	51
806	9.0	90	121	4.9	24.6	60
980	9.9	99	147	5.5	27.5	73

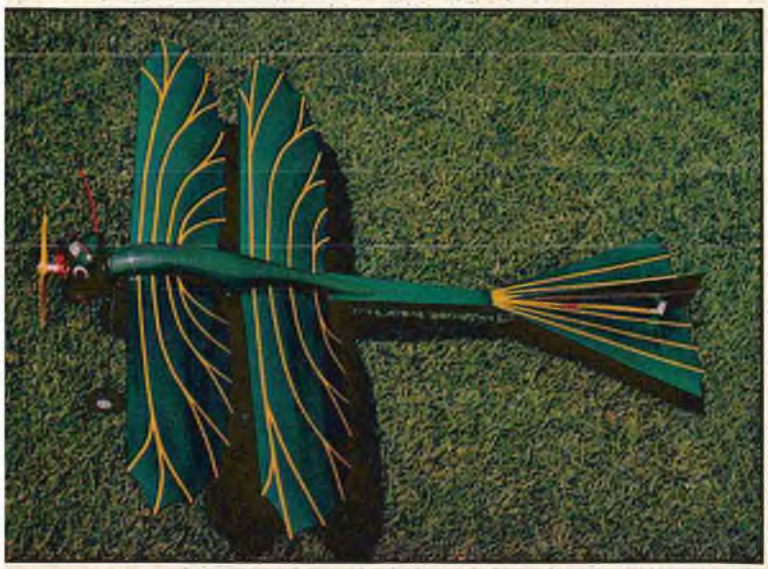


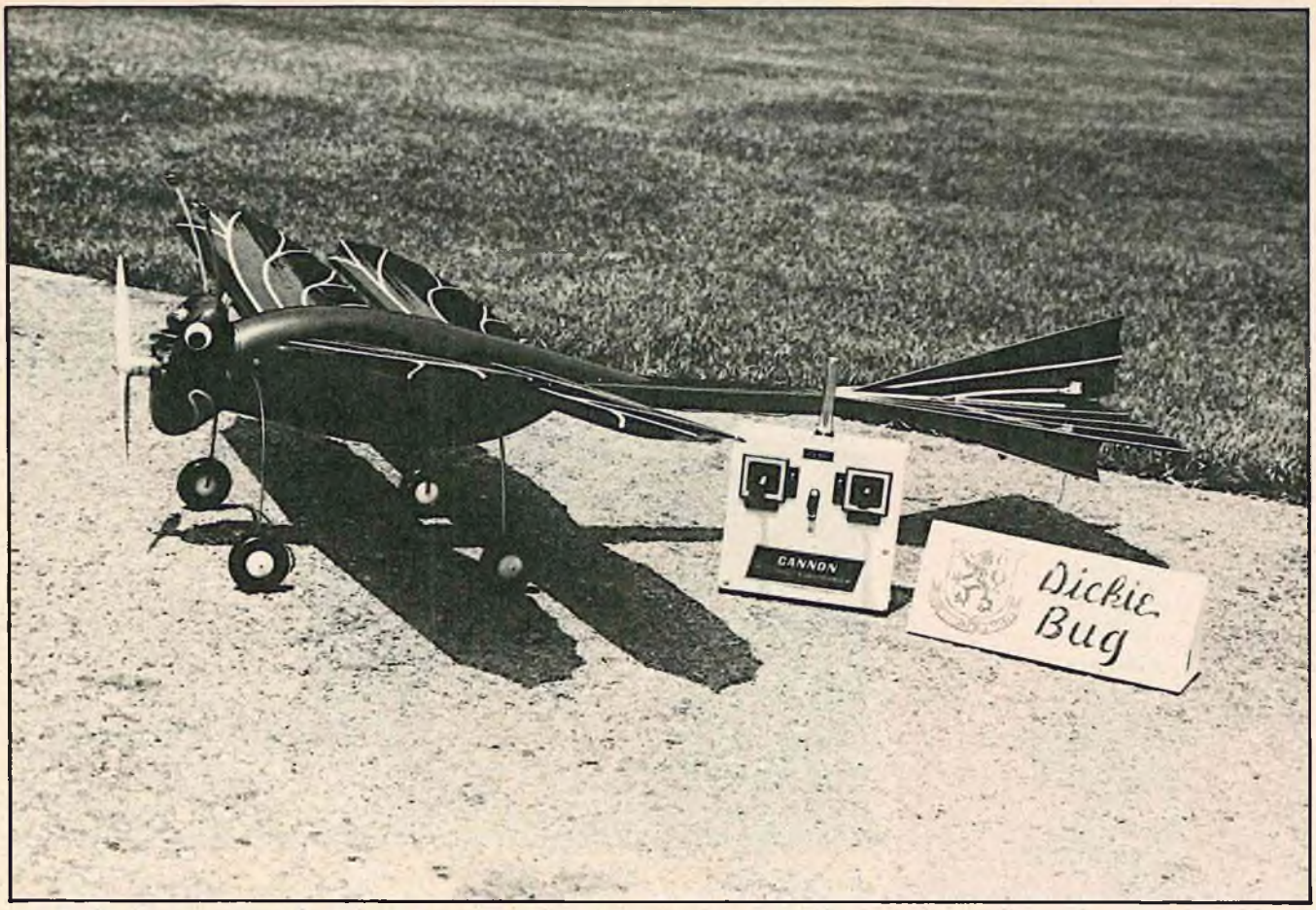


BASIC GLIDER DESIGN

Kimi Purcell, California State "1976 Miss Photogentic", sponsored by R/C Modeler Magazine in the National Cinderella Girl Pageant, poses with Dick Tichenor's "Dickie Bug". Eleven year old Kimi gives a good indication of the size of this most unique R/C aircraft.

BY DICK TICHENOR





The Dickie Bug, powered by a muffled Cox Medallion .09 and guided by a Cannon four channel using two channels of a Mini-Block for rudder and elevator.

Dickie Bug

IF YOU'RE REALLY LOOKING FOR A DIFFERENT APPROACH TO AN RC AIRCRAFT, THIS IS FOR YOU.

● Here is a refreshing change of pace from the run-of-the-mill R/C models. Would you believe the design was sparked by inadvertently placing two Dirty Birdy canopies together so that they resembled the body of an insect? A bit of imagination did the rest.

The Dickie Bug's first flight was made with more than usual conjecture as to how this configuration would perform in flight. Luck was with us as it was very stable, while being extremely maneuverable. The tandem wing arrangement works as a slotted wing at high angles of attack which appreciably delays any stalling tendencies. It certainly has been fun to fly, fascinates spectators, and inspires comments that make a most enjoyable flying session.

Thanks to cyanoacrylate adhesives and 5-minute epoxies, the bug was a snap to build. Except for sawing out the 1/4" plywood bulkhead, the entire aircraft was built on my office desk. Keeping Don Dewey from finding out what I was doing was something of a challenge because he thinks I am supposed to be working all the time.

Start construction by sawing out the 1/4" plywood engine mount bulkhead and drill for the Tatone tank mount. Cut a 3/32" diameter x 36" length of music wire in half and form the landing gear struts. The front strut will be held in place by the nuts on the engine mount screws. Cut slots in each of the 1/8" x 1/2" spruce longerons to accept the front landing gear. Epoxy the longerons to the bulkhead being careful to include the down and right thrust line offset. Next, epoxy the 1/8" plywood servo mounts to the spruce longerons. When that has set-up, pull the aft ends together and epoxy. Then glue the upper and lower sheeting to the tail boom. Add the 1/8" x 1/2" x 6⅜" spruce wing mount with the upper edges slanting inward about 1/16" per side. Now you can trim a canopy and epoxy in place to make the bottom of the fuselage. I used the Dirty Birdy canopy because we have them at RCM to supplement the Dirty Birdy construction article. You can use some other size or shape canopy if it suits your fancy, as the Dickie Bug is for fun anyway.

The tail surfaces are made of soft 1/8" sheet balsa. I have a habit of cutting out tabs and slots on parts for alignment purposes, it works well for me and is shown on the plans. I like to use the covering film for hinges on small models. My method is also shown on the plans. I have found that it is much easier to cover the tail surfaces before assembling them.

Now for the wings. Glue together soft 1/16" sheet balsa to make 4 panels 5" x 16". Trim the 4 panels to the outline shape shown on the plans. Mark the spar location on each of the panels. Be sure to make 2 left and 2 right hand panels! Cement

Warning: Spectator Reaction To Your Dickie Bug Can Be Injurious To Your Sense Of Humor

DICKIE BUG
Designed By: Dick Tichenor

TYPE AIRCRAFT
Wierd Sport
WINGSPAN
32 Inches
WING CHORD
5 Inches
TOTAL WING AREA
300 Sq. In. (approx.)
WING LOCATION
Shoulder (tandem)
AIRFOIL
Similar to Clark Y
WING PLANFORM
Dragon Fly
DIHEDRAL, Each Tip
Front 1½" — Rear 1"
O.A. FUSELAGE LENGTH
34¾ Inches
RADIO COMPARTMENT AREA
(L) 8½" X (W) 2" X (H) 2"
STABILIZER SPAN
11½ Inches
STABILIZER CHORD (incl. elev.)
11" Wide Point
STABILIZER AREA
66 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
6" High Point
VERTICAL FIN WIDTH (incl. rudder)
10½" Wide Point
REC. ENGINE SIZE
.09-.10
FUEL TANK SIZE
1 Oz. Tank Mount
LANDING GEAR
4 Wheels
REC. NO. OF CHANNELS
2 — (3) With Throttle
CONTROL FUNCTIONS
Rudder, Elevator, (Throttle)
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply, Spruce
Wing ..... Balsa and Spruce
Empennage ..... Balsa
Weight Ready-To-Fly ..... 26 Ounces
Wing Loading ..... 12½ Oz./Sq. Ft.

the spars in place - - - I used Zap. Make all of the ribs the same size to be trimmed at the trailing edge later. Zap the ribs to the spars only at first. Now bend the sheet against the ribs and hold in place while the Zap goes off. Stick the 3/16" square leading edges in their proper positions. Cut off the trailing edges of the overhanging ribs and trim the bottom edges of the ribs as shown on the plans. Trim and sand the leading edges to shape. Bevel the root end of each panel for the dihedral angle. Epoxy the panels together using clothespins to clamp the 1/16" ply spar splice in position. You will notice that the front wing has 1/2" more dihedral under each tip than the rear wing. The 1/8" center ribs are installed to complete the wing construction.

Install the wing mount hooks and rear landing gear so that the wings can be strapped in place with rubber bands. Trimming the top canopy is the next chore. About the only advice that I can give here is to allow a little surplus, trim and try it. I made several attempts before getting it to fit. Try to keep the tabs for the hold-down screws as near the size shown on the drawing as possible. They are most helpful for alignment each time you assemble the bug.

The head is a decorative personality item and serves no functional purpose. It is carved from a soft balsa block and hollowed out to clear the engine. The antennae are lengths of Gold'N-Rod inner pushrod with wooden beads stuck on top. The eyes are 3/4" diameter plastic eyes from a craft store. Those floating pupils really dance when the engine is running. The mouth is trim film stuck in place after painting.

There is a 3/8" thick balsa spacer between the head and the front bulkhead that fits around the Tatone tank mount. The head is epoxied to the lower half of the spacer. The head and forward fuselage (canopies) were painted with Aero Gloss Stinson Green. A yellow belly effect was sprayed on the bottom. The tail boom, tail surfaces and wings were covered with metallic green Solarfilm. D.J.'s trim tape was used for the striping.

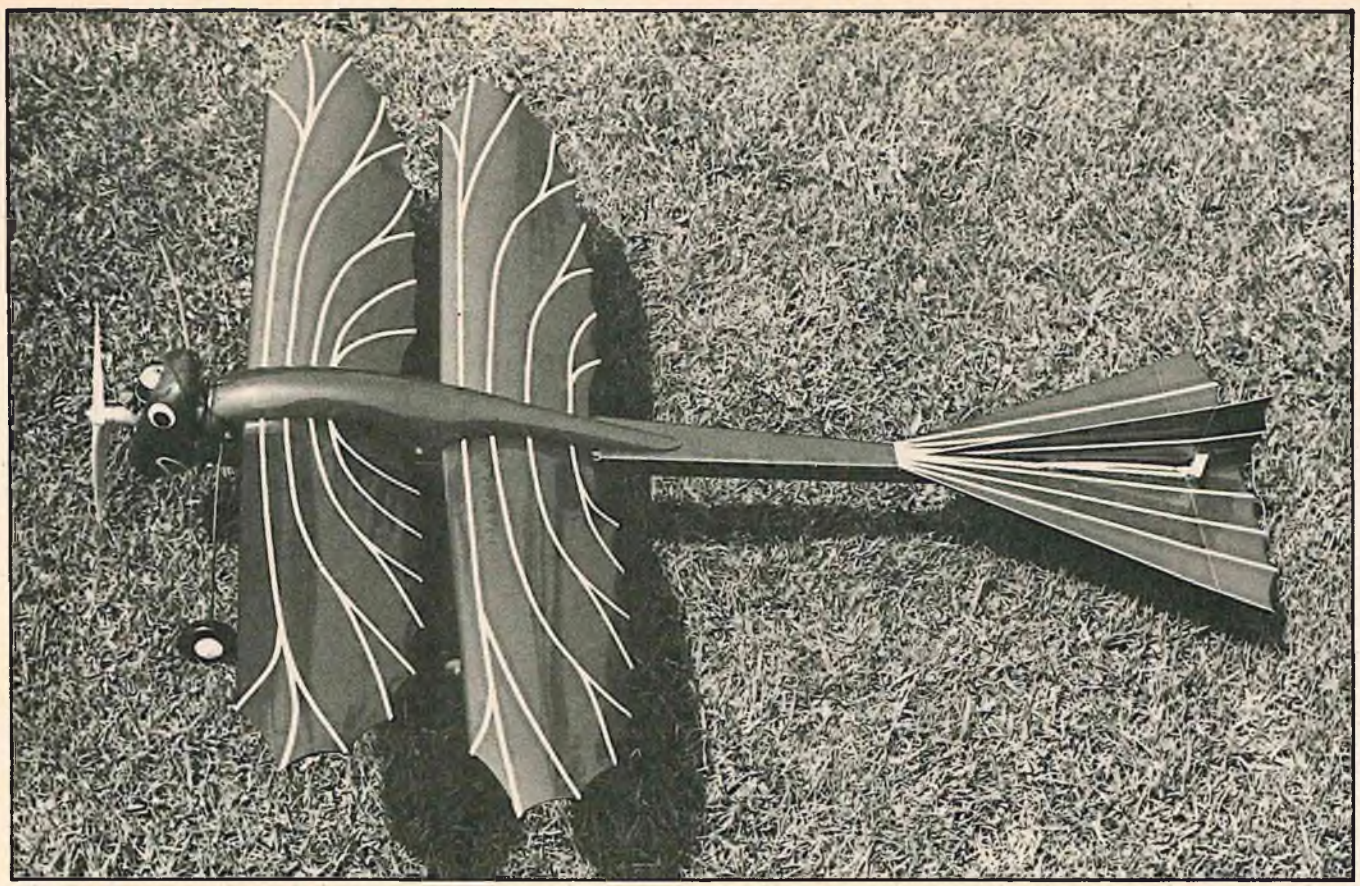
The tail surfaces were epoxied in place after the painting and covering. Holes were then drilled and the flexible Gold'N-Rod pushrods were secured.

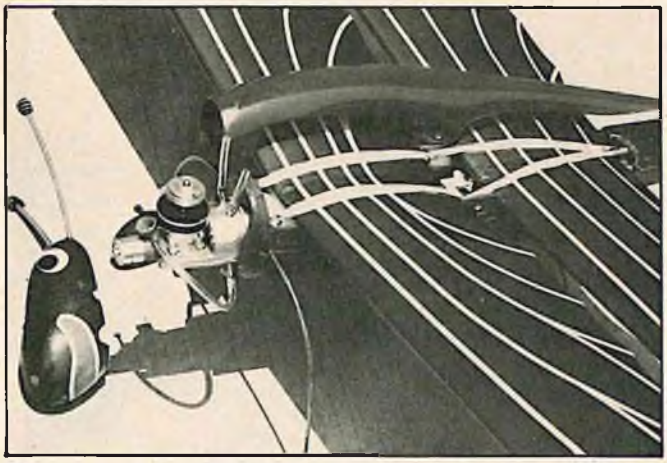
Our Dickie Bug had a Cannon Mini-Block radio installed. If you use separate receiver and servos, you might have to move the servo mounts and rear landing gear back a bit in order to have room for the receiver and battery pack.

We used a Cox Medallion .09 engine with the Cox muffler so we could fly at a nearby field without distrubing the residents. If you do not have a noise problem, a good .051 should have ample power for the bug.

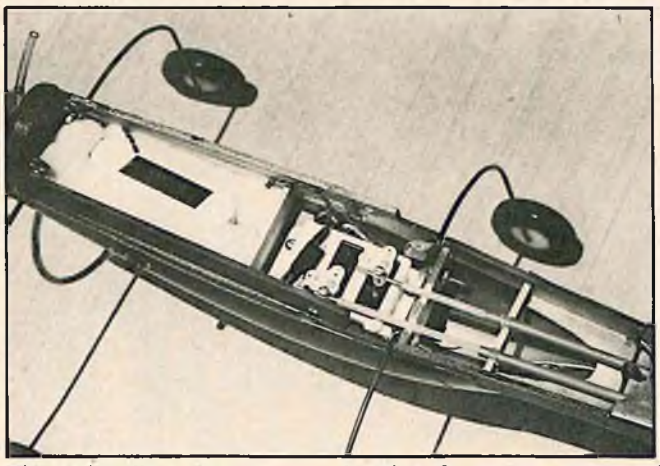
I have described how the original model was built and it has flown extremely well. If you have different building techniques that you prefer, why not try them? If you think of a different shaped head or body or wing or tail, go ahead and do it, the whole thought is to enjoy it. My Dickie Bug has been worth the effort just to see peoples reaction when they see it and believe me, they react. Be prepared to hear expressions like "Quick Henry, the Flit", "Where's the fly swatter?", etc, etc.

●

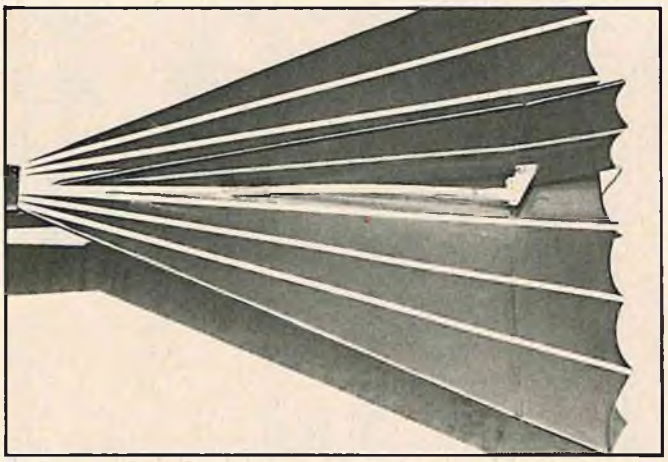




Carved head (cowl?) removed to show Cox .09 and Tatone tank mount. Top canopy removed.



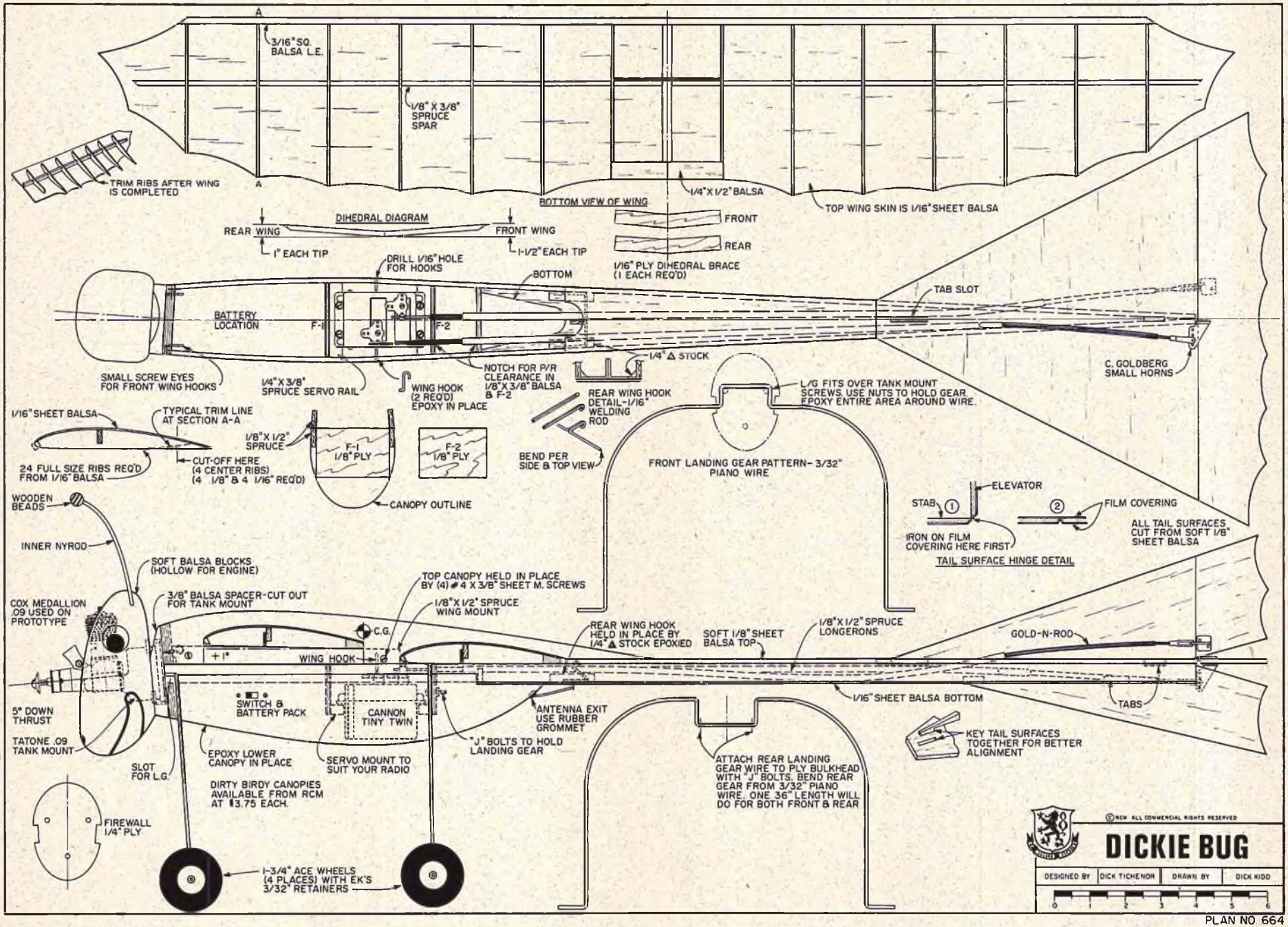
View of radio compartment showing Cannon system and Gold'N-Rod pushrods.



Pushrod linkage to rudder control horn. Ample surface area for scale-like (?) maneuvers.

Take that, and that, and - - - Dick Kidd assists as RCM's Editor pulverizes the Bug.

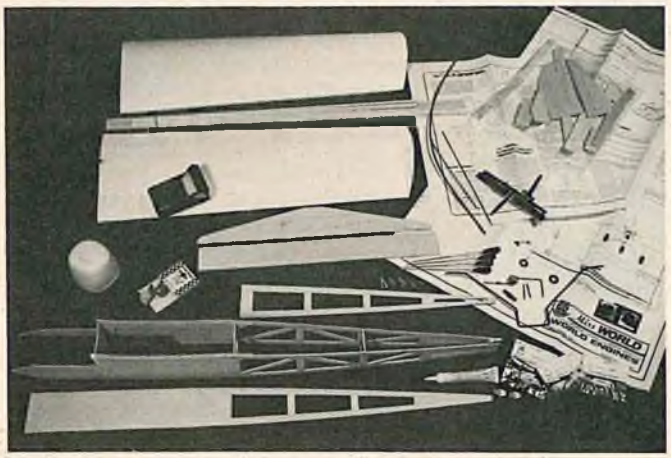
FULL SIZE PLANS AVAILABLE — SEE PAGE 189



PLAN NO. 664

RCM PRODUCT TEST

WORLD ENGINES, INC. MISS WORLD



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

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

● Imported by World Engines, Inc., 8960 Rossash Avenue, Cincinnati, Ohio 45236, Miss World is a general sport aircraft designed for .15 to .30 cubic inch displacement engines. It has a 48" wingspan with a wing chord of 8.5" for a total wing area of 400 square inches. The airfoil is a modified Clark-Y and this tricycle geared ship is designed to use three channels operating rudder, elevator, and throttle. There are several unique features in this kit including the use of light plywood on the fuselage and an optional foam or built-up wing with balsa tail surfaces. The light plywood fuselage sides are already glued to a factory assembled nylon crutch which is the heart of the aircraft. The engine mount, servo tray, transfer post, and landing gear mount are all molded into this crutch. The fuselage top and bottom are pre-cut to shape. The hardware included in the kit includes foam wing halves, formed plastic cowl, a nylon cabin which is also the fuel tank, pushrod ends, pushrod guides, pinned hinges, tank fittings, nylon horns, nosegear, formed wire gear, nose wheel control wire, tiller arm, throttle cable, World Engine glue, decals, pushrod clevises, and all screws. There is one plan sheet measuring 41½" x 33" with building instructions included on the plans. In addition, there is an instruction sheet which has a check list for step-by-step instuctions. Exploded views of the fuselage and servo installation on the plans are excellent and every part is shown full size. Our prototype, ready-to-fly, weighed 54 ounces for a wing loading of 19.4 ounces per square foot. The fuselage and vertical fin were covered with transparent orange Flite Kote while the stab and fuselage front were covered with white Kwik-Cote. The cowl was painted with white K & B Super Poxy. An O.S. Max .30 engine with expansion type muffler was used and was fed by a 4 ounce tank supplied in the kit. The vacuum formed plastic cowl provided in our

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SPECIFICATIONS

Name ..... Miss World
Aircraft Type ..... Sport
Manufactured by ..... World Engines
8960 Rossash Ave.
Cincinnati, Ohio 45236
Mfg. Suggested Retail Price $49.95
Available From ..... Mfg. and Retail Outlets
Mfg. Recommended Usage ..... Basic Powered Trainer
Wingspan ..... 48 inches
Wing Chord ..... 8.5 inches
Total Wing Area ..... 400 sq. in.
Fuselage Length ..... 38 inches
Radio Compartment Dimensions ..... (L) 8.2" x (W) 2"x (H) 4"
Wing Location ..... High Wing
Dihedral ..... 5 degrees
Airfoil ..... Flat Bottom (mod. Clark Y)
Wing Planform ..... Constant Chord (built up)
Double Taper (foam)
Stabilizer Span ..... 18 inches
Stabilizer Chord (incl. elev.) ..... 5 inches
Total Stab Area ..... 90 sq. in.
Stab Airfoil Section ..... Flat
Stabilizer Location ..... Mid Fuselage
Vertical Fin Height ..... 6 inches
Vertical Fin Width (incl. rudder) ..... 6 inches
Mfg. Rec. Engine Range ..... .15 — .30
Recommended Fuel Tank Size ..... 4 oz. (incl. in kit)
Landing Gear ..... Tricycle
Recommended No. of Channels 3
Recommended Control Functions ..... Rud., Elev., Throt.
Basic Materials Used In Construction:
Fuselage ..... Light Plywood
Wing ..... Foam or Built-Up
Tail Surfaces ..... Balsa
Hardware Included In Kit ..... Absolutely all hardware included
Plan Size ..... 41.5" x 33" (1 sheet)
Building Instructions on Plan Sheets ..... Yes
Instruction Manual ..... Yes
Construction Photos ..... No
Kit Includes ..... Shaped & Die Cut Parts
Mfg. rec. flying weight ..... 48 ozs.
Wing loading based on rec. flying wt. ..... 17.3 ounces

RCM PROTOTYPE

Weight, ready to fly: ..... 54 oz.
Wing Loading ..... 19.4 oz/sq. ft.
Covering and finishing materials used ... Flite Cote, Quik Cote, K & B
Engine Make and Disp. ..... OS Max .30
Muffler Used ..... Expansion
Radio Used ..... World Six
Tank Size Used ..... 4 ounce

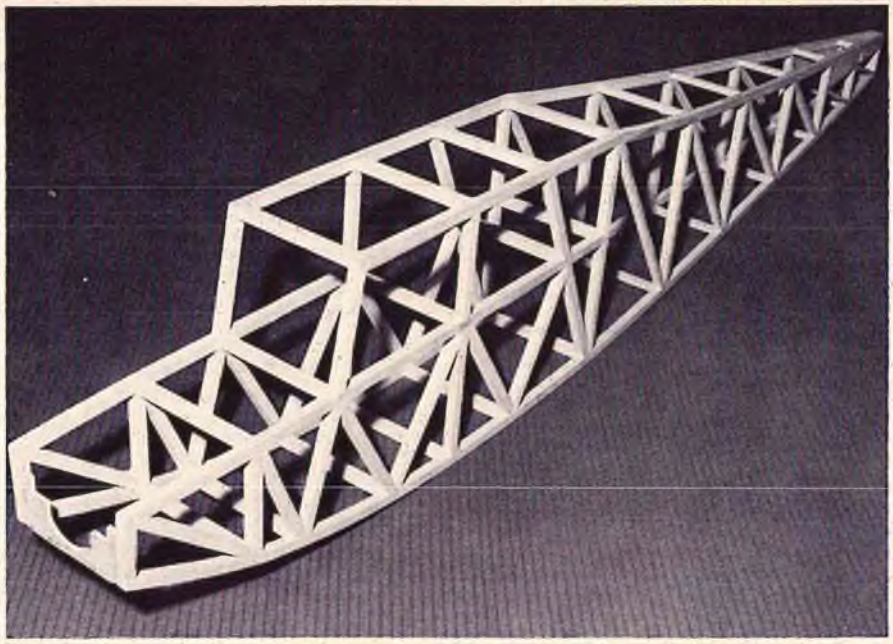
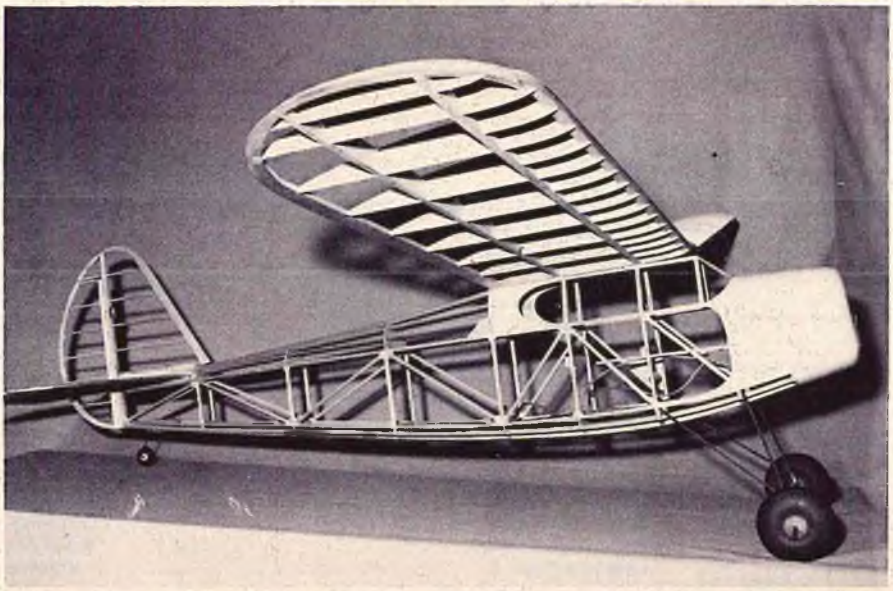


FIGURE 1: "Mercury" fuselage structure.

ARE YOU SHORTCHANGING YOURSELF?

BY SAM BLUMBERG

FIGURE 2: "T.D. Coupe" framed up.



● A short while ago, RCM published an article I'd written having to do with the pleasures of flying Old-Timer R/C models. Tacked to the tail end of the article was an offer to try to assist any of the readers who might have questions concerning the vintage models. I'm not sure whether I made the offer or if I was volunteered by the ever-generous RCM staff but, in any case, the response was rather surprising. A large number of inquiries were received and I was startled by the number of writers expressing the fear that the construction of an Old-Timer was a task for a Master Craftsman and way beyond the abilities of the average modeler. Again and again I found, "Sounds good — I'd sure like to try it — but I'm afraid that I couldn't build the model." What nonsense!

Now it's perfectly true that, almost without exception, Old-Timers are of built-up balsa construction, and the work involved in getting one together is a bit more than that required to unpack and assemble a plastic ARF. But, insofar as skill requirements are concerned, let's take a look at some facts. First of all, during the years prior to World War II, things in our hobby were considerably less sophisticated than they are today. The materials available were pretty basic and limited. Mostly there was balsa and spruce, bamboo paper and silk, acetate cements and nitrate dope. And, like the materials, the tools to work them were also limited. The typical modeler's bench displayed straight pins, razor blades, sandpaper, a coping saw, pliers, and a hand drill. Dremel tools were unheard of and, if somebody in the club had access to a jig saw, it served the entire club — by appointment. So, even if the state-of-the-art in model aeronautics, which was in its teens, had been able to generate sophisticated designs, the wherewithall to build them just wasn't available. You can verify this by leafing through some of Frank Zaic's classic "Model Aeronautics Year Books" of that period, reprints of which are still available through the AMA.

Secondly, there was the law of the marketplace. Most of the designs we now consider classics were commercially available as kits. And those kits were mighty crude by today's standards. Printed parts or paper templates, no prefabrication, sketchy plans and vague instructions. Yet, obviously, no manufacturer would have dared to enter production with a design too difficult or complex to appeal to the average builder of the day. Even then, hobby manufacturers were in the business in the hopes of making a profit.

Finally, and this is probably the most significant point, during the 1934 to 1942 period, which is the Old-Timer era, model airplanes were stictly a youngster's hobby. Rare, indeed, was the modeler who was out of his teens. By the time he'd accumulated a few years, he had responsibilities and was too busy trying to earn a living (it was the Great Depression — remember?) to fool with any hobby, or he was putting on a uniform for WW II. Yet many thousands of

the youngsters were successfully building and flying the models we now know as Old-Timers. Could all of these kids have been Master Craftsmen?

No, the kids weren't all craftsmen — not by a long shot! The range of skill levels was probably about the same as it is today. What the kids did have going for them, however, was that the only way to get a model airplane was to build it. So they sat down and built them. It was just that simple, and that's about as simple as most model building turns out to be once the "I can't do it neurosis" is overcome. Face it — model building is something that is done for pleasure. If it was too difficult, who'd want to mess with it?

Reduced to its fundamentals, the structure of a typical built-up flying model, regardless of type or vintage, is little more than an assembly of standard-sized sticks cut to length and glued together to form a space framework. Sometimes the sticks may be shaped pieces of flat sheet, as in ribs and bulkheads, but the concept remains the same. Make that framework air-tight by covering it with some lightweight material, stick a power plant in it, and Eureka, a built-up, ready-to-fly model airplane! About the only critical skill involved is that in using a razor blade or other sharp instrument without getting blood all over the plans. Dripping it on the floor is permissible. All of the rest is technique, and that develops with practice.

To illustrate what I've been talking about, take a look at Figures 1 and 2. Figure 1 is a photograph of the primary fuselage structure of a six-foot Scientific "Mercury", a popular 1938 free-flight design. Note that it is composed of two identical side frameworks that were built of 5/16" square balsa strips right over full-size layouts on the plans. The two sides were then joined with 1/4" square cross-members, making a box. To be added are the engine mount bulkheads and beams, wire landing gear and balsa sheeting about the nose, and it will be ready for covering. Figure 2 is a photo of the complete structure of a 1936 "T-D Coupe," ready for covering. Its fuselage was built-up exactly the same way as the "Mercury" — two identical sides joined together to make a primary box. The only real difference between the two is that the "Mercury" is slab-sided, and the "Coupe" has some formers and stringers added to the box to provide scale-like contouring.

The Coupe's wing and tail surfaces are equally simple to build, and quite typical of Old-Timer structures. The tail surfaces shown have been modified from the original free-flight versions by cutting out and hinging the rudder and elevators for R/C, but the construction principle is the same: leading and trailing edges, spars and shaped tip pieces pinned down over full-size plans and joined with cross-braces (ribs). A little sanding to knock off the square corners and they're ready for covering.

Like the fuselage sides and tail surfaces, the wing is also built directly on the plans, but because of its size and the need for dihedral, it's built in two halves and joined in the center with suitable splicing. The only problem one encounters here is that the plans generally present only one of the two halves, and it's up to the builder to transpose the plan to produce the opposite half. No big deal. Oiling the plan to make it transparent and building the other panel on the back side is a simple solution — but I'd like to have a nickel for every set of duplicated right or left panels that have been cranked out since model building started. Believe me, they don't fly right with an inverted airfoil on one half of the wing.

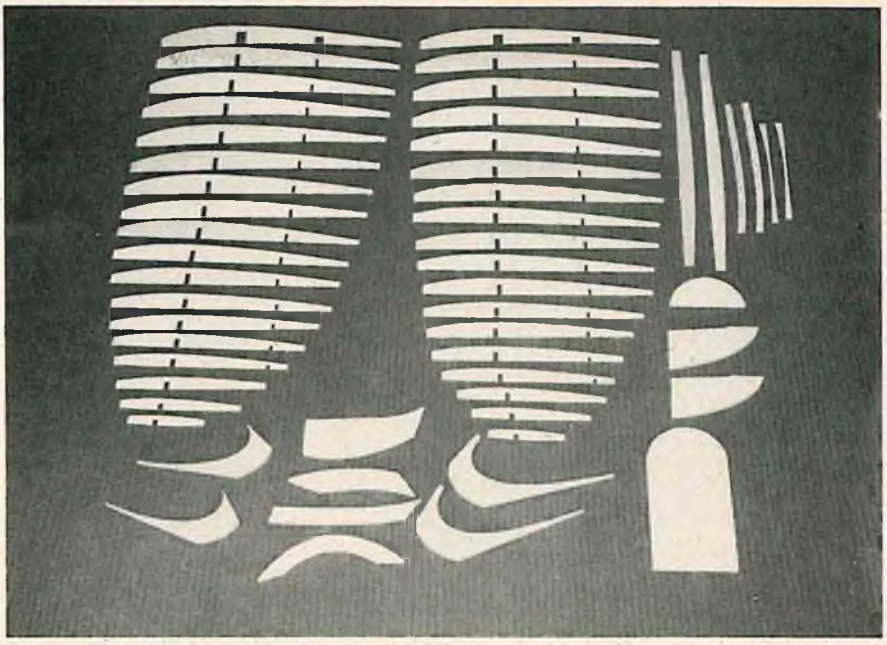


FIGURE 3: "Clipper" semi-kit parts.

Incidentally, if you're troubled at the thought of having to scratch build one of the Old-Timers from a set of plans and templates, stop your worrying. There are plenty full and semi-kits on the market now, and new ones are appearing every day. Figure 3 shows the contents of a P & W Models, Box 925, Monrovia, Calif. 91016, semi-kit for the Mk I Comet "Clipper", a 1938 six-footer that makes an excellent R/C model and qualifies for the "Antique" class. The parts in the kit are all machine cut and sanded and about as perfect as you're ever likely to encounter. All you have to do is add the strip stock and glue things together.

The part of model building probably most demanding of craftsmanship is the final covering and finishing, and that's more because of aesthetic than functional reasons. After all, that's the part everyone sees. There've been countless how-to-do-it articles published on the various covering techniques, and it really isn't difficult. It just takes time and a bit of care. Here, too, today's modeler has a definite edge over his pre-war counterpart since the modern iron-on materials and epoxy finishes make it fairly easy to turn out a professional looking job. They're a bit heavier, of course, than

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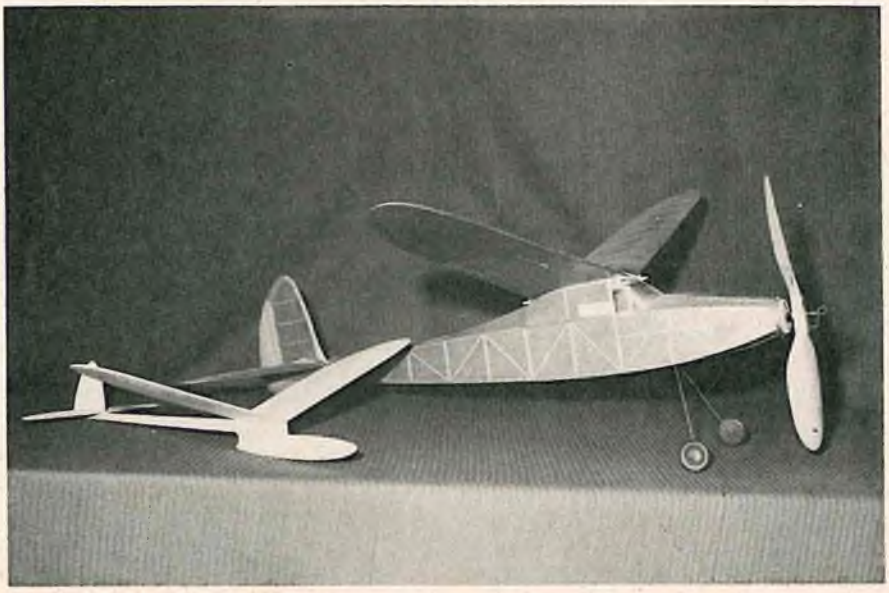
FIGURE 4: Jetco glider and Comet "Sparky".




OMEGA

BY GEORGE E. CALDWELL

OMEGA

If you want to fly a twin-engine aircraft, you are going to need an advanced trainer to learn those multi-engine skills. The Omega is the end result of years of designing, building, and re-building. You'll find it easy to fly twins - - - once you know how.

If you want to fly a Twin, or have your eyes on a scale 310 Cessna, P-38 Lightning, Shrike Commander, or the like, you are going to need an advanced multi-trainer to learn those multi-engine skills so necessary with the bigger, heavier ships. If so, this is your next project! If you have already started (or finished) your dream multi-scale ship, push it aside for awhile. The cost and effort put into one of these is worth more than one or two short flights. Believe me, I know! The Omega is the end result of years of designing, building, and re-building twins. It is easy to fly twins, once you know how.

The main problem of the single-gone-multi pilot is thinking airspeed. When your single quits, what do you do? Hopefully you drop the nose and keep up the airspeed, steepen the approach angle and land. With a twin, you have almost the same situation (without the landing), airspeed is critical. The Omega is sleek enough to allow for a low critical airspeed. Even with one engine operating you can stay above this speed in a shallow climb. In fact, the Omega will easily take-off from a paved runway and climb to altitude on one engine. Stop and think about that - - - take-off on only one engine. Although it is not recommended for your first flight, the average pilot can safely do this after about 30 flights. More about that in the flying section. The Omega is capable of flying any pattern routine and, in general, has been loved by all those who have flown it. Go ahead . . . get started!

Construction

The construction of the Omega is simple and very strong. Use medium balsa for all balsa call outs to minimize the weight. Good wood is a must. As for glue, I recommend Wilhold Aliphatic Resin, available at most good hobby shops. It is super strong, but doesn't become brittle like cements. Most experienced builders at this stage of the game have developed their own construction style, so I'll be brief.

Fuselage:

Affix the plywood doublers to the inside of both sides. Add 3/16" square balsa to the tail and F6 through F10. Glue the deck spar in place prior to the glue drying on the deck bulkheads. When dry, add, or, should I say, glue in F4 and F1. Rough carve the nose block before attachment. Add the nose gear mount and 1/2" block to the bottom. If you are making the wing removable, which I do not recommend, start thinking about it at this point. Add the top deck sheeting, starting from the fuselage middle and working toward the top. I used two pieces, right and left.

Add the cross grain bottom sheeting. Glue F2 and forward, F3 and forward, and the 1/2" balsa "hatch continuation" block. Make the hatch by gluing the 1/8" deck floor to F5 and then to the 1/2" balsa block fitted with the rear F3. Glue the 1/8" dowel to F5 and cut a hole in F6 to accommodate it. Counter drill the hatch and tap F2 for the hold-down as shown. (I used a nylon 10-32.) Next, glue the previously sanded horizontal stab to the fuselage sides. Sand the deck sheeting to the desired shape and glue on the vertical stab, dorsal fin, and both fillet blocks.

Wing:

Before starting the wing construction, decide if you want to use upright or inverted engines. Inverted engines keep the oil and gunk off the aircraft, but get pretty fouled-up on dirt fields. I think inverted engines look more realistic and I have yet to have any problems with them. Match the thin wire/plastic NyRod location to your carb set-up and servo size. Draw it on the plans so nothing gets reversed. Other than the engine geometry, the wing construction is normal for a fully sheeted wing. Build it straight and don't leave anything out!

Nacelles:

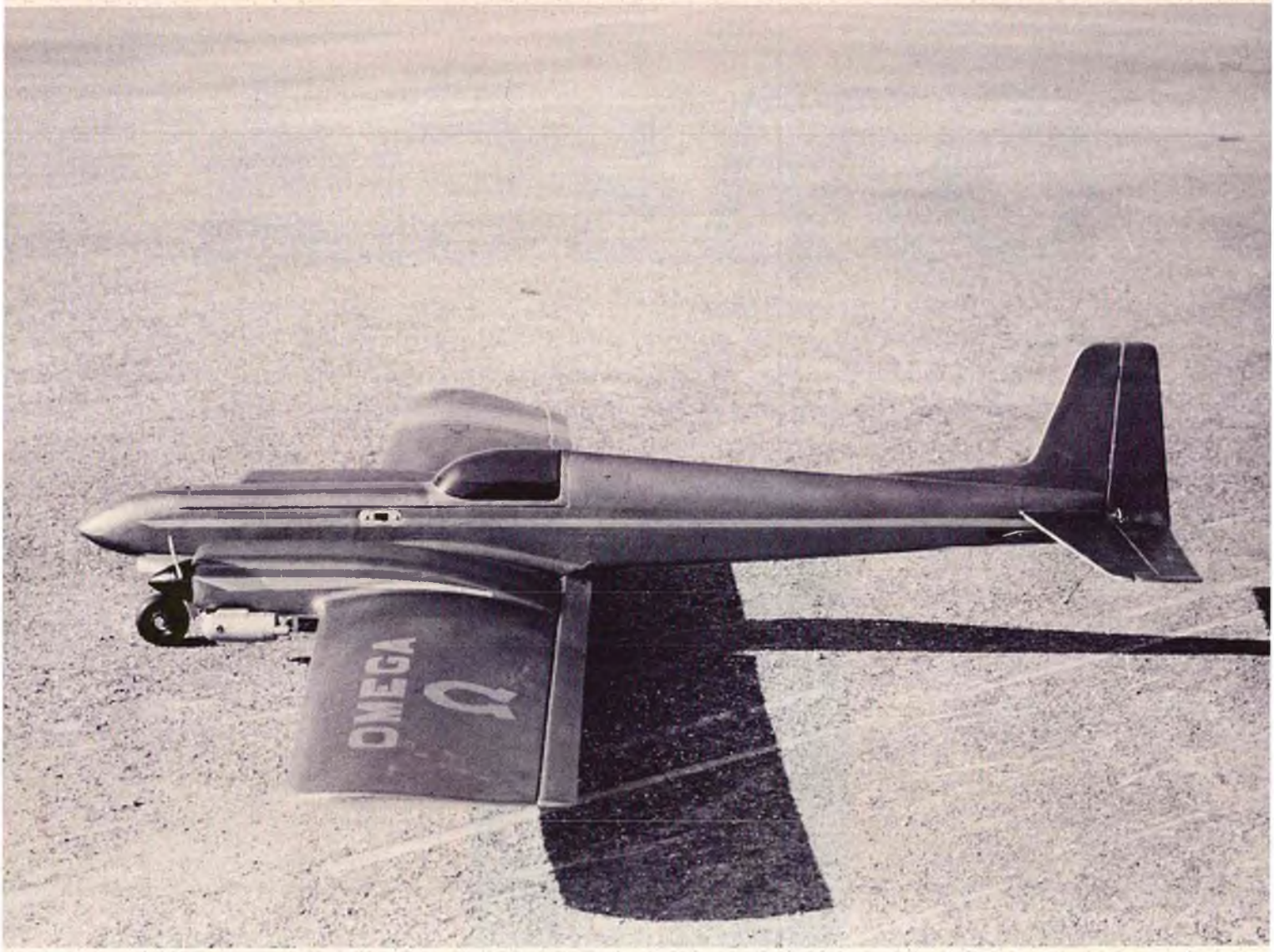
After the wing has been sanded, glue the nacelle sides to the wing. Glue, not epoxy, the firewalls in place with the noted thrust angles, NyRod, and fuel tubing holes. Cut the wing leading edge and sheeting to accommodate the fuel tanks. Do not cut into the spar! Seal the entire set-up with silicone sealer. Add the nacelle front piece and sheet the top and bottom with 1/4" balsa.

Finishing:

Sand well and build up good fillets with

OMEGA
Designed By: George E. Caldwell

TYPE AIRCRAFT
Twin Advanced Trainer
WINGSPAN
51 Inches
WING CHORD
9¼" root — 7¾" tip
TOTAL WING AREA
417.5 Square Inches
WING LOCATION
Low Wing
AIRFOIL
Semi-Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL, EACH TIP
3/4 Inches
O.A. FUSELAGE LENGTH
39½ Inches
RADIO COMPARTMENT AREA
(L) 8¼" X (W) 2" X (H) 1¾"
STABILIZER SPAN
18 Inches
STABILIZER CHORD (incl. elev.)
4⅛" Average
STABILIZER AREA
72 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
5¾ Inches
VERTICAL FIN WIDTH (incl. rudder)
4¼" Average
REC. ENGINE SIZE
.15-.19 Cu. In.
FUEL TANK SIZE
(2) 4 Ounce
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
3 to 4
CONTROL FUNCTIONS
(3) Throt., Elev., & Coup. Ail.
& Rud. (4) Throt, Elev, Rud, Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa and Ply
Wing ..... Balsa, Spruce and Ply
Empennage ..... Balsa, Spruce and Ply
Weight Ready-To-Fly ..... 72 Oz.
Wing Loading ..... 24.8 Oz./Sq. Ft.



resin and filler. Tint the canopy with Rit dye before installing, if desired (Use the powdered type only!) Hinge and pin all surfaces before painting. Add the landing gear doors and reinforce with fiberglass, especially on the main gear doors to the landing gear wires. I used torque wires for the aileron linkage installation and it worked very well. Finish with your favorite material, but keep it light.

Flying

Here's the fun part! Set up your engines so that they are turning the same rpm at idle, 1/2 throttle, and at full throttle. Set the idle low, but reliable. Check your radio for proper range, and that all surfaces move in the proper direction. If you have coupled ailerons and rudder, keep the rudder movement about 1'' and the ailerons 1/4'' up and 1/4'' down. Check for the proper Center of Gravity. It should be about 30% back, or 2¼'' back on the leading edge measured at the wing tip. (That's where the spar is.)

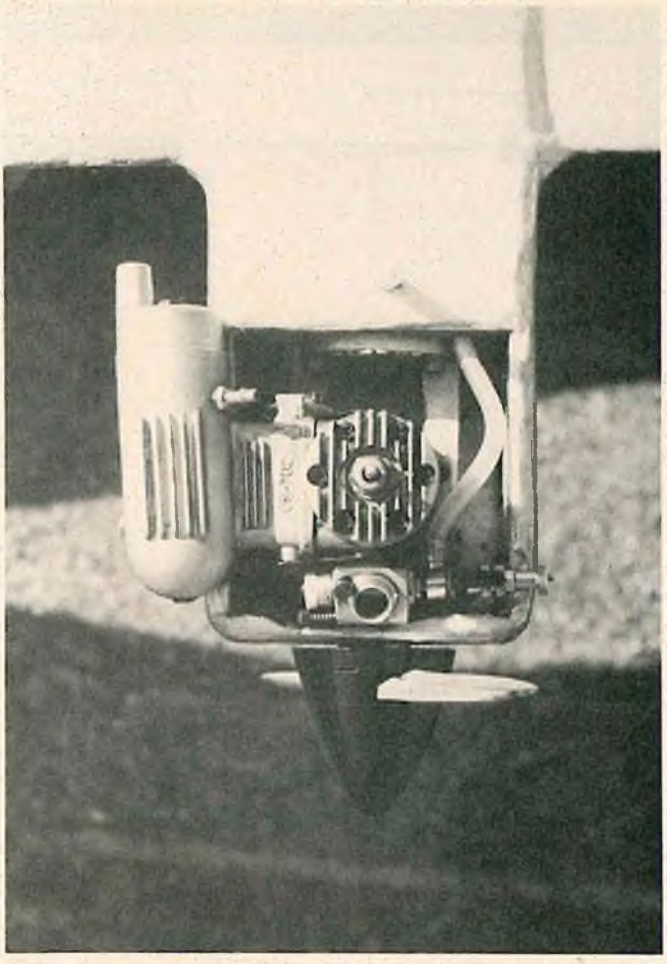
Pick a day when there are no gale warnings for your taxi tests and maiden flights. After starting the engines, calm yourself down while taxiing around. Notice the rapid acceleration. Taxi to the end of the runway and turn into the wind, centering on the runway. Now, goose the throttles. Keep it on the ground as long as your nerves will allow, or about 4 seconds, whichever comes first. Now you are above critical speed and well into vertical climb speed! This bugger is fast! Keep it climbing out straight and quickly trim for level flight. Keep it fast. Should you lose an engine on your first few flights, don't panic, that's why this thing has two engines, it will fly on one!

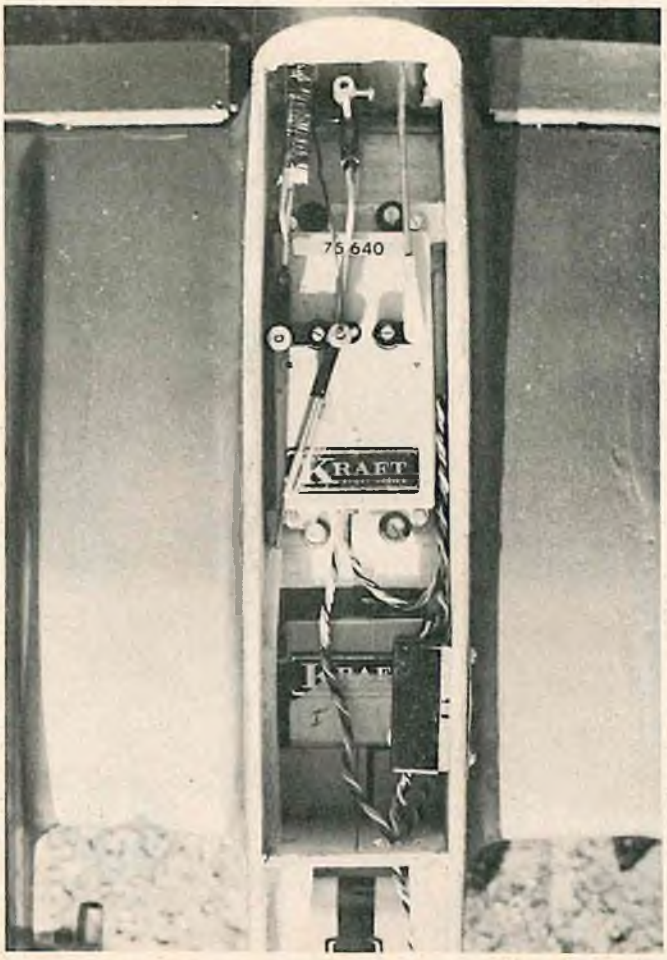
"The Omega is fast. Keep it climbing out straight and quickly trim for level flight. Keep it fast. Should you lose an engine on your first few flights, don't panic, that's why this thing has two engines - - - it will fly on one!"

Remember the airspeed and keep it as fast as possible. If you are low and slow, accelerate with full power. Fly it around for awhile on one engine before attempting that first single engine landing. Feel the turns — not too slow and not too fast. Keep full power until you are on final approach and keep it fast by descending. Don't dive it and don't play with the power — it will make it turn at slower speeds. Plan on a low angle flare - - - none of this minimum speed stuff. If you have to go around, decide early! Full power and absolutely flat altitude until you have that airspeed. Climb slowly and carefully in those turns, you're not a pylon racer.

Now for those single engine take-offs. Taxi around for awhile, noting the acceleration. Position the aircraft at the extreme end of the runway. Goose the power, keeping it straight with full rudder. The required rudder will decrease with airspeed. Lift off after using up three quarters of the runway length. Climb very slowly at first, while the aircraft is accelerating. Take it easy on the turns and keep them wide.

You will love flying the Omega and your next twin will have 10 times the chance of survival. Have fun! □

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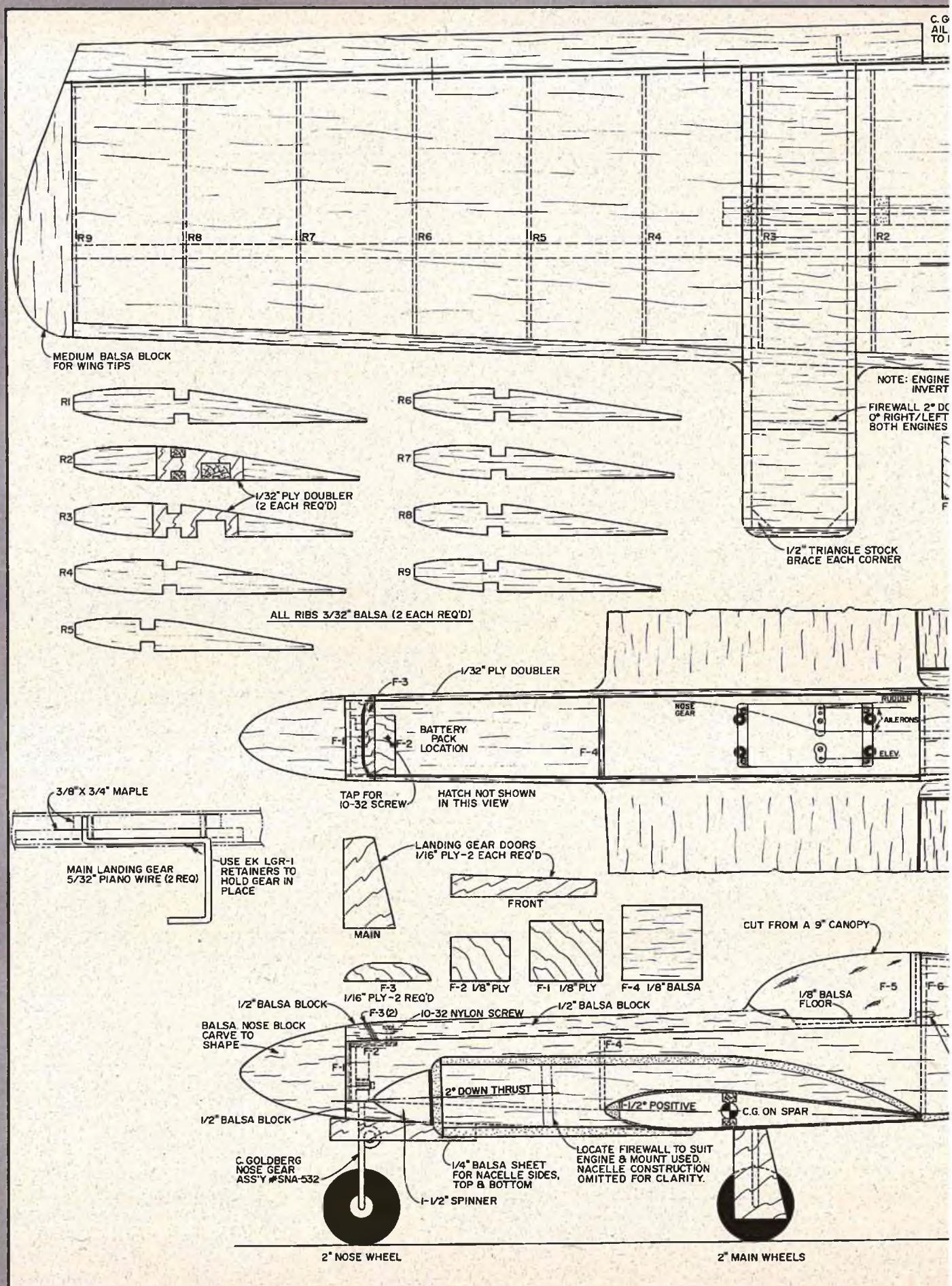
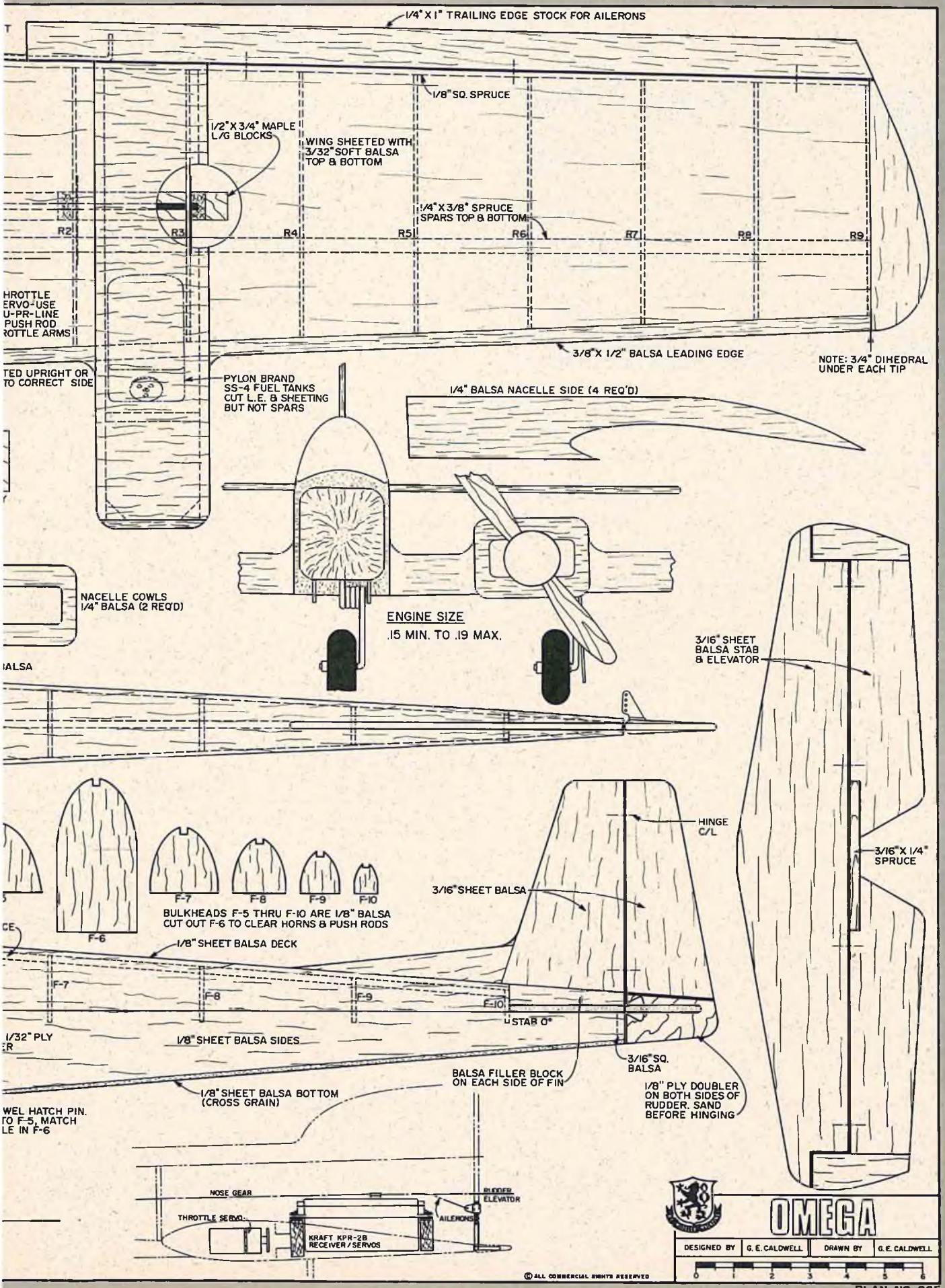
KRAFT


R9
R8
R7
R6
R5
R4
R3
R2
MEDIUM BALSA BLOCK FOR WING TIPS
NOTE: ENGINE INVERT
FIREWALL 2° DO 0° RIGHT/LEFT BOTH ENGINES
1/2" TRIANGLE STOCK BRACE EACH CORNER
R1
R2
R3
R4
R5
R6
R7
R8
R9
1/32" PLY DOUBLER (2 EACH REQ'D)
ALL RIBS 3/32" BALSA (2 EACH REQ'D)
F-3
1/32" PLY DOUBLER
F-1
F-2
BATTERY PACK LOCATION
F-4
NOSE GEAR
RUDDER
AILERONS
ELEV
TAP FOR 10-32 SCREW
HATCH NOT SHOWN IN THIS VIEW
3/8" X 3/4" MAPLE
MAIN LANDING GEAR 5/32" PIANO WIRE (2 REQ)
USE EK LGR-1 RETAINERS TO HOLD GEAR IN PLACE
LANDING GEAR DOORS 1/16" PLY-2 EACH REQ'D
FRONT
MAIN
F-3 1/16" PLY-2 REQ'D
F-2 1/8" PLY
F-1 1/8" PLY
F-4 1/8" BALSA
CUT FROM A 9" CANOPY
1/8" BALSA FLOOR
F-5
F-6
1/2" BALSA BLOCK
F-3(2)
10-32 NYLON SCREW
1/2" BALSA BLOCK
BALSA NOSE BLOCK CARVE TO SHAPE
F-2
F-1
F-4
2° DOWN THRUST
1-1/2" POSITIVE
C.G. ON SPAR
1/2" BALSA BLOCK
C. GOLDBERG NOSE GEAR ASS'Y #SNA-532
1/4" BALSA SHEET FOR NACELLE SIDES, TOP & BOTTOM
LOCATE FIREWALL TO SUIT ENGINE & MOUNT USED. NACELLE CONSTRUCTION OMITTED FOR CLARITY.
1-1/2" SPINNER
2" NOSE WHEEL
2" MAIN WHEELS



PLAN NO. 665

RCM PRODUCT TEST

HOUSE OF BALSA PIETENPOL

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

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

● The Pietenpol Air Camper is a Stand-Off Scale general sport aircraft first presented as a construction article in R/C Modeler Magazine and more recently kitted by House of Balsa, 2814 East 56th Way, Long Beach, California 90805. Its retail price is $49.95. It has a wingspan of 65", a wing chord of 11", and is designed for .19 to .35 cubic inch displacement engines and three channels of proportional control operating rudder, elevator and throttle. It may seem difficult to justify the cost of the kit, at a first cursory glance inside the box, although everything is neatly packed in plastic bags and the three sheets of plans are neatly rolled and everything is of obvious excellent quality. Upon further checking into the more subtle, less obvious thing such as the quality of the wood, the cleanness of die cutting, the prefabrication of parts and their fit to the plans and to each other, it became obvious that the value of this kit was not in the amount of lumber provided but in the fact that this was a kit that was meant to be built and, because of the thought and design implementation that went into it, built right. Unlike some kits on the market today, everything in the Pietenpol fit the plans and, even better, everything fit together perfectly. With this encouragement, and after a couple of readings of the 26 page illustrated instruction manual included in the kit, it was decided to follow this step-by-step instructions in the booklet. By doing this, a solid, well-built, easily fabricated, fun-to-build model will result, with a minimum of question or effort. The only deviations from the instruction booklet were to trial fit the tank and throttle servo so that the appropriate fuel line and control cable holes could be drilled before constructing the nose section and to cut the control rod exits in the tail filler before covering the fuselage. House of Balsa has gone to the trouble of providing different density balsa planks and strips. The softer 1/4" x 1/4" x 24" strips are used for the fuselage cross pieces and the harder ones for the longer ones. The softer 1/4" x 1/4" x 30" strips are for the fuselage side stringers and the harder for the wing leading edge and spars. Use the softer 3/32" x 1⅞" x

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SPECIFICATIONS

Name	Pietenpol
Aircraft Type	Sport/Stand Off Scale
Manufactured by	House of Balsa 2814 E. 56th Way Long Beach, California 90805
Mfg. Suggested Retail Price	$49.95
Available From	Both Mfg. and Retail
Mfg. Recommended Usage	General Sport
Wingspan	65 inches
Wing Chord	11 inches
Total Wing Area	715 sq. in.
Fuselage Length	38 inches
Radio Compartment Dimensions	(L) 5" x (W) 3¾"x (H) 4¼"
Wing Location	Parasol Wing
Dihedral	1½ inch
Airfoil	Semi Symmetrical
Wing Planform	Constant Chord
Stabilizer Span	17¾ inches
Stabilizer Chord (incl. elev.)	6 inches
Total Stab Area	101 sq. in.
Stab Airfoil Section	Flat
Stabilizer Location	Top of Fuselage
Vertical Fin Height	7 inches
Vertical Fin Width (incl. rudder)	5 inches (avg.)
Mfg. Rec. Engine Range	.19 — .35
Recommended Fuel Tank Size	6 — 8 oz.
Landing Gear	Conventional
Recommended No. of Channels	3
Recommended Control Functions	Rud., Elev., Throt.
Basic Materials Used In Construction:	
Fuselage	Balsa and Ply
Wing	Balsa, Ply and Hardwood
Tail Surfaces	Balsa
Hardware Included In Kit	A very complete package of hardware
Plan Size	25" x 38" (3 sheets)
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (26 pages)
Construction Photos	Yes
Kit Includes	Die Cut & Shaped Parts
Mfg. rec. flying weight	65 — 85 ozs.
Wing loading based on rec. flying wt.	14.5 — 17.7 oz./sq. ft.

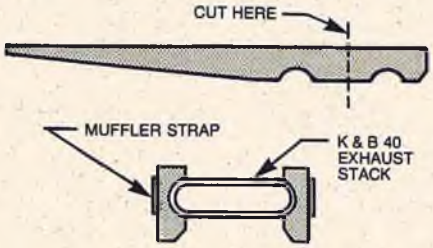
RCM PROTOTYPE

Weight, ready to fly:	83 oz.
Wing Loading	16.7 oz/sq. ft.
Covering and finishing materials used	MonoKote
Engine Make and Disp.	O.S. 30
Muffler Used	Semco
Radio Used	Pro Line
Tank Size Used	8 ounce

A BETTER WAY

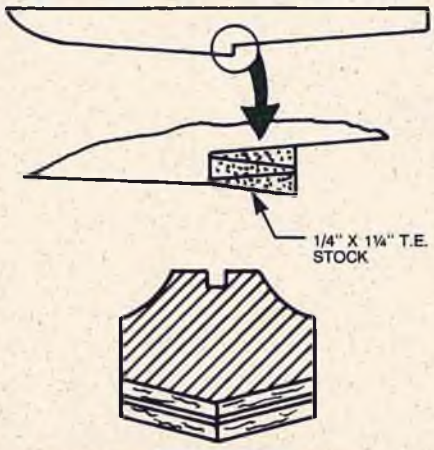
BY NIGEL CHIPPINDALE

● The K & B 40F is a great engine, but those of us who use mufflers are constantly frustrated by those holes for the exhaust baffle which have to be plugged in some way. Generally, the muffler manufacturer supplies a couple of little plugs that are awkward to fit and easy to lose. Arriving at the lake last weekend with my float plane disassembled, I found I had brought the muffler, but not those damn plugs! After scouting around the camp site, I found a wooden clothespin. The ends of this pin, cut as shown below, proved to fit perfectly between the strap of my Semco muffler and the exhaust stack, with the cut out portions of the pin fitting exactly the curve of the stack. I haven't bothered with the metal plugs since.



When flying with floats, even the best waterproofing job will let a few drops into the radio compartment from time to time. If you follow Ken Willard's advice and set the radio gear up from the floor, you'll avoid most problems, and if you paint the compartment with Hobbypoxy clear, you'll prevent soakage. I've found a useful additional trick is to put a piece of paper towel under the servos. This absorbs any water that does get in and can be replaced easily in mid-session to allow you to carry on flying without risking a damp radio.

The Sure Flite all-foam floats work very well, provided your model has plenty of power. They're a little reluctant to unstick, however, with lower powered models.



There's a very simple remedy that greatly improves the ease of take-off. Simply epoxy a couple of pieces of 1/4" x 1¼" trailing edge stock under the steps as shown to increase the effective step depth. Waterproof the T.E. stock with epoxy glue or, for extra durability, give them a covering of lightweight glasscloth (don't use polyester resin or you'll dissolve the floats!).

To economize when using 5-minute epoxy, get yourself a Devtube dispenser and a one pound pack of Devcon. When the pack is empty, refill using the spoons provided. **Don't** mix parts A and B when doing this, or, in five minutes, you'll have a glued together dispenser! The secret is to know that the can of hardener is actually part B, so be sure to put it in the right tube. And mark the plunger assembly so you put it back the right way around.

Sometimes the clunk tube has a tendency to slip off the brass tubes. The answer is to wrap one turn of copper wire around the brass tube and solder. File smooth and you have a neat bulge that will retain the rubber.

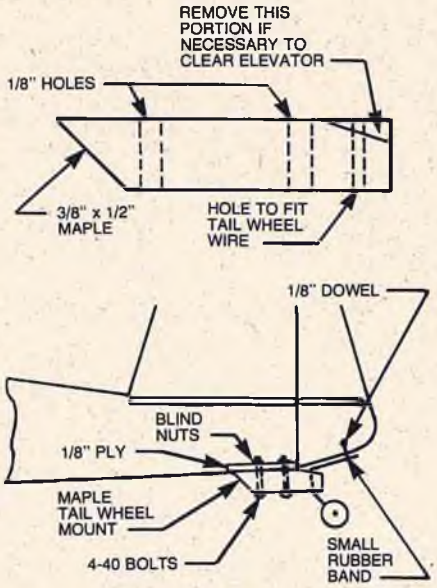
A scrap bit of glass with the edges sanded smooth makes an excellent place to mix epoxy. Eventually, it can be scraped clean with an old chisel.

All kinds of elaborate keepers have been suggested for servo and power plugs, but I find a wrap of masking tape the simplest and most reliable. It is easily removed when necessary.

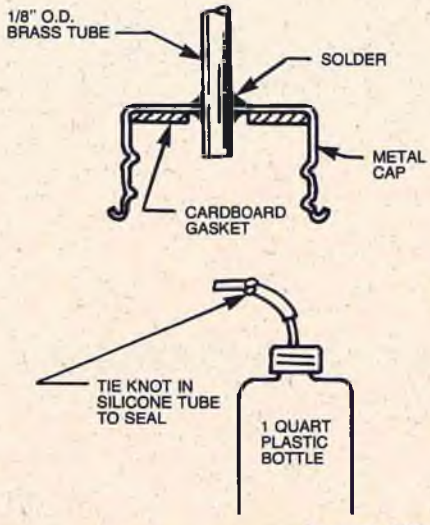
Gun oil works very well as a corrosion preventer to shoot into the engine at the end of a day's flying. It's lighter than 3-in-1 and makes for easier starts next time.

Lots of people slip their battery packs and receivers into Baggies to keep out fuel or for waterproofing when float flying. Better than the regular Baggies for this purpose are the type intended for freezing food. They're made of a heavier gauge polyethylene that's tougher and easier to handle. Get the small size.

Finding that in cold weather, the usual plastic tailwheel mounts had a tendency to snap, I looked around for a tougher type that would allow me to interchange a tailwheel and a tailskid with a minimum of bother. Good old maple turned out to be the answer. A 1" piece of 3/8" x 1/2" maple cut and drilled as shown has stood up to over a year's hard usuage, and the system has been used on a couple of dozen aircraft in this area with great success. And when the time comes to remove the tailwheel for float or ski flying, it's only a couple of minutes work to fit a ski set-up of the same type or a water rudder drive system.



After trying most of the popular fueling systems (electric pumps, air pressure, hand pumps and the rest), I finally settled on the simplest of all for my smaller models. It's as quick as any for tanks up to about 6 oz., sucks out the fuel after the last flight, serves as a prime bottle, and costs less than 10¢ to make. Simply find two one quart plastic bottles having **metal** caps, punch a 1/8" hole through one cap and solder a 2" length of brass tube into the cap. Replace the cardboard gasket (after punching a suitable hole), once the cap has cooled. Fill both bottles with fuel and you've got a half gallon to tuck in your flight box. Seal the one with the spout by tying a knot in a short length of



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BY FLOYD E. CARTER

FIREBALL

Designed in the 1940's by the legendary Jim Walker, the Fireball was one of the most popular Ukies of all time. The Half-A RC Fireball takes advantage of two very popular directions RC flying seems to have taken - - - The Old Timer movement and Half-A Pattern. The RC Fireball exploits the best in both of these interests. Those of us who grew up with the Fireball, and others like it, will agree that these models must not be forgotten. Indeed, the Fireball is a thoroughly 'modern' plane with pleasing lines and moments ideally suited for RC flying.

The time is 1944.
The place is a weed covered vacant lot next to a hobby shop in suburban Los Angeles. I, and several of my pals had ridden our bicycles there to witness a well publicized flying demonstration by a man named Jim Walker. In the waiting crowd I recognized all of our local flying personalities. Standing over on the sidewalk, flanked by his admiring followers, was our own "ace-of-aces". He had recently looped a control line model, a performance which elevated him to immediate superiority. (I was certainly not in his league, as I had yet to complete a flight without crashing.)

In a while a large station wagon arrived. The man named Jim Walker began his show. Out of the car came a red Fireball. He easily started the O & R 23 and walked to the center of the vacant lot. Holding the plane at arms length, with a U-Reely in his other hand, he tossed the Fireball away. It flew almost straight out trailing wires unwinding from the handle-reel. Then the plane began to fly around the circle, with the lines gradually getting longer. After about 50 feet of line had been reeled out the Fireball looped several times and was suddenly flying upside down! No one in our club had ever flown upside down, not even our great ace pilot! After an amazing series of stunts, Jim Walker began to reel in the lines, turning ever faster as the circle became smaller. Then mushing the Fireball into a near stall, he reached out and picked the plane out of the sky.

There were other marvels that Jim Walker performed that day, but my mind was still busy re-creating that wonderful Fireball flight. Although I cannot boast of having known Jim Walker personally, I was able to see him fly on later occasions, both control-line and R/C. A whole new generation of modelers has appeared since that time who only know of Jim Walker through the model publications. The Fireball is just one example of the talent and creativity of this man whose achievements were legion and whose dynamic energy seemed to be limitless.

The time is 1975. It is the year that 1/2A R/C pattern models caught on. Modelers have been flying small R/C models for a long time, but these early designs seemed to be stuck in the trainer mold and were, therefore, sport free-flight designs with some radio assist. The new, smaller radios proved to be the catalyst that was needed to trigger the development of this new dimension in R/C modeling. It seemed a fitting tribute to Jim Walker to combine this recent development with a design which caused such a sensation in the early forties. With the help of 3-views and a good memory, the Fireball project was underway.

Those who remember the Fireball, or who may have one in the attic, will discover that the construction of this version is quite unlike the kit version. The kit featured a carved balsa fuselage which one was cautioned to thin out somewhat. This cannot be used in the 1/2A version because light weight is the very key to success of these small models. The construction features a lot of little sticks and very little sheet wood. The goal is to get down to a flying weight of about 22 ounces. This type of construction is more work than the conventional sheet balsa fuselage and foam wings, but the payoff is in the snappy performance that is a unique characteristic of these 1/2A pattern models.

A few other familiar R/C construction practices are abandoned in this model. The wing is permanently attached. It is a mid-wing design with not too much dihedral and no ailerons. This removes it from the trainer category, but it is easy enough to handle once you get used to the incredible speed and turning radius.

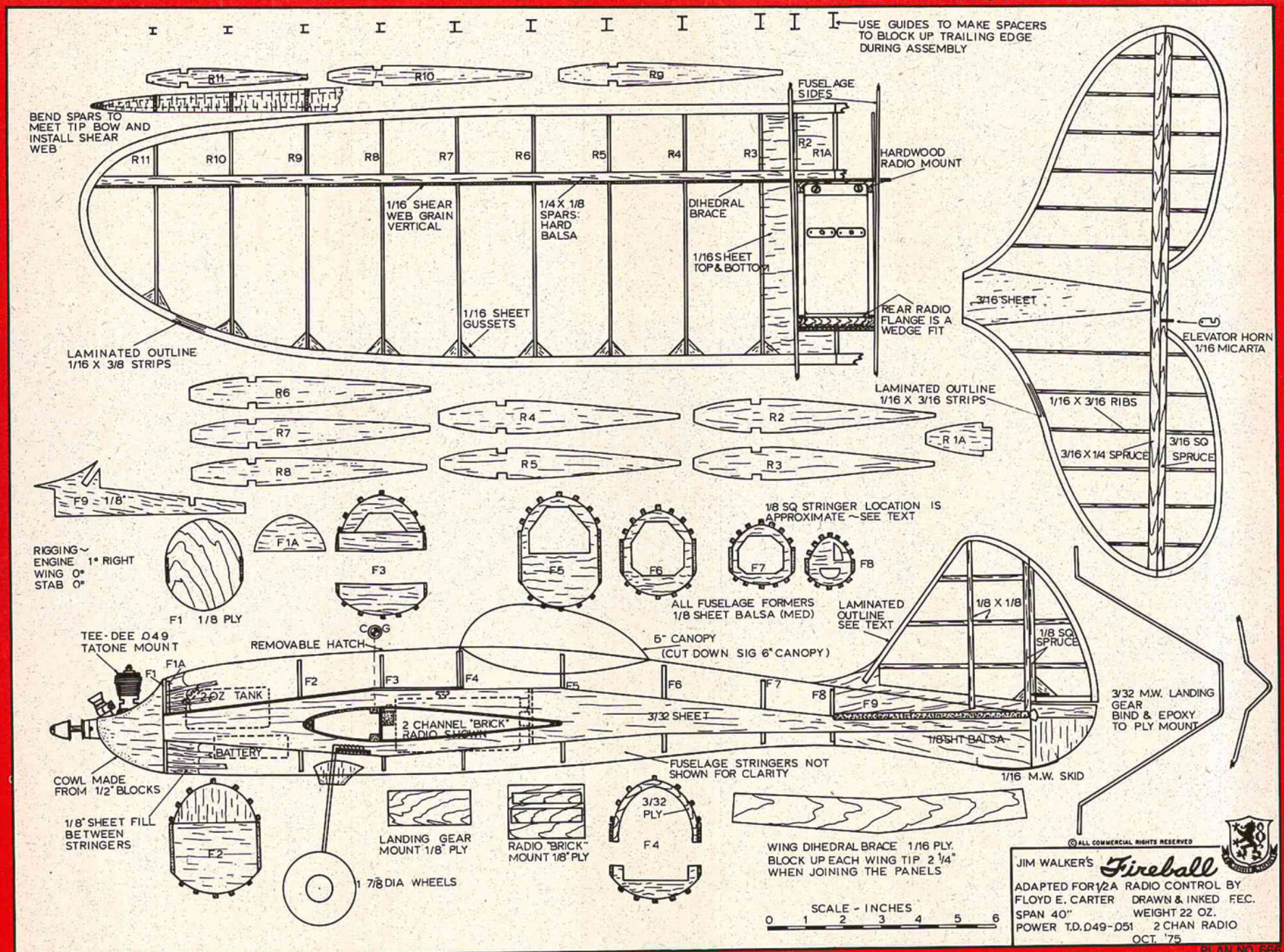
Construction

The laminated outlines are really worth the time and effort. This is a standard way to build small, light models, but should also be considered for other modeling projects. Begin by cutting the forms from plywood, or heavy cardboard, to match the inside curves. Strips from 1/16" sheet are cut 3/8" wide for the wings and 3/16" wide for the tail parts. Soak the strips in hot water for a few minutes. While they are still wet and soggy, coat with Titebond and bend them around the form while taping them in place.

FIREBALL
Designed By: Floyd E. Carter

TYPE AIRCRAFT
1/2A Sport & Pattern
WINGSPAN
40 Inches
WING CHORD
6-13/16 Inches
TOTAL WING AREA
418 Square Inches
WING LOCATION
Mid-Wing
AIRFOIL
Symmetrical
WING PLANFORM
Constant Chord (ellip. tips)
DIHEDRAL, EACH TIP
2¼ Inches
O.A. FUSELAGE LENGTH
26¾ Inches
RADIO COMPARTMENT AREA
(L) 3¾" X (W)2" X (H) 1½"
STABILIZER SPAN
14½ Inches
STABILIZER CHORD (incl. elev.)
4¾ Inches (Average)
STABILIZER AREA
44 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
4½ Inches
VERTICAL FIN WIDTH (incl. rudder)
5 Inches (Average)
REC. ENGINE SIZE
Tee Dee .049/.051
FUEL TANK SIZE
2 Ounce
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Two
CONTROL FUNCTIONS
Rudder & Elevator
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Spruce & Ply
Wing ..... Balsa and Ply
Empennage ..... Balsa and Spruce
Weight Ready-To-Fly ..... 22 Oz.
Wing Loading ..... 7.6 Oz/Sq. Ft.

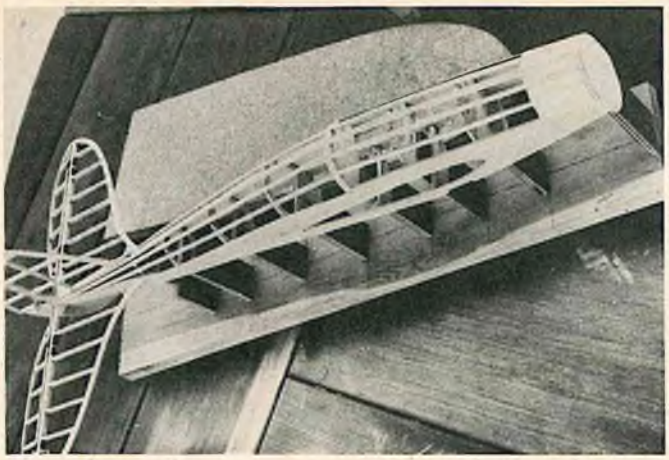
FULL SIZE PLANS AVAILABLE — SEE PAGE 189



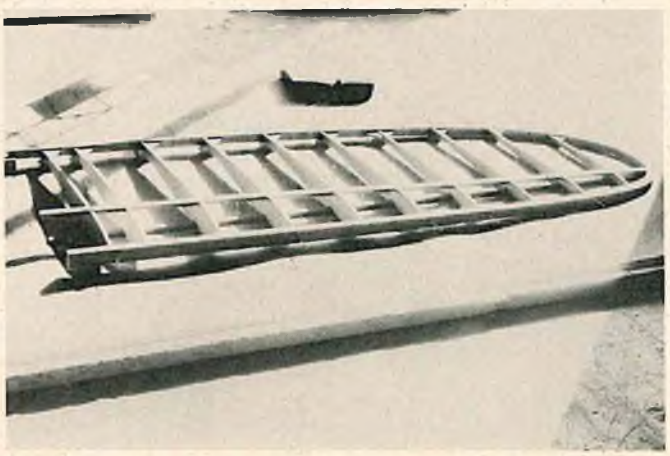
JIM WALKER'S **Fireball**

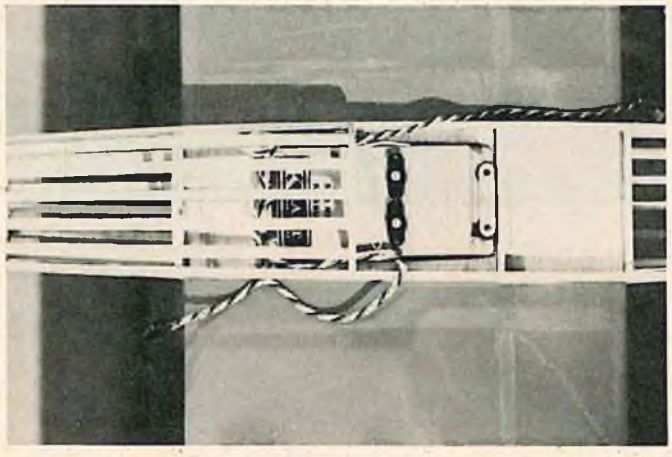
ADAPTED FOR 1/2A RADIO CONTROL BY FLOYD E. CARTER DRAWN & INKED F.E.C.
SPAN 40" WEIGHT 22 OZ.
POWER T.D. .049-.051 2 CHAN RADIO
OCT. '75

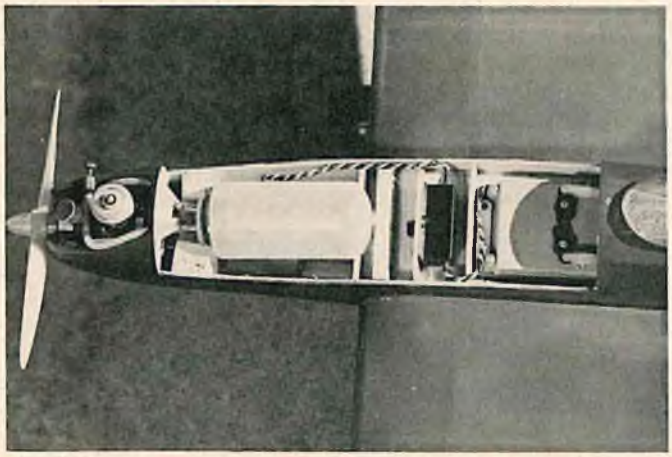
PLAN NO 666

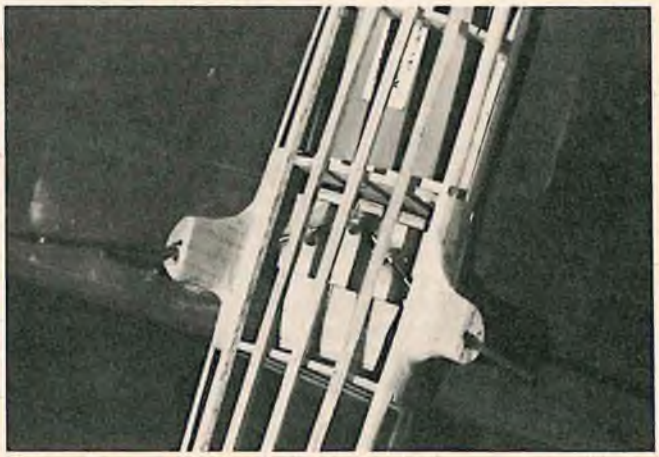


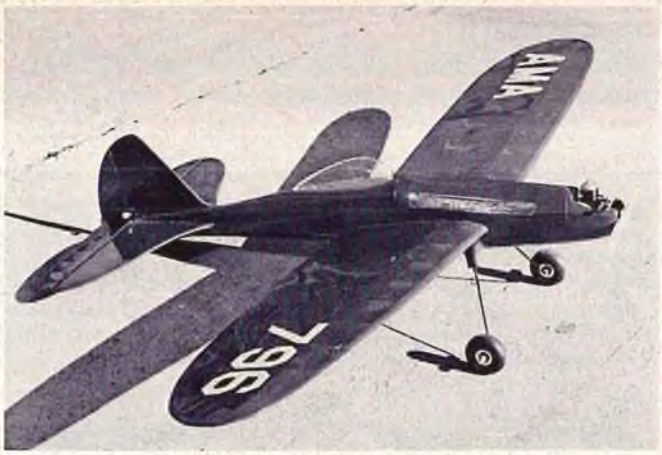
LEFT: A temporary building jig for the fuselage. Note layout lines to assure accuracy. 2ND ROW: (L) Basic wing structure with laminated outline in place. Only bottom spar is pinned to work table. (R) Solarfilm covering for wings and tail surfaces. Fuselage ready for silkspan and dope finish. 3RD ROW: (L) Rear flange mount of Kraft brick fits into grooved hardwood block. Two screws secure the installation. (R) Another view of brick installation. Individual component type may be more crowded. 4TH ROW: (L) The plumbing pressure line from crankshaft to vent line. 225 mah pack fits under 2 ounce tanks. (R) The landing gear installation. Smooth fillets are epoxy glue mixed with micro-balloons.











1ST ROW: (L) The familiar Fireball lines are retained in this model, even though it is not an exact copy of the original. (R) The author with the Half-A Fireball and a larger .40 powered version under construction. 2ND ROW: (L) If there were control lines stretched out, this could be a photo of a scene some thirty-five years ago. (R) Floyd Carter demonstrates hand launch technique. Half-A pattern ships are small enough to fly from football fields. And, if you're interested in an idea of its potential, go back to the spec sheet and check that wing loading!

After they are completely dry, they are ready for sanding.

The wing should be built first, as the finished wing is used for the fuselage and tail alignment. Pin the bottom spar to the plan and install the ribs. Block each rib trailing edge the correct amount with the spacers cut to the lengths shown. Next, add the top spar and the laminated wing outline. Bend the top and bottom spars together at the tip to meet the outline and install the vertical grain shear webbing between the spars. Join the wing halves with the plywood center brace.

If you are using a 2 channel brick radio, the rear mounting screws will not be accessible. Make the radio mount so that the rear flange is wedged in place. Two screws at the front flange of the radio will hold it in place.

The fuselage is started by making the 3/32" sides and all of the formers. Lightly rubber cement the formers to a fuselage jig (see photos), taking care that everything is aligned, both on the top and sides. Add the sides and the completed tail parts. Temporary strips should be used across some fuselage formers for strength until the wing is attached. Add as many stringers as possible while the fuselage is on the jig. To avoid warps, use the eyeball method to locate the stringers and glue them to the formers without excessive bending to attempt perfect spacing. The remaining bottom stringers and landing gear parts are installed after removing the assembly from the jig. Add the landing gear fairings (odd, aren't they?) and the blocks for carving the cowling.

The prototype model was covered with Pactra Solarfilm (#6002, Dark Red) on the wings and tail surfaces with hinges of the same material. The fuselage was covered with tissue and Aero Gloss. Fokker Red is a perfect match for the Solarfilm Dark Red. There are two good reasons for a doped fuselage. First, the paint seals the wood around the engine to protect it from fuel drippings. Second, I never could master the technique of film covering in tight places.

This is one model where a specific engine must be used. The Cox TD .049 develops unmatched power for its weight. Any other engine would have to be larger and heavier. The TD should be run on pressure. It helps to epoxy some aluminum tubing on the pressure fitting, as it is normally too short. The pressure line connects to one of the vents in the 2 oz. tank. The second vent pipe in the tank is used only for filling and must be plugged for running.

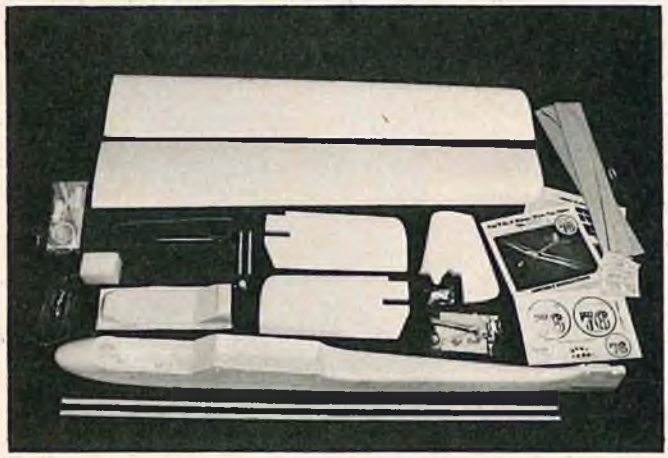
Flying

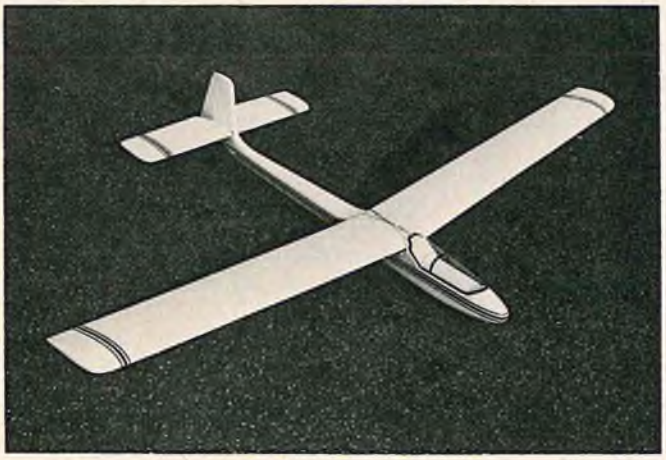
For anyone not accustomed to 1/2A R/C, it is well to consider that first flight, because things happened rather quickly. With the TD peaked, hand launch smoothly straight ahead. Concentrate on keeping the wings level while grabbing some altitude. With safe distance under the wheels, begin to try out the controls. Now you seem to be committed to fly until the engine runs out of fuel (and that alone seems to panic a lot of R/C folks). You will also get a lot of practice with dead stick landings, so keep your spot in mind and don't stray too far from it.

The big pattern meets will continue to see big machines for some time. For just pure fun flying, however, 1/2A R/C pattern is a perfect alternative with a minimum investment of time and expense. □

RCM PRODUCT TEST

HOBBY SHACK SPIRIT OF '76





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						Fidelity to Scale					
Other Materials		●				Flight Performance		●			
Accessories	●					Overall Appeal		●			
Die-Cutting			●								

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

● The Spirit of 76 is an all foam sport sailplane manufactured and distributed by Hobby Shack, 6475 Knott Avenue, Buena Park, California 90620, at a retail price of $27.76. This sailplane has a wingspan of 76" and a total wing area of 494 square inches and utilizes a flat bottom airfoil. Two channels of operation are required for rudder and elevator control. The fuselage is comprised of foam and plastic as are the tail surfaces, while the wing uses a combination of foam, spruce, and plastic. Control surface hinges, horns, screws, bolts and all hardware necessary to complete the aircraft are included in the kit. A twelve page instruction manual is included with the Spirit of 76 along with construction photos included in that manual. The manufacturers recommended flying weight is 34 ounces. The main feature of the Spirit of 76 is its complete ease of assembly as well as the added feature that your radio is well protected from impact damage. In addition, this is an ideal training aircraft. RCM's prototype weighed 34 ounces ready-to-fly for a 9 ounce per square foot wing loading. No covering was utilized over the foam and only DJ's Trim Tape was used for the finishing touch. We found the Spirit of 76 extremely easy to build - - - in fact, it was ready to fly in one evening. As we previously mentioned, this is an ideal trainer as well as the fact that the radio is almost immune to damage since it is virtually encased in foam - - - another plus for the novice starting with his first sailplane. In the performance category, we found the Spirit of 76 to be a very good trainer for thermal flying, or as a slope machine in light winds. In addition, it is an all-around good sport sailplane for the glider guider who wants a back-up ship to fly while building that ten foot high performance machine. In most cases, any damage to the Spirit of 76 can be rectified right at the field with five minute epoxy. A good kit and well worth the price. □

SPECIFICATIONS

Name ..... Spirit of 76
Aircraft Type ..... Sailplane
Manufactured by ..... Hobby Shack
6475 Knott Ave.
Buena Park, California 90620
Mfg. Suggested Retail Price $27.76
Available From ..... Direct from Manufacturer
Mfg. Recommended Usage ..... Sport Sailplane
Wingspan ..... 76 inches
Wing Chord ..... 6½ inches
Total Wing Area ..... 494 sq. in.
Fuselage Length ..... 44½ inches
Radio Compartment Dimensions ..... (L) 8" x (W) 2¼"x (H) 2¼"
Wing Location ..... High Wing
Dihedral ..... 4 inches
Airfoil ..... Flat Bottom
Wing Planform ..... Constant Chord
Stabilizer Span ..... 23¾ inches
Stabilizer Chord (incl. elev.) ..... 5¼ inches
Total Stab Area ..... 123 sq. in.
Stab Airfoil Section ..... Symmetrical
Stabilizer Location ..... Top of Fuselage
Vertical Fin Height ..... 8½ inches
Vertical Fin Width (incl. rudder) ..... 5½ inches
Mfg. Rec. Engine Range ..... NA
Recommended Fuel Tank Size ..... NA
Landing Gear ..... NA
Recommended No. of Channels 2
Recommended Control Functions ..... Rudder and Elevator
Basic Materials Used In Construction:
Fuselage ..... Foam and Plastic
Wing ..... Foam, Spruce and Plastic
Tail Surfaces ..... Foam and Plastic
Hardware Included In Kit . All hardware necessary to complete aircraft
Plan Size ..... NA
Building Instructions on Plan Sheets ..... NA
Instruction Manual ..... Yes (12 pages)
Construction Photos ..... Yes
Kit Includes ..... Die Cut Parts
Mfg. rec. flying weight ..... 34 ozs.
Wing loading based on rec. flying wt. ..... 9 ounces

RCM PROTOTYPE

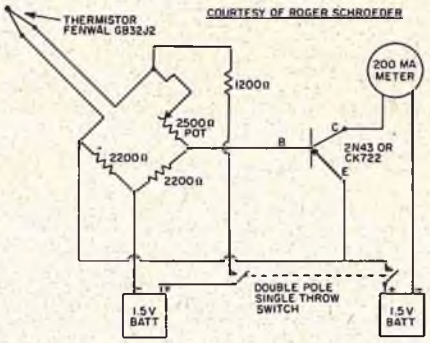
Weight, ready to fly: ..... 34 oz.
Wing Loading ..... 9.9 oz/sq. ft.
Covering and finishing materials used ..... DJ Striping Tape
Engine Make and Disp. ..... NA
Muffler Used ..... NA
Radio Used ..... NA
Tank Size Used ..... NA

SOARING WITH AL KINDRICK

Electronic Thermal Detection

Thermals are difficult to detect before a flight. After a sailplane is airborne, it is easy to tell if a thermal or a down draft is present, but, by then, it's too late to do anything about it. One had best determine if a thermal is present before the sailplane is launched.

Since thermals are a mass of warm air, their presence may be detected by a device that will measure slight changes in air temperature. A thermistor will measure very small temperature changes and is the sensing element used in most thermal detectors.



The circuit for the thermal detector is shown. The thermistor is one leg of a Wheatstone Bridge. Two legs of the bridge are fixed transistors and the fourth leg is a potentiometer used to compensate for the ambient temperature. The Wheatstone Bridge is operated by a 1½ volt battery. The output of the Wheatstone Bridge is fed into a transistor amplifier circuit. The output of the amplifier circuit is connected to a 200 micro-ampere meter.

Any current flow through a thermistor will heat the thermistor causing a change in its resistance. If air is allowed to blow across the heated thermistor it will be cooled and the thermistor resistance will change. This is the self-heating effect of thermistors and the reason that thermal detectors tend to be sensitive to wind velocity as well as to temperature.

In order to keep the wind velocity effect to a minimum, the current through a thermistor must be kept to a very small value. By using a transistor amplifier, the current in the Wheatstone Bridge can be small while still using an inexpensive meter to indicate the resistance changes of the thermistor.

When using the detector, set the 2500 ohm potentiometer, (see picture 1), so that the meter is at mid-scale. Watch the meter movements as the air temperature changes and note any prolonged rises in temperature that signify thermals. The wind velocity also changes when a thermal is present and this is another sign to watch for.

Transistors are also sensitive to temperature changes. The transistor used in this circuit should be shielded from the direct sun and also well ventilated.

The 200 micro-ampere meter will be the most expensive part of the detector. Surplus meters are quite adequate and are considerably cheaper.

The thermal detector pictured is housed in a Bud Electronics enclosure, 3" x 4" x 5". It is mounted on top of an inexpensive camera tripod. The thermistor is housed between two 1" diameter plywood discs, spaced 1/8" apart (see picture 2), painted white with a reflective silvered mirror on top disc. This whole assembly is epoxied to the tip of an inexpensive tubular, collapsible fishing pole about five feet in length. The lead-in wire is fed down through the center of the fishing pole and attached to the side of case with two feed-through terminals.

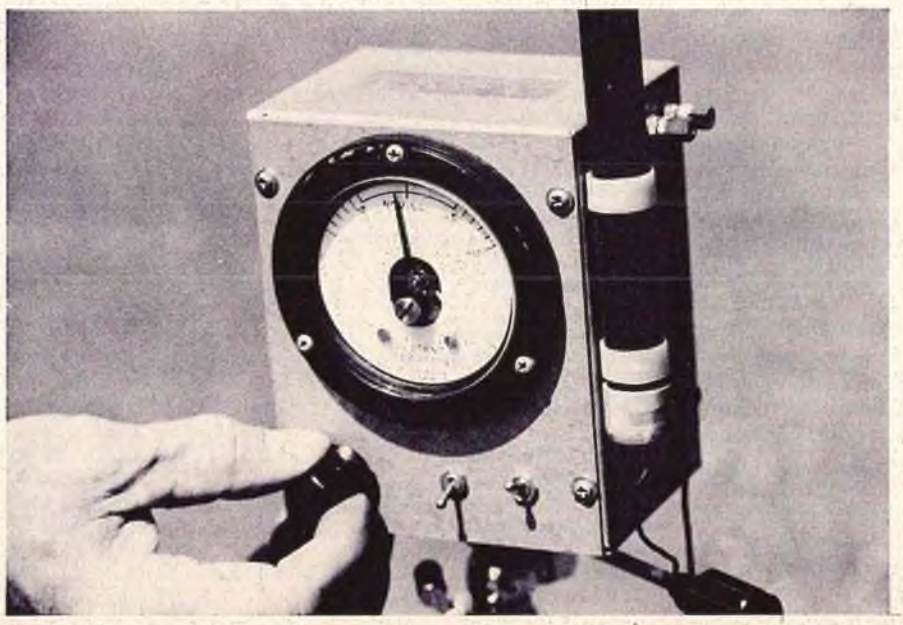
All of the electronics can be obtained from a large electronics house such as Allied Radio, or if you like to browse around the local surplus store, with a little digging you can come up with all the necessary parts. There is no fixed way to mount the detector. A fixed pole could be used in place of a collapsible fishing pole, so build it to fit your needs.

In open flight flying, with no set time to launch, there is really no problem. But at contests and meets where flight orders or groups have to be maintained, this is where the skill of reading and plotting readings will pay off.

Over a period of time watching and timing thermals as they move through an area, a frequency will develop. By studying these times in minutes, no matter when you launch you will have a pretty good idea

to page 128

Les Lear and his 'El Conquistador' and 'El Conquistador Grande', combined total of seven rolls of MonoKote!



LEFT: Turning the pot to set the needle to mid-range. BELOW: Thermistor is between these two 1" diameter plywood discs spaced 1/8" apart.

HERE'S HOW

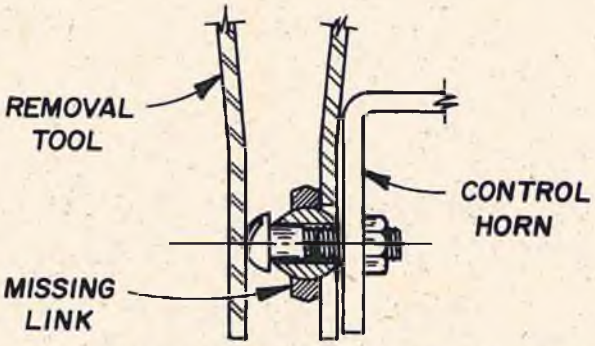
BY JERRY SMITH

WHILE CARRYING A FRIENDS HELICOPTER ONE DAY, I HAPPEN TO NOTE THAT ALL OF THE FITTINGS ON THE CONTROLS WERE THE MISSING LINK TYPE. AFTER LOOKING THEM OVER MY FIRST QUESTION WAS: DO YOU HAVE ANY TROUBLE REMOVING YOUR FITTINGS FOR ADJUSTMENT? HIS ANSWER WAS AFFIRMATIVE AND ESPECIALLY WHEN NEW, THEY ARE DIFFICULT TO PRY OFF. TROUBLE IS, THEY ARE NOT ALWAYS LOCATED IN THE MOST ACCESSIBLE PLACE. WHITH THIS IN MIND I BEGAN THINKING ABOUT A SIMPLE TOOL TO REMOVE THE LINK. AND, IT HAD TO BE ULTRA SIMPLE OR NO ONE WOULD BUILD IT.

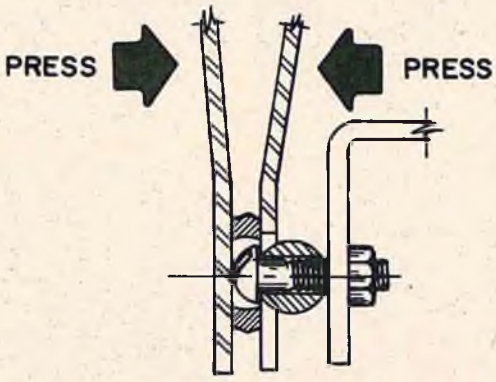
MY TOOL, AS PRESENTED BELOW, IS MADE OF ALUMINUM. ALTHOUGH IT MUST BE REBENT SLIGHTLY AFTER USE, I FELT THAT ALUMINUM WAS MORE WORKABLE AND EASIER TO OBTAIN. PAY SPECIAL ATTENTION TO THE SLOT WIDTH. IT MUST BE SLIGHTLY LARGER THAN THE BALL FOR THE TOOL TO FUNCTION PROPERLY.

THE MISSING LINK REMOVAL TOOL COMES IN MIGHTY HANDY IN THE WORKSHOP. ON SECOND THOUGHT, WHY NOT MAKE AN EXTRA ONE TO CARRY ALONG IN YOUR FLIGHT BOX!!

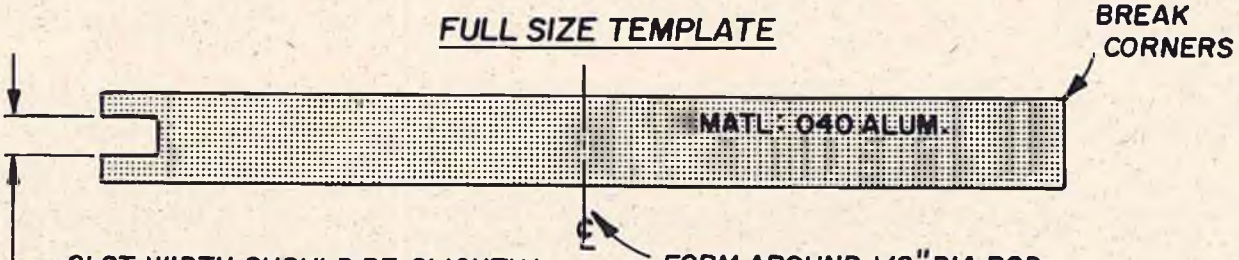
OPERATION



INSERT SLOT IN TOOL BEHIND MISSING LINK – COMPRESS BETWEEN THUMB AND FINGER – SNAP – IT'S OFF!!



FULL SIZE TEMPLATE



SLOT WIDTH SHOULD BE SLIGHTLY LARGER THAN THE BALL DIAMETER. FILE SLOT TO SIZE

FORM AROUND 1/2" DIA ROD AFTER NOTCHING














1ST ROW: (L) A scale SHK being prepared for flight. (C) Doc Hall hooking up Max Gier's scale Grunas Baby. (R) Scale KA8 preparing to launch. 2ND ROW: (L) Ken Wagner launching Terry Koplan's scale Glasflugel 604. (C) Colonel Thacker and scale winning Bowlus. Lee Renaud with back to camera. (R) Gordon Pearson and crew working on scale Monarch. 3RD ROW: (L) Dave Burt holding Doc Hall's scale Schulqleiter prior to launch. (C) Rick Pearson launching Sailaire. (R) Fred Zoller with Mexican team holding the Ulumcan, winner of Best Original Design. 4TH ROW: (L) Colonel Thacker launching Gordon Pearson's scale Monarch. (C) A scale SHK on tow. (R) San Fernando Valley Silent Flyers team – Pearson on ground; Terry Koplan, middle; Ken Wagner on canopy. 5TH ROW: (L) Mexican team talking to Tom Williams of California. (C) Linda Porter, scorekeeper, at Suds City Hangar. (R) Soar Nats Banquet; Ken Wagner, Rick Pearson, Terry Koplan, Chris Adams.

BY BARBARA HENON

Photos by Barbara Henon & Dick Shilling

SOAR NATS

● The festivities for the 7th Annual RC Soaring Nationals began early in the morning Saturday, July 17, with the Great Bicentennial RC Sailplane Race. This was a team competition in which one sailplane could be entered for each AMA chartered club entered in the Nats. The object of the race was to fly over a pre-determined course in as fast a time as possible while controlling the sailplane from a chase vehicle. An unlimited number of launches was permitted with the restriction that the point of hook-up of the plane be no further along the course than the point of the previous landing. This is a new concept in RC sailplane competition and has been tried by only a very few RC clubs. (The 20 mile Desert Dash held by the San Fernando Silent Valley Fliers was a prototype for this race.) Cross country racing is much closer in spirit to competition for full scale sailplanes, such as the well-known Smirnoff Derby, than the usual type of contest held for RC soaring. Jack Hiner and Neil Liptak of SOAR spent many hours in search of the best possible 76 km. course and in the planning of the event.

The pilot and the back-up pilot for each team were required to be members of the same RC club and to have completed Level III or higher in the LSF Achievement Program. After having seen the course, the wisdom of this last requirement became apparent. The distance for the course was set at 76 kilometers (47 miles) in honor of the Bicentennial. Many contestants arrived on Friday and drove the course for the first time. Most of the run was over farmland in the vicinity of Plainfield, Illinois. The terrain offered ample opportunity for stretching out long (300 meter maximum) winch lines and, with careful planning, reasonable places to land — but the hazards along the course were far from trivial. There were four sets of high tension wires to be cleared, numerous farm houses and trees, telephone poles and wires, a river, and one area of fairly dense woods on both sides of the road which continued for nearly a mile. Getting through this area would require lots of altitude. Fourteen teams were entered in the race and twelve actually participated. All teams congregated at a large sod-farm which was the starting point of the race. A prize for the most patriotic sailplane drew out the creative talents of the contestants. Red, white and blue were the only acceptable colors and original combinations of stars and stripes made this an exceptionally attractive group of sailplanes.

The start of the race was timed from hook-up of the plane to the winch, but contestants could elect to postpone their first launch in order to wait for better lift. The first launch was provided by SOAR winches, but after that the contestants were on their own. Most teams transported winches in their cars, but some relied entirely on hand tows or high starts. The first launch took place around 8:30 A.M. and, although no great lift was in evidence at that time, the weather looked exceptionally promising.

Among the early starters was The Greater Detroit Soaring and Hiking Society team with Jeff Mrlik the 1973 National Champion and 1975 NSS Open Champion as pilot, and Warren Tiahrt, the 1975 NSS Champion in Standard Class as back-up pilot. They were flying an Astro-Jeff II designed by Jeff's dad, Jerry Mrlik. It launched well and headed straight out onto the course, rising ever so slightly upwards — an exceptionally stable and efficient sailplane.

Meanwhile, back at the sod-farm, the rest of us were getting underway. It was difficult as a participant in this race to get an accurate idea of where everyone was at a specific time and who was doing what. But it would be equally difficult as a non-participant to describe the thrill of going down the road with the plane in good lift and passing other competitors at a good clip, or of being down somewhere with everyone passing you and finally getting out of a difficult area to take-off down the road again. I was a pilot for the WINGS (Women's International Glider Soaring) team assisted by Margaret Gill of Saint Louis. Dick Shilling and Bill and Stan Hinman completed the team. We were flying a so-called "Goose" which features a low-drag semi-symmetrical airfoil. We hoped that its high cruising speed would give us an advantage in the race. After nearly losing the plane in a corn field, we were heading down the road 1/2 mile or a mile at a time, making slow but steady progress. Clearing the first set of high tension wires, we soon caught up to Tom Christian of the Redwood Silent Flyers and John Baxter of the South Bay Soaring Society, the first LSF Level V. Then we were down and he sailed past us with good altitude. Finally we hooked a good thermal and got the Goose up high. With decent altitude, and the lift steadily building, it was possible to follow the plane down the road for over four miles. This was the most exciting time for us as when we landed we discovered structural damage to the wing root area of the fuselage which made it impossible for us to continue the race. Our crew decided to have a picnic at a bridge over the river close to the halfway point of the course. From this point, we watched the Munsee Sky Chiefs, with Gary Bussel as pilot, struggling through the woods. They were down in a field to the side of the woods attempting to hand-tow out. They managed to get their Pokey 808 up through the trees to the other side of the woods as we watched. We later found that Mike Matson had launched the Pokey by hand towing for most of the 47 mile course for a total of 52 launches, but they did finish the course in eight hours — before the 7:30 P.M. deadline. Most of their runs were about a half a mile, but they did get one fine run of about nine miles and that't what it's all about!

Shortly after the Pokey passed through, John Baxter's van streaked past. John was leaning out the window, transmitter in hand, looking up. They were traveling at a good clip, but none of us could spot the plane. We figured John could be putting us on, but if anyone could clear the woods like that it would be John. We later found that we had been the victims of a cruel hoax — John had abandoned the course sometime earlier.

On the way back to the sod-farm, we passed Jack Hiner and the S.O.A.R. (Society of Aeromodelling by Radio) team who had gotten off to a later start. They finished the course in 8 hours and 21 minutes with a total of 36 launches. When we arrived at the sod-farm we learned that the Greater Detroit Soaring and Hiking Society team had completed the course in 4 hours and 12 minutes with only 14 launches. This outstanding performance won the event for the GDSHS team. The longest leg of their course was 17.6 miles extending in three different directions, upwind, crosswind, and downwind. This astonishing run was followed with a back-to-back run of 13.1 miles. Their performance should awaken people to the tremendous, largely untapped capabilities of RC Sailplanes. Their success was due in no small part to highly organized teamwork. Jerry Mrlik modified the Clark Y airfoil of the Astro-Jeff to 11% which provided good penetration and speed for cross-country flying. Flaps and spoilers assisted in launching and in controlled landings. The plane was ballasted to 7¼ pounds to provide stability and speed. Each member of the team chosen by the GDSHS had a specific job to perform, and this job was not modified throughout the race. Jerry Mrlik drove the chase vehicle. The winch was mounted in the vehicle and the winch line looked directly to the plane without going through a turnaround. Dave Corven built a special tool to guide the winch line to pre-

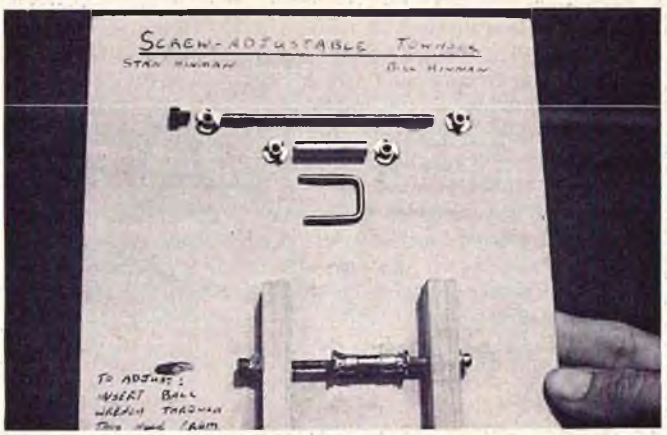
SOAR members and Barbara Henon with scale planes.

Ken Wagner and Jerry Mrlik preparing to launch Chris Adam's scale Caproni.

Tom Christian launching Legionaire at start of Great Bicentennial Race.

Canard on tow. Interesting sailplane flown by Bob Miller.

Helen Olsen and Contest Director, Dan Pruss, at motor home.



Adjustable screw mounted tow hook entered in Best Technical Achievement.

Dive brakes on Callisto sailplane, entered in Best Technical Achievement.

Stars and stripes motif on Terry Edmonds sailplane.

Chris Adams preparing to launch scale Caproni. Ken Wagner and Jim McIntyre of SOAR look on.

Doc Hall launching his scale Schulfleiter – an excellent vintage glider.

Mark Smith holding Don Edberg's second place Scale Duster.

An SHK prepares to go up on tow.

Rick Pearson with Sailaire contrasts with vintage airliner.

Overall view of SOAR Nats.

Barbara Henon and Dick Schilling of WINGS team with Goose prior to cross-country race.

Bicentennial race plane 'City of Los Angeles.' SFVSF plane destroyed in race.

Dick Schilling holding WINGS plane at start of race as Stan Hinman looks plane over.

WINGS Team during race. Timer Stan Hinman, Barb Henon, Margaret Gill, Dick Schilling.

SOAR Nats contestants enjoying watermelon roast.

Line at Suds City Hangar after contest.

John Deneau of CARDS and Bob Robinson measuring a spot landing.

Trophies on display before SOAR Nats banquet.

vent fouling and kept his eyes on the line, while Earl Pell worked the foot pedal and watched the plane. Needless to say, any kind of slip-up using this type of system could be disastrous and requires a tremendous degree of coordination between pilot and crew. Jeff did most of the thermalling while Warren Tiahrt flew the runs. The most difficult problem they faced during the race, aside from being attacked by some rather large dogs which threatened to devour the plane, was keeping the plane in sight while it was airborne. The underside of the Astro-Jeff II was covered with a metallic blue which provided good visibility and contrast as the sailplane passed beneath the rows of large cumulus clouds — known as thermal streets to full scale soaring pilots. When the Astro-Jeff II passed through the blue spaces between the clouds, the blue covering tended to disappear. Every set of eyes was needed to keep it in sight. The motto placed on the plane by Eric Kiegler "free as a bird" seemed especially appropriate at these times.

The runner-up team was the Dallas League of Silent Flight who finished the course in 6 hours and 7 minutes, with a total of 30 launches. Lemon Payne and Tom Williams (Texas) flew a Legionaire 100. Their longest run was 8 miles and they had two runs of 6 miles each. They managed to stretch out some of their runs by flying at an altitude of about 25' above the road in the wave produced at the front of the car. I don't know about anyone else, but I wouldn't want to try it.

Some interesting disasters were reported during the race — the team from Harris Hill hit a pole; the Milwaukee Flying Electrons who won the award for the most patriotic sailplane design hit a "Do Not Pass" sign; and the Rockland County R/C Club had their plane destroyed by a gust while still on the ground. A larger, more efficient version of our "Goose" flown by the San Fernando Valley Silent Fliers was destroyed due to an elevator malfunction.

In spite of a long and difficult course, most contestants were very enthusiastic about cross country flying. They felt that the

team concept of R/C soaring competition was exciting and they would like to see more of this type of event in the future.

Thermal Competition

Wind dominated the 7th Annual R/C Soaring Nationals held at Lewis University in Lockport, Illinois. It began to blow on Sunday, the day before the contest when most fliers were out trimming their planes and getting in some last minute spot landing practice. It was still blowing on Monday morning when Chris Adams launched for the first flight of the contest. The sky was overcast with 10-14 knot winds. The events for this SOAR Nats were four 2 minute Precision rounds and four 6 minute Duration rounds with the 9th round used as a "wild card" so that you could throw out your worst round of either Precision or Duration and take a chance on improving your score in that event. Contestants were allowed to declare after one minute of flight time, whether they would go for a 2 minute Precision flight or try to eke out a 6 minute flight. Under more normal conditions, 6 minutes would have been no real challenge and the contest would have been essentially a spot landing and precision time contest. The shorter Duration times, compared to the 10 minute flights of previous years, was a concession to an increasing number of contestants in the SOAR Nats — 10 minutes is just too long when there are over 200 contestants in each round and as many as 24 on a single frequency. Given the windy, often turbulent conditions this year, a pilot needed all the Duration flying skills he or she could muster to make 6 minutes, and most people didn't make it. The wind continued to build throughout the first day, forcing many contestants to fly only Precision flights in the hope that weather conditions would be improved by Tuesday. The best hope for Duration flights appeared to be way upwind and high. In a good position, it was possible to hang in wave lift way out beyond the winch turnarounds. Only a single plane was seen to circle in the traditional manner in a bona-fide thermal on Monday, and that one was going downwind at a good rate. Precision was no easier in the wind than Duration and many planes were blown downwind of the spot. Some folded wings on the launch and others flipped inverted after landing, including Mark Smith, whose name has been listed among the SOAR Nats winners more times than anyone else.

The wind was worse on Tuesday with gusts recorded up to 35 mph by meteorologist Orville Smith. So many people were missing the spot that Keith Finkenbiner of SOAR suggested a "last chance" circle be placed about 100' downwind of the landing circle for those who were blown off course. Groups of sailplanes hanging in the wave lift over the launch area prompted Contest Director, Dan Pruss, to give out cries of "surf's up" when summoning the next flight group to the ready area. It was even said that, when late in the day the Suds City Team opened up the keg provided by Old Milwaukee, that there were whitecaps on the beer!

There were nearly as many ways to ballast for the wind as there were competitors. Larry Pettyjohn of California, a printer by trade, used four 9½ ounce printing slugs to ballast his Paragon. The Mrliks favored 6" tubes captured in the wing of the Astro-Jeff. This plane could hold four tubes of 5 ounces each in each wing to nearly double the weight of the plane.

In addition to the wind, there was the threat of rain on Tuesday. There were reports of rain as close as 10 miles away from the contest site. There was a great deal of speculation on how many rounds of flying we could get in before the rain started and what would happen if some of the rounds were rained out. Fortunately the rain held off — that is until the last flight of the last round on Tuesday was rained out. I never did learn what happened to the pilot whose flight was rained out. Did they give him a re-flight on Wednesday? The thunderstorm that began at the end of Tuesday's flying was as severe as any I have seen. There was a great deal of flooding on streets in the area and Wednesday found the flying field ankle deep in mud. It was not until mid-day on Wednesday that the sun came out in all its glory, the wind was gone and hawks could be seen circling and mysteriously going up. By that time, the results of the 7th Annual SOAR Nats were very nearly determined.

Rick Pearson of the San Fernando Valley Silent Fliers in Los Angeles, California, a proven master of R/C flying under all kinds of weather conditions, overwhelmed the more than 200 of the nations top soaring competitors to become the new National Champion. It sould be understood that his victory had very little to do with luck.

Rick began R/C soaring on the slope and was already an accomplished pilot when he bagan thermal flying about three years ago. He is the type of flyer who is always trying to improve upon his own performance. I can remember when several years ago he was trying to do the requirements for LSF Level I. Rick wanted to do all five of the three meter spot landings consecutively. He missed one and it distressed him. Rick is intensely interested in competition and has been known to practice all day long for a little club contest. This attitude has made Rick one of the outstanding R/C soaring pilots in the history of the sport. He has won the SC^2 Championship for two consecutive years. SC^2 is an association of Southern California clubs which hold a series of contests during the year and the champion is determined by points earned throughout the season. Pearson has also won the North-South Challenge meet for two years. This is a meet of over 100 contestants held each year in California. Rick placed third in Standard Class in last year's SOAR Nats. He has said that contest flying is more than 30% mental. Last year Rick came to the SOAR Nats and wasn't quite ready. This year he wanted to win and left absolutely nothing to chance. During a contest, Rick concentrates on percentages. He evaluates each of his flights as a percentage of the possible obtainable score and is constantly trying to better his own percentages. His usual percentage over a season is around 92%. This year at the SOAR Nats his percentage was nearly 95% under some pretty difficult contest conditions. This was not the first contest Rick has won in the wind — the '74 North-South meet was flown in winds up to 30 mph and, come to think of it, the wind came up pretty good this year, too.

Rick tries to improve his odds by paying meticulous attention to the condition of his plane. Each time he flies he goes over every possible course of malfunction. He checks all servo screws, all linkages and clevises, the condition of the hinges, and whether anything might be missing or loose, such as a towhook. By attending to the cosmetic aspects of his sailplane, Pearson keeps mechanical failures to a minumum.

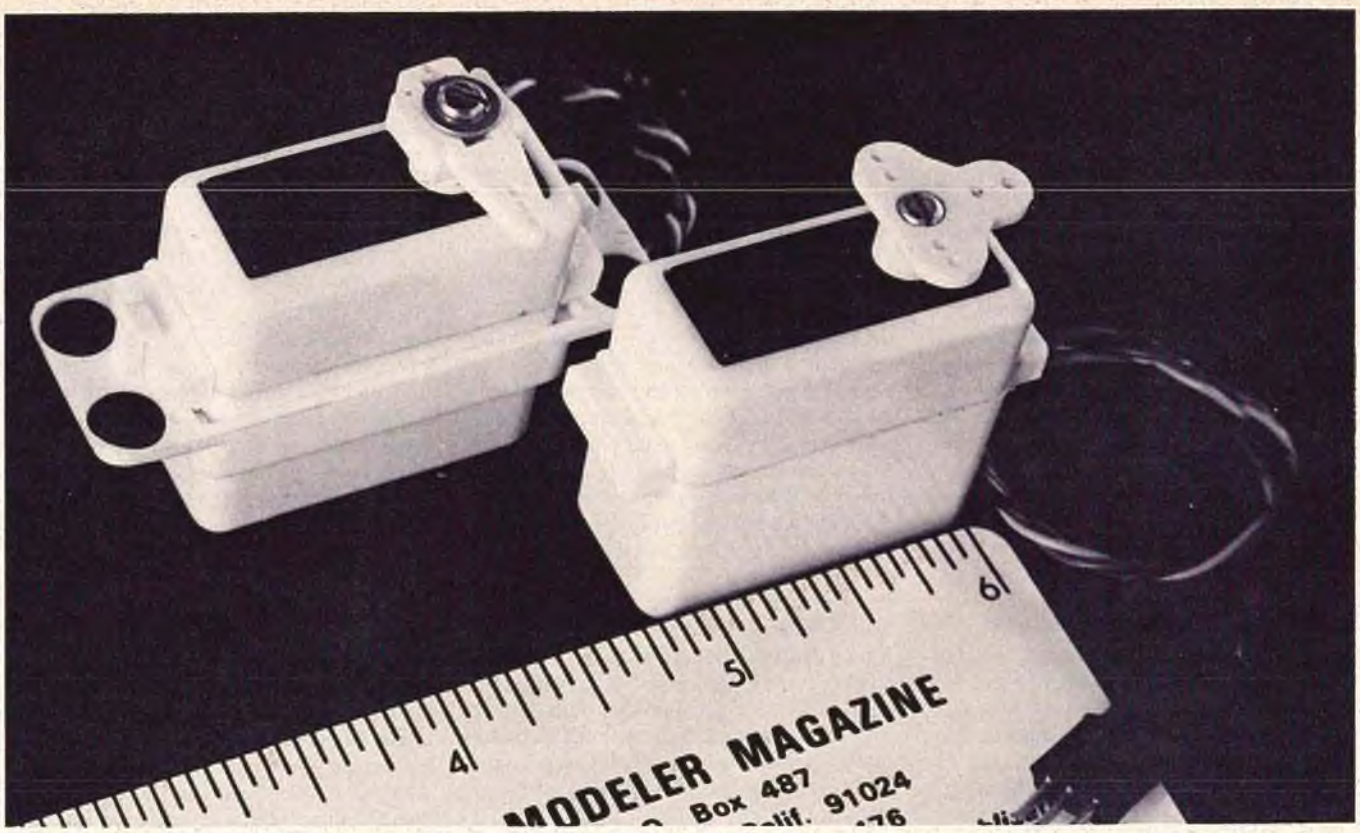
Pearson has flown a Standard Class sailplane for several years, but feels more comfortable flying a larger plane. His Sailaire is a 12' 6" plane that weighs 7 pounds without ballast and 10 pounds loaded. Pearson doesn't fly the plane — he drives it. His precision landing style evolved from hundreds of catches of his plane on the slope and he can put it anywhere he wants to. In wind, he approaches the circle high and downwind, uses the spoilers to set the altitude and then glides it in until it just touches the spot. In Duration, he makes the most of any kind of available lift and the size and weight of the plane give him the range to go and get it. Pearson and Sailaire are indeed an impressive meshing of man and machine.

Awards were given for 1st through 5th overall, but awards for Duration and Precision were given in each of three classes, A, B, and C. Class A is 100 inches and under with 2 control functions; Class B is 100 inches or less with unrestricted control functions; while Class C is unlimited. Although he won Unlimited Class Duration outright, Pearson was beaten in Precision by Bob Robinson of Michigan. Bob had flown his Duration rounds in the wind and then realized that his only chance for a trophy was to go for Precision, and was able to fly all Precision rounds on the last day of the contest when conditions were good. Pearson's worst round was a 391 out of 460, which included a 71 landing. Since Pearson normally concentrates on his own percentages and doesn't worry about other competitors scores, he didn't realize until it was too late that Robinson was in a position to beat him. Pearson elected not to fly his "wild card" round which would have given him a good chance of improving his score.

Dwight Holley of Connecticut was the 2nd Place Overall winner with 3287 points to Pearson's 3480. He flew a Maestro with flaperons and spoilers. Dwight flies with the Harris Hill L/D in New York, and I hate to say it, but he also belongs to a power club and flew power extensively before discovering gliders about three years ago.

Don Edberg, a mechanical engineering student at the University of California, was 3rd Overall winner, having placed 1st in Precision for Class B with his Aquila and

to page 120



The D5 servo, the world's smallest servo, can be constructed to fit your proportional system.

BUILDING THE

BY DOUG SPRENG

WORLD'S SMALLEST SERVO

Portrait of the genius as a young man.

- - - - and these are the tools you'll need.

● I have been advised by the awe expiring "East Side Bowery Boys" that the teeming R/C "masses" may not yet be ready for such a project. I'm sure that the "Bowery Boys" couldn't hack it. After all, didn't they donate all their intelligence to charity? It is said by some that their combined intelligence amounted to that of a two year old! (Ed's note: For those of you who haven't been around this sport too long, the East Side Bowery Boys were the most infamous group of RC'ers ever to disgrace the RC scene. In semi-retirement since 1965, this leather jacketed group of renegades has, unfortunately, re-organized and are back with us once more. We're sure to hear much more about them in the near future — at least if they have anything to say about it!)

Enough of that, this article is based on the D5 servo that comes from the infamous den of iniquity, "Dunham's R & R" in Lake Havasu City, Arizona. To make it even worse, Don Mathes collaborated heavily. Despite this, the finished servo works quite well, and Dunham swears it is the world's smallest. A complete kit of parts, including servo mechanism, will be available by the time this article appears. Look for address of service and the kit at the end of the article.

Since electronic construction projects could be a regular feature in RCM, I would like to present some possible projects. Let Dewey know your preferences by writing him at R/C Modeler Magazine, P.O. Box 487, Sierra Madre, Calif. 91024.

(1) Servo Tester.
(2) Club Monitor, with possible scanning feature.
(3) Pulse — Pulse Mixer (like Christy Mixer).
(4) D.C. Pulse Mixer (for Helicopter Gyros).
(5) Field Charger.
(6) Digital Pulse Width Readout.
(7) Tachometer.
(8) Glow Plug Driver (from 12v source).
(9) Any idea you, the modelers, have.

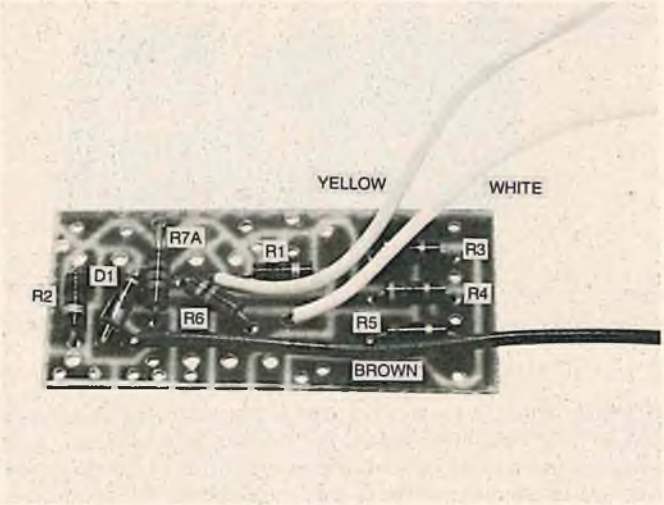
Now, as we dive headlong into construction, I would like to pass on some typical kit building advice. Please read before firing up the soldering torch.

Your most important tools shall be your soldering iron, needle nose pliers and side cutters. Get tools that are especially made for delicate P.C. work. Some are illustrated.

The iron is especially important. It should be the miniature type with a tip radius of about 1/32''. It should have a temperature range of 650° to 700° maximum. One of these temperature regulated Weller Soldering Stations are ideal and the cost is worth it, especially if you plan on building more kits. A solder sucker bulb is especially handy for clearing solder bridges and removing parts. Use **Rosin Core** solder only. I use the .025 diameter variety. This keeps from flooding the board with solder.

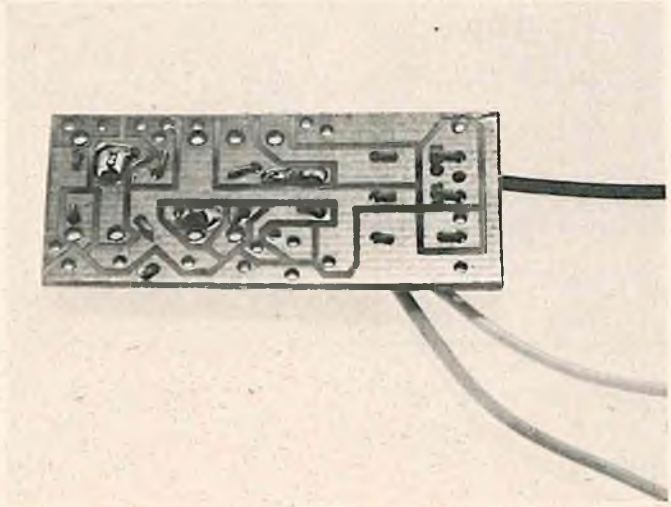
So, on with the project.

It is imperative that you read the whole step and understand it before proceeding!

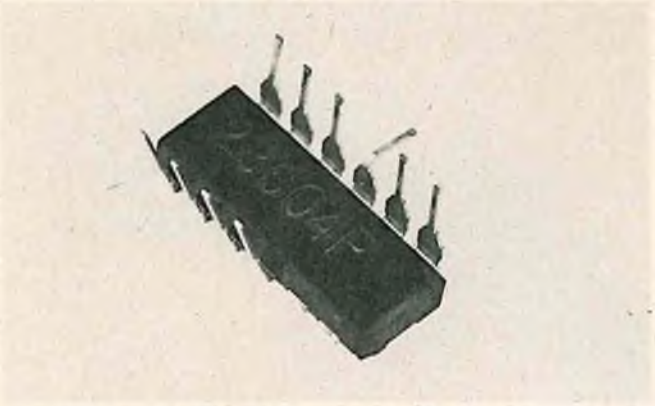


Step 1.

Install all horizontal resistors (R1, R2, R3, R4, R5, R6, R7). Install R7A, if you have positive pulses; if negative, leave out. Install R7B later for negative pulses. One caution here, make sure to fold the lead onto a land after insertion, but you must watch out that the lead is not long enough after being cut that it bridges another land as illustrated.



Make sure all parts are tight on the board. Install yellow, white and brown wires. They should be about 2'' long. You will trim them later. Solder the wires to keep them from falling from board during following assembly.

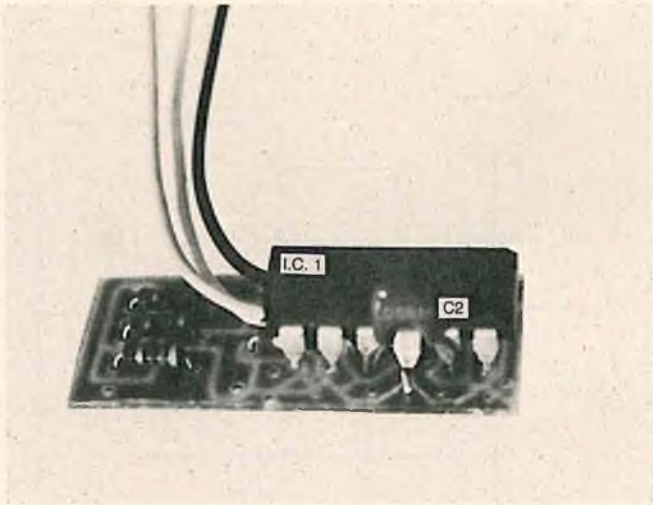


Step 2: Positive input I.C.

Step 2.

Remove pins 1 & 2 (positive pulse input only) of I.C. as shown. Re-form pin 10 as shown. Now, install the I.C. as shown, and solder pin 10 to the lead of R7A. If negative pulses, insert pin 10 in hole that was occupied by R7A. Again caution in bending leads. Do not bend the leads that go through larger holes until later. The I.C. must settle snugly down on the previously inserted parts.

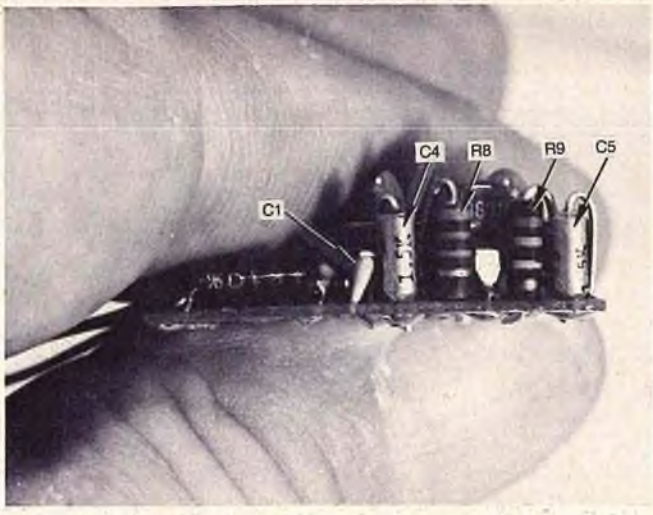
Step 2: Negative input I.C.



Step 3.

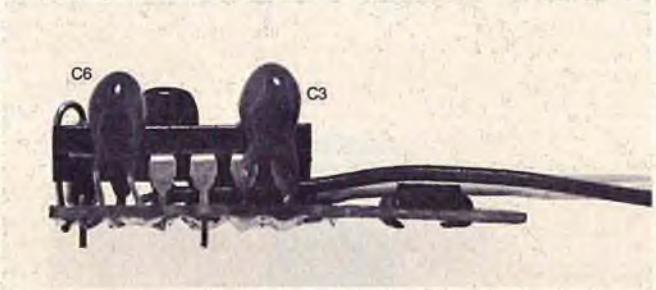
Form and install C2. Notice that the leads go through the same holes as the I.C. These holes have been drilled larger for this purpose. If you have any trouble getting the extra leads in, ream the hole slightly larger with a common pin. Careful; don't overdo it. Make sure neither C2 lead touches pin 10 or R7A. Solder after bending and

trimming both leads.



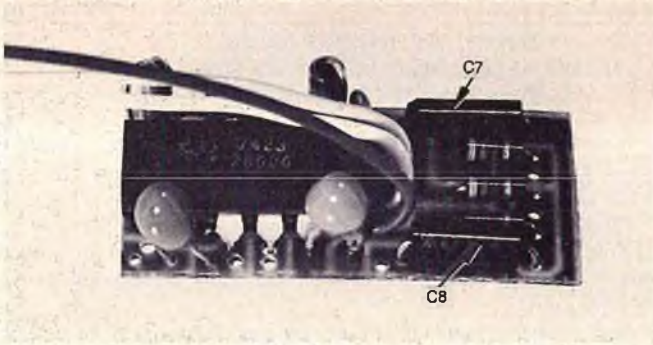
Step 4.

Install C1 (no polarity), C4, and C5 (red end is positive-up). Solder both ends. Make sure I.C. lead pin 7 is bent over and trimmed properly. Install R8, R9 — solder.



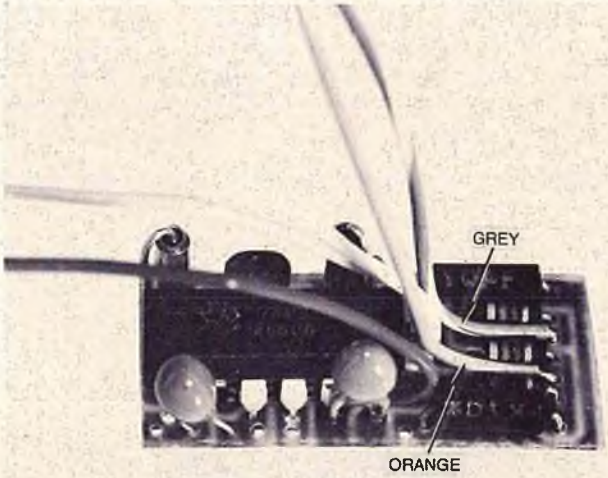
Step 5.

Install C3 observing polarity (+ marked on capacitor) — solder. For positive input servos install C6 as shown. Solder the negative side of capacitor plus I.C. pin. The lead length on these two capacitors is extremely important. For the necessary clearance to the top and side, the capacitors must half lay over the I.C., but cannot be so long as to interfere with the pot on the final closure. Also, care must be taken that the leads of C6 do not touch the cut-off pins, 1 & 2 of the I.C.



Step 6.

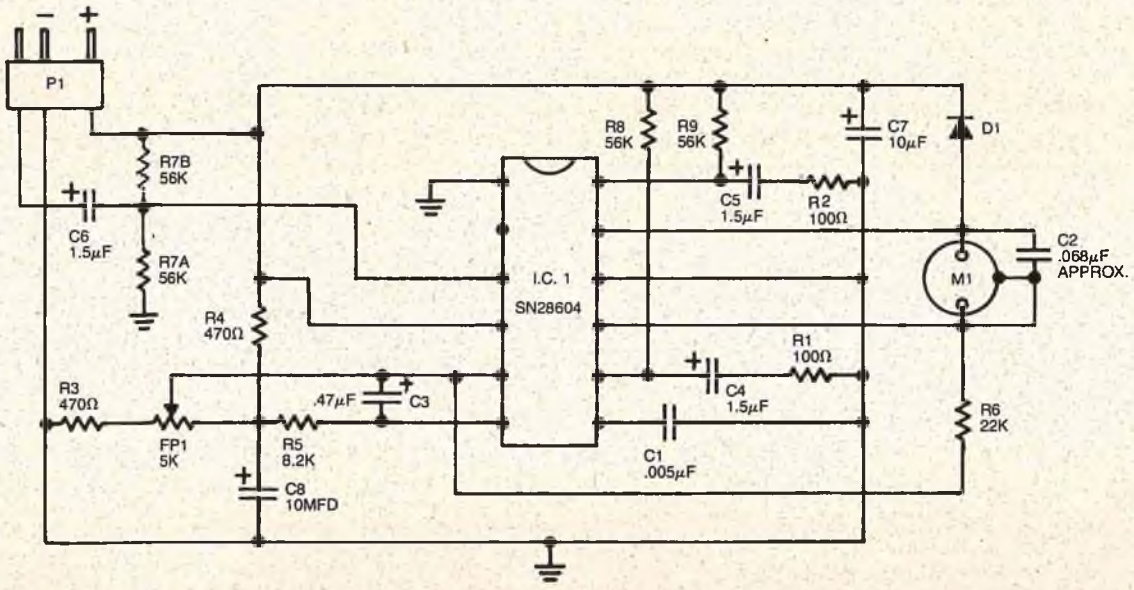
Install C7 and C8. Solder C7 only. Observe polarity as marked by positive being the chamfered end of the capacitor.



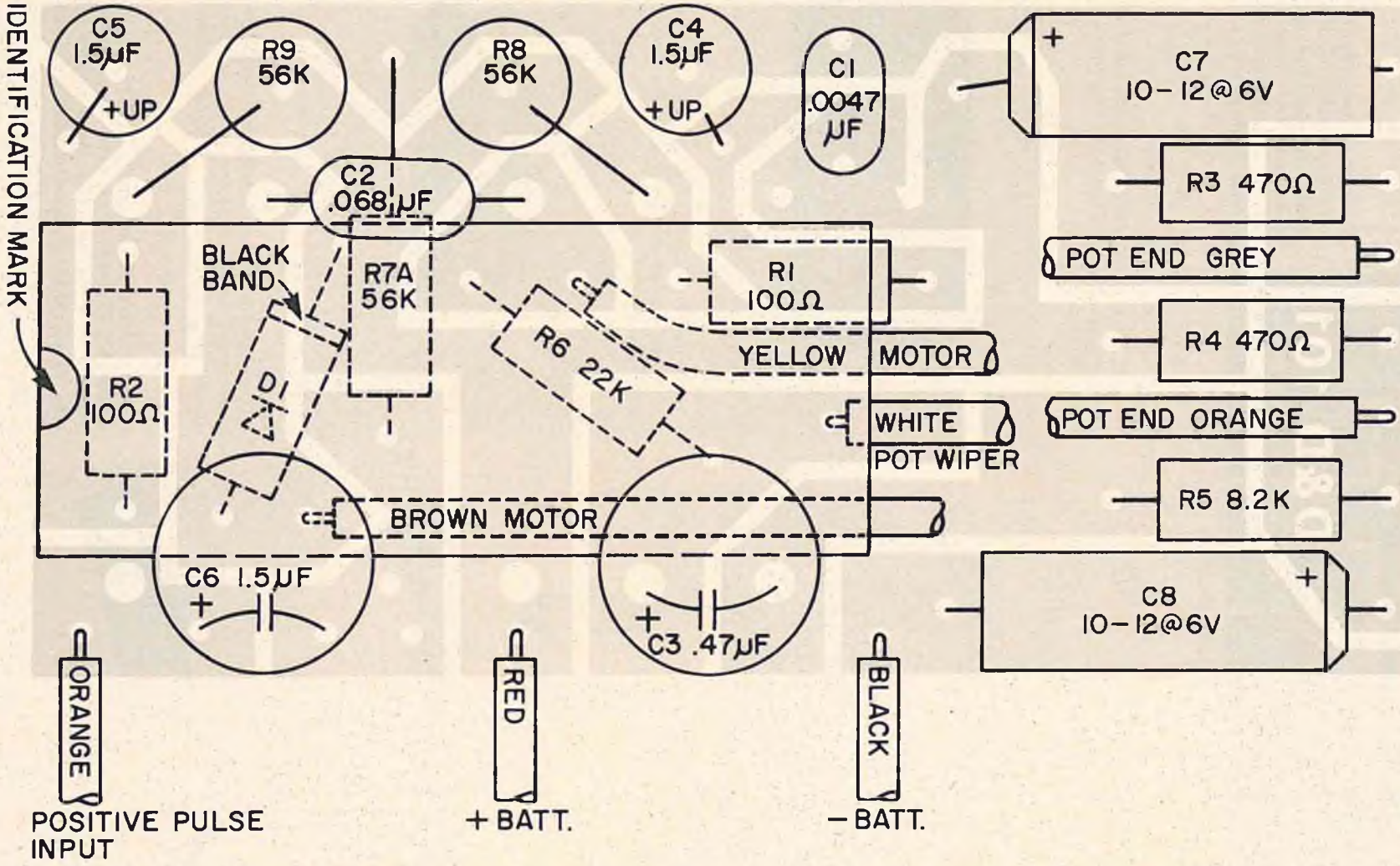
Step 7.

Install the grey and orange wires (about 2" long). Solder those lands.

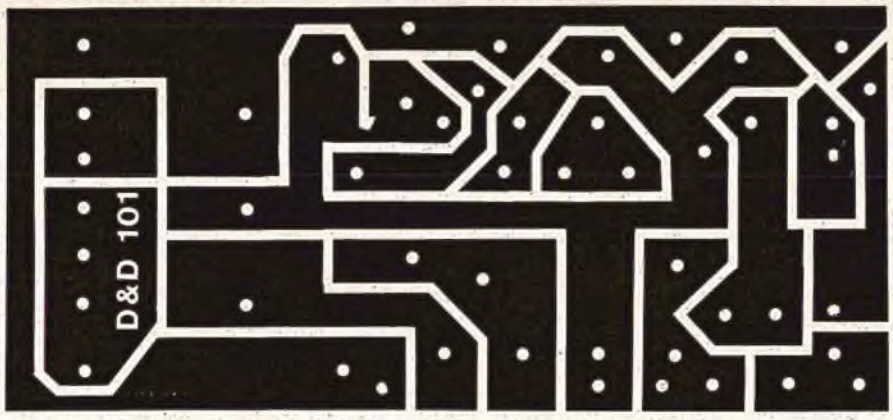
BELOW: The schematic for the D-5 servo. The full page drawing at the right shows the component overlay for a positive pulse input. A partial overlay showing the changes for a negative pulse input is also included with this article.



D5 SERVO SCHEMATIC



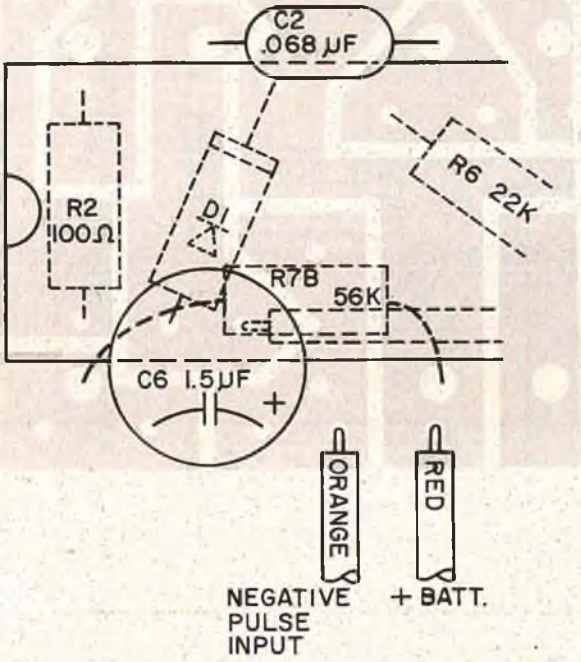
COMPONENT OVERLAY SHOWING POSITIVE PULSE INPUT



P/C BOARD (4 X SIZE)

P/C BOARD (ACTUAL SIZE)

For those who wish to make their own printed circuit boards, the P/C board is shown here four times actual size as well as actual size. Refer to past issues of RCM for details on making your own printed circuit boards.



PARTIAL COMPONENT OVERLAY SHOWING CHANGES FOR NEGATIVE PULSE INPUT.

Step 8.

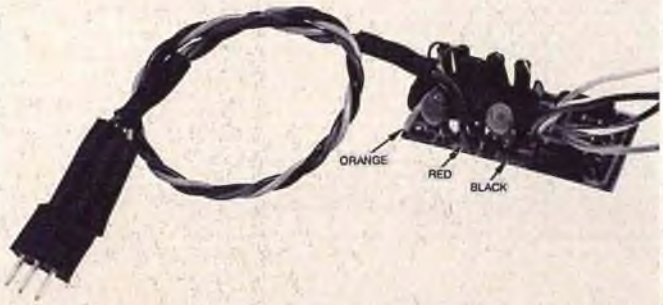
Solder red, black and orange wires into board as shown. Solder wires into plug using heat shrink both on individual wires and in two places on cable.

Step 9.

Install the pot as shown. Use 2-56 by 5/16" pan head screws. Tighten only enough to seat pot. Bend terminals over and trim to length, then tin.

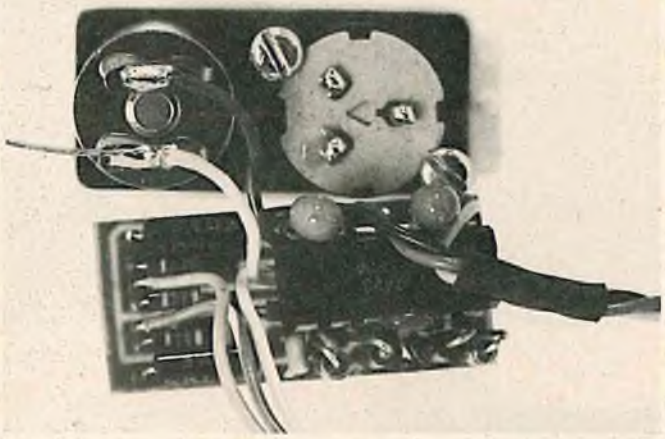
Step 10.

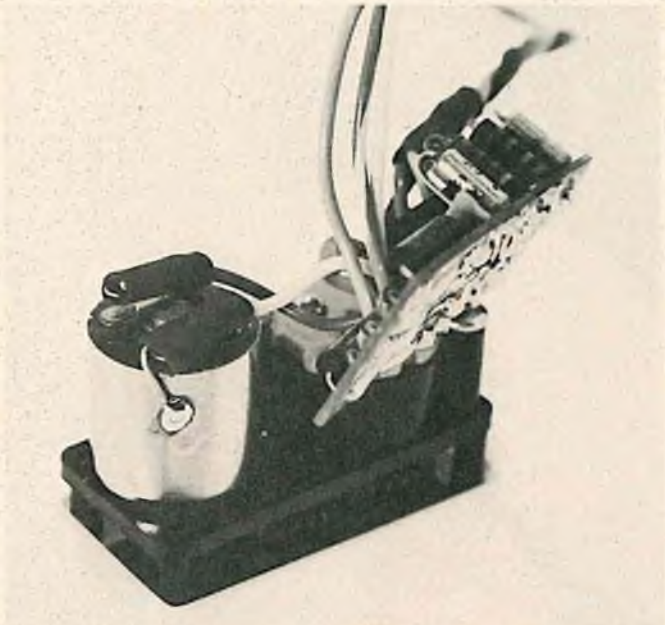
Carefully push pinion on to motor shaft. Spin motor to make sure it is not binding. Screw the motor into place (it's threaded). Screw in only enough to seat it. Align the terminals as shown.



A complete kit of parts (including servo) may be obtained by sending $26.95 plus $1.50 postage and handling to: D & D Electronic Specialties, 1229 N. Lake Havasu Court, Lake Havasu City, Arizona 86403. Arizona residents add 4% sales tax. Save time by sending postal money order or bank draft.

If service is needed on your servo, send it to: Chuck Moses, R/C Electronics, 2817 E. Lincoln, Anaheim, Calif. 92806. Tel: (714) 630-5061.





Step 13.

If your system requires a negative pulse servo, the following changes are required:

(a) In step 1, do not install R7A and plug pin 10 into board where R7A was at edge.

(b) In step 2, do not cut 1 & 2 on I.C., but re-form 2 & 3 as shown.

(c) Install C6 with opposite polarity but in the same holes.

(d) Install the orange signal wire in different hole as indicated — solder.

(e) Install R7B as shown. Solder only after the red wire is installed.

Step 14.

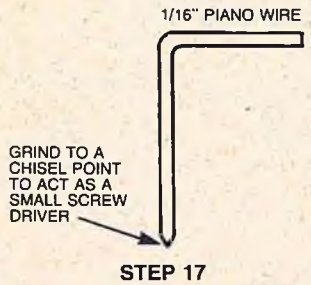
Carefully inspect the top and bottom of the board for shorts. Solder all unsoldered lands and check for bridges, using 8X magnifying glass. Clean the bottom of the board with a solvent such as Trichlorethylene, or alcohol, and a stiff bristle brush.

Step 15.

Fabricate a centering tool as shown or use a jeweler's screwdriver. Now you're ready to fire it up.

Step 16.

With the servo operating (we have faith) and the transmitter in neutral, insert the tool in the output arm hole until you feel it engage the adjustment slot. Apply rotary pressure to the adjustment tool until the servo is centered. To reverse the direction of travel, reverse both the motor and the pot end arms and re-center.



STEP 17

Step 11.

Cut and strip motor wires as shown. The yellow wire is cut and stripped 1/2'' longer to make the ground connection to the motor terminals. Slip heat shrink tubing over the wires and terminals. Shrink the tubing. Solder the extension of the yellow wire to the side of the motor towards the corner of the servo.

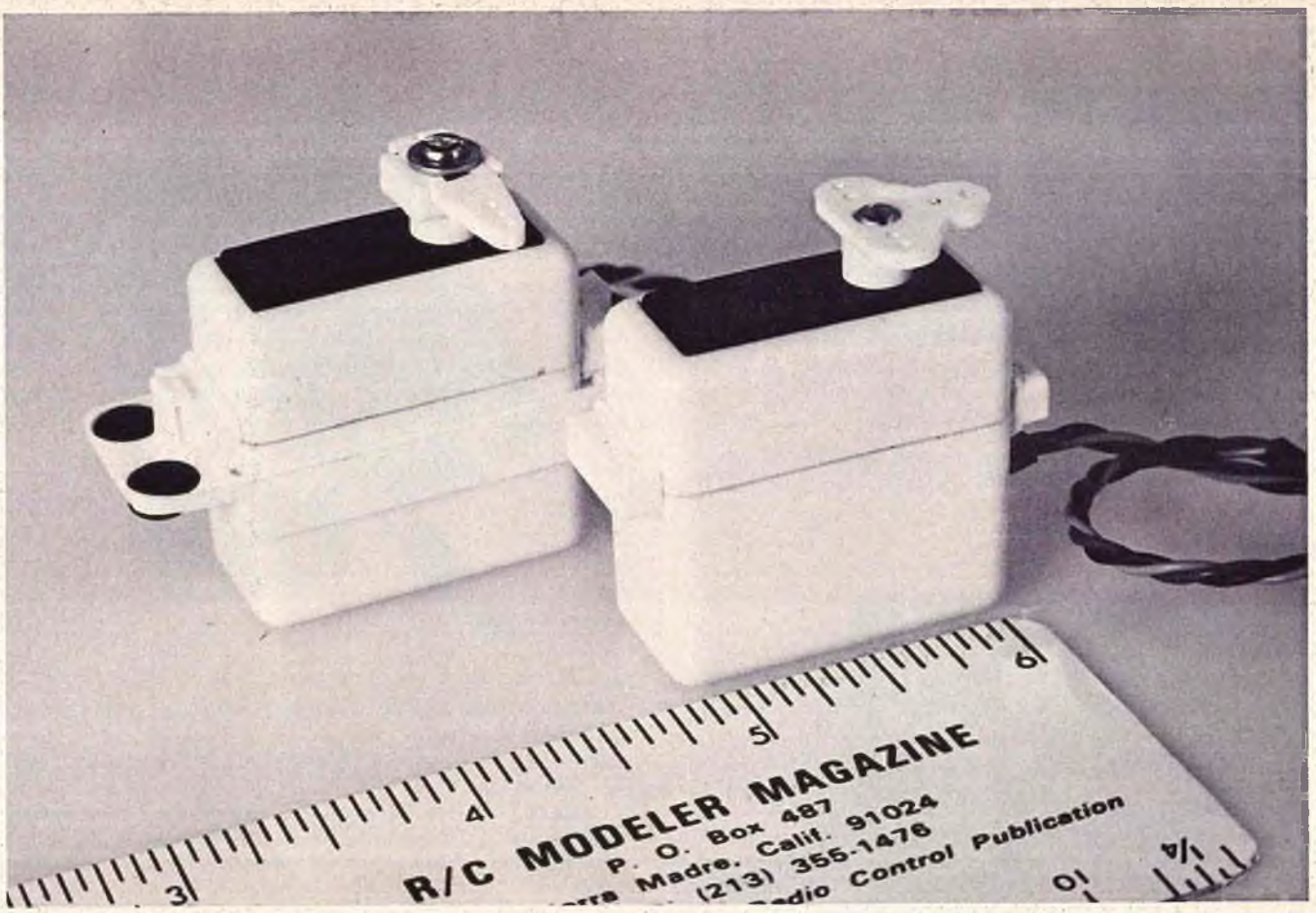
Step 12.

Solder the wires to the pot as shown.

Step 17.

Assemble the servo bottom cover. If the cover won't close completely, it may be necessary to file the lands to remove excess solder build-up, or C3 or C6 may be too high. This may be adjusted by bowing the leads slightly, being careful not to cause any shorts. When the bottom cover closes correctly, clip the servo closed with the end clips supplied in the accessory package. This completes your servo.

Now, aren't you proud?



BILL OF MATERIALS
D & D Servo Kit

Resistors:
R1 — 1 — 100 ohms 1/8W ±10%; brown, black, brown, silver.
R2 — 1 — 100 ohms 1/8W ±10%; brown, black, brown, silver.
R3 — 1 — 470 ohms 1/8W ±10%; yellow, violet, brown, silver.
R4 — 1 — 470 ohms 1/8W ±10%; yellow, violet, brown, silver.
R5 — 1 — 8.2K 1/8W ±10%; grey, red, red, silver.
R6 — 1 — 22K 1/8W ±10%; red, red, orange, silver.
R7A, B — 1 — 56K 1/8W ±10%; green, blue, orange, silver.
R8 — 1 — 56K 1/4W ±10%; green, blue, orange, silver.
R9 — 1 — 56K 1/4W ±10%; green, blue, orange, silver.

Capacitors:
C1 — 1 — .0047μF Monolithic; all marked.
C2 — 1 — .068μF Monolithic; all marked.
C3 — 1 — .47μF Tantalum; all marked.
C4 — 1 — 1.5μF Tantalum; all marked.
C5 — 1 — 1.5μF Tantalum; all marked.
C6 — 1 — 1.5μF Tantalum; all marked.
C7 — 1 — 10μF Tantalum; all marked.
C8 — 1 — 10μF Tantalum; all marked.

Semi-Conductors:
D1 — 1 — Silicon diode (4148); banded end positive or cathode.
I.C. 1 — 1 — SN28604; marked.

Pot:
FP1 — 1 — 5K potentiometer (CTS).

Servo Mechanism:
1 — Dunham's R & R D5.

Miscellaneous:
1 — PC board (D & D-101).
1 — Plug set (Deans).
7 — Pcs. heat shrink tubing 1/2" long, 3/32 I.D.
1 — Set, wires.
1 — motor.

SERVO SPECIFICATIONS

Weight:	25 Grams (.88 oz.)
Size:	1.275"L x .625"W x 1.325"H (excluding output fittings and mounting lugs.)
Thrust:	7.2 in./oz. torque (stall at 2 lbs. at .225" from centerline of output)
Current Drain:	8 ma

"I'll be damned! The thing really works!"

RCM PRODUCT TEST

SURE FLIGHT PRODUCTS AERONCA CHAMP

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

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

● The Aeronca Champ, manufactured by Sure Flite Products, P.O. Box 6497, Buena Park, California 90622, was designed by Vince Micchia. This is a general sport aircraft with a wingspan of 52", a wing chord of 8" for a total wing area of 405 square inches. Utilizing a flat bottom airfoil, it is designed for engines in the range of .10 to .15 cubic inch displacement. Three channels are recommended operating rudder, elevator, and throttle. The basic materials used in the construction are conventional balsa and plywood and the hardware package includes the pre-bent landing gear wire, hinges and control horns, various screws, mounting straps for landing gear plus a tail wheel wire. The plans consist of one sheet measuring 23" x 35" with building instructions included on the plans. Our prototype, ready-to-fly, weighed 40 ounces for a wing loading of 14.3 ounces per square foot. White Solarfilm with Carl Goldberg Models Trim Tape was used for finishing with Perfect Paint used for "touch-up". RCM's prototype utilized a Super Tigre .15 engine with EK Ranger three channel proportional system. A four ounce tank was used. This kit seems to be well engineered in regards to structural strength. Our only change to the kit as designed was to mount the tail wheel bracket to the fuselage rather than to the rudder as shown. Our experience with taildraggers has been such that this type of mounting will prevent any type of tail wheel failure or excessive strain on the rudder. No other changes were deemed necessary. During construction of this model we felt that a brand new modeler would have difficulty in certain areas. There are several duplicate part numbers in the fuselage and, since the wood is not marked, the use of a separate sheet included in the kit is required to identify each part. Die cutting in our particular kit was poor. The fin and rudder parts did not match the plans and considerable re-shaping was also required in the forward fuselage area. When it comes to the flying characteristics of the Champ, this model handles extremely well with no undesirable characteristics. The Center of Gravity shown on the plans should be carefully observed. The model flies very realistically with the .15 but a .19 cubic inch displacement engine would be required to make it fully aerobatic. This aicraft is extremely realistic in the air and one that you will enjoy flying. □

SPECIFICATIONS

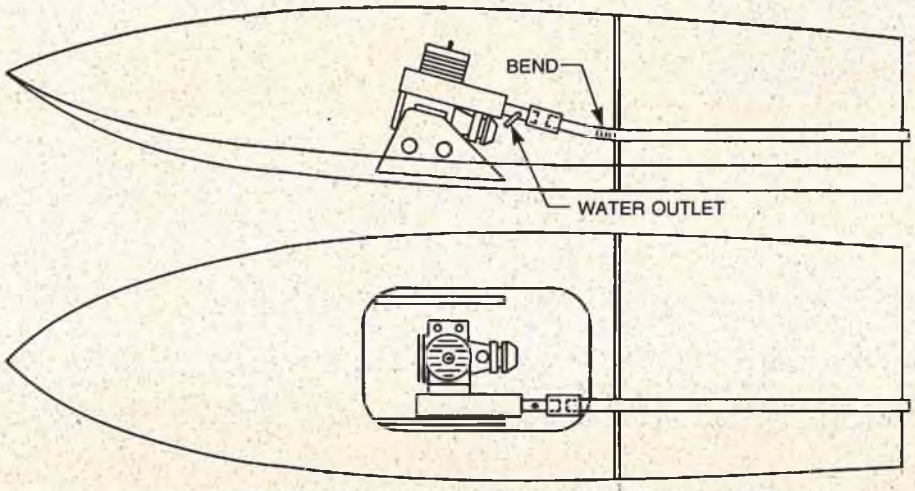
Name	Aeronca Champ
Aircraft Type	Semi Scale
Manufactured by	Sure Flite Products P.O. Box 6497 Buena Park, California 90622
Mfg. Suggested Retail Price	$34.95
Available From	Mfg. and Retail Outlets
Mfg. Recommended Usage	General Sport Aircraft
Wingspan	52 inches
Wing Chord	8 inches
Total Wing Area	405 sq. in.
Fuselage Length	31 inches
Radio Compartment Dimensions	(L) 8" x (W) 3½"x (H) 3"
Wing Location	High Wing
Dihedral	1 inch
Airfoil	Flat Bottom
Wing Planform	Constant Chord
Stabilizer Span	16 inches
Stabilizer Chord (incl. elev.)	5½ inches (avg.)
Total Stab Area	88 sq. in.
Stab Airfoil Section	Flat
Stabilizer Location	Top of Fuselage
Vertical Fin Height	7¼ inches
Vertical Fin Width (incl. rudder)	6½ inches
Mfg. Rec. Engine Range	.10 — .15
Recommended Fuel Tank Size	4 oz.
Landing Gear	Conventional
Recommended No. of Channels	3
Recommended Control Functions	Rud., Elev., Throt.
Basic Materials Used In Construction:	
Fuselage	Balsa and Ply
Wing	Ply and Balsa
Tail Surfaces	Balsa
Hardware Included In Kit	A complete package of hardware
Plan Size	23" x 35" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	No
Construction Photos	No
Kit Includes	Die Cut Parts
Mfg. rec. flying weight	NA
Wing loading based on rec. flying wt.	NA

RCM PROTOTYPE

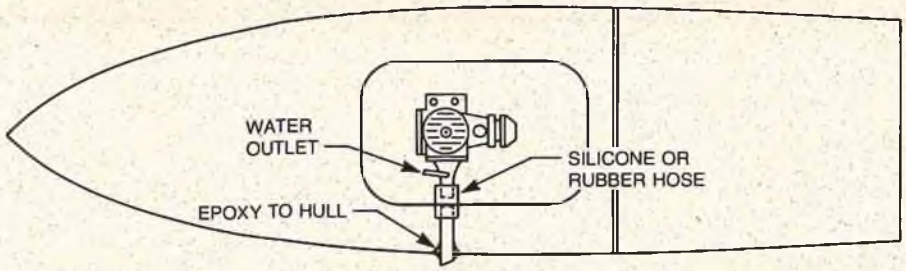
Weight, ready to fly:	40 oz.
Wing Loading	14.3 oz/sq. ft.
Covering and finishing materials used	Solarfilm, C.G. Trim Tape
Engine Make and Disp.	S.T. 15
Muffler Used	No
Radio Used	EK Ranger
Tank Size Used	4 ounce

EXHAUST ROUTING
FOR RC RACING BOATS

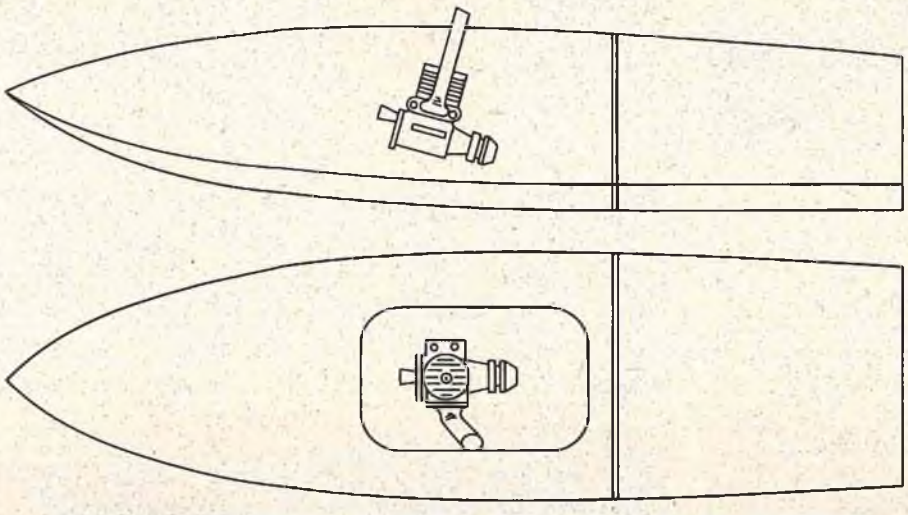
BY GLENN CUPIT



DEEP-V MUFFLER INSTALLATION (CLOSED-FRONT SEMCO MUFFLER)



DEEP-V THRU-SIDE SET UP



DEEP-V ONE PIECE ELBOW EXHAUST OUT TOP OF ENGINE COMPARTMENT

What to do with the exhaust is a problem that must be faced by all R/C boat builders. To get the gooey exhaust mess out of the boat, often requires exhaust systems not found in any other type model. (We will not discuss tuned pipes here, as their nature dictates minimal changes in placement.) Mufflers are upon us, however, still are not universally required. Our suggestions will include both muffled and unmuffled installations.

Exposed engine boats (most uncowled hydros) may simply let the side exhaust expel over the side. If anything, a short extension is all that is necessary to keep exhaust oil out of the boat. Muffling this installation is equally easy as many aircraft mufflers can be adapted. My favorites are: JCM Airfoil, Du-Bro, and Semco.

Some shallow freeboard monos can also use these same techniques. Rear or front exhaust adds special problems for muffling, as special custom adapters are required in most cases (ST X-40, OPS 40, KB SR III 40). Most front or rear exhaust set-ups simply use a short length of tubing, an elbow, exhaust throttle, or nothing at all. Deep V's require the most planning and care. Any exhaust leakage in an enclosed installation below deck level will adulterate the intake fresh air and cause a great reduction in power.

The simplest routing for an unmuffled side exhaust is through the left side of the hull. Few commercial exhaust extensions are long enough to reach through the hull in one piece. Again, most will require custom fabrication, but it is well worth the effort.

When designing and building your

exhaust system, keep in mind the number one obstacle to overcome: Vibration! Heat is a secondary and minor problem when compared to the extreme vibration which will quickly shake apart, loosen, and fracture exhaust, hull, or engine! For this reason, I am suggesting a rule never to be broken: **Do not allow the exhaust to touch any part of the boat unless there is a complete break in metal-to-metal from engine to hull.**

One method is to tightly mount a flange through the side or transom and connect to the exhaust extension or elbow with silicone or rubber hose.

Rubber? Yes, rubber automotive heater hose works fine. The trick is to run the water outlet into the exhaust on the engine side of the hose. This cools the exhaust sufficiently enough to prevent burning of the hose. I feel you should always run the water outlet into the exhaust of an enclosed installation (except tuned pipes, as water would be forced back into the engine).

In transom exhaust set-ups, a solid straight piece of thin wall aluminum or brass tubing should be fastened (epoxied) solidly to the transom and radio compartment bulkhead. Connect the rubber tubing to the tailpipe from the engine elbow or muffler. Since the engine is usually on about a 10 angle to the keel, a bend is necessary somewhere in the exhaust system. Don't succumb to the temptation to put this bend in the rubber hose! This will cause a premature failure of the hose. Instead, bend up the muffler exit pipe or the tailpipe forward of the bulkhead. Use clamps (ty-wraps work well) on each end of the hose.

Use silver solder on the 1/8'' brass tubing into the exhaust pipe ahead of the hose for the water outlet. This is a little added insurance in case of loss of water which would melt soft solder.

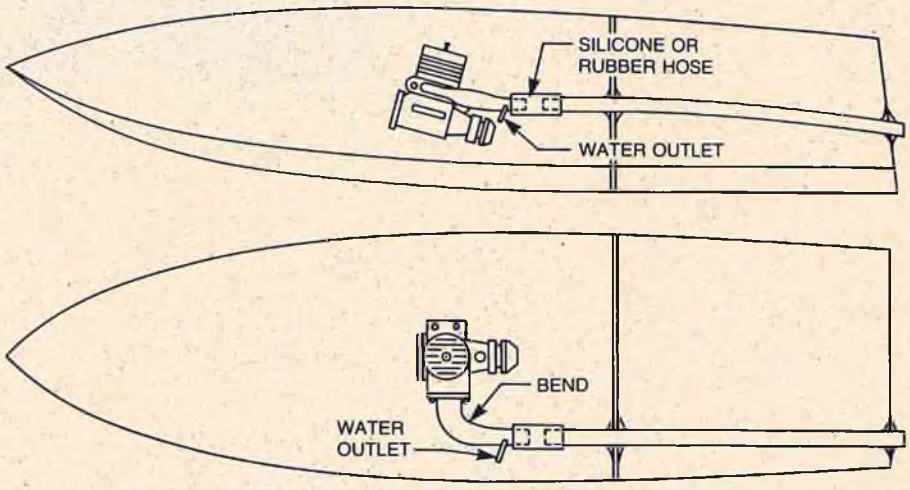
Another alternative in a Deep-V is to run the exhaust up and out the top of the engine compartment. This requires a top exit muffler such as Semco makes, or a fabricated exhaust pipe. The thing to remember here is to extend the exit point well above the deck to preclude the possibility of exhaust gasses mixing with the intake air in the engine compartment.

Copper plumbers elbows, silver soldered to brass or stainless flanges made to fit the exhaust port, work well for fabricating bends from the engine to the rubber hose. Keep this pipe as short as possible; long pipes hanging from the engine tend to fatigue and crack. If your engine does not have holes tapped in the case for muffler installation, don't despair. Simply use Semco's neat worm type clamps, cut to length and tap the flange you just made, 4-40 or 6-32. Fasten the ends of the clamp to the flange and you're in business. The heat from silver soldering will warp thin flanges and they will not seal properly against the exhaust when tightened. Use no **less** than 3/16'' brass or 1/8'' stainless for flanges. (I prefer 1/4' stock.) After making the exhaust stack, surface the mating side with a good flat file, then rub back and forth dry on progressively finer grits of wet-or-dry paper. (Start with 220, finish with 400.) It is a good idea to also surface the exhaust port on the crankcase for a good seal. A flat steel surface, with no nicks is needed. (A table saw, band saw or drill press tables work fine.) Sandpaper is placed on this with the rough side up. The part to be surfaced is rubbed across the paper, cleaning often. With a little practice, holding the item so as not to rock, a very satisfactory finish can be achieved. No gasket is necessary between the exhaust pipe and engine. Loctite all screws!

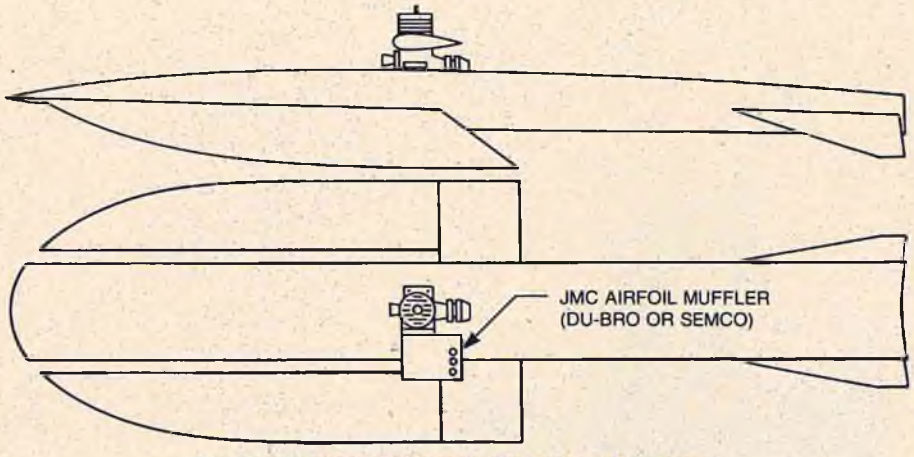
Keep the exhaust pipe diameter as large as possible from the engine to the transom so as not to reduce power. I suggest a minimum of 5/8'' tubing on .40's and 3/4'' tubing for .60's. Most hardware stores stock this aluminum tubing in 6 foot lengths.

If you use an exhaust throttle, all of the above suggestions still apply. Simply consider the exit side of the exhaust throttle as the exhaust port and begin fabrication from there.

Happy Boating! □



DEEP-V WITH FABRICATED ELBOW



EXPOSED ENGINE INSTALLATIONS ABOVE DECK

FOR OLD TIME'S SAKE

BY RANDY CARMAN

Old Time Eagles Do It Again!

The Old Time Eagles of Jersey, hosted their Fifth Annual Old Timer with R/C Assist Contest on July 10th at Lakehurst Naval Air Station, Lakehurst, New Jersey. The weather was not cooperating at all in the morning, which kept a few fliers away. Rain, clouds, fog, and drizzle made for many quick flights. Towards mid-afternoon, however, the sun broke through and thermals were being picked up by many pilots. The contest was well run by Dave Jaggie. The following were the cash prize winners:

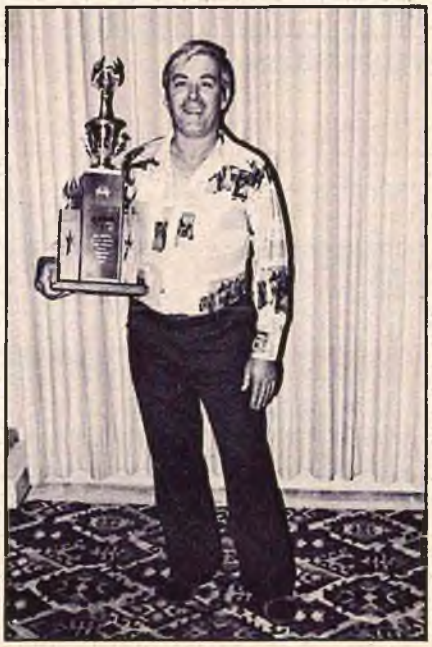
Class A
1st — Woody Woodman (Zipper).
2nd — Dave Jaggie (American Ace).
3rd — Joe Beshar (Jr. Fox).

Class B
1st — Vince Bonnema (Clipper Mk I).
2nd — Al Schwankert (Sailplane).
3rd — Larry Fair (Clipper Mk I).

Class C
1st — Bill Green (Playboy Sr.).
2nd — Gary Montana (GHQ Sportster).
3rd — Dave Jaggie (Playboy Sr.).

Antique
1st — Hugo Mercoli (Dallaire Sportster).
2nd — Gary Montana (GHQ Sportster).
3rd — Al Schwankert (?).

Gary Montana won the RC Grand Champ Award. That's the first time we've seen him smile.



Your editor and Johnny Clemens, AMA President. Johnny said he's the one with the flat chest! (On the right or left?)

Texaco
Cliff Schaible (who else?) — flying a Lanzo Record Breaker (what else?).

.020 Replica
Dave Jaggie flying a Clipper Mk II.

☆ ☆

S.A.M. Champs A Big Success

"The S.A.M. Tenth Annual Champs are history." – – Joe Beshar, S.A.M. President, Aug. 2, 1976.

Boy, what a Champs, too! 191 entrants from twenty-seven states, Canada, and New Zealand (!) converged on Wright Patterson Air Force Base in Dayton, Ohio for three hectic days of flying and fun!

To kick things off, on July 30th the traditional bean fest was held at Wittenberg University's Rathskeller in Springfield, Ohio. The beer flowed like Niagara, and if, Joe B. and a South Jersey modeler, Bill Green, hadn't made a quick dash to the store, there would have been no beans! Ah yes, beans, saltines, and beer! The winning combination to get things moving!

It was a good time to renew old friendships and make new ones. Clubs such as SCIF, SCAMPS, Central Ohio Free Flighters, Old Time Eagles, SPOTS, South Shore Modelers, and SAM 23 swapped information. There were many notables present too - - - Sal Taibi, Chet Lanzo, Leon Shulman, to name but a few.

That big man from Maryland, Danny Sheelds, had a surprise for all in the form of movies of contests held during the late thirties! They were something to see! Teenage kids attempting to fly their balsa birds with crabby engines! Ground loops galore! Danny spent years (he claims thirty, but he doesn't look a day over 29) hunting for these remarkable films. Many thanks, Dan, for an hour of wonderful nostalgia.

Saturday, at 6:00 a.m. (Yawn!), Woody Woodman, the R/C C.D., arrived at Wright Field to hold the first round of Texaco flights. He sat alone in the dark for some time until the entrants pulled in. Dawn comes a little later in Ohio than Woody had expected. The weather was a bit threatening at that hour, but later in the day it cleared and was gorgeous!

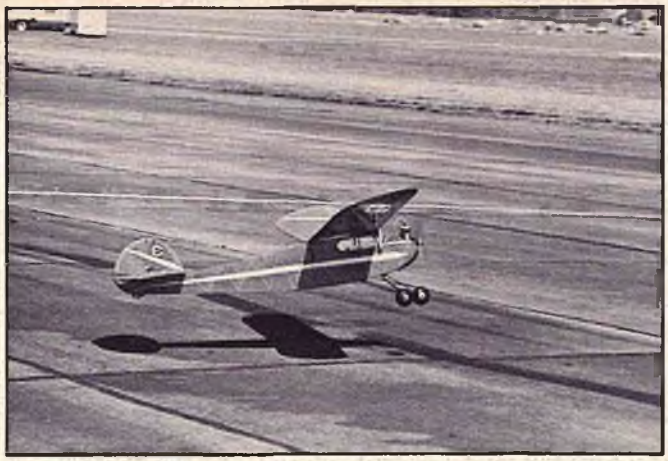
By 9:00, the flying was well underway, both R/C and free flight. By 10:00, the runway was jammed with spectators tripping over airplanes and contestants! A few lengths of rope would have come in very handy! By 11:00, everyone was walking cross-legged looking for a bush! Many thanks to those coach owners who graciously loaned their facilities to those in need.

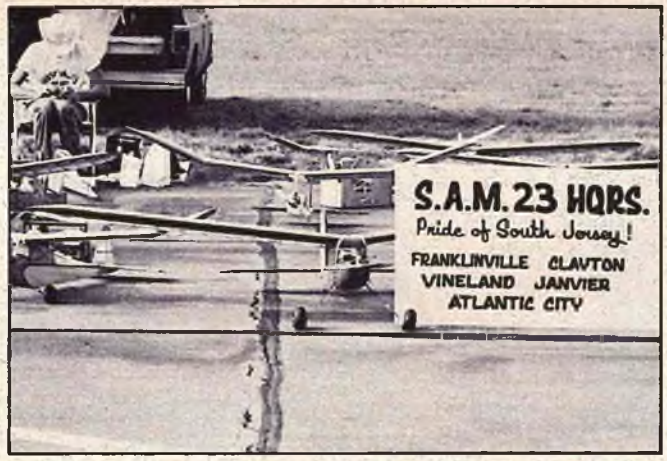
By noon, the skies were hazy blue with a few thermals scattered about. Joe Beshar,

text to page 118

Tom Acciavatti - - - winner of the Beshar-Woodman Perpetual Award.

1ST ROW: (L) Joe Beshar and John Worth look rather pleased to surround Miss SAM Champs, Pat Kraph. It seems that most mishaps occurred when she was at the field - - - wonder why? (R) Jack Van Dusen at the Old Time Eagles contest with his diesel powered Zephyr. 2ND ROW: (L) Andy Anderson, Mike Granieri, George Haley, and Jim Clark display their Squadron of MG's. Mike designed the MG in 1935 and flew it in the 1936 Nats. (R) Andy Anderson and his MG. 3RD ROW: (L) A true study in concentration! Cliff Schaible gives Andy Anderson moral support. (R) Jim Clark's scaled down MG is a beautiful hunk of balsa and silk! LEFT: Howard Carman assists George Haley of Somerville, N.J. with his full size (10 ft. span) MG.





1ST ROW: (L) Bob Von Konsky of San Jose, California and SAM 21, showed a pretty take-off with his Anderson Spitfire Powered Powerhouse. (R) Guess who?! 2ND ROW: (L) Esio Grassi helped to advertise the Bicentennial with his pretty red, white, and blue Miss America. (R) Tom Acciavatti proudly displays his bright orange, .40 powered Clipper MK I. Tom scaled up 20% to attain 960 square inches of wing area. 3RD ROW: (L) John "Daddy Warbucks" Pond shows off his vivacious Viking with a Merco .61. Would you believe it flies? (R) Cliff Schaible with two Lanzo's! Chet and the Record Breaker (Chet's the one on the left). RIGHT: Mr. Beshar's lesson in dethermalization!

RCM PRODUCT TEST

GMC MODELS HALF-A-CHAOS

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

● GMC Models, 28062 Glasser Street, Canyon Country, California 91351, is the manufacturer of the 1/2A Chaos designed by Ted Bozanich and George Chabot. Available direct from the manufacturer and from retail outlets. The 1/2A Chaos has a retail price of $24.95. Designed as a 1/2A Pylon racer, this machine has a wingspan of 36¾" and a total wing area of 206¾" and is designed for .049 to .051 cubic inch displacement engines, a one ounce tank, and two channels of control with the third channel optional for sport flying. The 1/2A Chaos uses balsa and ply in the fuselage, foam and balsa in the wing, with balsa tail surfaces. A spinner, motor mount, canopy, control horn, and dowels are included in the kit. There is one plan sheet measuring 20½" x 28¼" with building instructions included on the plans sheet in addition to a one page instruction manual. RCM's prototype of the 1/2A Chaos weighed 21 ounces ready-to-fly for a wing loading of 14.6 ounces per square foot. Powered by a Cox TD .051 engine our Chaos was covered with Flite Cote, Solarfilm, and trimmed with DJ's Trim Tape. An RS radio was used operating ailerons and elevator. The kit was very complete and all the parts were rubber banded together in separate bundles for ease of identification. All of the necessary hardware is included in the kit except the skid for the fuselage and wing. We would, however, recommend that the manufacturer use a 1/4" x 1/2" x 24" strip of hard balsa in the wing for reinforcement instead of a glass tape spar. With regards to the flight performance of the 1/2A Chaos, it was excellent in all respects and, for sport flying, will loop as fast as you can blink, will do axial rolls extremely rapid, and flies inverted almost as well as it does upright. In addition, it is an excellent 1/2A pylon racer, for which it was designed, although at high speed it does have a tendency to fishtail. It has a very flat glide during power-off conditions. An all around excellent 1/2A aircraft for pylon racing or general sport flying, although we would not recommend this machine for the beginner due to its high performance characteristics. □

SPECIFICATIONS

Name	Half-A Chaos
Aircraft Type	1/2A Sport/Pylon
Manufactured by	GMC Models 28062 Glasser St. Canyon Country, California 91351
Mfg. Suggested Retail Price	$24.95
Available From	Mfg. and Retail Outlets
Mfg. Recommended Usage	Competition Aircraft
Wingspan	36¾ inches
Wing Chord	6¼" at center
Total Wing Area	206¾ sq. in.
Fuselage Length	27⅝ inches
Radio Compartment Dimensions	(L) 7" x (W) 2½"x (H) 2"
Wing Location	Low Wing
Dihedral	1/2 inch
Airfoil	Semi Symmetrical
Wing Planform	Double Taper
Stabilizer Span	14 inches
Stabilizer Chord (incl. elev.)	3¾ inches
Total Stab Area	49 sq. in.
Stab Airfoil Section	Flat
Stabilizer Location	Top of Fuselage
Vertical Fin Height	4 inches
Vertical Fin Width (incl. rudder)	4¼ inches (avg.)
Mfg. Rec. Engine Range	.049 — .051
Recommended Fuel Tank Size	1 oz.
Landing Gear	Tricycle
Recommended No. of Channels	2 — 3
Recommended Control Functions	Elevator and Ailerons
Basic Materials Used In Construction:	
Fuselage	Balsa and Ply
Wing	Foam and Balsa
Tail Surfaces	Balsa
Hardware Included In Kit	Spinner, Motor mount, Canopy, control horn, dowels
Plan Size	20½" x 28¼" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (1 page)
Construction Photos	No
Kit Includes	Shaped Parts
Mfg. rec. flying weight	20 — 24 ozs.
Wing loading based on rec. flying wt.	13.9 — 16.7 ozs.

RCM PROTOTYPE

Weight, ready to fly:	21 oz.
Wing Loading	14.6 oz/sq. ft.
Covering and finishing materials used	Flite Cote, Solarfilm
Engine Make and Disp.	Cox .051
Muffler Used	No
Radio Used	RS
Tank Size Used	2 ounce

WINDWARD

REVISITED

Miss Terry Seitz, at left, poses with author's modified Windward. Terry flies RC quite capably and has just finished an ABC Scrambler FF. She is a senior at Poway High School in California.

BY PAUL DENSON

In 1969, Mark Smith introduced the Windward glider to the soaring fraternity, undoubtedly one of the best all-around soaring planes ever kitted. This kit has been built by the hundreds, no by the thousands, by novices and experts alike, and it is hard to believe that a kit this easy to build, can fly as well as it does.

It was also in 1969 that I learned to fly RC. In fact, I scattered balsa wood all over San Diego county learning and since then I have built 9 Windwards. Come to think about it, who hasn't built a Windward? In the years I spent flying at Torrey Pines, I have seen more people show up with Windward's than any other single plane. It is a plane for the novices, it is a plane for the fun-flyer and it is a plane for the expert. For example, Rod, Mark's father won the Soaring Nats in 1971 with a Windward. Also, in 1971 at the West Coast Regionals, both Kelly Pike and Rod took first in separate events with Windwards. I attended practically every large contest on the West Coast in the early 1970's and the Windwards were there. They competed and they took home their share of the hardware.

As time went by, the planes grew larger as the pilots gained experience. Due to LSF influence, speed was introduced, the contest changed and the planes started changing. They loaded the large floaters with more and more weight, pushing them beyond their capabilities trying for that last ultimate mile per hour in speed. Design had to change.

Today those 10, 12, and 14 foot giants have literally become machines, honed to extract the slightest amount of lift from a thermal, then speed off looking for another bit of lift. The planes are soaring machines flown by LSF Level III, IV and V experts. Most of these planes carry ailerons, spoilers, flaps and some have a retractable wheel to cut down air resistance. Others are even able to drop water ballast.

It has finally become necessary to divide the planes into two groups, the Standard Class with wingspans under 100 inches and limited to two servos, and the Open Class that has no restrictions short of the FAI rules.

After a short sabbatical from soaring, it would be expected that I would pick an exotic flying machine to herald my return to the soaring fraternity. What was the plane? Yep, you guessed it, a Windward. The reason was because what was there in the Windward that put it in a class by itself in the early 70's, is still there and since fun flying is my thing, why not the best fun flyer being kitted.

It is a fantastic plane for learning, it allows the novice to make mistake after mistake and never lets him down, it is tough and can withstand the bumps, knocks and bruises that a novice puts it through when learning the techniques of flying directly at him for landings. When he puts it into positions that a sailplane should never be in, just take your hands off the stick and she rights herself. Ask any expert what plane you should build for your first attempt, and he will probably spend the next hour or so bending your ear extolling the virtues of the Windward.

The one here is my number nine for me. The first one also was powered with an .049 - - - in fact a TD. Where we flew inland, far from the slopes, winches were almost unknown. We heard rumors that the Harbor Soaring Society up in Costa Mesa had one, but no one had ever seen it. We

The old Apprentice Senior Citizen (ASC) hisself.

even tried, quite successfully, towing up the gliders with Jim Pike's 1955 T-Bird convertible. High starts in those days were similar to those recommended by Frank Zaic in his **Model Glider Design** - - - two 50 foot lengths of 1/4" brown rubber and 300 feet of fish line. After a month's exposure to the sunlight, the rubber was mostly knots. I got my first 30 minute thermal off that high start. It wasn't a Windward this time, but an unkitted champion — Willy Richard's 'Gus'.

Number 2 bit the dust at a monthly contest sponsored by the Harbor Soaring Society. In a day of disaster, my son who was learning to fly stashed No. 2, I crunched my entry, borrowed a friend's Windfree and proceeded to strain it through the fence around the tennis court. Le Gray used the old axiom on me about getting thrown from a horse and let me fly his "foamy" to get in my third round so the contest wouldn't be a complete loss. Today, I know why Le let me use it, as I remember it was the most gosh awful looking thing and no matter what I did to it, it couldn't have looked worse, Thanks again, Le!

Number 3, which weighed in at 24 ounces, was lost when its wing, with balsa spars, folded while being towed up an experimental winch.

At the North-South contest in Bakersfield, California on an icy cold February day in 1972, Windward Number 4 hit an up-going winch line, did a 360° flat turn, didn't even hesitate, but just kept on going. Upon return through the winch area (dumb), a winch line fell across the plane and dragged it post haste to the ground. Later, during the same meet, it was destroyed by a radio glitch, better known as pilot error.

It was discovered about this time that a strong shove on the rudder of a plane with a wheel could make it ROG out over the cliff at Torrey Pines. Right, Number 5 had a wheel and became an ROG'er.

Number 6 weighed 36 ounces, just slightly over 1 kilogram, and was designed for a game at Torrey Pines called "Hit the Beverage Can". The idea was to launch, gain altitude, come inland from the edge of the cliff, turn and do a touch-and-go and at the same time try to knock over a stack of two beverage cans with your wing. After a day of this, the average glider disintegrated. Now you see why it weighed 36 ounces, armor plated leading edges are heavy.

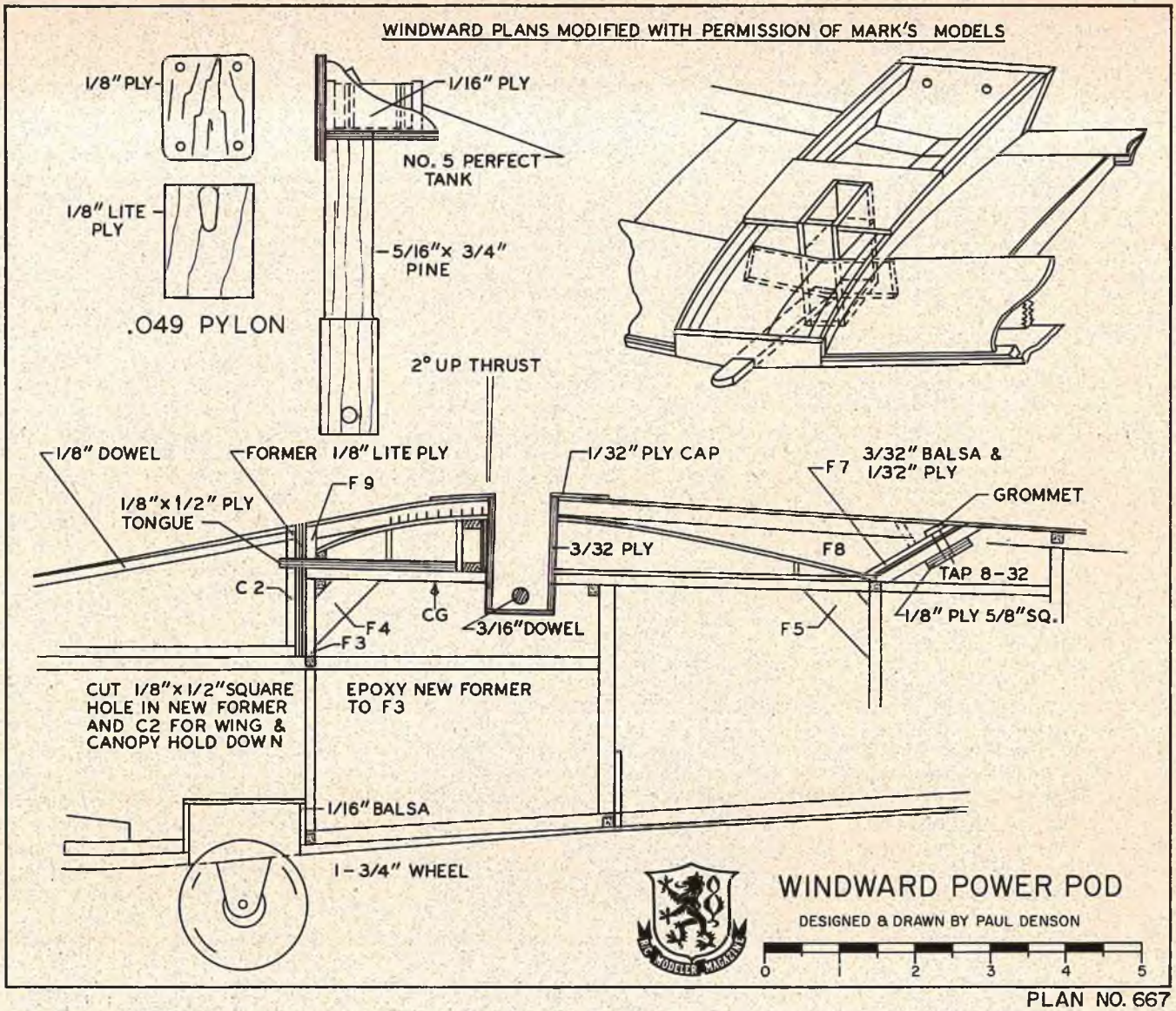
Numbers 7 and 8 were built for other people, which brings us to Number 9.

We recently moved to a new mobile home. I am sure the fantastic hill just across the street from the park had absolutely nothing to do with our selection of this location, particularly since the hill faces the prevailing westerlies that blow in this area. I decided I must join the two hawks who live somewhere up there. There are no roads to the top and the fact that I am an Apprentice Senior Citizen slows down my inclination to climb up there, so how else — back to the .049 power.

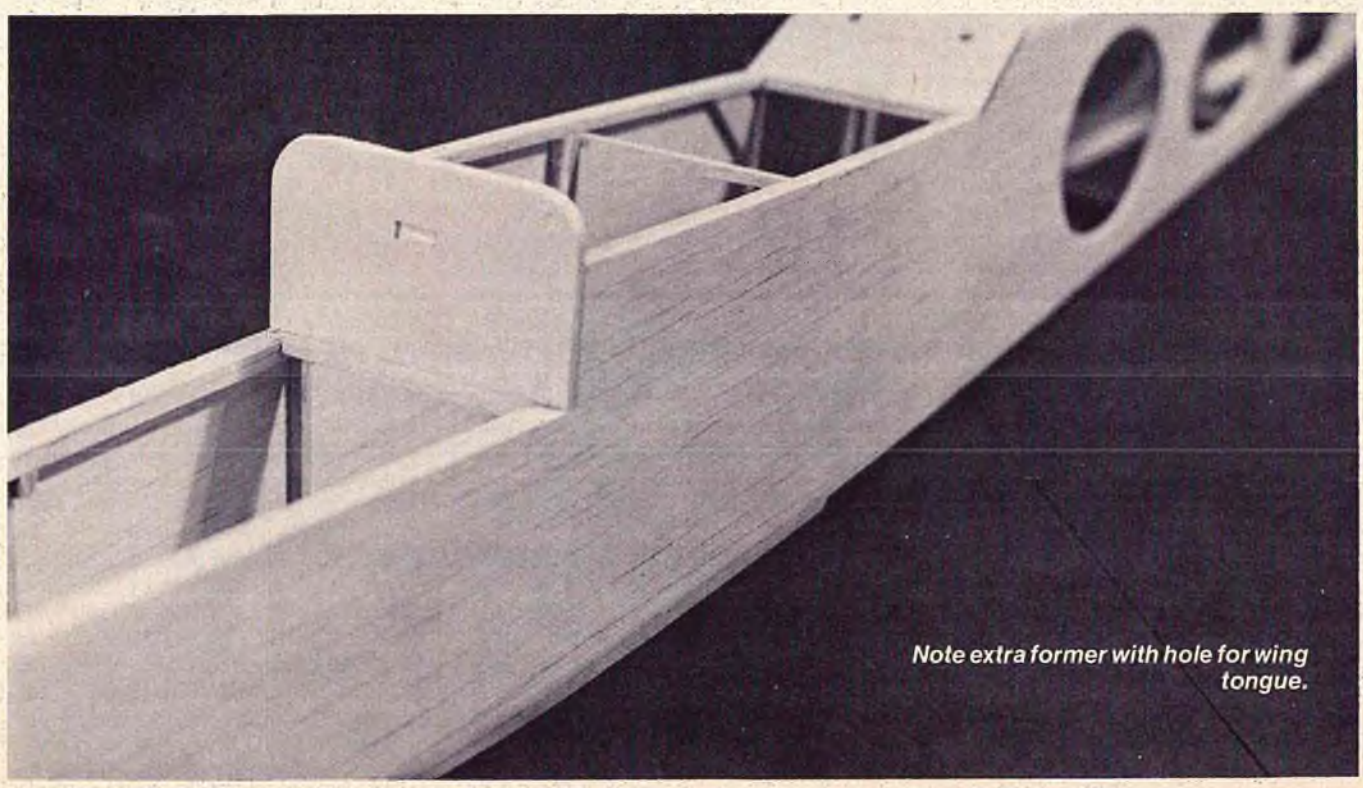
The group I fly with frown, no, let's make that stronger, they stomp on power planes, which for some reason or another cause the loss of flying fields, so I must have a way to completely hide the fact that this plane has ever seen an engine. I pull out the power-pod, drop in the wing plug, scrupulously clean off the castor oil and spray it with an under-arm deodorant and take it out to the field for a turn or so on the winch and high start. When asked about the hole in the top of the wing, I respond, "Oh! I put lead shot in there for ballast." This seems to satisfy most. Why the wheel? It serves a two-fold purpose. Did you ever power ROG a glider? Try it, it is fun! And when I come down from the hill, among the hawks, I can land in the street in front of our home nice and quiet, disturbing no one. Another modification to the Windward is the removal of the wing hold-down dowels. The wing now has a tongue on the leading edge and two 8-32 nylon bolts that hold down the trailing edge,

FULL SIZE PLANS AVAILABLE — SEE PAGE 189

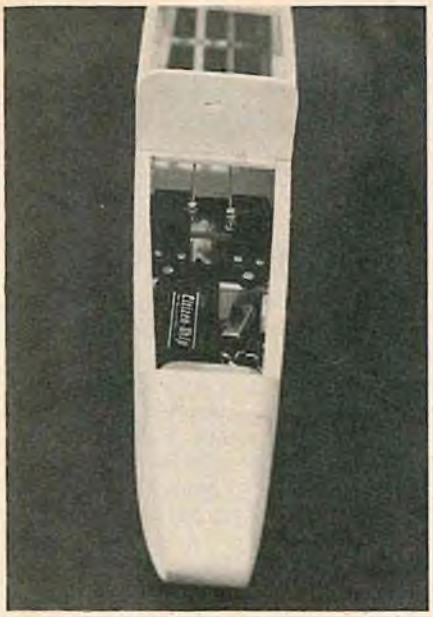
WINDWARD PLANS MODIFIED WITH PERMISSION OF MARK'S MODELS

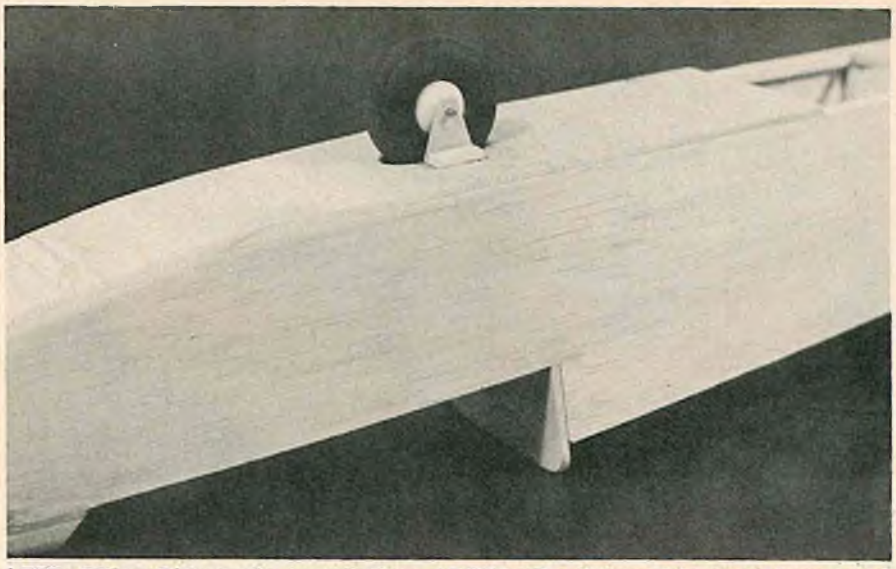


PLAN NO. 667

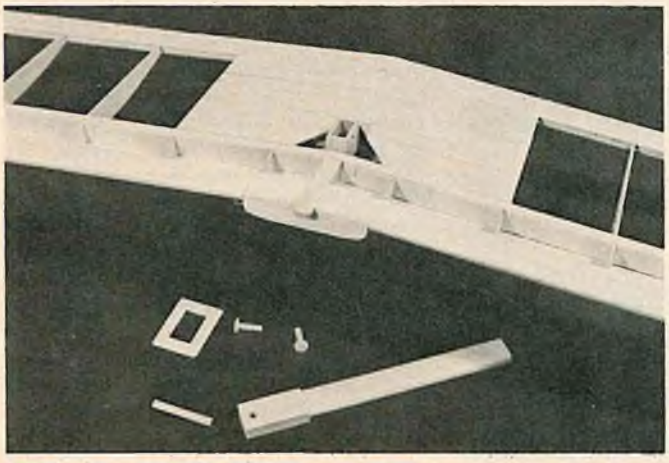


Note extra former with hole for wing tongue.

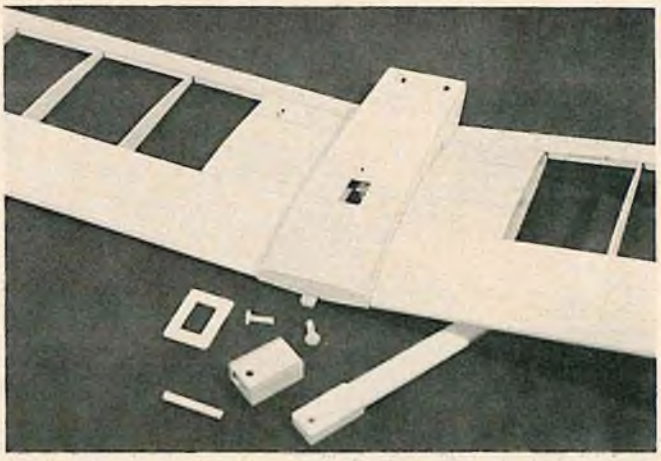




LEFT: CitizenShip radio installation. ABOVE: Don't forget to use plywood at wheel installation.

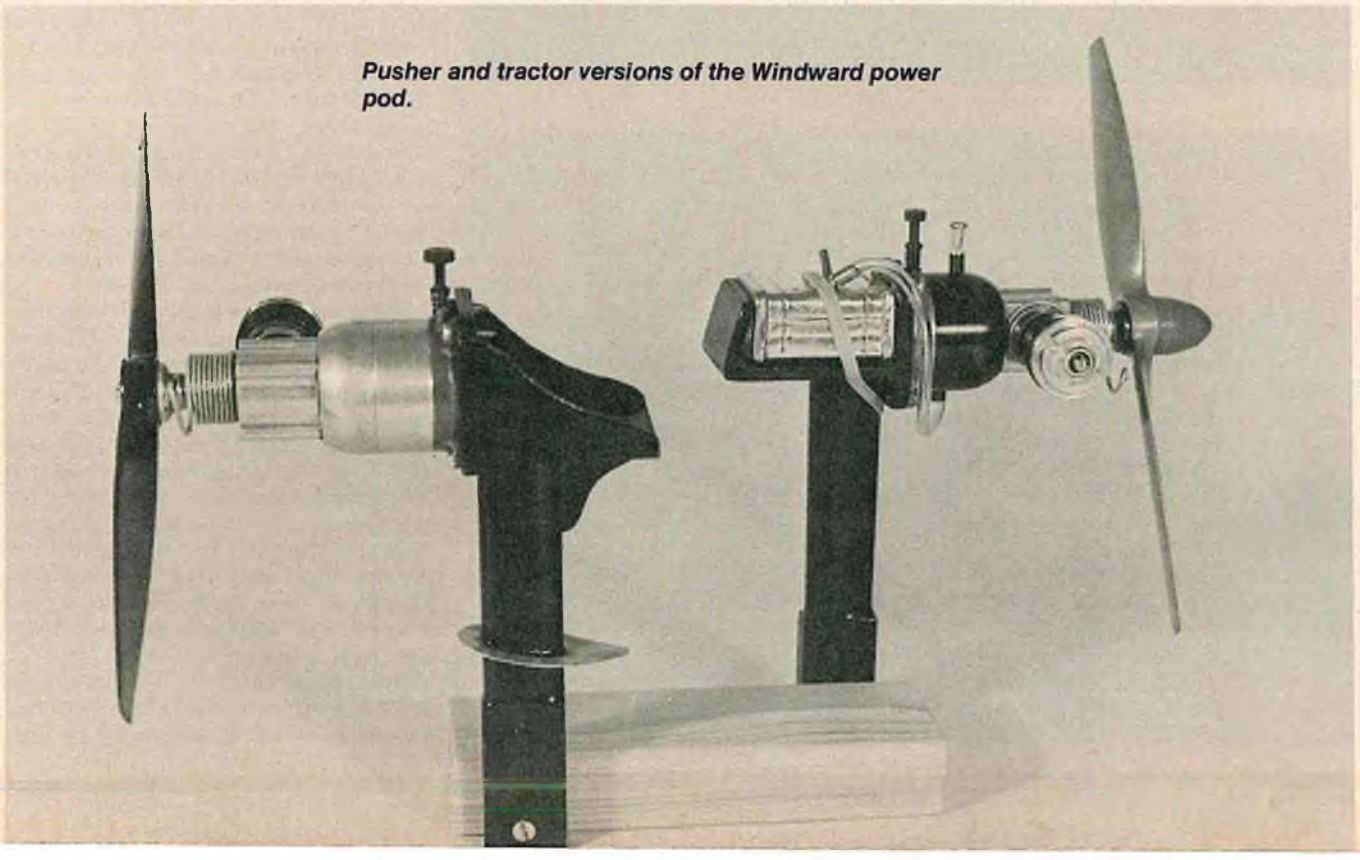


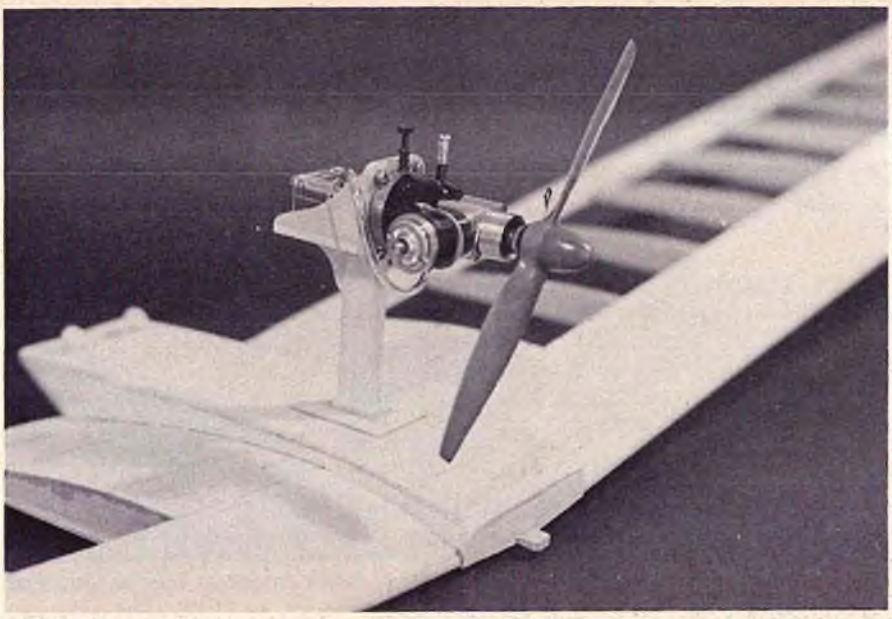
View of underside of wing showing hold-down tongue, power pod box, and power pod pylon.

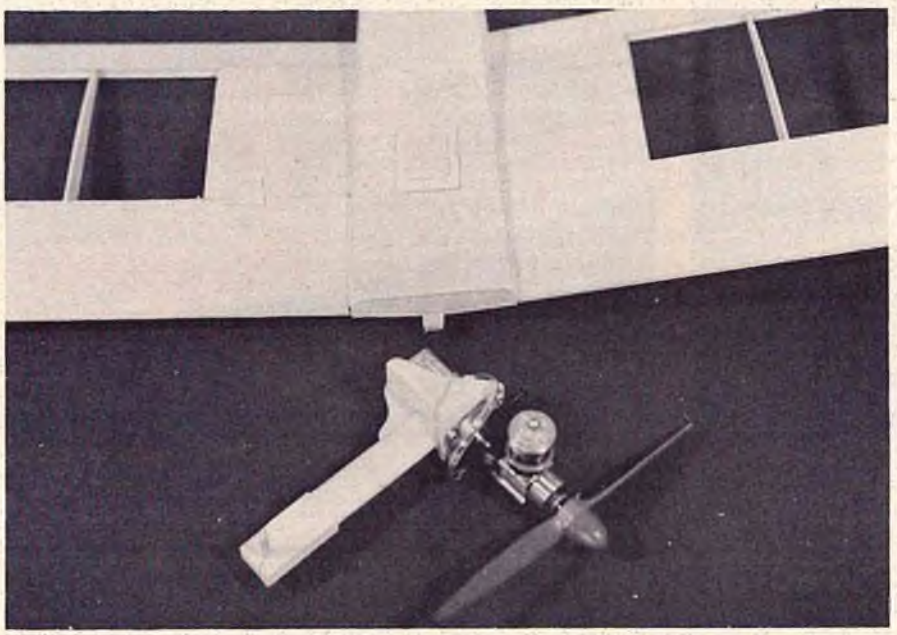


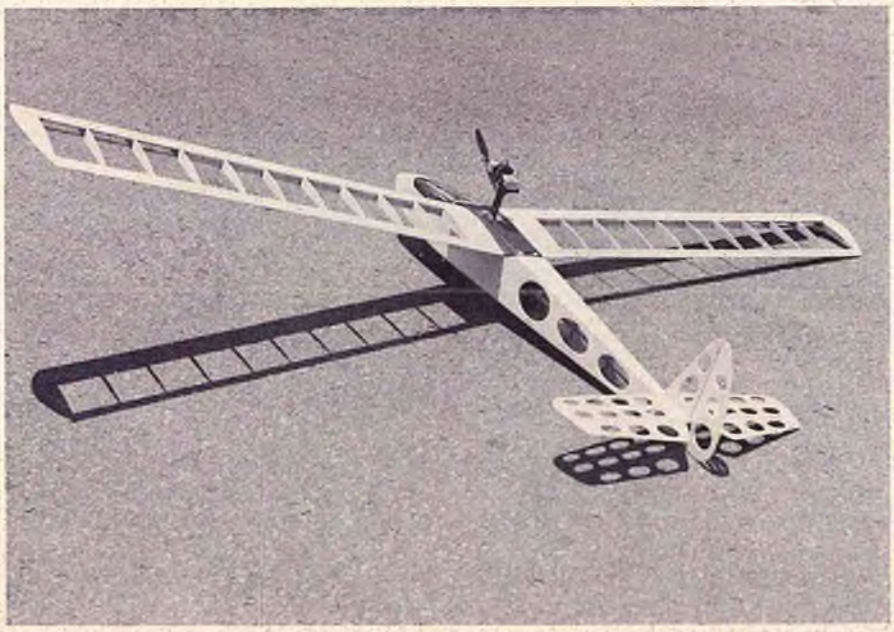
In this view the top of the Windward wing is shown. Note hold-down screw holes, plus power pod box.

Pusher and tractor versions of the Windward power pod.









LEFT: Power pod mounted on Windward wing. With pod removed, plug fits into hole for hi-start or winch flying. BOTTOM, LEFT: There are 37 oval lightening holes in the Windward.

eliminating the traditional rubber bands. Speaking of tradition, you experts who learned to fly many years ago with a Windward, and have now progressed to one of those soaring machines, have a few surprises in store for you when you buy a Windward kit. Did you like the oval cutouts in the fuselage of the Windfree? Well in 1972, when Mark updated the plans, the Windward began sporting oval holes in the fuselage, the stab, the elevator, the fin and the rudder. This gives your artistic talent a chance when you are cutting and sanding all those ovals and how could you cover it with anything but transparent film. How come, you ask, are you just finding out about the oval holes and you brag of 9 Windwards? I loaned my first and only set of Windward plans to my brother last year and he never returned them, so I had to buy a new kit to get another set of plans. (Rod says they are going to print the plans on paper that self-destructs when you finish your plane.) A doubler on the fuselage has strengthened the tail end very much. New webbing has been added to the wing in three places. First, between the leading edge and the spar, secondly, the opening of the V in the trailing edge has been closed up, and third, the spruce spars are now completely boxed in with webbing most of the way to the tip.

In case you would like to make some, or all, of the modifications I made on Number 9, let me give you some hints and kinks. Read on and check the drawings occasionally. The pylon on the power-pod is made from a piece of 5/16" by 3/4" white pine and is sanded to an airfoil shape above the top of the wing tube. It is long enough that a Cox 6-3 plastic prop will clear the top of the wing fairing. The pusher pylon must be longer than the tractor. If the prop just clears in tractor, it won't in pusher. The firewall is 1/8" aircraft ply, the pylon passes through the 1/8" Lite ply base and is epoxied to both the base and the bottom of the firewall. The right-angle braces are 1/16" ply.

The wing tube for the base of the pylon is made from 3/32" aircraft ply. To insert the tube in the completed wing, it is necessary to cut through the 3 layers of 1/16" sheet balsa in the center of the wing and remove 1⅛" of the center rib just back of the dihedral brace. The tube is epoxied in place to the dihedral brace, flush with the top of the wing fairing and sticking out 3/8" below the bottom of the wing. This is to allow room for the 3/16" hold-down dowel to pass through the tube and pylon base. I have found about 2° up thrust is sufficient. When the power is that high above the Center of Gravity, some up-thrust is necessary. A loose fit between the base of the pylon and the square tube is mandatory; by the time

you get a coat of epoxy on the pylon base and in the tube, the fit will be too tight. Not only is epoxy a must, but the "rat-guard", for want of a better word (remember how they put metal discs around the hausers on ships in port to keep the rats from climbing up the lines and coming aboard) will keep the castor oil from flowing down the pylon and into your plane and forming puddles around your servos. It has been intimated perviously in the literature, that servos do not work too well 1/2 full of castor oil.

You may do as you wish in regard to the auxiliary tank. My Cox Black Widow ran for about 5 minutes on the tank set-up and trying to figure what to do with it for that long became a problem. So they say, it is easy to grab a tiger by the tail, but it is another thing to hold on for 5 minutes. Scream is what that Black Widow did! Can you imagine a 5 minute engine run on a 1/2A free-flight? Well, that is where my Windward was headed - - - O.O.S. directly overhead. We finally developed a great big circle with just enough down to keep it level. I wanted that engine stopped. Straight up didn't lean it out enough to stop it, upside-down didn't work either, the Black Widow has a sport-stunt tank. It was high enough by the time it ran out of fuel that I was able to work 3 thermals before it finally touched down. That is the reason you see two pylons with the Black Widow as a pusher and a Golden Bee as the tractor. I mean, after all, that hill owned by the hawks is only 200 feet high. Any .049 engine will draw from the auxiliary tank if you hook it up as follows: Using an older style .049 with vents located on either side of the needle valve, run a piece of K & S small clear tubing from the outlet of the tank to either of the vents by the needle valve. Fill both tanks through the other vent. Seal the filler tube with a 3/4" piece of the tubing that is plugged with a small sheet metal screw. The system will air vent through the auxiliary tank vent. On the newer .049's with the stunt tank, run a line from the outlet of the auxiliary tank to the bottom vent, then fill through the top vent. Both tanks are full when the auxiliary tank overflows. Seal the top vent.

If you decide to install the wheel, make sure the 2 to 3 inches of bottom is made from Sig 1/8" Lite ply. I didn't, and the third landing was on the wheel and then scars in the MonoKote when the bottom hit the street. A wheel well inside the fuselage is necessary to keep the dirt and gravel out of the bottom of your plane. 1/16" stock is fine. Don't forget to epoxy the inside of the wheel well to repel dampness. Be sure and put some kind of skids on the tips of the

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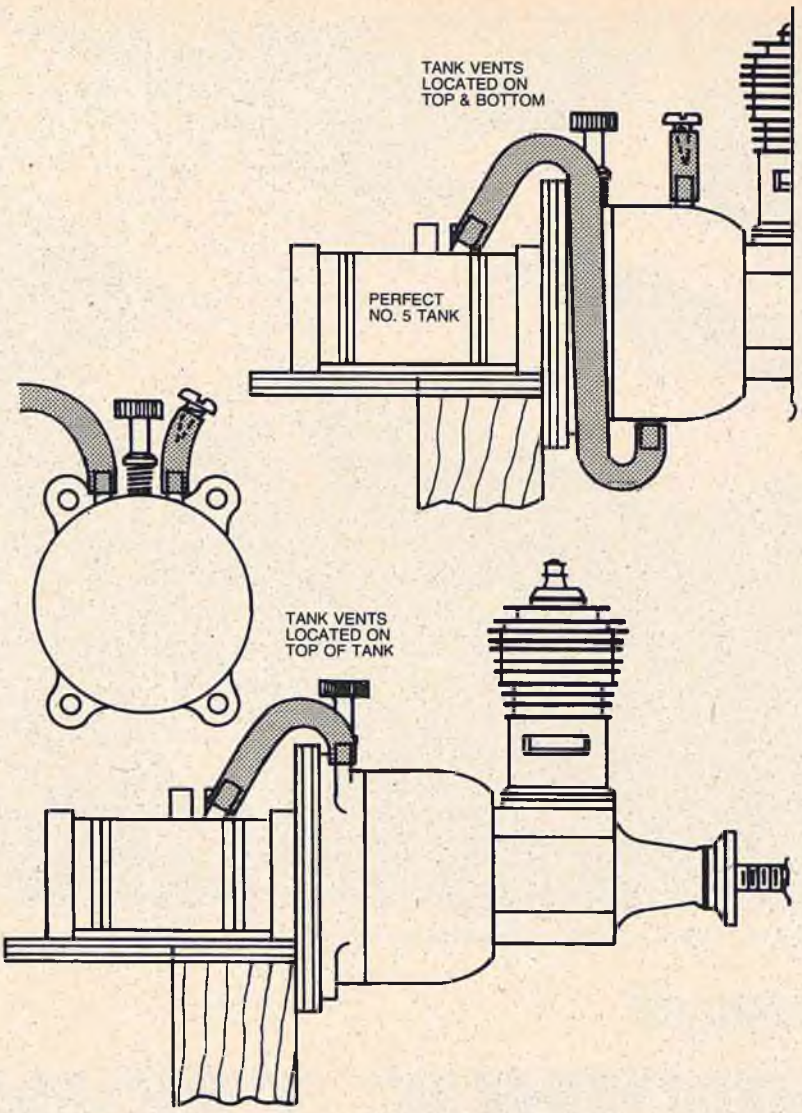
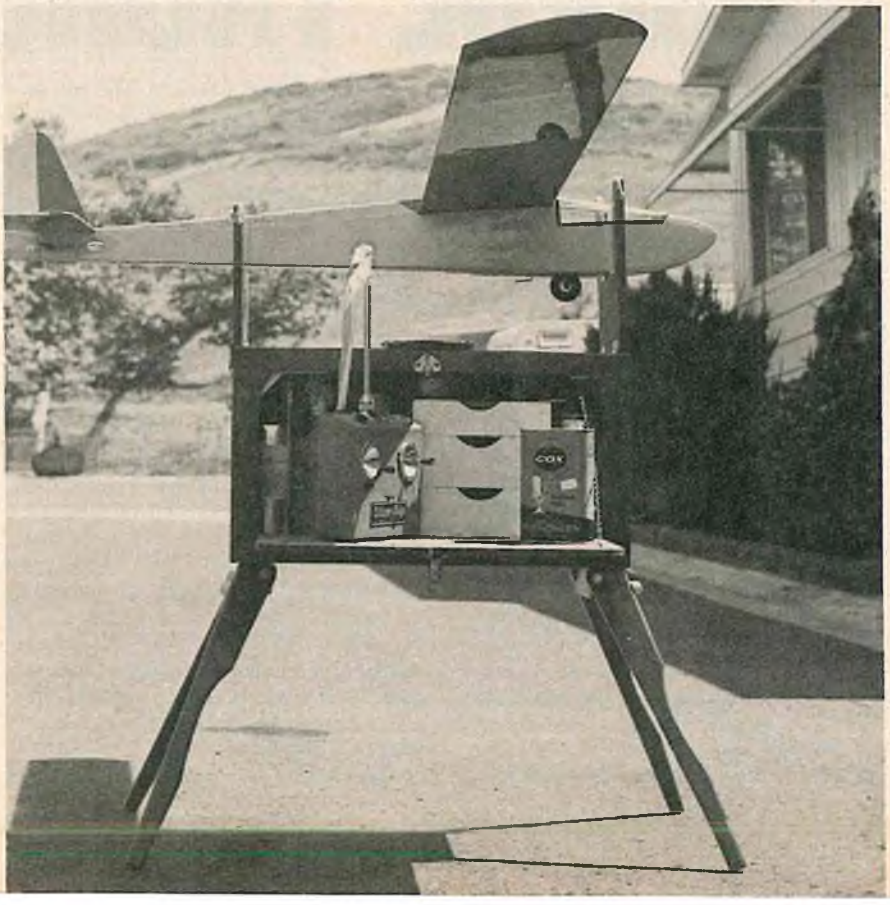




Down to the corner, across the street, and old Paul is at his flying site. Wonder if that's why he bought the house - - - -

The DigiVue tach is an ideal companion on race day. Lets you know how much heat is up front, right to the very last 100 rpm.

BUILDING THE

By Jerry Smith

DIGIVUE TACHOMETER

● The age of digital readout is upon us. All across the country the demand for digital clocks, watches, meters, thermometers, calculators - - - in fact, just about anything that displays numbers, is on the increase. As the wave of popularity sweeps the country, designers are finding still other uses for digital displays. One such use has recently been marketed by Modelcraft Electronics, P.O. Box 970, Lomita, Calif. 90717. Actually, this is the first digital tachometer to reach the model world with accuracy far superior than what is now realized in the meter display types. Modelcraft has spent many months developing and testing the circuitry to ensure a reliable product which reflects the latest state-of-the-art in digital equipment.

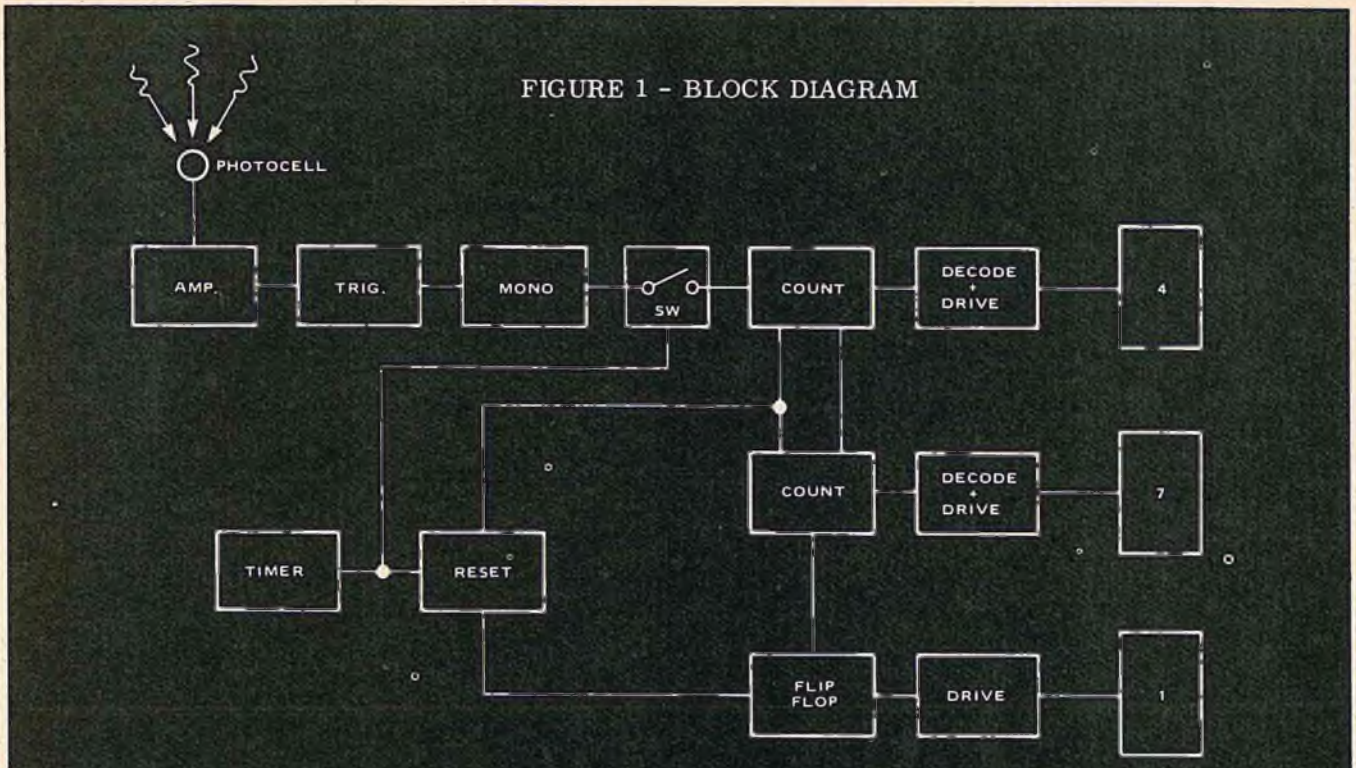
The Modelcraft Electronics Company got its start some 1½ years ago under the leadership of Mr. Henry Lopez. Henry, a graduate engineer with a Masters degree in aeronautics, really digs electronics and pursues it as a hobby. His modeling career has been quite lengthy — mostly sailplanes and control line. For the past six years, he has been interested in R/C and has contributed several articles to R/C Modeler. The last, as a matter of interest, was a construction article on his digital tach which was published in the RCM Anthology Library Series, the R/C Engine, Volume 2. This manual is available from R/C Modeler at $6.95, and is well worth the investment towards additional knowledge on R/C engines. A must for the serious modeler.

The DigiVue Tach is a three digit, direct readout tachometer covering the range of 100 to 29,900 rpm ± 100. All direct readings from the tach are multiplied by one hundred, i.e., a reading of 125 on the tach would be interpreted as 12,500. The first figure on the right is the one hundred digit, the second is thousands, and the third is ten thousands. Timing accuracy is approximately 1/2% of the full scale (depending on calibration and temperature). As quoted by the manufacturer, the temperature drift of the timer is .005%/deg. centigrade. The accuracy of the timer is maintained independent of battery voltage by a voltage regulator circuit which maintains a constant voltage at the timer.

The tach, measuring 1¼''H x 3''W x 6''L, is housed in a gray enameled aluminum housing. Six alkaline AA pencells (or Nicads) make up the power requirement and are not included with the unit. A charging jack and plug are included in case one should choose the route of rechargeables. In checking the current draw with the unit operating, I was quite surprised with the readings obtained. Under the worst condition on the readout display (maximum number of bars lit in the readout display numbers — 288) the current meter read 275 mils as the unit strobed. On the off cycle, it was less than 100 mils. When considering the readout is not lit on part of the cycle, one could conclude from the readings, that a fresh set of alkaline pencells should last a considerable length of time under normal usage.

In actual use, the tach is aimed at the propeller at about the mid-point between the tip and the hub. It is important to hold your hand steady in order to get stable readings. This is very quickly learned by observing the digital display. The tach is correctly aimed at the propeller if, when every time the unit strobes, the reading repeats consis-

FIGURE 1 - BLOCK DIAGRAM



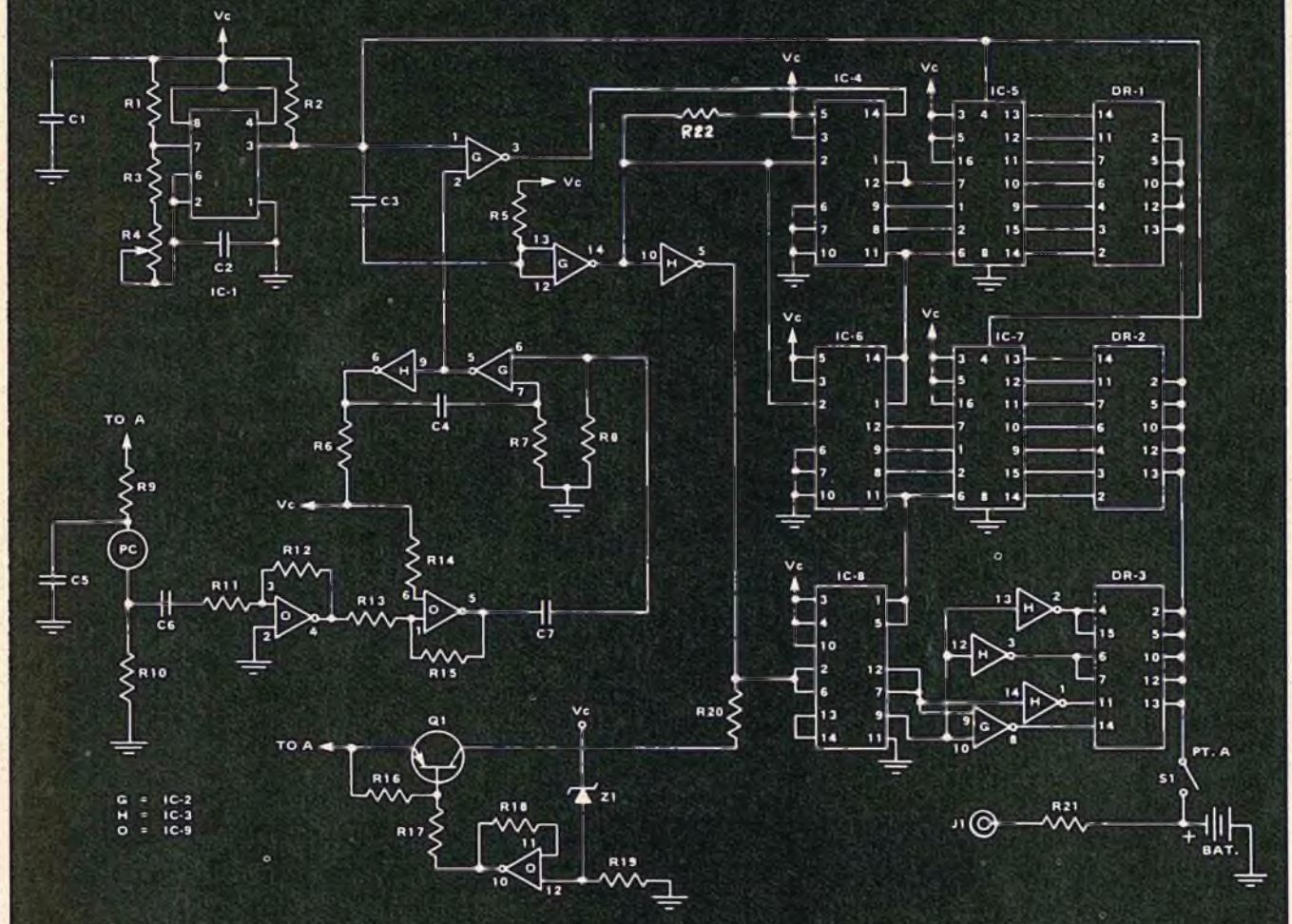
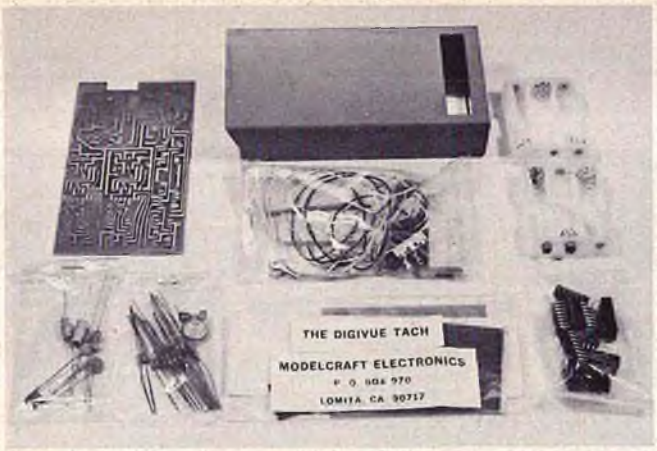
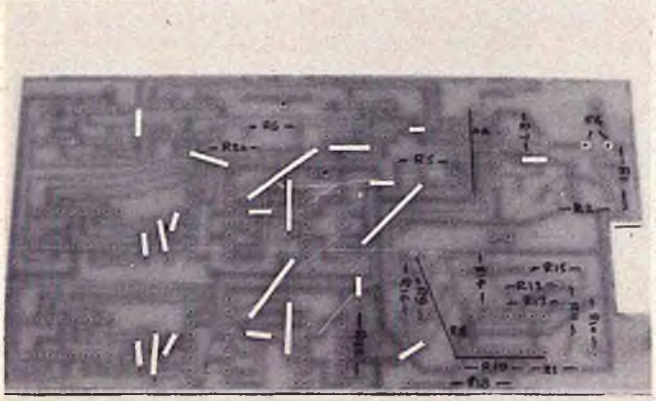


FIGURE 2 - SCHEMATIC

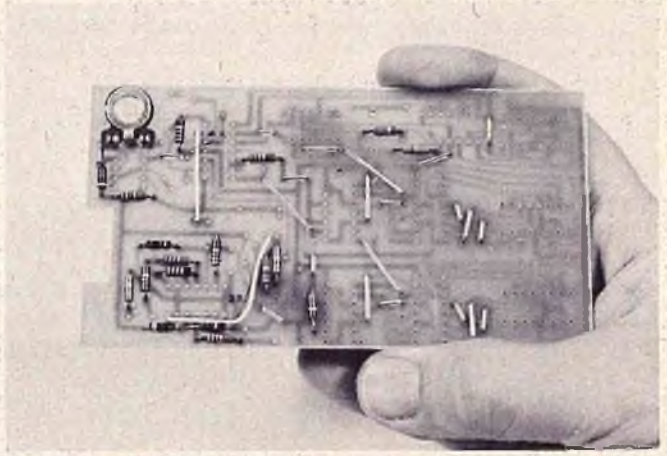


The DigiVue tach kit as received. Well organized packaging makes for easy component checkout. Parts are top quality.

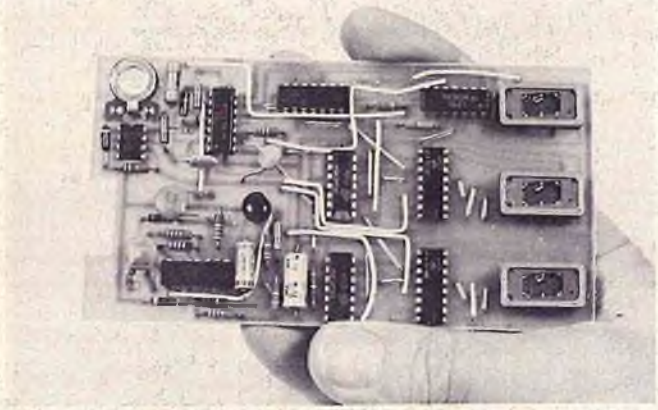
Tools required for building. Note micro tip on Ungar soldering iron. Solder-Wick helps remove parts in case of error.



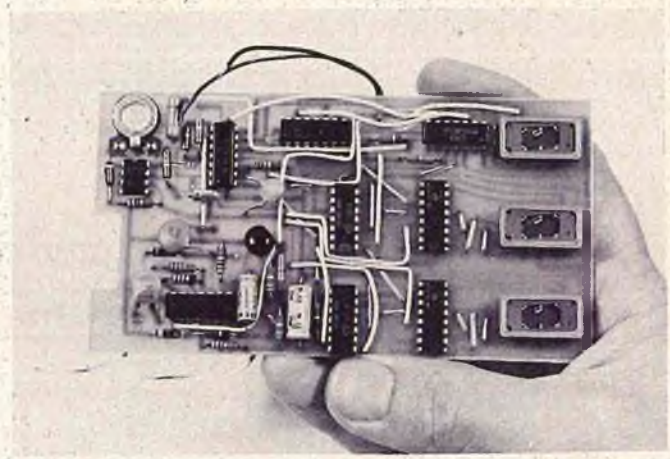
Basic printed circuit board before assembly of components. Jumper locations marked are mighty helpful. Component locations marked with felt tip pen make for fewer mistakes.



First overlay completed makes a nice stopping-off place before continuing with overlay 2.



Second overlay completed. Board is still roomy and easy to work. More jumpers are added.

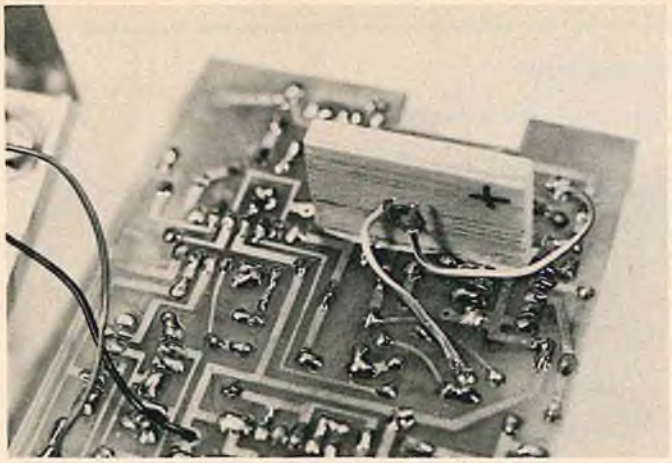


Third overlay complete. Board assembly is ready for battery hook-up. Note large size of incandescent readouts.

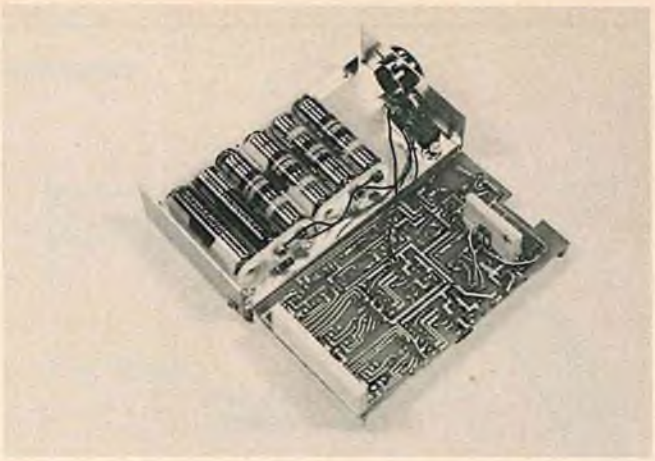
tently. The hundreds digit may oscillate between two values because of the ambiguity in this digit. This comes about because every time the count starts, it catches the propeller in a different start position, so one time it may count one less blade than another time. The first thing you will observe is that your engine hunts at idle, and, that the tach will display the variations in the idle speed. Conversely, as you run your engine at high speeds, it is interesting to note that the tach readily locks on and is quite stable.

My introduction to the Digi Vue Tach was in kit form. The complete kit, less batteries, sells for $49.50. For those who are not quite so adventurous, the tach is offered completely wired for $69.95. (A good way to go if you lack experience in building electronic kits.) In this case, I found the kit easy to assemble and anyone with reasonable soldering experience would have little, if any, difficulty.

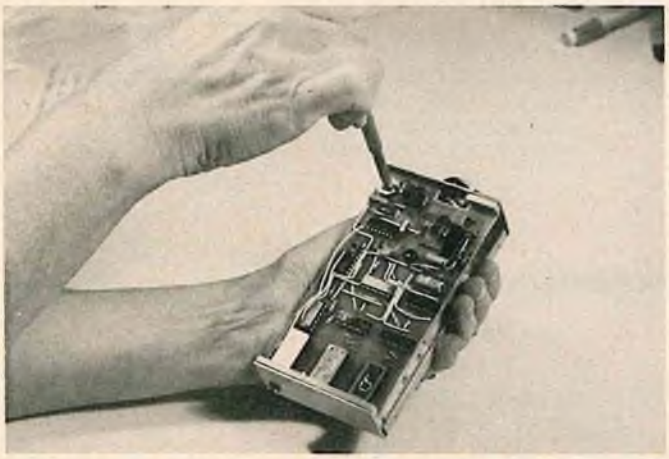
The kit comes complete with good instructions, discreet components neatly packaged, a well defined printed circuit board and all necessary hardware to complete the



Photocell pickup is mounted in balsa block and epoxied to printed circuit board.



Completed tach ready for initial test and calibration.



Simple calibration. Aim tach at florescent light and adjust pot R4 until tach consistently strobes 36.

Assembled tach reading 60 cycle light. Big glowing numbers make it easy to read – even in the bright sun. Note charging jack in lower left hand corner for rechargeable batteries.

assembly. Some 45 discreet components and numerous jumpers make up the circuitry on the board. Component check-out has been made easy by packaging all resistors together. Similarly one package contains capacitors and a third package contains general hardware and wire, etc. Because of its size, the printed wiring board is not difficult to wire. Unlike the conventional Heathkit, that many of us are used to assembling, the printed circuit board is not marked with component location. For this, overlays showing component and jumper locations are provided. Overlay 1 shows only jumper wire locations. It is recommended in the instructions that you pencil the jumper locations on the board before attempting to solder them in. This will enable you to double check with the overlay and cut down the possibility of errors. It is important the jumpers be installed correctly. Later on, as components are added, it is difficult to see and change these in case you run across an error. I found that a felt tip pen gave better line definition on the printed circuit board.

Overlay 2 shows discreet component and additional insulated jumper wire locations. In this step, most of the components are mounted and special care in soldering is required. When soldering the IC's, install all the IC's at one time; then, solder one pin of each IC at a time. This will give the IC a chance to cool between pin soldering.

Overlay 3 shows additional jumpers with final wiring of components to ready the board for test and calibration.

To initially test the completed tach, a 1/2 amp. fuse (supplied) is temporarily connected in the positive lead from the battery: the photo cell is covered with tape, and a voltmeter with a range of at least 6 VDC is connected across the leads of capacitor C1 on the board. With batteries installed, the switch is actuated. If the fuse blows then you have problems. (Better to blow a fuse than all those precious IC's!) With the fuse intact, two digits should be flashing off and on, displaying 0-0. The voltmeter should read a nominal 5.3 VDC, assuring you that the voltage regulator is functioning properly.

Calibration of the unit is equally simple. Turn on the switch, and aim the unit at a fluorescent light. Keeping your hand steady, adjust pot R4 for a repetitive reading of 36 on the display. The accuracy of the unit depends on this calibration, so take your time. The switch on this unit is normally off and must be held "on" for operation. With this feature, there is no danger leaving the unit on to deplete the batteries. However, it does preclude the tach to be used in the way a meter tach would be used. That is, for needle valve tuning and max deflection of needle; you must hold the switch on. A good way to get around this is to have a friend hold the tach, while you read the rpm and adjust the needle, a two man operation at best.

The final assembly of the tach has somewhat the flavor of building a model. Balsa blocks provided are epoxied to the PC board and act as spacers to support it in the aluminum housing. The final assembled tach looks quite professional with the provided decals in place. My total assembly time on the tach was about 8 hours, or an easy three evening project. It is advisable to read the instructions thoroughly and proceed slowly. Be sure there are no errors in wiring. There is nothing worse than to hurry through a project and have some little error in wiring prevent it from functioning. My best advice is to read and proceed **slowly**.

Probably the best that can be realized from the DigiVue tach, besides its direct reading feature, is accuracy. To prove this, several pieces of missile level test equipment were employed. The unit was hooked

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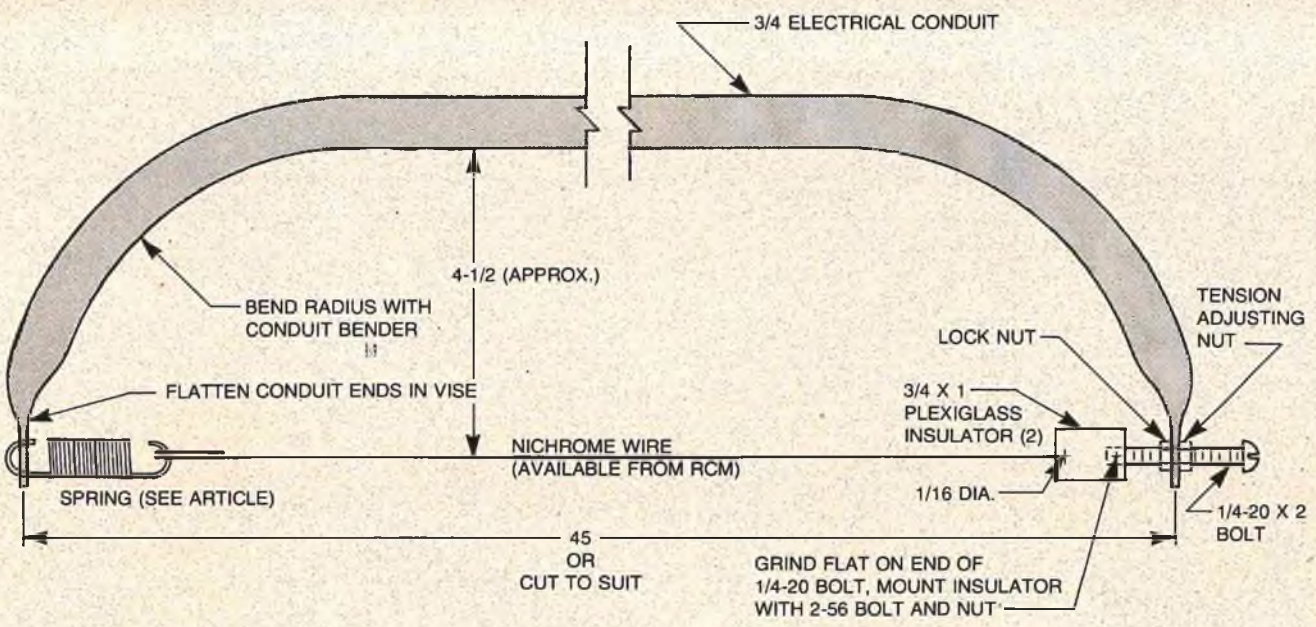
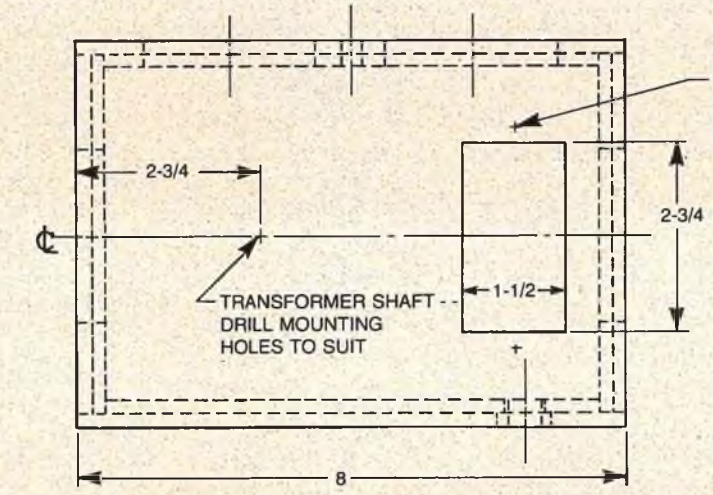
FOAM WING CUTTING BOW



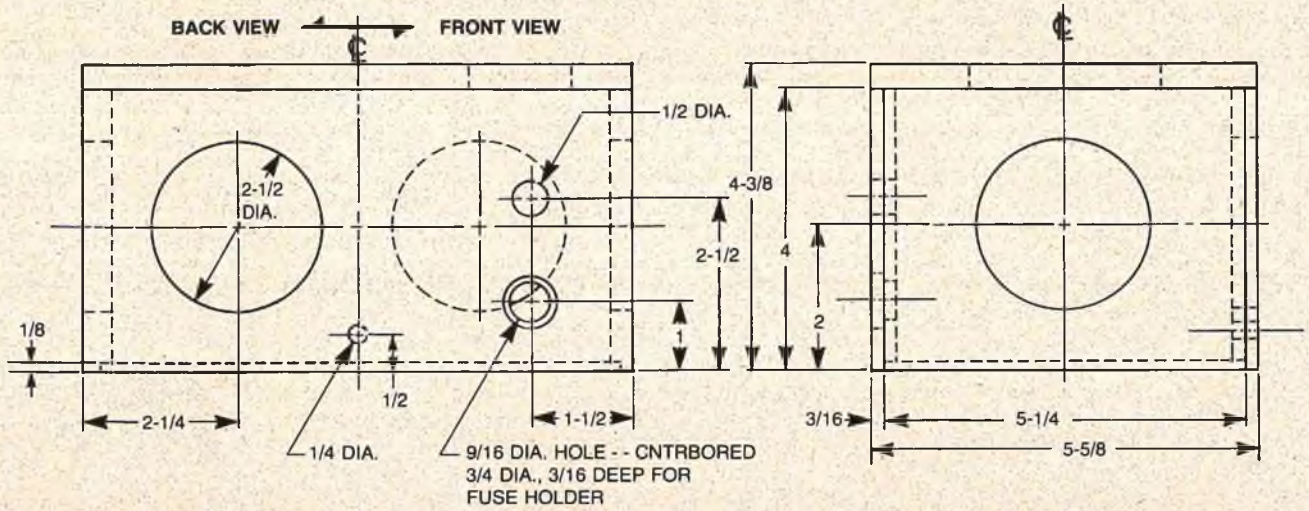
VARIABLE TRANSFORMER BOX



NOTE: TOP HELD ON BY 3/4 FLAT HEAD WOOD SCREWS, CENTERED ON EACH EDGE OF TOP

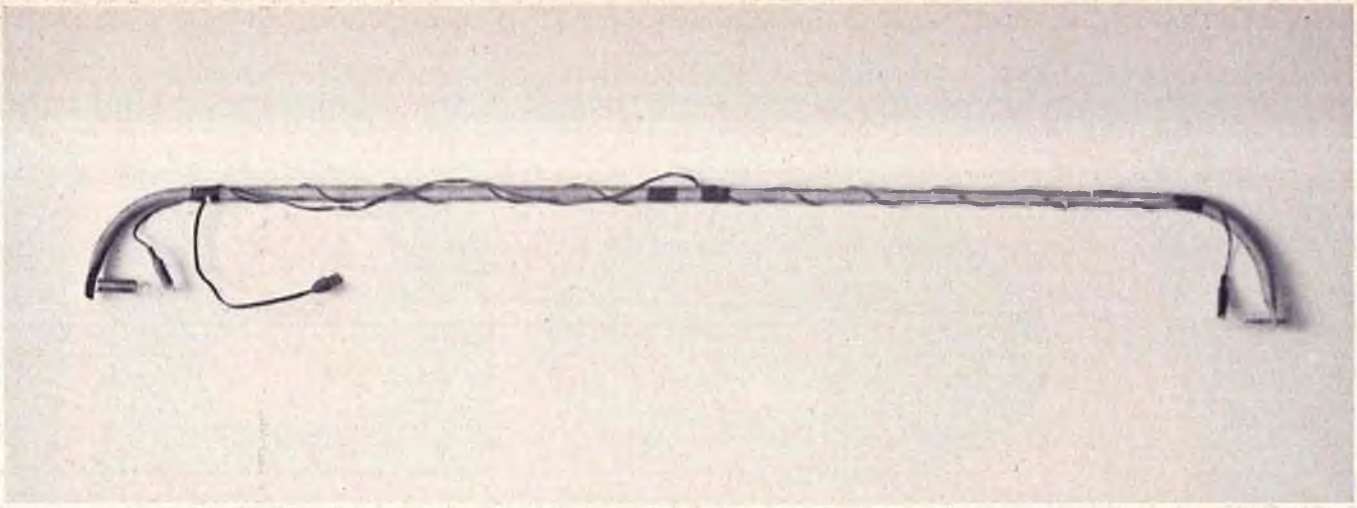
MATERIALS

2 — 3/8x4x8 SIDES, HARDWOOD.
2 — 3/8x4x5-1/4 ENDS, HARDWOOD.
1 — 3/8x5-5/8x8 TOP, HARDWOOD.
1 — 1/8x5-1/4x7-5/8 BOTTOM, MASONITE OR PLY.
4 — 3/4 FLAT HEAD WOOD SCREWS.
2 — 3/8 ROUND HEAD WOOD SCREWS.



DELUXE FOAM CUTTER
AND
SPEED CONTROL

BY E. SCOTT HINCKLEY

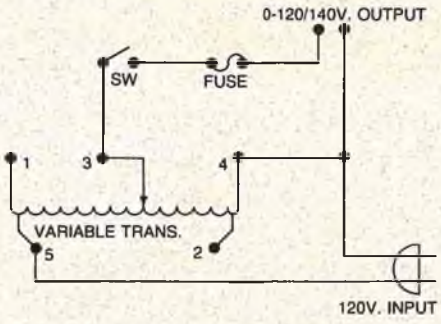


Overall view of foam cutting bow. See drawings and text for details.

I have used this particular foam cutter and a similar variable transformer set-up to cut foam wings and control the speed of power hand tools around the shop since 1969, when I first got into radio control modeling.

The cutting bow is made from regular electrical conduit which was bent at right angles on each end with a conduit bender. The tip of each end was then flattened in a vise and drilled to accept a 1/4-20 bolt in one end and a spring in the other end. The spring came out of a junk box and is fairly stiff. Its purpose is to keep the wire taut, as the wire expands when heated and contracts as it cools. Nichrome wire, such as that sold by RCM, is used for the hot cutting wire. The lamp cord used to connect the bow to the transformer unit is attached to the ends of the Nichrome wire with insulated alligator clips. One word of caution — **do not** wrap the lamp cord around the conduit, as this could cause a small induced voltage in the bow. I did this and have received a slight shock when operating the cutting bow and accidentally touching a metal table at the same time. The rest of the construction should be fairly self-explanatory by looking at the accompanying drawing.

SCHEMATIC FOR TRANSFORMER HOOKUP



A variable transformer is necessary for the foam cutter as the voltage/temperature needs vary according to wire length and diameter, and length of foam being cut. A secondary benefit of this unit is as a variable speed control for power hand tools such as the Dremel Moto-Tool. The particular transformer I use will take up to a five amp load at 120 volts. A lower rating will, of course, cost less. My first transformer was an integral variable transformer/fuse/switch/outlet unit purchased from Radio Shack for around $16.00. This unit was eventually used on an experimental stationary craft-type foam cutter. I then found that it had been discontinued by Radio Shack, but was available from some other sources at twice the price!

My next variable transformer, the one shown in the accompanying pictures, was purchased from the local electronics supplier for around $25.00, not including the fuse and fuse holder, duplex outlet and cover, and toggle switch. Specifics for connecting leads to the transformer are included with it, as are the mounting instructions. The sides and top of the box enclosure are 3/8" thick solid cherry with an inset 1/8" masonite bottom. The finish is three coats of natural Watco Danish Oil. The four 2½" diameter (approx.) vents, two in back and one on each end, are sold by building supply stores and permit air to circulate through the box as the transformer heats up in use.

For my particular set-up, I have found that 35-40 volts works the best for cutting foam wings of around two foot half span. Each cutting bow will probably have its own best working voltage, however. The only other thing needed to cut professional quality foam wings is another person who can move the wire along a numbered airfoil template as the numbers are called out. A wife, father, mother, or fellow modeler can usually do this satisfactorily after a couple of wings and some patient advice.

Good luck in your foam wing cutting! And if all else fails, the variable transformer set-up shown here makes a dandy weight for holding parts together while the glue dries!

Supplies Needed
For Cutting Bow

Electrical Conduit — cut length to suit.
Spring (see text).
1/4-20 x 2" bolt with 2 nuts.
2-56 x 1/2" bolt with nut.
Plexiglass Insulators (2) —
approx. 3/4" x 1" each.
Nichrome wire — approx. .015" dia.
Alligator clips, insulated (2).
Lamp cord and plug.

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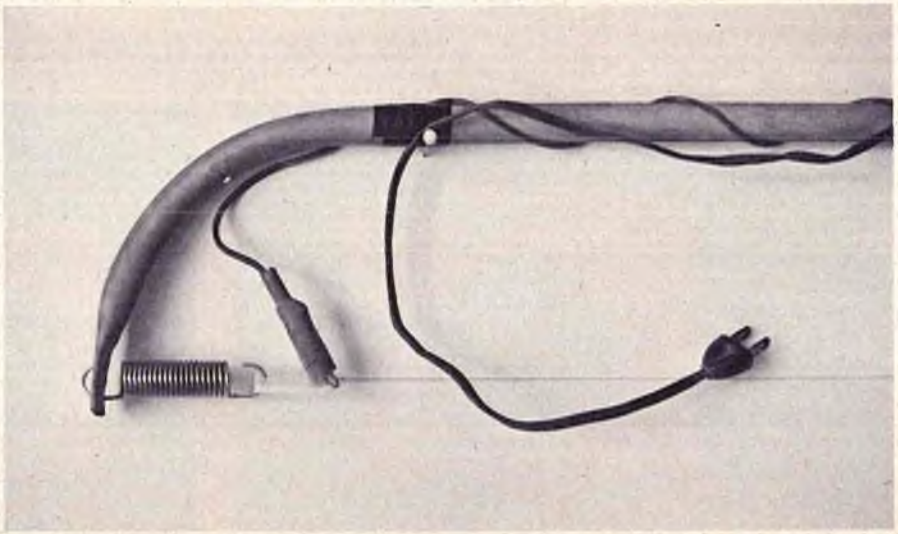
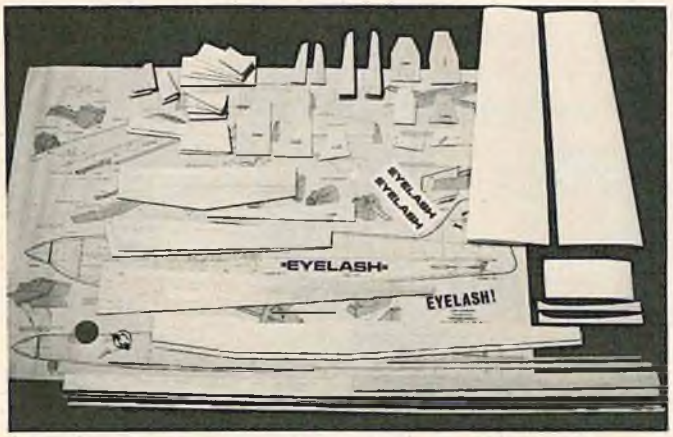
Close-up of electrical connection to Nichrome wire. Note spring.



RCM PRODUCT TEST

SPAN AERO PRODUCTS EYELASH



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 Eyelash is a 1/2A Pattern and sport aircraft designed by Art Schroeder and manufactured by Span Aero Products, Wildwood Lane, Norwalk, Connecticut 06856. This little high performance machine has a wingspan of 39½" and an average wing chord of 5¾" for a total wing area of 227 square inches. Designed for .049 to .051 cubic inch displacement engines and a 2 ounce tank, either 2 or 3 channel of proportionals can be used with ailerons and elevator the primary controls and the 3rd channel being used for rudder, if so desired, in pattern maneuvers. The fuselage of the Eyelash is of balsa as are the tail surfaces, while the wing is of foam. Included in the kit is the spinner, motor mount, one pushrod, 1/16" music wire and a piece of inner NyRod. There is one plan sheet measuring 34" x 22" with building instructions on the plans in addition to a two page instruction manual. The manufacturers recommended flying weight is 20 to 26 ounces. RCM's prototype of the Eyelash was finished in Solarfilm with MonoKote trim and weighed 23 ounces ready-to-fly, for a wing loading of 14.6 ounces per square foot. A Cox TD .049 engine was used with 2 ounce tank and Citizen-Ship radio for control. With regards to the kit, the parts were soft cut but were not sanded. The corners on some parts had to be rounded to match the parts on the plans. Some parts were numbered to match the plans while other parts were not numbered making it somewhat difficult to identify. We would recommend joining the wings with 1" lengths of 1/8" diameter dowel for guides and strength. If a fixed rudder is used, we would also recommend joining the rudder to the fin with aluminum tabs for flight trim. Since the Eyelash uses a wire skid instead of conventional gear we would recommend that 1/16" wire wing tip skids be used. With regards to flight performance, the Eyelash is an absolute dream to fly and, both looked and handled like its big brother, the Eyeball. In fact, this 1/2A ship went through maneuvers exactly like the larger pattern ships. With a belly skid and wing tip skids there was no damage when landed on a stadium parking lot. This is an excellent plane from a flight performance standpoint and one that you can fly all week on the same amount of fuel used by a .60 pattern ship in one flight. An excellent flying machine, but not one that we would recommend for beginners because of its high performance. □

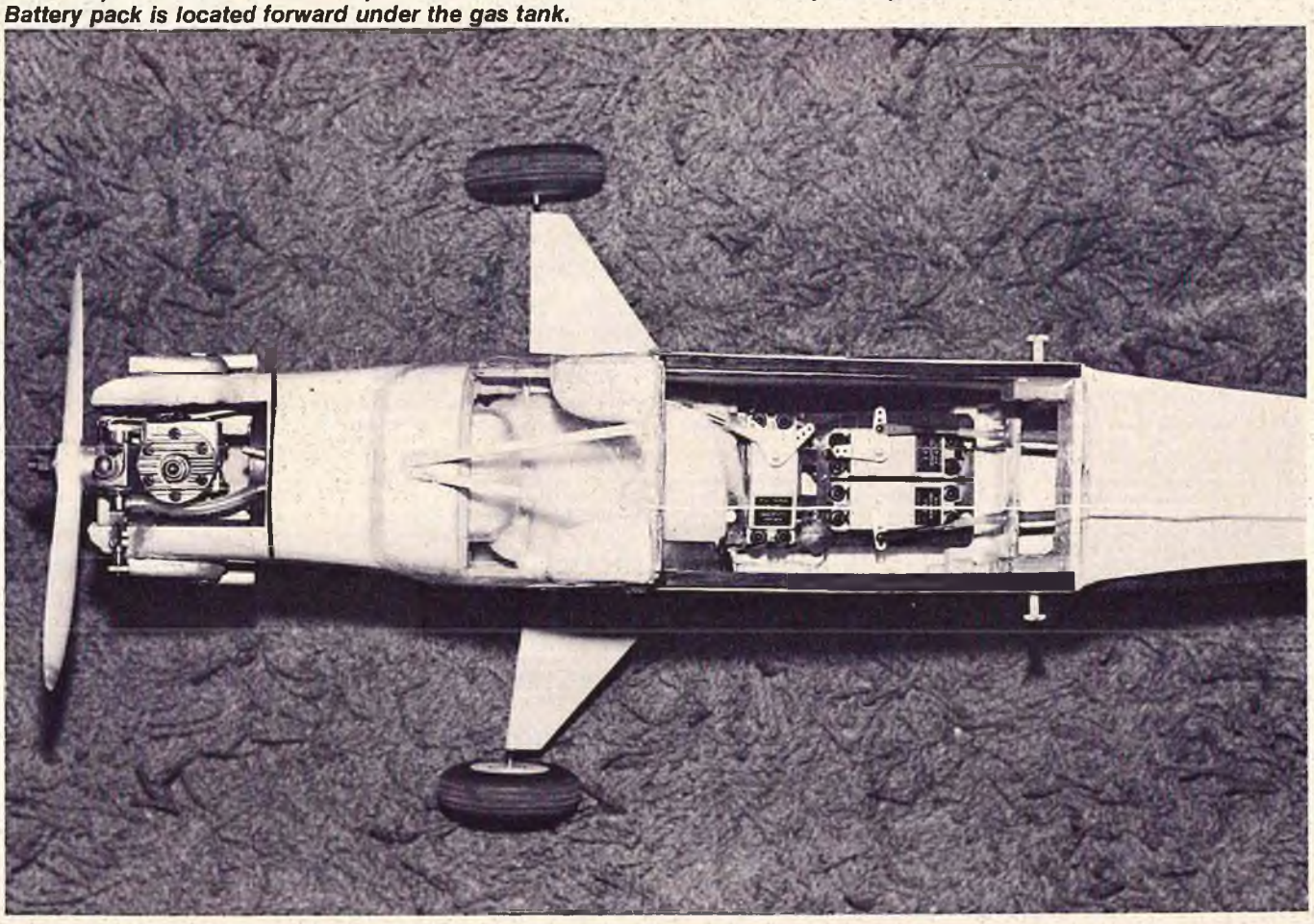
SPECIFICATIONS

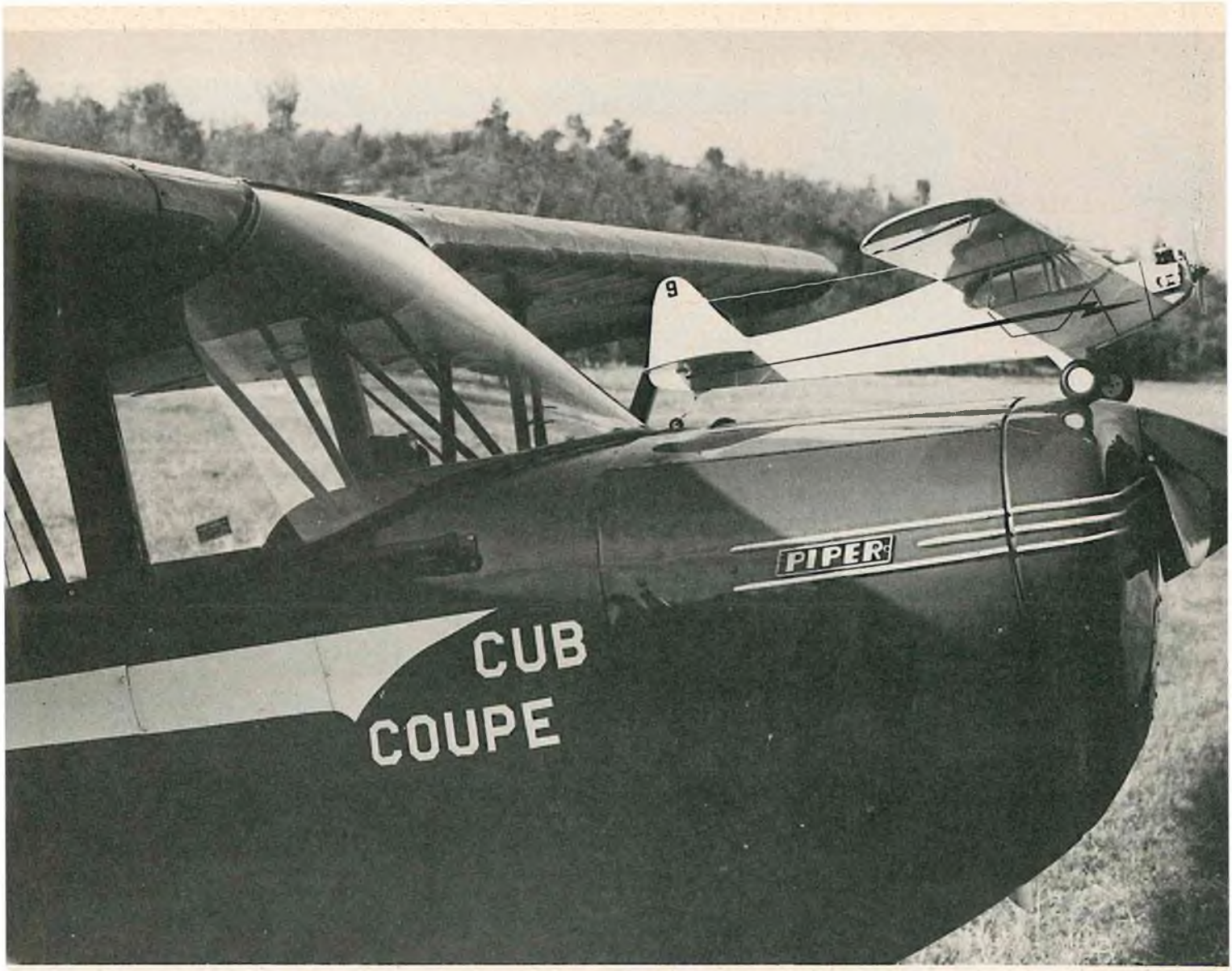
Name ..... Eyelash
Aircraft Type ..... 1/2A Pattern
Manufactured by ..... Span Aero Prod.
Wildwood Lane
Norwalk, Connecticut 06856
Mfg. Suggested Retail Price $23.95
Available From ..... Both Mfg. and Retail Outlets
Mfg. Recommended Usage ..... Competition Aircraft
Wingspan ..... 39½ inches
Wing Chord ..... 5¾ in. (avg.)
Total Wing Area ..... 227 sq. in.
Fuselage Length ..... 32 inches
Radio Compartment Dimensions ..... (L) 8" x (W) 2"x (H) 3½"
Wing Location ..... Shoulder Wing
Dihedral ..... None
Airfoil ..... Semi Symmetrical
Wing Planform ..... Swept L.E.
Stabilizer Span ..... 14 inches
Stabilizer Chord (incl. elev.) ..... 3¾ inches
Total Stab Area ..... 52½ sq. in.
Stab Airfoil Section ..... Flat
Stabilizer Location ..... Mid Fuselage
Vertical Fin Height ..... 3 inches
Vertical Fin Width (incl. rudder) ..... 6 inches
Mfg. Rec. Engine Range ..... .049
Recommended Fuel Tank Size ..... 2 Ounce
Landing Gear ..... Wire Skid
Recommended No. of Channels ..... 2 — 3
Recommended Control Functions ..... Elevator and Ailerons
Basic Materials Used In Construction:
Fuselage ..... Balsa
Wing ..... Foam
Tail Surfaces ..... Balsa
Hardware Included In Kit ..... Spinner, motor mount, 1 pushrod, wire, inner NyRod
Plan Size ..... 34" x 22" (1 sheet)
Building Instructions on Plan Sheets ..... Yes
Instruction Manual ..... Yes (2 pages)
Construction Photos ..... Drawings Only
Kit Includes ..... Shaped Parts
Mfg. rec. flying weight ..... 20 — 26 ozs.
Wing loading based on rec. flying wt. ..... 12.75 ounces

RCM PROTOTYPE

Weight, ready to fly: ..... 23 oz.
Wing Loading ..... 14.6 oz/sq. ft.
Covering and finishing materials used ..... Solarfilm, MonoKote Trim
Engine Make and Disp. ..... Cox TD .049
Muffler Used ..... No
Radio Used ..... CitizenShip
Tank Size Used ..... 2 ounce

ABOVE: Not a pure scale model, but there are no doubts as to its famous lineage. Finish is yellow Flite-Kote and black DJ Multi Stripe. BELOW: There is ample room in the Cub for the Futaba or any R/C system comprised of miniature servos. Battery pack is located forward under the gas tank.





The J-3 model poses as a hood ornament for its full scale first cousin, a Piper J-4 Cub Coupe.

RETURN TO THE THRILLING DAYS OF

YESTERYEAR

BY JIM KITCHEN

It is a surprising fact that the typical RC'er is 35 years old. So says R/C Modeler's latest survey. This means that there are many of us mature modelers to balance the younger participants in our hobby. Our memories take us back to those nostalgic days of the fifties, forties and, perhaps, even to the thirties when Franklin Delano Roosevelt was the shining light guiding our country from the depths of the Great Depression.

It was during those earlier years that we first developed an awareness of manned flight. For some, this became an enduring fascination resulting in a lifetime of aircraft modeling or even a career in aviation. For others, the fascination may have lain dormant for years, to eventually reappear in the active state of modeling.

Just as full scale pilots retain fond memories of the first airplane that they learned to fly, so it is with me in terms of Mr. Piper's J-3 Cub, the first real aircraft to turn my eyes toward the skies. This old sentimentality really stirred my model building blood when I saw an advertisement for a J-3 model being kitted by Sure Flite Products. This kit particularly suited my preference for smaller models because of its 48" wing span and recommended engine size of .09 to .15. The use of three channel controls called for in the design are reminiscent of my first R/C trainer, a Top Flite Headmaster.

Lately, I have been having thoughts about a new R/C system, and I'm leaning toward three channels for use in sailplanes and smaller models. Buying a new R/C system is a lot like buying a new car: you begin by rationalizing some real or imagined problems with your present car, or you may

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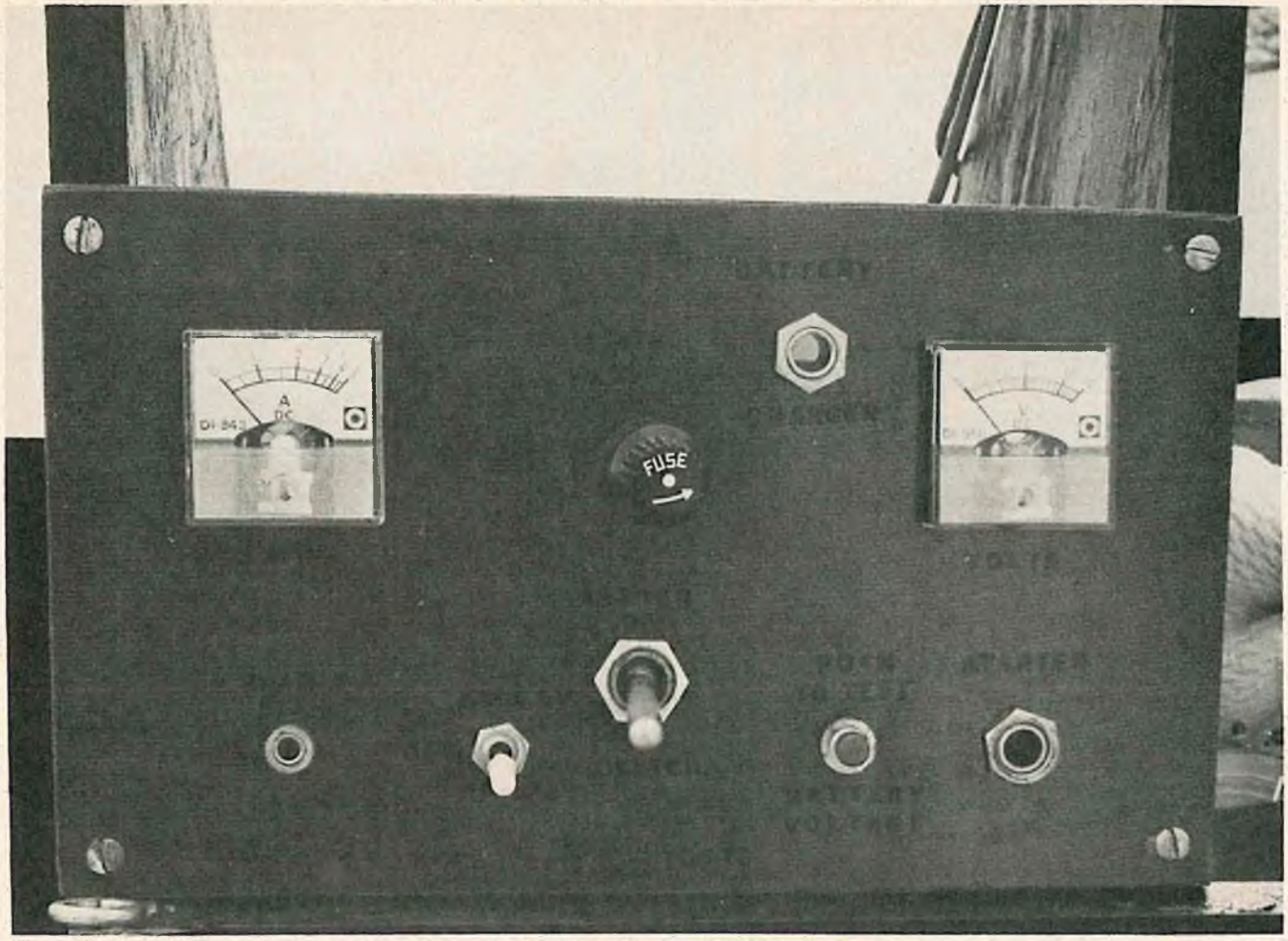
No Cigarette
J.A. MC.ENDREE
MARK MC.ENDREE
2011-WINTHROP.ST.
IRVING, TEXAS
A.M.A.-70573
A.M.A.-70574



CUSTOM POWER PANEL

BY J.A. McENDREE, JR.

● The Power Panel, described in this article, and shown in the photographs, has worked quite well for me during the past six months. It is relatively inexpensive to construct and everything is quite compact. The overall size of the panel is 8" x 4¾". As you can see, I can check battery voltage, determine the condition of the glow plug, and even use 1.5 or 2 volts for the glow plug. The entire system is protected by a fuse, although the largest single load will be from the electric starter.

Using the wiring diagram accompanying this article (which I came up with after seeing the article on page 39 of the May 1975 issue of RCM) the fuel pump can be hooked up to any of the battery taps using 2, 4, 6, 8, or 10 volts, depending on the type of pump you are using. This entire system can be charged without removing anything as long as you have the battery vented.

All hardware is available at local Radio Shack stores except the meters. The volt meter is a 0-15 VDCP precision Mini-Meter DI-950 while the amp meter is a 0-5 DCP precision Mini-Meter DI-943. Both are

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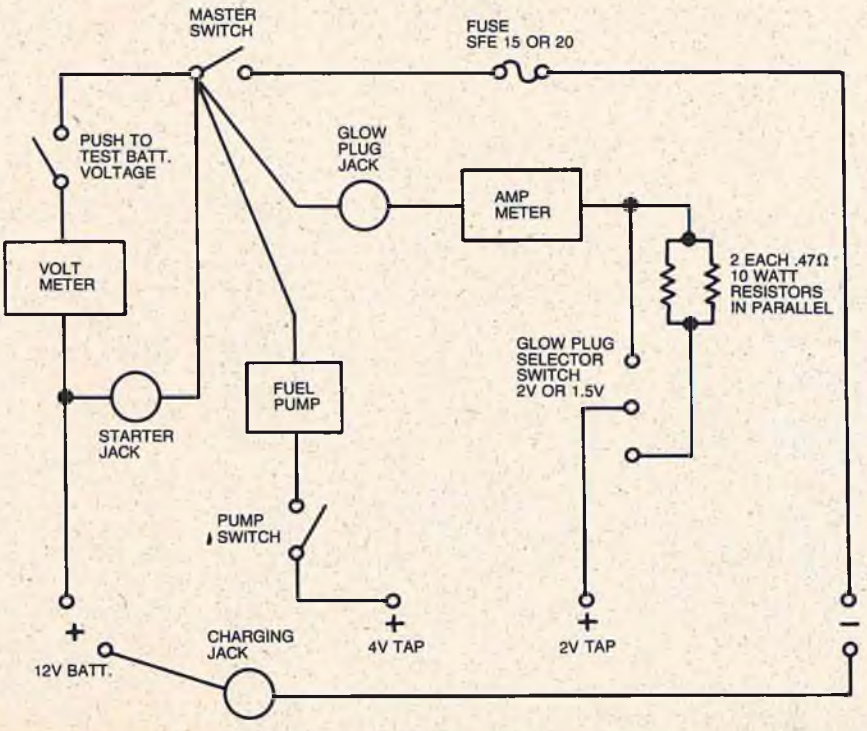
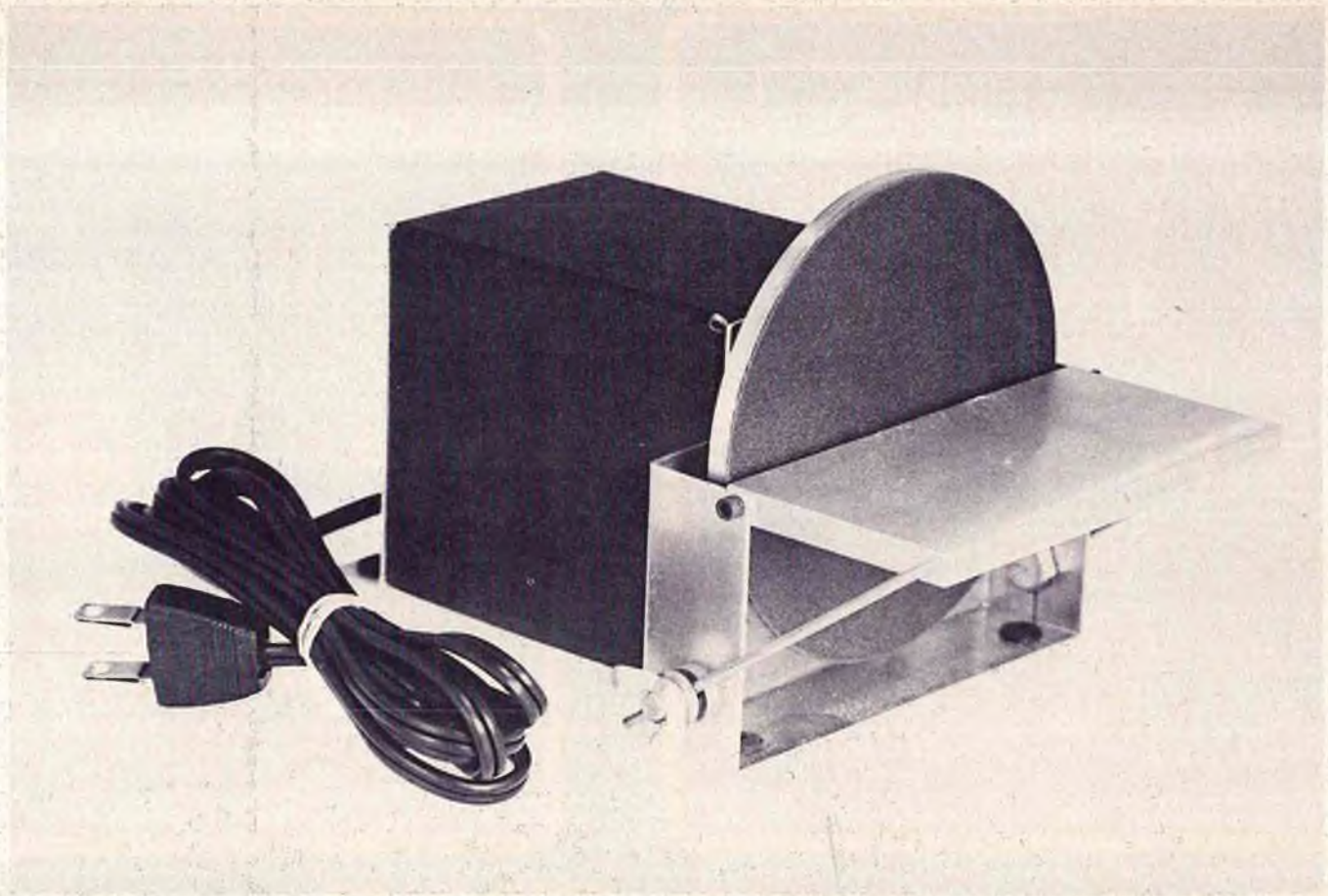
POWER PANEL





The compact, yet powerful and versatile, disc sander by Mathes Electronics.

MATHES DISC SANDER

● Finally someone has come up with a practical small disc sander! Don Mathes needed one for his own use, thought about it, and built one. It worked so well that he decided to manufacture them.

We have seen numerous small power tools that seemed like good ideas but, for a variety of reasons, most of them just were not practical when put to actual use. Our enthusiasm was somewhat restrained when we plugged this 4" diameter sander into the electrical outlet. After about 15 minutes of sanding various sizes of balsa, plywood and spruce, any skepticism that we had felt had disappeared.

This unit is small enough to be moved about on your work bench so as to be convenient to your project. It runs so smoothly and is heavy enough that it does not have to be fastened to a base or bench. The black oxide abrasive paper is secured to the face plate with contact cement which makes replacement quick and easy. The motor can be stalled if you want to press hard against the face plate the same way that you apply the disc brakes on your car. A gentle pressure of the wood to the disc results in rapid cutting with a very smooth finish.

Mathes' little sander has become a handy

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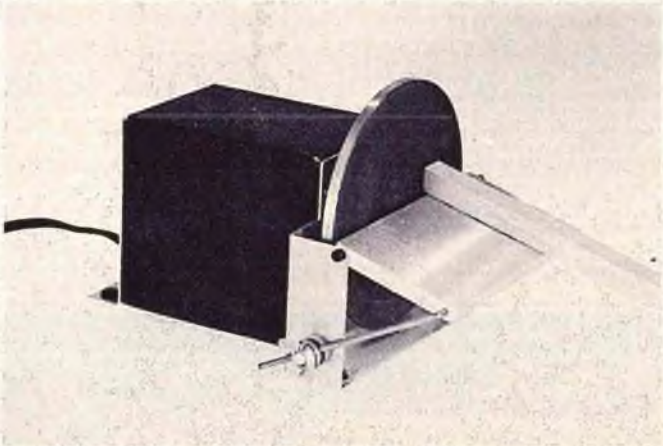
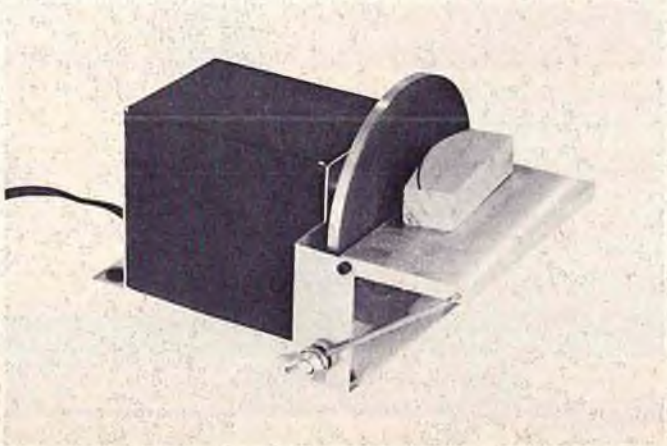
Adjustable table permits sanding precise angles.



Here a curved block is sanded to shape.



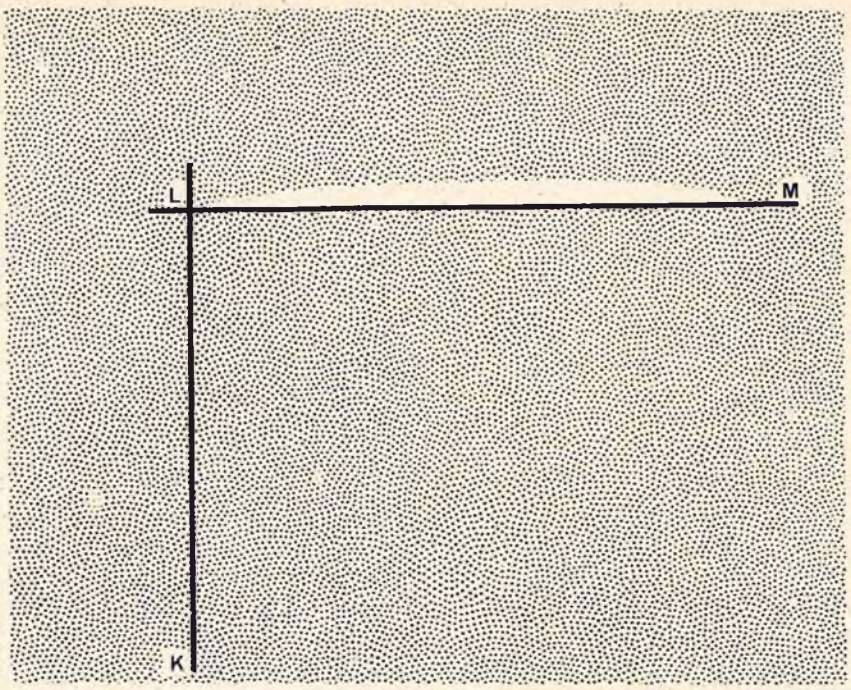


FIG. 1

YOU CAN DRAW

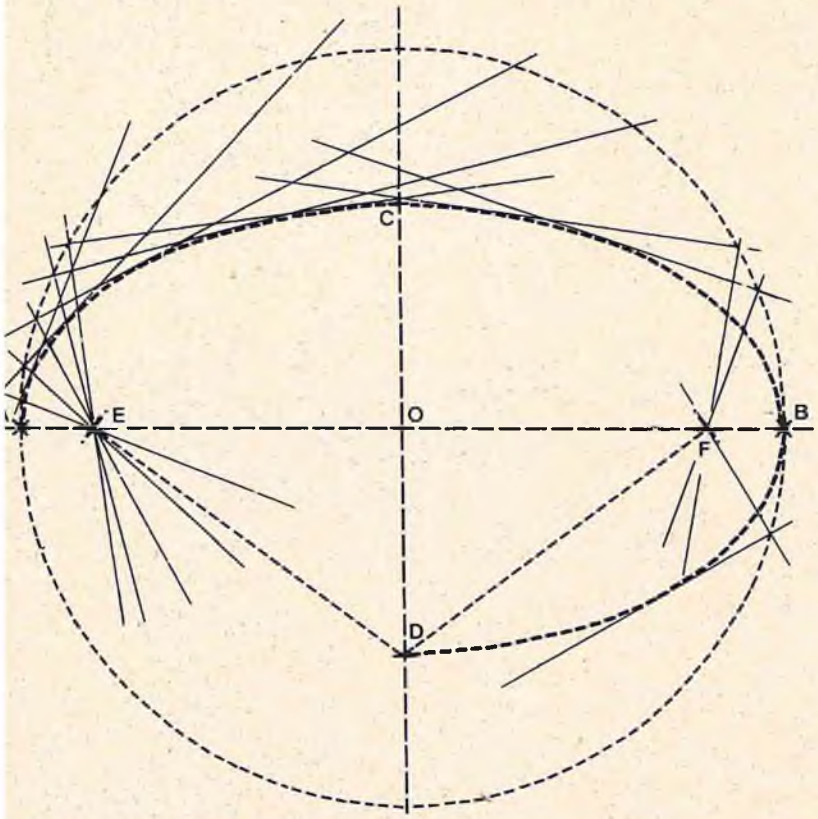
BY H.J.R. DILLEN

ELLIPTICAL CROSS SECTIONS

● Undoubtedly, Mr. Ralph Learmont's article on Elliptical Cross Sections in RCM, November 1975, (page 76), will have been very welcome to many scratch-builders, and I must admit that it was very clear and easy to follow.

Being a scratch-builder myself, I use a similar system, but instead of the so-called balsa gadget, I'm using a celluloid sheet, the kind used for viewgraphs, on which two lines, KL and LM, have been scratched with a hoppy knife, at an angle of 90° (Fig. 1). Along line LM — a kind of stretched halfmoon section is cut out, and used to draw the working lines.

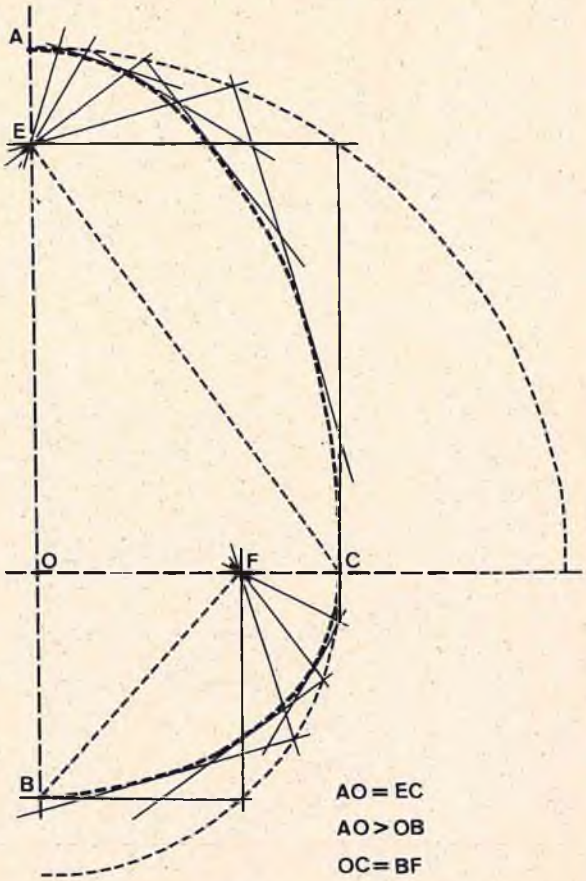
When an elliptical cross section has to be drawn, I use the same system Ralph described, by starting with both axis AB and CD, with O as the centerpoint. With a compass, I draw a complete circle, and with the same radius, I mark points E and F, taking D or G as centerpoint. So far, all steps are identical, but from now on I use my celluloid sheet. By moving line LK, either on point E or F, up or down, until point L coincides with the outer circle, I have my stretched halfmoon cut out to draw my working lines (see lower right quarter of



ELLIPSE ACBD

AO = OB = ED = DF

FIG. 2



AO = EC

AO > OB

OC = BF

FIG. 3

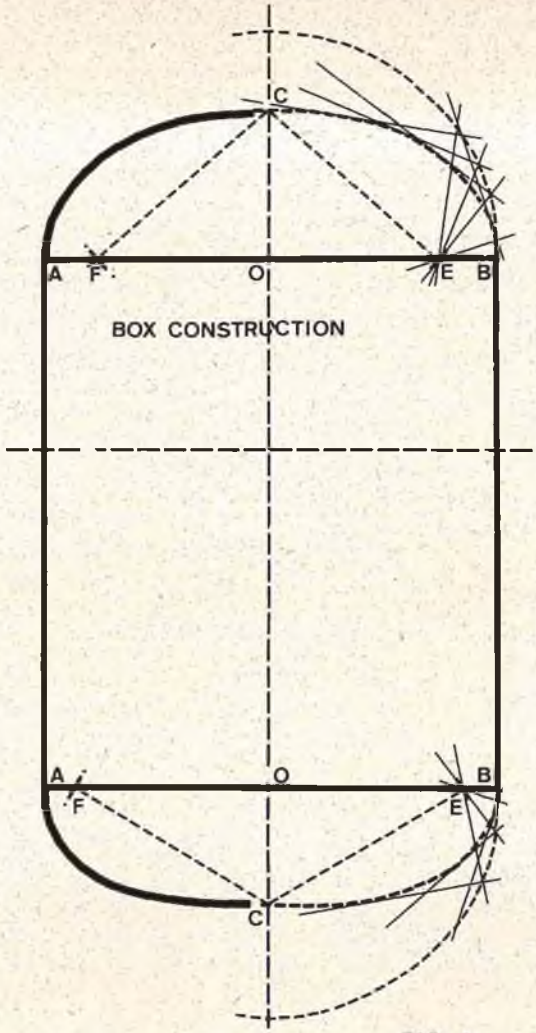


FIG. 4

Fig. 2). Now, move line LK, so that point L reaches another point of the circle, and draw another working line. Most of the times only 5 to 7 working lines are necessary to complete a quarter of an ellipse, as shown on the upper left quarter of the ellipse in Fig. 2.

This procedure can, of course, be repeated for the three remaining quarters but, personally, I just finish one quarter this way, and the three other quarters are copied with normal tracing paper.

To this point, we have concerned ourselves with only a symmetrical ellipse section. For asymmetrical ones, two quarters have to be drawn and the two others copied. I'm sure it is not necessary to mention that, for asymmetrical ellipses, two circles have to be drawn (Fig. 3).

We must admit that perfect symmetrical, or asymmetrical, sections are not used every day, or for each model we make, because very often, we have a box construction with rounded top and bottom. Even for these sections, the same principle can be applied (see Fig. 4).

Wing sections, certain stabilizers, wing tips, or even side views of fuselages, are drawn that way, and very seldom with a poor result (Fig. 5).

As you can see, my system does not need pins to guide, because most of the time the thickness of these pins can easily cause deformation. Even half a millimeter slip on the balsa gadget with compass, may ruin your drawing, and what's more, no third hand is needed to draw the working lines.

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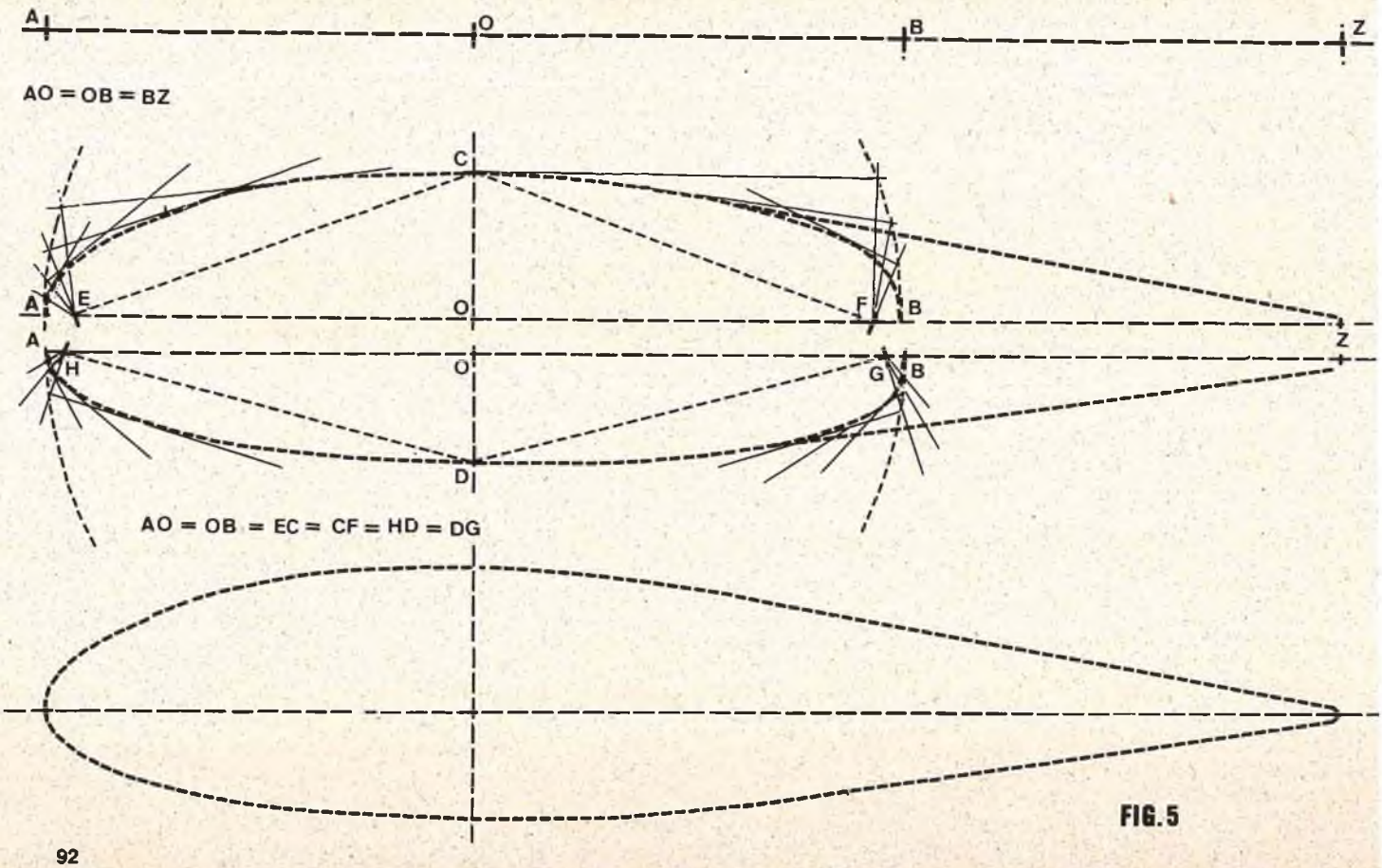
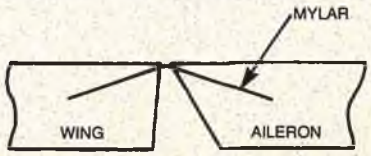
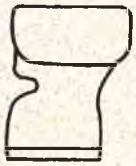


FIG. 5

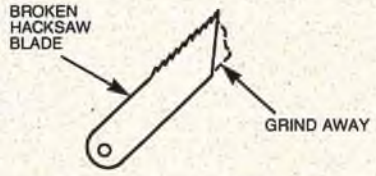
FOR WHAT IT'S WORTH

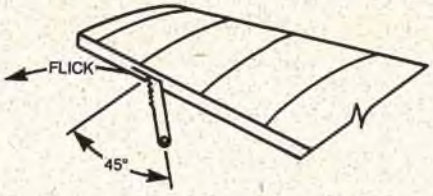
When joining ailerons to the wing, or fastening tail surfaces together, try using mylar hinges (drafting mylar thickness depends upon the size of the aircraft). Use a cut-down single edge razor blade as shown in the sketch to make the slit for the mylar. After the mylar is inserted, Hot Stuff or Zap them in place. Use film covering over the entire surface to complete the hinged surfaces. This idea was submitted by E.B. McFarland of Renton, Washington.



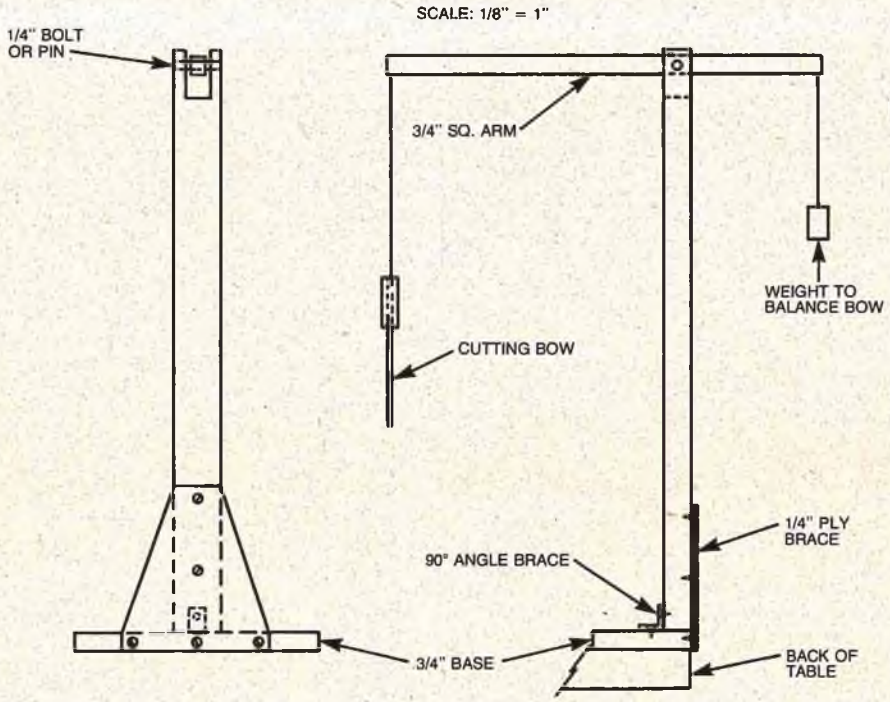


Are you having trouble making slots for hinges? Try using a broken hacksaw blade with a new tip group on the non-cutting side as shown in the sketch. Push the blade in the hinge line about 1/8'' and at a 45° angle, but parallel to the hinge line. Then flick up and out. You will find that you will have a nice slot for a Klett hinge that is exactly the right width. This suggestion was reprinted from the Pilots Log of the Fort Worth Thunderbirds Radio Control Club.

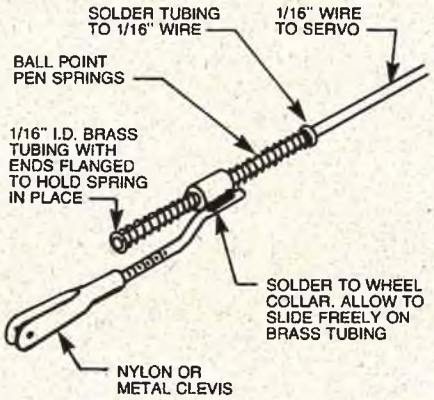




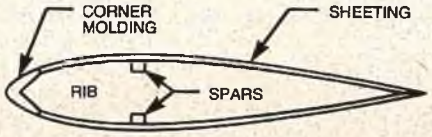
At one of their local workshop meetings, Gene DeCook of Canandaigua, New York, was asked to demonstrate the cutting of foam wings to the other members of the Sky-Rovers R/C Club. The main concern was how to suspend the bow above the table. Gene was thinking of rope, or cord and pulleys, and really making quite a project out of it. As you can see by the sketch, the simplest and most obvious way always seems to prevail. The materials and dimensions are not critical and the cost is practically nothing. The unit can be C-clamped to the back edge of a table or bench.



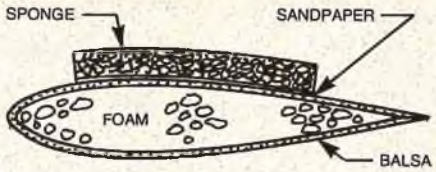
Here is an override device created by Nick D. Wolf of Mt. Lake, Minnesota, which has worked wonders during the past year. As you can see, the sketch is completely self-explanatory. The springs used are those from a ballpoint pen.



Thomas J. Ridge of Bryson, Texas, submitted the following sketch for scratch building wings for Quickie 500 club racers. Pre-finished outside corner molding, available at most lumber yards, are used for the leading edge of the wing. Either plastic or wood may be used successfully. The shape of the leading edge will then be approximately as shown in the sketch.



Sanding sheet balsa covered foam wings was a problem for Peter Goodchild of Gladwyne, Pennsylvania, since his sanding block always seemed to leave grooves in the balsa sheeting. The solution for Pete was to contact cement the sandpaper to a sponge which provided a flexible sanding block that would form to the contour of the wing surfaces.

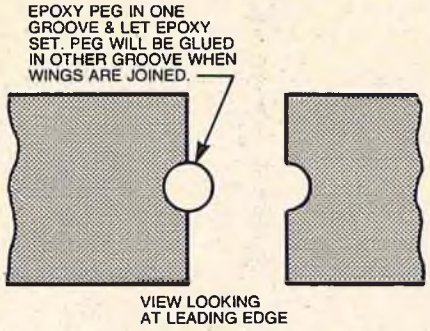


Mike Stroup of Durham, California, suggests coating your T-pins, straight pins, or other modeling pins with ordinary soap so that glue won't stick to them and, as a consequence, when the pins are removed from the wood, you won't leave a hole in the balsa the size of a toothpick.

Have you ever built up the nose of your fuselage only to discover that now you have to install blind nuts for your nosegear and/or motor mounts? Well you can either tear apart the fuselage to install them or you can try this little trick suggested by David R. Hartman of Lakewood, Colorado. Take a one foot length of larger diameter Gold'N-Rod and cement a blind nut to the end with Hot Stuff. Now drill your holes in the firewall for the motor mounts and nose gear bearing. Guide the blind nuts into position from inside the radio compartment and start the bolts from the outside. As the blind nuts seat into the wood the Gold'N-Rod can be freed with a simple twist. This is also useful

when repairing planes which have lost blind nuts in a crash.

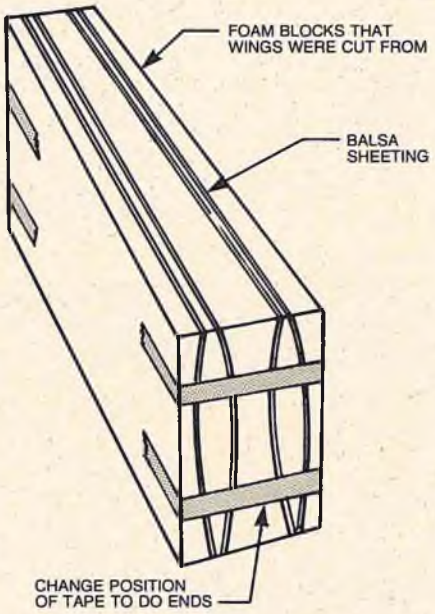
Howard S. Davenport of Warner Robins, Georgia, has always had difficulty installing the wing hold-down dowel in the leading edge of a wing. Whenever he tried to drill the hole, the drill tends to follow the soft balsa or foam on either side of the hard epoxy seam at the wing centerline. This results in a hole that is off-center and usually means wing mounting problems and misalignment. Howard devised the following method of installing the dowel before the two halves of the wing are joined. First, cut a groove in one wing root just long enough to accommodate the peg and half of its diameter. Next, use a half round carving tool and sandpaper wrapped around the peg to cut the groove. Cut an identical groove in the other wing root. Epoxy the dowel in one groove and let the epoxy set before joining the wing halves together in the usual manner. This does a beautiful job provided care is taken when cutting the groove. It takes a little bit more time and effort but the results are well worth it.



Here's an idea suggested by Jim Happel of Catonsville, Maryland, which makes gluing hinges quite easy. The epoxy smeared on a hinge before installation gets very sloppy. For a cleaner, easier, and stronger method, purchase a disposable syringe with a 20 gauge needle. Fill the syringe with a sufficient amount of slow curing epoxy. Push the needle into the hinge slot and apply a very firm even pressure to the plunger. Keep pushing until the glue just begins to ooze out of the slot. Now push the hinge into the slot and virtually no excess glue will appear. Be patient while applying the glue as it may take 10 to 15 seconds to fill the slot. Jim also recommends the use of Vaseline on the metal pin hinges for extra insurance.

Have you ever been frustrated by a clogged tube that comes with a bottle of Zap or Hot Stuff? Don't cut the tube off just because it is clogged. Jim Gustafson of Fairbanks, Alaska, suggests pulling the tube out of the bottom and taking a piece of thin copper or galvanized wire and inserting it in the unclogged end. Next, force the wire through the tube until the clogged section is pushed out. Your tube is then ready for using again without cutting it shorter each time.

The following suggestion from Dale Urbahns of St. Louis, Missouri, can be used for Sig foam wings, or any other wing that is shipped in the foam block from which they are cut. Fifteen minutes or less will produce two wing halves identical in size and shape. First, number the pieces of foam before unpacking. Then, remove the cores and glue the sheeting in place. Install the sheeted cores back in place in the block, carefully aligning the pieces of foam, then tape tightly together. After the adhesive has dried, trim and sand the excess sheeting flush with the foam.



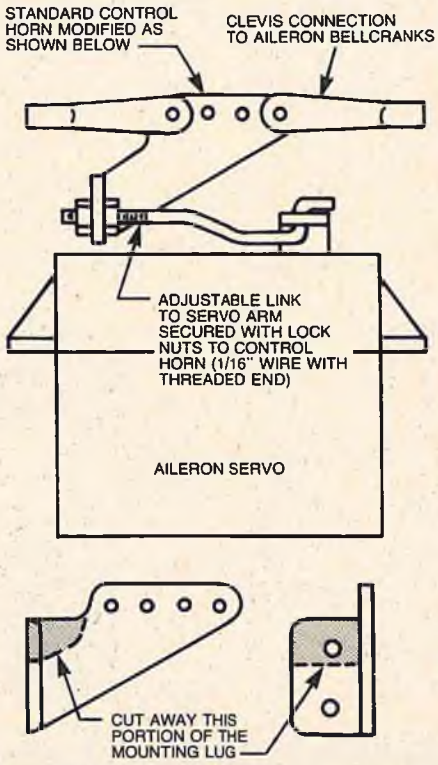
To add strength, and at the same time save on weight when building your next fuselage, try a full sheet balsa-ply. This is accomplished by sandwiching a sheet of 1/32" balsa between two 1/16" sheets of balsa, making sure the two outside pieces have the grain running horizontally while the grain of the 1/32" inner piece runs perpendicular to the outside one. You will find that this will provide tremendous strength with only a slight increase in weight. This suggestion was submitted by A. Famiglietti of Barrie, Ontario, Canada.

Necessity being the mother of invention, the following idea was born in panic. On a holiday, Dan Harrison found the hobby shop closed when he needed a Gold'N-Rod and could only locate old bits and pieces in the shop. Deciding that perhaps they could be held together with Hot Stuff or Zap, he tried this method and found they did not provide a good fit and had virtually no strength. However, wrap the joint with tissue and you have a super strong joint. Now, for the inside shaft, use a dowel of hard balsa inside the inner tube and a small drop of Hot Stuff and you have a length which will work and is strong enough to be used in a .60 pattern ship.

An excellent adhesive that has been overlooked by modelers is one that is normally used in home construction and called Liquid Nails. It comes in caulking gun cartridges and behaves like a filled contact cement. It is very tenacious and is good for sticking weights in sailplanes and many other non-structural applications. A caulking gun is definitely not handy to use in the shop, but if a group gets together and brings in their used up, and washed out, Crest toothpaste tubes, a cartridge will fill many tubes. This idea was submitted by Byron Blakeslee of Littleton, Colorado.

Did you ever have problems with the clunk in your fuel tank doubling back on itself? If so, try this suggestion from Donald W. Manvell of Rome, Pennsylvania. Take a spring from a ball point pen and stretch it out beyond its normal length. Slip this over the fuel line leading to the clunk and cut to the right lengths. This will make the fuel line sufficiently stiff so that it will no longer flip back towards the front of the tank, preventing proper fuel draw.

The following sketch from Jack Whitehouse of Whitehorse, Yukon, Canada, is for use with conventional outboard aileron hook-ups. It works extremely well with servos utilizing rotary arm outputs and is positive with absolutely no slack. Study the sketch and you'll find it to be self-explanatory. □



ENGINE CLINIC

from page 10

It is okay to use the squish band head right off. The stock head is a little low on compression to begin with. Be sure you tighten the head bolts equally. Any distortion caused by incorrectly tightened bolts would also account for the rapid wear and loss of compression. Before tightening the head bolts turn the engine over and note the amount of drag. Then tighten the head bolts in a criss-cross pattern. Front, rear, right front, left rear, left front, right rear. Check the drag again. It should be the same as before tightening the head. If not, start again. If the engine is tighter after tightening the head than before something is wrong.

Dear Mr. Lee:

Last Fall I bought 2 OS Max .50 engines to power my Cessna 310, I figured to have ready to fly this Summer. I installed the engines, one by one, in an old Contender and very carefully ran a gallon or two through each. I break my engines in in flight, much the same as yourself.

Problem: I noticed on the first engine an excessive amount of raw fuel escaping around the front bearing. This persisted all through break-in and even after I started peaking engine out. I reserved judgement until I ran the second engine so I could make a comparison. The second engine ran exactly the same!

Both seem to be very good engines – no idling problems, plenty of power, etc., but both use as much or more fuel than any .60 size engine I have, not to mention the mess!!

I called World Engines and asked for OS Max help. They gave me Dave Brown. He merely advised that OS were running "wet nosed" and that was about it.

A "friendly hobby dealer" has advised a bearing replacement with a seal on inner side should be available.

My ship is ready to go now. Just before I give up and try to live with this situation, I decided to ask for your advice. The sealed bearing idea sounds good, but I figured the OS bearing would be a sealed type.

Sure would appreciate your help, but whether or not, your Engine Clinic is my

favorite column in RCM.

Thanks,
Hermon D. Lowery
Pekin, Illinois

I guess that one of the most often asked questions I receive is related to engines leaking fuel out the front bearing. We have run through this many times in the past but for the benefit of new readers will cover it again.

It is perfectly normal for an engine to leak some fuel out the front bearing. In fact, it is actually desirable, as this indicates the front bearing is getting adequate lubrication and any foreign matter is being flushed from the bearing. No leakage at all would result in the front bearing not receiving any lubrication. So, gang, if you see a little "wetness" around the nose of the engine don't panic. This is normal. This amount of leakage will not effect fuel consumption enough to matter. Many fellows lose more fuel through siphoning action from the vent tube without even knowing it. If the fuel blows out like a spray gun so that the back of the prop gets wet, etc., then there is cause for alarm.

Unfortunately, the only cure for an engine that blows excess fuel out the front bearing is to replace the crankcase, crankshaft, or both. Sealed bearings do not work in this application. The function of seals on sealed bearings is to retain packing grease and keep out foreign matter. I have yet to find a sealed bearing that will stop fuel leakage out the front bearing. The seals are very thin neoprene, or similar material, and do not exert enough pressure on the bearing races to seal against base pressure of the engine forcing the fuel out. I have also tried both rubber and Teflon "O" rings which requires machining of the front of the crankcase. The Teflon did work fairly well but this is not a modification that anyone can easily perform.

I am sorry, Hermon, but there is not much that can be done. If running "wet nosed" is a characteristic of the engine you will just have to put up with it.

Dear Mr. Lee,

I just purchased the new Fox 45 R/C. I was surprised to learn while reading the instructions that this engine can only be run on castor oil and that tests with synthetics proved disasterous for the engine. I would like to know why this is so. It seems to me that oil is oil and if synthetics work well in

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ELLIPTICAL CROSS SECTIONS

from page 92/91

Of course, anyone works best with the system he has developed himself, but I leave it to all scratch-builders, who do not have their own system, to try out both systems and to decide which one they are going to adopt for their future projects. □

MATHES DISC SANDER

from page 90

and worthwhile addition to the RCM work shop. The sander is priced at $24.95 and is available through hobby shops or direct from Mathes Electronics, Lake Havasu, California 86403. □

CUSTOM POWER PANEL

from page 87

available at most electronic stores. Be sure to refer to the previously mentioned issue of RCM for battery tapping instructions. Also, if your fuel pump is of a different voltage than shown in the schematic, use the appropriate tap as outlined in the May 1975 issue of RCM. *(Ed's note: The May 1975 issue of RCM is no longer available but reprints of the above article are available for $1.00 per reprint.)* □

DAYS OF YESTERYEAR

from page 85

convince yourself that styling and technology have made your old car obsolete. You think about that nice feeling that comes from owning something new. Once you decide to "just look" at new cars, it is only a matter of time until one is sitting in your driveway.

My R/C equipment is nearly five years old. Two 4-channel systems have served me faithfully during this period, but they were manufactured before the advent of three wire servos and some of the latest electronic circuitry. Today's R/C systems are a real

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from page 107/85

bargain. You can buy a system for as little or less than you could five years ago, and this is really exceptional when you consider recent inflation. For example, your kit and engine costs are at least fifty percent more. "House brands" and sport series have become a real boon to the growing number of R/C sport flyers.

After looking over the current crop of R/C systems, I decided on the Futaba as the most likely candidate for a new system. Some of Futaba's features that I especially liked are: (1) Unique transmitter shape, (2) ease of frequency change using plug-in crystals, (3) buddy box-trainer system, and (4)-servos that plug directly into the receiver rather than into pigtails from the receiver. I mulled over the fact that most three channel systems use dry batteries for their transmitters, and came to the conclusion that it was probably just as economical to get a four channel system with three servos in order to have rechargeable batteries for both the receiver and transmitter.

I did some last minute soul searching as to whether to buy an R/C system which I really didn't need, and if I bought a four channel, should I get three or four servos? You probably have already guessed the answer to this one. Like that new car buyer, I could no longer resist the temptation of a new R/C system. I also decided that the extra servo would come in handy.

I subscribe to the theory that it is best to install the largest engine within the size range specified in the model design, so I chose an O.S. Max 15 R/C engine to power the J-3 Cub. My reasoning is that you can always slow down by throttling back, and the extra power may prove useful for short field take-offs, windy day flying, or later when the model becomes fuel and epoxy logged. Also, with ample power, the engine setting is less critical. You can favor the rich side to reduce varnish build-up and promote longer engine life.

The Sure Flite J-3 Cub is comparable in price to any other kit of similiar design and

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Fellow RC'ers gather around to witness the first test flight. L to R: Kneeling: Tom Vincent and the author. Standing: David Evelsizer, John Darby, Jr., Rick Harding, Damon Bryson, Joe Olschowka, John Darby, Sr., and Darwin Evelsizer.

DAYS OF YESTERYEAR

from page 108/85

size. Parts are die-cut from very good quality wood. A pre-bend landing gear and all normal hardware are included. Clear acetate is provided for the skylight, cabin windows, and windshield. Plans are full sized with numbered instructions to show you the proper construction sequences. All told, it is an excellent kit of average difficulty.

There is ample room in the Cub's radio compartment to install the Futaba or any other R/C system comprised of miniature servos. The Futaba is a complete system with such extras as servo trays, servo output arms of different shapes, frequency flag, and even a transmitter neck strap if you are inclined to use one. I used the three-servo tray, anchored to hardwood bearers for the Cub's radio installation. Futaba servo trays are somewhat unique in that they have plastic spring-type clamps to secure the servos to the tray, rather than the small screws that are used by most other R/C systems. There is room for the square battery pack, wrapped in foam, to fit snugly forward under the gas tank. This works out nicely for balance; my Cub was slightly nose heavy when held at the forward wing spars. (I assumed that the forward spar was a good approximation for the C.G. because C.G. information was missing from the plans.)

A new plane on the field always gets a lot of attention from the other R/C flyers present when it arrives. Of course, I had men-

Take-offs are reminiscent of a real Cub.

The famous J-3 Silhouette is easily recognizable.

tioned my current modeling project at previous flying sessions and club meetings, and had made it known that today would probably be the big day. Everyone gathered around as I nonchalantly unloaded the new model, modestly accepting compliments about its appearance, and answering questions concerning its vital statistics. My new R/C system brought additional questions such as "when and where did I get it", "what did it cost", "how did I like it so far", "what frequency", and so on. Someone suggested that if the main landing gear was in the stock Cub location, ground handling might be a problem, and the question was asked as to why the stabilizer had so much positive incidence. My reply was that I just followed the plans (while secretly hoping that I hadn't made any mistakes). I didn't mind the questions because they prolonged the time before I would have to face the challenge of the first flight test.

After assembling the Cub, I stalled a little more by drinking a cup of nerve tonic (coffee). Soon their was a lull in the flying activities. Once again everybody gravitated to my pit area with comments of, "Put her up and let's see what she will do." Unable to delay any longer, I fueled the model, primed the engine, hooked up the glow plug, and started flipping the propeller. Guess what — flooded! My usual problem with a new and unfamiliar engine. One of the engine experts present offered to start the engine for me. I thankfully accepted his offer, and made a last minute left-is-left and up-is-up control check while feeding throttle at his direction. He started the engine and set it rich because of its newness. He indicated that high trim on low throttle was necessary in order to keep the engine running at low speed.

Real Cubs frequently landed in cow pastures. Their pattern included a low pass to survey the terrain and clear out any cows.

DAYS OF YESTERYEAR

from page 111/85

A ground handling check was the next order of business. The combination of tail wheel steering, high idle, and a breeze soon had the model at the far end of the runway where it refused to return. Ground steering wasn't helped by the fact that I had instinctively applied rudder with my left hand on the throttle stick momentarily forgetting that the rudder was plugged into the aileron channel. A helpful on-looker retrieved the model, and the moment of truth had arrived!

I pushed the throttle to the wall, this time remembering to steer with my right hand. The tail immediately lifted off the ground as the model began to pick up speed. I applied some up elevator to keep the tail down because I was afraid that the Cub would nose over. Before I could release the elevator, the model broke ground and began a lumbering climb not unlike its full scale counterpart. My brain had just accepted the fact that the J-3 was airborne with minimal airspeed when suddenly she lurched to the left at about five feet above ground. Instincts saved the day by applying the proper corrections of right rudder and releasing some up elevator to drop the nose. With outward calm, I continued the climb out while inwardly I started to shake as the realization dawned that the J-3 had come within a hair's breadth of buying the farm. At a safe altitude, I put the model into a left procedural turn. This turn was sharper than anticipated because of an unconscious compensation for the apparent trim problems. Full trims of right and up stabilized the Cub in a flyable condition, and I decided to fly out the tank to help break-in the engine. My dead stick landing resembled a student pilot's in a real Cub, but the model had survived its first test flight in one piece. (Note: This is my ninth R/C model, but it is only the second one that I have personally flight tested.)

I refueled, and took out the trim by compensating adjustments to the control surfaces. The rest of the day was spent leisurely flying around the field getting to know the new model, while breaking in its new engine. I kept out of the way of the hot shots, but sneaked in a few low level passes to admire the Cub's in-flight realism. I did a few simple maneuvers. Inside loops were no problem. I tried a power spin by giving full up elevator and right rudder, but all that happened was a lopsided loop. Then it dawned on me that I must have used the wrong rudder again! It felt strange to apply full rudder and elevator with the same stick, but when I did, the Cub snapped into a tight power spin. I released the controls after several turns because I feared that the wings might shear off. The Cub has good spin recovery through neutralized controls followed by up elevator. Anyway, my prefer-

Is it a real J-3, or a model?

ence is stall spins, and they are easier on the model. Stall turns, tail slides, and barrel rolls are other maneuvers that the Cub will take in its stride.

I also practiced full scale-like turns. Bill Shelby, my original flight instructor, used to have me practice gentle sweeping turns on my Headmaster. He would say that anybody can make abrupt turns, but it takes a little finesse to maintain altitude and a constant bank angle for large radius turns. I flew some large radius Figure Eights, something that I hadn't done since my Headmaster days.

Touch-and-go practice is even more enjoyable with a realistic looking model. The glide characteristics of a flat bottomed high winged model took a little getting used to. I blew several approaches on the high side, but it was still a nice sight to see the Cub sailing by at head height. Another challenge is to achieve a three point landing just like the real tail draggers.

I usually try to avoid the new model-engine-R/C system combination, on the grounds that there is a much greater likelihood of something going wrong when everything is brand new. It is my hope that this article will provide encouragement to some of those who have been thinking about joining the R/C ranks, and also strike a nostalgic chord in the experienced RC'er. Because a first time R/C modeler would probably have new equipment, I purposely used everything right out of the box. My successful experiences are good evidence of the reliability of today's engines and R/C systems.

This has been a very enjoyable modeling project. I have been rewarded with a model that has both excellent flying characteristics and a high degree of realism. An added bonus is the fuel economy provided by the O.S. Max 15 R/C engine. The Futaba system has performed flawlessly. I have realized a life-long ambition of owning and flying my very own Piper J-3 Cub.

Care to join me? □

DELUXE FOAM CUTTER

from page 82/81

Supplies Needed For Transformer

Variable Transformer — original used a 5 amp, 0-120/140 volt unit made by Staco, Inc., Dayton, Ohio.
Fuse and Fuse Holder — 5 amp.
Toggle switch — 6 amp, 125 volt.
Duplex outlet and cover.
Lamp cord and plug.
Box (see drawing for dimensions and materials). □

from page 79/76

up to a 9V power supply. A function generator was used to inject a 350-400 HZ sine wave signal of 50 millivolts. The readout on the tach was compared with a Hewlett-Packard crystal controlled frequency counter completely across its entire specified range. All readings noted compared favorably with the counter except the maximum range of the tach, 299. The tach read 298 when compared with the counter. All tests were performed at ambient room temperature (72°F). Time precluded a temperature test, however, this would, no doubt, affect the accuracy of the unit to some degree. While hooked up to the power supply, the voltage was gradually lowered. I found the tach will operate down to 5.5 VDC with no adverse effects except for a noticeable dimming of the incandescent display readouts.

The tach was used extensively under different light conditions. With the sun directly overhead in a cloudless sky, the big 3/8" readouts could be seen, however, I found that letting your shadow fall over the displays improved visibility. With the sun down behind the trees the tach still continued to give consistent readings. Next, a completely overcast sky, semi-cloudy bright was chosen. The tach continued to lock in. And, finally one evening about an hour after sundown with very little light, I finally got some erroneous readings.

I loaned the tach to a friend with a helicopter who was interested in **accurate** RPM to adjust his automatic speed control. Upon seeing him a week later his first comment was, "How much do you want for it?"

It is difficult for me to fault the Digi Vue in any way. Certainly the price is right. I encountered no difficulty following the instructions during the building phase. All components were of good quality. The tach worked as stated in the instructions. It was easy to test and calibrate. And, above all, it will give you very accurate readings.

Building the Digi Vue tach was certainly a rewarding experience, giving me particular joy in knowing I built it myself. It is a precision instrument, useful in all areas of modeling, that will give you many years of service and pleasure. □

WINDWARD REVISTED

from page 75/71

wing, a 3" 1/16" music wire wand will keep the tip high enough off the concrete to protect the stab. My Windward, including flight pack, engine, pod, and wheel weighed 30 ounces.

Since modesty and conceit are faults, and a perfect person has no faults, I will admit to being an expert in the glider building field and say, "You other experts look around and see why the novices are having so much fun - - - it is because they are flying Windwards. Don't knock it if you haven't tried it . . . lately".

May the Windwards have another seven years as successful as the past seven. □

FOR OLD TIMES SAKE

from page 66

by then, had given a remarkable demonstration of old time flying. His sturdy Stratostreak bit the dust before it even left the ground. The motor mount was a unique application designed to spin with the torque of the engine! Later he gave another lesson with his Fox — "How to Dethermalize" — straight in! Not content, he decided to prove the old adage, "things happen in threes," by landing atop a building. Now that didn't do any significant damage, but the retrieval really smarted!

Saturday ended with more Texaco flights and Woody heading back to the motel for a well deserved nights rest. As a matter of fact, everyone had Saturday night off. Time to ready the planes and batteries for the next day.

Sunday dawned blue and beautiful! Woody, now experienced with the mid-western sun-ups, arrived at the field at 7:00 for more Texaco. The "boomers" were there even at that hour! Gary Montana of South Jersey, logged a 25 minute flight! Hugo Mercoli registered a 19 minute flight with his Dallaire Sportster. Andy Anderson, also from Jersey, did quite well for a beginner — he captured fourth place with his MG, which was finished on Friday night in the Holiday Inn parking lot! But, the most incredible time was, you guessed it, Cliff Schaible's — 48 minutes! His skill with that Lanzo Record Breaker is outstanding.

Sunday was not without mishaps either. There seemed to be a lot of radio interference around the base. Several pilots lost all control. (Still don't know who the culprits were.) A good argument for impounding transmitters. Al Schwankert had an interference problem which forced him to drop about 500 feet. He was lucky - - - he regained control in the nick of time.

Dick Sturges of Northfield Village, Ohio, was not quite as lucky. His Playboy smacked into another flier's windshield, cracking both badly.

Jim Clark of Plainfield, New Jersey lost his Playboy when the wind clipped it and wham! Right into his own travel coach. The fuselage was a mess. The wing popped off and landed in yours truly's lap. Jim claims the coach moved!

Lee Webster, a very pleasant Southern gentleman, had his troubles, too. And with a Playboy. (What was that about "threes?") The rubber bands over the wings popped under power — Zonk! The wing was intact, the tail was mendable, but the fuse was a wreck.

Sunday continued to be beautiful and max's were the order of the day. Tom Acciavatti, of Massachusetts, recorded two to win the Beshar-Woodman trophy for the most perfect flights in Class A, B, or C.

We left the field for a while to visit the Air Force Museum. If you're ever in the Dayton

area, it's a must see! From kits to Apollo. It made for a fascinating afternoon.

In the evening, S.A.M. held its yearly business meeting. It was a typical meeting with factions voicing their opinions. When are we all going to learn that we're all modelers, no matter what our particular "shtick?" Let's stop arguing amongst ourselves. 'Nuff said?

At any rate, the only things settled were: (1) The ignition conversion controversy will be put to a yes/no vote through "SAM Speaks." The question, should glow engines converted to ignition be allowed? Our feelings say "Yes". The original ignition engines in working order are getting harder to come by, as are parts and plugs for some of the oldies. And as they become more scarce, the prices will skyrocket! (2) The Eleventh Annual Champs will be hosted by the western region in either Taft or Las Vegas.

Monday was left to the free flighters as the Nats took over the airwaves. The F/F old timers had one of the best days — gorgeous air and just a zephyr of a breeze.

Two free flighters of note were two gals, Leslie Norman and Stephanie Perryman. Leslie even outdid her husband in B Pylon and C Cabin. Stephanie's the granddaughter of George Perryman. This little doll picked up a trophy as big as she is for First Place in a junior rubber event. More power to you both.

Monday night was the big, and we mean **big**, banquet at Wittenberg's Student Union. The spread was phenomenal. Chicken, cold cuts, salads, and a side of beef. Following the food came the speeches. Thanks went out to Bob and June Laybourne for their social directing, to Bill Hale for his contest coordinating, to Dick Smith for his free flight CD'ing, and to Woody Woodman for his R/C CD'ing. We too, would like to add our accolades to all concerned and, especially, Woody. He worked his fanny off and deserves a round of applause.

The time for trophies had come and the R/C winners were:

Class A

1st — Tom Acciavatti.
2nd — Joe Beshar.
3rd — Mark Patrolia.
4th — Hugo Mercoli.
5th — Larry Fair.

Class B
1st — Tom Acciavatti.
2nd — Gary Montana.
3rd — Hal Hadley.
4th — Vince Bonnema.
5th — H. Smith.

Class C
1st — Bill Green.
2nd — Mark Patrolia.
3rd — Gary Montana.
4th — Al Schwankert.
5th — Hugo Mercoli.

Antique
1st — Hugo Mercoli.
2nd — Stu Murray.
3rd — Lee Webster.
4th — Tom Acciavatti.
5th — Esio Grassi.

Texaco
1st — Cliff Schaible.
2nd — Gary Montana.
3rd — Hugo Mercoli.
4th — Andy Anderson.
5th — Don Lamkin.

R/C Grand Champ
Gary Montana

A lighter touch of the evening arrived when Tim Banaszak and Karl Spielmaker, the co-sponsors of a compressed air event, handed out the prizes. Karl awarded Tim First Place, a plaque embellished with a tire pump, and $25.00 in $2.00 bills for three flights totalling 110 seconds! Tim then awarded Karl with Second Place, $15.00 in $2.00 bills for three flights totalling 85 seconds. Fred Collins received $4.00 (in $2.00 bills) for his run — $1.00/second. Talk about a power race!

Marianne Clark, Jim's wife, was called on to present gifts to the hardworking ladies who made the Champs run smoother: Doris Hale, June Laybourne, Evelyn Woodman, and Mary Schwankert. A pleasant and fitting touch.

The Champs were well handled and Wright Field was indeed right. A great place for RC'ers and free flighters alike. Wittenberg University bent over backwards to provide a terrific banquet and comfortable facilities for all. The Central Ohio F/F Club also deserves a big hand for their coordination of the events and especially their choice in weather.

We had a ball! Hope you did, too! ☐

SOAR NATS

from page 53/49

Second in Duration to Ray Hayes.

The San Fernando Valley Silent Flyers team of Rick Pearson, Terry Koplan and Ken Wagner walked away with the team trophy for the second year in a row. This is the first time that this trophy has been won more than once by the same team. Top competitors in their own right, Ken and Terry won Duration and Precision respectively with their Windrifters in Class A.

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SOAR NATS

from page 120/49

A near disaster turned out to have a happy ending when Bill Elliot of Huntsville, Alabama, crashed his Legionaire the day before the contest. This was a real "garbage can special" when I saw it. The fuselage was shattered into a million pieces, one wing had all the ribs sheared off. . . well, under normal circumstances it never would have flown again. The gang from Huntsville, as well as many others, stayed up until the wee hours of the morning the SOAR Nats began and fixed that plane. Bill flew it as a part of the winning Junior-Senior (under 18 years of age) team, along with Gregg Smith and Jim Vanderzyl. Vanderzyl also took the trophy for the best Jr.-Sr. and Gregg Smith was the recipient of the Felix Pawlowski Award. This award is presented each year by the University of Michigan to a top Jr.-Sr. competitor who also scores highly on a written test on aerodynamics.

Scale was a real treat this year, because there was such a wide variety of sailplanes entered and they were all good. There was a group of planes from the 30's which included Col. Bob Thacker's superb home-built Bowlus which won the event this year, as well as last, Doc Hall's Schulgleiter and Max Gier's Grunau Baby. The sight of these planes flying free with the sun shining through their ribs is a "never to be forgotten" thrill. Steve Moskal, Chairman of SOAR, flew a WW II German troop glider, while Gordon Pearson built a scale version of Stan Hall's Vector.

In sharp contrast to the old-timers are the sleek scale versions of modern glass ships with modern instrument panels and working landing gear. Only a few years ago it was thought that these planes could not be flown with full scale outlines. The chord at the tip of a high aspect ratio wing would be too small to provide any lift on a model. A scale horizontal stab would make a model drop

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SOAR NATS

from page 122/49

out of the sky. Ken Wagner, with his Libelle, and Terry Koplan, with his Glasflugel 604, have gradually modified their scale ships until they are now flying with full scale outlines, but the planes have to be flown fast and it takes tremendous pilot skill to fly them. Scale is based on both static and flight points and it is no accident that people such as Don Edberg, with his immaculate Duster (2nd), Ken Wagner (3rd) and Terry Koplan (tied for 4th with Carrol Moffat) who placed well in scale also place very highly in the rest of the contest.

To concentrate on a few high scorers would be to miss the unique flavor of this most prestigious contest. This flavor is due to an influx of people from all over the country. The names such as Harris Hill L/D, Dallas League of Silent Flight, CARDS (Chicago Area Radio Drone Squad), RC/RC, and Torrey Pines Gulls, embroidered on the flying jackets represent the finest in soaring. In fact, this year there was an official team from Mexico and a new club, Cloud Base, from Canada which gave the SOAR Nats a truly international character.

The Mexican team was selected by competition in Mexico and the team was sponsored by Mexicana Airlines. It is interesting to note that R/C soaring is international in its appeal. The Mexicans are planning to begin an LSF program in their country. We all enjoyed comparing notes with these fliers who are accustomed to flying at the Mexico City altitude of 7,500 feet. To cope with their special flying conditions, they designed a plane with a low drag, lifting fuselage called **Ulumcan** which translates as "Watcher of the Birds". The performance of this plane was impressive enough to win it the award for Best Original Design. We hope that there will be many opportunities for further exchanges with these fine competitors.

Women were more involved in all phases of the contest than ever before. Carol Seydel ran a winch, Helen Olsen and Linda Porter did the scoring and had it finished without

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SOAR NATS

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error at 5:00 P.M. on Wednesday. The WINGS (Women's International Glider Soaring) team was back this year and women were flying with other clubs as well. Two members of the WINGS team, Barbara Robinson and Margaret Gill were pregnant, but that didn't slow them down. There was a surprise baby shower held for Barbara under the tent by Ken Bate's trailer on Tuesday during the contest. Could it be more than coincidence that Bob Robinson and Bob Gill won awards for Precision and Best Technical achievement?

At the banquet on Wednesday night it was announced that this would probably be the last SOAR Nats as we know it. SOAR has held this contest for 7 years and they have set a standard of excellence in the sport that will be very difficult to follow. Frank Garcher of Midwest expressed the feelings of all of us in the hope that the good work done by the members of SOAR at this most marvelous of sites could somehow continue. In 1977, we all hope that B.S. in the dorms, night flying, and fine competition will be more than just a memory. □

SOARING

from page 46

when the rising air will pass through. You can head up-wind to catch the next bubble; circle, tack across the course, and catch the right air as it passes through.

Now, thermal detection is a science that requires skill, patience, and knowledge - - - don't think you will hit it off 100% of the time. This electronic thermal detector will give the serious sailplaner that edge that is needed in competition.

Many thanks go to Roger Schroeder for the schematic of the electronic thermal detector.

The photograph showing the adjusting of the potentiometer, shows a second toggle switch. This switch should be disregarded as it was used as an experiment for extremely low temperature application and it is not shown in the schematic.

Happenings and Things

Les Leer of Southern California, took his "El Conquistador", scaled it up one third and came up with his "El Conquistador Grande". 136" wing span, with 1350 square inches. The picture shows the standard version on the right; the "Grande" on the left.

•

From Per Olsson of Sweden, comes a good idea for ballasting the conical nose type sailplane. Take some aluminum foil (two or three layers), shape it to fit the most forward compartment in the plane. Then, carefully pull it out and place the mold so it stands vertically, in a can or a tube, then melt and pour in the amount of lead required. When the lead has cooled, tear off the foil and glue the weight in place using silicone rubber.

Along these same lines is the use of a low melting alloy called "Cerro Bend". It melts in hot water and can be poured directly into the sailplane. The only drawback is it is more expensive than lead. If there is any interest in this alloy, I will write it up at a later date.

•

From Glendora, California, comes a very attractive cotton "Tee" shirt printed with "RC Soaring". The shirt is 100% cotton, very good quality, and comes in all sizes and colors. Contact 4-D Enterprises, P.O. Box 182, Glendora, California 91740, if you are interested.

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"Why wait for a high start?" says Bill Festag of California. He has built a detachable power pod using an Astro 5 electric motor and nicads. He uses it very successfully on various sailplanes. The added wing loading doesn't seem to affect thermaling greatly.

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An interesting note from the South Bay Soaring Society. Kirby Parker is the club LSF Coordinator. He keeps records of all club members Grade Level, and best of all, achievements needed for the next LSF level. This is great information needed for scheduling club events and contests.

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Next month — some ideas and facts on night soaring.

Good Lift. □

A BETTER WAY

from page 39

silicone rubber tube and slipping it on the spout. To defuel, hook to the engine fuel line and squeeze the bottle. When you release it, it will suck the fuel out quite quickly. Note that beyond about 6 oz. tank size, the other systems become more suitable, but for the smaller engines this one is very convenient. A good source of suitable bottles are certain brands of two-cycle oil, some of which are ready marked in fluid ounces.

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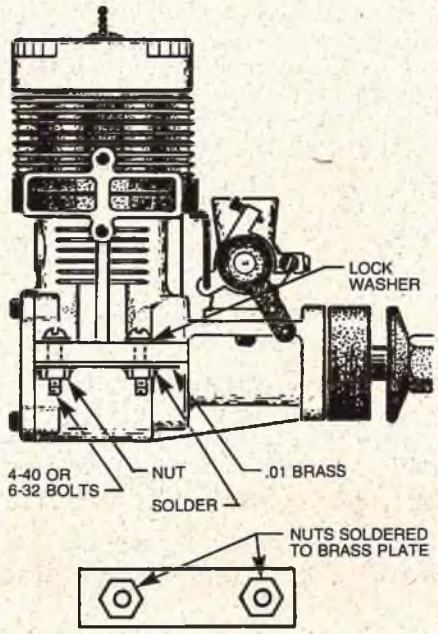
If you use 1/4", or similar plywood for an engine mount plate, you may find problems with the ply crushing and allowing the engines to loosen a little. If you make up a nut plate to distribute the pressure, the problem will be avoided. Cut a couple of pieces of brass sheet (about .01") roughly 1/4" x 1" and drill holes big enough for your engine bolts with the same spacing as your engine mounting lug holes. Solder nuts of the appropriate size to the plates. Use lock washers under the bolt heads and screw into the nut plates. For added vibration resistance, screw a second nut down onto each bolt after they are tight.



PIETENPOL

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.... 30"

sheets for the wing leading edge planking and the harder ones for the trailing edge. The optional fuselage side stringer is recommended and, if used, should be tapered for about 3" from each end after cutting to the proper length. This will produce a better looking airplane, adds strength to the rear of the fuselage, and the taper makes covering

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easier. The quality of die cutting is excellent and, because of the thinness and sharpness of the cutting die a little care is necessary in pushing the parts from the sheet. We found the best results to be attained by pushing the parts out from the back after brushing the sheets with fine sandpaper. All heavier plywood and balsa parts are cleanly saw cut and only a minimum of shaping is required for the nose and fuselage top blocks. The firewall is bevelled on both sides and the bottom and, when properly placed at the front of the tank floor, automatically sets the required right thrust. Similarly, the die cut dihedral angles provide exactly the right slant to the root rib to match the arrow shaft spar angle and to give a good tight fit at the center section. The method chosen by House of Balsa to mount the wing to the fuselage is extremely strong yet clean and easily demountable. The wing, centersection, cabanes, and fuselage are permanently joined with epoxy and hardwood pins. The die cut plywood centersection ribs are prepunched at the proper location and angles to permit the arrowshaft spars to slide into the centersection. Removable 1/16" dowel pins are then inserted through the holes in the spar and the opening in the centersection is covered with a 1/16" plywood hatch. The hardwood wing struts are functional and must be used and are easily attached to the wing strut plates with clevises. When the wing is removed, the struts can be rotated rearward, without removing them from the fuselage for ease of transportation. The cabane struts are cut to the proper length and will give the required two degrees positive incidence. Because of the semi-symmetrical airfoil, it appears that there is negative incidence. Remember that the angle of incidence is measured against the centerline of the rib, not the bottom. The model, as presented in the kit, is slightly modified from the original RCM plan. The fuselage is wider, the centersection/cabane strut joint has been strengthened, a 1/4" square spar has been added to the wing and the rudder and stabilizer joint has been strengthened. All of these modifications have been made to improve the model, not to make it easier to kit or sell. In our opinion, this is a high quality kit of a good flying airplane. It is rather unusual in that the cost of the kit is not based on the volume of wood and fittings, but more on the quality of the wood, the high degree of prefabrication, the accuracy of fit and the clarity of the plans and instructions. It is apparent that much thought went into the design to assure simplicity, strength, and trueness of structure. It is a good beginners kit because of the detailed step-by-step instructions and the clarity of

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PIETENPOL

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the plans. A beginner should require help only with the radio and engine installation. It is also a good kit for the Stand-Off Scale set because of the possibilities for self expression and the wealth of detail that could be added. Since many Pietenpol's were home-built, the builder can individualize his model, the same as many full scale home-builts were, by changing the nose configuration from the Ford Model A illustrated to a Volkswagen, or something similar, which could be cowled in and would not need a radiator. Our test model was powered by an OS .30 engine with a Semco muffler and used a Pro Line Challenger with PLS-15 servos for control. The 8 ounce tank gave what seemed to be unusual duration, probably since this is one airplane that we enjoy flying at 1/4 to 1/3 throttle. The radio compartment is big enough for any servos, even some of the antiques that are still around. Using the control throws given in the instructions (another feature we like), response to control was good and was positive, but not touchy, and adequate for most maneuvers. The airplane flew with only a small amount of down trim probably because of the larger engine and the accurate wing, tail and engine relationship guaranteed by the type of construction and the accuracy of the die cutting. A take-off run

with the .30 was about 10 or 15 feet, but without any rocket-like characteristics. With the .30 it will hang on the prop and mush along all day long without too much trouble. A good, slow idle is recommended if power-on landings are desirable. The Pietenpol just doesn't want to come down if there is any power-on to speak of. The thing we liked most about it was that because it is so slow, you can watch it coming and going, with plenty of time overhead. In short, a great kit of a real enjoyable airplane. ☐

ARE YOU SHORTCHANGING - - -

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the old paper or silk and dope finishes but, unless you're after the ultimate in performance, the extra weight isn't going to be all that important.

It hasn't been my intent to provide a course in model building in these few paragraphs. All I've really tried to do is dispel notion that it takes some kind of Superman to glue together an Old-Timer free-flight — or any other kind of built-up model for that matter. And that finally gets us, if you're still with me, to the real point of this whole discussion.

All of us participate, to a greater or lesser degree, in one of the finest spare time activities ever developed. It has something for everyone and, better than most avocations, offers liberal portions of both hobby and sport. Webster's defines a hobby as "an interest engaged in for relaxation"; and a

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ARE YOU SHORTCHANGING - - -

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sport as "a physical activity engaged in for pleasure". There's a tremendous difference. Certainly I'm not knocking the "sport" end of modeling, the flying. That's usually the culmination of all our efforts and, without it, there wouldn't be a lot of meaning to much of the rest of it. What does disturb me, though, is that today, thanks to the marvels of prefabrication, many modelers are short-circuiting the building, or "hobby" part and jumping directly into R/C flying. This isn't all bad, of course, since it does expose them to the hobby and permits them to concentrate on mastering the fine art of stick wiggling. I fear, however, that in the short-circuiting, they're also short-changing themselves out of the genuine benefits and pleasures inherent in the hobby.

Before the advent of plastics and the ARF, the typical modeler followed a well-defined path. He usually started by whittling sheet balsa gliders and ROG's and progressed into built-up tow gliders and rubber models of all types. Powered models came after a reasonable proficiency in building and flying had been achieved. It was a simple painless apprenticeship that provided challenge, education, and a glorious feeling of acomplishment every step of the way. Even better, it gave him something lasting — an outlet for his creative impulses, and a constant source of pride. That same approach is still available. For about ten buck's worth of Jetco and Comet glider and rubber model kits, one can go the whole route. A few evenings work and you'll wind up an accomplished model builder ready to tackle almost anything, and you'll also have something to play with while you're awaiting your turn at your frequency. Then, when something interesting shows up, be it an Old-Timer or super-scale, it's no longer a question of "Can I build it?", but, instead, "How soon can I get started?"

Try it. You'll be repaid many thousands of times over. Believe me, no model builder ever suffered from boredom and, at the very least, it will make the family happy — they'll know where you are in the evenings! □

MISS WORLD

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.... kit was a little rough and uneven. While this kit was being reviewed, World Engines corrected this with an injection molded cowl with cut-out for engine clearance. We feel that the Miss World kit contains more "goodies" than one could ever expect in a kit. The option for a foam or built-up wing is decided by the purchaser before buying the kit. The two most important features in the construction of Miss World is the fact that there is very few parts in the pre-assembled fuselage adding to the overall ease of assembly. Where this airplane excells is in the excellent ground control. The positive linkage provided with a transfer post to the rudder servo makes for absolutely no lost motion. Flying off a grass field we experienced no tracking problems whatsoever. Take-offs are true while rotation and climb-out are rock steady. The O.S. Max .30 engine is more than enough power and almost all flying, after the initial trim flights, were with 1/2 throttle. Miss World will perform all basic maneuvers including snaps and spins. With a fairly high wing loading for a sport aircraft, one would expect a rather fast descent after the engine run. Be prepared for a treat in this respect, however, since you will experience the most flat and stall-free glide one could expect from a powered aircraft. We also had the opportunity to fly Miss World in 15 to 20 mph winds and found that it penetrated exceptionally well, was quite responsive to rudder, and could be landed dead stick with excellent penetration even in this type of wind condition. □

RC DESIGN MADE EASY

from page 22

But, back to the wing on our basic aircraft. If we feel that the correct wing loading should be around 10 ounces per square foot, then we need to make an estimate of what the finished sailplane is going to weigh. Take a look at chart number one. This gives you the wing loading in pounds and ounces and converts this to wing area for various loadings. If we assume that our glider is going to weigh about 3 pounds, finished and ready to fly, then we see that for a 10 ounce loading we need a wing area of 691 square inches. If we decide that we can build an 8 oz./sq. ft. aircraft, then we would need 864" of wing area.

Let's leave the wing loading idea for just a minute and go back to our thought that we wish to construct a sailplane with a 99" span. A lot of ideas are changing now about the merits of high aspect ratio as opposed to low aspect ratio, and frankly, I am not sure just who may be correct. All successful full scale gliders sport wings of very high aspect ratio, 16:1, and up to 20:1. This is pretty hard to do with a model and still have a wing that is strong enough to withstand the abuse

of a winch tow, or a hard landing. Many of the most successful glider kits have aspect ratios hovering around the 10 to 12 mark. Take the highly successful Olympic, for example. It has an AR of 11:1. The same is true for the Aquila, with the same chord and span as the Olympic. This is based upon the span divided by the root chord. In both of these great sailplanes the center half of each wing has a constant chord, while the tip half has a double taper. We could get into a hairy discussion of what the true aspect ratio is, but let's simplify our discussion for now, and consider that we have an aspect ratio of 11:1. (Actually figuring that the tip is roughly 6" wide and the root is 9" for the tapered segment, which is about 24" long, we can work it out to an AR of 11.72:1. But who cares.)

From the above we know that very successful model gliders are built with an AR somewhat less than that used on their full sized counterparts. What may be coming in glider design is a use of lower aspect ratios, perhaps down to 6:1. Not too much has really been done with soaring aircraft at these lower levels, but quite often the models used in slope soaring have much shorter, wider wings. Since quite a bit of competition today is based not upon all-out soaring ability, but rather upon consistency in stacking up "add-em-up" flights with a spot landing tossed on the end, it would not surprise me to see many of the designs in the coming years have wing chords of 12" or more with spans of 80 to 100 inches.

But, back to our designing project. If we were to design a non-tapered wing for our glider with span of 99" and, from earlier date we wanted it to have a wing area of 864 square inches, we would then have a chord of 864/99 = 8.73". Dividing 99 by 8.73 would give us an AR of 11.34:1. All around in the same ball park. If we want a wing that has a constant chord center section and tapered tips, we can just give a little on the total wing area and come up with a wing that will be just about the same as the popular kit gliders. But, if you want to be just a bit different, and to plot a lot of airfoils, you can build a wing that has a constant taper from root to tip. In this case, if we are looking at a 99" span with an effective ratio of 11:1 and with a tip at least 6" wide, we would have to have a root chord of 12" wide. Or, sacrifice more area and use a constant taper of 9" chord and 6" tip. For a 99" span, this would then give us a wing with an average chord of 7.5", a span of 99", an area of 742 square inches, an AR of 13.2:1, and if we still built it to come out at 3 pounds weight, a wing loading of 9.3 ounces per square foot - - - all well within our limits.

Next, let's consider the amount of horizontal stabilizer that you want to haul around. Some designers have favored a flat plate airfoil section, while others have gone to a thick symmetrical section. Not many gliders sport a lifting tail section, which is due to the problems of getting the aircraft up into the air on tow. With too much of a

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RACING AT RANDOM

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dary breakdown of responses from those flyers classifying themselves as Advanced or Expert. Of the 112 Survey replys received, 53 considered themselves to be in the Advanced and Expert catagory. After studying and comparing the combined results to the advance results, we chose to give you the Advanced flyers responses, as the results are the same, differing only in a few percentage points. In most cases, the results were more clearly defined with the Experts. For example: Question 12 — With respect to .15 size carburetors only:

0. Only type packaged with engine; Expert (38), Combined (37).
1. (0) plus types cataloged for engine; Expert (36), Combined (34).
2. Any .15 size carburetor, no re-work; Expert (8), Combined (10).
3. Any .15 size carburetor, re-work to fit engine only; Expert (19), Combined (20).

In most cases, we felt the responses by the experts were more conservative. However, on Question 22, 60% of the experts favored propeller modification with 40% dissenting. The combined survey showed a much closer response of 53% in favor and 47% opposing. This means that of the 59 non-Expert votors, 31 or 52% opposed modifying props and only 28 or 48% were in favor. This question is still close.

◇ ◇

In case you haven't heard, a new book is available from Pylon Publications called "The Modern Air Racers in 3 Views, 1949-1975", covering all classes including 22 Unlimiteds and 41 Formula I's. The book is available from Pylon Publications, P.O. Box 2726, Dept. 1., Rochester, N.Y. 14626 for $4.95.

◇ ◇

From the Des Moines Modelaires RC News comes the following hint by K.K. McClure, the editor. He suggests using Hot Stuff to stick down fiberglass cloth so that it doesn't wrinkle or slide out of place when the resin is being applied. The resin could then be brushed on and smoothed out to a very thin coat without disturbing the cloth.

◇ ◇

The following is a letter and a set of rules for 1/2A pylon racing, that has been submitted to the AMA by Bob Aberle as a basic proposal for a new official event. While

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many of the rules differ from those currently in use, we feel they do have considerable merit as they probably deal more realistically with what is really important in 1/2A pylon racing. Anyone wishing to comment should direct his correspondance to Bob Aberle, 33 Falcon Drive, Hauppauge, N.Y.

Dear John,

Since approximately 1971, R/C modelers have been flying 1/2A pylon races to a set of rules orginated by the staff of R/C Modeler Magazine. RCM is to be commended for their efforts, since 1/2A R/C pylon racing has grown steadily over the years. It is most unfortunate that even at this writing there is still not a single set of recognized rules for this event. As a result, the original 1/2A pylon racing rules have been modified by various groups and clubs, throughtout the country, to suit their particular likes and dislikes.

The first real step necessary to square away 1/2A pylon racing is to have it included in the AMA Rule Book as a recognized event for the 1978-1979 seasons. As a minimum, a single set of rules should be established as a **baseline,** *even if only on a provisional basis. Rule change proposals can always be added later on to "fine tune" the event.*

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Towards this end, I have prepared a Rule Proposal Form. Remember, this is a basic proposal for a new set of rules, not a change as the form implies. Rationale and supporting data have been included as well. Duplicate copes of this proposal are being distributed to the Contest Board under separate cover.

Very truly yours,
Bob Aberle
Flying Models Magazine

1/2A R/C Pylon Racing (Provisional) Rules

1.0 Objective

To provide a racing event which employs relatively small, inexpensive and easily constructed radio controlled model aircraft. To encourage the AVERAGE R/C flyer to participate in basic pylon racing type competition.

2.0 General

All AMA and FCC regulations covering the R/C flyer, his aircraft and equipment, shall be applicable except as noted herein. Each contestant will be allowed two (2) entries (planes) in this event. The second or alternate aircraft may be used only after it has been determined (by the Contest Director) that the first aircraft is no longer safe to fly. Only the contestant who has entered the aircraft may pilot it in this event. No alternate pilots will be permitted. Any unsportsmanlike conduct such as repetitive unsafe flying, any attempt to gain unfair advantage or actual rule violations shall be cause for disqualification (of the contestant) at the discretion of the C.D. The decisions of the C.D. or his designee relating to interpretation of these rules shall be final and binding on all contestants.

3.0 Detail Specifications

3.1 Radio Equipment — Any type of R/C equipment may be used provided that only two control surfaces are actuated, i.e. aileron and elevator or rudder and elevator.

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3.2 Aircraft Engine and Related Accessories

3.2.1 Engine — Maximum total nominal displacement shall be .0519 cubic inches. Engines must be production units assembled from factory available parts. Engine and all parts, whether original or replacement, must have been produced in quantities greater than 500 units, and must be available through normal retail outlets in the U.S.A. or from the engine manufacturer. No ball bearing or tuned pipes will be allowed in this event.

3.2.2 Mufflers — At the discretion of the C.D. and as notified in advance publicity prior to the contest, mufflers may be required, depending upon local operating conditions and restrictions.

3.2.3 Pressure — Any type of fuel pressure system may be used. The engine may be tapped for pressure (at various locations) or a pen bladder type system may also be employed. Modified needle valve assemblies shall be permitted.

3.2.4 Throttle — No throttle shall be required.

3.2.5 Fuel Cut-Off — A positive means of fuel cut-off must be provided which is activated by the basic radio system (usually at extreme up or down elevator). This cut-off must either be a mechanical valve or a device which simply closes off the fuel line. A rigid fuel tank pick-up tube which requires that the plane be rolled inverted to stop the engine, is unacceptable.

3.2.6 Propellers — Only commercially available wood or plastic props may be used. Aside from removing flashing or burrs or balancing these props are not to be modified in any way. Hand-made props are expressly forbidden.

3.2.7 Fuel — Fuel is to be limited to a maximum of 50% nitro content. All fuel must be purchased commercially mixed. No home-made fuel will be permitted. At the discretion of the C.D., fuel may be supplied at the contest for ALL contestants.

3.3 Aircraft Requirements

3.3.1 Appearance — Model need not resemble a full scale racing plane. Canopies, cockpits, pilots heads, wheel pants, cowlings, etc., are not necessary.

3.3.2 Wing — Wing area shall be a minimum of 200 square inches including that area displaced by the fuselage. Area measurement will be taken from the top side of the wing. The wing itself may be of any planform, i.e. constant chord, tapered leading edge, tapered leading and trailing edge, swept back or swept forward. Delta wings or flying wings are prohibited.

3.3.3 Airfoil (wing) — The minimum airfoil thickness, at the root chord shall be 7/8 inch. The ratio of thickness to chord, at the root, must be maintained at the tip section as well. In the case of a tapered wing planform, the tip section will be proportionately thinner.

3.3.4 Weight — Weight less fuel but including all equipment necessary for flight, shall be no less than 20 ounces, nor more than 32 ounces.

3.3.5 Fuselage — No minimum cross section area will be required. However, in the interest of safety, the C.D. may disqualify any entry which in his opinion does not appear structurally sound or air worthy.

3.3.6 Landing Gear — Landing gears or wheels are not necessary.

3.3.7 Identification Markings — I.D. markings will consist simply of the contestants AMA number or as an alternate, the letter N followed by the last two or three digits of the AMA number, followed by the first letter of the contestants last name. Location and size of the I.D. is not important.

4.0 Operation of the Race

4.1 Number of Planes Per Race — A maximum of four (4) aircraft will be flown in each heat.

4.2 Type of Launching — Unless advertised in advance, all launching will be by HAND and by an assistant or helper of the contestant. No contestant shall launch his/her own aircraft. Launches of all aircraft will be as close to simultaneous as possible. Launches are not to be staggered at intervals.

4.3 Number of Laps — Each race will consist of ten (10) complete laps of the racing course.

4.4 Cut Pylon — If a pylon is cut by a contestant, that lap will not be counted. If two pylons are cut, the contestant will receive no score for that heat, and shall pull up and out of the race until the heat is over.

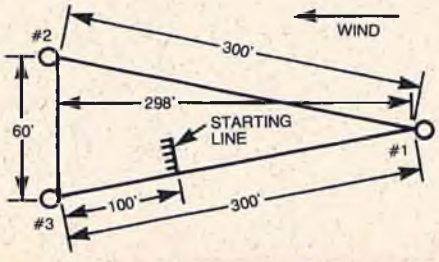
4.5 Altitude — No minimum altitude is required during racing.

4.6 Engine Start Up — Engines must be started within a maximum time of two (2) minutes after the signal to start is given. Any contestant not ready to race when the starting flag is dropped shall draw a zero for that heat.

4.7 Rotation of the Race — All laps will be flown in a counter-clockwise direction of rotation, with all turns being to the left.

4.8 Callers — Callers of the far pylon turn are not permitted. Pylon turns will be solely initiated by the flyer (contestant), without any assistance.

4.9 Race Course



5.0 Scoring

Points shall be awarded after each race as follows: four points for First Place, three points for Second Place, two points for Third Place and one point for Fourth Place. The winner of the event is the contestant who has accumulated the most points after the conclusion of all heats. All contestants must be given an equal number of opportunities to race.

Logic Behind The Proposed New 1/2A R/C Pylon Racing Rules

My main purpose in submitting this new set of rules was simply to "make it official." These rules are in fact based on the following:

(1) 1971 R/C Modeler Magazine original rules.

(2) Current 1976 R/C Modeler rules.

(3) P.R.O.P.S. Rules (Pylon Racers of Puget Sound) (Pacific Northwest).

(4) L.I.R.C.S. Rules (Long Island Radio Control Society).

(5) Some additional comments and ideas of Bob Aberle.

Detailed Comments

(1) Fuel Pressure — This should definitely be permitted. Cox engines have minimal suction to begin with. Pressure enables a complete race to be run without the customary erratic engine performance that is common with this type of engine.

(2) Fuel Cut-Off — Required for two reasons. One, to speed up the race. Enables the flyer to kill his engine and land as soon as the heat is over. Saves time! Second, is the safety aspect. With the rigid fuel pick up, the plane must be rolled inverted. If the engine is "sagging" or having real trouble, it may be impossible to hold it inverted and wait until the engine runs out of fuel. During this period, the plane could be "hedge hopping" between spectators, causing a hazard. A positive R/C activated cut-off is essential.

(3) Propellers — Use of commercial props eliminates, to a degree, the problem of throwing blades, due to poor design or construction. Home-made or re-worked props can pose a safety hazard.

(4) Fuel — MOST IMPORTANT ITEM TO THE FUTURE SUCCESS OF THIS EVENT — A limit of some type is essential. I wanted to stipulate 40% nitro content, but unfortunately at this writing, the Fox Company has decided to drop their line of 40/40 fuel. This leaves a choice of either the Cox Racing fuel (30% nitro) or the K & B Speed fuel (50% nitro). 30% nitro isn't quite enough in my opinion. At 50%

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nitro, you can get some reasonably good speed and still not go through glow heads like crazy. Beyond 50% nitro is ridiculous. Fuel limit will tend to slow down the present "Hot Dog" flyers who spend the better part of their time re-building their engines for peak performance. Makes it more of a plane/pilot race.

(5) Appearance — Why make all the planes look alike. You can hardly tell the difference between the various present day Quarter Midget or Formula I designs. Enable originality in design and simple designs at that.

(6) Wing — Again for originality sake, allow different wing planforms. The constant chord wing is too restrictive. Let the designer use his imagination. Otherwise, you will end up with all "racers" looking alike.

(7) Airfoil — Allows for proportionately thinner airfoil at the tip, based on the same ratio used at the root chord. This goes hand-in-hand with item (6) "Wing." It would be impossible to allow tapered wings and then at the same time require a minimum airfoil thickness of 7/8". The section at the tip would be ridiculous.

(8) Fuselage — Fuselage cross section is difficult to monitor properly at contests, especially in the case of original designs. It causes an extreme burden on officials to check each plane. The size of the present R/C equipment (including the new Cannon Super-Mini System) still dictates a reasonable cross section. Again, allow for originality in design. Make it easier for the average contestant to participate. Many presently available 1/2A R/C kits qualify for this event in every respect except for fuselage cross section. Why not give these manufacturers a break.

(9) Landing Gear — R.O.G.'s only tend to complicate this sport/racing event. Let the guy fly, don't make him travel 200 miles to a contest, only to find he can't take off a rough surface. Hand launching is much more desirable and is encouraged. Landing gears and wheels also tend to upset these small models on landing. A simple skid is better, lighter and cheaper.

(10) Race Course — This is the current 1976 RCM course. It is a little shorter than the one used by the P.R.O.P.S. Club in the Seattle, Washington area. The shorter course makes it easier for the flyer to negotiate the far pylon turn, with less chance of cutting. Three pylons are essential to good racing. □

RC DESIGN MADE EASY

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lifting stab, the aft end keeps flying upward, and tends to keep the aircraft from attaining the height available from a high start or winch tow. For slope soaring, a lifting section would be quite good. Most all-around soaring aircraft seem to be happiest with a flat plate stab, and one that is pretty small. In fact, some years ago, the area of the horizontal stab was about 20 to 22% of the wing area. Today, most modern gliders have horizontal stabs of 10 to 13%. As the area of the stab has decreased, the balance point of the aircraft has moved slightly forward, so that the stab is not carrying much of the weight of the airplane. This makes for a sailplane that penetrates the wind better, and one that can cover more sky looking for that elusive thermal, at a more rapid rate of speed. For our ideas, let's say that a horizontal stab of 13 to 15% of the wing area will give us the results that we are seeking.

The vertical stab need not shrink as has the horizontal stab. Rather, keep enough vertical area in the stab to keep the aircraft tracking up the high start, or winch, with minimum correction needed. A good, safe figure to use is about 7.5% of the wing area. Compute this area including all of the fuselage area that could be considered as part of the vertical stab surface. You can't go wrong with too much rudder area. A minimum of 50% of the total vertical stab is acceptable, while many designs use almost

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the entire vertical surface as the rudder. After all, this is really the most important control that you have on your soaring aircraft, and you want the aircraft to go where you aim it, not where it would like to go by itself. Speaking of control surfaces, we can set aside 25% of the total horizontal stab for an elevator and not go wrong, although if we want to go to the extra work of building a flying stab, we can then make all of the horizontal tail surface an elevator. Just don't make it too small. An elevator surface that is too small tends to need more deflection to make the aircraft react, with a resulting increase in the drag of this member. Keep 'em large, it won't hurt a thing.

Now, we come to the fuselage of our bird. A lot depends upon what you have decided to do in the way of a wing span. The ratio of the fuselage length to wing span is not super important, but the relation of the parts of the fuselage to each other is important. For general use, if we utilize a fuselage length of one half of the wing span, we have designed a glider that is both pleasing to the eye and will be a good flier. You can go longer or shorter if you wish - - - it's your aircraft. If we have a wing with a span of 99", then a fuselage length of 49 to 50" will be just fine. Make it shorter if you wish - - - maybe only 40" long - - - this will be helpful when flying in small airfields. With an overall length of 49", we need to decide where to put the wing, and then work from there. A good rule of thumb is to make the nose length about 20% to 25% of the total fuselage length. Stick the wing chord next, use up about 40% to 45% for the distance between the trailing edge of the wing and the leading edge of the stab, stick on the tail section, and you have your total sailplane fuselage. Of course, it's a bit rough to make all of this come out exactly right, but don't sweat it — work with the averages and make it come out nearly to the above parameters. As for the balance point of the aircraft, this can, and will, vary with the size of the horizontal stab. With aircraft utilizing stabs in the 22% range, the balance point will be between 35% and 40% back of the leading edge of the root chord. You worry about

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taper and what type you have, while with aircraft with stab in the 13% to 15% range, the balance point will be found at 25% to 30% back from the leading edge of the root chord.

Let's look for a moment at the rudder hinge line. Perhaps you have been wondering why so many of today's popular gliders have a rudder post line that slopes to the rear rather than being vertical to the center line of the fuselage. This isn't an imitation of the looks of jet aircraft. Rather, this is the method used to keep the nose of the aircraft from dropping rapidly when a turn is signaled to the flying model. If the line of the rudder hinge is sloped to the rear when a turn is signaled, the rudder actually has a bit of an elevator effect, tending to force the tail of the model down and to pull the nose up. The farther back this line is swept the more positive the nose will react. There is a point that may become too much in that the aircraft will simply yaw around a turn rather than flying around and, also with too much rearward sweep, you cannot get enough control to break out of a thermal when you need to, or to get positive control low to the ground. A mush or a stall might be the result of too much rear sweep. An easy rule of thumb is to sweep the rudder hinge line 10% to 15% toward the rear. If your modeling experience goes back a bit you may remember that quite a few rudder-only type models had forward sweep to the rudder hinge line, the reason here was to cause the nose to drop quickly, thus forcing the aircraft into a spiral dive more rapidly. We don't want this reaction on a soaring aircraft, rather we want the nose to stay up in the turn.

Another line to look at is the normal line down the middle of the fuselage, and the amount of positive position of both the wing and horizontal stab to this line, and the amount of positive that the wing has in reaction to the horizontal stab. Keep in mind that a soaring aircraft is really falling through the sky at some rate, or glide rate. We want the aircraft to fly with a slightly nose down attitude, as this tends to streamline the glider more with its path through the air mass. If we set the horizontal stab at about 2 degrees

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postive to the normal line, and the wing about 4 degrees positive to the normal line, we will have gained the needed results. If we place the fuselage too much in a nose down position we will have a rather strange looking bird in flight. The Hobie Hawk is a good example of this - - - the fuselage is flying in a nose down attitude, and it is certainly a very strange looking bird in flight. Add to the nose down flight path and a high wing loading and you have a rather fast flying glider to say the least.

Also a large factor to consider when designing the fuselage of your dream ship is to try and make it as "clean" as possible. Drag is murder on a glider, and anything that can be done to eliminate drag will make for much better flights. A fuselage that flows around the joint of the wing will have much less drag than one that is mearly set on top and held in place with rubber bands. A rounded fuselage is much cleaner than a square fuselage. Look at a fish, natures greatest example of streamlining. You see some fat fishes, but you sure don't see many square fishes! Keep the lines of your glider smooth and flowing for the very best results.

For some general rules, build the structure strong. If you're in doubt about the strength of the wing or fuselage, add a bit of muscle. It's more important than the added weight. Keep the tail of the aircraft as light as possible. Keep the design clean, allow

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enough room for the radio equipment that you plan to use, and make sure that you have enough room for the battery pack. And, allow a bit of room for extra nose weight. You almost always need it. And, make a provision in the fuselage of the aircraft to add removable ballast. Build ballast boxes right on the C.G. of the aircraft so that you won't make any trim changes when you add ballast for those windy days that always come along. Place the tow hook about 1" behind the leading edge of the wing. You may want to experiment around a bit to find the spot best suited for your glider. Make sure that the wing structure has plenty of strength, and that it is flexible — a must when yanking the glider into the sky with a winch or a high start.

If you like to experiment, try a low aspect ratio glider, you might stumble on to something really great. Use light weight tip plates to cap off the wing tips rather than to taper the wing. Use plastic films for covering, it's a heck of a lot easier than silk and dope, and a lot prettier too. If you're going to design your own, don't be afraid to experiment a bit. Use common sense in designing your aircraft. Use the guidelines that I have presented, and temper them with your own reason. You'll have a lot of fun doing it, and one heck of a lot of pride when you say "I designed it myself." □

RADIO SPECTRUM

from page 16/12

club, or group of people who go flying together. So, if you suspect interference, keep an eye peeled for World Engines' monitor.

• •

Dear Jim,

I have two Mattel units, and until I read the article from Terry Schulz in the Feb. RCM, I was having trouble with range. I have now added another battery to my receiver, and now have plenty of range.

In his letter, he said he had converted his Mattel to use a KPS-12 digital servo.

Can you show me how this was done? I have some small 3 wire Cannon servos I'd like to use.

Also, can a three wire servo be made to work with a four wire receiver.

I thank you,
Charles E. Sullivan
Aptos, California

Terry Shulz, where are you? Sounds like you could sell Mr. Dewey an article. □

ENGINE CLINIC

from page 103/10

other engines, Foxes included, why do they cause this engine to "wear out after a few hours of running"?

Dave Tees Jr.
Conroe, Texas

There are a lot of excellent synthetic oils on the market suitable for model use. However, when it comes to straight lubrication at high temperature none can hold up to Baker AA castor oil. Many are close but, on that extremely lean run where cylinder head temperature can reach 600° and even higher, the synthetics will go up in smoke, whereas castor oil will still give some lubrication. The castor may break down and turn to a brown varnish but this, in turn, prevents the metal-to-metal contact that results in scoring. This is not to say that castor will prevent scoring — just that it does offer more protection at higher temperature before it also breaks down.

However castor has many shortcomings

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such as the afore mentioned brown varnish, is messy to clean off an airplane, makes an engine stiff in cold weather, etc. The synthetics are better in all of these respects and, in the long run, their advantages override their disadvantages.

From a manufacturers standpoint, however, Duke does not like to get engines back that have been run far too lean and burned up due to synthetics. Also being a fuel manufacturer he does not want to be blamed if some one destroys their engine running it too lean and then blames his fuel. Recommending castor oil fuels and using castor oil in the fuels he manufacturers, is a safety factor. Less engines burned up, and less engines damaged by the use of his fuels.

I would like to say that synthetics, when properly run, are superior to castor oil in my opinion. It is only the guys that like to run the engine peaked and then a couple of clicks leaner hoping for a couple of hundred more rpm that have the problems. Even the addition of a small amount of castor oil to a synthetic oil based fuel will offer protection at high temperature. Any sport fuel should contain a minimum of 22% lubrication and racing fuel 18%-20%. 5% castor oil, and the balance synthetic, works very well.

Dear Clarence:

Nowadays when we have to use mufflers on our engines all the oil on the airplane creates a problem. Especially in cold weather it takes half an hour to clean it. Would it be possible to design a muffler with a long pipe to carry away the mess from the plane? I mean that the pipe should be wide enough to compensate for the length, otherwise the back pressure would be too high. It must also of course still be effective as a muffler.

It would be interesting to hear your comments.

Sincerely,
P.O. Sonden
Sweden

This is another one of those most often asked questions. Everyone hates the oil mess on an airplane and wishes there were something that could be done to eliminate it. From time to time someone comes along with a revolutionary oil that burns along

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with the fuel and leaves no residue on the aircraft. These clowns never seem to realize that if the oil burns it is not going to lubricate the engine let alone carry away heat which is one of the functions of the oil — not just lubrication alone.

Many fellows ask about exhaust extensions. These can be used but at the expense of increased back pressure which results in loss of power and increased operating temperature. Increased operating temperature, in turn, means shorter engine life.

If an extension is to be used then it must be of large enough diameter so as to not create excess back pressure. This is pretty hard to do with a .60 size engine as a diameter of at least 1" would be desirable if the extension is 6" or longer in length. The longer the extension, the larger the diameter. The only suitable material for an exhaust extension is Teflon tubing and, to my knowledge, it is not available in these larger diameters. Silicone rubber hose can also be used but the wall thickness is pretty heavy and silicone hose very expensive.

Mr. Lee:

I have a relatively simple problem (for you) but do not know just how to solve it.

I have an Enya 60 III TV that has been run exclusively in "pattern" type aircraft for the past five (?) years. In other words, it has lots of time on it.

I have always run it with 10% nitro (Dukes) fuel and swing a 11 x 7½ prop. This engine has performed flawlessly for me all these years, but has now started to seize on the top end. It still idles beautifully, but does not run smooth anymore at full throttle.

My question is (if you haven't already guessed) – can this engine be re-built (how?) – or is it ready for the bone yard?

I have **never** *stripped this engine down to clean any interior parts.*

Thanks for your help,
Bill Snyder
Somerville, New Jersey

Any engine can be re-built as long as parts are available from the manufacturer. Normally a new piston ring, wrist pin, sleeve, and con rod would be required. If the bearings feel rough they should be replaced as well. The engine would then be like new again. One thing to check for here is fuel

leakage out the front bearing as covered in a previous letter. After many hours of running a lot of dirt is bound to have been ingested by the engine. Going down the intake it, in turn, causes wear of the seal area behind the front bearing. This is why, after many hours of running, engines that had previously run dry will start leaking. If an engine is a bad leaker then either the crankcase, or crankshaft, or both would have to be replaced. These parts, along with the previously mentioned internal parts, have now resulted in replacing 90% of the engine. The cost involved would more than likely run more than that of a new engine. Actually, Bill, when it comes to re-building an engine that is going to require replacement of the major parts it is always best to return it to the manufacturer (or importer) for the work. The prices are usually far less than what you can buy the individual parts for. If the engine is too far gone, you get a new engine in exchange for a minimum rate charge.

Dear Mr. Lee:

I am a newcomer to R/C and I get lots of conflicting advice from fellow modelers. They told me to buy a Sig Kadet so I did, no regrets. Then came time to buy the engine. One expert told me to buy either a K & B or an OS .40, because he felt that a .25 was not enough power and that eventually I would have to buy a .40 for my next airplane. Another expert said that I should go by the manufacturer's suggestions and buy a .25 or .30. He thought that a .40 was too much power for a Kadet.

So I thought that to train on an airplane one should not have too much power. I bought a Fox .25, much to my regret now, because it was on sale in one of the mail order houses. When the plane was all completed, I took it to the flying field and the engine was broken in and set properly. Even after four flights and a half gallon of fuel through it, it still takes a half hour to start. Among other things, when I first try to start it, it starts real fast, then it stalls. When I go back to start it again, the propeller just goes around and around, and there is **no compression**. *This is the newer type Fox engine, with the flange carb mount and the adjustable fuel nipple disc.*

Would the momentary loss of compression mean that the engine will soon be ruined? Or should more adjustments be made?

Sincerely yours,
Gregory S. Thornton

Greg, it is always better to have a little more power than you need and throttle back rather than to try and stagger around the sky with an underpowered ship.

You say you took the airplane to the flying field and broke the engine in. As with our first letter this month, how did you do this? Was it in the airplane while sitting on the ground? Again, this is a serious mistake that many modelers new and old alike make. The engine digests enough dirt and foreign matter during this run-in period to permanently damage it. Your hard starting is due to lack of compression as you have found out. When cold the compression is always better due to the closer fit of the parts and the thicker oil helping the compression seal.

The fact that your engine does start up and then dies indicates another problem, however. You must not be opening your needle valve far enough for initial starting to begin with. This starting up and dying lean can damage an engine, especially when new. This may be part of your lack of compression. Dying lean always leaves an engine dry. This coupled with its being hot results in lack of compression. Lower compression, when hot, is characteristic of most engines. Try opening the needle valve an extra half turn when starting so that the engine starts up four cycling and see if this doesn't help your problem. Also be sure and check the head bolts for tightness and be sure your glow plug is tight. If the engine continues to exhibit a complete loss of compression when hot it would be best to return it to Duke Fox for a check. □

SUNDAY FLIER

from page 6

left alone. The great majority of CB'ers operate legally - - - it's mostly the lunatic fringe that causes the problems (we have some in the model field too). Second, the modelers were aided materially by the National Association of Broadcasters, whose cause for concern was the interference that CB transmissions were causing on TV channels 2 and 5. The third aside has to do with the letters to congressmen and senators - - - you note I listed them last in importance. Maybe my experience was isolated. I'm a Republican - - - at least registered as

SE-5 on walkway - - - that's ordinary lawn grass at right!

one. My congressman is a Republican. When I wrote him, I at least got the courtesy of a reply that he'd "look into it, and let me know." That was the last I heard, until someone told me he was actively supporting the CB'ers in their drive for more channels. As for the Senators, I did receive a reply from Senator Cranston. In any event, there's no doubt about one thing: a lot more CB'ers vote than do modelers.

So, let's see what happens when it all goes into effect in January 1977.

And keep your powder dry.

★

Three years ago, at the Pioneers Annual World War I Jamboree, I had a ball flying my modified Guillow SE-5 — a 24" biplane in which I installed an .020 Tee Dee, and a Cannon Tini-block with two channels for rudder and elevator control. It was quite a sensation at the time.

As I write this, I have just completed the first public demonstration of my latest brainstorm. At the Poineers' Biplane Bash, on August 8 and 9, at their beautiful new model airport which is a joint effort between the Pioneers R/C Club and the Santa Clara Police Activities League, I flew my new little biplane. No, not the Cannonshot — that's now considered a big biplane, and the 24" SE-5 is almost huge. So what was it? Would you believe a legal, Peanut scale, 13" wingspan Stand-Off Scale SE-5? And with rudder, elevator, **and** motor control on the .010 Cox? Believe it.

What inspired it? Naturally, the new Cannon Super-Mini Block. Sure, it fits in there tighter than - - - use your own simile. I have one, but not for a family magazine. Anyway, it fits, and it works, and it flies, but not until after a harrowing series of crashes while I kept reducing the rudder throw to a little over 1/16" in each direction. Any more than that and a high speed snap roll results.

Take-offs are very touchy, of course. In fact, if there isn't a little headwind, you can almost forget it. Hand launches likewise.

Flying is real sporty. With the engine turning 27,000 rpm, the slipstream on the rudder gives instantaneous response, and when the engine quits, it goes sluggish, so you better plan your landing ahead. Best of all, throttle back and land at idle (12,000 rpm). Interesting fact — it glides faster than it flies under power. Rather than explain it to you, how about dropping me a note telling

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me why you think that's so? Anyway, the best description of the flying is "Flying the Cannonshot is like flying a hummingbird; flying the Peanut SE-5 is like flying a bumblebee."

Wing loading figures out to be one pound per square foot. Power loading is about fifty pounds per horsepower. So that helps explain why it's touchy, in addition to the well known opinion of many modelers that the smaller they get, the more squirrely they get.

But it was a challenge that I couldn't resist. Wonder if any of you would like to try it. Tell you what; write me, and if enough of you show an interest in building one, we'll publish the plans. Incidentally, once you get it trimmed out, it's a nice flying "hands off" type, and you could, if you want to go a little more conservative on weight, install one of Ace's little pulse rudder units. Let me know.

★

Drat! Wouldn't you know it? Just when I had it all figured out what I could write for a couple of columns, I get aced out of both. Last month I gave some design parameters to you so you could design your own glider, and, naturally had planned to come up next with some general dimensions for a good sport power job — only to get beat to the press by good ole Chuck Cunningham. 'Slife.

So, at least for the time being, I dropped that idea, and thought I'd do a re-run on one of the most popular columns I ever wrote. It was about the dumb things we modelers do — and I gave a year's subscription to the one that was the most far out. So wouldn't you know it? Just as I was about to ask for entries, I get the winner before anyone else has a chance.

This guy designs a great new bird — well, what it really is is a different size version of an already popular and well proven model, so it should perform about the same. Biplane, good lines, nice balance.

All finished, it looks absolutely great on the workbench. Let's go fly. Out to the field. All pre-flite checks complete. Fire up the mill, and let go. Down the runway, and up and away. And I do mean up. The nose keeps coming up; feed in downtrim, still comes up the nose. Full downtrim; nose still up. Add in a little down elevator, and finally, with full downtrim and about 1/3 down elevator, it flies level. Must be the C.G. is really not where it should be. Better throttle back and land. Throttle back; violent nosedown into a dive. Just able to hold nose up with full up elevator. Put in full uptrim, and finally, after hariest test flight in many a year, get safe back down.

Better check that C.G. Nah. That can't be it. Hey, did you notice, in all that up and down, that you also had to hold right rudder?

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Well I'll be damned. How in the world did that happen? This darn model has **upthrust** and **left** thrust, and nearly all sport biplane designs have downthrust and a bit of right thrust. And that's what I built into it, too. So how come? (So says the builder, anyway.)

Oh, oh, Mr. Dumbdumb, Now I remember. I built that fuselage on the workbench, and the easy way, with the straight top longeron was to build it upside down. So I put in the downthrust angle, and a bit of right thrust, on the firewall, so the engine bearers mounting to it would have the right amount without shimming.

And when I turned it right side up, that blasted firewall had upthrust and left thrust.

No. Honest guys, it wasn't me. And I'm not sure that I should come right out and say. But I'll tell you this much — it doesn't make much sense to give a year's subscription to a magazine, when the winner is the editor and publisher!

Back to the drawing board. And keep knocking your head against the wall.

It feels so good when you quit. □

FROM THE SHOP

from page 2

'Nats News' at Toledo in 1974. Subsequently he edited the 'Nats News' at Lake Charles, Louisiana both in 1974 and 1975 and was editor of the 'Nats News' at Dayton, Ohio for the 1976 Nationals.

Les was elected as secretary of the club for 1976 and also serves on the club Board of Directors.

On the personal side, Les Hard has been married 31 years to his wife, Mary, and, in his spare time, designed and built his own home. By occupation Les is a sign designer, painter, and at present, has charge of supply and equipment for the company that he works for, the Central Advertising Company. In addition to R/C, he lists his hobbies and pastimes as bowling, fishing, woodworking, photography, and traveling.

With regards to his club, the Capital Area Drones Squadron, Inc., this group was formed by Chuck Spencer and Milt Stevens in January of 1970 and started with 25 members. It has grown to its present size in 5½ years. The club has three flying sites to fly from, with all the power fields member owned. The glider fliers fly from a sod farm and the club pays only for the mowing of the power sites. The Capital Area Drone Squadron, Inc., sponsors both a sailplane meet and a sanctioned fun fly each year and has a pilot training program and a crew of six top instructors.

RCM would like to take this opportunity to extend its congratulations to Les Hard, editor of the The 'Bee Line', newsletter of the Capital Area Radio Drones Squadron, Inc., at Lansing, Michigan, for a job well done. □