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RCM radio control MODELER

THE WORLDS LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

RC AND THE LAW: MODELERS NEGLIGENCE LIABILITY

VOLUME 13 1976 NUMBER 12

RCM MODELER

FEATURES

THIS MONTH'S COVER
This month's cover features Gail Aiken, a saucy, native folk dance instructor of Tehran, Iran. The plane is a Royal F-4 Phantom. Photography by Edward C. Miller.

DECEMBER

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From The Shop

DON DEWEY

● Of the several hundred newsletters we receive, and read, each month, we got a particular kick out of the Bulletin of the Eglin Aero Modellers, edited by Ed Moorman, Eglin AFB, Florida. This particular issue was called the "Playbeam," and was a special parody issue based on the popular men's magazine. The entire Bulletin is truly a collector's item, and Ed who has a tremendous sense of humor, authored the following piece entitled "The Parable of Beauty," which we would like to reprint for your enjoyment.

THE PARABLE OF BEAUTY

Once upon a time long, long ago in a far away place in the West, there was a lad who wished to learn how to fly. He had a burning desire to try his wings, but, as a youth, he loved beauty. His first model was a scale plane; a thing of beauty with wings that glistened in the sun. Alas, on his attempt to fly, he crashed. His plane of beauty and graceful lines became vicious and spiteful in the air.

After the crash, his enthusiasm waned, and he vowed never again to try flying. He would become a monk and build plastic display models. He sank lower and lower into despair. As he was about to build his first plastic model, a wise old sage interceded and spoke words of wisdom to the lad.

"My son," spoke the sage, "your obsession with beauty has led you astray. Consider the young woman who is fair of face and body. She, you say, is beauty. But," the sage continued, "place her on the athletic field and she is as the pig when it is chased by the terrier, slow afoot and ungainly. Now consider the amazon who runs like the wind and glides over hurdles. Does she not possess beauty and grace?"

"That is true," answered the lad, "but how does this apply to flying?"

The sage then explained his parable to the slow thinking youth. "Your plane with scale detail and wings that glisten in the sun is like the girl that is fair of face and shapely of body. It posseses physical beauty but is slow and ungainly in the air. You must strive for functional beauty, for grace and agility."

"I begin to understand old one," stated the lad. "I shall build a plane of great functional beauty." The youth turned to leave, then reflected on the sage's advice, and turned back to him asking, "Wise one, do you have any other words for me?"

"As the maiden of great beauty is soft and fragile, so is the scale plane. The stout and sturdy woman may be considered ugly, but she is strong and will serve you well through a long life. So, too, is the strong functional airplane." The lad looked as if he would speak but the sage held him to silence with a raise of the hand. "Finally," continued the wise one, "one does not learn the art of love from a virgin. One learns from a woman of experience. Likewise, one should learn to fly from an experienced flier."

"I have learned much today," spoke the lad. The wise old sage smiled, content that he had shared some small measure of his wisdom.

And the youth departed thinking not of flying, but of where he could find a woman of experience.

●

Finally, we would like to reprint portions of a letter we received from Bernie Greenberg of San Diego, California:

Dear Don:

I am so full of appreciation for the San Diego Sherrifs Department that I feel that this story should be told and I hope you see fit to print it in one of your future issues. As a long time subscriber, I would like the RC modelers to know how helpful and considerate the San Diego Sheriffs Department was to me, and my 10 year old grandson, this past June.

I fly out of the San Diego Stadium parking lot, the stadium where the Chargers and Padres play. One day, while test flying an M.E.N. Trainer, I had a mid-air with a Sig Kadet. Although both planes were totaled, I managed to salvage part of the fuselage and the stabilizer and, in addition, the radio was not damaged.

When I got home I found an old semi-symmetrical wing about the same size as the trainer wing and decided to cut out the wing saddle on the broken fuselage to accept the new wing. Since the plane was going to be heavier, I installed an OS Max .30, finished rebuilding the plane, and went down to the stadium to test fly "Brent's Bird", which I called this plane after my grandson. The radio I used was a Futaba 6 channel with a buddy box system so I could teach Brent to fly.

It was a beautiful day in San Diego and, since it was on a Tuesday, early in the morning, I had the entire lot to myself. I ran a couple of tanks of fuel through the new OS .30 and then decided to test fly the new bird since the engine did not freeze up after leaning it out slightly.

The take-off was uneventful, but I noticed I had to hold a lot of up-elevator even with full up trim to hold the plane in a shallow climb. I climbed out and noticed that I had to increase up-elevator more to keep the plane from settling. I started a landing turn and tried to make a sharper turn, but the plane would no longer respond to up elevator and there seemed to be virtually no control left.

On the south side of the parking lot, directly behind the flight line, is a marsh that, in places, is as thick as a jungle. This marsh is fed by a small river that runs through Mission Valley. Naturally, the plane settled into the marsh out of my line of sight. I was afraid to steepen the turn, with no up-elevator available, to hold the nose up as I wanted to land as flat as possible.

With a small grandson who was trying, somewhat unsuccessfully, to hold back the tears, we climbed a small embankment in hopes of spotting the plane. The marsh reeds grow 15 to 20 feet high it's not too wise to go to far in this miniature jungle. Thus, we searched about an hour and a half, and left the area covered with whatever grows in the marsh as well as mud up to our knees. Of course, on the way home, all kinds of promises had to be made to my grandson about getting started on another plane. About this time, I was

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FROM THE SHOP

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ready to give up RC and take up a less hazardous sport like stamp collecting!

A few months ago while in the general area of the stadium, there was a Sheriffs Patrol Helicopter searching the area at low altitude. I happened to think of that when I got home and, in desperation, decided to call the Sheriffs Department and tell them my story. The officer referred me to the Patrol Bureau, Aviation Division.

Deputy Sheriff Morse answered my call and, believe me, I felt very foolish when telling him what had happened. Almost bashfully I asked him if, perhaps in the future a patrol helicopter happened to be in that area, and if someone happened to remember, perhaps they would keep their eyes open for my missing RC aircraft. Deputy Sheriff Morse said he would see what he could do. At that moment I would have said the odds of recovering my aircraft was about 100 to 1 against. I left my phone number with the Deputy, not really believing that I would ever hear from them. Later that afternoon, a friend insisted we drive over to the area where I lost the plane feeling, perhaps, if we looked again, we might find it. We arrived at the flying sight about 3:15 P.M. the same day and, while we were looking around, standing on the edge of the marsh, suddenly out of nowhere appeared the helicopter from the Sheriff's Department and, after checking around a few mimutes, the helicopter hovered in one spot, and the observer dropped a large 3 pointed grappling hook. After about three attempts he was finally successful in securing the object and as he lifted it up I could see he had my RC aircraft by the tail assembly. He picked it up very gently and, equally as gently, deposited it on the flight line.

Don, there was absolutely no damage to the plane at all –that's how careful the Sheriff was when he hooked onto the plane. The two Sheriffs in the helicopter were Deputy Sheriff John L. Heene, and Deputy Sheriff Milos Koutsky. I mention these gentlemen, not only because they brought the plane out, but more so because of their pleasant and helpful attitude to a citizen of San Diego. I have written to Sheriff John F. Duffy, thanking him and his Department for taking the time for something that could only be important to my grandson and me.

If this true story is interesting enough to publish, fine - - - but mainly, Don, I wanted you and other RCM readers to know that a great and helpful bunch our San Diego Sheriffs Department is and, once again, I give them my sincere thanks.

Bernie Greenberg

Engine Clinic

CLARENCE LEE

● Before getting to the letters this month, I have three items that I would like to bring to your attention. A little over two and a half years ago, in the May 1974 "Engine Clinic" to be exact, I did a review on the then new RNS R/C Products motor mount for the Formula I pylon racers. During the past two and a half years the RNS motor mount has been the most popular Formula I mount with most of the top competition fliers using it in their racers - - - Kent Nogy, Bob Smith, Terry Prather, and yours truly, to name a few. RNS R/C Products is run by Ron Schorr, the current president of the NMPRA. Ron has now decided to expand the line of mounts to include those for several of the .60 size engines. This is due to the fact that Ron is now getting interested in pattern flying himself. Two .60 size mounts are now available. One for the K & B/Veco and the other for the Kraft. The Kraft mount, in turn, will also fit the Webra Speed, O.S. Max Schnuerle, Enya's Mk I, II, and III, and Super Tigre Bluehead. Any other make of engine with the same bolt pattern as the previously mentioned engines can, naturally, be used as well. The mounts come predrilled and tapped. Because of the popularity of the Perry pump, the mounts have been made long enough for a "pump" engine to be used and the mounting holes drilled accordingly. If you do not wish to use an engine with the Perry pump, the mount can be shortened and the engine moved back — however, you will then have to drill new mounting holes.

The RNS mount is machined from solid square bar stock aluminum. All excess material is removed, giving the mount one of the highest strength-to-weight ratios of any motor mount available. Being machined from square, rather than round bar stock, there is a larger mounting area to bolt to your firewall making for more rigidity and less vibration. The more solidly you mount your engine, the less the vibration. The less the vibration, the more power that is transferred to the propeller. The price of the RNS mount is $15.50 plus postage and, if your dealer does not have them in stock, it can be ordered direct from RNS R/C Products, 5224 Teesdale, North Hollywood, California 91607.

RNS R/C Products also has another item that is of interest to the Formula I fliers. That is an aluminum spinner machined from bar stock. These spinners were formerly manufactured by Bob Siegelkoff of CB Products and sold as the popular CB spinner. Due to the increasing production costs and the fact that the spinner was a limited production item, Bob decided to discontinue it. When Ron Schorr heard this, he decided to order 200 spinners from Bob to have them available for the Formula I fliers. At the time of this writing (1st of September) there are about 175 spinners left. When they are gone there will be no more. They are available in the 2" size only and sell for $14.00 plus postage. These have to be ordered direct from RNS R/C Products as they will not be available through your dealer in order to keep the price at a reasonable figure.

●

Our last item this month is a really "neat" booklet that Art Suhr has had printed that is a must for anyone interested in the old time ignition engines. To my knowledge it is the only book of its type available and something that has long been needed by those interested in the hobby of collecting the old time engines or for even the non-collectors who still have an interest in this type of thing. Over the years Art has collected magazine ads for nearly all of the old time engines and kept them in scrapbook form. Art has now taken all of these ads and had them reprinted into booklet form — and take my word for it gang — it is really an outstanding piece of work. If you have ever wondered what a Price Midget made in 1940, an M & M made in 1939, or hundreds of other "oldies" looked like, then get yourself a copy of Art's book. The book is invaluable for collectors as it shows the various

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Radio Spectrum

JIM ODDINO

● Over the last few years, I've received a number of letters similar to the following one. As you know, I've resisted the idea of making this column a primer for RC, but a couple of things happened to change my mind. The first was the fact that I received three letters on the same subject in one week. Here is one of them:

Dear Mr. Oddino,

I have been reading your columns in RCM ever since they first appeared, but I have not yet found what I want to know.

When RCM first announced that you would be writing a column called "Radio Spectrum", I thought I would learn all about radio control. This has not been the case, and is the reason for this letter.

Have you ever considered writing a series of articles on radio control? One that would answer questions like:

1. What is radio control?
2. What is digital proportional?
3. How does digital proportional work? (the theory behind digital proportional).
4. What is inside the transmitter, the receiver, and servo housings?
5. How does the elevator on your ship know how far to move when the stick on the transmitter is moved halfway up, etc.?

Are there any technical reference books on this subject and where can they be obtained?

If you do decide to do a series of articles on these subjects, please try to keep the first three or four articles as simple as possible and without any electronics. This, I think, will help clarify the subject matter and reduce the confusion that results when the reader is asked to refer to schematics that are usually located on pages other than the one he is reading. Then use whatever electronics is necessary.

Yours truly,
David R. Ledoux
Millville, Mass.

The second reason for printing this letter had to do with a recent experience I had. With the ever increasing discussions on applying frequency modulation (FM) to RC, I decided to do a little research to find out what the state of the art was in transmitting binary data. I started going through a number of references such as the Bell Labs technical journals and I.E.E.E. proceedings. I ran into a bunch of acronyms like MSK (Minimum Shift Keying), OK-QPSK (Offset Keyed — Quadrature Phase Shift Keying), and SFSK (Sinusoidal Frequency Shift Keying). I found myself saying to myself that it sure would be nice to pick up a document that would give a simple explanation of the advantages and disadvantages of each, how they are generated and detected, etc.

By the way, it looks like these techniques are ideal for RC, and I wouldn't be surprised to see the industry and FCC get together on some new regulations. It turns out that with instantaneous phase shifting you create an RF spectrum similar to supressed carrier — double side band. What this means is that more power is put in the side bands and you end up with more range for a given amount of transmitter power, just a step away from single sideband where

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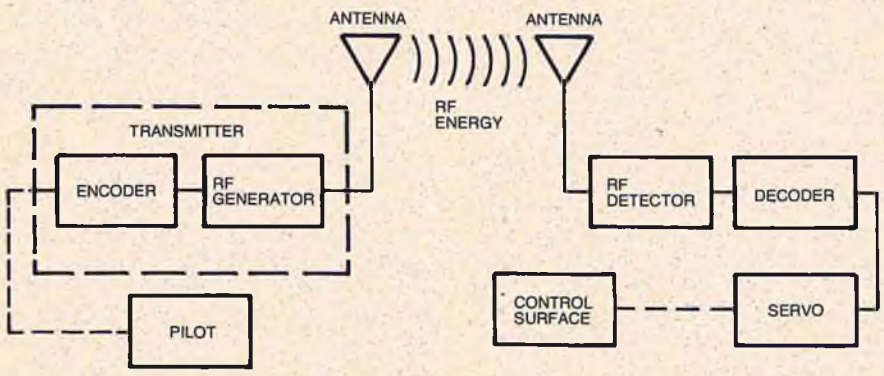

FIGURE 1

ENGINE CLINIC

from page 10

models of the same make of engine and can be used for reference material. Got an engine missing the timer or needle valve and wonder what the original looked like? Get a copy of Art's book. The price is $5.00 and this includes the postage.

Art is also in the process of putting together another book that will contain all of the engine articles and reviews published in the various model magazines from about 1936 through 1950. The tentative price of this book will be $10.00 and, hopefully, it should be available about December. Send no money for this one. Just drop Art a note and place your order. He will, in turn, notify you when it is ready and the exact cost. Art's address is Art Suhr, W218 N5866 Maclynn Court, Menomonee Falls, Wisconsin 53051.

•

While on the topic of old time engines, there is a correction I would like to make. A few columns back I listed a few sources for old time ignition coils, fellows offering accessories for the old time engines, conversions, etc. I said that Ralph Mroch was marketing his Remco .29 ignition which, in turn, was being made from the Old Torp .29 dies. Although Ralph had originally contacted K & B in this respect, examination of the old dies showed them to be worn out and no longer usable. So Ralph had completely new dies for the Remco .29 made. It is not made from the old Torp .29 dies. Ralph called and asked that I point this out.

•

Okay, let's get to a few letters.

Dear Clarence:

I am an avid reader of your column and have learned a lot from your responses to reader's letters. Now I have reason to write for help.

I am flying a 4 lb., 11 oz. A-Ray powered with a Merco .35 with a Semco flow-through muffler. Prop is 10/6, fuel tank is 4 ounce. I am not sure that I should be concerned about fuel economy. I am currently using K & B 100 with castor and am getting (at most) 6 minutes a run, running wide open. My carburetor setting is rich (close to breaking into 4 stroking). When I try to lean out the carburetor setting, the rpm falls off considerably. The engine is new; approximately 1 hour run time on it. I broke it in by running two tanks 4 stroke, varying the throttle to occasional full open, being careful not to overheat. Then 1 tank with an occasional 4 stroke, again being careful not to overheat. Subsequently, I flew the plane with the engine occasionally 4 stroking. The last three flights were with the engine rich, but without breaking into 4 stroking. Have you any suggestions for improving economy, or is the fuel consumption normal at this point in its young life. Further, can I expect better economy in the future? Thanks for your column. (Total time on engine is 1 hour.)

Sincerely,
A.S. Cammarath
Endicott, New York

First off, a 4 ounce tank is pretty small for a .35 displacement engine. You should be using a 6 ounce. Six minutes on 4 ounces of fuel isn't really all that bad considering that you are running the engine rich. Most stunt type .35's will get about 2 minutes to an ounce when broken in but this is at a slightly rich two cycle. You are getting one and a half minutes which I am sure will improve as you lean the engine in.

Of more concern would be the fact that the rpm falls off considerably when you try to lean the engine out. After an hour of running time it should be capable of holding a slightly rich two cycle. Even though you are using only a 4 ounce tank, be sure it is as close to the engine as possible with no excess fuel line. Many times fellows will stick the fuel tank

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RADIO SPECTRUM

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all the power is put into one sideband.

Anyway, I realized that it doesn't matter what level you're at, you're always looking for some simple straight-forward explanations. So here comes Lesson Number One with no electronics and no schematics.

★ ★

The first thing most people think of when you use the term "radio" is the little black box in their car or on their table, that they tune-in to get the news of the day or the latest rock and roll music. The thought of controlling something by means of this box would be completely mystifying. Of course, the table or car "radio" is really only half of the radio system which must include a transmitter, as well as a receiver, if any information is to pass from one person to another, or from a person to a thing, such as a model airplane, boat or car. And that is what it is all about, passing information. Man has invented many ways of passing information from drums and smoke signals to colored television. Probably one of the first means of communicating was by sign language, so let's take a look at how we might control something with sign language, and compare it to RC. We'll start with a simple system as RC was in its early days and then progress.

Let's say your wife is going to back the car out of the driveway and you are going to direct or "control" her path by means of hand signals. You are the transmitter and will be sending information and she will be the receiver, receiving and decoding - - - that is trying to figure out what you want the path of the car to be. Her muscles and the car's steering system are the actuators that steer the car. Notice I didn't say "servo" and I'll explain the difference later. Let's say you and/or or wife aren't too smart - - - just as early RC systems weren't too smart - - - so you come up with a scheme that tells your wife that first time you raise your hand, she should turn right and the next time she should turn left, the next time right and so on. If you don't raise your hand, she should go straight. Early RC systems were just like that. If the pilot didn't transmit a carrier, the model went straight. The first time he transmitted, the model turned right and continued to turn as long as he held the carrier on. When he released the button, the model returned to straight flight, due to its built-in stability. I should point out that the carrier could be visible light, infrared energy, sound, etc., but radio frequency energy turns out to be the best for our purposes.

Well, it wouldn't take you long to find out you didn't have very good control of the car coming out of the driveway, even if your wife could always see your hand signals. (In the early days of RC, it was worse because the receiver couldn't always "hear" the transmitter.) You'd probably realize that it would be very desirable to get a right command when you wanted it, even if you had just given a right command. You could signal with your right hand if you wanted a right turn, and with your left for a left turn. Your wife would be required to detect the difference in the two hands. In RC, the engineers figured out how to modify the carrier by modulating it with low frequency "tones" so the receiver/decoder could tell the difference between a right and left command. If the carrier was turned on and off at say 250 times per second, it would be a right command, whereas 300 times a second would be a left command.

You would now be able to get pretty good control of the car, even a certain amount of smoothness by varying how long you held up you hand vs. how long it was down. The modeler achieved this by pulsing the switches on his transmitter. The guys with the fastest thumbs were the best flyers.

The next thing you would want, however, would be true proportional control, that is, you would want to control how far

your wife turned, as well as what direction. You would, therefore, have to transmit more information. You could devise a plan where your wife would turn the wheel in proportion to how high you lifted your arm. Your wife would have to sense how high you arm was and also sense how far she had turned the wheel. When they matched, she would stop turning and hold the value commanded. This was first accomplished in the so-called analog RC systems by varying the frequency of the modulating tone such that 3500 full right and 3300 full left. Frequencies in-between resulted in proportionately less severe turns. Notice that in the proportional system, your wife had to detect the steering wheel position, as well as the command from you, the transmitter. A servo must do the same thing. It must compare the position of its output shaft to the command it receives from the transmitter, and stop at the appropriate position. An actuator simply drives over to its stops if the command is held long enough.

Let's stop right here and summarize what we've discussed and, hopefully, this will answer Dave's first question, "What is radio control?"

As applied to modeling, radio control is the passing of information from the pilot to the aircraft by means of apparatus that generates and detects radio frequency energy. An RC system must have a transmitter that includes an encoder, which might be a simple switch or a tone generator, and an RF section that generates RF energy. The receiver must detect RF energy and could be a simple diode such as the early "crystal sets" or a complex circuit such as those found in television sets. It also must have a decoder which changes the information to a form the servo can use. In the case of the analog proportional system, a discriminator changes the frequency of the tone to a DC voltage.

The third element in the system is the actuator, or servo, that actually moves the control surface. A block diagram of an RC system is shown in Figure 1.

More channels can be added by adding tones on other low frequencies and filter, or discriminators, to detect them. Next month, we'll look at the encoding and decoding of so-called digital proportional signals.

★ ★

Dear Jim,

I enjoy your 'Radio Spectrum' column very much; keep up the good work.

I built an RCM Classic system designed by Ed Thomson as soon as it was published and it has given excellent service over the years and is still reliable.

However, I should like to build an up-to-date system employing modern techniques, 3-wire servos, CMOS coding, etc. The RCM World system seemed to fit the bill, but it was on

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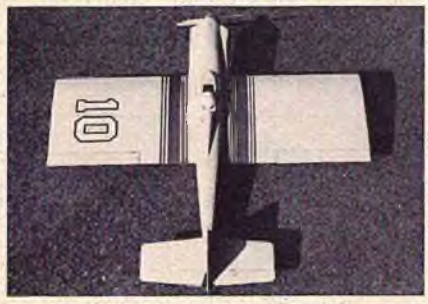
Racing At Random

FRED REESE & DON DOMBROWSKI



'Flying Dutchman' Cassutt QM racer by Fred Reese. Design was encouraging at first, but proved disappointing with increased engine performance of the Rossi.

For eight months I have been flying a very low aspect ratio Cassutt QM. The wingspan is only 29.5" and the chord is 10.25" giving a wing area of 302 square inches. The root airfoil is symmetrical and the tip airfoil is a 2409. Ready to fly, less fuel, the Cassutt weighs 2 lbs., 8 oz. In spite of the skepticism expressed by nearly everyone who sees the airplane, it flies very nicely and is probably the easiest to land QM I have ever had. As I expected, the straight line speed is excellent.

The first race for the Cassutt was the two day West Coast Championship race and I did poorly. I had pylon cuts, one no-start and was, in general, out horsepowered. During the race I loaned my back-up Miss Dara to Norm Bell, who had crashed the first day, and watched to my amazement, my old Super Tigre engine running much better than the newer engine in the Cassutt. Needless to say, after the race I switched engines. At the next race it was a different story and the Cassutt appeared to be as fast as any other at the race, but cut pylons kept me out of the running.

After missing one race, during which time the club switched to Rossis, I found I was again out horsepowered. I raced the Super Tiger twice more against the Rossis and even tried an X-15. Finally, at the last race, I installed a Rossi. The result was disappointing as I was still not competitive. My engine was not completely broken-in but still was running well. As the day progressed, my times rose as the wind increased, as they had previously, and I was having trouble flying smoothly through pylons 2 and 3.

In conclusion, I feel the critics of the short wing were probably right in that performance does suffer in the turns compared to the 40", high aspect ratio racers, and is not sufficiently compensated by straight-away speed. I also feel the smaller size of the airplane is a factor in judging pylons (we do not use flagmen and rely on the judgement of our callers) resulting in at least twice as many pylon cuts as I had previously. On the positive side, the performance is close to being competitive and might be improved by increasing the span 3-4 inches and increasing the area to 320-340 square inches. I do believe constant chord airplanes can be competitive in this event as evidenced by the success of Austin Leftwich's Little Gem and, currently, by Jack Stafford's new Brown Racer.

■

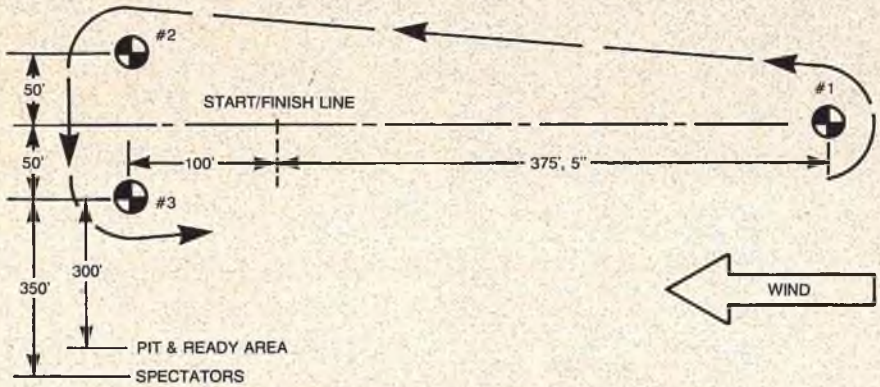
The following letter and rule proposals are from George Zink, President of NMPRA-QM. We support George and these rules as they truly reflect the majority's wishes.

NMPRA-QM RULE PROPOSALS

When NMPRA-QM decided to become involved with presenting rule proposals to the AMA for inclusion in their 1978 Rulebook, we wanted to have something which would be acceptable to the vast majority of QM racers throughout the U.S.A.

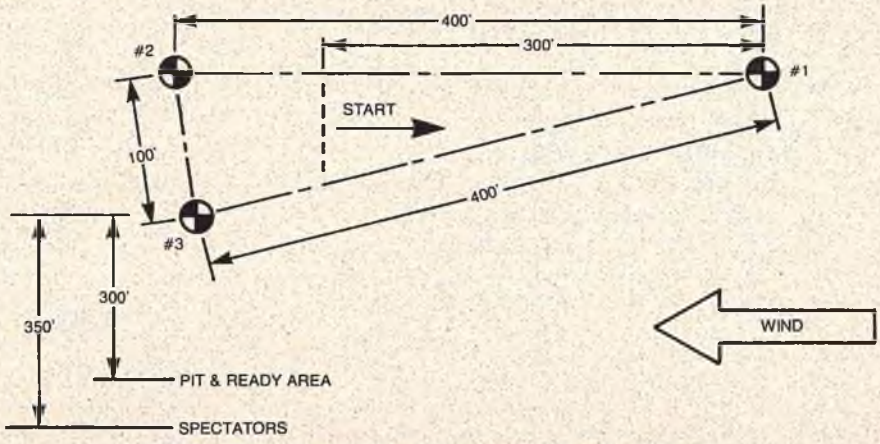
Our first step was to determine just what the current situation really was. That was the purpose behind our CD survey. A second survey, published in RCM cleared up

FIGURE 1
QUARTER MIDGET RACE COURSE LAYOUT (2.0 MILES)



LENGTH FROM STARTING LINE TO PYLON #1 WAS CHANGED FROM 378' TO 375', 5"

FIGURE 2
QUARTER MIDGET RACE COURSE (1.705 MILES)
(SHORT COURSE)



SHORT COURSE LAYOUT & RULES, SUBMITTED BY QMRC OF SO. CALIF.

some of the questions we had from the CD survey and it received much wider circulation. What was now needed was to construct rule proposals from the surveys results and to present them for approval to a body of QM people from all parts of the country. The opportunity to do just this came at the Nationals in Dayton.

We gave a set of our rule proposals to each contestant in the QM registration line, gave them a day to digest the rules and held an informal meeting the second night.

For the most part, our proposals were accepted by those present. A few minor changes and additions, but generally there was good support. There was one glaring exception, however, one which caused a good deal of heat as well as light. This was our interpretation of the 2 class system. Since we made a radical departure from our first proposal, we feel we owe an explanation to those people who received the first set of proposals as well as those who supported the 2 class system.

You may have noted that the survey went in favor of the 2 class system by about a 2/3rds majority. We dug a little deeper after the meeting at the Nats and broke the results down by area: West Coast, 55% for; South Central West, 69% for; North East, 92% for; North Central West, 44% for; South Central East, 46% for; North Central East, 35% for.

Although the districts are split, the overwhelming response from the North East threw us a curve and swayed the overall response.

By itself that still would not have swayed our support of 2 classes. The people at the meeting offered much more compelling reasons for the change.

First of all the 2 class system was really not defined well for the questionnaire. The second class we had in mind was closer to an open class above QM for the advanced fliers. Some of the people who wanted 2 classes would have liked to see the second class expressly for beginners.

There were other valid points for continuing with a single class system, but the one which broke my resistance was the lack of confidence (to put it mildly) that the 2 class system would really draw new people into Quarter Midget. Indeed, it may even cost us a few of the people we now have. Some of the areas which just barely support one class would be forced to split the racers into 2 classes and would find it impossible for QM to continue. On the other hand, the areas which are presently using a 2 class system, established and can still operate under single class rules.

Some of the other modifications to the rule proposals made at Dayton were as follows:

Exhaust extractors — instead of a short length tube of constant cross-section, the present rule proposal uses the 1/4" slot to detune exhaust systems.

Weight of the aircraft is to be checked at the end of each heat.

Idle requirements revert to 1/2 point penalty for engine off landings with no option to regain the points lost by a separate idle demonstration.

Race Horse starts shall be the primary starting method with staggered starts at the option of the CD.

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For Old Time's Sake

RANDY CARMAN

A Visit From St. SAM

'Twas the night before Christmas,
And all through the place
Not an engine was purring –
Not even a Syncro Ace!

The stockings were hung by the chimney with care,
In hope that St. SAM soon would be there.
The fliers were nestled all snug in their bed,
While visions of airplanes few in their head!

And Mamma in her p.j.'s and I in my cap,
Had just settled down for a little cat-nap,
When out on the field there arose such a clatter,
We sprang from our bed to see what was the matter!

The moon on the breast of the new-fallen snow,
Gave the lustre of high-noon to the objects below.
When, what to our hungover eyes should appear,
But an .020 sleigh and eight tiny reindeer,
With a little old driver, a cute little ham,
We knew in a moment it must be Saint SAM!

More rapid than Spitfires his coursers they came,
And he whistled and shouted and called them by name;
Now Playboy, now Powerhouse, now Fox, now Clipper,
On Lanzo, on So Long, on Gas Champ, and Zipper!

As Sailplanes before the wild thermals fly,
When they meet with an obstacle mount to the sky.
So up to the house-top the ol' timers flew,
With a sleigh full of plans and St. SAM, too!

And then, in a twinkling, we heard from the scene,
The sound of an engine a little too lean.
As we drew in our heads and were turning around,
Down the chimney St. Sam came with a bound.

He was dressed in coveralls, he looked mighty cool,
And his clothes were all tarnished with Fantastic and fuel!
A bundle of plans he had flung on his back,
And he looked like John Pond after downing a six-pack!

His eyes – how they twinkled, his dimples – how merry!
His cheeks were like roses – from too much sherry!
His droll little mouth smiled at us both,
And the beard on his chin was at least three days growth!

The stump of a prop he held tight in his teeth!
And the smell of fuel – Phew! Did he wreak!
He had a broad face and wore a dumb little hat,
And carried a field box upon which he sat!
He was chubby and plump, a right jolly old flier,
Who drew from his pocket a needle nose plier.
A tweek on the valve, a twist of the prop,
And soon his engine ran like a top!

No curse did he mutter, no word did he say,
But left enough plans to keep us busy all day!
And laying his finger aside of the trim,
The rest of the flight was up to him!
He launched up the chimney, to his team gave a sign,
He knew he could make it just one more time!

And we heard him exclaim as he flew out of sight –
"Happy Landings to all, and to all a good flight!"

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Soaring

AL KINDRICK

● With the mild winters we have been having in Southern California, night soaring has become a year-round sport. Just about any sailplane can be converted to night flying by the use of electric lights or by using Cyalume Light Sticks (available from RCM Product Division).

I have been night flying for five years, so with my many flying sessions, I have gone to all electric lights.

Three methods are used to launch: high start and towline; by attaching a small inexpensive flashlight or Cyalume Light Stick to the parachute; while the third method, the one I use (and I have to apologize to the "purist" sailplaner) is the use of a power pod.

I experimented with different colored bulbs and found the most visible are yellow and blue. Colored bulbs on wing tips, clear bulbs on stabilizer tips, and a clear flashing light on the vertical fin do the trick.

When using electric lights, the normal ballast is replaced with four 500 MA nicads, center tapped. The full voltage goes to the flashing light on the vertical fin, while the center tap goes to the wing and stabilizer lights. Using miniature lamps with a 2 volt .06 amp rating will enable you to fly 1½ hours. By using an electronic flasher where the voltage drop is more critical, it will die off more quickly, giving a good indicator of battery life.

Deans Plugs used for light connectors. Over 200 flights and still going strong. Bulbs rubber banded to 1/8" dowel which is glued into wing tip.

Night flying is a fun sport that is rapidly catching on all over the world and a few strict rules should be adhered to by individuals or flying clubs.

If a pilot is interested in night flying, have him, or her, show their proficiency during daylight hours. Fly at the site where night flying will take place. Set up a landing approach and stick to it and develop a "groove" or pattern. Mentally fix in your mind the location of obstacles, power lines, trees, back stops, goal posts, buildings or any object that would cause your sailplane to go to zero flying speed.

When your aircraft is airborne, always remember the last command you transmitted. This may seem unimportant, but it's almost mandatory since orientation is very difficult at night.

The best flying is on the darkest of nights. A full moon is not the best time to fly since there are too many reflections and shadows. At the flying site I like to use an electric lantern because it can be turned off so it won't create any ground shadows.

If you use the Cyalume Light Sticks, a #64 wing bend with a half hitch around the end attaches quickly to the wing. By the way, the Cyalume only weighs 22 grams, is 6" long and is 5/8" in diameter and good for three or more hours of flying, so don't worry about weight or drag.

Whether you use electric bulbs or light sticks, high start or power pod, always practice safety. If you have observers, have them stay close and behind the pilot, since this way he knows where they are at all times. You will be surprised when you find light rising air after dark. Try it once and you're hooked. Have a ball!

●

Happenings and Things

Mario Fernandez, President, Club de Planeadores of Mexico, informs us of their first National Sailplane Meet. It is flown over a period of four contests, and the scoring is the same as Formula I racing: 1st place, 9 points; 2nd place, 6 points; 3rd place, 4 points; 4th place, 3 points; 5th place, 2 points; 6th place, 1 point.

Mario says that the lead changed hands many times before the final round, and was a very tight, hard fought contest which is evident by the final score.

1st, Mario Fernandez, Windrifter, 22 points; 2nd, Ricardo Wille, Aquila, 21 points; 3rd, Raul Lopez Breton, Cirrus, 19 points.

Note that the two top winners used Standard Class sailplanes!

What would be the chances of the top sailplaners of Mexico getting together with our top LSF, or NSS pilots and holding a Fiesta Meet sometime?

●

"The Great Bicentennial Cross Country Sailplane Race", held before the Nats in Chicago, sounded like a fun time sport, patterned after the SFVSF Desert Dash. On the 76 Km (47 miles) course you could launch as many times as you wished. All tow equipment, pilot, and

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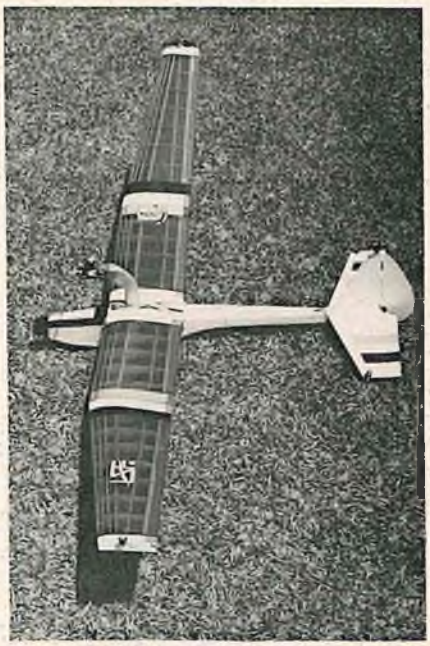
Overall view of night flyer. Colored bulbs on wing tips, clear bulbs on stabilizer. A flashing light is used on the vertical fin.



Sunday Flier

KEN WILLARD

Headquarters van for 1976 LSF Tournament.

The 1976 League of Silent Flight Soaring Tournament was held on August 28 and 29, at a farmer's field just a few miles from Santa Rosa, California. Note that I am careful to say California — and for good reason. When I called the motel chain earlier for reservations, they were assigned to me without any hesitation. Then, as is my habit — formed through many years of traveling — I re-checked just before leaving for Santa Rosa.

"What reservations?" asked the agent. "We don't have any for you." So, I fumed and sputtered a bit, told her when I made them, grumbling about inefficiency, etc, but she remained calm, and re-checked the records.

"Oh, yes sir, here they are. Two nights in Santa Rosa, New Mexico!"

I didn't even know there was such a place.

Well, we got it straightened out — a mutual misunderstanding, and I got my room in Santa Rosa, California where the tournament was. Maybe I would have been better off to go to Santa Rosa, New Mexico.

As is usually the case, with one or two exceptions, all participants agreed that the site was great, the thermals were great, with sink to match at times, and most of all, the concept of head-to-head competition helps to reduce the luck element, but certainly didn't eliminate it.

The events were well designed to demonstrate versatility of the sailplanes — thermalling, speed, and precision. Many max's were achieved — more than were not — and this resulted in most of the thermal events winding up as precision landing contests, since flight times were normalized. Some answer to this situation needs to be developed. "Shorter tow lines" were suggested as a possibility, but that would tend to increase the luck factor — unless all contestants stayed together in the air, since if one went in one direction while the others went another, and hit a thermal while the others hit sink, they wouldn't have a chance of changing course at the low altitude. One mistake would be too many. Longer max times was another possible solution. Better — but then the rounds and heats would take longer — and maybe a round would again have to be cancelled, as it was this year, due to lack of time. That decision, made by Kirby Parker, Contest Director, after a democratic vote process which resulted in a tie, turned out to be the absolute right thing to do. Had the round been attempted, darkness would have nullified it anyway. So time is a determinant, and longer max's means fewer rounds, or the alternative of more days. So the answer to minimizing the luck factor in thermal contests has not yet been fully realized.

The speed event in this year's tournament worked out better than anything I have previously seen. It wasn't a structural test speed dive like the FAI uses, since there are three laps instead of one. The one thing still missing is the opportunity for the fastest planes to compete against each other. Maybe "match races" by the heat winners is a way to determine the best overall performer in this event. You can't use comparative times, since the flights were made in different air conditions. The flights have to occur simultaneously to be significant in the results. It almost looks like the way to go is head-to-head elimination — like tennis. But how do you establish the "seeding" of the contestants?

What with all the indeterminates involved, how about trying a speed event that isn't just a structural test, yet minimizes the influence of different air conditions. One lap (which can be completed in any air condition using a 150 meter tow) to be all that is flown, and the sailplane must be flown at the same wing loading as it carries during the thermal events. Sure, there is some element of structural strength involved, but nowhere near that which prevails when you load the job up to 24 ounces — which is legal under FAI rules. And this way, you'll get an idea of the speed capability of a thermally configured sailplane — not a dive bomber.

You'd have to trust the integrity of the

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Kirby Parker, Contest Director (left) announces event.

Don Edberg, First in Open Class, First in Scale . . . and first in smiles!

Fred Weaver's 14' span beauty, the only plane to score a pefect 1000 in Thermal Precision.

Zoegling Primary Glider

For some reason, this crate from the 1930's seems to have a nostalgic pull on people's emotions, quickly drawing a crowd wherever it is flown. With coupled rudder and ailerons, it turns in about a ten foot circle, finding even the smallest thermals after leaving the high start. On the slope, and flown at eye-level, the tail goes up and it lazily scoots along, following the cliff contour. The speed is the same flat out level or straight down . . . slow!

BY DR. GERRY CASEY

● Super-super efficiency is the keynote for the age! Sailplanes for RC'ers are ever faster, fly farther, go higher, are more graceful and ever so fantastically beautiful! . . . Ho hum.

Comes now another approach to the R/C Glider aficionado: slower, shorter, lower, dirty, cluttered and very, very ugly! Wow, man, it's so ugly it is actually beautiful. I guess it's kind of the way I feel about the Iguana Lizard: down the ugly scale you will finally arrive at beautiful again. No?

To own the Zoegling Primary Glider is to fly in a completely different ballgame. First, there is no pressure on the pilot because everything is slowed down. There's worlds of time for thinking about turns and whatever you are planning next. Slow and ugly - - great! About the only distraction you'll get with this bird is the huge flock of spectators. Sometimes we forget that to the uninitiated, the great big beautiful twelve foot span bird hundreds of feet high thermalling, or above the slope, is not enough for their interest. Not so the lowly Zoegling: for it is usually flown at eye-level on the slope and very commanding as it scoots back and forth like a pylon racer in slow motion.

From the dim past comes the semi-scale German Zoegling. Old not-withstanding, for the new or experienced flyer, this model is satisfying in our times. Nothing else quite captures the thrilling sound of wind whistling through the rigging wires. Little is so rewarding as wheeling into thermal turns a little wider than the wingspan. And how many other designs can find a thermal at ten feet of altitude and work it across the flying field? Comforting also is the fact that this weird bird is **strong.** Once I hooked a wingtip landing and merrily cartwheeled from wingtip to tail to nose and over again before stopping. Damage? None. No sireee! With all those rigging wires, everything yields just enough to absorb the goof-off.

And why did I pick the Zoegling to build? That is a story . . .

Back in the nineteen thirties, the art of gliding was new and raw and so was I. Thermalling had not yet been discovered and our soaring was a series of eights cautiously flown on strong slope winds. Most of the flying machines then were the open type primary designs modified from the original Zoegling of the German Gliding Schools. In the U.S.A., it was quickly modified and renamed the "Northup Primary." During this period, I was fortunate enough to have built and flown my own.

While gliding here was for sport, the training of pilots ten to fifteen years of age in Germany was a deadly serious pursuit. Stripped of the ability to bear arms or to have an Air Force by the Geneva Convention, Germany quietly set about building a super-supply of skilled pilots via the glider training and sailplane route. Many of the German youngsters who learned to fly in the Zoegling also had a hand in its construction. Can you imagine the wonderful stimulus to fly and build with integrity?

From the Zoegling trainer to the sleeker sailplanes soaring on the Rhon and Wasserkuppe slopes, the youth gained extreme proficiency. Thus it was that the old Zoegling was built and flown in great numbers.

So here was I one day in December with a fine, open primary glider easing my way off auto-tow towards the Palos Verdes Cliffs in Southern California. Always before my flight had been over the cliffs, one quick and careful turn and then scoot back to a landing. But on this day, when I made my turn, the updraft kicked my bottom and I felt the glider surge upwards. I was soaring!

For two and a half hours, I shuttled back and forth above the cliffs, happier than I'd ever been. I was dressed in light clothing, clutching the seat bottom for security against the primary's nakedness and, despite the bitter cold and whistling wind, reveling in my first soaring experience. When I finally landed, my crew had to pry my stiff and blue fingers off the control stick! It was hours before I could stop stammering and describe the emotional impact of soaring flight. Many years later when I had earned F.A.I. Badge Silver "C", I would recall that moment. It was the greatest!

After my soaring flight, and the fact that then I was an "expert," the next step was to hop up the Primary. This we did by adding an enclosure for the pilot. Technically, this made the Primary a "Secondary Glider." Actually, it was still the same old beast that flew the same, but was a heck of a lot warmer when soaring!

So how did the model come to be? Okay, for the past few years I'd been flying my own sleek R/C sailplanes on those same cliffs as my first soaring experience. One day I showed another RC'er an old photo and he said, "What a great model that would make!"

"Really?" Why was I surprised? You know the rest of my reactions: The gastro-intestinal feeling as you contemplate structure and design then the wild ride to the hobby shop for a supply of balsa and glue. I've built many scratch machines before, but this time the fun of building and flying was so much that after a year, I built another, improved version offered herein.

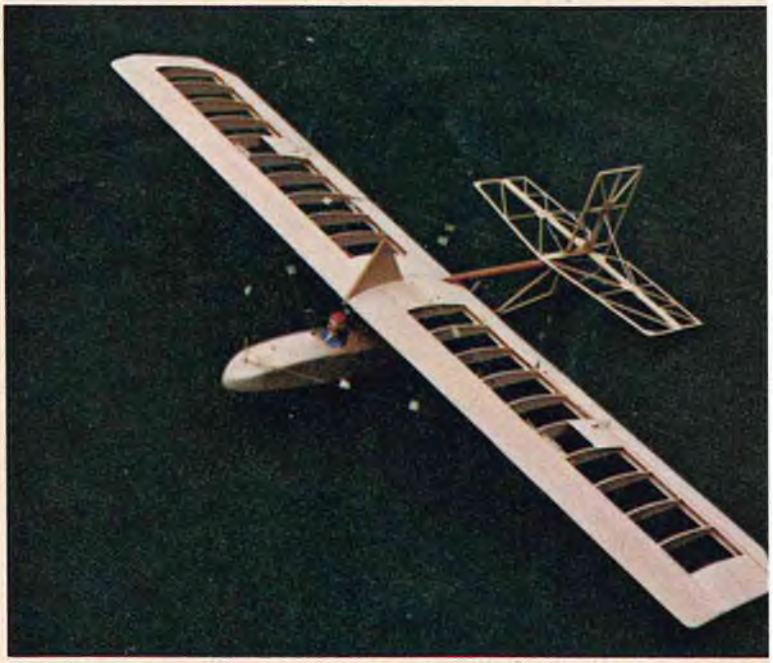
Are you sold? Can't you feel that nostalgia? Okay, let's start building!

Tail Surfaces:

Notice I didn't say "empennage." Right on, we are going to do it the old way! So put your waxed paper over the drawings and build the tail surfaces just like you've always done before. The only difference is that the model construction is similar to the actual full-size bird and that makes for more fun in building.

Be careful to keep the tail surfaces flat

LEFT: Dr. Gerry Casey flies the Zoegling Primary Glider to an easy spot landing after a thermal flight. BELOW, LEFT: The author with the Primary and another, larger version, dubbed Big Mother! In the photo below, the Primary is shown ready to cover. The photo at the bottom of the page shows two of the Zoegling Primarys, waiting their turn to fly.



and I suggest epoxy for the joints. Build the elevators as one piece and cut them into individual elevators after gluing in the 3/32" wire center piece. To sand the aft sections for the proper trailing edge contours, shim under the unsanded T.E.'s then sand to shape. This way, no carving is needed and everything stays straighter. Go all the way and add the flat hinges, but do not drill the holes for the metal fittings just yet. (Wait until fitting to the fuselage for locating.)

Wings:

Wasn't that fun? See, even the building of old ugly is a gas!

Now make the rib pattern of 1/16" ply. Epoxy two pin points through the pattern and let them protrude about 1/16". Smear epoxy around the rib profile and sand super-smooth when dry. Now the X-Acto knife will not catch on your pattern. Cut all ribs and sub-ribs for the aileron ends and aileron horn ribs per the drawing and per the thickness shown. (Also make the 1/4" balsa full-dimension ribs for the mock center section and also the two full sized ribs of 1/32" ply.) Clamp in a bundle and use a razor saw to cut the slots for the spars.

The next step is to glue the ribs to the bottom front and rear spars. Locate your markings on the spars from the drawings, but do not attach to the building board as it isn't necessary. Anything bowed or wiggly will straighten out later when pinned to the board for sheeting.

Over the waxed paper and on the drawings, shim and pin the 1/16" balsa trailing edge sheet to the board. Cement to the rear bottom spars and ribs. While drying, glue the front and rear top spars in place. Now add the 1/16" spar webs to the front spars as shown. (These end one bay short of the aileron bay.) Add the aileron ply platforms and the A-1 sub ribs as shown.

Using a razor plane and sandpaper, shape the bottom of the leading edge to size. The wing can now be removed from the building board. Off the board, pin and glue the leading edge in place. Make small cuts in the spars (where shown) and crack and bend to receive T-1 and the wing tip spar fillers. Glue in place. Glue the rear spars by **bending** together; **do not cut**. Add the 1/4" x 3/8" balsa tip pieces and carve and sand to shape. Sand to receive the tip sheeting. Trim the excess sheeting from the ailerons.

With the wing off the board, carefully add the lower leading edge sheeting. Clamp to the spar with clothespins and Tee pin to the leading edge. (Yes, I know the clothespins make dents, but you will steam them out later!) The balsa sheeting may need to be wet on the top side, fastened to dry, then permanently glued later. Drying may be hastened with a heat gun. Note that the lower leading edge sheet does not extend into the tip bay.

When all is glued and dry, trim the sheeting. Now you may complete the carving and shaping of the top side of the leading edge.

Complete the sheeting for the root and tip bays on the underside only (off the board). Add the 1/16" balsa capstrips to the wing undersides.

NOTE: On the root section, underside of the **left** wing, note the substitution of 1/16" ply for balsa sheet where the servo compartment floor is located. Glue the ply with epoxy.

1930 ZOEGLING PRIMARY GLIDER

Designed By: Dr. Gerry Casey

TYPE AIRCRAFT
Stand Off Scale Prim. Glider
WINGSPAN
73 Inches
WING CHORD
12 Inches
TOTAL WING AREA
876 Square Inches
WING LOCATION
Parasol Wing
AIRFOIL
NACA 7410 (mod)
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
1 Inch
O.A. FUSELAGE LENGTH
40¼ Inches
RADIO COMPARTMENT AREA
(L) 9" X (W) 3" X (H) 2½"
STABILIZER SPAN
24 Inches
STABILIZER CHORD (incl. elev.)
8 Inches (Average)
STABILIZER AREA
184 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
8¼"
VERTICAL FIN WIDTH (incl. rudder)
6"
REC. ENGINE SIZE
NA
FUEL TANK SIZE
NA
LANDING GEAR
NA
REC. NO. OF CHANNELS
Two
CONTROL FUNCTIONS
Elev. & Coup. Rud. & Ail.
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Ply, Spruce
Wing	Balsa, Ply, Spruce
Empennage	Balsa & Ply
Weight Ready-To-Fly	44 Oz.
Wing Loading	7.2 Oz./Sq. Ft.

Make your pattern and mark the aileron ribs for cuts to receive the aileron spar and aileron sub-spar. Cut carefully with a fine-tooth razor saw. After cutting, the pieces may be neatly removed by twisting slightly with pliers at the glue joint. Chisel or sand any protrusions so the spar will lay flat to the sheeting. Cut the aileron spar to fit. (Note the beveled edges.) Now, glue in place.

Now it is time to shim and pin the aileron portion of the wing to the building board and glue the aileron spar in place. When dry, cut the ailerons free of the wing, then trim and sand to receive the top sheeting. Be careful making this cut as you have only 1/16" gap to work with.

Add the flat hinges per the drawing and glue. The hinges may need trimming at the sub spar. Epoxy the aileron horns and sub ribs in place. Add the top sheeting to the aileron — this assembly must be pinned flat to your working surface. When dry, trim and sand to shape.

Install a flexible type control rod in the right wing per drawing for the interconnected aileron/rudder (epoxy). Make it longer than shown and trim later on.

Install the aileron servo in the left wing root with servo tape. Add the aileron rods. The left wing rods may be permanently connected to the servo. (Use metal Goldberg Kwik Links.) The link that will attach the right wing controls has the pin side cut off and will connect to the servo arm with the left link. Leave the right wing push/pull rod about 3" longer than the root for later fitting. (If your aileron servo has opposite throw than the one shown on the drawings, reverse the horns at the ply platforms in the wings.) **Caution:** Do not hook up the connectors to the bottom of the servo as they are too hard to connect when assembling for flight! Add the wing connection wires and tubes at this time, using epoxy. Cut the holes in the center section for the rods and aileron controls. Cut a slot in the right side to receive the right wing rudder control. Match this cut with one of the 1/32" ply ribs and glue in place. Cut, fit and epoxy pre-drilled dowels in place where shown. Use no other wood as the holes will tear.

Add the 1/8" x 1/4" spruce tension braces to the ribs where shown (epoxy). Complete the hatch cover and attach points.

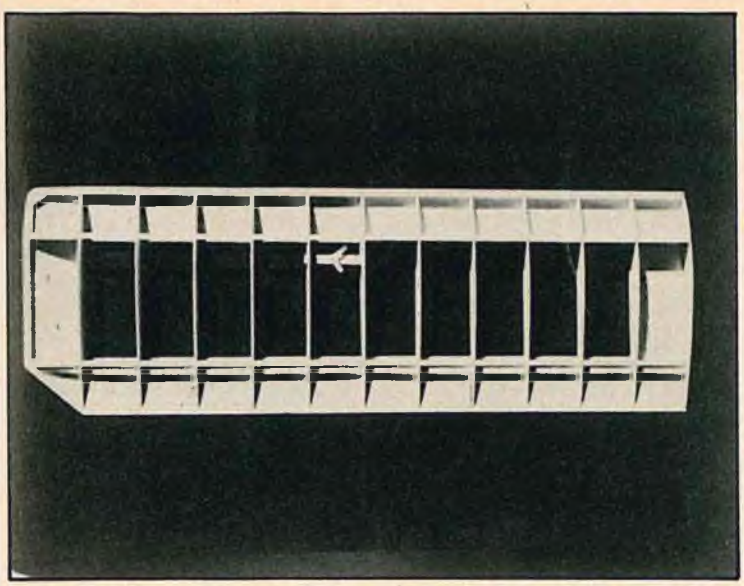
Now pin the wings securely to your building board and glue the top sheeting for the leading and trailing edges in place, as well as the tip and root sheeting. Let dry thoroughly. Lucky for you (and me!) warps are not critical for this design as the rigging wires make everything come out right. Sand to shape and final smoothness when dry.

At last! Hook up the ailerons from the platforms and horns to the aileron horns and adjust for neutral. Install and connect the rudder rod as shown (leave long). Check for complete freedom of movement. Your servo throw may now be checked for sufficient travel. Using the horn holes shown on the plan with Rocket City adjustable servo arms is recommended.

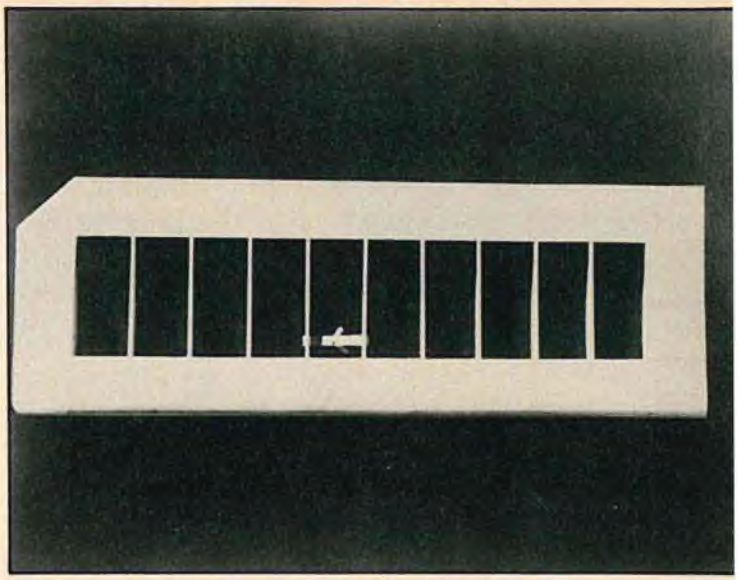
Now the delicious part — the dessert is last!

Fuselage:

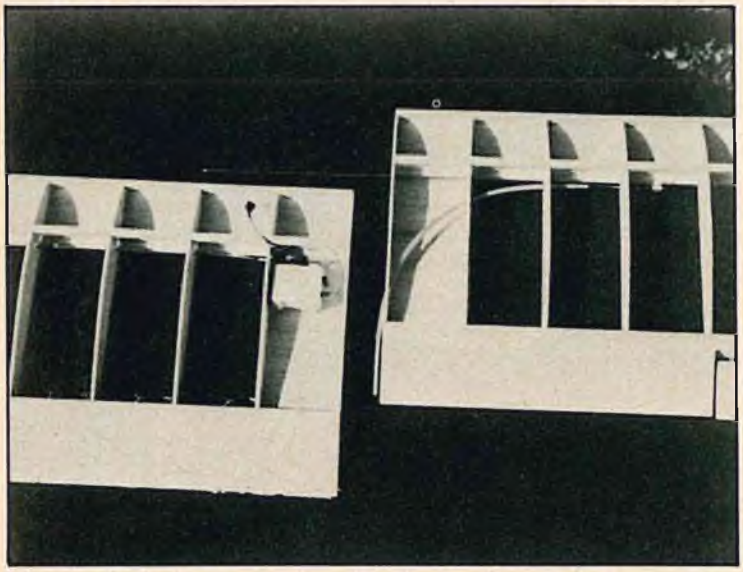
Make all the flatwork on the building board as shown in the photos. Add the gussets to the workable side. When dry,



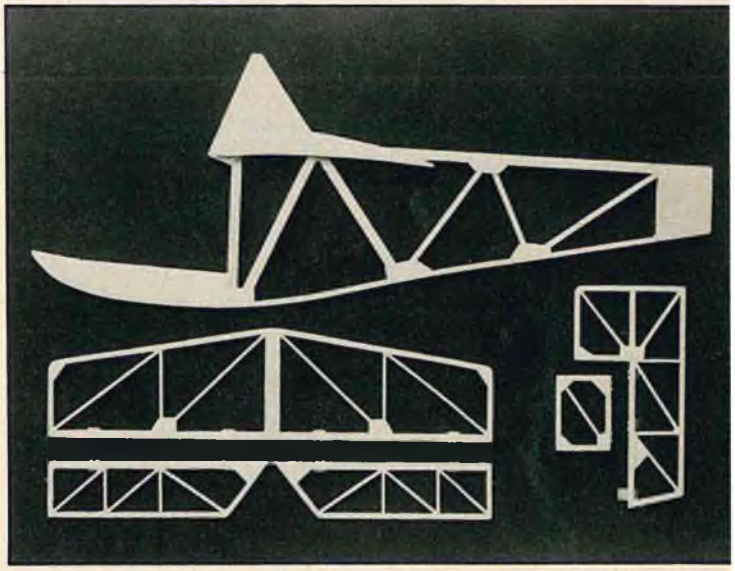
The Zoegling Primary Glider wing panel ready for aileron installation.



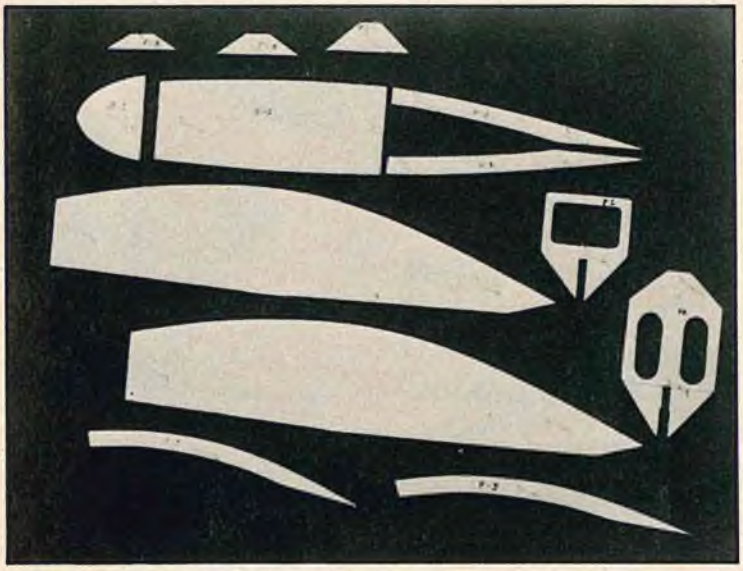
One wing panel shown with bottom sheeting completed.



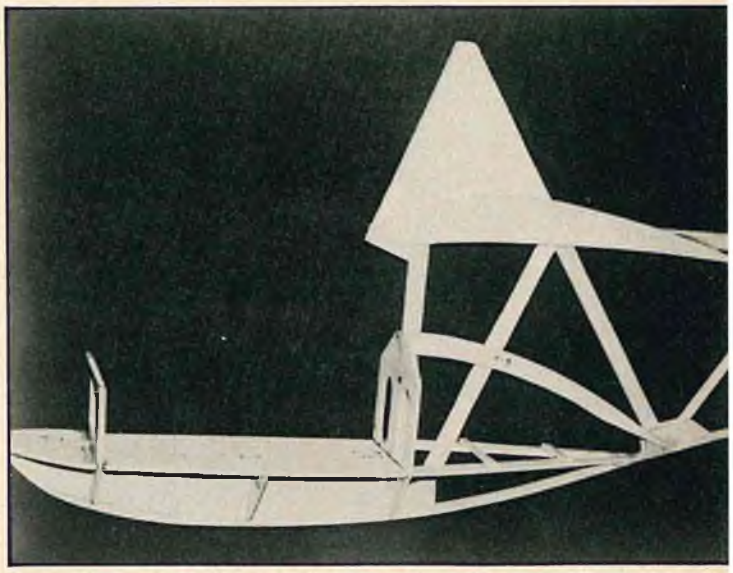
Close-up of wing root details before top sheeting is applied.



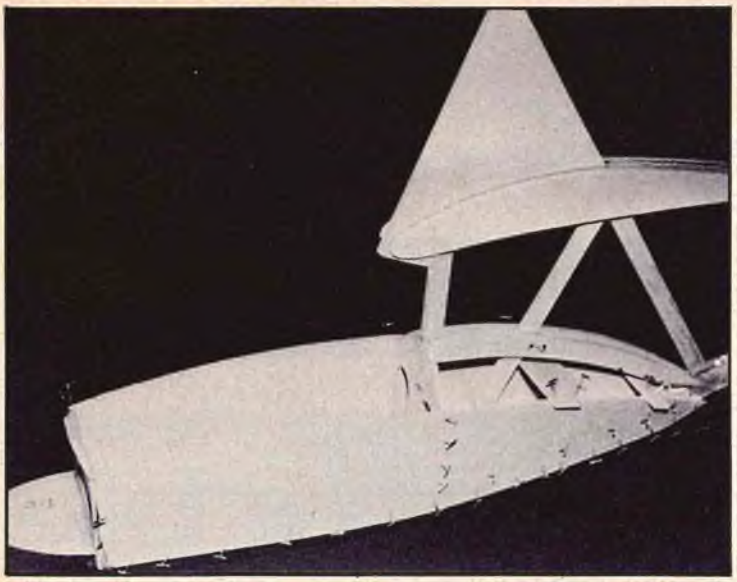
The fuselage 'flatwork' completed and ready for building pod.



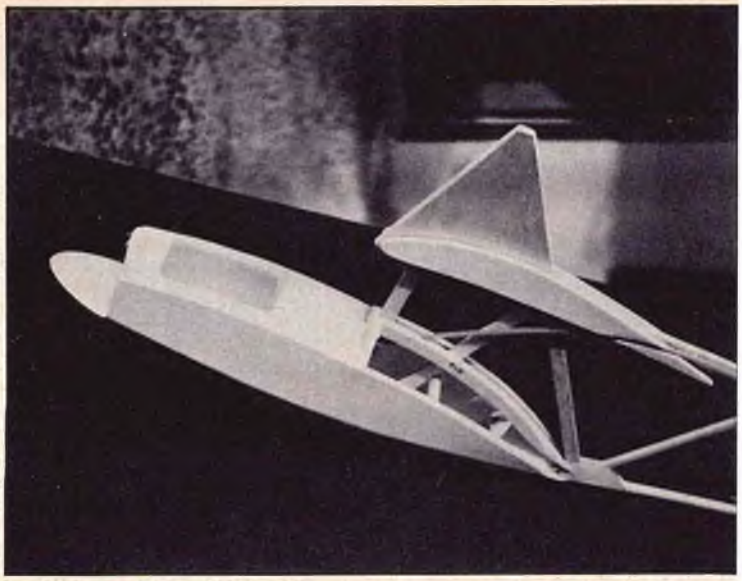
The fuselage pod formers are pre-cut and ready for assembly.



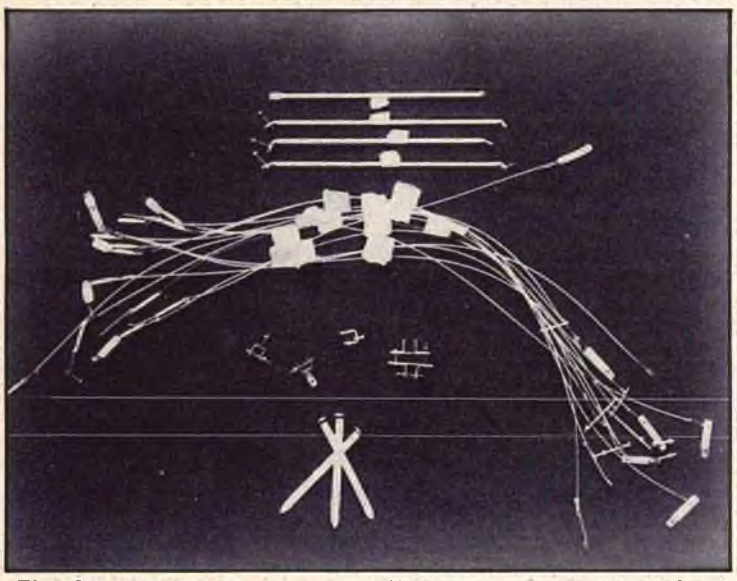
The basic pod is shown assembled, ready for skid sheeting.



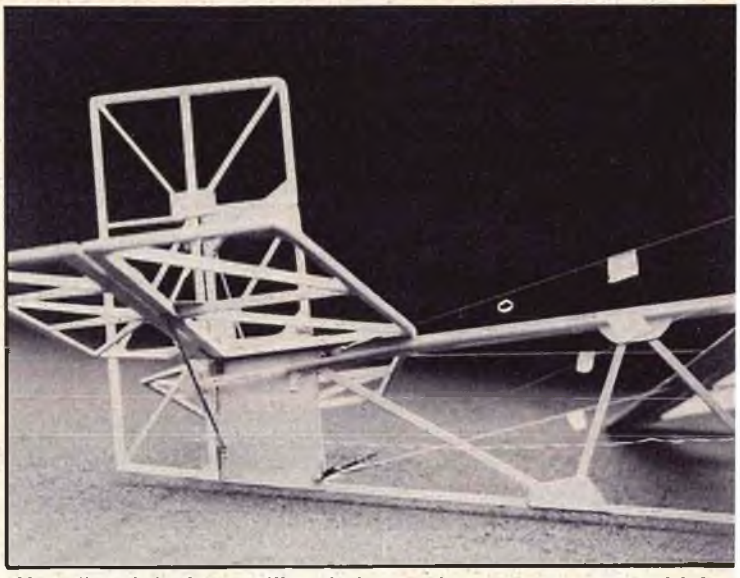
The side panels installed in this photograph. Note that they are oversize.



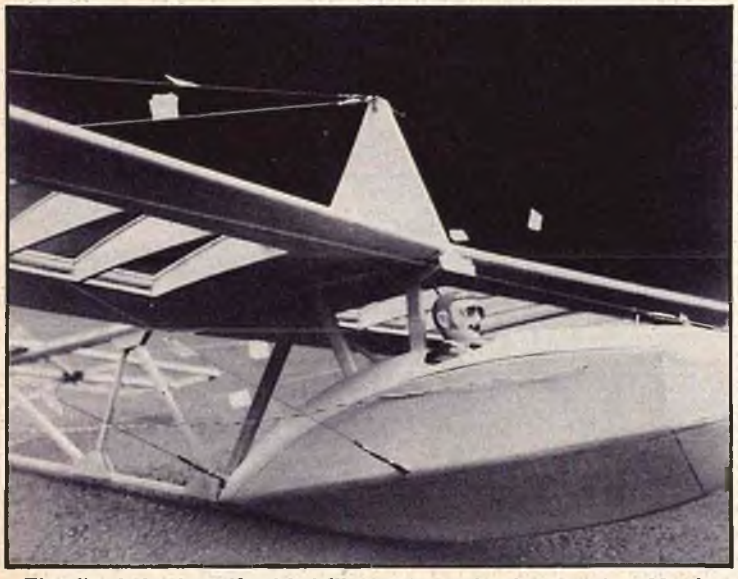
Ready for hatch sheeting. Elevator control rod cut into 1/4" balsa root rib.



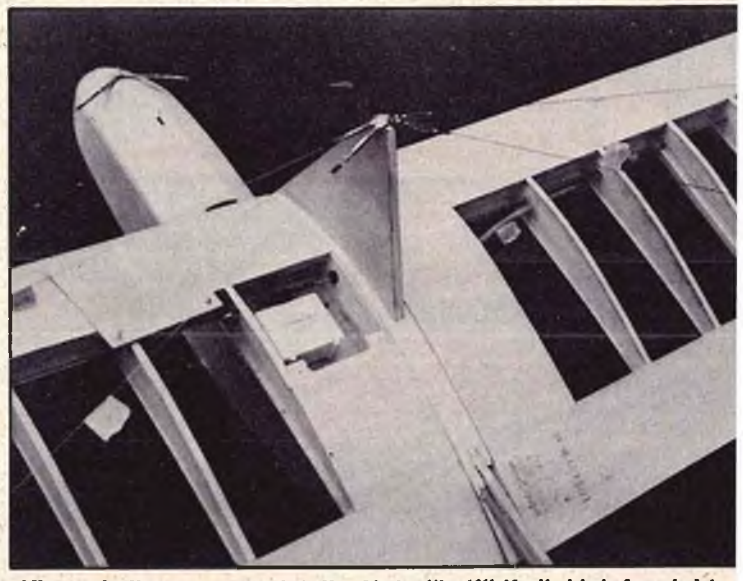
The fittings, rigging, and "stuff." Tabs of tape used for identification.



Note "straight-forward" and cluttered empennage assembly!



The final rigging. If a bird flies out, you've lost a wire, Mac!



View of aileron servo details. Note "half" Kwik-Link for right aileron.

remove and add gussets to the opposite side. Do the same with two of the full size 1/32" ply ribs. Cut these so they blend into the other ply coverings — not over!

Add formers F-1, F-3, floor F-7, then F-4 and F-6 rear formers. Add the 1/8" x 1/4" braces to F-6 where shown. Add F-2 to the skid, then bevel-sand to receive the skin sheeting. Bend and permanently glue the tow hook in place.

Fit and glue the sheeting to both sides of the skid from F-1 to the end of the pod. Cut all skins 1/4" larger than required. When dry, trim the excess to receive the side panels. Note that the dotted lines on the fuselage formers on the drawings shown where the sheeting overlaps. Glue the 1/8" side panels with white glue. Before the glue sets, pin temporary scraps of balsa to the panels to insure parallel dimensions. When dry, trim and sand, and note that all skin seams overlap. Allow for trim when rough-cutting. The technique after gluing is to trim with a razor plane, then sand. After the joints are completed, ease the corners by sanding. Note the section change aft, and ahead of, the tow hook. The front portion will receive the skid later. Glue F-5 and the 1/4" square spacer and braces to your side panels. Use masking tape to pull the side panels parallel when gluing.

In the cockpit area, add the 1/4" stiffener rails and cross-piece where shown. Now install the elevator control rod and cut the root rib to receive it. After the epoxy sets, add the 1/32" ply rib over the balsa root rib (see photo).

Place waxed paper over the cockpit area and fold to cover formers H-1 and F-3. Cut and pin the 3/32" balsa hatch base in place. Cement H-2 at the front and fasten to H-1 with pins from in front. Add H-3 and H-4. When dry, epoxy dowel pins to H-4. These should protrude through F-3 approximately 1/16". Careful, Mac, don't glue them to "F-3". When dry, remove all except the front pins.

Sand all bevels to receive the sides of the hatch sheeting to the rear of the pod. If you are wealthy, use a single sheet of balsa! (Sob, I didn't!) Cement the oversize hatch sheeting in place. When dry, sand to fit the fuselage side panels and hatch formers to receive the top hatch sheeting. Cut oversize, fit and cement the top 3/32" sheeting from the front of H-2 to the rear of the pod. Cut the holes for the posts, etc., from one side only. Cut and glue when the top sheet has been glued in place.

When dry, reach into the cockpit area with a pair of needle nose pliers (through the front former) and push the pins through the sheeting where the hatch is to be separated later. Now remove the pins and mark with a pencil where they have protruded through the outer skin. Connect the markings and carefully cut with a knife or single edge razor blade. Look inside to check the accuracy of the cut. Care here will make you proud later! Cut between the hatch front and rear formers with a razor saw. Remove the hatch and sand all joint edges smooth. Cut the cockpit hole in the hatch and add the slide lock at front. Glue, sand, hollow and form the **upper** nose blocks. Glue in the solid lower nose blocks.

Add the right side 1/32" ply root rib to match the balsa rib. Cut both the right and left side ply ribs to receive the aileron and connector rods.

Fittings and Rigging:

All the metal fittings except the main front flying wire attach fittings may be made from brass paper fasteners 3" long. For additional bearing areas of high stress, simply fold the end over before drilling to receive the turnbuckle. Build and install the fittings as you go. (I know - - - it reminds you of the old Erector Set!)

I recommend Lou Proctor's hardware, rigging wire, and turnbuckles plus his wee bolts and nuts. You will find his advertisement in this magazine.

Begin your rigging with the top landing wires and adjust for the proper dihedral. If you want your glider to be very agile, use 1" dihedral per wing as per the plans. If you'd like more "hands-off" flying, add 2" per wing. Identify all rigging as you go with small pieces of masking tape. Next, add the lower flying wires and tighten the turnbuckles to Middle "C"! Yes, Mac, we use different methods here. If you can't find a Middle "C", listen to a honey bee. Anyway, it's a low hmmmmmmm!

Okay, now install and tighten the front drift wires then add the rear drift wires. Install the tail assembly. Connect and fit the elevator, rudder and ailerons to their locations. Connect the ailerons to their servo. Install 1/2" long 2/56 threaded rod into the inside control rod of the rudder where it terminates at the right wing root. Let 1/4" protrude for joining to the rudder rod on the fuselage. When assembling and disassembling, it is a simple task to uncouple the rudder at the horn and twist a few turns to connect to the wing. Check all rigging for alignment and controls for travel and freedom of movement. Be sure you're coding all the rigging with tape or you'll never find them for final assembly!

Radio:

Install your elevator servo on a slant as shown. Install the switches, charge plug, receiver and battery. Final balancing must wait until completion. Re-check operation of all controls: the interconnected rudder and aileron should move freely and without any binding. The same is true for the elevator. Run your antenna out the side and fasten it to the aluminum tail brace rod.

Finishing:

We chose transparent Solarfilm for lightness and ease of application on the wings and tail surfaces.

As there are obstacles to film coverings on the fuselage, we used resin followed with spray lacquer. Letters and numbers were dry transfer type available from stationery stores (Letraset, etc.). MonoKote trim was used for the Nazi emblems and wing crosses. The 2" scale Williams Brothers pilot was painted to look German (! ?).

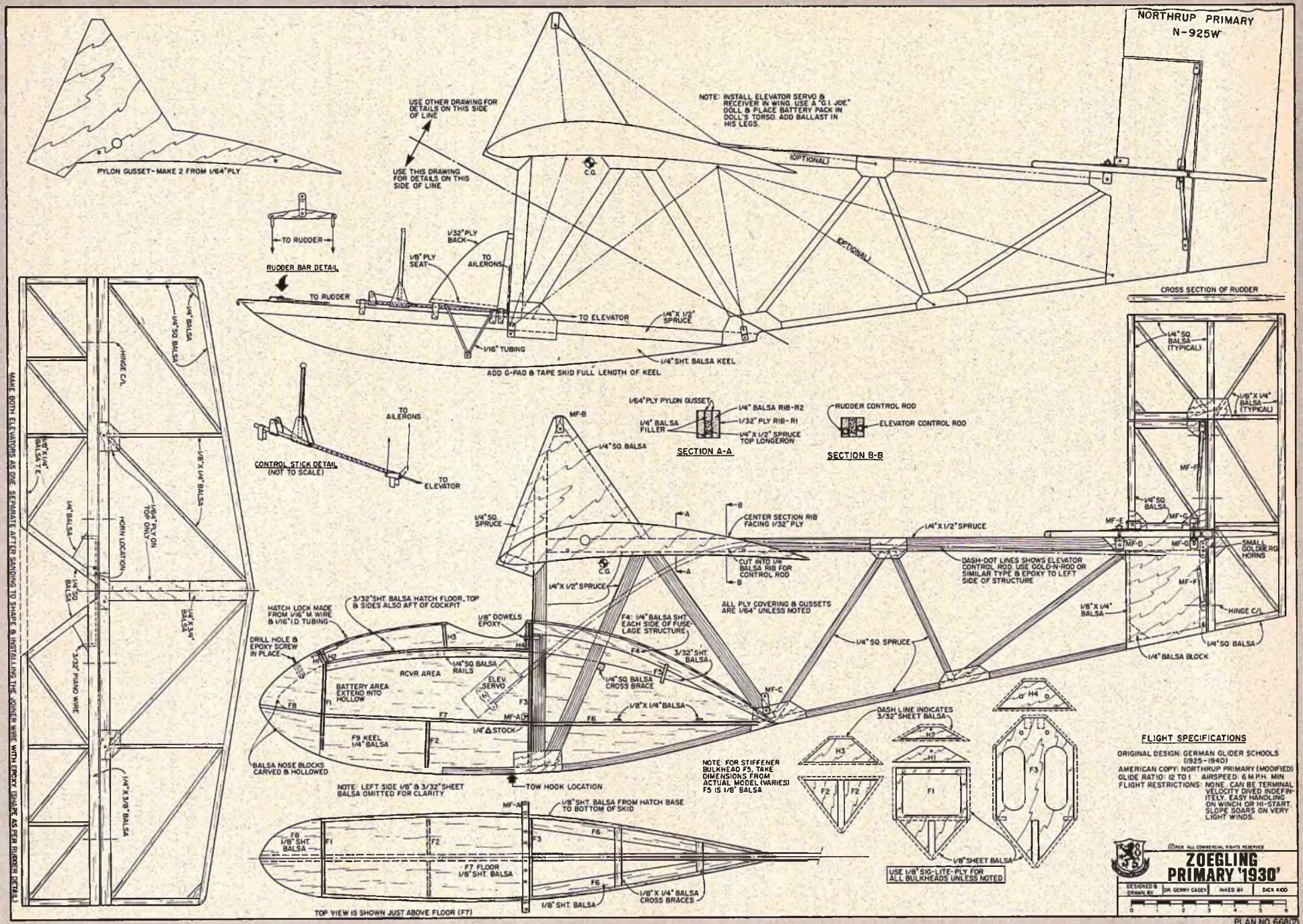
"Der Zoegling" flies easily, is quite agile, and goes exactly where you put it. Try perfecting the special Zoegling approach: Circle tightly at a forty-five degree angle downwind, then roll out about eight feet high and head towards yourself. Start slowing it up with elevator. With a bit of practice, and a 10 mph wind, you can fly it to yourself at eye level and it will float to your toes like a parachute. Now you can make those LSF spots as if you've dropped a carpenter's plumb-bob upon them!

Flying:

Add ballast to place the Center of Gravity where shown. It is not critical but favors forward for best handling. As I've said, "Der Zoegling" flies easily, is quite agile and goes exactly where you put it. Try perfecting the special Zoegling approach: circle tightly at a forty-five degree angle downwind then roll out about eight feet high and head it towards yourself. Start slowing it with up elevator. With a bit of practice, and a 10 mph wind, you can fly it to yourself at eye level and it will float to your toes like a parachute! Now you can make those L.S.F. spots as if you've dropped a carpenter's plumb-bob upon them!

So what are we doing talking? Go fly the thing, step back a few hundred years and be the hit of the slope. From a high-start launch, and after a thermal flight, it is a real weird sight to see it circle continuously from about fifty feet of altitude and roll out of the last turn about six feet high with a short glide right to your feet. It may be outlawed for LSF spot landings! Just remember the Doctor's prescription that "Ugly is so, so, beautiful!" □

FULL SIZE PLANS AVAILABLE — SEE PAGE 175



METAL FITTINGS

NOTE: MAXIMUM SIZE OF ALL ATTACH BOLTS: 2-56

MF-A
.020 X 1/4" BRASS

ALIGN BENDS TO FLYING WIRE ATTACH POINTS ON WINGS (ROUGHEN BRASS TO EPOXY).

MF-B
(JOINS MF-H)

MF-C

MF-D

SOLDER SCREW HEAD INSIDE FITTING.

MF-E

SOLDER JOINT

MF-F

TYPICAL BOTH ENDS

MAKE (4) OF 1/8" ALUM. TUBING. FLATTEN BOTH ENDS BEFORE DRILLING HOLES. (TAKE DIMENSIONS FROM FINISHED MODEL).

MF-G

BEND & FOLD TOGETHER AS SHOWN - MAKE 2.

MF-H

MAKE 2 - FITS ON TOP OF MF-B WITH SHORT SHEET METAL SCREW

ALIGN BEND TO LANDING WIRE ATTACH POINTS ON WINGS.

MF-I

RIGGING STRAPS - MAKE 20

RIGGING INFORMATION

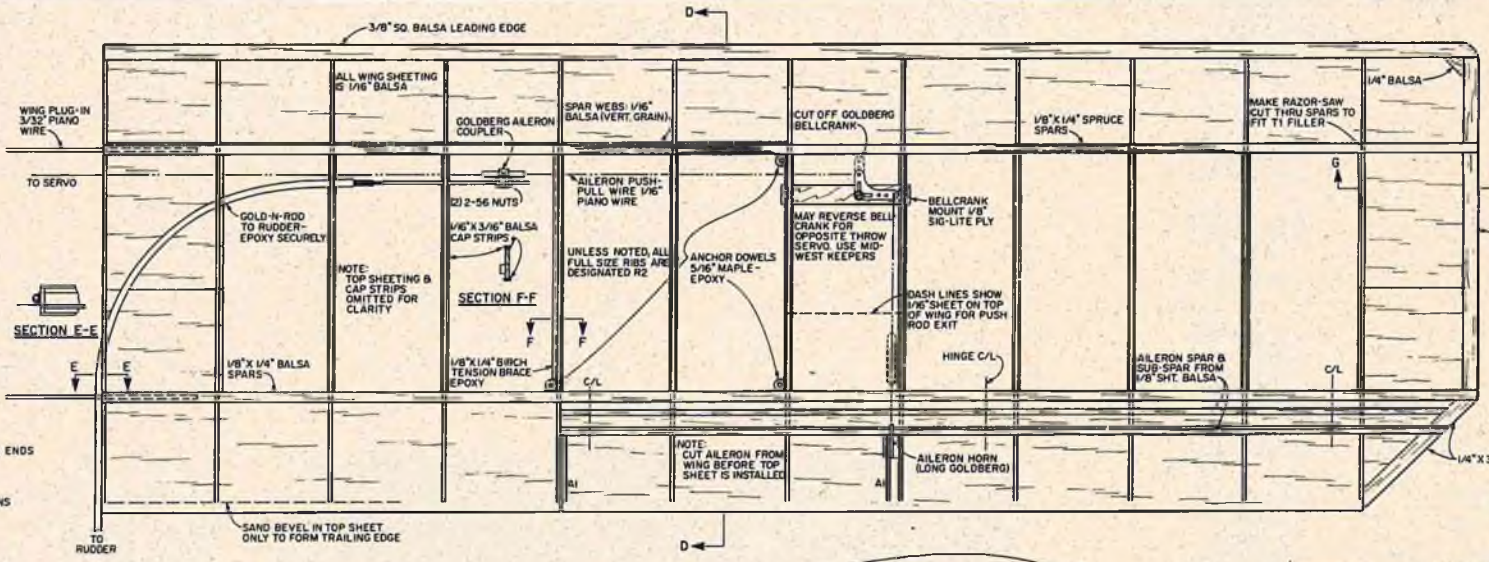
USE "LOU PROCTOR'S" ITEMS LISTED BELOW:-

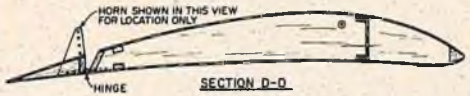
- #3 OR #5 TURNBUCKLES WITH CLEVIS ENDS;
- #312, SWAGE FITTINGS FOR WIRES;
- #202 RIGGING CABLE (25 FT.);
- #317 CLEVIS PINS;
- #316 BOLTS & NUTS.

1" DIHEDRAL EACH TIP

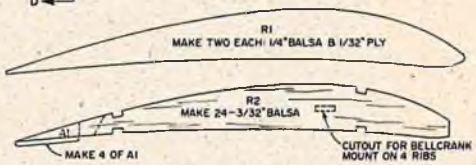
14 RIGGING WIRES TOTAL

- 4 FLYING WIRES (2 EACH SIDE)
- 4 LANDING WIRES (2 EACH SIDE)
- 2 FORWARD DRIFT WIRES
- 4 AFT DRIFT WIRES

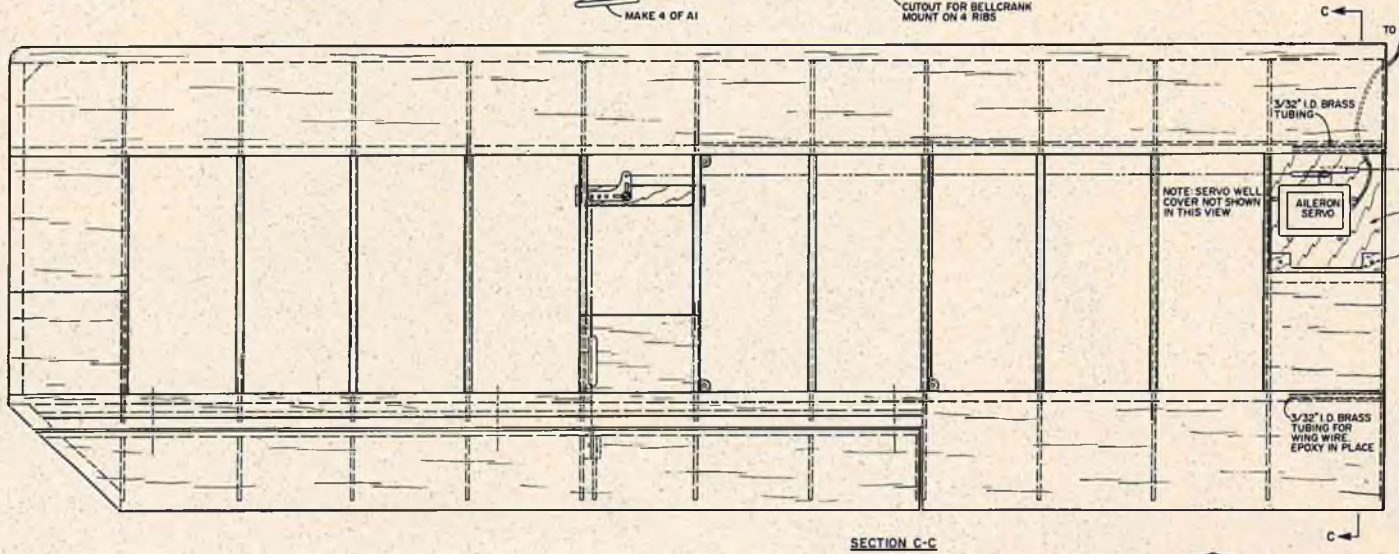




SECTION D-D



SECTION G-G



SECTION C-C

ZOEGLING PRIMARY '1930'

DESIGNED & DRAWN BY	DR. GERRY CASEY	INKED BY	DICK RIDD

0 1 2 3 4 5 6

PLAN NO 668 (2)

Son Of QUAKER

The peripatetic Basset strikes again - - - this time with a 38" span scale model of the famous old timer, the 1937 Quaker. For pulse rudder-only, you can set the trim and the Son Of Quaker will find its own thermals, soaring around as long as you want to keep it up there. If this ship strikes a nostalgic chord and you have an affinity for relaxed flying, break out the T.D. .020 and let's get started - - -

BY LOREN DIETRICH

"Ah, Wagger," sighed Walt as he lit his pipe and sat down on an old DeBolt Live Wire fuselage, "you missed the good old days of the big free flights!"

"Umpff," muttered the pensive Basset who usually had a flair for conversation, as well as for radio control. Today, however, he seemed lost in thought.

Walt gestured with impatience. "Really, Wagger, you don't remember the old realistic looking 7' monsters of the 1930's as they circled overhead like huge hawks, with the sun shining through the bamboo paper and showing off all that gorgeous lumber inside. Man . . (pardon me, I meant **dog!**) **that** was really modeling!"

Wagger shifted his haunches, raised his soulful, if somewhat bloodshot, eyes to meet those of his master. "I suppose a 7', 1937 Flying Quaker with its shock-absorbing landing gear and red scalloped paint job really turned you on, boss?"

"You got it, bonedoggler!" enthused Walt.

"I sure do," grinned Wagger. "A 38½" scale model, including all structure, powered by a TD .020 and steered by pulse rudder, with functional landing gear and yummy scallops! Now, here's how we'll build it . . ." Wagger murmured, putting on his half-glasses and unrolling the plans over Walt's latest Peanut Scale which was soon crushed flat.

Tail Surfaces:

First, (Wagger explained to Walt), you'll have to track down some 3/32" reed at a hobby shop or upholstery store that re-builds wicker furniture. Be sure to get some stiff reed, not the limp basket-weaving stuff. Reed is a dried swamp-plant stalk, and is an ancient way to make tips on model surfaces. It may be hard to find, so don't be discouraged easily. If you get desperate, you could split some bamboo and form it around a light bulb, another old-timer trick. (If worst comes to worst, you could make conventional "rubber model" tips of bent spruce strips, laminated balsa

strips, or flat stock; however, the scale romance would be lessened. It had **reed** tips, man!) Soak the reed in hot water until pliable, pin in place over the plans, and let dry. Glue in the spars, leading edge, and the top of the ribs. Let dry, turn over, shim up the outline, and quickly add the bottom of the ribs. Watch that symmetrical airfoil! After all has dried, sand the surfaces. Finally, glue the fin to the stabilizer.

Wing:

Build the wing in three pieces, consisting of the flat center section and the two panels. The only tricky part here is to soak, form, and dry the reed tips, then build the upcurving wingtips by careful fastening and forming. It's fussy, but it's the way it **was**. The little diagonal braces at the reed tips on both the tail and wing are also scale braces to keep the tips from deforming. The 3/16" square spars and ply dihedral braces may seem like overkill for a small model, but are of scale size. Note that the center section and butt ribs will have to have their spar slots widened slightly to accommodate the dihedral joiners. Measure that dihedral carefully when joining. Note that the center section is not sheeted, but, rather, has two extra 1/8" stringers to resist the tension of the hold-down rubber bands. Shape the leading edge and block sand all structure. Be careful of those ribs!

Fuselage:

Build two sides over the plans, noting that the uprights are 1/8" square aft of the wing trailing edge but are 1/8" x 3/16" forward. Remove from the plans, sand both sides smooth and add ply gussets at the landing gear slot. Cut the crossbraces, join the two sides over the plans at the cabin area. Join the tailposts, and insert the aft crossbraces. Squeeze the nose together, adding firewall F1 and the forward crossbraces. Add the cabin sheeting, cutting out the windows first. Add F2 and F3, then cover the nose with 1/32" sheet forward of the windshield. Sheet the bottom of the nose with 1/16". Add the stringers and small plates for the wing and stab dowels. Add the windshield top fairing and the two dowel "V" braces. Now note that some parts of the structure, such as the nose and the landing gear slot, are lower than the stringers and sheeting. Add some light "shim" strips to bring them up to the same level for smooth covering. Block sand all of the structure for a smooth transition, rounding the outside longeron corners slightly. Epoxy in a strong tailskid; it's also the rear rubber hook to hold the tail on!

Landing Gear:

This is one part of the Quaker that always turned me on. Shock absorbing, rugged, forward; what a prop-saver in the days of unguided landings! Start by drilling 1/16" holes through the bottom longerons in four places. Insert a piece of 1/16" music wire through the front holes for the front strut, then bend to the shape shown on the plans. Bend the cabane pieces from 1/32" wire, then wrap and solder to the front strut. Bend the rear strut over the plan, solder that top bar to it, then insert the rear strut through the fuselage slot. Wrap and solder the rear strut to the front strut, making sure of your alignment. Slide a piece of 1/16" wire through the holes in the longerons below the rear strut; wrap rubber bands around this piece and the top bar of the rear strut. Also, wrap a rubber band around the center "vees" of the cabane struts. Check the shock absorbing action; ain't that **neat**? Now add the ply stiffeners to the rear strut to prevent bending during hard landings. Add the Trexler airwheels. Hint: Shoot a little silicone spray into and onto those tires, then inflate **only** with a tire pump and needle. After each flying session, deflate tires and peel them from the hubs. Put them back into their box and place in a cool, dry place until the next flying session. They should last forever instead of 30 days!

"SON OF QUAKER"
Designed By: Loren Dietrich

TYPE AIRCRAFT
Replica Old Timer
WINGSPAN
38½ Inches
WING CHORD
5⅜ Inches
TOTAL WING AREA
190 Square Inches
WING LOCATION
Cabin
AIRFOIL
Flat Bottom
WING PLANFORM
Elliptical Tips
DIHEDRAL, EACH TIP
2½ Inches
O.A. FUSELAGE LENGTH
26¾ Inches
RADIO COMPARTMENT AREA
10 Square Inches
STABILIZER SPAN
14 Inches
STABILIZER CHORD (incl. elev.)
4 Inches (Mean)
STABILIZER AREA
64 Square Inches
STAB AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Fuselage Top
VERTICAL FIN HEIGHT
5⅞ Inches
VERTICAL FIN WIDTH (incl. rudder)
4 Inches (Mean)
REC. ENGINE SIZE
Tee Dee .020
FUEL TANK SIZE
Tank Mount
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
One
CONTROL FUNCTIONS
Rudder, Pulse
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa
Wing	Balsa
Empennage	Balsa
Weight Ready-To-Fly	9½ Oz.
Wing Loading	7.2 Oz/Sq. Ft.

Radio:

The tail can now be temporarily installed with rubber bands. Lace the Adams pulse actuator to a piece of 1/16" ply and locate as shown. (I used a piece of ply about 3/4" wide and the same height as the fuselage. It fits into a fabricated slot in the bottom of the fuselage, then fastens to the top crossbrace with one screw. It's easily removed for service.) The 3/32" dowel torque rod has music wire bound and epoxied to its aft end. This passes through a plastic tube in the "tail cone", then bends up for rudder actuation. The front of the torque tube, again, has music wire which passes through a ply crossbrace "bearing", then bends 90° to be driven by the actuator crank. I didn't draw all this out because it's in your Ace R/C catalog which you got with you equipment, right?

Get it all working smoothly **now**. Wrap the receiver in foam, fasten it to the 1/32" ply tray which slides down between the fuselage sides in the cabin after you build some 1/8" square "tracks" for it. Make accommodation for your switch under the cabin on the right side. Also make provisions to run your antenna down through a plastic tube in the fuselage bottom, then along the bottom to the tail skid. It works fine on the bottom and looks better there on scale models.

Covering and Doping:

Pre-dope all structure that will touch the covering, and then sand lightly. Use heavy white silkspan for the fuselage, light silkspan for the wings and tail. Run the grain of the silkspan lengthwise on all parts. Cut a piece of silkspan slightly oversize, lay it on the surface of some water in a shallow pan, pull it out of the pan over one end and lay it on the newspaper. Lift, lay it on the surface of the part and pull out smoothly. Lift the edges, dope the outline of the structure, smooth down, and pull taut. Trim 1/16" oversize, re-wet the edges, dope and smooth around the edge of the part. Cover the other side quickly to minimize warpage. (Note: When covering fuselage, don't dope inside of the engine compartment. Instead, rub in a coat of slow-drying epoxy and allow to cure.) Now, clear dope all surfaces for air seal and fuel-proofing, but take it easy on the wings and tail. Don't go for a gloss finish; you'll have trouble with the warping of those reeds later. Sand lightly between coats. When everything is ready for the color trim, pick up some vinyl "Contact" shelf paper from the variety store and use this instead of masking tape. Taking your clues from the plans, lay out the scallops on the contact paper and cut out carefully with a sharp blade. Strip off

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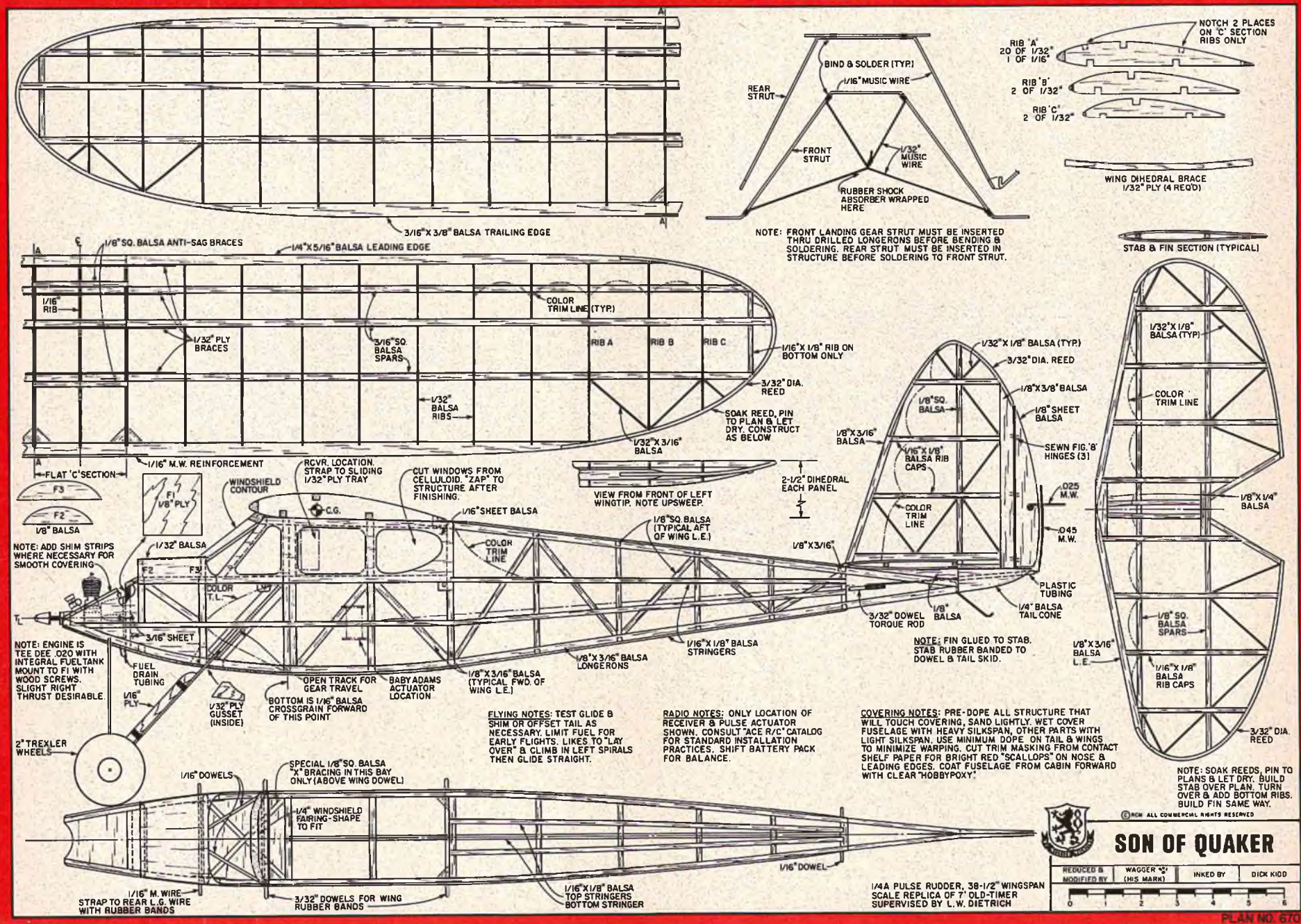
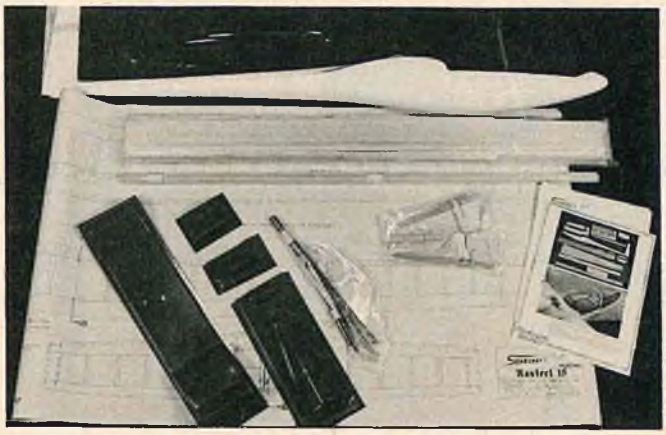
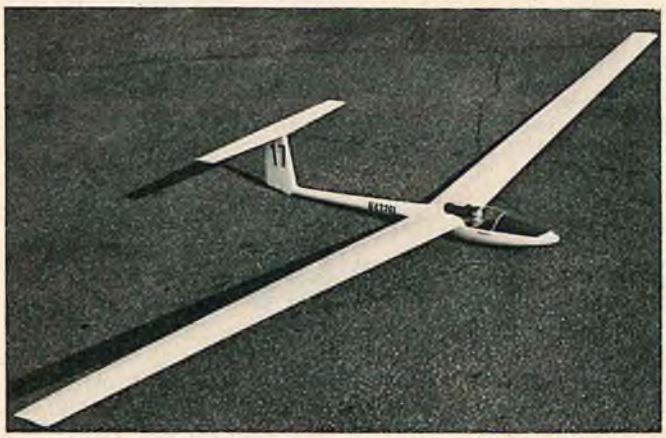
FULL SIZE PLANS AVAILABLE — SEE PAGE 175



RCM PRODUCT TEST

WINDSPIEL MODELS KESTREL 19





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 Kestrel 19, imported by Windspiel Models, 835 Piner Road, Santa Rosa, California 95401, is both a competition and sport sailplane that is equally at home in the Open or Scale Classes. With a wingspan of 134.5", and a total wing area of 850 square inches, it has a recommended wing loading of 9 ounces per square foot. It is designed for 2 channel operation, operating rudder and elevator.

The basic materials used in construction is a fiberglass fuselage, a balsa, spruce and plywood wing with conventional balsa tail surfaces. The hardware included in the kit consists of the pre-bent wing wires, bellcrank and clevises, pushrod material, control horn, stabilizer wires, tow hook, formed canopy and instrument panel, micro balloons, rudder hinges, and scale decals. There is one plan sheet measuring 67" x 24", with building instructions included on the plan sheet in addition to a 12 page instruction manual. Parts are both die-cut and shaped.

One unique feature of this kit is the method used to build the wing root sections. To start with, the 6 root ribs are first drilled for the wing rod tubes. Next, they are all assembled on the brass tubes at their correct location and epoxied in place. Once the epoxy has cured, the two root sections are separated by use of an X-Acto saw. This method of construction ensures that the two root sections have exactly the same alignment for the wing rods and ensures an accurate base for the rest of the wing structure.

RCM's prototype weighed 62 ounces ready-to-fly, for a wing loading of 9.25 oz./sq. ft. K & B Superpoxy was used on the fuselage with white MonoKote used on the wings and stabilizer. A Kraft 2-channel brick radio was used for guidance.

Upon first opening the kit, you are instantly aware of its high

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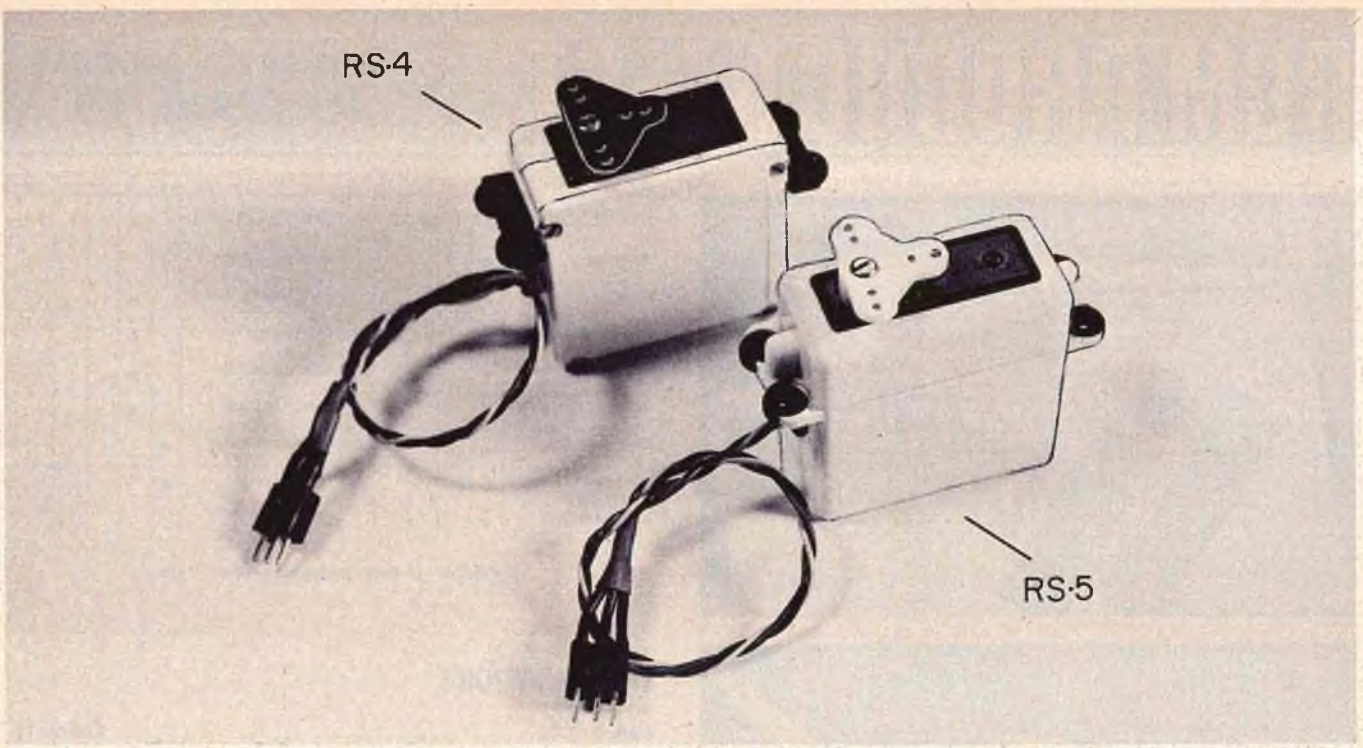
SPECIFICATIONS

Name	Kestrel 19
Aircraft Type	Sailplane
Manufactured by	Windspiel Models 835 Piner Road Santa Rosa, California 95401
Mfg. Suggested Retail Price	$89.50
Available From	Mfg. & Retail
Mfg. Recommended Usage	Sport & Competition
Wingspan	134.5 inches
Wing Chord	8 root — 4.5" tip
Total Wing Area	850 sq. in.
Fuselage Length	47.5 inches
Radio Compartment Dimensions	(L) 10" x (W) 2.5"x (H) 2.25"
Wing Location	Shoulder Wing
Dihedral	7½ inches
Airfoil	Undercamber
Wing Planform	Double Taper
Stabilizer Span	29.5 inches
Stabilizer Chord (incl. elev.)	4 inches (avg.)
Total Stab Area	118 sq. in.
Stab Airfoil Section	Symmetrical
Stabilizer Location	T-Tail
Vertical Fin Height	9.25 inches
Vertical Fin Width (incl. rudder)	6.0 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	Fiberglass
Wing	Balsa, Spruce and Ply
Tail Surfaces	Balsa
Hardware Included In Kit	All hardware necessary to complete aircraft
Plan Size	67" x 24" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (12 pages)
Construction Photos	Yes
Kit Includes	Die Cut & Shaped Parts
Mfg. rec. flying weight	64 ozs.
Wing loading based on rec. flying wt.	8.5 — 10 oz./sq. ft.

RCM PROTOTYPE

Weight, ready to fly:	62 oz.
Wing Loading	9.25 oz/sq. ft.
Covering and finishing materials used	Superpoxy, MonoKote
Engine Make and Disp.	NA
Muffler Used	NA
Radio Used	Kraft
Tank Size Used	NA



The completed Royal RS-4 and RS-5 servos. Fast, light and powerful, these servos will fit ideally in your system.

BUILDING THE **BY JERRY SMITH**

ROYAL RS4 TECH VII SERVO

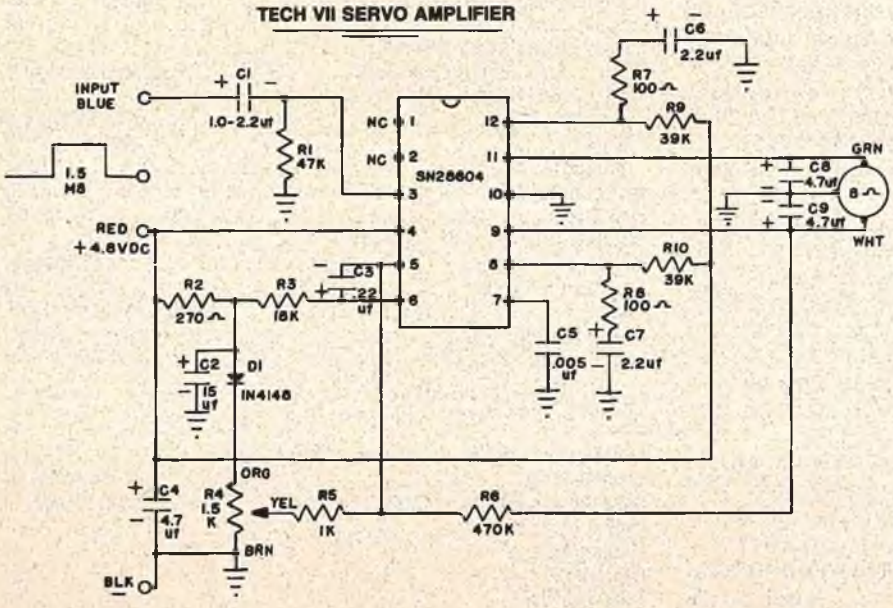
● Ever thought about adding a servo to your present system? Then you look at those salty prices and your thought suddenly disolves. Well, it can be done, and for about 1/2 the cost of your present system servo. But, it will take a little more effort on your part than just opening up a box and plugging in a servo. Let me tell you how it can be done.

For many years a company by the name of Royal Electronics Corporation, under the management of Mr. Sidney Gates, has been marketing all kinds of R/C electronic kits. I can remember back in the late 60's of having excellent success with the Royal Classic 6 Channel. The radio gear, purchased in kit form, was one of my very first all-out kit building projects. As a matter of fact, the radio is still working great — to this very day.

In those days, the printed circuit boards contained many more components and solder joints, increasing the chance of malfunction. I considered the success I had with that old Royal - - - a real feat. As I look back, what stands out most in my mind is the very fact that I built it myself. What remains with me now is a sense of accomplishment and self-satisfaction of having succeeded.

Today, Royal Electronics offers a varied number of servo kits known as the Tech series. The Tech servos are offered in a wide range of configurations depending on your needs. For example, if you own a positive pulse system, you would be interested in a servo amplifier to match. In this case, it would be a Tech VII amp kit. The Tech VII amplifier will operate with Royal, E.K., W.E. Expert, Kraft, Orbit, Unicom, R.S. Systems, MRC, Futaba, and Cannon. (Any positive pulse system with a pulse signal of 1 MS to 2 MS.) If you own Heath 8 channel, Royal has a special servo amplifier board. This is known as the Tech VIII amp. Or, if you own a Proline, which is a negative pulse system, you would simply order the Tech IX servo amp.

The servo mechanics is also a choice and here again, it depends on your needs. Royal offers the RS-4 (D & R Mech.), RS-5 (Dunham Mech.), RS-5D (Double servo brick in the Dunham Mech.), RS-6 (Royal Mech.), KPS-14 and KPS-15 (Kraft Mech.). As you can see, Royal has a wide range to satisfy



your needs - - - a servo kit for whatever system you now own.

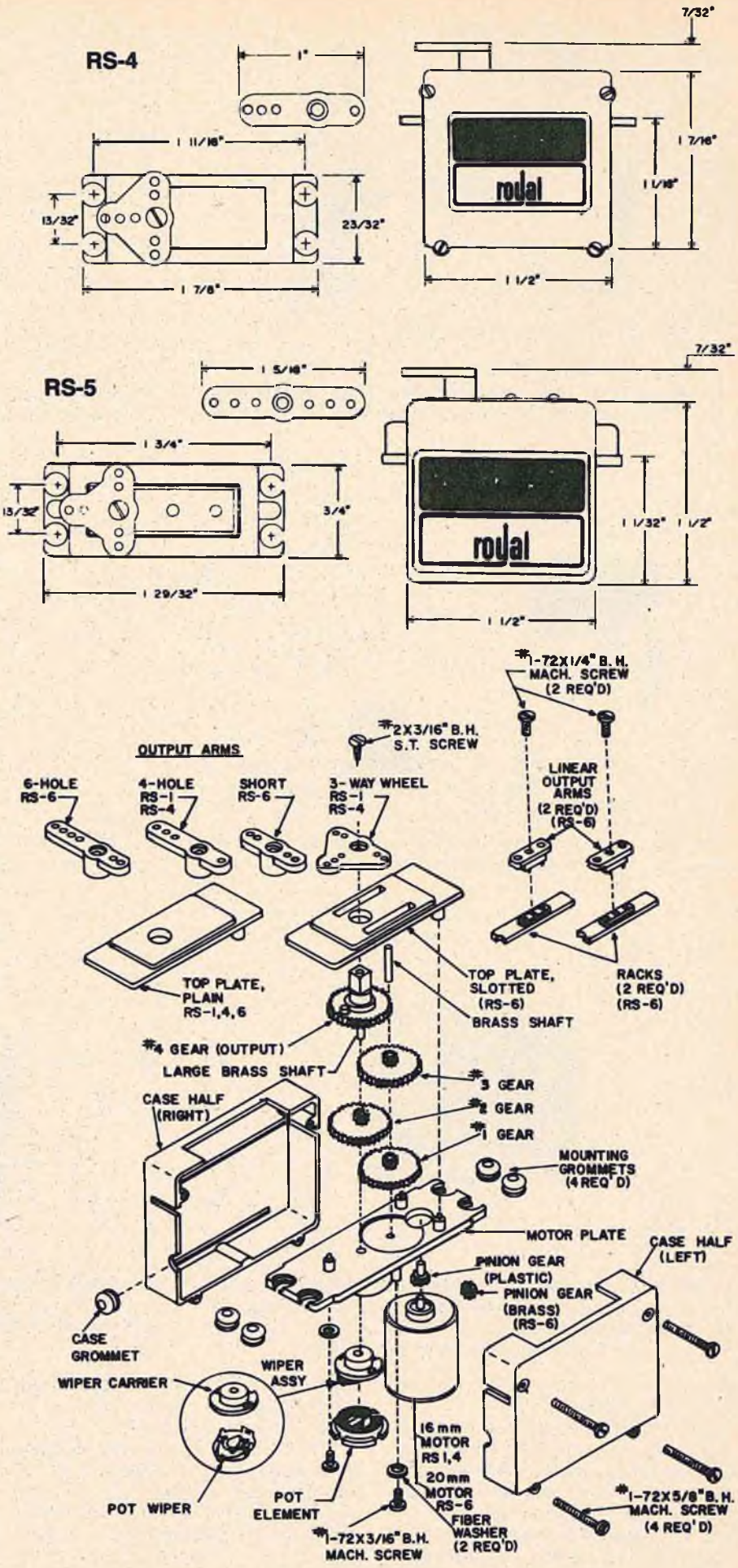
The major reason for buying a servo kit over the pre-built servo is cost. Obviously you don't include your labor as part of that cost, as long as it's for yourself. When it's for the other guy, that's a different story. But, with a little simple reasoning, you will discover that you can buy almost two Royal servo kits for the price of one manufactured servo. And that's a substantial saving in anybody's pocketbook.

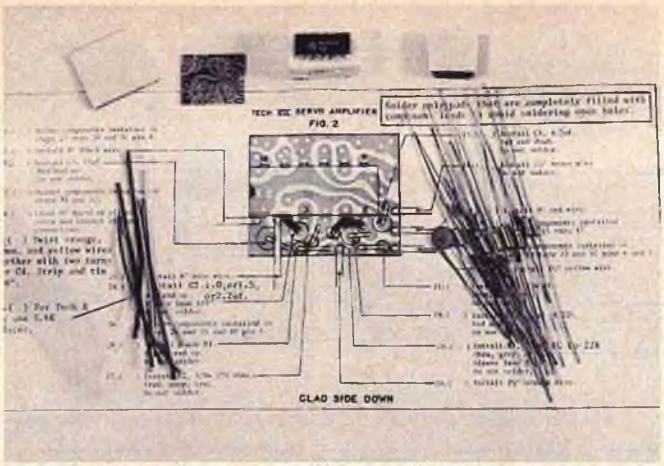
Now, let's talk about the Royal servo kit and what you can expect to encounter. For my system I chose the RS-4 (D & R Mechanics) with the Tech VII servo amplifier (I own a positive pulse system).

Upon examining the contents of the kit you will find about 20 resistors and capacitors, one integrated circuit, a printed circuit board, a few pieces of insulated wire and foam sponge. All these parts are packaged together and make up the servo amplifier kit. The mechanical parts are packaged separately. In the RS-4 kit, the gear train must be assembled, however, good pictorial instructions make this an easy task. The RS-5 servo kit (Dunham Mechanics) has the gear train pre-assembled. You might consider going this route as it does cut down assembly time.

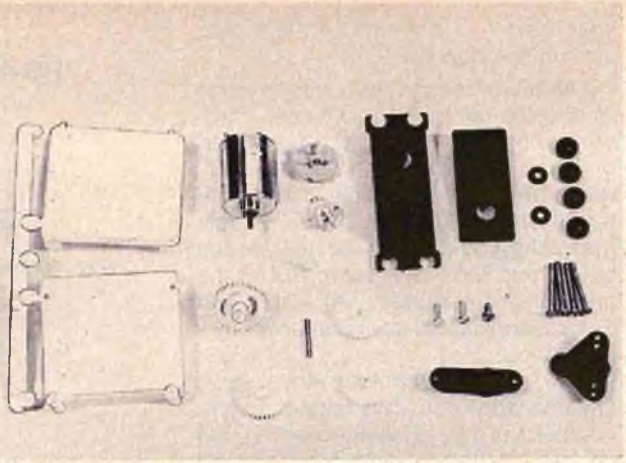
In any kit the instructions are the most important ingredients toward successful construction. You just can't get from here to there without them. I found the instructions supplied most adequate. Royal has done an exceptional job of pulling together all the information required to make kit building less painful. Two overlays in the instructions identify each part, point out exactly where each is located; when to solder; along with the order of assembly. The printed circuit board is quite small but component layout is excellent. Some of the 1/8W resistors are located beneath the integrated circuit, so special care should be taken to see that the right values are properly located. It is difficult to change them later on.

Although the track and soldering lands are very small, soldering is not difficult. The board is well defined and has good track spacing for its size. I suggest, if you have some doubt about your soldering ability, that you practice a little before starting. A 30 to 50 watt iron with a tip 1/16" or smaller in diameter is required, (i.e., Ungar soldering iron with micro-needle tip No. PL340 3/64"D). Always clean the tip on a damp sponge before each soldering operation. Apply enough heat to allow the solder to flow, then get off it. Do not overheat. And, finally, don't apply too much solder on the joint. It's not necessary to blob it on. Practice with these points in mind and you will encounter little difficulty. When it comes time to assemble the amplifier,

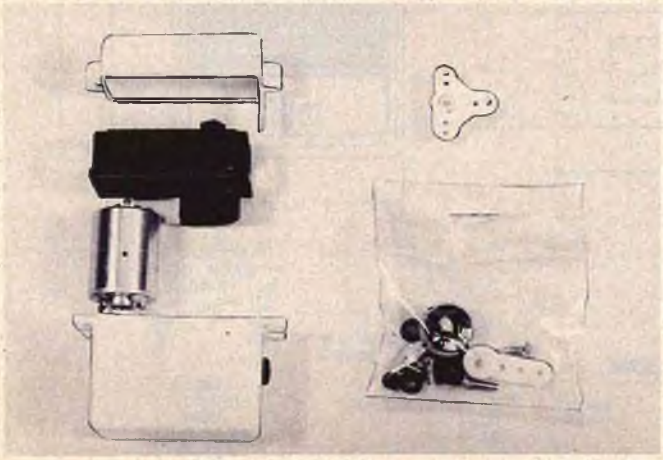




The Royal Tech VII servo amplifier kit. Good instructions, few parts make an easy one evening project. Quality parts are supplied.



The RS-4 servo mechanical parts kit. Assembly is easy with the excellent exploded view line drawing supplied in the kit.



The RS-5 servo mechanical parts kit. Gear train is pre-assembled, making assembly time much shorter.

Modified IC. Pins 1 and 2 are removed to satisfy wiring for positive pulse system.

Building the amplifier board begins by installing 4 1/8W resistors. Take extra care at this point for proper value & locations. Resistors are buried under integrated circuit, making them extremely difficult to get to later.

Completing Figure 1 of the instructions, partially filled board shows neat and orderly layout. Installing components in order of sequence is a must.

be sure to use a good grade of rosin core solder (not supplied).

The SN28604 integrated circuit is used exclusively throughout the different amplifier boards. In each case this IC is modified or wired differently to satisfy system compatibility. In the Tech VII amp the SN28604 is modified by removing pins 1 and 2. It is entirely possible for one to cut off the wrong pins and render the parts useless. Make certain of the lead, before you proceed!

The mechanical parts go together quite easily. Assembly instructions are very complete and lead you step-by-step along with photos of the actual assembled servo mechanics. On the back of the assembly instructions is an exploded assembly drawing identifying all the parts that make up the servo mechanics. With this excellent drawing it is virtually impossible to become confused. It also makes a handy reference sheet for ordering parts should the occasion arise. Any part of the servo kit can be ordered from Royal. I mean every part! Right down to the #2 x 3/16 screw

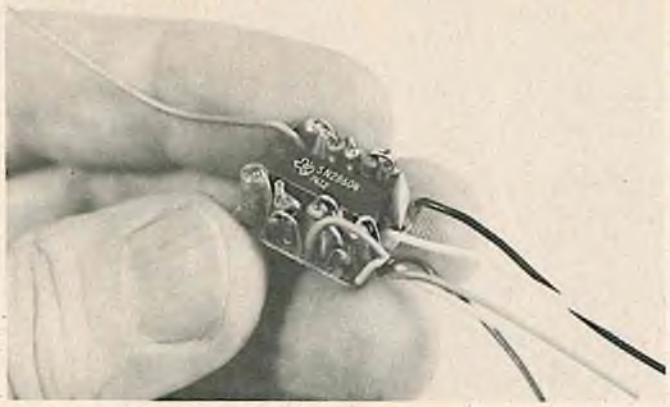
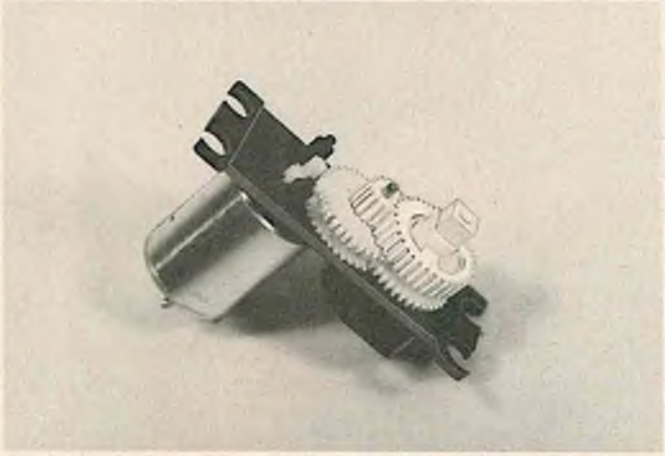


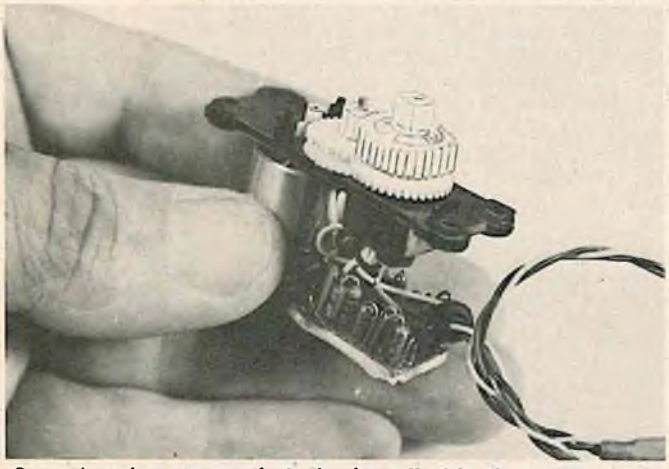
Figure 2 of instructions completed and ready for inspection. Cable wire and connector are not supplied with kit but can be ordered from Royal separately.

Carefully inspect track side of board to make sure there are no solder bridges or foreign matter between lands. Solder flux is easily cleaned off with dope thinner.

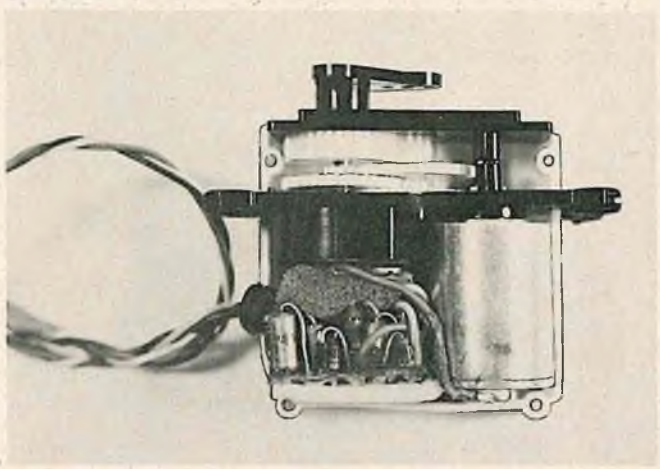


Mechanical section of servo with motor and gears installed.

Pot element is lubricated with a special lube available from Royal. Pure Vaseline can also be used. Apply sparingly.



Completed servo ready to be installed in the case.



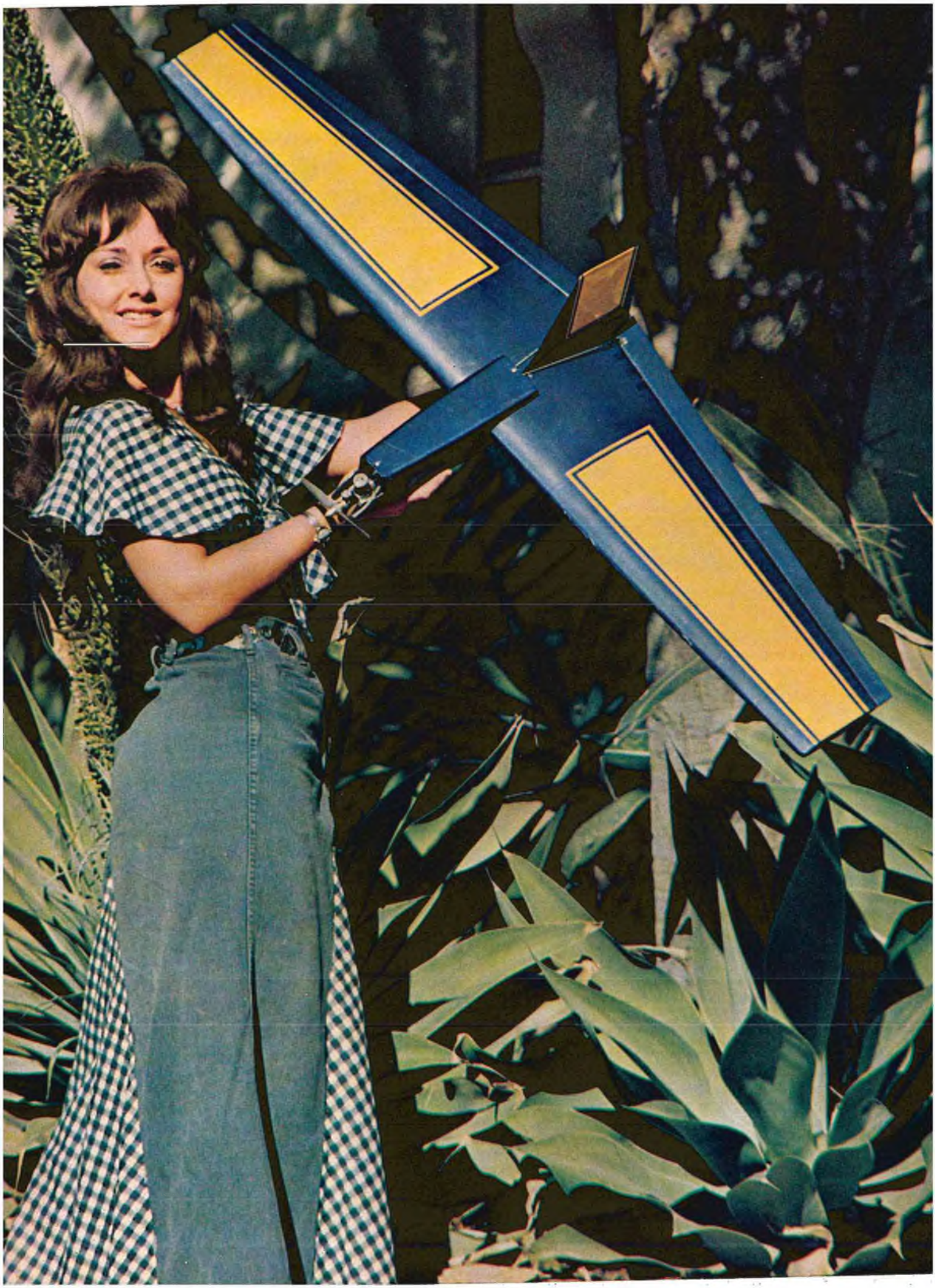
Ready for final closing. Note sponge between amplifier and potentiometer. Helps to restrain wires under vibration. Double sticky foam tape on bottom of circuit board does great job of retaining amplifier in the case.

that retains the output arm.

It never ceases to amaze me when, after spending many blurry-eyed hours reading, soldering, assembling and checking, that little blob of electronics does work. After all you expect it to, however, there is that nagging question, will it?

Past experience on hundreds of IC servo amplifiers sent back to Royal shows that the major causes of improper operation or non-operation can be traced to building errors. Failure of the IC to function is rarely the cause of malfunctions. However, it is possible to damage the IC by applying power when a solder bridge or other short circuit is present in the circuit board. Once again, the instructions come to your rescue. Two full pages are devoted to a troubleshooting guide listing the symptom, possible cause, and cure for the most common malfunctions and possible causes. For the technical kit builder with an oscilloscope, one page is devoted to wave shapes at different pin locations on the

to page 142



SIMITAR

A Half-A flying wing with quick response and near full-pattern capabilities. Easy to build and repair, the Simitar requires a minimal flying field size and yields about thirty-two flights per quart of fuel.

BY BILL EVANS **PHOTOGRAPHY BY BRUCE ROBERTSON**

● The Simitar is a product of the 70's energy crisis and the nation's general conservation effort. With the recent problems having to do with shortages of fuels and materials and the resultant high prices, more economical models seem to be a wise choice for many modelers.

Small aircraft generally cost about one third as much to build, maintain, and fly, than their much larger counterparts. Therefore, there are some of us who could not enjoy R/C flying if we were unable to realize the advantages of smaller low cost aircraft.

The significant features of the Simitar that you will enjoy are:

(1) Easy to build and repair.

(2) Most any .049 will provide ample power.

(3) Response is quick.

(4) Landing gear installation is not required.

(5) Fuel consumption gives about 32 flights per quart at 6 plus minutes per flight.

(6) Flying field size is minimal.

(7) Dead stick landings are a breeze due to the excellent glide characteristics.

(8) Near full pattern capabilities.

The disadvantages that we have noted are:

(1) The small size, combined with high speed, make orientation at distances difficult for inexperienced pilots.

(2) Large radio gear may be a bit cramped.

Several design requirements were kept in mind for the Simitar. Those were:

(1) The wing span must be 48" or less.

(2) Construction must be quick and simple.

(3) Stall speed must be less than 10 mph.

(4) Maximum power .049.

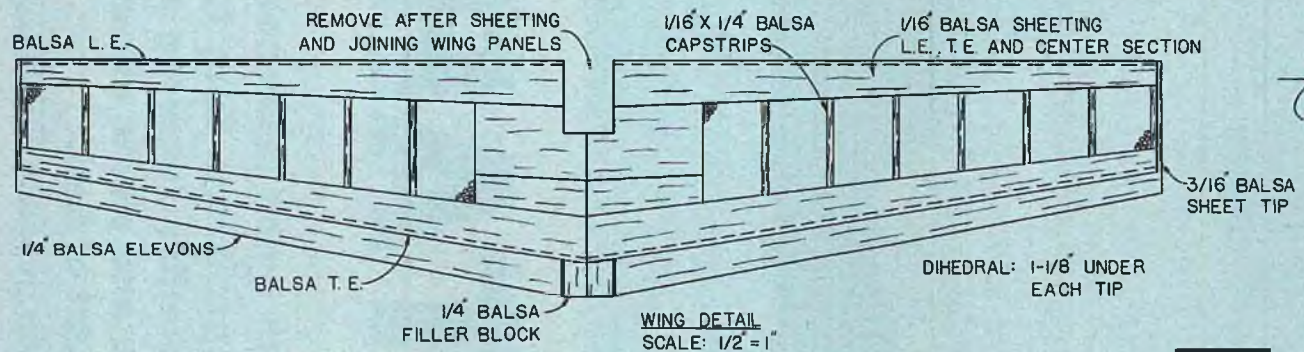
(5) Two channel radio to be employed.

(6) Weight must be 20 ounces or less to minimize damage in the event of impact.

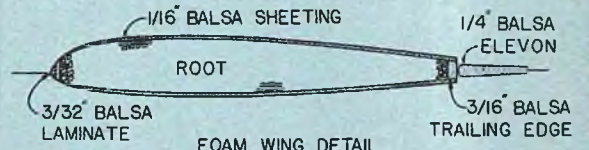
Flying experiences with the Simitar have been most rewarding and pleasurable from the very first. Hand launches are made from a standing position, and no running start is required when using a TD .049 for power. After the first launch of the initial prototype a bit of down elevon trim was applied and it was off in a normal climbing attitude. Inside and outside loops were tight and tracking through the loops was good. The rolls, twenty-five or more, made it seem like the ship was attached to an electric drill! Four point rolls, due to a lack of rudder control, as well as tail slides, are not practical for this ship. Inverted flight and tight turns, however, were very easy.

The most satisfying first flight experience was the dead stick landing, since the glide was excellent, very flat and gentle and, much better than expected.

FULL SIZE PLANS AVAILABLE — SEE PAGE 175

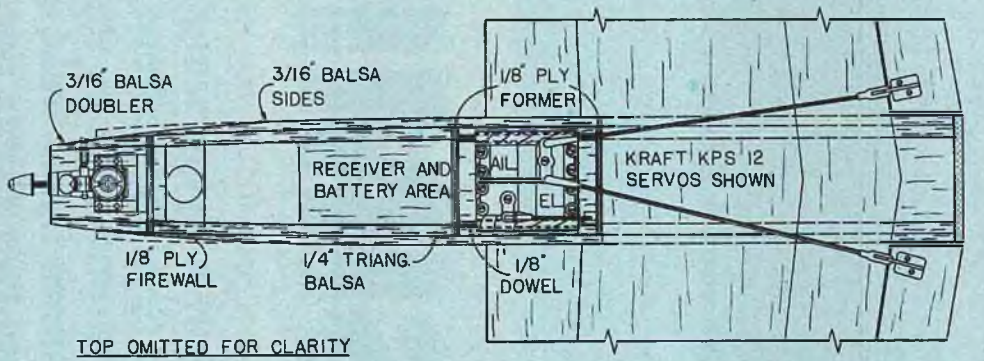


WING DETAIL
SCALE: 1/2" = 1"



FOAM WING DETAIL

NOTE: ELEVON FLIGHT TRIM SHOULD BE .2"



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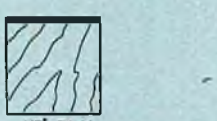
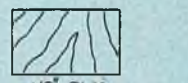
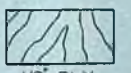
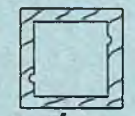
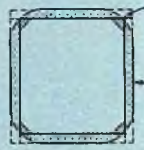


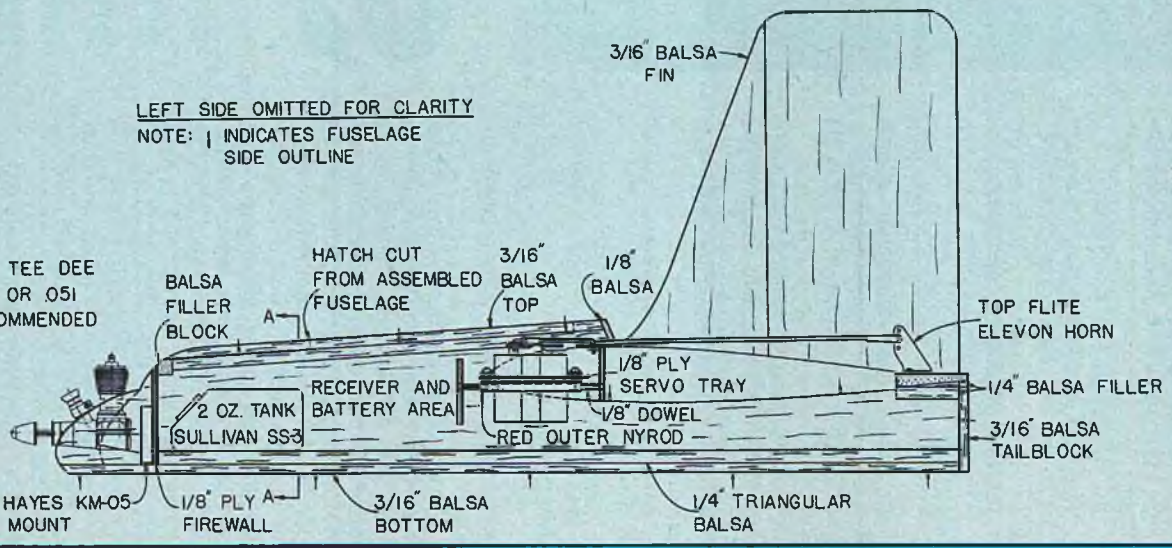




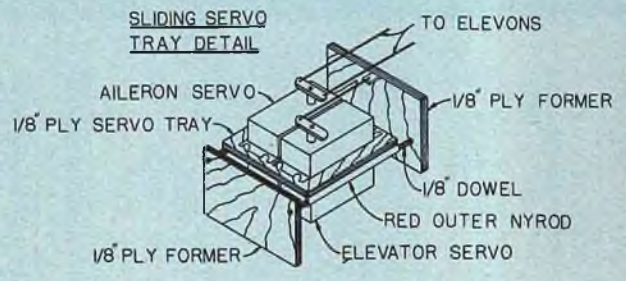




SECTION A–A



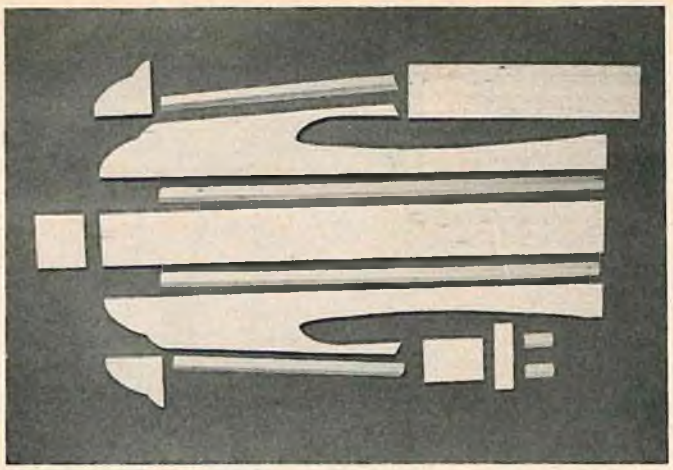
SLIDING SERVO TRAY DETAIL

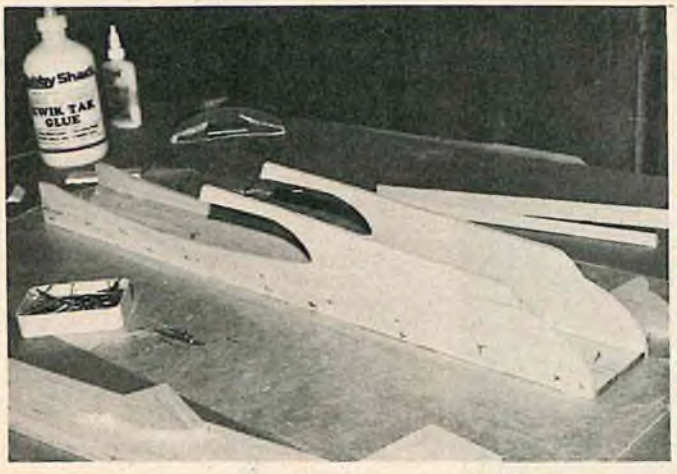


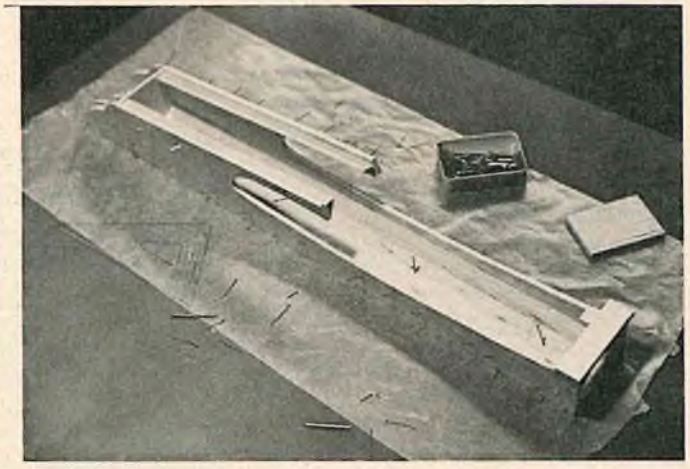
SIMITAR

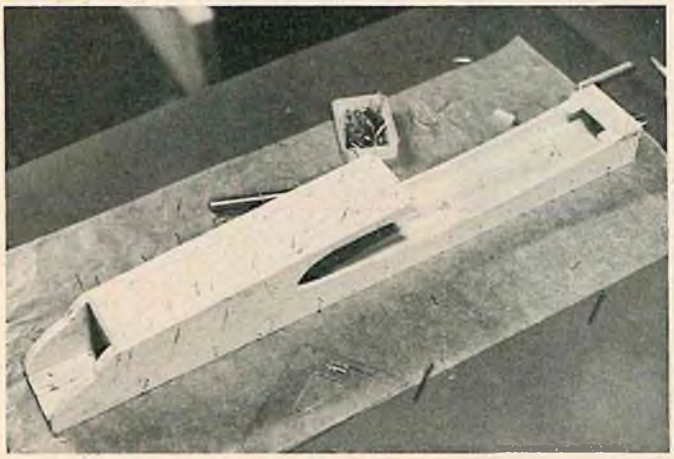
DESIGNED BY / DRAWN BY	BILL EVANS / B. ROBERTSON	INKED BY	CHUCK FELTON

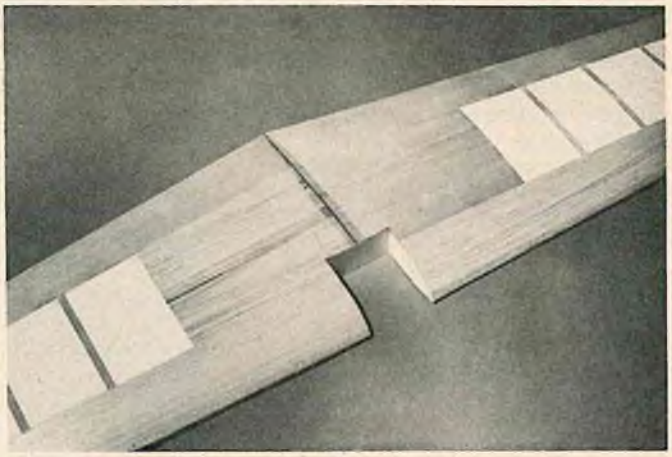
PLAN NO. 669

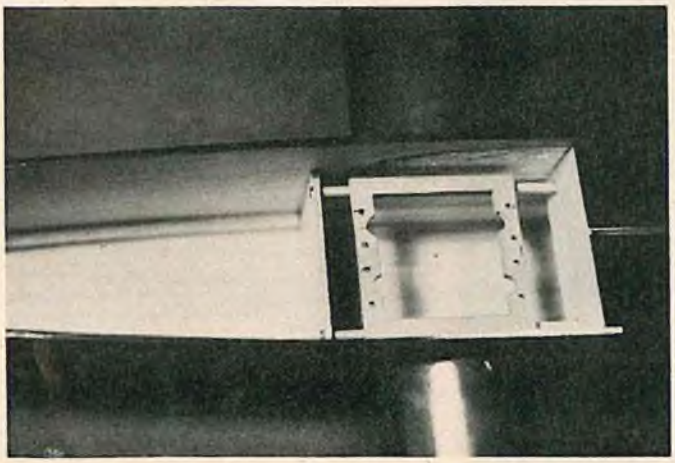




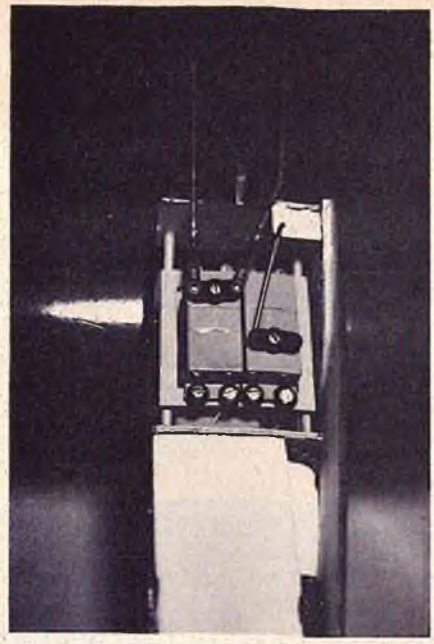




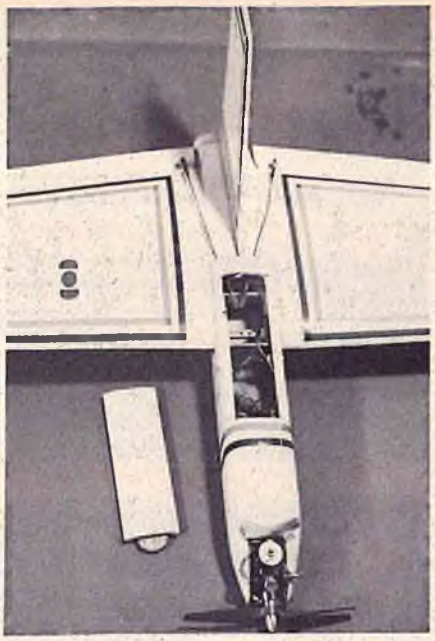




1ST ROW: (L) Basic fuselage parts, ready for assembly. (R) One fuselage side glued to bottom. 2ND ROW: (L) Right fuselage side added to bottom sheet. (R) Firewall and bracing added. 3RD ROW: (L) Fuselage top sheet glued in place. (R) Foam wing cores with sheeting and capstrips glued in place. 4TH ROW: (L) Servo sliding tray with servos removed.



LEFT: Close-up view of the servos mounted on the sliding servo tray. Note linkage arrangement for elevons. RIGHT: The completed Simitar with Hatch removed. Note Cox Tee Dee .049 engine, hatch tongue and elevon pushrod location.



In fact, the first flight landing approach was set-up three times before touch down was realized. More recent flights after the engine fuel supply has been spent have resulted in as much as six minute glider flights, and glider flight is the best expression for the landings of the Simitar.

Though the Simitar is not a beginners ship, competent multi-pilots can handle it with ease. If you have doubt about your capability I would suggest that you have an experienced flyer on hand for the initial flight. It has been our experience that one can become fairly proficient with the Simitar after two or three flights. Remember the most satisfaction comes with the flat glide which makes the landings a breeze.

Simitar foam cores are available for $6.00 from: Bill Evans, 19216 Calvert St., Reseda, Calif. 91335. Phone: (213) 344-6391.

Material List

5 — 1/16" x 3" x 36" balsa
3 — 3/16" x 4" x 36" balsa
1 — 1/4 " x 4" x 36" balsa

Construction

- ☐ Cut two 1/2" and two 3/8" strips from the 1/4" sheet.
- ☐ Cement and pin 1/2" x 1/4" balsa strip to the leading edge of each wing panel, making sure that the leading edge is kept straight.
- ☐ Cement and pin the 3/8" x 1/4" balsa strip to the trailing edge of each wing panel.
- ☐ Set these assemblies inside to dry.
- ☐ Cut the fuselage sides, top, bottom, and cowl cheeks from 3/16" sheet.
- ☐ Pin the fuselage bottom to a flat surface.
- ☐ Glue and pin the left fuselage side against the fuselage bottom. Pin the 3/8" triangle stock against the left fuselage side and the fuselage bottom.
- ☐ Repeat for the right side.
- ☐ Glue and pin the 3/8" triangles to the top inside edges of the fuselage, front and rear.
- ☐ Glue and pin the fuselage top front and rear, making sure not to glue the top to the sides. The top piece fits between the sides, not over them.
- ☐ Glue and pin the 3/16" sheet pieces for the rudder together on a flat surface.
- ☐ Trim and sand the wing leading edges so that the leading edge wing skins will fit nicely over the leading edge.
- ☐ Trim and sand the trailing edge strips to be flush with the foam.
- ☐ Locate and mark the position of the wing skins on each wing panel.

SIMITAR
Designed By: Bill Evans

TYPE AIRCRAFT
1/2A Flying Wing
WINGSPAN
50 Inches
WING CHORD
Root 10" — Tip 5½"
TOTAL WING AREA
387½ Square Inches
WING LOCATION
Top Of Fuse Pod
AIRFOIL
Semi-Symmetrical/Reflexed
WING PLANFORM
Swept T.E.
DIHEDRAL, Each Tip
1 Inch
O.A. FUSELAGE LENGTH
19 Inches
RADIO COMPARTMENT AREA
(L) 6½" X (W) 2" X (H) 2½"
STABILIZER SPAN
NA
STABILIZER CHORD (incl. elev.)
NA
ELEVON AREA
60 Square Inches
STAB AIRFOIL SECTION
NA
STABILIZER LOCATION
NA
VERTICAL FIN HEIGHT
7½ Inches
VERTICAL FIN WIDTH (incl. rudder)
5½" (Avg.)
REC. ENGINE SIZE
T.D. .049
FUEL TANK SIZE
1 Ounce
LANDING GEAR
NA
REC. NO. OF CHANNELS
Two
CONTROL FUNCTIONS
Elevons
BASIC MATERIALS USED IN CONSTRUCTION

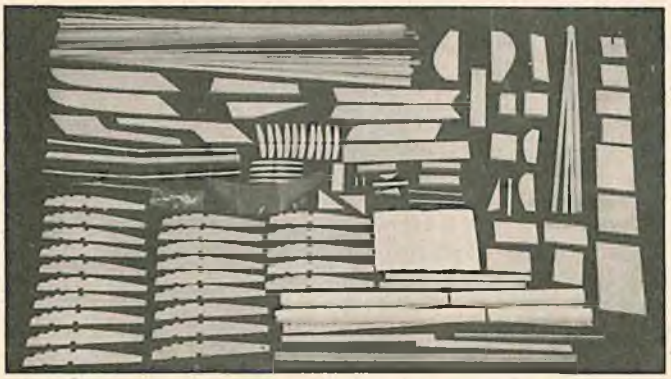
Fuselage	Balsa
Wing	Balsa and Foam
Empennage	Balsa
Weight Ready-To-Fly	18—24 Oz.
Wing Loading	6.7—8.9 Oz./Sq. Ft.

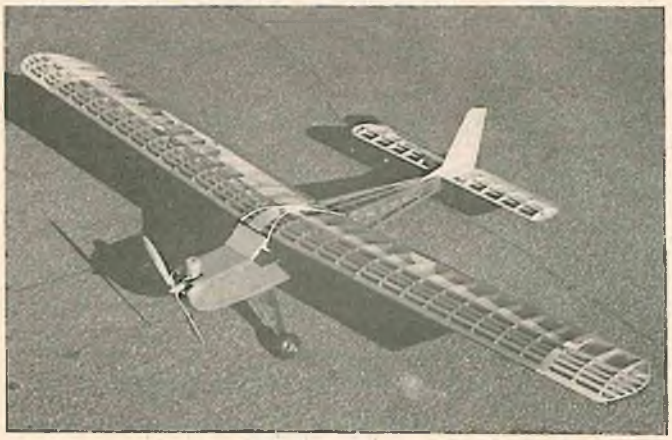
- ☐ Apply contact cement to both the foam cores and the wing skins.
- ☐ Bond the wing skins to the wing panels, making sure that no warps occur when bonding the skin to the wing. This should be done on a flat surface.
- ☐ Sheet the wing center sections.
- ☐ Glue and pin on 1/4" x 1/16" capstrips at 2" intervals.
- ☐ Sand the wing panels smooth, rounding the leading edge to airfoil shape. Slightly round trailing edge as shown.
- ☐ Epoxy the wing panels together using a 1⅛" block under each tip.
- ☐ Cut the elevons from 1/4" sheet and sand to shape as shown.
- ☐ Cut the rudder from 3/16" sheet and sand to shape as shown.
- ☐ Cut a notch in the wing to accept your choice of radio installation. In most cases cut a 2" wide piece out of the wing at the center section. The length of the cut should be about 3" starting at the leading edge.
- ☐ Cover the wing, elevons, and rudder.
- ☐ Trim and sand the fuselage to shape.
- ☐ Cut the hatch as shown.
- ☐ Cover the fuselage.
- ☐ Locate the fuselage on the wing and pin in place, then mark the fuselage location with a pencil. Remove the fuselage and trim the wing covering away where the fuselage covers the wing.
- ☐ Construct the servo sliding tray using epoxy, then epoxy the servo sliding tray into the wing cut-out.
- ☐ Epoxy the fuselage to the wing.
- ☐ Epoxy the rudder to the wing, removing the wing covering at this joint.
- ☐ Attach the elevons to the wing.
- ☐ Install your linkage, making sure that left rudder control on the transmitter results in the left elevon going up and the right elevon going down.
- ☐ Neutral position of the elevons should be so that the elevons are raised about 1/8" to 3/16" above what you would normally expect as neutral. This will produce a slight reflex.

Flying — Don't over-control! Easy smooth control must be applied until you become familiar with the craft. Fly it a bit fast until you become accustomed to its characteristics. ☐

RCM PRODUCT TEST

HOBBY LOBBY SR TELEMASTER





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

● One of the most popular aircraft in recent years is the Senior Telemaster which was presented as a construction article in R/C Modeler Magazine, and which is currently being kitted by Hobby Lobby International, Route 3, Franklin Pike Circle, Brentwood, Tennessee 37027. Priced at $89.95, it is available direct from the manufacturer and is designed as a basic powered trainer, an intermediate trainer, and a general sport aircraft that is a pure pleasure to fly.

The specifications of the Senior Telemaster include a wingspan of 95" and a wing chord of 14⅛", for a total wing area of 1,330 square inches. The recommended power range is from .60 to .80 cubic inch displacement and a 12 to 14 ounce tank. Four channels are required; operating rudder, elevator, throttle and ailerons.

The basic materials used in the construction are: balsa, plywood, and spruce for the fuselage, wing and tail surfaces. Hardware included in the kit are formed dural landing gear, pre-bent tail wheel wire, aileron torque rods, and two control horns. There are 4 plan sheets measuring 30" x 34" with building instructions included on the plan sheets, in addition to a 24 page instruction manual. The manufacturers recommended flying weight is 112 ounces for a wing loading of 9.75 ounces per square foot.

RCM's prototype, ready-to-fly, weighed exactly 112 ounces for the same wing loading as recommended by the manufacturer. Our entire ship was covered with Solarfilm and was powered with a Veco .61 and guided by a Kraft Sport Series radio. During construction, we found that vertical braces, as well as larger cross braces, were needed in the radio compartment area. With regards to the kit itself, the grading of the balsa, with regards to weight match on our particular kit, was poor since the elevator and ailerons consisted of rock hard material on one side and soft on the other. In fact, we had to

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SPECIFICATIONS

Name	Senior Telemaster
Aircraft Type	Sport & Exhibition
Manufactured by	Hobby Lobby Rt. 3, Franklin Pike Circle Brentwood, Tennessee 37027
Mfg. Suggested Retail Price	$89.95
Available From	Direct from Mfg.
Mfg. Recommended Usage	Trainer & Sport
Wingspan	95 inches
Wing Chord	14⅛ inches
Total Wing Area	1330 sq. in.
Fuselage Length	65¼ inches
Radio Compartment Dimensions	(L) 14" x (W) 3¾"x (H) 6"
Wing Location	High Wing
Dihedral	3" each tip
Airfoil	Flat Bottom
Wing Planform	Constant Chord
Stabilizer Span	34¾ inches
Stabilizer Chord (incl. elev.)	9-9/16 inches
Total Stab Area	320 sq. in.
Stab Airfoil Section	Flat Bottom
Stabilizer Location	Top of Fuse.
Vertical Fin Height	9½ inches
Vertical Fin Width (incl. rudder)	7½ inches
Mfg. Rec. Engine Range	.60 — .80
Recommended Fuel Tank Size	12 — 14 oz.
Landing Gear	Conventional
Recommended No. of Channels	4
Recommended Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa, Ply, Spruce
Wing	Ply and Balsa
Tail Surfaces	Balsa and Spruce
Hardware Included In Kit	Dural gear, rods, horns
Plan Size	30" x 34" (4 sheets)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (24 pages)
Construction Photos	Yes
Kit Includes	Shaped Parts
Mfg. rec. flying weight	112 ozs.
Wing loading based on rec. flying wt.	9¾ oz./sq. ft.

RCM PROTOTYPE

Weight, ready to fly:	112 oz.
Wing Loading	9¾ oz/sq. ft.
Covering and finishing materials used	Solarfilm
Engine Make and Disp.	Veco .61
Muffler Used	No
Radio Used	Kraft Sport Series
Tank Size Used	12 ounce

RC DESIGN MADE EASY

BY CHUCK CUNNINGHAM

PART IV: CONSTRUCTION TECHNIQUES

● Okay, gang, have you been paying attention for the past several months on our simplified ways of designing successful RC aircraft? I hope that you have, because I don't want to go over it again for a few more years! But, now that you have the ability to design it yourself, what are you going to apply this ability to? Should you try a low wing super-duper fire-breathing monster? Should you attempt to design a fast flying biplane? Should you try your hand and pencil on a soaring aircraft to end all soaring aircraft?

It's a tough decision, and one that only **you** can make. But, what makes almost all aircraft alike? What makes them almost the same, be it a low wing, a mid-wing, a high wing, a biplane, a multi-engine or what have you? What makes each aircraft like the other, even though one may be an .049 powered ship and the other a .61 size aircraft? Sure, the thing that makes them all the same is the location of the engine, the wing, and the horizontal stab upon the fuselage. What I have been trying to tell you for the past several months is that, if you stick to the same basic formula for all sizes and styles of aircraft, you will have a good flying machine if you simply follow the design rules set down in prior months.

But, then how come a low, mid, and high wing aircraft are just the same? Well, it's a matter of their being the same, and yet being a bit different. For example, why is a low wing and a high wing the same, and yet they really don't fly quite alike . . . or do they? It all depends upon the distance that the wing is from the center line of the aircraft or, more specifically, from the thrust line of the aircraft. The closer the wing chord line is to the thrust line, the more nearly alike the aircraft will fly. If you build an aircraft with the chord line 2" below the thrust line and another aircraft with the wing chord line 2" above the thrust line, they will fly quite similarly, except for one small item. With the mass of the fuselage hanging below the wing, you gain a certain amount of pendulum effect, or a stabilizing influence upon the flight of the aircraft. If the center of weight is above the wing, then this aircraft is less stable.

To demonstrate this in the extreme, consider a hang glider. As long as the weight of the pilot is below the wing, everything is okay, but if the weight of the pilot is above the wing, watch out - - - instant trouble. In our models, the problem isn't quite so extreme, and quite frankly, it isn't much of a problem, but this one factor tends to separate the trainer type aircraft from the more advanced aircraft. And, speaking of trainers, one more reason why most trainers are shoulder or high wing designs is that the wing is just a bit more removed from the possible harm of a lousy landing by a fumble thumbed fledgling pilot. And anything that you can save, you can use to fly again.

But, back to the original question. What are you going to design to test out your newly acquired skills as a model designer? What do you really want in the way of an aircraft?

First, consider your skill level. If you are a rank beginner, then save the design urge until you have acquired your skills as a pilot. If you can get an aircraft up and down in one piece and can make a reasonable pass around the field, then start pushing the pencil, because by the time that you get done, you should have gained a few more hours of flying time and skill. If you're a reasonably good pilot, then it's high time that you started off on the "design it yourself" trail. The real thing to look out for is not to overstep your own ability or interest. Consider carefully what you want, and then set about working on this project.

In the past, we have concentrated upon the ideas of location of wing and stab, engine size in relation to wing area, and other critical design areas. But, now that you have decided upon the choice of engine, and the choice of type of aircraft, and have drawn up the outline of the aircraft, what next?

Good question. There is no doubt that, to design and build your own model, is much much harder than building a kit, and even somewhat harder than building from a magazine plan, because you have to think out each step before you get to it. You won't have any handy construction article or book to tell you what to do next. But, this is the fun and the challenge of doing it for yourself.

If you have constructed several kit aircraft, you have found that they have been quite similar in their construction. Sure, they may have gone about the task in a different manner, but the results have been pretty much the same. Generally, the fuselage has been constructed of balsa sheet with formers holding the sides in place and top and bottom sheeting tying everything together.

Okay, stick to this method for your first aircraft. Don't skimp on the wood size - - - generally a fuselage constructed of 1/4" sheet is fine for a .60, while 3/16" sides work fine for a .40 and 1/8" for smaller aircraft with extra wood used around the nose section to add more strength and MASS to the nose area.

Why add more mass to the nose? Simple, to dampen some of the vibration from the engine. An aircraft with a reasonable amount of balsa wood in the nose structure will have far less vibration when the engine is running because the balsa really does a great job of absorbing this vibration. You may want to reinforce the fuselage structure with doublers made of balsa or plywood, so by all means do it. A few ounces of added structure is a heck of a lot better than building an aircraft that is too flimsy. In the same line, choose your balsa with this same thought in mind. You can get super light balsa if you wish, but if it is super light, it is also super flimsy. Pick out fuselage side pieces that are strong, weigh about the same, have a similar grain and are hard to the touch. If you explore the balsa racks a bit, you will soon learn how to judge the type of balsa that you want to use. Don't pick out pieces that are so hard that they cannot be formed to shape, or that will crack easily. Since you are doing the designing, and putting your own "kit" together, you can take the time to get wood that is just right for your use.

Next, remember how in the last kit you built the formers and the rest of the structure went together. There is nothing more important in construction, whether you're building a kit or a do-it-yourself aircraft, than to get everything lined up as near perfect as you can make it. The one thing that you **must** do when constructing the fuselage, is to build it straight. To do this you must be very careful. You simply cannot construct a fuselage in mid-air over the bench and expect it to be right. You must either use a fuselage jig, such as the RCM Fuselage Jig, or build your fuselage on the building board, being careful that everything is constructed over a true center line. The easiest way that I have found to do this is to draw center lines on each of the fuselage formers, pin them to the top view on the plans, and then glue the sides to these formers. After everything is dry, I bring the tail of the fuselage together right on the center line and pin it in place and glue it. This is when you will find out if you have purchased pieces for the sides that are similar in nature. If they are similar, you will have no trouble in bringing everything together at the center line but, if one side is much harder than the other, you're going to have trouble keeping everything straight. Be sure to use plenty of epoxy glue around the firewall just as you would on a kit

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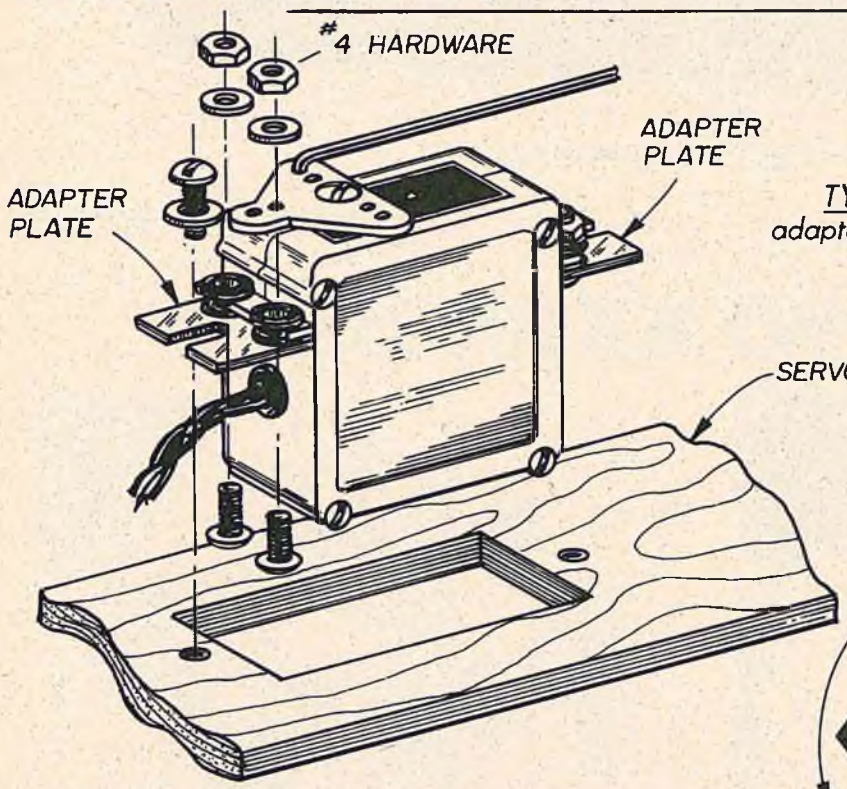
HERE'S HOW

BY JERRY SMITH

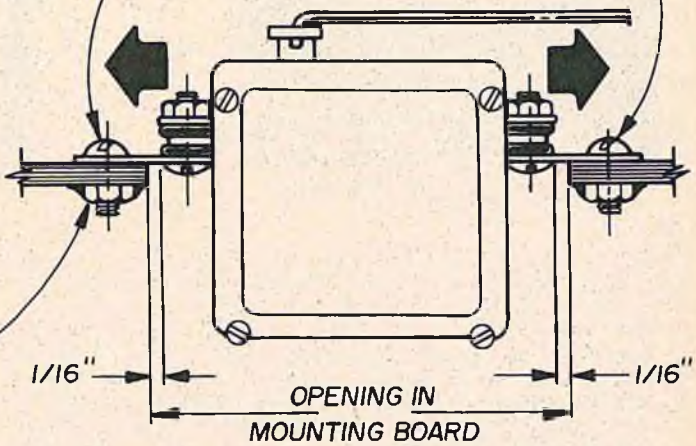
THERE ARE MANY WAYS OF MOUNTING SERVOS HOWEVER, THIS SUGGESTION SUBMITTED BY VIC ZUGEL ADDS A FEW EXTRA BENEFITS ALONG WITH GOOD SOLID MOUNTING. VICS' IDEA IS A SIMPLE WAY OF CENTERING THE CONTROL SURFACES THROUGH THE PUSH RODS. WHEN SETTING UP YOUR CONTROLS FOR THE FIRST TIME OR, IF EXPANSION OR CONTRACTION OCCURS AFTERWARDS CAUSING AN OUT-OF-TRIM CONDITION, INSTEAD OF REMOVING THE CLEVIS AND TURNING IN AND OUT FOR ADJUSTMENT, YOU CAN EASILY LOOSEN THE TWO SERVO MOUNTING SCREWS; THEN SLIDE THE WHOLE SERVO ASSEMBLY EITHER FORWARD OR BACKWARD TO ZERO-IN THE CONTROLS. COMPLETELY REMOVING THE SERVO IS ALSO A SIMPLE MATTER. JUST TWO SCREWS!

THE ADAPTER PLATES (1/32" ALUM.) ATTACHED TO THE SERVOS SHOULD HAVE SLOTS LONG ENOUGH TO OBTAIN AT LEAST ± 1/16" TRAVEL. THE OPENING IN THE SERVO MOUNTING PLATE SHOULD BE LARGE ENOUGH TO PROVIDE FOR THIS MOVEMENT. THE NUTS, FOR THE ADJUSTING SCREWS ON THE BOTTOM OF THE MOUNTING PLATE, MUST BE EPOXIED IN POSITION TO PREVENT THEM FROM TURNING WHEN ADJUSTMENTS ARE REQUIRED.

R/C SAILPLANE ENTHUSIASTS, IN PARTICULAR, WILL FIND VICS' IDEA MOST ADAPTABLE IN THEIR SERVO INSTALLATIONS.

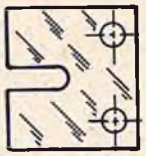


TYPICAL SERVO INSTALLATION
adaptable to any number of servos being used



NOTE: EPOXY NUT IN PLACE OR USE BLIND NUT 2 PLACES

FULL SIZE ADAPTER PLATE TEMPLATE

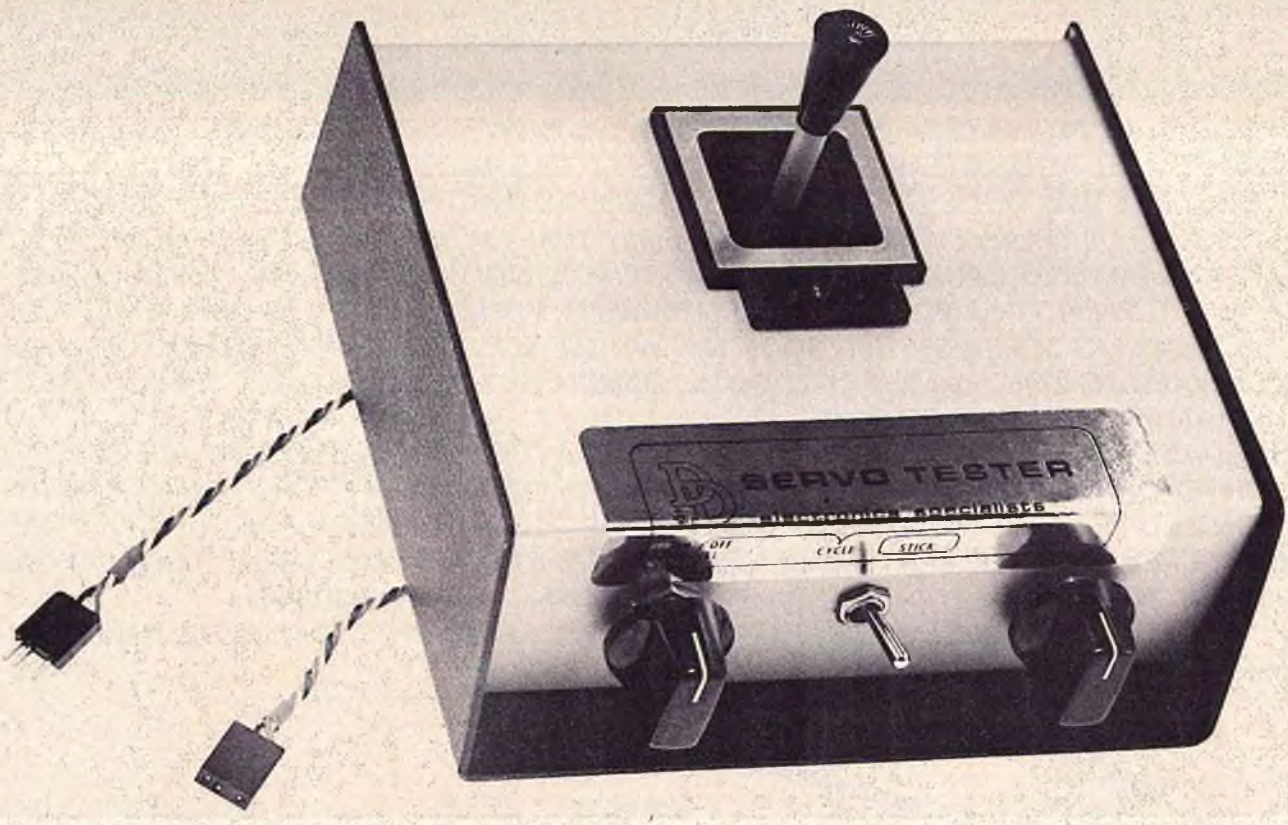


MATL: 1/32" ALUM
2 PER SERVO

CAN BE USED WITH:

- D&R SERVO
- DUNHAM
- WORLD SIO
- ROYAL RS-4 & RS-5
- ACE BANTAM
- RS

Our thanks to – Vic Zugel
Parma, Ohio



The RCM Servo Tester varies both the amount of travel and the speed of travel.

BUILDING THE

BY DOUG SPRENG

RCM SERVO EXORCISOR

The author, just before his arrest . . .

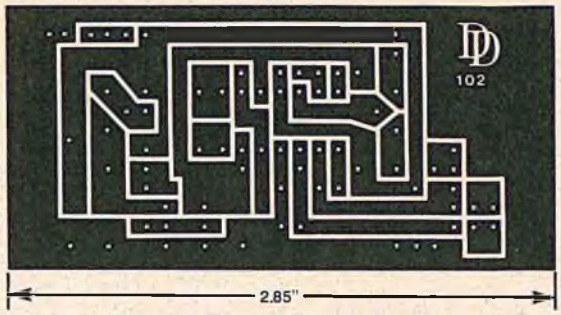
. . . for stealing the tools in this picture.

● A funny thing happened on my way to the Forum last night. I was ambushed by the nefarious East Side Bowery Boys! Their fearless, hooded leader, (I could tell it was D. Dewey by the way he was shaking), swore to hold me until after deadline to assure that this magnificent technological breakthrough would never appear in his miserable rag. Needless to say, I escaped. I asked him what a resistor was and, while he and the Bowery Boys were in conference about it, I slipped away. They are probably still in conference and the mag will probably be late this month.

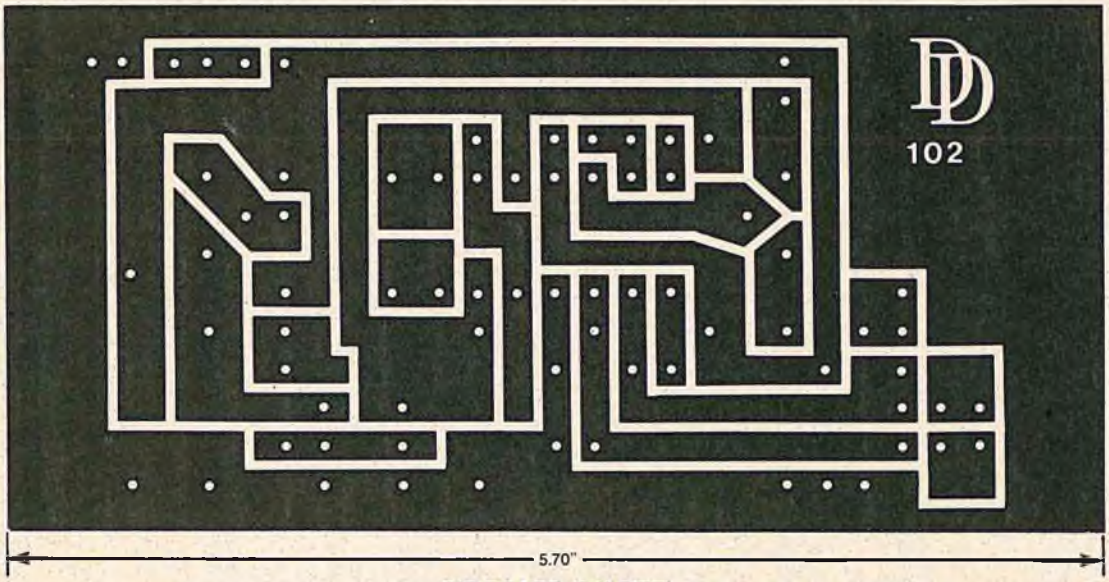
Anyway, the major difference between this and any Brand X is that, in the cycle mode, you may not only vary the **amount** of travel, but also the **speed** of travel. The advantage of this is that, in the extreme slow speed operation mode, motor dead spots are most likely to show up. Also, this mode is a very good way to tell whether or not the minimum impulse is proper. Both a long or short minimum impulse will cause jerky operation. If it's just right, the servo will creep around smoothly. The variable travel is necessary because, if the servo is moving at maximum speed, it won't travel as far as when it is creeping. This effect will be obvious upon operation of the tester. It is wise to cycle new or repaired servos for ten minutes or so; five minutes slow; five minutes fast. It will also operate either negative or positive input servos. It is not, however, usable with four-wire servos.

The other obvious advantage is that it has a stick mounted on it. The stick may be adjusted to produce the same amount of travel as your transmitter, therefore more exactly duplicating the operation of your system. Think of how handy this will be during installation - - - you can

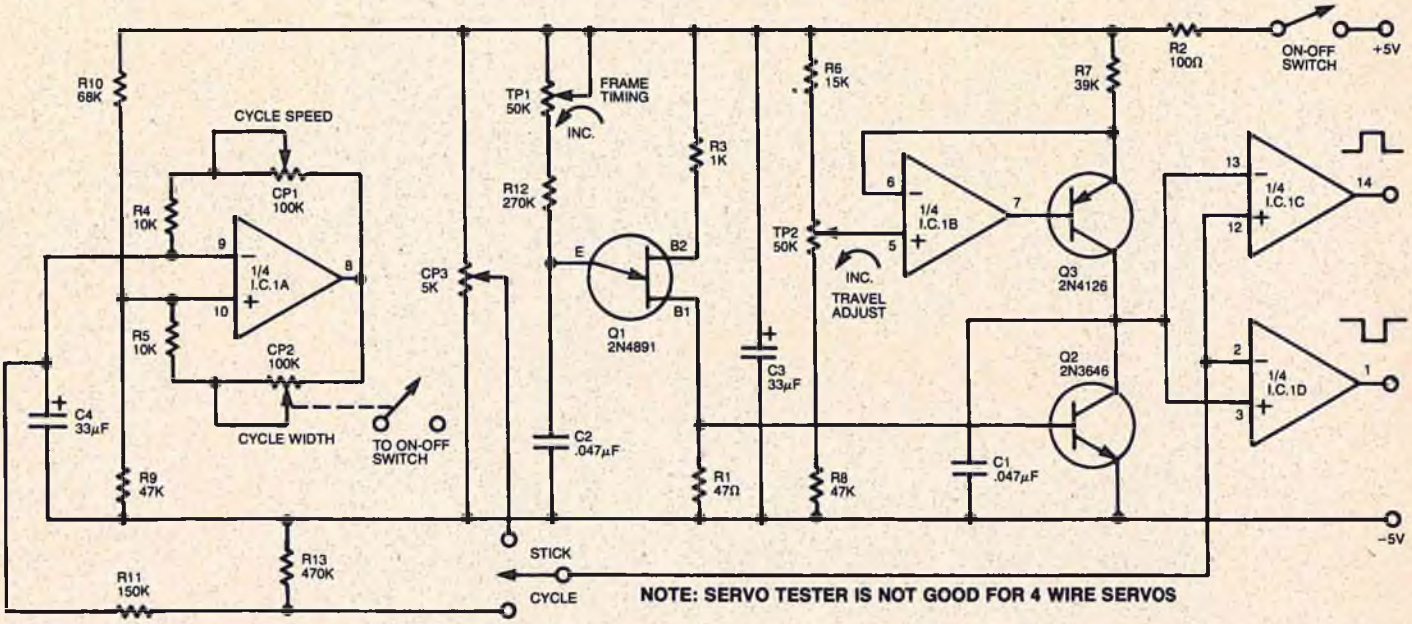
The RCM Servo Tester is a breakthrough in the state of the art of servo test instruments. In varying the speed of travel as well as the amount of travel, motor dead spots are likely to show up in extreme slow speed modes. In addition, this is an excellent way to determine whether or not the minimum impulse is proper. When you consider all the features of the Servo Exorcisor you'll want to build it . . . and it will run the devil out of your servos!



P/C BOARD (ACTUAL SIZE)

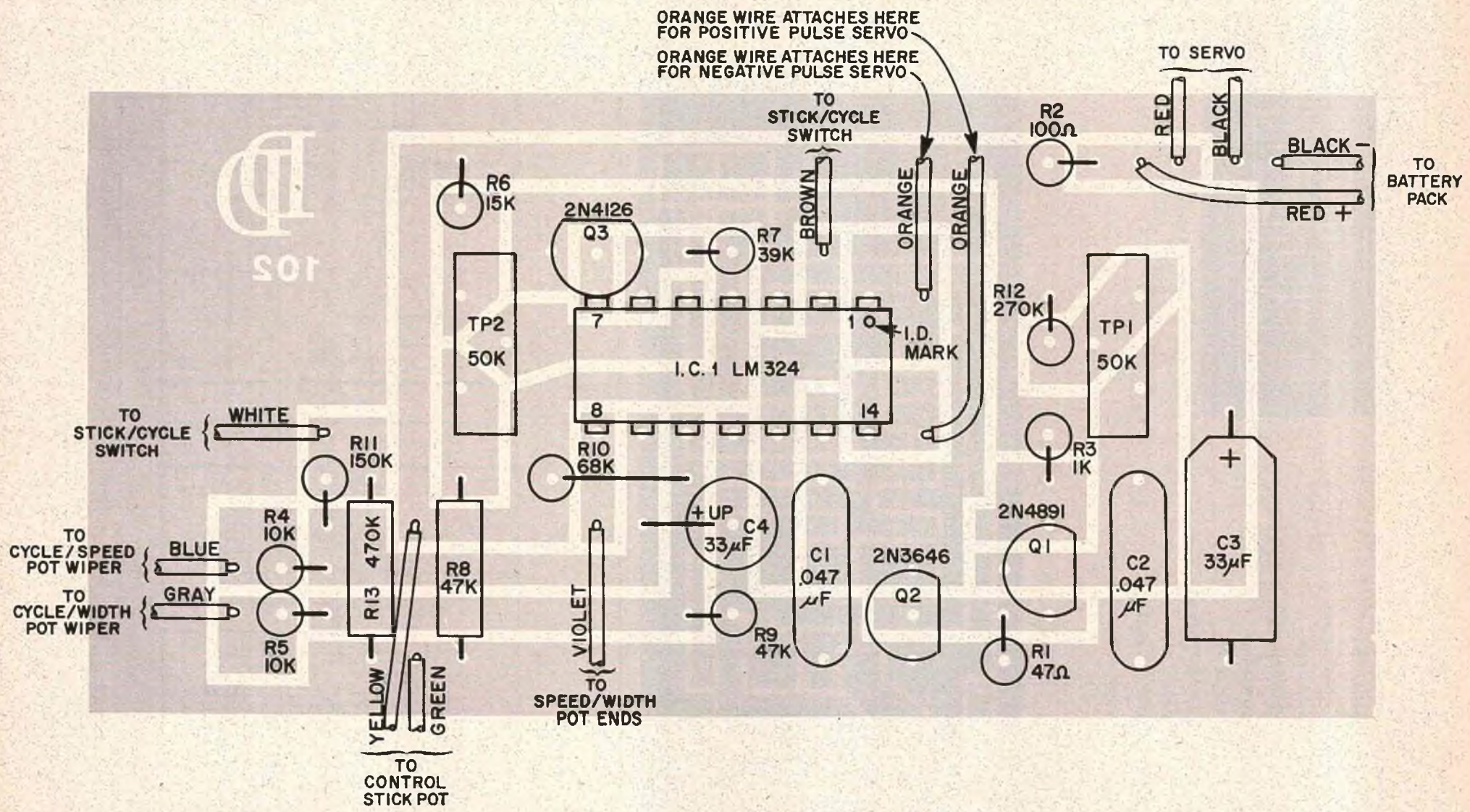


P/C BOARD (2 X SIZE)



NOTE: SERVO TESTER IS NOT GOOD FOR 4 WIRE SERVOS

SERVO TESTER SCHEMATIC



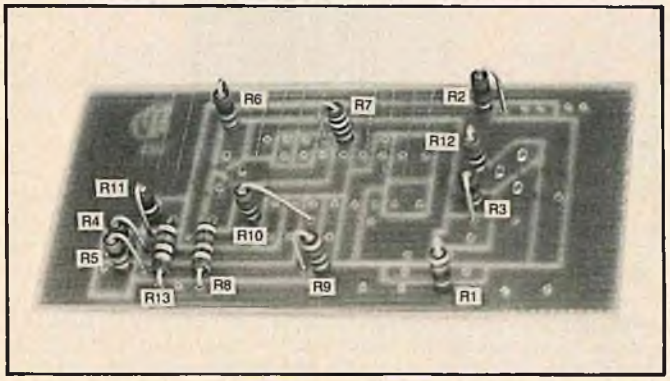
SERVO TESTER COMPONENT OVERLAY

simply leave your airborne in another airplane.

The stick assembly is by Dunham's R & R in Lake Havasu City, California, (a noted modeler's retirement mecca). The kit will make use of the conductive plastic pot to take full advantage of the **Linear** charging ramp in the tester.

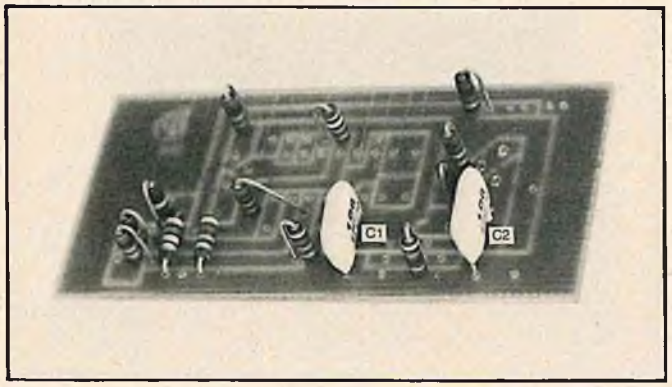
Before you start construction, I would like to pass along a few tips. Illustrated is a set of typical tools for this type of small printed circuit assembly work. Most of these tools are available at your local Radio Shack store. Use the smaller 25 to 30 watt irons; several are available. Be sure to use the iron clad tips. Radio Shack also stocks a good line of assorted miniature pliers and cutters. **Use rosin core solder only!**

So, on with the assembly. **It is imperative that you read and understand the whole step before proceeding with it!**



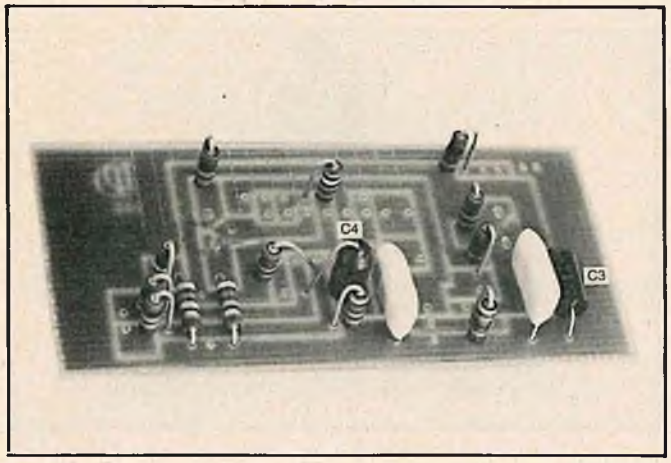
Step 1.

Install all resistors. The color code information is in the parts list. Notice that they are all 1/4 watt, ten percent. Be sure to bend the lead over on to the land. Cut the lead after bending, so that it does not block a hole or jump a land. Do not solder.



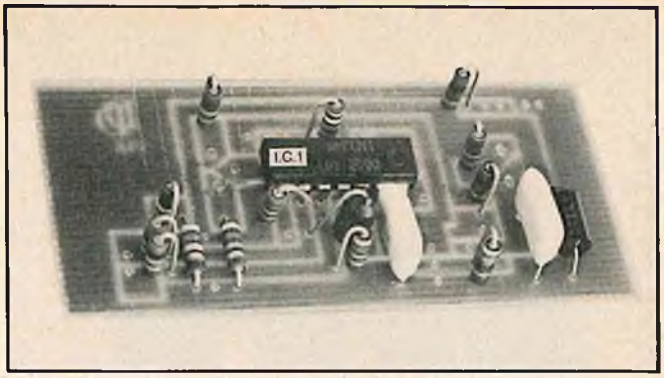
Step 2.

Install mylar capacitors, (no polarity) (.047/250V); do not solder.



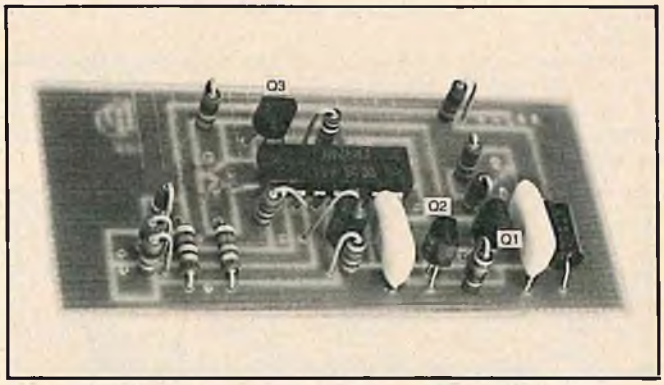
Step 3.

Install the two 33 MfD./10V Tantalum capacitors. Notice that one lays down and one stands up. The standee should have its beveled end up. Do not solder.



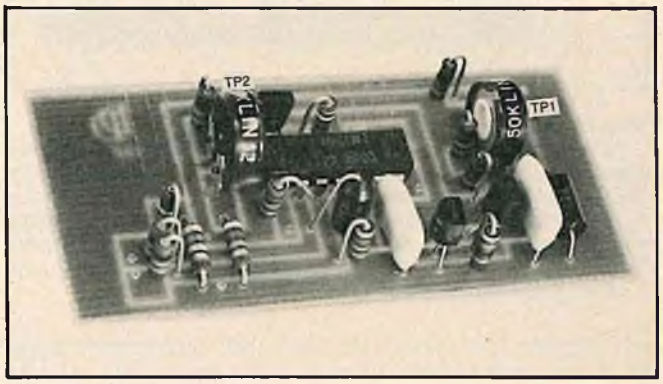
Step 4.

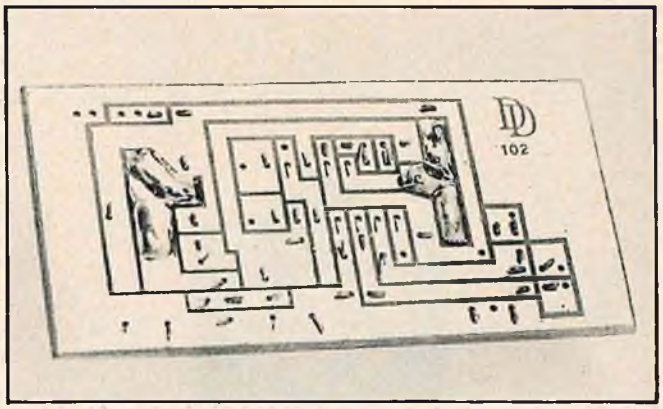
Install I.C. #1, noting carefully which end the little dot indicating pin 1 goes. Again, exercise care about lead dress. Do not solder.



Step 5.

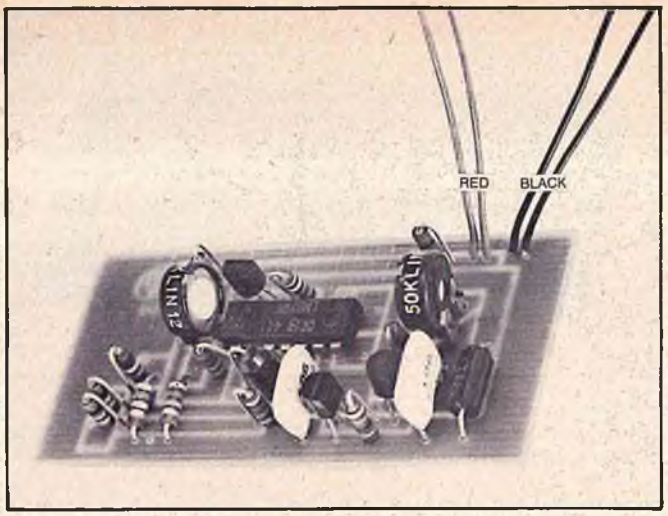
Install all transistors. Notice which direction the flat faces. Do not solder.





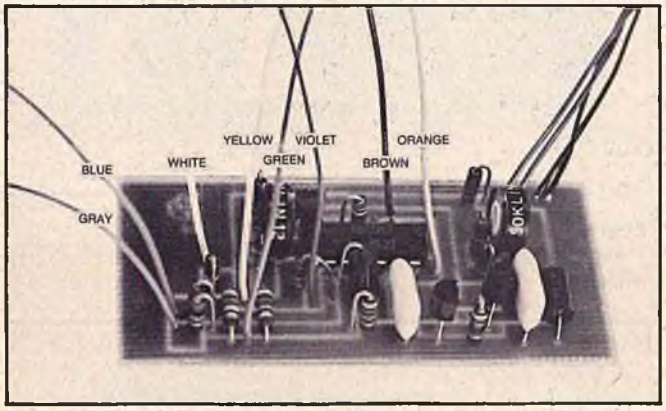
Step 6.

Install the 50K Trim pots. Both pots are identical. Pay attention to the basing. Each pot faces the outside of the board. Bend the leads over, trimming with cutters to prevent shorting to an adjacent land. You may solder the pots.



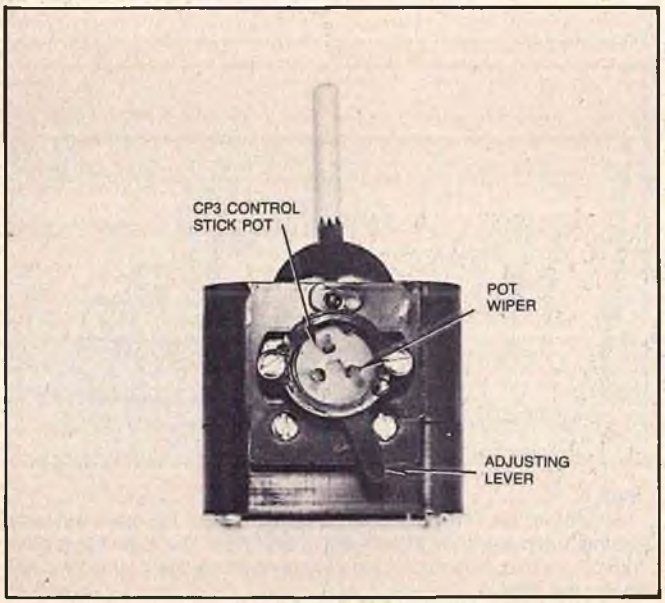
Step 7.

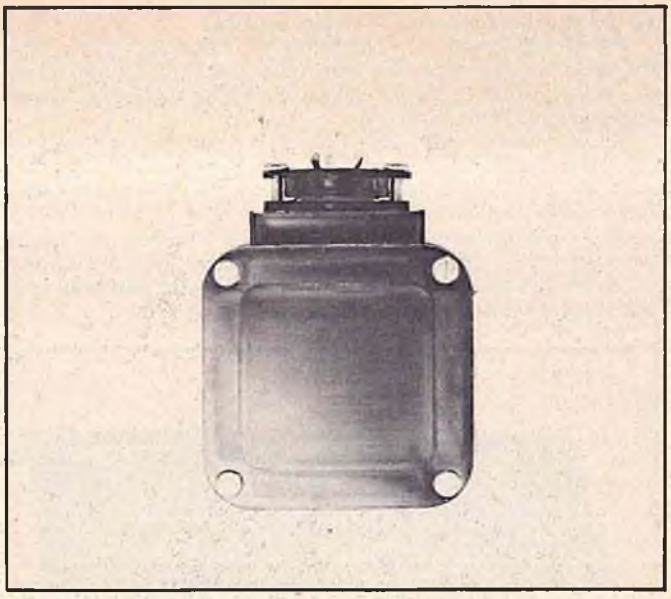
Strip one end of two pieces of Red, and two pieces of Black wire. 1/8" to 5/32" wire should be showing beyond the insulation. Insert red wires where indicated, and solder the whole land. Insert black wires where indicated and solder. Each wire should be 8" to 1' long. They will be trimmed later.



Step 8.

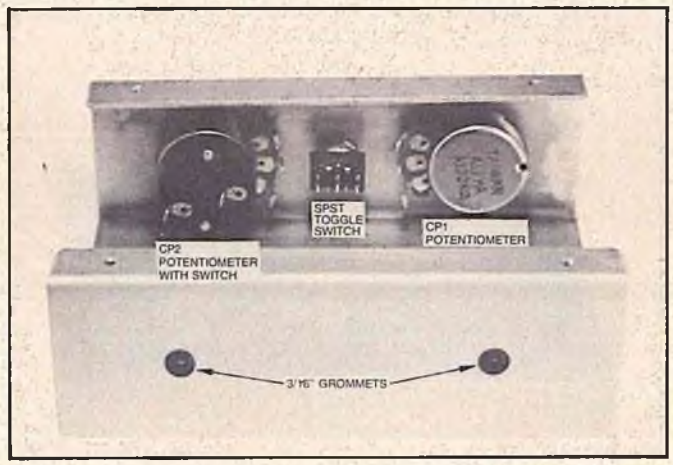
Using the same procedure, strip and install all other wires, **one at a time,** soldering each wire plus the rest of the components on the land. The orange wire will go in one of two places depending on whether you have positive or negative pulses. Make sure the wires are not bridging two lands together. Leave all wires long, for they will be trimmed later. Solder all other lands. Clean rosin off bottom of board with Trichlorethylene or Acetone.





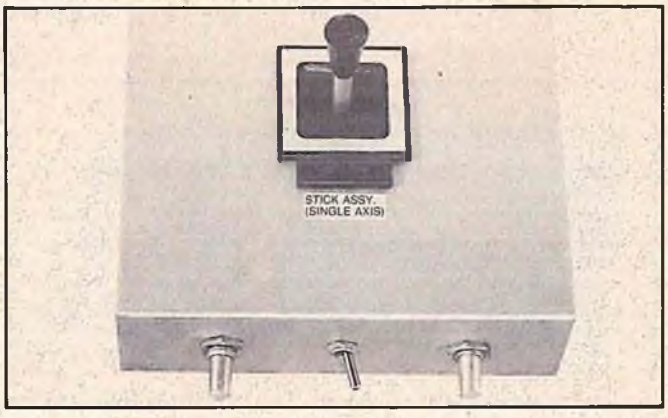
Step 9.

Install pot in stick assembly. Note direction that the arrow points away from the wiper contact and direction that the adjusting lever arm points. This is important. It makes sure the servo will not go hard over when unit is first activated. Do not over-tighten mounting screws. This will prevent adjustment arm from rotating pot. Tighten them just enough to make sure pot is seated in mounting. **Do not adjust wiper assembly.** It is properly set at the factory.



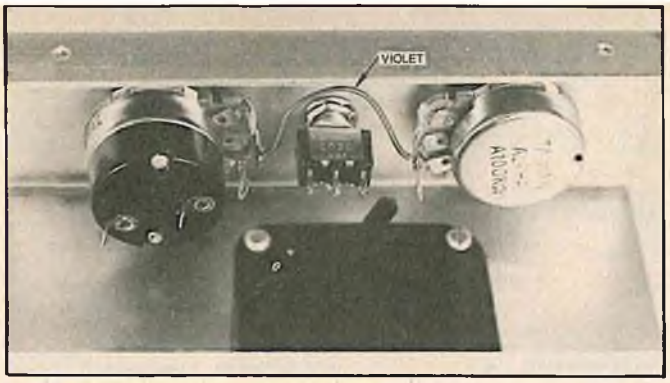
Step 10.

Install the potentiometers, switch, and grommets as shown. Cut pot shafts off to 7/16" long from end of threads.

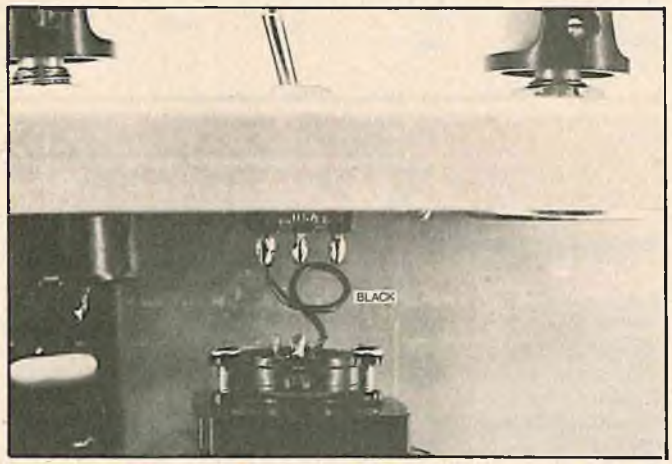


Step 11.

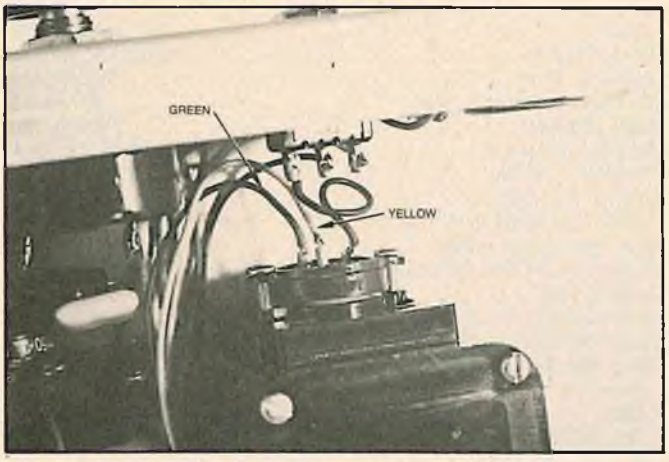
Install stick assembly as shown, being careful to get it square with case. Metal facia is glued by peeling off protective paper and moistening with Trichlorethylene, then pressing into place.



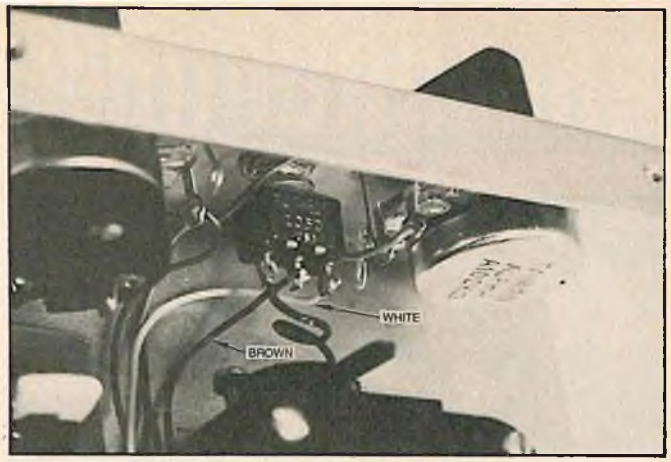
Step 12.
Solder a piece of violet wire between the pots as shown.



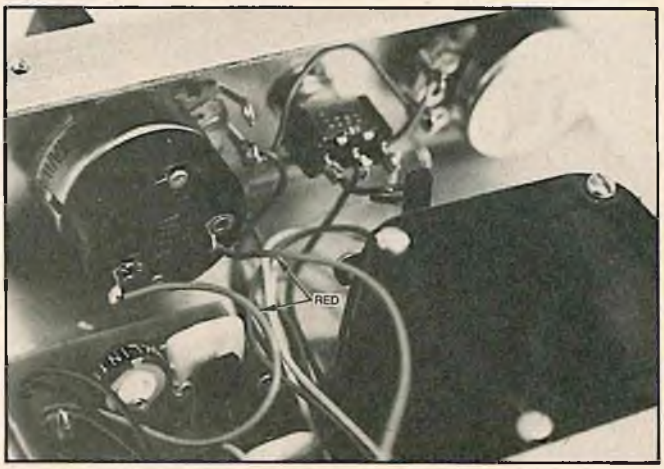
Step 13.
Solder a piece of black wire between one side of the switch and the stick pot wiper as shown.



Step 14.
Solder the yellow and green wires to the stick pot as shown.



Step 15.
Solder the blue, gray, and violet wires to the control pots as shown. Solder the brown and white wires to the switch.



Step 16.
Solder one red wire to either on-off switch terminal on the back of the cycle width pot. Solder whats left of the red wire on the other on-off switch terminal and run straight back through the grommet along with one of the black wires. This is power input, red is +5V. Black is negative.

Step 17.
Run the orange wire plus the remaining red and black wire through the other grommet. This is the cable to the servo.

Step 18.
Install the plugs on the power and servo cables that mate with your brand of radio. Note: Since there are so many different types of plugs, we find it almost impossible to supply the correct plugs, so the customer is asked to obtain the correct plugs from the appropriate manufacturer. Plugs shown are D & R and fit my Mathes Radio.

Step 19.
Once the plugs are attached and the switch and a battery and servo are plugged in, the tester may be tested. With power off, throw the mode switch to "stick" position. Turn power switch on and the servo should run to some position. Center the servo by adjusting the centering arm on the stick. (Both the trim pots on circuit board should be approximately centered.) Check the servo travel with the stick and trim. If the travel is too short, rotate the travel adjust trimpot (TP2) counter-clockwise slightly, and re-center the servo by rotating the centering arm on the stick. Repeat until the travel is correct. If the travel is too long, rotate the travel adjust trimpot clockwise and re-center the servo until the travel is correct.

Adjust the frame timing by adjusting TP1, while forcing the servo slightly off neutral until the "buzz frequency" is approximately the same as that which results when a servo is operated by your radio system.

Now throw the switch to the "cycle" position. The servo will run back and forth. The rate and amount of travel is adjusted by the front panel pots. The effect of various control settings is self-explanatory. Note: Some servos will jitter at one end with the travel adjust at maximum

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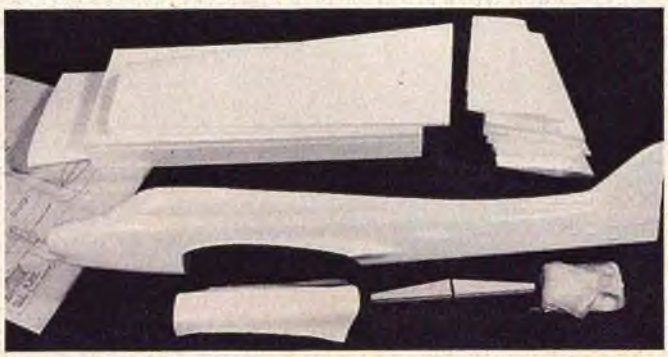
RCM PRODUCT TEST

HOBBY WORLD VERTIGO II



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			NA		
Other Materials	●					Flight Performance	●				
Accessories			●			Overall Appeal	●				
Die-Cutting			NA								

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

● The Vertigo II is a competition pattern aircraft designed by Bob Reuther and Tom Moore of Hobby World. The kit which retails for $69.95 is manufactured exclusively for Hobby World by SKY GLAS Fabricators of Madison, Tennessee. The basic materials used in the kit are a fiberglass fuselage with foam and balsa wing and tail surfaces. The fuselage is molded initially in two halves formed of layers of 4 oz. and 6 oz. weight fiberglass cloth and polyester resin. Additional 4 oz. weight cloth is added in high stress areas. Prior to application of the fiberglass cloth to the mold, the mold is sprayed with a gel coat which forms an excellent base for the aircraft's final finish. Bulkheads and motor mounts are jigged into place in order to insure accuracy of alignment. After final assembly, the fuselage is then mold cured for several hours, again to insure accuracy. The wing and stabilizer cores consists of very light weight foam which is jig cut using female, rather than male, templates in order to insure smooth and accurate surfaces. The elevator is cut with the foam stabilizer core and both are sheeted together. After sheeting is complete, the elevator is then cut free of the stabilizer which assures an accurate fit for the elevator. The vertical fin is molded with the fuselage, including a post for hinging the rudder. Pushrod exits are molded into the fuselage as well as centerline and cut-out markings for the stabilizer. The kit includes foam cores for the wing, stabilizer and elevator as well as a fiberglass fuselage with bulkheads and motor mounts, fuselage belly pan, plans, decals, landing gear trunion blocks for fixed gear, and fiberglass cloth for reinforcing the two wing halves.

The design includes a number of relatively new features. First, a long low fuselage nose section allows the nose gear to fully retract without cutting into the wing center section and still maintain at least 1.5" prop clearance. Second, the engine compartment is large enough to accept, without modification, all pump equipped engines which permits the fuel tank to be mounted at the Center of Gravity — a very important consideration for the serious pattern flyer. In this manner, the Center of Gravity does not change as fuel is consumed throughout the flight. Also, the fuselage is large enough for a 16 oz. tank at this location or in the nose compartment, if desired. Third, a 1⅜"

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SPECIFICATIONS

Name	Vertigo II
Aircraft Type	Competition
Manufactured by	Sky Glas Fabr.
Mfg. Suggested Retail Price	$69.95
Available From	Hobby World
Mfg. Recommended Usage	Competition AMA & FAI
Wingspan	63¾ inches
Wing Chord	13 inches
Total Wing Area	728 sq. in.
Fuselage Length	56½ inches
Radio Compartment Dimensions	(L) 14" x (W) 3"
Wing Location	Low Wing
Dihedral	1 inch
Airfoil	Symmetrical
Wing Planform	Swept L.E. — T.E.
Stabilizer Span	26½ inches
Stabilizer Chord (incl. elev.)	8⅞ inches
Total Stab Area	177.3 sq. in.
Stab Airfoil Section	1⅜" thick Diamond
Stabilizer Location	Mid Fuselage
Vertical Fin Height	6 inches
Vertical Fin Width (incl. rudder)	11 inches
Mfg. Rec. Engine Range	.60 w/pump
Recommended Fuel Tank Size	16 Ounce
Landing Gear	Tricycle
Recommended No. of Channels	5 w/ret.
Recommended Control Funct.	Rud, elev, ail, throt, ret.
Basic Materials Used In Construction:	
Fuselage	Fiberglass
Wing	Foam and balsa
Tail Surfaces	Balsa and foam
Hardware Included In Kit	Landing gear blocks and glasscloth
Plan Size	48" x 30" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	No
Construction Photos	No
Kit Includes	Shaped Parts
Mfg. rec. flying weight	NA
Wing loading based on rec. flying wt.	NA

RCM PROTOTYPE

Weight, ready to fly:	146 oz.
Wing Loading	28.9 oz/sq. ft.
Covering and finishing materials used	Resin, cloth, Superpoxy
Engine Make and Disp.	O.S. Max 60F
Muffler Used	O.S. Max
Radio Used	Kraft Series 72
Tank Size Used	16 ounce

HALF-A FIELD BOX

MODIFYING THE CARL GOLDBERG MODELS MINI-TOTE TO A CONVENIENT FIELD BOX DESIGNED FOR HALF-A FLYING. COMPLETE WITH A TWELVE VOLT BATTERY AND NEW MINI-STARTER, THIS CONVERSION WILL HOLD EVERYTHING YOU NEED FOR RACING OR GENERAL SPORT FLYING.

BY DICK TICHENOR

● Flip Wilson says, "The Devil made me do it!" I will have to say, "Astro Flight made me do it!"

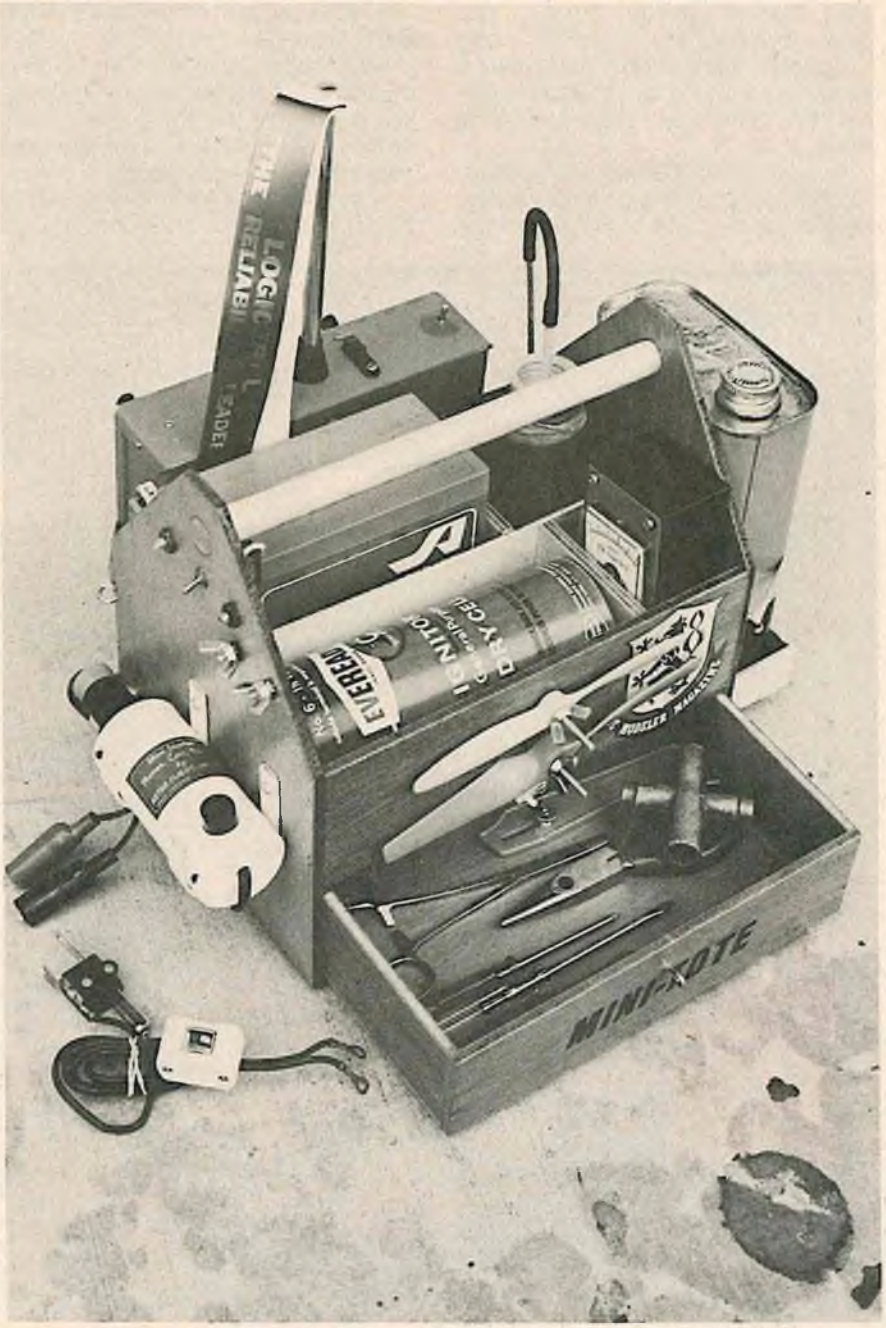
Astro Flight's new Mini-Starter for 1/2A engines excited me so much that, after forty years of modeling, I now have an electric starter. All this time of resisting the elaborate hernia causing field boxes, has usually forced me to toss my gear into an old corrugated paper box or paper bag for a trip to the flying field. Now, I can take this little rig out with the 1/2A models and not have to listen to the snide remarks from my buddies.

Carl Goldberg Models has a dandy kit for a small field box, known as Mini-Tote. After assembling it, I naturally had to put my own touch to it, so I added a small tray on one end to support a quart can of Cox fuel and installed a couple of dividers in the top tray. I connected a toggle switch between the screw terminals for the starter and the new Astro Flight 12 volt Gel Cell battery as a safety precaution. A space was provided for an EK-Logictrol expanded voltmeter that is most useful in letting me know if my airborne battery pack will let me safely get in that "one last flight." A Sullivan fuel bulb fits in a back corner.

A glow plug condition meter from Hobby Shack installed on a 1/2A Du-Bro glow plug connector wire tells me what is happening with the plug and it is carried in the drawer. Also in the drawer is an indispensable hemostat from Ace R/C, along with screwdrivers, pliers, etc.

My EK transmitter is held on the back shelf with a rubber band. And, I almost forgot, the Mini-Starter that made me do this thing is held on one end by a couple of metal clips covered with heat shrink tubing.

The Mini-Tote field box, with the equipment that I have mentioned, has been a most convenient accessory to our 1/2A flying. Its compact size has made it easy to hide, which is necessary, because my boss likes it and has threatened to take it away from me. □



NRCHA

DON DEWEY (N1A)

ALL THUMBS

By Lynn Faust The helicopter has been hanging there over the spot for a good fifteen or twenty seconds now, at about three or four feet, and it is beginning to look like a beautiful flight. But wait a minute! The wind is shifting and gusts are starting to pick-up.

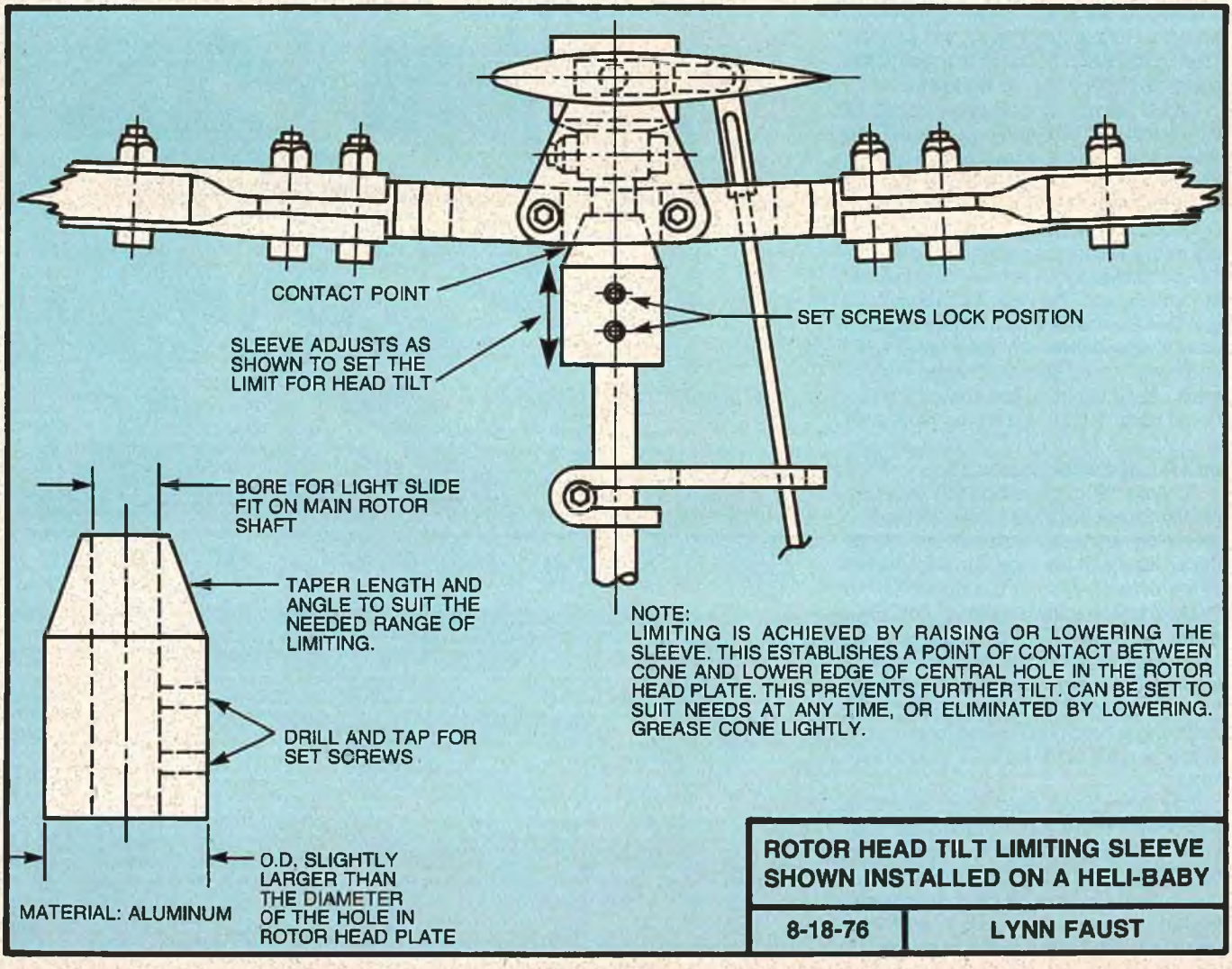
Whoops! Watch that drift. Gently now, ease in more power and a little forward pitch. Correct for yaw. Whoops, too much. The other way stupid! Too much — lookout . . . and just like that the day's flying is over as the bird gives its imitation of a lawnmower, busting a set of rotors.

As you stand there dumbfounded, watching the bird flopping helplessly on the ground, the question starts forming in your mind, what happened? Did you have a mechanical or radio failure? Or more truthfully, wasn't it the old panic induced syndrome called "five pound thumbs."

At some time or another we all get into situations where everything begins to come unglued, and it's very human to over-react. Choppers seem to be especially susceptible to this reaction and I personally, have filled a small barrel with parts damaged because of it. While most chopper pilots will tell you these birds are stable when set-up right, many will also admit we are our own worst enemy while flying them. We all tend to over-control under pressure.

At the present, I am flying a Heli-Baby. This is an extremely stable machine and a real tribute to Schluter, the bird's designer. It is, however, a stupid bird which continually refuses to hide my mistakes. Given bad commands, it does exactly what it is told, and, I might add, it often complies rather spectacularly! It was finally concluded our mutual best interests would be served if the bird was allowed to do what it was designed to do, fly, without the added affliction of heavy thumbs. How this was done may interest those of you who also own dumb birds.

It was decided that minimal change, or additions, were to be made, therefore, here is what was done. As shown on the drawing, a simple sleeve with a cone on one end was machined from aluminum. Two set-screws are threaded into the lower end. Removing the main rotor



head, the sleeve is place on the rotor shaft cone end up, then the head is re-installed. You will note the sleeve can now be raised or lowered on the shaft, inserting or withdrawing the cone in the center hole on the bottom of the head. As a result, you can limit the tilt of the head without interfering with the cyclic action. Experiment with how much tilt you can safely handle, then lock the set-screws firmly against the rotor shaft. This limiting can be reset at any time, or totally eliminated by moving the sleeve down away from the head. It's almost too simple, but believe me, it really works! The real beauty of the gadget is that once proper limiting is established, normal commands give the same results they always did, except, of course, the bird suddenly becomes smart and ignores your occasional five pound thumbs, and amazingly your flying improves. Isn't that exactly what we have known all along? It was that dumb bird's fault all along.

Seriously though, the gadget we have described isn't expected to be a magic cure-all, but rather, is offered as a simple addition for those of you who, like myself, need just a little help now and then. You will also note there are no exact dimensions shown on the drawing. Since it is possible this part could be used on many different birds, it also follows that each will have it's own requirements. It should be a simple matter to establish exactly what you need. An eyeball machine job, done on a spindle in your trusty electric drill, is more than adequate and the invested time and effort is a small price to pay for a super smart bird. Try it, you'll like it.

Now, about a future project. Besides my heavy thumbs, I have another affliction, which it appears our fearless leader, Dewey, has also contracted. If I can just dream up a solution for all that body english.

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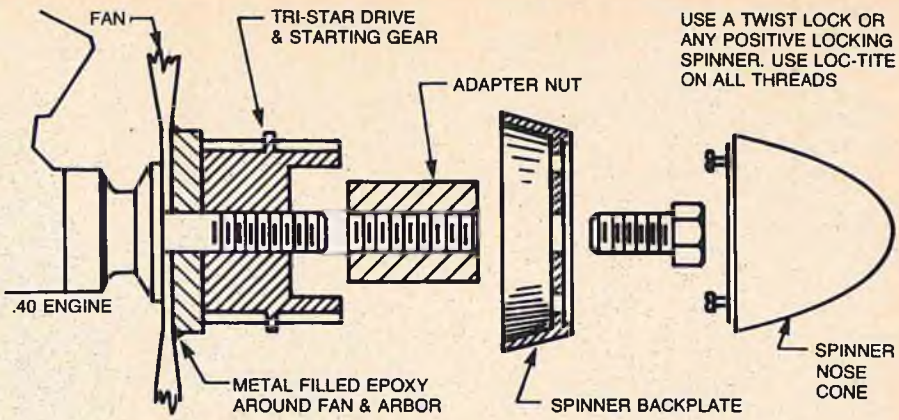
Chopper Hints & Kinks

Anthony Garrambone (N152C) of North Miami, Florida, passes on the following modifications that he has successfully used on his Du-Bro Tri-Star. As Tony points out, his Tri-Star has survived a lot of hard training and, to keep it performing without too much expense, he decided to modify it as follows: First, the cooling fan, which has a tendency to come loose, is roughed up with sandpaper, as well as the area around the arbor. It is then cleaned with thinner and slow setting epoxy is squeezed between both sides of the fan and the arbor, creating an epoxy fillet around the arbor. This will keep the fan in place and prevent it from slipping.

Next, Tony formed the landing gear braces into semi-circles, as used on the Shark, and installed rubber shock mounts between the landing gear braces and the main frame which absorbs hard landings quite well.



The next modification was to the radio box which is too small for some receivers. In addition, after too many hard landings, the front mount protector tends to bend downward, causing a change in servo adjustment. To solve that, Tony moved the servos closer to the swashplate. He hand-made a plastic vacuum formed radio box fitted from plaster molds of the original.

The last modification was to the tail boom drive shaft. After wearing out three of them, Tony used the stock drive shaft ends #489 and 1/16" music wire and formed a new drive shaft. He used two large rubber grommets to keep the drive shaft from "whipping" inside the boom and soldered the shaft ends to the wire, using a wooden pencil (with the lead removed) to keep the wire centered inside the drive shaft ends. He also constructed the tail rotor blades from balsa, and replaced the tail skid with a lighter piece of music wire. Because of the latter weight change, Tony's Tri-Star no longer needs ballast added to the nose.

While on the subject of the popular Du-Bro Tri-Star, D. Russell Rhue of Chula Vista, California, has been flying his Tri-Star for nearly a year now and has modified it greatly to obtain added reliability. One modification made by Russell was to install a 1½" Twist-Lok spinner on his engine. This makes it as easy to start as any RC plane. The sketch is self-explanatory but you are cautioned to use plenty of Loctite on all connections.

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In the July 1976 issue of RCM, we presented an article on the Shark 60 in which we stated that the Profi .60 engine would not fit the Du-Bro Shark. E. Paul Johnson of Des Moines, Iowa, submitted the photographs of the Profi .60 which he has installed in his Shark and which works extremely well. By the way, the Profi is an extremely reliable and dependable engine with a low idle and extremely smooth throttle transition throughout its rpm range.

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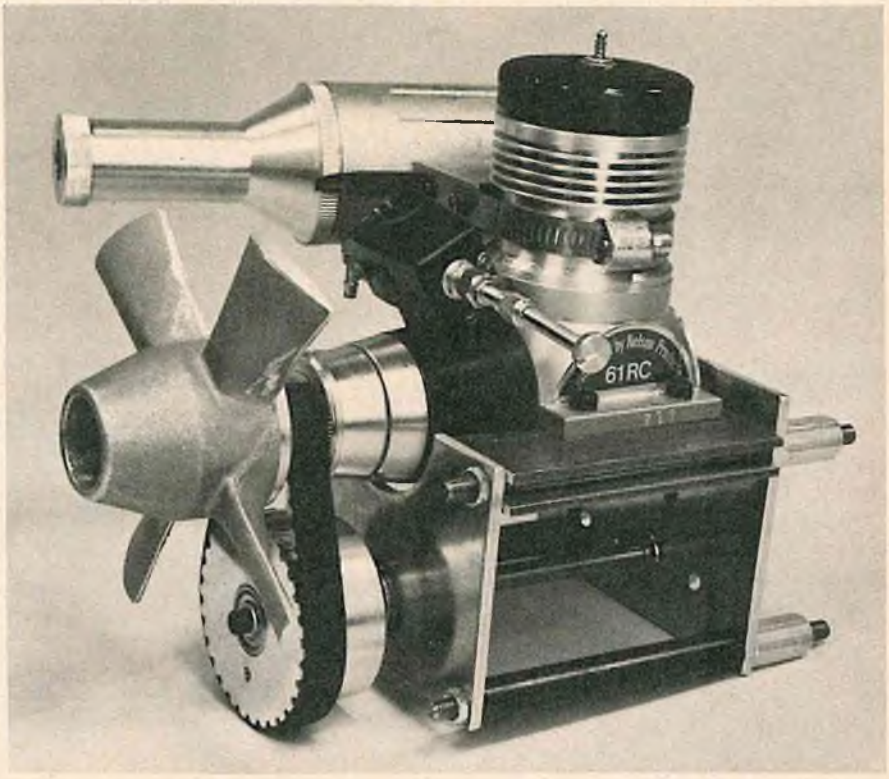

Paul Hoogeveen of Arnhem, Holland, submitted the sketch and photographs of a modification to his Schulter Bell Huey Cobra. Wishing to construct a scale helicopter without protruding fuel tank and exhaust, he tried placing the tank above the engine, but continous flooding of the carburetor was a constant hazard and made starting extremely difficult. In fact, this method ruined several electric starters while attempting to start the helicopter. And, during that period of time, Perry had not yet produced his fuel pump, so there did not seem to be an apparent answer. However, the solution was found and has worked to complete satisfaction for many hundreds of flights on the Huey Cobra. As Mr. Hoogeveen points out, in the Netherlands there are virtually millions of very small motor bikes (50cc) rolling around, so it was quite easy to obtain a second hand carburetor. After removing the float chamber from the rest of the carb housing, it was mounted next to the engine as shown in the sketch and photograph. It turned out to be quite reliable, inexpensive, primable and, best of all, worked perfectly.

After some struggling, Mr. Hoogeveen also managed to construct a 2-stage exhaust which fits completely in the fuselage that overcomes the special two stroke sound he did not particularly care for on a turbine type helicopter.

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Chuck Winter of Merced, California,

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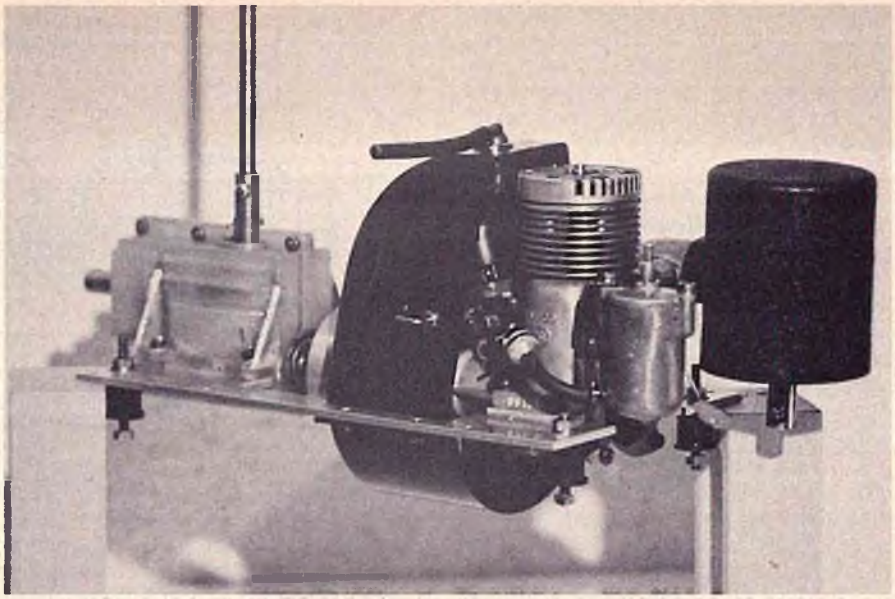
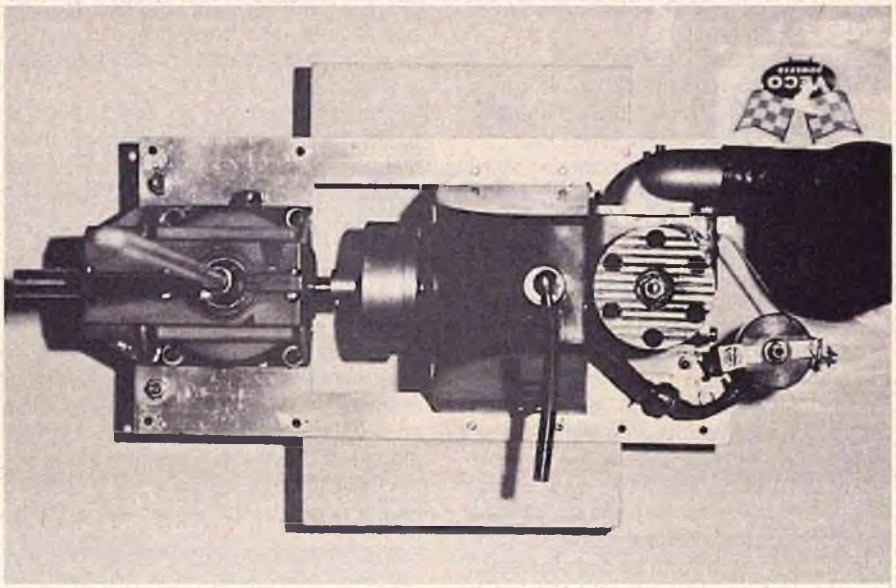
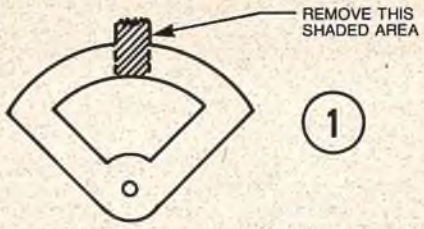
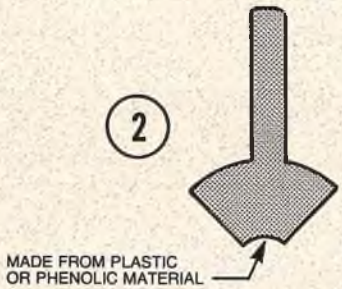
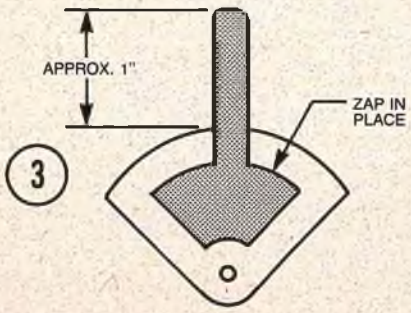
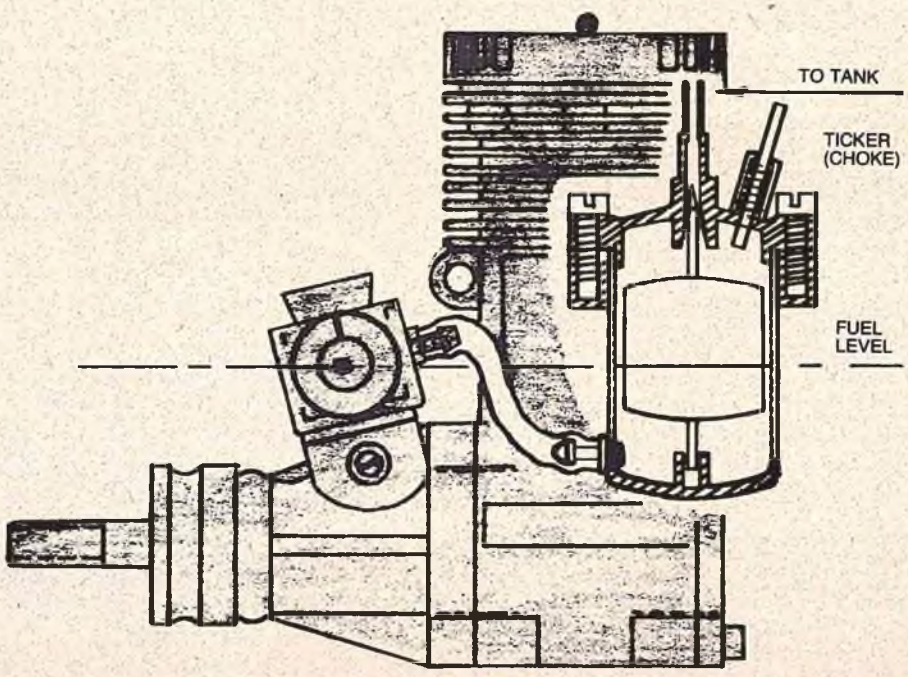






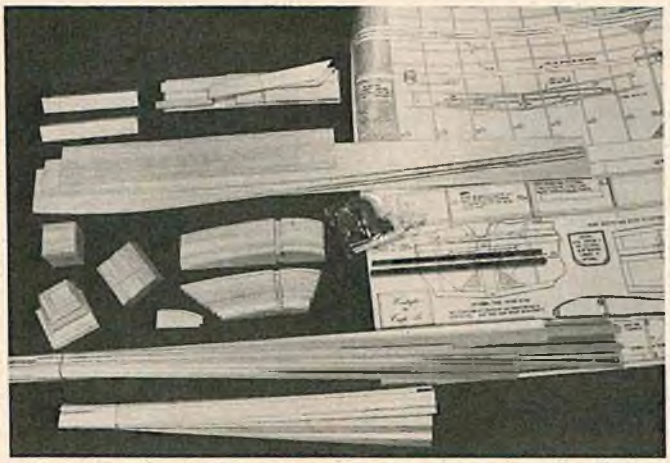


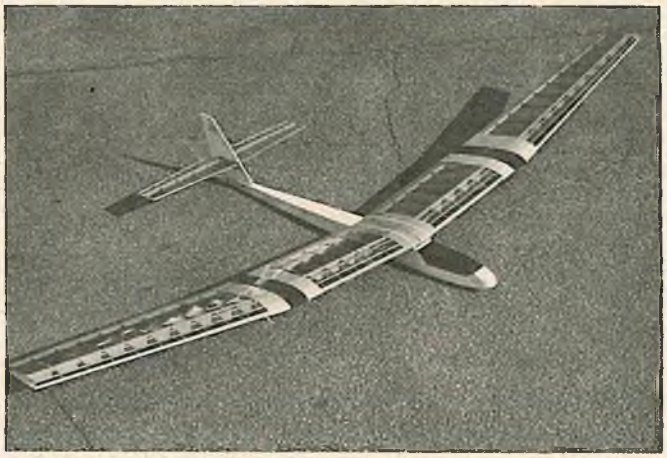




RCM PRODUCT TEST

CRAFT-AIR WINDRIFTER





● The Windrifter is a Standard Class sailplane with a wingspan of 99.8", and a total wing area of 916 square inches, manufactured by Craft-Air, 5901 Oakdale Ave., Woodland Hills, Calif. 91367. Designed by Tom Williams, it is priced at $44.95 and designed for rudder and elevator operation.

Fuselage construction is of balsa, plywood, hardwood and fiberglass cloth reinforcement, while the wing and tail surfaces are of conventional balsa and spruce construction. Hardware included in the kit consists of hinges, control horns, wing seating tape, 1/16" music wire and a tow hook. There is one plan sheet measuring 35" x 50" with building instructions on the plans, in addition to a four page instruction manual. The kit has some unusual features in that it utilizes a spruce I-beam spar, 2 piece polyhedral wings, and an exceptionally good flat-bottom airfoil that gives excellent L/D, as well as outstanding no-stall characteristics, but yet penetrates in virtually any type of wind conditions. The plans also include an optional take-apart stab for convenience in transportation to contests, etc. Two major changes have been made from the original Windrifter in that the horizontal stab is mounted mid-way on the vertical fin and the Hoerner wing tips have been eliminated.

Our prototype weighed 42 ounces ready-to-fly for a wing loading of 5.8 oz./sq. ft. without ballast. The wings, stabilizer and elevator were covered with transparent blue Solarfilm, while the fuselage, vertical fin, and rudder were covered with white Solarfilm. Trim was black and metallic silver striping tape. The radio used in our prototype was a Hobby Shack Cirrus Sport IV.

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

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

SPECIFICATIONS

Name ..... Windrifter
Aircraft Type ..... Sailplane
Manufactured by ..... Craft-Air
5901 Oakdale Ave.
Woodland Hills, California 91367
Mfg. Suggested Retail Price $44.95
Available From ..... Mfg. and Retail Outlets
Mfg. Recommended Usage ..... Compet./Sport
Wingspan ..... 99.8 inches
Wing Chord ..... 10.5 inches
Inner panel 10.5" taper to 6.25" at tip
Total Wing Area ..... 916 sq. in.
Fuselage Length ..... 45.5 inches
Radio Compartment Dimensions .. (L) 12" x (W) 1½-2"x (H) 2¼-2½"
Wing Location ..... High Wing
Dihedral ..... 2⅛" (inner panel)
Polyhedral ..... 4.0"
Airfoil ..... Flat Bottom
Wing Planform ..... Double Taper
Stabilizer Span ..... 27.0 inches
Stab. Chord (incl. elev.) ..... 6.0" center tap. to 4.0"
Total Stab Area ..... 128 sq. in. (approx.)
Stab Airfoil Section ..... Flat
Stabilizer Location ..... Mid-Vert. fin
Vertical Fin Height ..... 9.5 inches
Vertical Fin Width (incl. rudder) ..... 8.5 inches
Mfg. Rec. Engine Range ..... NA
Recommended Fuel Tank Size ..... NA
Landing Gear ..... NA
Recommended No. of Channels 2
Recommended Control Functions ..... Elevator and Rudder
Basic Materials Used In Construction:
Fuselage ..... Balsa, Ply, Hardwood
Wing ..... Balsa and Spruce
Tail Surfaces ..... Balsa and Spruce
Hardware Included In Kit Hinges, c. horn, wing tape, music wire, tow hook
Plan Size ..... 35" x 50" (1 sheet)
Building Instructions on Plan Sheets ..... Yes
Instruction Manual ..... Yes (4 pages)
Construction Photos ..... No
Kit Includes ..... Die Cut & Shaped Parts
Mfg. rec. flying weight ..... 36.5 ozs.
Wing loading based on rec. flying wt. ..... 5 oz./sq. ft.

RCM PROTOTYPE

Weight, ready to fly: ..... 42 oz.
Wing Loading ..... 5.8 oz/sq. ft.
Covering and finishing materials used ..... Solarfilm
Engine Make and Disp. ..... NA
Muffler Used ..... NA
Radio Used ..... Cirrus Sport IV
Tank Size Used ..... NA

MODELERS NEGLIGENCE LIABILITY

BY MICHAEL E. YEKSAVICH

● Filled with pride, you watch as your ship speeds through its paces. Attentively alert, you bring the plane zooming past when suddenly, control is gone. Instantly the object of your pride becomes a dangerous and, perhaps, a lethal weapon. Sometime later, due to the afternoon's events, you are financially ruined by a lawsuit.

Farfetched? Not at all. As an institution, our sport has preached care and safety for years. Those sermons were made for good reason. "Unguided missiles" can result in the loss of aircraft, loss of flying sites, loss of property, and loss of life and limb. Few modelers doubt that the careless modeler reflects adversely upon modeling, but few realize the personal legal consequences of carelessness. Such carelessness is called negligence.

The law of negligence establishes standards to which we modelers must adhere or face imposition of liability. These standards can be quite complicated, but the practice of our hobby entails using complex equipment, exotic supplies, and power planes which can injure others. Thus, we should have an appreciation of how the law of negligence applies to modeling.

Basic to our understanding of negligence law is to recognize that everyone has an obligation to not expose others or their property to an unreasonable risk. In the law, that obligation is termed a duty. Accordingly, we have a duty to not expose others to an unreasonable risk. "Unreasonable risk" is the key phrase, for the determination of whether such a risk has, or has not been created, is the touchstone of negligence law.

Determination of unreasonable risk is made through the use of a fictious person whom we will call the reasonably prudent modeler. This fellow is always prudent or careful and concerned about others safety. In regards to the practice of safety, he is practically perfect.

Blending these bits of information together, the basic negligence formula is evolved. Simply stated, it is, "that failure to behave as a reasonably prudent modeler presents an unreasonable risk to others and is negligence."

The behavior of the reasonably prudent modeler is the standard by which our actions, as modelers, are judged in determining if we are negligent. If we behave as a reasonably prudent modeler would behave under similar circumstances, then we **are not** negligent. Alternatively, if we do not behave as a reasonable prudent modeler would under similar circumstances, then we **are** negligent.

Michael E. Yeksavich is an attorney currently in Government Service. He graduated from the University of Tulsa Law School in 1968 and has taught Business Law for New Mexico State University, Real Estate Transactions for the United States Armed Forces Institute, and has written a programmed instructional text used to teach several phases of law applicable to the military at the Judge Advocate General's School. Among the Bars, the author is admitted to practice before, are the Supreme Court of Oklahoma and the United States Supreme Court.

Suppose a modeler builds a .60 powered pattern plane with paste made from flour and water. It may be poor judgement to build such a plane with such paste, but it may not be negligence. Doubtless it would be negligence to fly the pasted plane, but if the craft were a static display intended solely for viewing, pasting might not be negligence. In the one case, a reasonably prudent modeler would not fly a flour pasted plane, but in the other, it is not imprudent to have a pasted display craft.

Other illustrations involving the negligent and the reasonably prudent modeler include the following examples. A reasonably prudent modeler checks his equipment before he flies; a negligent modeler does not. A reasonably prudent modeler does not buzz spectators; a negligent modeler does. A reasonably prudent modeler does not leave fuel unattended; a negligent modeler does. These contrasts demonstrate how the negligent modeler presents an unreasonable risk to others by his behavior, but the careful modeler does not. Note that negligence does not require an affirmative act, it can result from **not** doing something that should have been done. For example, checking equipment before using it is a negligent act if the check is negligently done. But, not checking equipment before using it can also be a negligent act.

The fact a modeler has been negligent does not complete the liability inquiry. Once negligence is established, a factor named proximate cause becomes an issue. All proximate cause means is that there must be a reasonable connection between the negligent act and the resulting injury or damage. For example, if when buzzing a crowd, one of the members is struck by the aircraft, most of us would agree that there is a clear connection between the injury and the negligent act. Injury to a spectator is a reasonably natural and probable result of buzzing a crowd.

Delving deeper into the proximate cause concept, suppose a flying field is five miles from a town, and our ace craftsman is there with his flour and water pasted .60. Somehow he gets the thing airborne, and once up, it shreds to pieces. One of the pieces is caught up by an unusually strong gust of wind and carried over the town where it falls on a citizen and injures him. Under the circumstances of a distant town and unusually strong gust of wing, it is hard to say that the negligent act of flying the pasted plane is the proximate cause of the injury. It is not a reasonably natural or probable result of the negligent act.

Although proximate cause can be an extremely technical legal question, it is usually a straightforward proposition as in the spectator being hit by the pasted plane example. Nonetheless, since it is a distinct part of negligence law, every case must be evaluated for proximate cause's presence. If the proximate cause link is missing between the negligent act and injury, there is no liability.

You may have noticed that the term "injury" keeps popping into our discussion. Injury is the final element in the negligence liability equation. If no injury results from the negligent act, there is no liability. For example, if the pasted .60 completes its flight without incident, there is nothing to be liable for, i.e., there are no injuries or damages. Although lawyers may differ over exactly what the word injury means (i.e., does only being scared qualify?), there is no argument over the fact there must be an injury in order for there to be liability.

From the discussion, you can tell that although there are different elements composing the negligence liability formula, in application they all blend together. Blended together, these elements yield the result that a modeler's negligence liability arises when an injury is proximately caused by his failure to behave as a reasonably prudent modeler would have behaved under similar cifcumstances. The determination as to whether liability exists in a given factual setting is made by a court utilizing that fundamental rule.

By way of applying the rule, picture yourself on trial for a misadventure you suffered while flying. The court would create for its evaluation how the reasonably prudent modeler would have acted under circumstances similar to those under which you acted. This creation springs from the evidence presented at trial, and something, for want of a better description, best thought of as

fundamental common sense. Your conduct is then measured against the reasonably prudent modeler's conduct. If you do not measure up to his standard, then you have been negligent. Assuming the negligence was the proximate cause of an injury to another or his property, then you would be held liable.

Following a determination that liability exists, an ascertainment of the amount of damages is made. Damages are the compensation paid for the injury resulting from the negligence. It is payable in money, and is computed by the addition of several components. For our purposes, the two most important of these components are what are called "actual damages" and "punitive damages." Collectively, these form the total damages awarded in a particular case.

Actual damages is a self-explanatory term. They are the compensation paid for the actual losses suffered by the victim as a result of the negligence. Actual damages are designed to place the injured party into the same position (at least economically) as if the injury had not occurred. For example, if as a result of a negligent act, a car window is broken, actual damages are the money amount necessary to replace the window.

Included within the gamut of actual damages are such items as hospital bills, doctor expenses and replacement or repair cost for damaged property. Also falling within the actual damages category are payments for "pain and suffering." Doctor bills and the like are relatively easy to ascertain, but who can place a price tag on pain? It is the sort of thing law suits are born of.

The second type of damages we are concerned with are punitive damages, sometimes referred to as exemplary damages. Punitive damages are designed to punish and/or serve as a deterrant to discourage others from similar negligent misconduct. They are not awarded in every case, usually being more appropriate in the cases involving a gross or culpable degree of negligence. Theoretically, at least, there need be no limit on the amount of punitive damages which can be awarded in a case. Thus, in an extreme case, there could be awared $1.00 in actual damages and $1,000,000.00 in punitive damages.

A monetary award resulting from a "little bit of negligence" can be extremely expensive. The importance of prevention and protection is apparent. Prevention means prevent the negligent act; be careful when you build and fly, and aid in the regulatory police of our sport to eliminate the careless modeler. Protection means insure with adequate insurance against the possibility that you might slip. Remember also that the practice of law belongs to the experts. So if you have a question regarding negli-

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ARE YOU ADDICTED?

By John A. Novotny

PLEASE ANSWER THE FOLLOWING QUESTIONS, AND ADD UP YOUR SCORE

1. The FIRST thing I do when I wake up on Saturday is:
- (1) Point — Fool around with my wife.
- (2) Points — Let the dog out.
- (3) Points — Check the wind conditions.
- (4) Points — Run to the work room and see if the paint is dry yet.

2. My bathroom contains the following:
- (1) No reading material.
- (2) National Geographic.
- (3) One or two R/C Magazines.
- (4) My entire collection of 18,347 R/C Magazines.

3. A TYPICAL CONVERSATION with my wife is about:
- (1) The kids.
- (2) The bills.
- (3) R/C.
- (4) We don't talk anymore.

4. I _____ stop at the local hobby shop on my way home from work.
- (1) Never
- (2) Sometimes
- (3) Always

5. I have _____ finished and unfinished models in my work room.
- (1) 1-2
- (2) 3-5
- (3) 6-10
- (4) I haven't counted lately

6. My favorite aftershave lotion is:
- (1) Brut.
- (2) Midnight Romance.
- (3) Old Spice.
- (4) A secret blend of castor oil and thinner.

7. Look at the bottoms of your thumbs, what do you see?
- (1) Thumb print.
- (2) Small dents from transmitter sticks.
- (3) Deep dents from transmitter sticks.
- (4) Transmitter sticks.

8. When I argue with my wife about going to the field, I usually:
- (1) Give in.
- (2) Threaten divorce.
- (3) Lock her and the kids in the basement and go anyway.
- (4) We don't argue any more.

9. Look at the bottoms of your feet, what do you see?
- (1) Clean feet.
- (2) Dirty feet.
- (3) Balsa scraps.
- (4) MonoKote, epoxy, wire, hinges, & #4-40 lock washers.

10. The walls of our living room are covered with:
- (1) Paint.
- (2) Wallpaper.
- (3) MonoKote.
- (4) Blueprints of new R/C planes that I want to build.

11. How much do you spend on R/C in a month?
- (1) $1-$10.
- (2) $10-$50.
- (3) The entire rent.
- (4) I cashed-in my life insurance policy.
- (5) I haven't added it up lately.

NOW ADD UP YOUR SCORE:

10-20 Points	**Good Husband and Father.**
21-30	**Mildly bitten by the bug.**
31-36	**See your family doctor.**
37+	**There is no known remedy for your disease.**

RC FLYING AND THE LAW

SOME LEGAL QUESTIONS CONSIDERED BY

ARTHUR J. SABIN ASSOCIATE PROFESSOR OF LAW

Arthur J. Sabin specializes in the teaching of the Law of Product Liability, Tort Law, including Negligence and Property Law. An Associate Professor of Law at the John Marshall Law School, Chicago, Illinois, Professor Sabin has been an avid R/C pilot for four years. In addition, he was the principal author retained by Kraft Systems, Inc., to write their 1976 Bicentennial Instruction and Installation Manuals. The author has also been retained by Top Flite Models, Inc., in developing propeller standards in terms to instructions and directions with respect to same which, it is hoped, will become industry wide standards.

● The "between flight gabbing" by one group of club members seemed more intense than usual. This time, the subject wasn't the pro's and con's of this design or that kit, which radio was best, etc. No — the topic this time was about injuries, damages and legal liability.

Two weeks before, a club member had, during a flight, accidentally hit another club member in the neck with a pattern ship, sending the injured member to the hospital and causing the total loss of the injured man's plane which he was flying at the time he was hit. The word was that the injured club member was going to sue the other pilot and possibly the club as well.

What did I, an attorney and Professor of Law, think about the situation? The questions came hot and heavy, but boiled down to the apparent need to achieve some fundamental understanding of what was involved. In any situation of this sort, the basic legal question is one of fault . . . with liability for damages (translated into dollars), following the determination of fault. Now fault may be the result of an intentional act (not the case here) or more usually the result of negligence. Negligent fault is essentially the failure to do that which a reasonable person would have done under the same or similar circumstances. Applying this legal approach to the situation at hand, the essential question amounts to this: Whether pilot "A" conformed to the standard of care that a reasonable person flying a radio controlled model would have shown in terms of skill, care and caution under the circumstances at the time of the injury of pilot (or spectator) "B". This is basically a question of fact and if there is a jury trial, the jury will be instructed to come back with a finding of guilt (fault) by measuring the conduct of the defendant (pilot "A") against what a reasonable person would have done under those same or similar circumstances.

The evidence that would be presented to the jury would go to the essential question as to whether pilot "A" had conformed to the demanded standard of reasonableness. Thus, testimony might be presented from "expert" witnesses, in this case, highly skilled pilots qualified by years of experience. Both sides would present such "expert" testimony seeking to establish whether pilot "A" did, in fact, conform to a standard of reasonable care, the care that a reasonable person flying a radio controlled model would have exhibited at that time and place.

Once the jury returns its verdict of guilty or not guilty, should the verdict be guilty, in most instances the jury will also assess the damages during the trial they have also heard evidence as to the extent of the damages sustained by the plaintiff (pilot "B"). In the case at hand, the damages that might be alleged by pilot "B" would normally consist of such out-of-pocket expenses as hospital and doctor bills, loss of wages from work, pain and suffering and the value of the lost plane and its equipment.

It must be understood, however, that the jury could find that there was no negligence in the flying of the defendant pilot and, therefore, the injured plaintiff would recover nothing. Again, the essential here is that there will be no liability unless there is **fault**. The jury must find that the defendant pilot was at fault before they can assess damages because liability (translated into money damages) follows fault.

Furthermore, while there is considerable variance from state to state, certain defenses can be alleged by the defendant pilot against the injured plaintiff. These include the allegation and proof that the injured plaintiff was **contributorily negligent**, meaning, essentially, the the plaintiff was at fault himself. Here it might be established that on that day, the injured pilot was standing on an area of the field that was within the expected flight path of planes. Additionally, the defending pilot has every right and opportunity to challenge the amount of degree of losses which the injured plaintiff is claiming.

The concerns of the group then turned to the question of club liability. The topic is quite a large one with many and varied ramifications. What the members were most concerned about was, however, the question of the liability of the club and/or an instructor with respect to a pilot trainee. The interest in this facet of potential legal liability is important to our club because a great deal of teaching takes place. The club has regularly appointed "instructors" who are so appointed by action of the Board of Directors of the club and who wear special badges carrying that identification. So the questions came in rapid succession: What if the instructor can't get the transmitter back fast enough from the trainee . . . is he liable? Is the club liable for the instructor? What if the trainee hits a spectator or another club member? Is the instructor and/or the club liable?

Once again, the answers to these questions can, for the most part, be understood in terms of liability following fault as discussed in this article. The question, however, became more pointed when I was asked whether I thought there was any written document which would help the club protect itself from liability in the event of loss or damage to the trainee's model during instruction or in the event that, as a result either of some act of the trainee pilot or the instructor, there is personal injury or property damage inflicted upon another. Could the trainee pilot assume that responsibility, I was asked.

In response to these questions and the need of the club with respect to pilot trainees, I prepared a document entitled "Agreement & Undertakings with Respect to Instruction in Piloting Radio Controlled Models." The purpose of this document, which is reproduced for you as a part of this article, has the purpose of fulfilling the essential need of the club and the instructors to have the trainee understand and agree that he assumes the risk of loss and damage to his model and equipment regardless who is piloting same or how the loss occurs and that the trainee assumes the risk of injury or property damage to himself or others which may occur regardless of what fault or error caused same.

Additionally, there is a Hold-Harmless and Indemnification aspect to the agreement whereby the trainee agrees to Hold Harmless the instructor and/or club in the event of any claim or litigation arising out of a training process.

Note that the agreement insists that the member maintain a current membership in the Academy of Model Aeronautics and abide by their rules with respect to insurance and safety instructions.

Agreement & Undertakings With Respect to Instruction In Piloting Radio Controlled Models

This agreement is entered into this ____ day of _____, 197__, by and between Chicagoland Radio Control Modelers, Inc., an Illinois corporation (hereinafter referred to as CRCM) and _____ (hereinafter referred to as the Member).

WHEREAS, CRCM has officially designated by action of its Board of Directors certain of its senior members as Instructors, said designation indicating that CRCM reasonably believes said individuals to be proficient in the piloting of radio controlled model aircraft and capable of imparting said knowledge to others, and

WHEREAS, the Member, having already joined CRCM and wishing to receive instruction in the piloting of radio controlled model aircraft,

NOW THEREFORE, in consideration of CRCM allowing its designated Instructors to teach piloting skills to the Member and for and in consideration of said Member receiving, from time to time, such instruction from one or more designated Instructors, the following shall constitute the terms and agreements between these parties:

1. That the Member shall at all times of receipt of said instruction have then maintained in full force and effect a current membership in the Academy of Model Aeronautics and shall abide by all rules and regulations of the Academy in maintaining insurance coverage and obeying all safety instructions.

2. That the Member understands and agrees that he assumes all risk with respect to the loss or damage of his model and equipment during instruction, whether said loss or damage occurs during his control of the model or during the instructor's control and whether such loss or damage occurs as a result of mechanical or electronic failure or "pilot error."

3. That the Member understands and agrees that he assumes all risks with respect to damage of property or injury to himself or to any other person or persons resulting from mechanical or electronic failure of any nature, or "pilot error" on his part or on the instructor's part, all of which may cause property damage and/or serious personal injury.

4. That the Member agrees to personally hold-harmless, indemnify and defend the Instructor and/or CRCM from any and all claims, suits, causes of action or assertations of liability of any nature whatsoever arising out of or by virtue of any damage, loss or injury as described in paragraphs 3, supra, and to do so regardless of insurance coverage that may be applicable, and regardless of whether he or the instructor are in control of the model at the time.

Entered into at Chicago, Illinois on the day and date stated above.

Chicagoland Radio Control Modelers, Inc.

By:_____

Read, Accepted & Agreed:

_____

Member

No document is going to save anyone from liability for intentional harm. No document is going to protect any person who can be shown to be negligent. Remember that "pilot error" doesn't necessarily mean negligence. If that were true, your really good pilots would never make a mistake and we know that doesn't happen. It is only when a mistake involves the failure to abide by a reasonable standard of care . . . that is . . . that care which a reasonably careful person flying a radio controlled model would have shown under those same circumstances, that there will be liability because there was fault.

A final word of caution: State laws vary greatly and no attempt should be made to follow this "form" unless and until a member of the Bar of the state in which your club is located has reviewed the entire matter and advised the club as to its best course of action.

Happy flying and don't be negligent!

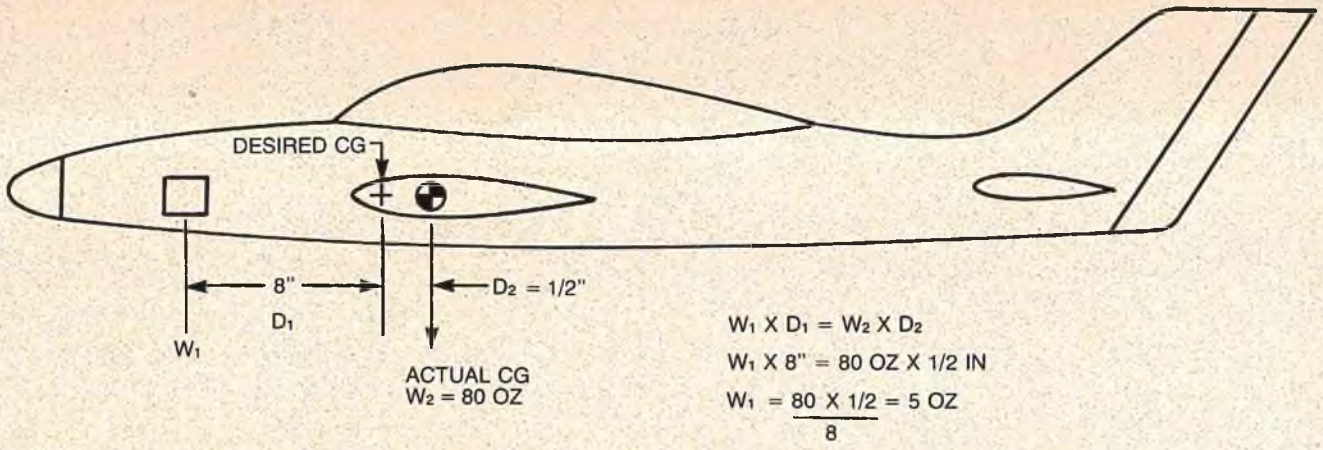


FIGURE 1. BALLAST REQUIRED FOR A FIXED DISTANCE

CHANGING THE CENTER OF GRAVITY

BY MILT SANDERS

● Have you ever wanted to change an airplane's Center of Gravity (CG) by 1/4" or 1/2" to either position it as shown on the plans or experiment a little and then spent half an hour or 45 minutes putting various weights in different places while delicately balancing your pride and joy? Well sit back and find out how to accurately change your airplane's CG with less torn hair and fewer fingernail creases on the wingtips.

This method evolved through similar frustrations in past experiences. Several times I have gone flying and decided to change the CG on my plane, only to find myself totally unprepared. If I happened to find some lead sinkers in my tool box, I had no idea how much it would change the CG without adding, balancing, adding, balancing, etc. I finally sat down and said, "This is dumb!" So being an aeronautical engineer (see what I mean about not using my bean), I took pencil and paper in hand and figured out a simple way to prepare for CG changes. Knowing that all model fliers are not aero engineers, I thought many fliers might benefit if I shared this method with them. Here is the theory.

The entire weight of the aircraft can be represented as acting at a single point, i.e. the Center of Gravity. At the CG, all our moments are in balance. Moments in this respect are considered as weights times distances, and the easiest units to use are inches and ounces. For example, suppose the engine weighs 14 ounces and sits 10 inches in front of the CG. The engine moment is 14 x 10 = 140 inch-ounces. To balance this moment, we need an equal moment behind the CG. If the tail weighs 7 ounces and is located 20 inches behind the CG, we then have a balancing moment of 7 x 20 = 140 inch-ounces. In effect, we are balancing a teeter-totter around the CG by changing weights and distances. But a question immediately arises: the engine, tail, and other components are not point masses nor is the airplane uniform from front to back. How does one get all the distances and weights to balance the moments? This is not necessary. All one has to know is (1) total airplane weight, (2) current CG, and (3) how much you want to change it. Here is the method.

Simply regard the total weight as acting at the Center of Gravity. The amount of desired CG change gives you a distance for computing a moment. When changing the CG 1/2" on an 80 ounce airplane (16 oz. = 1 lb.), the moment to rebalance is 1/2" x 80 oz. = 40 in.-oz. The only trick now is selecting a place to secure the ballast. When you have selected a good spot, measure the dis-

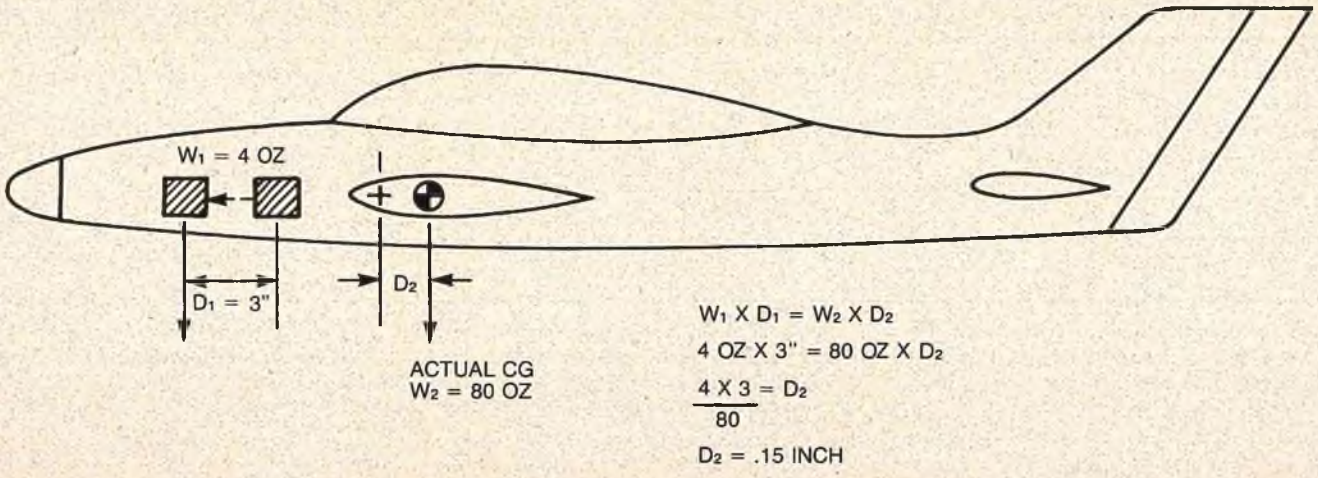


FIGURE 3. CG SHIFT FOR EQUIPMENT MOVEMENT

tance from the **desired** CG to that spot. Multiply this distance by sufficient weight to get the 40 in.-oz. as required in our example: 40 in.-oz. equals 8" times ballast, assuming our measured distance was 8". Solving for the ballast, we get 5 oz. to move the CG 1/2". This procedure is illustrated in Figure 1. As you know, or can surmise, a smaller weight at a longer distance will balance our airplane with the smallest weight increase.

This method also works if you desire to move components, or find out how much effect moving each component can have on the CG. The basic equation, Figure 2, is weight #1 times distance #1

$$\text{WEIGHT}_1 \times \text{DISTANCE}_1 = \text{WEIGHT}_2 \times \text{DISTANCE}_2$$

FIGURE 2. THE CG EQUATION

equals weight #2 times distance #2. Using another example, Figure 3, we will see how much CG change occurs when a 4 oz. battery pack is moved 3". Assume an airplane weight of 80 oz. Weight #1 is the 4 oz. battery, distance #1 is the 3" change, weight #2 is the total airplane, and distance #2 is the unknown CG movement. Substituting these numbers into our equation: 4 oz. x 3" = 80 oz. x CG change. Solving for CG change:

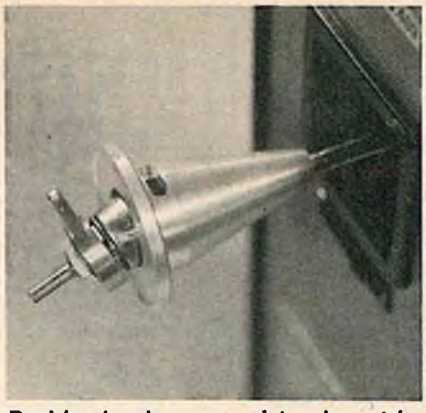
$$\frac{4 \times 3}{80} = .15"$$ or about 5/32 of an in.,

the diameter of a landing gear wire. That really isn't very much for a 5 pound airplane. The amount of CG change does vary with the total airplane weight, though. Entering numbers for both a 3 pound and a 7¼ pound airplane with the same battery and distance change, results in CG changes of 1/4" and 3/32" respectively. Notice that the lighter aircraft has a greater CG shift for the same weight shift.

These numbers may look nice, but what can we get out of them? First, we can see that only small changes can be made by shifting components in the limited room available. This tells us to build carefully in order to arrive at or near the CG indicated on the plans. This also includes equipment placement for proper CG position. Second, these small changes are not bad, since it is wise to change CG in small increments: this keeps airplanes from acquiring poor flying characteristics and ending up planted in the ground. And, third, if you need a large CG change, put a small weight at the greatest distance possible from the current CG.

I hope this method sheds some light on the problem and puts those CG's in the right place with the least amount of frustration. Write and let me know if you have any problems with this method.□

Trim lever installed on Heath GDA-1057.



Rudder knob removed to show trim lever installation.

HEATH GDA-1057 FOUR CHANNEL RUDDER TRIM

BY FREDERICK R. HESS

● The addition of rudder trim to the Heath GDA-1057 R/C transmitter can be easily accomplished with no special tools beyond a Dremel, or similar, hand grinder. Patience and a fine rat-tail file will do if no grinder is available.

Assuming that the transmitter is already assembled and adjusted, the first step is to mark a spot on the rudder control housing. This mark must be on the straight part of the housing just above the taper. The spot should be one-quarter inch from the top of the control housing (not the knob). The mark should be on whichever side of the stick that you want the trim arm. (Mine is at 12 o'clock.) It can be anywhere, so long as it is 30 degrees or more away from the set screw which locks the control in place.

At the marked point, carefully make a center-punch mark while supporting the stick. Drill a number 43 hole here making sure that it is perpendicular to the stick and on a radius. Drill through the aluminum control housing and just start into the steel spacer. At this point disassemble the rudder stick assembly, loosen the set screw and pull the potentiometer up out of the housing. Be careful to make sure there is enough slack in the leads to the control. Remove the steel spacer from the potentiometer and carefully continue drilling the #43 hole through one side of the spacer. Tap this hole 4-40 UNF and set aside.

Using a Dremel, or similar, grinder with a 1/16" rotary file or burr, open up the #43 hole in the control housing to about 3/32" vertically and about 3/8" wide. The width will determine the amount of trim range.

The trim arm can be either made from a 4-40 screw, or a neater one fabricated by threading about 1/8" on the end of a 3/32" diameter rod 5/8" long. The other end should be rounded.

Re-assemble the rudder control, aligning the threaded hole to the slot in

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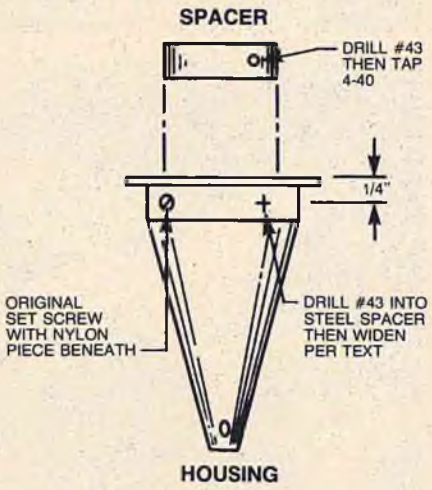
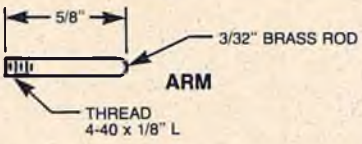




FINISHED STICK ASSEMBLY WITH TRIM

RCM PRODUCT TEST

ALLIED HOBBIES HALF-A STREAKER

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 1/2A Streaker is kitted by Allied Hobbies Mfg., P.O. Box 6568, Orange, California 92667, for 1/2A pylon racing or sport flying. In the pylon racing version, the wingspan is 33-13/32" with a chord of 6", giving a wing area of 200 square inches. The sport version has a wingspan of 35", a chord of 6", giving a wing area of 210 square inches. With a flying weight of 20 ounces, the wing loading is 14.39 ounces per square foot and 13.70 ounces per square foot respectively.

The streaker is an easy plane to build and with the well written instruction manual, novice builders will experience no difficulty. The only modification to the kit was the addition of one more strip of reinforcement tape (full span) along the bottom of the wing. The formed plastic turtleback/canopy was an easy and light way to add to the overall appeal.

The prototype was covered with white and yellow Flight Kote and the plastic turtleback/canopy was painted with white and black RS Perfect Paint. MonoKote trim was used for the stripes. A Cox .051, swinging a 5-4 Cox prop, supplied the power, while a 3-channel Heathkit supplied the guidance. This radio installation used an Ace 225 ma battery pack, it's small in size (1" x 1" x 7/8") and light in weight (about 2 oz.).

Flight performance and overall appeal of the 1/2A Streaker is good. Aileron response was excellent from launch to ground roll-out. The low wing does give some problems when hand launching, but you can let it take-off from the ground with no difficulties.

In conclusion, the 1/2A Streaker is a rewarding kit to build and fly. As a 1/2A pylon racer, it meets the RCM rules and is competitive. □

SPECIFICATIONS

Name	1/2A Streaker
Aircraft Type	1/2A Pylon Racer
Manufactured by	Allied Hobbies P.O. Box 6568 Orange, California 92667
Mfg. Suggested Retail Price	$19.95
Available From	Both Mfg. and Retail
Mfg. Recommended Usage	1/2A Racing
Wingspan	33.4" — 35"
Wing Chord	6 inches
Total Wing Area	200 — 210 sq. in.
Fuselage Length	26¾ inches
Radio Compartment Dimensions	(L) 6" x (W) 2"x (H) 2"
Wing Location	Low Wing
Dihedral	1/2 inch
Airfoil	Semi-Symmetrical
Wing Planform	Constant Chord
Stabilizer Span	10 inches
Stabilizer Chord (incl. elev.)	3¾ inches
Total Stab Area	37½ sq. in.
Stab Airfoil Section	Flat
Stabilizer Location	Top of Fuselage
Vertical Fin Height	2⅛ inches
Vertical Fin Width (incl. rudder)	3 inches
Mfg. Rec. Engine Range	.049 — .051
Recommended Fuel Tank Size	1 ounce
Landing Gear	Conventional
Recommended No. of Channels	2
Recommended Control Functions	Elevator & Ailerons
Basic Materials Used In Construction:	
Fuselage	Balsa
Wing	Ace Foam
Tail Surfaces	Balsa
Hardware Included In Kit	Pre-bent landing gear, straps, screws, linkage
Plan Size	34" x 22" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (14 pages)
Construction Photos	Yes
Kit Includes	Shaped Parts
Mfg. rec. flying weight	21 — 23 ozs.
Wing loading based on rec. flying wt.	15.12 — 15.77 oz./sq. ft.

RCM PROTOTYPE

Weight, ready to fly:	19 oz.
Wing Loading	13.67 oz/sq. ft.
Covering and finishing materials	MonoKote, Perfect Paint, Flite Cote
Engine Make and Disp.	Cox TD .051
Muffler Used	No
Radio Used	Heath
Tank Size Used	1 ounce

The Grand Champion, an immaculate Curtiss F6C-4 by Granger Williams.

ORANGE COAST RC CLUB SCALE CONTEST

BY DICK TICHENOR

● One of the largest scale contests that we have ever been aware of was held at Mile Square Park in Southern California and hosted by the Orange Coast RC Club. A turnout of 52 magnificent models included a wide variety of aircraft types, something of interest for everyone.

This scale meet was unique as there were two events. The first was AMA Sport Scale, the second was called Static Scale in which the ground judging resembled the AMA Scale event. If an entry in Static Scale was flown, no specified maneuvers required, the builder was awarded 20 additional points. Proxy pilots were allowed but if the builder was the pilot, he received another 5 points. Most of the Static Scale entries were flown.

RCM considers this contest very significant as most scale contests rarely attract more than a dozen or so entries and we would like to relate why this contest was so successful. The key was a small group of scale enthusiasts who sincerely wanted a successful scale meet and were willing to exert their time and effort to organize and promote it. The ramrods were Harris Lee and Bert Baker. Planning for the meet began about a year in advance. Quite a few scale modelers were contacted to determine what type events would attract the most entries. That is how the Static Scale event was conceived which would give an equitable opportunity to compete to the modelers who excelled in detail work while not being quite so talented in flying ability.

The contest date was selected and reservations for use of the field was made nine months in advance. Flyers were printed with the initial distribution made to clubs, hobby shops, magazines and known scale enthusiasts. This early announcement proved worthwhile in creating interest in the contest and allowed the modelers plenty of time for preparations.

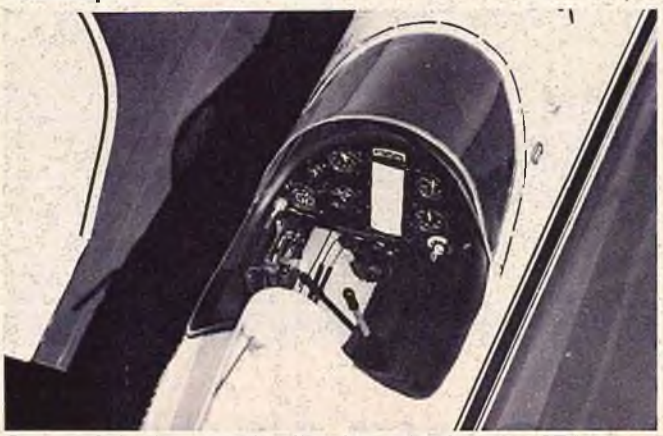
A flyer was given to each modeler who displayed models at the MACS trade show in Anaheim, California. The MACS show was an opportunity for the contest organizers to personally contact the model industry, to explain their contest concept and to ask if they were interested in donating prizes. Soliciting prizes from the industry is a delicate matter as the manufacturers are constantly being approached for donations and they all have a budget that limits their contributions. The contest organizers

to page 102

Just like the hero in old time movies; Granger Williams made realistic flights with the Curtiss F6C-4.

Lloyd Whitmarsh's Waco gets the 10 foot scrutiny from Bill Northrop and Frank Szekula.

Ryan STA by Ray Lay was probably the most detailed model at the contest, but had take-off problems.



Some of the interior details of Ray Lay's Ryan STA.

Every scale meet must have a Piper J-3 Cub. This beauty belongs to John Haggart.

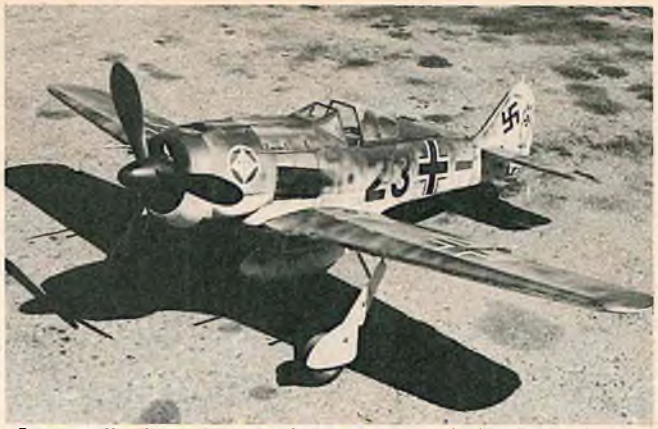
Colby Evett's Grumman F8F Bearcat drops belly tank and bombs and fires rockets.

Gene Sidwell prepares his beautiful Pitts Special for a flight.

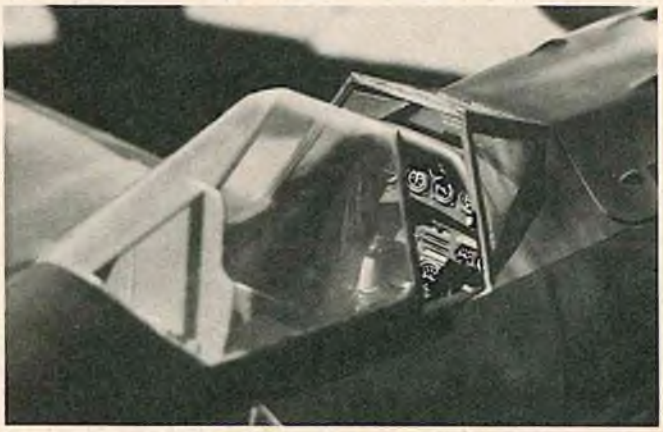
Bald Eagle is Armand Veronico's P-51 choice.

Don Lien took 3rd Place in Sport Scale with this Spitfire.

Jerry Ortego's P-47 Thunderbolt flies well.

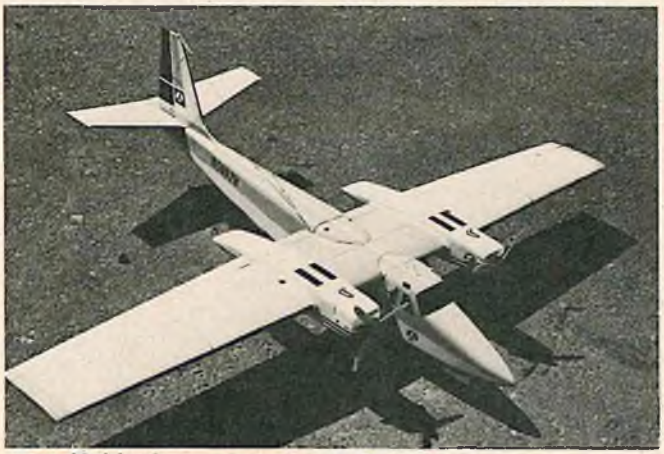


Gene Wiley's Focke Wulf 190A has a sliding canopy.

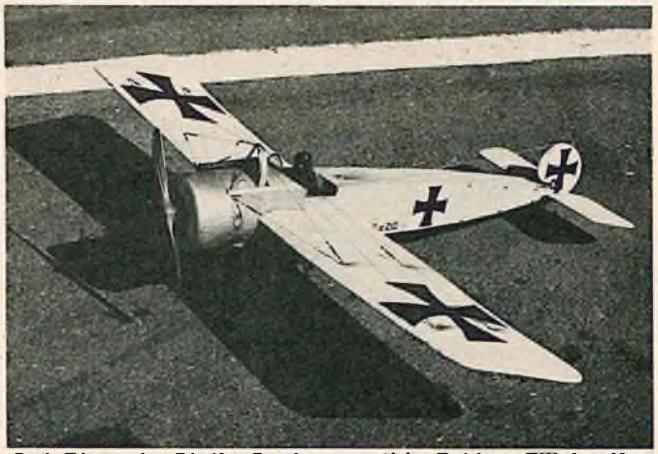


Impressive cockpit details in Gene Wiley's FW 190A.

Beautiful Nieuport 17 by Don Lien.



Ken Holden's well-known Shrike Commander.



3rd Place in Static Scale was this Fokker EIII by Ken Holden.

A portion of the line-up for ground judging.

Ducted fan entries: YF16, Roman Yerema; Lockheed S3-A Viking, Dave Lindsay; Grumman Cougar, Larry Wolfe.

S3-A Viking details by Dave Lindsay.

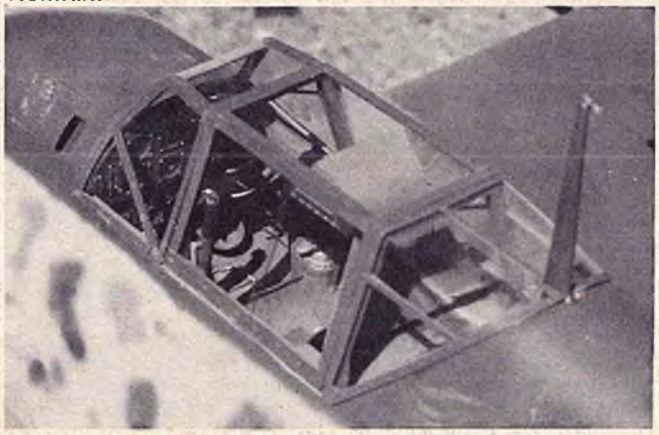
Neat Piper Colt by Ross Pierce.

Frank Comyns' realistic Pitcairn Mailwing.

Earl Thompson entered his Cessna 310II.

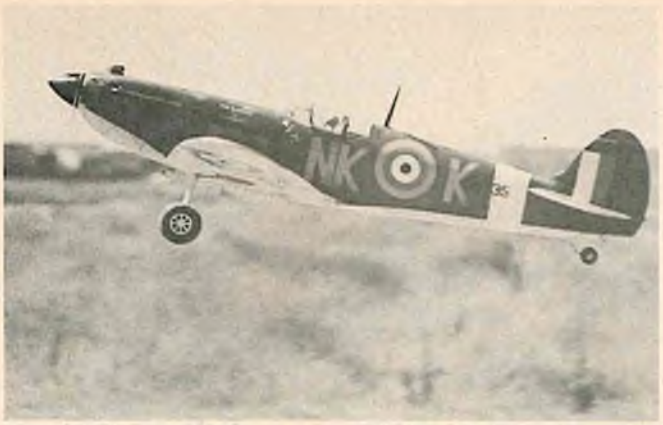
Grumman F6F with weathered finish was entered by Bob Holman.

Earl Thompson's detailed ME-109.

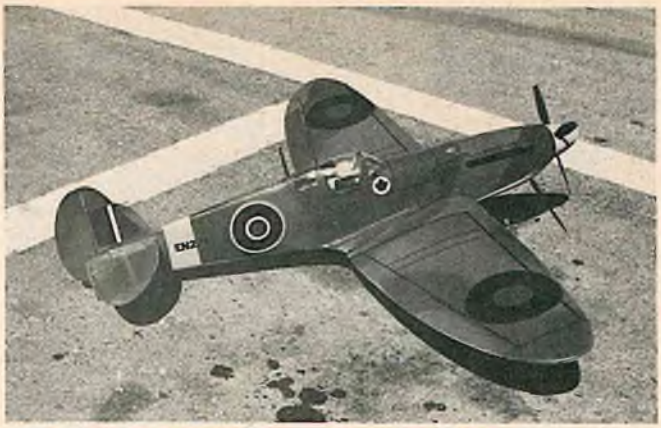


Cockpit in Thompson's ME-109.

Bob Olson flew his light blue Waco YMP-3.

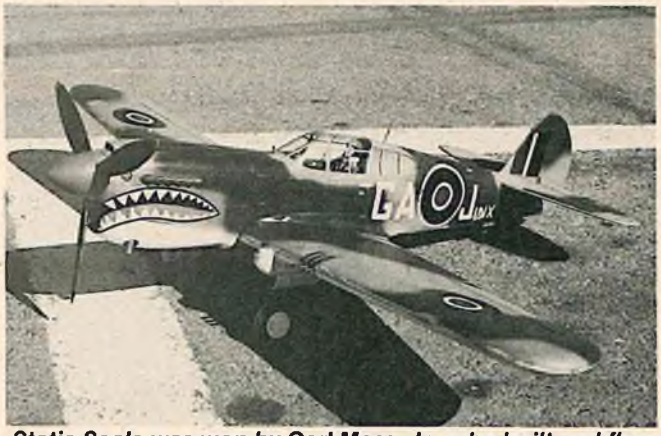


Spitfire by Jack Watson roars into the sky, 2nd in Static Scale.



This Spitfire was built and flown by Clint Williams.

2nd Place in Sport Scale was won by Bert Baker with his weathered finish P-39 Aircobra.



Static Scale was won by Carl Mass, Jr., who built and flew this outstanding Curtiss P-40.

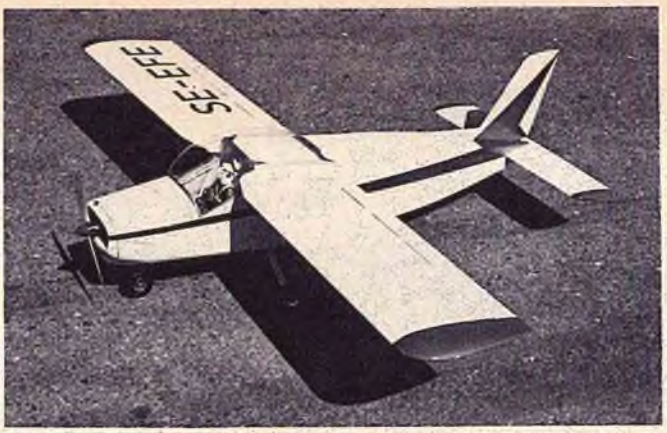
Jack Cleveland's entry was this Republic P-47 Thunderbolt.

Hal Wright is the builder of this Douglas JD.

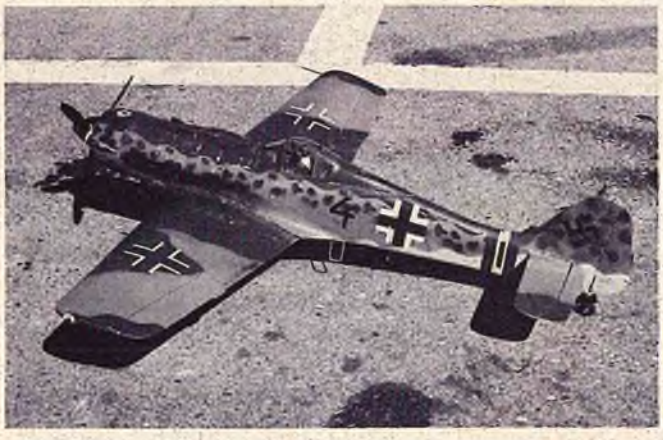
Tim Holden entered his P-51 Dallas Doll.

Progress in fighters, Granger Williams F6C-4, Roman Yerema's YF-16.

Frank Comyns' Waco 10.



MALMO MF1-G by Harry Apoian.

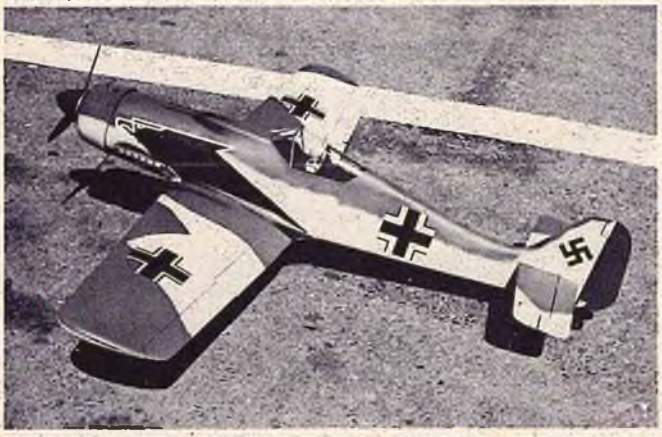


Ed Reints weathered the finish on his FW190-9.

A Tony take-off by Gary Randolph.

Larry Jenno makes a landing gear repair to his Fleet Trainer.

A Spirit of St. Louis by Ken Holden.



This FW190-9 was built and flown by James Meister.

A powered Waco glider by Harry Apoian.

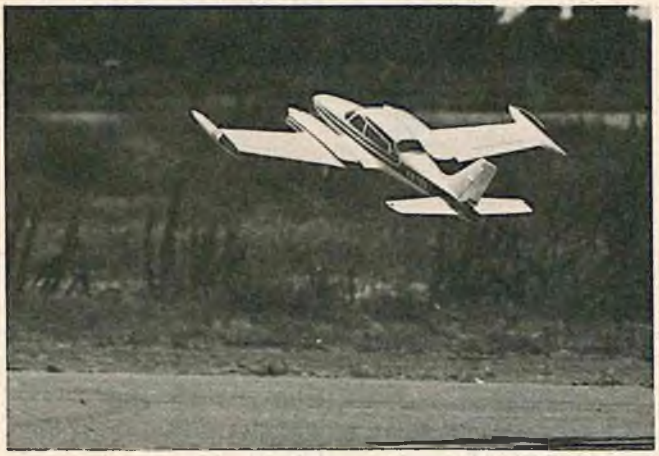
Joe Kirn brought out a Tallmanz B-25 Photo Ship.

Boomer is a P-51 by Jerry Bruce.

Jack Swanson's FW 190.

A Tony by Orville Hinshaw.

Spectators were allowed a close-up look during the lunch break.

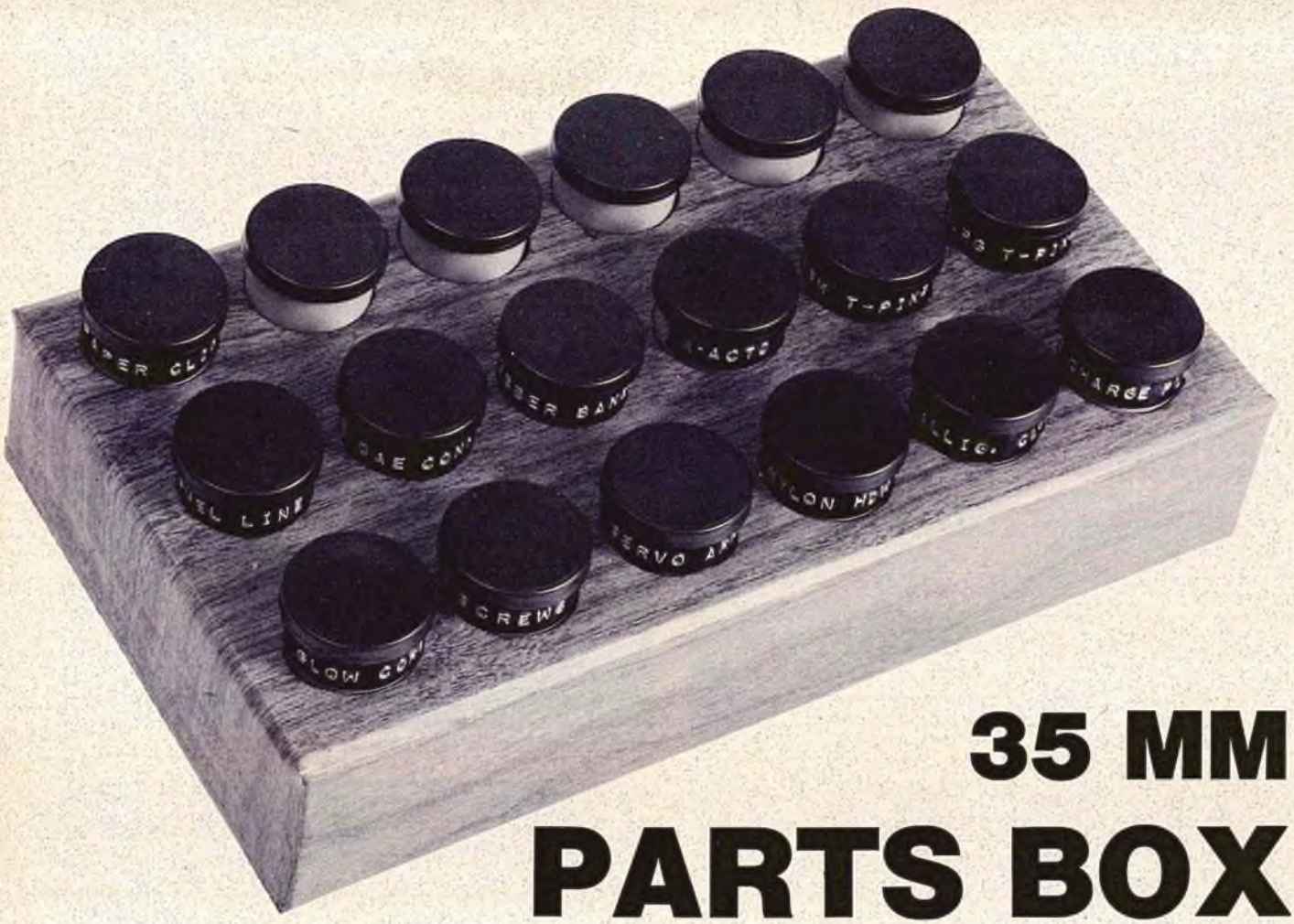


Earl Thompson's Cessna 310II heads for the sky.

Bert Baker's P-39 Aircobra.

We didn't get his name, but it's a beautiful P-51!

BY RALPH TOMACCIO



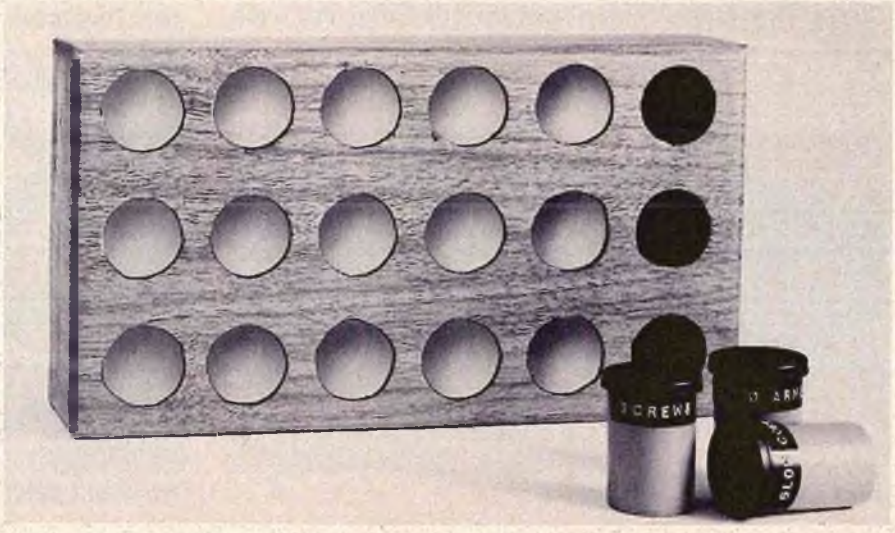
35 MM PARTS BOX

● Most people are familiar with the usefulness of the plastic 35mm film container for holding small parts and, being a professional photographer, I have more than my share laying around the house. Priding myself in being somewhat organized, I decided to make a holder suitable for both the workbench, as well as for taking to the field, for those unexpected repairs which call for the small parts usually left at home.

Any sturdy box at least 1¼" high can be used. Mine is made out of a very sturdy box used by the Polaroid Corporation in packaging their 4" x 5" sheet packets. Ask your local photographer to save you a couple. It holds 18 film containers very nicely. For the perfectionist, it can be covered easily with contact paper and made to look extremely attractive. 1/2" wide Dymo labels are used on the sides of the film containers for easy identification. They may be put onto the box, but this necessitates taking the time to locate the proper hole if more than one is out of the box.

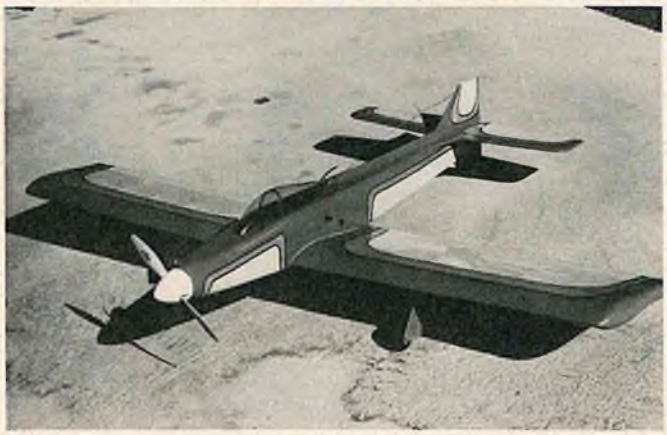
If the box is higher than 1¼", as is the Polaroid box, an inner shelf must glued inside to raise the containers above the top. This allows for easier removal, even by the large handed modeler. Another Polaroid box was used, in this case by splicing it lengthwise to create the required height. Before gluing it in place it was covered with felt type contact paper.

After the box is covered and holes cut, run a black felt tip pen around the inside edge of the holes to finish off the appearance. □



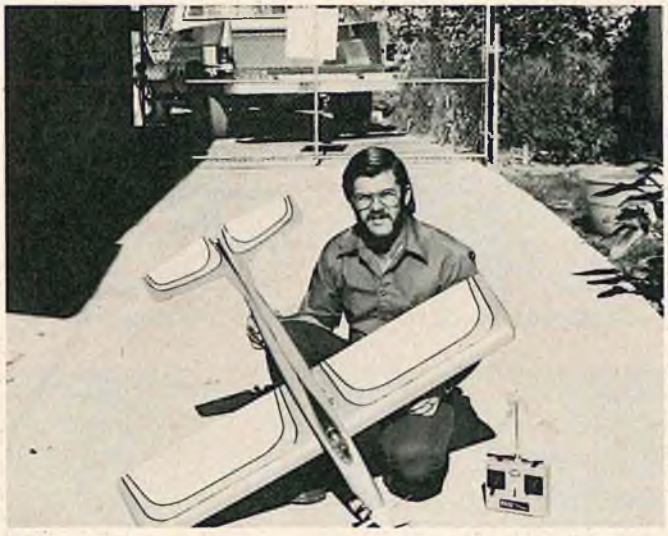
RCM PRODUCT TEST

ACE RC, INC. SUPER PACER



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



● The Super Pacer, from Ace R/C, P.O. Box 511, 116 West 19th, Higginsville, Missouri 64037, is a sport pattern ship designed for .23 to .25 engines. With a wingspan of 46" and a chord of 8", the total wing area is 408 square inches. Our prototype weighed 49 ounces ready-to-fly, giving a wing loading of 17.3 oz./sq. ft.

This is an excellent kit with top quality wood and all parts separated and bundled in their respective groups. With the use of Hot Stuff and 5-minute epoxy, the kit builds quickly and accurately. The only modifications we made was the addition of 1/16" plywood wheel skirts. A word of caution with regards to your radio installation is to plan ahead, since the aileron servo and its attendant linkage takes up quite a bit of room in the radio compartment. The three tone finish on our prototype was accomplished by first covering the appropriate areas with yellow and red Flite Kote with orange MonoKote trim areas touched off with DJ's trim tape.

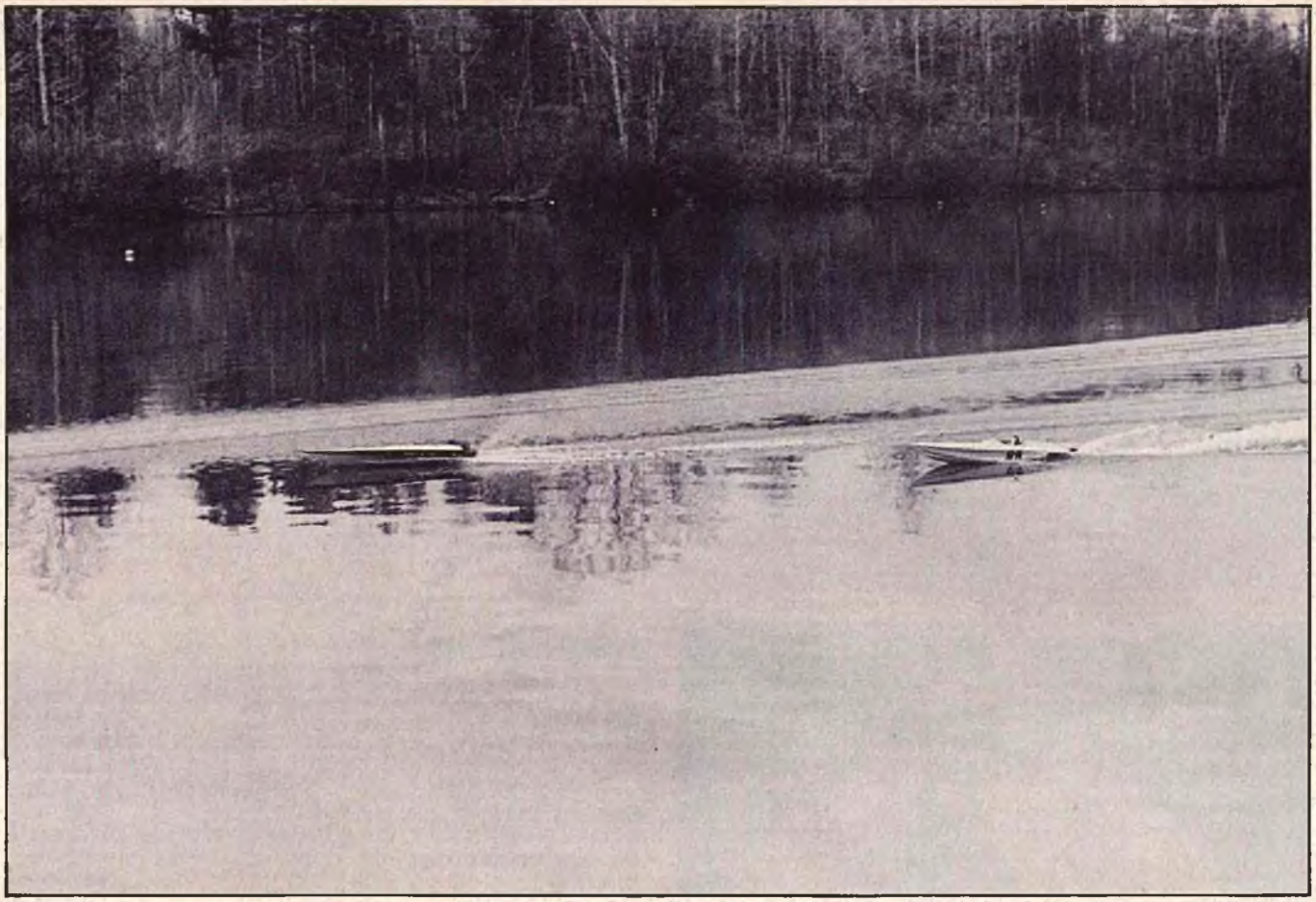
Ace R/C designed the Super Pacer for solid, smooth performance with good ground handling qualities so the complete competition regimen could be accomplished. All of these considerations are met by the Super Pacer since both flight performance and ground handling are excellent. The novice flier will experience no problems in taxiing, or taking-off, because of the wide stance landing gear and low profile. Unlike many designs of this type, rudder response is excellent and knife edge flight is no problem. We would rate the Super Pacer as an outstanding kit at $32.95. The kit is well thought out, easy to build, and rates high in the performance department. □

SPECIFICATIONS

Name	Super Pacer
Aircraft Type	Sport and Pattern
Manufactured by	Ace RC Inc.
	P.O. Box 511
	Higginsville, Missouri 64037
Mfg. Suggested Retail Price	$32.95
Available From	Mfg. and Retail Outlets
Mfg. Recommended Usage	Sport & Pattern Comp.
Wingspan	46 inches
Wing Chord	8 inches
Total Wing Area	408 sq. in.
Fuselage Length	40 inches
Radio Compartment Dimensions	(L) 2½" x (W) 2⅝"x (H) 8¾"
Wing Location	Low Wing
Dihedral	1 inch
Airfoil	Symmetrical
Wing Planform	Constant Chord
Stabilizer Span	19⅜ inches
Stabilizer Chord (incl. elev.)	4⅞ inches (avg.)
Total Stab Area	76.5 sq. in.
Stab Airfoil Section	Symmetrical
Stabilizer Location	Top of Fuselage
Vertical Fin Height	3½ inches
Vertical Fin Width (incl. rudder)	5⅞" (avg.)
Mfg. Rec. Engine Range	.23 — .25
Recommended Fuel Tank Size	4 oz.
Landing Gear	Conventional
Recommended No. of Channels	3 — 4
Recommended Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa
Wing	Balsa
Tail Surfaces	Balsa
Hardware Included In Kit	Pre bent landing gear, canopy & others
Plan Size	28" x 20" (2 sheets)
Building Instructions on Plan Sheets	Yes
Instruction Manual	No
Construction Photos	Yes
Kit Includes	Die Cut & Shaped parts
Mfg. rec. flying weight	48 ounces
Wing loading based on rec. flying wt.	17.1 oz./sq. ft.

RCM PROTOTYPE

Weight, ready to fly:	49 oz.
Wing Loading	17.3 oz/sq. ft.
Covering and finishing materials used	Flite Kote, MonoKote
Engine Make and Disp.	S.T. 23
Muffler Used	Super Tigre
Radio Used	RS 5 Channel
Tank Size Used	4 ounce



ABOVE: Boat on left is at speed while the trailing boat is slowing to enter pit area. BELOW: Herb Stewart, Florida, is about to receive wife Ricki's boat for its mandatory pit stop.

ATLANTA MINIATURE OFFSHORE CLASSIC

BY BO INGRAM, JR.

● A sleeping giant roared to life during the last few days of March this year in sunny ole' Atlanta, Georgia. The Atlanta Miniature Offshore Classic, which has been hailed as many of those who should know as the largest IMPBA sanctioned Deep-Vee race ever, came off with almost not the least little problem or complaint.

Sleepting giant? That is what this writer and many of the Metro Atlanta Model Boat Club considered themselves until last year when they decided to hold the first sanctioned R/C Boat Race Atlanta has ever seen. It was not without its problems and woes and, in that perhaps is the real story to be told.

The first problem the MAMBC tackled was sponsorship. Through the energetic efforts of its members, the MAMBC acquired the sponsorship of the Atlanta Coca-Cola Bottling Company. One of the firm's top management had been a full-size off-shore racer at one time and lent an interested ear to the project and awarded the Coca-Cola sponsorship both in name and money.

As soon as rules governing the race were decided upon, a gigantic effort to attain a trophy and prize list second to none was initiated. Letters to the various manufacturers and distributors went out. The reaction was better than ever anticipated and over $1,500.00 in prizes and trophies eventually poured into the coffers. That was not the only thing that poured in the MAMBC office. Entries by the dozens started coming in and Contest Director, Dave Field, knew that we had a tiger by the tail.

When the race was originally conceived, we considered the total number of outside entrants might go as high as 30, but never in our wildest ramblings did we envision the total number of entrants reaching the final number of 65 entrants entering a total of 96 boats for the two day affair.

With the entrants pouring in at an ever increasing rate, and the club getting favorable attention and coverage from John Bridge, President of IMPBA, as well as others, the club set out on a media blitz that a Presidential candidate would envy. Through hard work press coverage from the local papers, as well as television exposure, was gained prior to the race. The PR department of world famous Stone Mountain Park, the fabulous State park that was the site of the Classic, put their organization behind the race with press releases to the various home-town papers of the club members. In all, the club gained exposure of well over 3,000,000 viewers and readers. This is the kind of effort that is going to be needed, prior to the time when the day comes that R/C modelers of all types, must take their case before the public, when such problems as industrial users of R/C frequencies and CB Radio intrusions become a serious threat to our hobby/sport.

All in all, the pre-race effort was one that any club would be hard-pressed to duplicate, and one that we feel justifiably proud of. But the pre-race effort was only a prelude to the efforts and organization that went into the race itself. As March 20, the first day of the race neared, the MAMBC sleeping giant had its eyes opened to the stark realities of conducting a race of this size. Frequency conflicts were, as usual, the biggest headache, but with much telephoning around the U.S., the final race format was settled. In lieu of the original 4-15 minute heats for each class, a decision was made to cut back to 3-15 minute heats so the mandantory engine off pit stop could be left in and heats of from 5 to 7 boats could be run. Engine classes were left at .00 to .41 CID and .42 to UP CID.

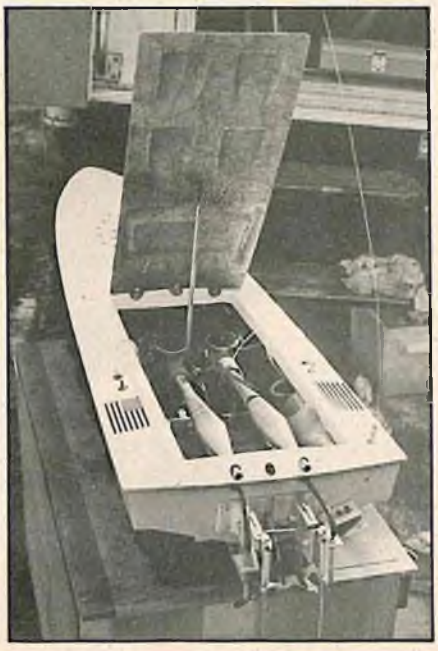
As the big day neared, final preparations were made and, when Friday March 19th rolled around, room accomodations and the 1001 other problems had been solved. Registration went smoothly with all those registering receiving a race package with all necessary information and ID tags, as well as a complimentary race patch and a Coca-Cola 50th Anniversary tray.

Saturday — Race Day. With 96 boats to run in the two classes in two days, the fact that the heats had to be run with a minimum of problems was stressed by the CD. After a short drivers meeting, the first heat was called. What happened the rest of the day can only be described as mind boggling. The scream of as many as seven Schneurle Ported 40's and 60's for nine hours can be appreciated only by those lucky few who have witnessed such a spectacle. With the exception of a one hour liquid sunshine delay, all went without a hitch. As usual, the premium was placed on consistent driving of a reliable boat with speed a secondary consideration. The organization was fabulous and the race proceeded as scheduled with Assistant CD, Harry Jones, calling the play-by-play.

Saturday night, the cocktail party that had begun on Friday night continued for all those who had registered, as well as their guests. Steve Muck treated everyone to a showing of several films of full-size off shore racing and an unexpected surprise came when John Bridge dropped in on the party. John stayed for much of Sunday's racing and we are very appreciative of his attendance.

This writer, who had never witnessed such a race, had thought that nothing could top the organized mayhem that had been conducted on Saturday, but it was pale compared to the driving on Sunday when the $1,500.00 worth of prizes and trophies were within the reach of many, some who had come from as far away as California. The show they put on for the over 1500 spectators

One of the several twin 60's entered in race.



.40 CLASS WINNERS: 1ST ROW, Kevin Kaler; 2ND ROW, (L) Bob Obukuro (R) Ed Keedy; 3RD ROW, (L to R) Rip Holdridge, Tim Smith, Mike Kelly, Alex Haynes.

.60 CLASS WINNERS: 1ST ROW, Fred Gimbel; 2ND ROW, (L) David Shad (R) Kevin Kaler; 3RD ROW, (L to R) Rip Holdridge, Dexter Crotts, Paul Beckman, Randy Hughes.

HIGH POINT WINNERS: (L) Alex Haynes, 3rd (C) Kevin Kaler, 1st (R) Rip Holdridge, 2nd.

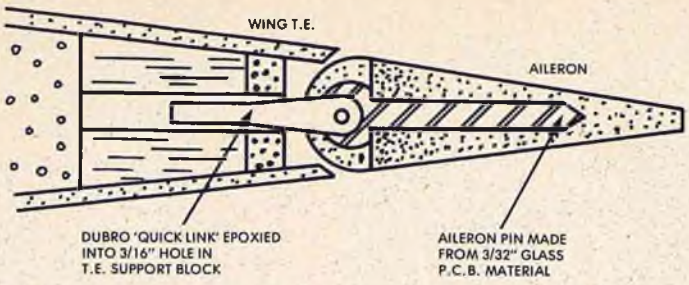
View of action in the drivers area at the highly successful Atlanta Miniature Offshore Classic.

was nothing short of unbelievable. As things began to come down to the wire on Sunday, a definite trend was being established, and that is the old addage that a Deep-Vee racer does not have to be fast to win, would not hold water in Atlanta. The group from Baltimore showed that to everyone with a fleet of OPS powered 3-D's that had everything vital to Deep-Vee racing: Reliability and consistency. But they also had the one other factor that is usually inversely proportional to the other two — speed. Blistering speed!

When all was said and done, the Baltimore group captured five of the fourteen silver Revere Bowls that were awarded in the two classes, as well as taking home first and third high point prizes, which were awarded to the top three drivers for most laps completed in both classes combined. And they did it pure and simply by having their proverbial "acts together."

The racing started winding down during the middle of the afternoon with accidents taking their toll, but, in the end, this Classic was relatively free from major wrecks or protests. This was due in large part to the skill and experience of those in attendance. Run-offs and re-runs were scheduled immediately following the last race with awards following.

Trying to write a closing comment on this event is simply impossible. Perhaps the one point that must be stressed is that all this was accomplished by a club that is less than a year old. A club of dedicated RC'ers that have so far been able to work and have fun without the usual petty problems that endanger so many organized R/C Clubs. It was good honest work and the end result was a weekend of racing and camaradierie that will not be soon forgotten by those who were lucky enough to have participated in the First Annual Atlanta Miniature Offshore Classic. □



SCALE-LIKE OFFSET AILERON HINGES

BY MAJ. B.G. WATTIE

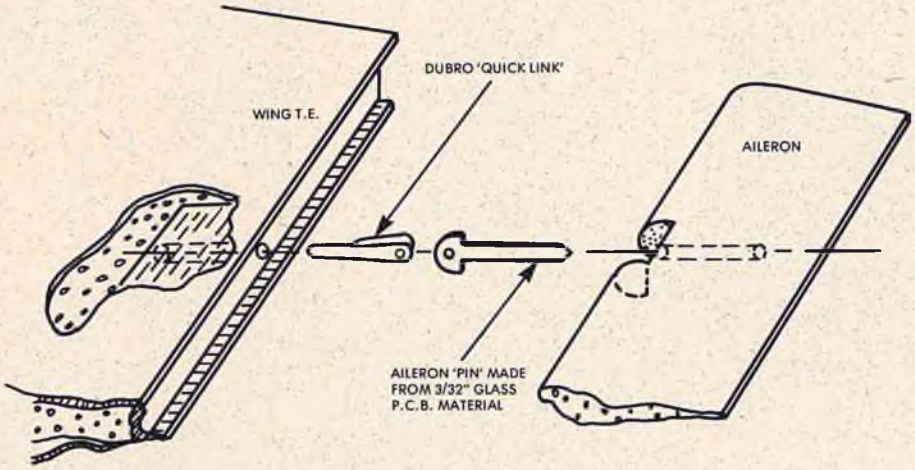
If you've tried to duplicate simple offset aileron hinges as used on full-scale aircraft, you know how frustrating it can be. Here's a simple method that can also be used on any control surface where you want to maintain a smooth airflow.

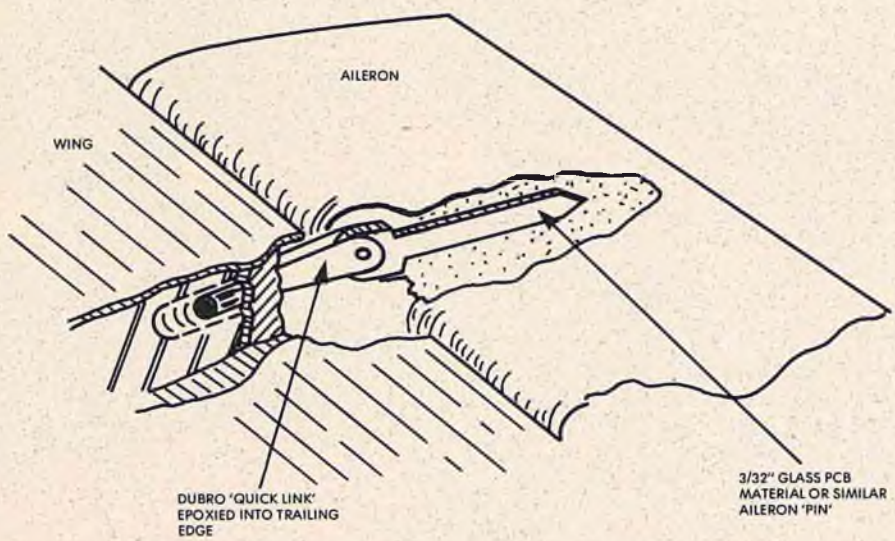
● After several unsuccessful attempts at duplicating simple offset aileron hinges as per full scale aircraft, I have arrived at the optimum solution as depicted in the accompanying sketches.

Normally, I finish and paint both wings and ailerons prior to installation. The aileron 'pin' is cut from scrap 3/32" Printed Circuit Board (PCB) material. Check your local surplus store for a cheap supply and be sure to use the glass epoxy type board.

The hinges are located and installed in the aileron first. The insets are cut and a hole is drilled into the aileron to suit the aileron pin. Then the pin, with the Du-Bro Kwik-Link attached, is epoxied into the hole in the aileron. When dry, the aileron is aligned against the trailing edge of the wing to locate the holes for the Kwik Link part of the hinge. Drill a 3/16" hole as deep as required, fill with epoxy, then press in the aileron assembly. Check for final alignment while drying.

All of the above takes less time to actually accomplish than it does to write about how to do it. The prime advantage of the steel support over commercial nylon type hinges is obvious. I have found that they are strong enough so that only three are required on a typical fourteen inch "barn door" type aileron. Of course they're useful for other control surfaces as well as for non-scale applications where you want to maintain a smooth airflow. □

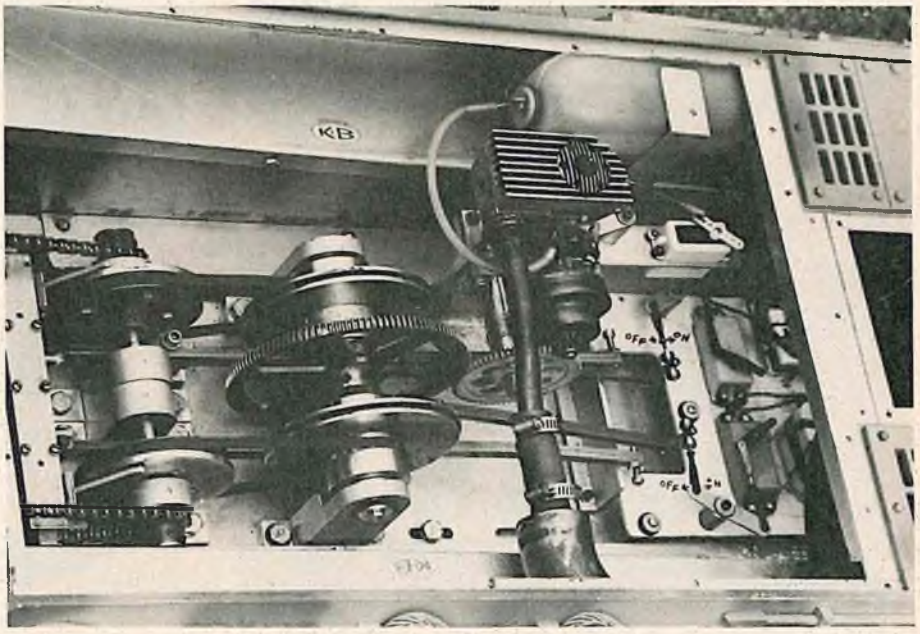




Clarence Johnson is a machinist with the postal service in Los Angeles, California. His prime hobby is live steam locomotives. The Tiger II tank is 1½" = 1" scale, 52" overall length and weighs 115 pounds. Most of the Tiger's parts are aluminum castings from patterns made by Clarence. Details are accurately reproduced. Road wheels have independent suspension.

TIGER II

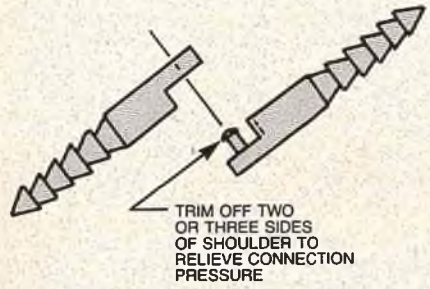
CLARENCE JOHNSON'S FANTASTIC R/C MODEL OF THE WORLD WAR II GERMAN ARMY TANK. BY DICK TICHENOR

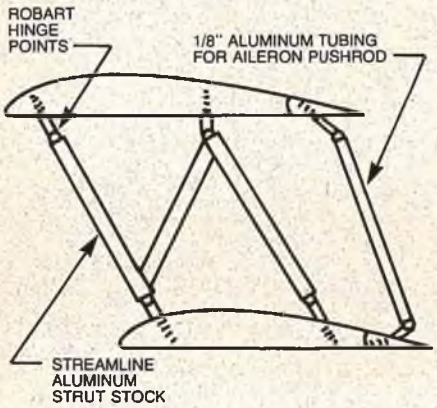


TOP, RIGHT: Clarence explains some of the Tiger's features to Don Dewey and Dick Kidd. Turret is removed for starting engine. Dewey's body guard, Officer Wayne Bailey, S.M.P.D., in background. LEFT, CENTER: Smoke pours realistically out the rear exhaust stacks as the tank travels at a scale speed of approximately 32 mph (actual 4 mph). Officer Bailey, Fire Marshal Probart, Detective Bill Kent, S.M.P.D., and Don Dewey watch the performance. BOTTOM: Are you ready for this? The 115 lb. tank is powered by a Veco .19 air cooled with a heat sink head and a centrifugal clutch in flywheel. Each set of treads has an individual servo operated clutch and disc brake. Reduction gearing is clearly shown. Cannon radio installation is shown. A heavy duty battery pack is used. ABOVE: Climbing the sharp incline of the Police Department parking lot doesn't slow the heavy Tiger making its realistic charge.

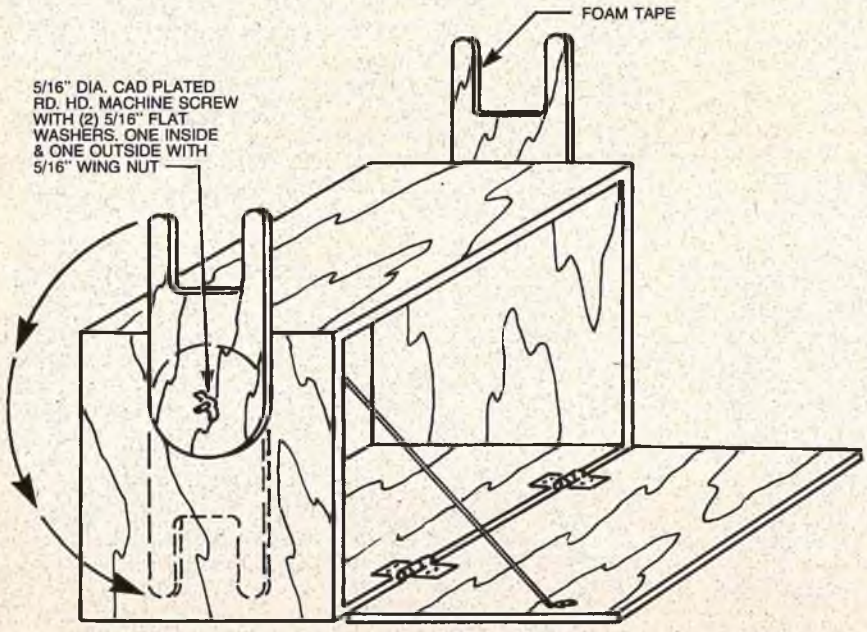
FOR WHAT IT'S WORTH

Trimming a Robart Hinge Point allows easy assembly and disassembly of interplane struts. The connection is still strong in tension, but pops apart easily. Push end grain balsa into the aluminum struts, add a couple of drops of Zap, then drill a 1/8" hole for the hinge point. A drop of Zap secures the pin. This idea was submitted by Larry Well of Corvallis, Oregon.





The accompanying sketch from Andy Lelich of Pittsburgh, Pennsylvania, shows how to install a simple collapsible cradle for your field box and is completely self-explanatory.



Almost everyone has, or will someday, break a wing dowel rod. Removing the epoxied stub from the wing is an operation that requires a small hatchet and much reconstruction work in order to repair the structural damage. Allan Weir of Ithaca, New York, has a simpler solution. During construction, instead of installing the wing dowel rod, Allan installs a piece of arrowshaft of the appropriate inside diameter which is epoxied in place in the wing. The dowel rod is then slipped inside the arrowshaft and can be easily removed should the need arise.

On 1/64" plywood covered foam wings, ailerons and other cut-outs are easily made using a cut-off wheel and a Dremel Moto-Tool. Outline the cut-out sections in pencil (allow for balsa facing) and cut just through the skin with the Moto-Tool. Next, use a sharp knife to cut through the foam from both sides. Sand lightly and face the bare foam with balsa. Conventional ailerons are easily made when this procedure is combined with the use of torque rods. (RCM 2-76). This idea was submitted by E. Scott Hinckley of St. Johns, Arizona.

After losing two nylon wing hold-down bolts, Anthony LaVardera of Bellmore, New York, decided there had to be a better way. First, he put 5-minute epoxy glue into the clearance holes in the wing. Anthony used just enough to prevent the screws from passing through as shown in Figure 1. Next, he ran a tap through the holes with the same thread size as the nylon screws as shown in Figure 2. He then removed some of the threads from the nylon screws as shown in Figure 3. The screws were then threaded through the wing where they are captive to the wing and will not fall out. Removing the threads does not weaken the screws and they are free to turn when you attach the wing to the fuselage as shown in Figure 4.

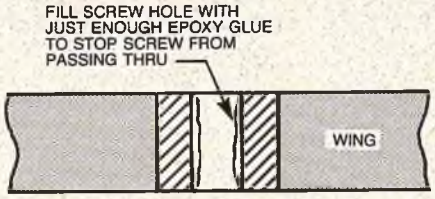


FIGURE 1

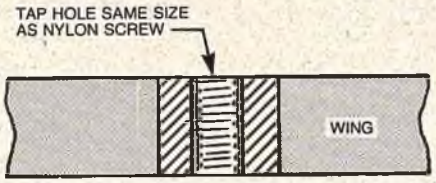


FIGURE 2

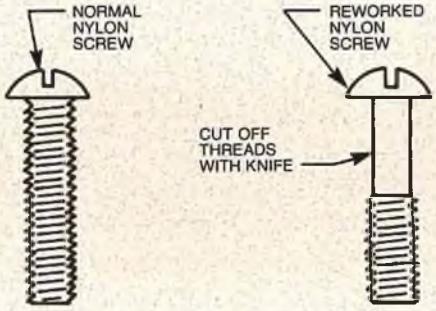


FIGURE 3

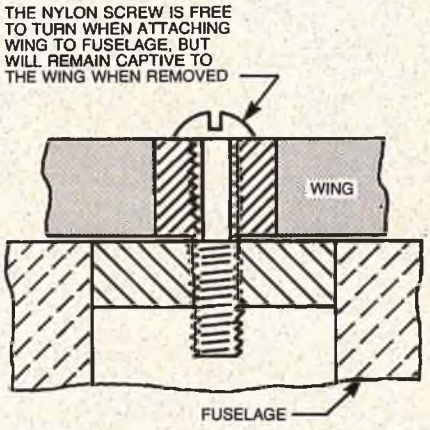


FIGURE 4

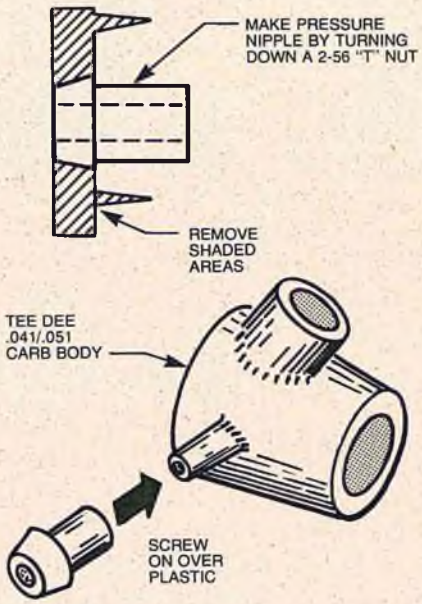
Ralph E. Turn of Amherst, Ohio, writes that, when using a 1/16" plywood template for cutting foam wing cores, it seems that no matter how smooth you make the edges, the wire still catches and drags over the surface, causing roughness in the surface of the core. Recently, while experimenting with foam materials, Ralph discovered that, if you

rub the edge of a lead pencil point over the surface of the template edge, it will leave a layer of graphite, which is one of the best lubricating mediums. This will also eliminate the catching and dragging of the wire. Ralph's cores have improved 100% in quality since he employed this simple trick.

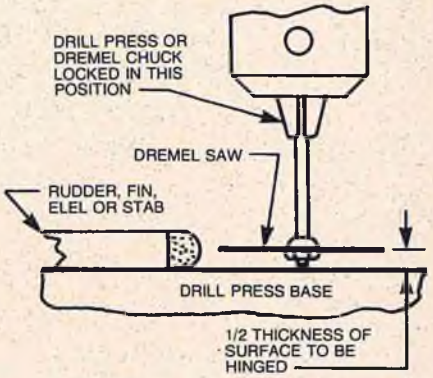
One of the most reoccurring problems, either with kits or scratch-built aircraft, is fuselage alignment. Before Bill Schott of Bath, New York, began using the following idea, he'd pile National Geographics, or other heavy magazines, on the fuselage to hold it in eyeball alignment until the glue dried. At best, this is a hit-or-miss proposition. The solution for building straight fuselages every time, is to trace the top view of your model onto a 2" x 6" or 2" x 8" piece of lumber, using ordinary tracing paper. Band-saw around the outline carefully. Next, tape or clamp this jig closed where the bandsaw blade entered, and support it over a flat surface using three short lengths of 2" x 4" material. Put your fuselage sides inside the jig and install the bulkheads in their proper location. This will force the sides out against the cut-out outline. If the cut-out was accurate, you just cannot build an out-of-alignment fuselage. Bill leaves his fuselage in the jig as long as possible and adds stringers, etc. When all is done, you unclamp it and the straight fuselage is easily removed. To date, Bill has built one RCM Sportster, two RCM 40 Trainers, two AcroStars, 3 PD Parasols, and one RCM 60 Trainer in this jig and all came out straight as a die.

Here is an invaluable tool for checking wings for warps or other forms of misalignment suggested by Glen Saxby of Alice Springs, Australia. If a constant chord wing is used, then the "Wing Checkers" can be used on each half of the wing. Simply ensure that the plywood is level with the trailing edge each time. Glen has been building foam wings for some time now so, when it is time to join the two wing halves, they can be fitted in place together and then checked with the "Wing Checker" near the tip (the same distance from the tip, especially if a tapered wing is used). One has only to sight along the two straight edges and see that they are level. This, then, ensures you at least have accurate wings.

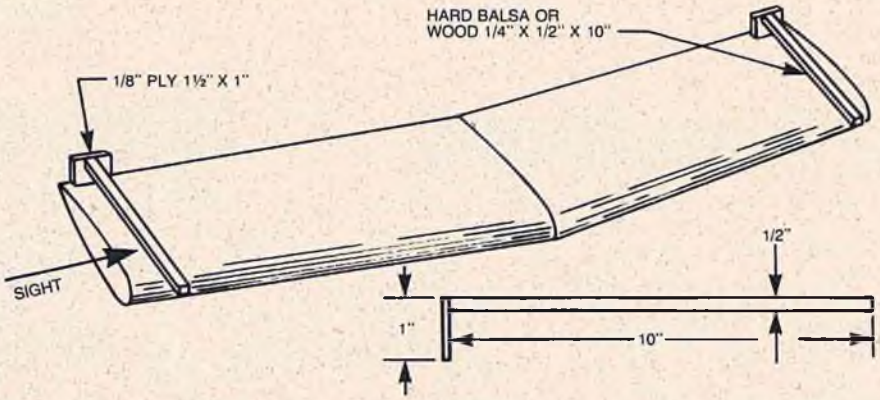
Larry Renger of Costa Mesa, California, points out that port-timed crankcase pressure works great on 1/2A engines, but fuel lines won't stay on the stock outlet nipple molded on the nylon carburetor body of Tee Dee engines. You can cure this by making a brass nipple from a 2-56 blind or T-nut. Run the nut over a bolt, chuck it in an electric drill, and file to the contour shown in the sketch. When finished, just screw the nut all the way onto the plastic. Then, follow the engine instructions for drilling the pressure tap.



Many words have been written on how to cut hinge slots in control surfaces, but here is the quickest, and easiest method we have seen to date as suggested by Scott Orten of Grafton, Wisconsin. The tools required are a Dremel Moto-Tool, a Dremel Drill Press Stand for the Moto-Tool, and a Dremel saw blade .023" thick. The procedure is to mount the Dremel tool into the Drill Press, then mount the saw blade on an arbor and insert into the Dremel Moto-Tool. Lay your control surface to be slotted on the Drill Press table. Next, adjust the saw height to locate the saw exactly in the center of the part you are hinging. Lock the drill press at this location. Start the tool and cut the hinge slot. After cutting all slots on that particular part, put the mating part on the table and saw those slots. On elevators and rudders where both parts are made from the same thickness wood, you get cleanly cut matched hinge slots. You will find that this is the easiest method you have ever used for cutting hinge slots, all of which will be perfectly aligned and centered.



Charles Theibault of Lakewood, New Jersey, using borrowed plans and not wishing to mar them, had to transfer the formers of an 8' DC-3 to balsa, which usually entails tracing them on a translucent paper and cementing them to the balsa and then cutting them out. During this process, Chuck found a very easy procedure for doing this. Using opaque Silkspun or Super Coverite, he traced the formers directly from the plans and ironed them on the sheet balsa using a MonoKote heat sealing iron set at about 1½ on the dial. This could vary with different types of irons, since the heat desired is just enough to stick the material to the wood and not to distort or shrink it. The parts cut out very cleanly and easily using either an X-Acto knife, razor blade, Dremel Moto-Saw or band saw and, in addition, strengthened the thin balsa formers to the point that not one was broken during the process. In addition, the Coverite may be left on during assembly for additional strength or removed for future use.



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Send your Hints & Kinks to For What It's Worth c/o RCM.

SHOWCASE '76

from page 101/98

could write it, you will live with the boy from age three to twenty-one from 1929 to 1947, through the school and war years and flying. Introduced at the recent EAA Fly-In, the book was highly received by the public in all age brackets with many coming back for second copies. There are 22 cartoon illustrations, a full color cover painting, and the book is handy pocket size on heavy, quality paper stock. This book is highly recommended for anyone with an interest in aircraft. It is priced at $4.50 per copy plus 50/ postage and handling or $1.25 for First Class postage. Order direct from D & B Publishing, P.O. Box 123, St. Charles, Missouri 63301. Missouri residents please add 3% sales tax. Allow four weeks for delivery. □

RC SCALE CONTEST

from page 75

handled it correctly to the extent of each entrant in the contest receiving a merchandise prize that exceeded the entry fee in dollar value.

Committments were obtained from prominent modelers, with established qualifications, to officiate the contest. John Eliott agreed to be the Contest Director. Bill Northrop served as Chief Scale Judge with the assistance of several other scale enthusiasts. Flight judging was performed by well known USPGA members including Dave Lane and Jack Stafford. Officials of this caliber established confidence that the contest would be conducted under a strict, but fair, administration.

The contest organizers maintained a complete plan for the contest outlining the actions accomplished, those pending with schedule dates, committments and anticipated results. This was done so that they could all keep track of their progress, a real business approach.

Within a week following the contest, a letter of thanks was sent to each of the prize donors along with a list of the winners.

This contest has proven that, if a group really wants to hold a successful meet, it can be done with proper planning and willingness to work to make it happen. Probably the most important factor was getting their information to the scale builders.

Our congratulations go to the Orange Coast RC Club and to the contestants for an exceptional RC Scale Contest. Plans are already underway for a bigger and better contest for 1976. □

BY KEN PENMAN

IN LOVE WITH CONNIE

● Since I was a teenager, I have been "in love" with the lines of the Lockheed 'Constellation. The graceful lines of the fuselage and triple vertical tail stabilizers have made the plane easy to distinguish from other aircraft. It was my desire as a teenager to someday make a flying model of the Connie. Having "matured" out of model building, the idea was suppressed for a couple of decades until I became interested in radio controlled aircraft. What really drew me back to model aircraft building was the complexity of the "new hobby" — one's imagination is the only stumbling block, and the hobby provides a great outlet for creativity and experimentation with the myriad new materials constantly being put on the market.

Even as I progressed through a Falcon trainer, a glider, then a Cherokee Babe, I was thinking of "my Connie." The ship seemed like a natural for RC semi-scale. The air scoops on top of the nacelles could be enlarged to conceal the upright mounted engines, the long nose with the tricycle landing gear would be easy to balance and land, and the large fuselage would provide plenty of room for the radio gear and other control systems.

The all balsa Cherokee Babe was used as a trainer for getting up-to-date with the new resins, fillers, and epoxy paints. Research began by writing Lockheed and Trans World Airlines. Their major contribution consisted of sending me a few photographs. The local university provided many articles from the 1940's regarding technical aspects of the aircraft. The most helpful resource was the Len Morgan Famous Aircraft Series on the Constellation by Terry Morgan. It provided many interesting facts and detailed pictures. Final research consisted of gleaning many model magazines to see what had been done with the Constellation; with multi-engine planes, in general; and what kits, if any, were available.

The size of aircraft I wanted led me to select the Kyosho Corporation all-balsa control line kit distributed in America by Kayeff, Inc. It was a Super Connie with a wingspan of 73.5" and a fuselage length of 67".

CONSTRUCTION

The Kyosho kit was also convenient because it was designed so that the inboard wing sections containing the four engines were an integral part of the fuselage. The wings were attached just beyond the outboard engines. Many modifications of the basic control line kit were made to adapt it to RC, however, the major adaptation was to convert the kit from a Super Connie back to the original Connie (model 749A). Research indicated that the original Connie was increased in length by adding a 9' section just fore and aft of the wing. Therefore, 9 scale feet were removed fore and aft of the Super Connie kit plans. This also would reduce the wing loading for the RC plane.

Construction began by developing a jig out of Novoply and mounting the jig on a movable stand (I knew the project would take several years with the limited time I had available). The kit included a plywood keel and plywood fuselage formers. These were mounted in slotted blocks at 90° angles. When all alignment was completed, the jig blocks were cemented in place (see construction photos).

Radio controlled functions included rudder-nose gear, elevators, ailerons, flaps and throttles. The rudder provided a challenge since the Connie rudder has five sections (3 above the elevators and 2 below on the outside stabilizers). The landing gear was included in the kit and the nose gear was modified to be steerable and include a simple lever-type brake (between the two nose wheels and operates on full down elevator control). Since the outer wing sections were removable, torque tubes (square tubing) were used to operate the ailerons. The Connie used Fowler flaps but, after many frustrating attempts to design workable Fowler flaps, they were abandoned for split flaps. The flaps operate in a 50° range. The throttle controls are linked to the servo by bellcranks and connecting rods.

The finish consisted of using finishing resins, Epoxolite putty and Hobbypoxy paint. Flasher lights (Paul Harvey Products) were used for the dorsal and ventral fuselage running lights. Windows on the Connie were rectangular on many models but round on the early model 749A. To give depth to the windows, closet door pull inserts were used. The inside of the pull was painted, then pictures of people (cut out of magazines for appropriate scale and profile angle) were glued in place. Curtains were then added and, finally, a plastic window attached. Thirty of these were pre-

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HEATH RUDDER TRIM

from page 73

the housing (do not worry about the knob or springs at this time). Screw the trim arm into the steel spacer through the slot. It should be possible to rotate the control about 10 to 15 degrees by means of the arm. If binding is present, disassemble and open up the slot as needed. When the operation is smooth and wide enough, a drag will be necessary to hold a setting. The drag is made by placing a small (i.e. about 1/16") piece of nylon or Teflon in the hole for the 6-32 set screw so that the set screw pushes on the steel spacer **through** the nylon. A small piece of almost any old nylon fitting will do.

After the trim is working smoothly, finish re-assembling the rudder knob and set it up as per the Heath instructions. Make sure that final servo centering is done with the idle adjust arm in the center of its range.

A small dot of Loctite® may be used to secure the trim arm from coming out. A firm bottoming of the threads with pliers will suffice too. □

MODELERS NEGLIGENCE LIABILITY

from page 69/68

gence liability, see a lawyer — do **not** treat yourself.

Our hobby imposes upon us an obligation to prevent others from undergoing an unreasonable risk. If we do not, there is little doubt that we are not behaving as reasonably prudent modelers and are negligent. When another's property or person is damaged or injured as a result of our negligence, then we and our sport pays. Modeling's golden rule should be, "Be careful." □

WINDRIFTER

from page 67

The only modifications we made to the kit was that the vertical grain 1/8" spar webs were cemented in the outer wing panels to give the wing a full length I-beam construction. In addition, the 1/8" square balsa turbulator spars should be replaced with 1/8" square spruce, since it is quite easy to crack the 1/8" square balsa while handling the wing panels. Although certainly not es-

to page 110

from page 108/67

sential, this reviewer paneled the inside of the radio compartment with 1/32" plywood rather than covering the fuselage with fiberglass cloth and resin forward of the wing center section, as recommended in the instructions. This way, no painting was necessary and Solarfilm could be used over the entire fuselage.

The Craft-Air Windrifter is an excellent kit for the experienced builder and flyer, since it is highly competitive and has an exceptionally wide speed range. On the other hand, the Windrifter makes a fine second sailplane for the beginning glider flyer, since it is extremely easy to build and a very forgiving machine in the air. It is also, in our opinion, a great sailplane for LSF Grade Level advancement. As an example of the machine's performance capability, the first three flights on our prototype were flown in a contest in which it placed sixth, while the fourth flight was to complete the Goal and Return for LSF Level 4 (1.25 miles and return). During all of these flights, the Windrifter was found to be extremely stable, flying well in both light and heavy thermals and, as previously mentioned, with a phenomenal speed range. With regards to its stall characteristics, you actually have to work quite hard in order to stall the Windrifter at all.

Following these tests, we took the Windrifter to the local slope soaring sites and found that it performed equally as well in either light or heavy slope conditions. In fact, while other sailplanes were up and down, the Windrifter flew slowly back and forth right on the hilltop in a light slope breeze and, when the heavy winds were in, it flew in the air high above the slope much like its big brother, the first Windrifter. Our final test flight on the machine was enough to accomplish the one hour flight required for Level 4 of the LSF.

to page 113

WINDRIFTER

from page 110/67

You couldn't ask anything more of any sailplane than that which the Windrifter provided for us on its first few flights. And, when you consider the price, it has to be one of the best buys on the market today. □

NRCHA

from page 66/64

uses a single stick transmitter for flying his helicopters. He has extended throttle on his transmitters so that he can hold the throttle control with two fingers. For use with Pro-Line and World Engine radios that use a trim lever for throttle, the sketches show Chuck's method for extending the throttle arm.

•

The following is a letter that we received from Tim J. Peters (N109B) of Jennings, Kansas. We felt that this was worth passing on to you, and we invite your comments concerning his suggestions on the NRCHA Grade Level Proficiency Program:

Dear Don;

I thought you'd be interested in hearing some comments from a beginner copter pilot who lives out in the sticks. I've been in RC helicopter flying for about a year now, and have enjoyed almost every minute of it. Most of the material you read in the model magazines about helicopters present the helicopter pilot as a "dedicated monk" forsaking all other phases of the hobby in pursuit of taming the helicopter. Believe me, it's not all that terrible to learn to hover! Furthermore, it's an enjoyable experience (if you start slowly), since only a small space is required to learn, as compared to the space required for fixed wing flying.

My copter is a Du-Bro Tri-Star, pow-

ered by a K & B .40 with Heath "Pack 17" guidance. Of course, a reliable radio and engine is a must and I can proudly say that neither has failed me while in flight. And althought the Tri-Star has been very tail-rotor touchy, it has served as an excellent trainer. I am presently on the same set of main rotor blades, though I am on my third flybar. I would recommend that an additional outrigger be added to the two shown on the Du-Bro plans. The new outrigger should extend out in front parallel (in line with) the tail boom. This has helped me prevent many possible forward turnovers. Had I started using it earlier, it would have saved me at least one flybar.

The rest of my letter is based on my own personal opinion, and ought to be good for making a few waves.

When you fly your copter in a populated area, as I do, you almost always attract a crowd. It sounds terrible to say, but generally when more than one or two are around (especially children) I pack up. Before you dismiss me as unfriendly, think about it. Here are my three justifications: First, people can be distracting. I am not good enough to take my concentration away from my copter for even a split second. You can sure be surprised at the predicament you're in if you do. Second, helicopters are among the most dangerous of models. The closer you are to them, the more danger you are in. Uninformed spectators almost always come closer than is prudent. Those whirling blades seem to have an attractive influence on them. Last, no beginner wants spectators until he is a competent flier. The crashes and rough landings are demoralizing enough without witnesses.

Concerning the NRCHA – I think it's a fine organization for chopper pilots. I joined for the sole reason of participating in the Grade Proficiency Program (although the patches you get with your membership are pretty nifty too!). I'm now a Level I pilot, and proud of it. I'd like to make three points about this also. First, about witnesses. It seems to me

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NRCHA

from page 114/64

that anyone age 12 or over ought to be a suitable witness. This includes family members. No one who is really mature is going to try and coerce a family member into accepting anything less than the required competencies for a given task. And if someone did, SO WHAT! The fact that he bluffed his way into a given level will be obvious to anyone who knows enough to care about it. Sometimes it's hard (and a little embarrassing) to find a non-family witness for the proficiency program. If anything, my wife is a stricter judge for my flying than any stranger. Remember, I am the only one in a 40 mile radius who flies RC.

The fact that the Proficiency Program allows training gear (outriggers included) for Level I only is very discouraging to me. It's going to keep me from attaining Level II for at least several months, and probably a year. I am in no way capable of flying without it, simply because I cannot justify the cost of the parts I would break in trying. This goes hand in hand with my third criticism.

I would like to see the establishment of another primary level in the Proficiency Program. I believe there is too big a gap in the competencies required for Level I and Level II. Let's have another level in-between these two, allowing training gear and with a few more advanced hovering tasks. Maybe some very limited translational flight could be included. Call it Level IA or something – but at least let's think about it!

If you choose to print my letter, please include that I am most interested in contacting anyone in my area (Northwestern Kansas) who is a serious helicopter buff.

Sincerely,
Tim Peters,
Jennings, Kansas 67643

VERTIGO II

from page 62

. . . . . thick diamond airfoiled stabilizer is utilized which provides a "soft" non-critical elevator operation about neutral, yet affords sufficient "bite" when positioned significantly away from neutral to allow for spin maneuvers. Finally, the aerodynamic centroid of the rudder is positioned so as to coincide with the roll axis of the plane such that rudder and aileron functions are truly independent, i.e., applying rudder during points 1 and 3 of a 4 point roll does not induce any roll moment into the flight path. This is also important at the top of the Figure M and stall turn maneuvers.

to page 126

RCM SERVO EXORCISOR

from page 61/56

and the speed at minimum. This is caused by the wiper of the servo going off the end. In this case, reduce the amount of travel and operation should return to normal.

You will notice that the tester is extremely stable in temperature and voltage. It will function as a "secondary standard" for timing.

Now install the label and use double stick tape to mount the board. Put the case together and install the bottom feet with the screws supplied and your "Exorcisor" is complete.

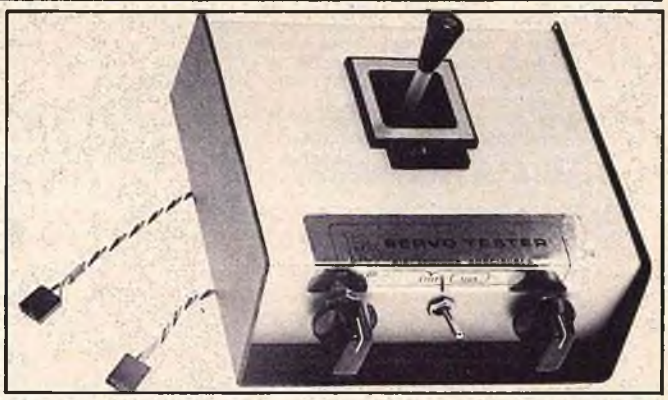
For service, sent tester to: Chuck Moses R/C Electronics, 2817 E. Lincoln, Anaheim, Calif. 92806. Tel: (714) 630-5061.

A complete kit of parts may be obtained by sending $26.95 plus $1.50 postage and handling to: D & D Electronic Specialists, Box 132, 1229 Lake Havasu Ct., Lake Havasu City, Ariz. 86403. Save time by sending postal money order or bank draft.

PARTS LIST

Resistors:
- R1 — 47 ohms 1/4W ±10%; yellow, violet, black, silver.
- R2 — 100 ohms 1/4W ±10%; brown, black, brown, silver.
- R3 — 1K 1/4W ±10%; brown, black, red, silver.
- R4 — 10K 1/4W ±10%; brown, black orange, silver.
- R5 — 10K 1/4W ±10%; brown, black, orange, silver.
- R6 — 15K 1/4W ±10%; brown, green, orange, silver.
- R7 — 39K 1/4W ±10%; orange, white, orange, silver.
- R8 — 47K 1/4W ±10%; yellow, violet, orange, silver.
- R9 — 47K 1/4W ±10%; yellow, violet, orange, silver.
- R10 — 68K 1/4W ±10%; blue, gray, orange, silver.
- R11 — 150K 1/4W ±10%; brown, green, yellow, silver.
- R12 — 270K 1/4W ±10%; red, violet, yellow, silver.
- R13 — 470K 1/4W ±10%; yellow, violet, yellow, silver.

Potentiometers:
- CP1 — 100K Linear.
- CP2 — 100K Linear w/switch.
- CP3 — 5K Linear.
- TP1 — 50K Linear.
- TP2 — 50K Linear.



Capacitors:
- C1 — .047μF Mylar 250V.
- C2 — .047μF Mylar 250V.
- C3 — 33μF Tantalum 10V.
- C4 — 33μF Tantalum 10V.

Semi-Conductors:
- Q1 — 2N4891.
- Q2 — 2N3646.
- Q3 — 2N4126.
- I.C.1 — LM 324.

Miscellaneous:
- 1 — Case.
- 4 — Feet.
- 4 — Feet screws.
- 1 — Stick assy. (single axis).
- 2 — Knobs.
- 2 — Grommets (3/16).
- 1 — P.C. Board.
- 1 — SPST Toggle Switch.
- 1 — Double sided tape.
- 1 — Label.
- Wire — All approx. 1 ft. long; (1) brown, (2) red, (1) orange, (1) yellow, (1) green, (1) blue, (2) violet, (1) gray, (1) white, (3) black.

VERTIGO II

from page 118/62

Southern Sorghum contact cement was used to apply the wing and tail skins to the foam cores and polyester resin was used to mount the belly pan, stabilizer, and servo rails within the fuselage. The aileron servo was mounted under the wing in the belly pan area with access provided by a 3" x 3" trap door. An OS Max 60F SR engine with Perry Aeromotive Pump and 16 oz. tank as recommended by Hobby World, was used and is an excellent choice for this aircraft. This engine will "drop in place" and provide the proper power level and range for serious competition. The radio employed was a Series 72 Kraft with KPS 15 II servos. The fuselage contour is designed to match a Fox 2¼" spinner which was used. Rhom-Aire retracts, Red Max fuel and Kraft wheels completed the system.

The finish consisted of one coat of polyester resin, sanded and followed by a coat of resin and lightweight fiberglass cloth. This was sanded and a coat of K & B Primer applied. After sanding away the primer, two coats of K & B Superpoxy color was then applied.

I would recommend no change to any of the surface areas or moments of the Vertigo II. However, as this fuselage has a long nose moment, it will be necessary to mount the throttle, elevator and rudder servos as far rearward as possible in order to achieve good balance.

Flight characteristics of the Vertigo II are excellent. After only one trim flight, the plane was taken to the South Carolina State Championships to capture third place in the Expert Pattern Event. The stabilizer and wing are mounted above and below, respectively, the centerline which produces good straight line roll characteristics. As noted earlier the roll and yaw functions are truly independent. The control surfaces are effective down to the last mph and the craft with it's 15.2% airfoil will slow

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VERTIGO II

from page 126/62

down nicely for precise landings.

The Vertigo II is capable of accurately performing all AMA and FAI maneuvers and should be considered as a decided advantage to the competitive minded pattern flyer. □

IN LOVE WITH CONNIE

from page 105/104

fabricated and inserted into the fuselage openings after the painting was completed.

The receiver antenna was inserted through a plastic tube inside the fuselage. The exterior antenna is for scale effects only. The completed plane with fuel weighs 14 pounds. One pound of weight was added 8" forward of the wing for proper balance. The wing loading is 46 oz/sq. ft.

POWER

Four O.S. Max 25's were mounted upright. They were toed outward 2°. Four-ounce tanks were mounted in each nacelle. A Jenesco refueling manifold and shut-off valve was mounted on each engine for ease of refueling and shutting off engines. Grish 8/6 three bladed silver props with black spinners gave the power plants a realistic appearance. Wiring was installed so that battery power could be provided to the glow plugs at idle speeds, however, early engine testing indicated no need for this system since the engines idled without failure. The 25's are more than adequate power and the plane could probably take-off on two engines!

With an electric starter and capable assistants, all 4 engines can be started and adjusted in about 2 minutes. A tachometer was purchased to synchronize the 4 engines, however, a well tuned ear seems to work as well.

The radio was a Heathkit GDA-19-1, 5 channel system with 5 servos.

OPERATION

The Connie is currently undergoing an extensive flight check-out. Many taxi runs and short take-offs and landings are being conducted to assure proper function of controls. Three years of planning and building are satisfied when the purr of 4 engines and flashing lights streak down the local runway. □

SENIOR TELEMASTER

from page 53

. . . . . add 2½ ounces of lead to the right wing tip to balance the wing, as well as 4 ounces of lead in the nose to bring the Center of Gravity to the correct location.

With regards to its flight performance, the Senior Telemaster is outstanding with a .60 and a 12/6 prop. It will hang on its nose and dance on its tail, hover like a helicopter, fly like a bird, and land like a feather. For low and slow flying, and large graceful slow maneuvers, the Senior Telemaster is a pure joy to fly. You'd have to go a long way to find a ship that will give you more sheer enjoyment than the Hobby Lobby Senior Telemaster. □

KESTREL 19

from page 43

. . . . . quality. All wing and stabilizer ribs are neatly packaged in plastic bags, as were all the accessories and balsa sheeting. The fiberglass fuselage was finished in a white Gelcote and required very little sanding or filling. Our particular test kit had one noticeable flaw in the fuselage — the reinforcing tape used to join the two fuselage halves was twisted one full turn on the aft section on the bottom. To correct this, we had to remove a section of tape approximately 4" to 6" long so that the pushrods would have room to operate. Since these fuselages are individually layed up, this was, more than likely, a one-of-a-kind error.

The wing and stabilizer ribs were beautifully cut out and sanded and only required minor trimming to achieve an absolute match to the plans. The construction of the kit is straight-forward and posed no major problems whatsoever. The plans and instruction booklet were loaded with pictures and full size drawings of various items. The only item that was left out of the instructions was a starting point for the stab incidence. All

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RC DESIGN MADE EASY

from page 54

model. Add extra braces and pieces to help hold the firewall in place, but mainly, don't skimp on the epoxy.

Next, consider just how you are going to construct the wing of your new ship. Depending upon the size and the type of construction, you are going to have to figure out what type of spars to use, what type of dihedral brace and, overall, how much strength to build into the aircraft. I've seen a lot of wings fold in years past, simply because the designer didn't take into account the very great abuse that

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can be given to an airplane. Some very great kits models were the most prone to fold wings several years ago, but have since been re-designed to withstand the strain.

The Bridi line of aircraft seems to have the most simple method of joining wings, built in two halves, then glued together wrapping a band of fiberglass cloth around the middle, and smearing a lot of epoxy into the cloth. After allowing it to dry, you sand it smooth, and you've got a strong wing. Other aircraft use plywood doublers glued against the spars. Whatever method that you choose to use, it is a good idea to carry the center section structure past the width of the fuselage. All too often a wing will fold just outside of the fuselage line. Again, on the center section, always use epoxy, and lot of it. Build up large glue fillets, and don't worry about the weight that you add to the center section. I believe that the new super glues really are super, and I enjoy using them, but I can't believe that they can be best at either the firewall or the wing center section. In the first place, their strength depends upon a complete contact surface between two pieces of wood. This takes a super builder to accomplish every time. I would rather depend upon epoxy to give me a good joint, and to make up for little building goofs as I go along.

Getting back to the wing, another common mistake is to make the wing spars out of wood that is too light or too small. Wing spars, especially on the larger .60 size aircraft should be either of very hard balsa or spruce, and the wings should be webbed (vertical grain) between the spars all of the way out to the tip. This is a bit more trouble, and takes more time to build, but is more than worth the effort. Just this past Spring, I watched a Quickie 500 type aircraft being flown by an expert flyer — a craft that had been constructed by an expert builder. It sported a very fast running Max .40 in the nose and was covered with plastic film. The pilot was making all sorts of close-in, high speed maneuvers with the aircraft, when suddenly, he pulled out of a dive in a square turn to straight and level flight. Then, wham! The aircraft disintegrated in mid-air — it simply burst apart. It was constructed of very light wood, all weight had been saved in construction, and sure enough, the structure wasn't strong enough for the loads imposed upon it and it really came unglued. A total wipe out. The lesson to be learned is that it's okay to build a very light model if you're not going to fly it roughly, or if it is not going to swat the ground on a hard landing, but for all around good performance, and long life,

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from page 134/54

it is far better to build it a bit more rugged. Add a few ounces of weight and gain the extra strength. You need it.

The tail section of your aircraft is where you can use that light wood, but you must be sure that, even though you have used light wood, you have built it strongly enough so that the tail will not flutter in a dive, or the wood between the fuselage and the horizontal stab is not so soft that it simply breaks away in a dive.

Another little problem that you have to contend with in the construction of your own ship is to try to design the structure so that you will have a reasonably warp free aircraft when you get done. The best and easiest way to do this is to use straight-grained balsa in all of the structural members, and, when picking it out, make sure that each piece is straight. If the structural member already is warped, then it is a sure bet that, when you get finished building, the structure will also have a warp. This same principle holds true when you are constructing a kit model. If some of the wood is of inferior grade, too soft, too hard, or warped, don't hesitate to replace it with hand selected wood. Chances are that this won't happen, but if it does, and you are the unlucky one, then be sure to replace the bad wood. It is much better to spend a few extra bucks here, than to complete the entire project and find that you have a mess on your hands.

There are lots of thing to consider when designing your own aircraft - - - not just what it is going to look like, or what type of aircraft you are going to build, but also **how** you are going to build it. But, don't give up. You will really experience a thrill that you can only get from doing it yourself.

Who knows, you just might design the next great airplane that will become as famous as some of the great designs of past years.

Good luck - - - and good pencil pushing. □

NOVEMBER PUZZLE ANSWERS

1. The **beginner** should always ask for **advice** from a more **experienced** flyer.
2. RC is also referred to as **RPV** which translated means **Remote** Piloted **Vehicle**.
3. The **elevator** is the part of the **horizontal** stabilizer which moves up and down and **controls** the pitch moment of the aircraft.
4. As you become proficient in **trimming** out your aircraft, you will adjust the **Center** of **Gravity**.
5. Every **engine** needs to be **broken**-in before **flying**.
6. Be sure that your **batteries** are fully **charged** before each **flight**.
7. Regularly check all **control** surface functions **before** every **take-off**.
8. The **Academy** of Model **Aeronautics** is the governing **body** for Model Aviation in the U.S.
9. A **landing** gear that is non-retractable is called a **fixed** landing **gear**.
10. A **Sunday** flyer is one who **flies** for the **fun** of it.
11. When shutting off your system, always turn the **receiver** off first, and the **transmitter** off last.
12. Never **point** your transmitter **antenna** directly at your **plane**.
13. There are two types of mufflers, a **flow**-thru and a **closed** end.

OCTOBER PUZZLE WINNERS

Lavan Alexander
Floyd Andrew
Thomas Baxter
Randy Campbell
Mark Cornish
Ed Dunn
C. Michael Hall
John Hodgson
George Johnson
Harry Lewis
Thomas McGill
John Mrozinski
Kenneth Patterson
Michael Saponara
Harold Stewart
James Walls
Gerald Zeigenfuse

Ernest Allen Jr.
Jerry Asfazadour
Fred Black
William Chock
Robert Danhausen
Theo Everett
Louis Haviland
Jay Hyde
Stan Kempthorne
James Marinangel
Dennis McMahon
Evert Nelson
A. Pistori
Dennis Sedlock
Mark Tootelian
Roger White

A.G. Amendola
Bill Bara
James Bowman
James Coker
George Dominick
Lloyd Fuke
Kenneth Heintz
Carroll Johnson
Frank Leffert
Darrell Mason
Kenneth Mowrey
C.P. O'Brien
George Roberts
L.K. Schlaeppi
Don Verhaeghe
Paul Wuenstel

ROYAL TECH SERVOS

from page 47/44

integrated circuit. The troubleshooting guide will come in handy later on should your servo malfunction after operating successfully.

Final assembly of the servo is quite simple. The amplifier board fits in the case easily. A piece of double sticky foam tape is placed on the track side of the amplifier board, allowing about 1/8" of tape to extend over the edge next to the motor. The tape has two functions, in preventing the board from shorting against the motor case, and holding the amplifier board firmly in place. A small piece of sponge tape is placed between the amplifier and the pot to help retain the wires soldered to the pot.

It is interesting to note that Royal suggests potting the motor wires with Pliobond cement. To further protect against vibration, Pliobond cement is also applied to the wires soldered in the PC board. I particularly liked this idea. It adds that little extra bit of insurance.

The completed servo looks very professional, in fact, from outward appearance you would be hard pressed to tell it was a kit. In operation, the resolution is good. The servo centers very well with no bounce or overshoot. It is fast, responsive, and fits into my system with no operating problems whatsoever.

My Royal servo has been flying around for sometime now and works simply great. I have it operating the elevator in my .15 powered Top Dawg sport racer. As a side comment, the rest of the radio gear in my racer includes: A WE S10 servo on the rudder, an Ace bantam servo on throttle, an Ace 1-8 Commander receiver, a Kraft 450 ma battery pack and, finally, a Proline transmitter. I have encountered absolutely no trouble with this combination.

Yes, it is possible for you to have that extra servo in your system and at a very reasonable cost. Why not try a Royal kit as I did? It's just not that difficult. Prices

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ROYAL TECH SERVOS

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start at $23.50 for the RS-4 and RS-5. You can save even more per servo by taking advantage of Royal's package price, i.e., 2 servos $44.66, 3 servos $63.45, and 4 servos at $79.96. Servos and parts can be ordered from Royal Electronics Corporation, 3535 South Irving Street, Englewood, Colorado 80110. Send for their literature and look 'em over. □

KESTREL 19

from page 130/43

of the wood contained in the kit was of good quality, but could have been improved if the strip material had been pre-cut. The Kestrel 19 kit comes with all the material to make a highly detailed cockpit including a headrest and an instrument panel — these items are of a styrene material as is the canopy base. All-in-all, an excellent kit.

With regards to flight performance, the flight characteristics of this model are outstanding. It goes up straight on the hi-start and only requires the slightest movement on the controls for any needed correction. Once off the hi-start, it has one of the best glide ratios this reviewer has seen. It thermals well on the lightest lift and, if a really good thermal comes along, it will climb at a fantastic rate. It turns well and has no bad tendencies to tip stall at low speeds. Response to the controls is excellent under all conditions and, due to the overall good design of this airplane, it has a wide-speed range. The landings are smooth and extremely scale-like. We would not hesitate to recommend the Windspiel Kestrel 19 to any sailplane enthusiast who wants a high performance machine with scale appearance. □

On page 107 of the November 1976 issue an incorrect address was given for ordering the Mathes Disc Sander. The correct address is 1229 Lake Havasu City Court, Box 132, Lake Havasu City, Arizona 86403.

SON OF QUAKER

from page 41/40

the backing, then stick to the surface. Remember, you're masking off the white to paint the **red**; almost got it wrong, didn't you?

Now, paint thin, clear dope over the edge of the masking vinyl, then let dry to prevent "bleeding". Now brush on several coats of a bright red trim dope, peel off the masking, and **love** those scallops! Note that you can now put red dope over the epoxy in the engine compartment.

Now, when all trim is complete, brush one coat of clear Hobbypoxy over the whole nose of the fuselage including the engine compartment. After this cures, fuel soaking should never be a problem and the ship should last forever.

Oh, yes; windows. Cut slightly oversize, hold in place lightly with pencil eraser, then "Zap" or "Hot Stuff" the edges. Pre-form the windshield first, then use a similar technique.

Flying

Remove all warps, determine that the rudder is moving the right direction, turn on the radio, and test glide for a smooth and straight descent. Shim, or offset, the tail for correction, **not** the wing. Put the prop on backwards and limit fuel for the first few flights. The climb should be es-

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SON OF QUAKER

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sentially straight with no rudder application, and almost "stally". Then, with rudder application, it should lay over in a climbing turn and spiral up unassisted. After the power stops, the glide should be smooth, flat and straight. You'll probably notice it takes lots of rudder to change direction because of that huge fin. Landings will be bouncy, but you won't break props!

"Now, Walt," Wagger said with a ghastly grin that showed canine teeth, but which was intended to be an engaging grin, "go hunt thermals. The Quaker will hold circles and center the thermal all by itself or with minimum help from the pilot. Just soar away against the sun and get back by dark. I will expect my usual ration of 'Puppy Chow' with whipped cream, no later than six, as usual."

"Urk!" replied Walt. □

SUNDAY FLIER

from page 30

contestants with regard to ballasting. Either that, or set up an arrangement where the event just preceding speed is seven, or ten minute duration, and immediately upon landing, the contestant goes right back up on tow for the speed run. It would take some organizing, but would reduce cheating. Not eliminate it — someone would be sure to figure out a way to stick in ballast while walking back from the landing spot, but they would be a very small minority — like the fishermen who win jackpots by stuffing a couple of one pound weights down the gullets of their fish. People are people.

As for the precision event, I have to express my own personal opinion which is shared by many flyers. The air time portion in which you try to release from

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the tow and then land — or touch the ground — in exactly two minutes, or three, if that is the established time, is fine. The part that stinks, as far as I am concerned, is that, so long as you shed no parts, and remain right side up, your landing points are determined solely by the distance of the nose of your plane from the center spot.

Now I ask you this: Which landing should get the higher points — one in which the flyer approaches alongside the spot, digs the inboard wing tip into the ground, resulting in the nose slamming into the ground, the plane cartwheeling crasily, then spinning around horizontally and finally stopping, right side up, with the nose resting either on the spot or a couple of inches off; or a landing in which the flyer approaches the spot, headed directly for it, touches gently down on the belly of the fuselage, a few feet in front of the spot, but either slides by the spot a couple of feet, or stops short a foot or so. The answer, by today's rules, is totally ridiculous. The crash landing wins.

It doesn't make sense. So why do we continue to tolerate it?

The basic reason given is that it "eliminates the element of human judgement," and reduces the determination of the winner to a simple measurement.

Nuts. That's like establishing the winner of a diving contest by counting the number of revolutions he can make before hitting the water — doesn't matter whether he hits on his feet or his head.

There has to be a better way. And there is.

Everyone who competes, or officiates in a sailplane contest, knows a good landing when he sees it, and is qualified to make a reasonable judgement. Here's a suggested method: The basic points to be established by the distance of the nose of the aircraft from the spot.

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These points would then be factored by "landing excellence." The scale would read from 0 to 1.0.

Example: Take the above mentioned comparison — the cartwheeling, reeling, spinning landing where the nose winds up right on the spot. Landing points — 100. Landing excellence, on a scale from 0 to 1.0 would be 0.1 (since the plane didn't go over on its back, which would be zero points), and the total points for landing would then be 100 times .1, or ten points.

The other landing, winding up, say, four feet from the spot, for about 84 points, would receive a landing excellence score of near perfect, or .9. The total landing points — 75.6.

Such a system, if installed, would go a long way to eliminate the cartwheel approach, the javelin dive, and the ground loop intentional, and all the other gyrations now being practiced, because they are legal. I don't say, "make them illegal", just penalize the flyer for using the technique. Who knows? He might go in for full scale soaring, and try the same techniques. Win first prize — just enough to cover funeral expenses.

And here is my ultimate argument. At the LSF Tournament, only one flyer achieved a perfect score of 1000 points (900 flight + 100 landing). It was Fred Weaver. And he brought that big monster of his in to the spot in a smooth landing (relatively) and slid to a stop on the spot without a turn. So it can be done. And it should.

Other ideas have also been suggested. One, which has a lot of merit, was described to me by Tom Williams. It is a variation on the "runway" system which has been used at times in the past. The weakness of the runway system was that you could approach the runway from the side if you wanted to — and then you were right back to the spot landing approach with a final dive or whatever you wanted to do to stay near the center of the runway, and within the sidelines. The variation which Tom suggests is that there be a "gate" set up, just downwind of the end of the runway, through which the sailplane must pass, thus coming in over the end of the runway in final approach to the spot, located at the center of the runway. And, if landing points were awarded on the same graduated distance basis from the spot, but with the requirement that the nose of the plane be on the runway, that would tend to improve the quality of the landings, at least. But I still think the best solution, in spite of the human element, is to introduce landing excellence — as they have done long since in the power plane events.

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SUNDAY FLIER

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The overall quality of the flying at this year's LSF tournament was excellent. And the closeness of the scores reflected it. Only one point separated Don Edberg, the Open winner, from Neil Nolte, who placed second. And less than 100 points separated first place from tenth placer Tom Jones. Percentage-wise, Don Edberg was 97% perfect; Tom was 95%! Your old Chief Sunday Flier placed 25th — 92.4%. Now that's what I call tough competition!

As usual, the scale event brought out some beauties. You know that's true when you see where Bob Thacker's fantastic Baby Bowlus, a perennial winner in static points, came second in that category to Gordon Pearson's Vector I. Of course, Don Edberg did his usual outstanding job of flying and overcame his sixth place static handicap to take home the trophy, in AMA Scale, that is. Jon Lowe's sleek 604 took top Stand-Off Scale points for flying and static combined.

All in all, it was a great event. The South Bay Soaring Society, assisted by the Redwood Silent Flyers, kept things running smoothly, considering that 124 flyers participated. Too bad the last round had to be cancelled for lack of time. In a way, though, it is a harbinger of things to come. The LSF now has over two thousand members, and somehow a way must be found to let more of them have a chance to compete in the annual LSF tournament. Dan Pruss, President, has discussed the possibility of having regional tournaments, with the top winners to be eligible for a national finals — somewhat like the elimination contests which were used to pick the U.S.A. team for the World Championships. Naturally, one of the problems becomes the costs involved for the individuals. Either you

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Rick Pearson with his 'Sailaire'.

SUNDAY FLIER

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can afford it, or you'd need a sponsor — and that could be tough to find.

Ah, me. Growing pains — always growing pains. The LSF — the only sailplane organization that you have to earn your way to belong by demonstrating proficiency, now has so many enthusiasts who've qualified that a new type of tournament has to be developed to give them a chance to show it. If any of you have a genious idea, send it to Dan Pruss, President, LSF, Rt. 2, Box 490, Plainfield, Illinois 60544.

It's a tough nut to crack.

Both for you and for Dan.

But it's worth a try.

For soaring - - - and for the League of Silent Flight.

RESULTS OF THE 1976 LSF TOURNAMENT

OPEN

(1) Don Edberg, (2) Neil Nolte, (3) Alex Mladineo, (4) David Oberman, (5) Marvin Qualls, (6) Rick Norwood, (7) Randy Vermulm, (8) Terry Koplan, (9) Kirk Hanson, (10) Tom Jones, (11) Gerald Arana,

(12) Robert Thacker, (13) Philip Harris, (14) Craig Foxgord, (15) Mike Mitchell.

STAND-OFF SCALE
(1) Jon Lowe — 604, (2) Jack Alten — Cobra 17, (3) John Baxter — Diamont, (4) Bob Nelson — Daimont, (5) Dave Darling — Kestrel 19.

AMA SCALE
(1) Don Edberg — Duster, (2) Stan Powell — ASW 15, (3) Gordon Pearson — Vector I, (4) Robert Thacker — Baby Bowlus, (5)- William Davidson — Javelin J4.

★ ★ ★

Here is a flash report on the 1976 RCM 1/2A Trophy Races held at the Pioneers/Police Activities League Model Airport in Santa Clara, California on September 19, 1976.

1. Dale Metzler	Quicksilver
2. Ron Clem	Tigercat
3. John Acord	Wild Turkey
4. Gary Acord (John's Dad)	Wild Turkey
5. Lee Helzel	Modified Upstart

Fastest Time: 1:25.4 by Gary Acord. More details next month. □

Sid Axelrod, recovered from surgery, came and flew his Topsailer with stars and bars. Other Topsailer is RCM's Chief Sunday Flier version.

SOARING

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helpers had to be in the tow vehicle. Each team could use only one plane with no back up planes allowed. The Detroit Flyers finished first with Mrlik and company in the lead. Four hours and 15 minutes in 14 launches with a flight of 17.6 miles for the longest leg did the trick. Dallas LSF finished second, using a modified Legionaire, and a ton of dust in their convertible! The SFVSF hooked their elevator up backwards and crashed on their first launch. The Harris Hill L/D group tried to eat a telephone with a Hobie Hawk and the pole won. The Suds City flyers ran their plane through a No Passing sign. The W.I.N.G.S. plane pooped out after 15 miles so the group picnicked at the iron bridge. As for the Muncie contingent, rumors persisted that they are still hand towing their plane on the course and are determined to finish. Thanks to Bob Gill of the St. Louis Eagles for the preceeding technical data!

We're still hearing comments and reading that flyers on 27 MHz are getting shot down by illegal CB operators. If you know or hear of this happening, report it to FCC immediately. This seems to be the only way "legally" to police our own frequencies.

•

The pattern flyers have their 1/2A planes for a change of pace. We sailplaners have our diversion, as well. It is called the "Gyrfalcon", manufactured in England by Gliderbirds. This bird is a slope soarer that can really get everyone's attention. The vertical fin is clear Lexan that makes it almost invisible. The body is styrofoam and is painted with water based paint and striped with felt marking pens. Made strictly for the slope, it is very fast, responsive, and realistic — plus a lot of fun.

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SOARING

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The fast, realistic looking Gyrfalcon.

South Africa's RC Soaring Magazine is one of the finest publications for the soaring enthusiast that we have had the privilege of receiving. Keep it up and you have my vote for the "Bird of the Month".

New Sailplanes

The J-Bird has been designed primarily to be a docile, slow, forgiving floater type Sport Trainer that will out-climb

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FOR OLD TIME'S SAKE

from page 22

Here I sit trying to bring on the Christmas spirit in the middle of September! So to help kick off the holiday season, thought you might enjoy a little fun with an old Christmas stand-by.

We also thought you might like a peek at our Christmas shopping list!

To John Pond — a pipeline to Coors.

To Joe Beshar — a P.A. system with low volume control.

To Tim Banaszak, SAM secretary — a secretary.

To Jack Bolton, SAM Speaks editor — a printing press.

To all SAM chapters — letterhead and envelopes addressed to yours truly.

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FOR OLD TIME'S SAKE

from page 168/22

To the next SAM Champs sponsors — porta-johns for the flying field.

To Don Dewey — continued prosperity so he can donate to next years Champs.

To all our readers — plenty of plans, balsa, silk, and dope to keep them occupied all winter.

•

SPOT's Second Annual Contest

On August 15th, the Society for the Preservation held its second annual contest at North Branch Park, Bridgewater, New Jersey. There was a pretty good turnout despite the dismal morning weather, which lasted until late afternoon. Twenty-seven contestants, mostly from Jersey and Massachusetts, and one from Pennsylvania, brought their multitudinous array of planes to the 4-H field for a day of fun. Fliers and spectators were treated throughout the day to a display by Fran McElwee and his flying Bicentennial flag.

Flying was on the whole pretty good for a crummy day. The winners were:

Class A

1st	Woody Woodman
2nd	Mark Patrolia
3rd	Al Schwankert

Class B

1st	Vince Bonnema
2nd	Gary Montana
3rd	Ted Patrolia

Class C

1st	Al Schwankert
2nd	Hugo Mercoli
3rd	Joe Lachowski

Antique

1st	Hugo Mercoli
2nd	Mike Lachowski
3rd	Joe Lachowski

Fuel Allotment (open to all classes)

1st	Cliff Schaible
2nd	George Haley
3rd	Ray Hinds

Trophies for first place were handmade representations of the SPOT logo — miniature Buzzard Bombshells endlessly soaring in a bell jar. Second prize was a Sullivan Gel-Cell, and third place received a gallon of sport fuel.

There was also a special event — a spot landing, what else! George Parker of Lee, Massachusetts walked off with the prize (a can of fuel) for the closest landing to the center of the spot.

Speaking on behalf of SPOT, hope all who came had a good day. We certainly did!

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Well, that's it for now. Hope the holidays find you and yours well and happy. Next month we'll have a new year's project for you all! 'Til then — Merry Christmas! HO, HO, HO!!! □

SOARING

from page 168/27

anything, even in the lightest lift. For the modeler who wants to just plain fly for fun, stay up a long time in weak lift, or fly the slope when nothing else will stay airborne, the J-Bird is the vehicle needed.

To make bad landings, join tree clubs, and stand up under inexperienced handling, the J-Bird stands out in its class.

The J-Bird will teach you to fly quicker and easier than any ship you can obtain. It will stay together longer and build faster and easier than most. If the ship you are going to build is the one you want to learn radio control soaring with, there just isn't a better sailplane around today.

The J-Bird is unique since it introduces a new method and material to the model builder, namely —

Fuselage — ASA (not ABS) plastic built around a balsa crutch.

Wing — foam cores covered with Greenskin — balsa L.E., T.E., and tips; spruce spars.

Tailfeathers — conventional, balsa.

Adhesives — *for the fuselage:* Hot Stuff, Zap, Jet, etc., Ambroid, Aerogloss, Sigment, Aliphatic, etc. *For the wing:*

epoxies, Aliphatic, white glues, water based contact cements, etc. (See RCM's book "Foam Wings").

J-Bird Spec's: Span, 97"; Area, 6.39 ft./2 — 921 sq. in.; A/R, 10.3/1; Wt. Approx., 38-48 oz.; Wing loading, 5.9-7.5 oz. ft./2.

A Greenskin covered wing with 5-6 coats of binder (Wilhold white glue and water (50/50) can be flown. One coat of Flecto Varathane 90 gloss will waterproof it. Greenskin can also be covered with Plyspan (lite-med-super), Silkspan, Jap tissue, silk, 100% nylon or any of the low heat thermo seal coverings such as Solarfilm, Flite Cote, etc.

The J-Bird is a Hi Johnson design that will be marketed by Craft Air; the list price will be $59.95 and the release date is scheduled for November 1976.

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Good lift ☐

RACING AT RANDOM

from page 18/16

I doubt if you could find even one QM flier who would wholeheartedly agree with each and every rule proposed for 1978. But, taken collectively, and considering all parts of the country, we think this is a pretty fair set of rules and they deserve at least a fair trial.

We would like to express our thanks to all the people who got involved with helping us write these rule proposals: The people who took the time to answer our survey questionnaires, the people at Dayton, and especially the people who helped with the computer work and actual proposal writing. We had great cooperation from everyone concerned and hope the proposals reflect the work and dedication it took to make them.

NMPRA-QM
1978 Quarter Midget Rule
Proposals to the A.M.A.

1. OBJECTIVE. To provide closed course racing that will encourage participation by the sport flier and novice racing enthusiast.

2. GENERAL. All AMA regulations (see sections titled Sanctioned Competition, Records, Selection of National Champions and General) and FCC regulations covering the RC flier, his plane, and equipment shall be applicable to this event, except as noted herein. The contestant shall be allowed two aircraft entries, both operating on the same radio frequency. The alternate or back-up aircraft may be used only if the primary aircraft is considered unsafe by the CD or his appointed official. All aircraft must be checked by the CD or his appointed official prior to insertion into its race flight. Consideration for the safety of the spectators and contest personnel is of the utmost importance.

3. MODEL AIRCRAFT REQUIREMENTS. Models entered in this event shall be semi-scale or recognizable replicas of full scale piloted propellor driven aircraft that have been designed for, or competed in, closed course, speed record attempt, or cross country racing. No deltas and/or tailless type aircraft shall be allowed. In case of unusual or little known designs, the flier shall produce documentation to verify that such a plane or special design did exist.

4. ENGINE(S) SPECIFICATIONS.

4.1. Definition — The engine shall be a

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RACING AT RANDOM

from page 174/16

complete unit, ready to run, needing only prop, fuel and starting voltage, *excluding* glow plug, exhaust extension, gaskets, head bolts, crankcase bolts, drive washer, prop washer and prop nut. The excluded parts are not subject to rules regarding production and availability.

4.2 Production — At least 1,000 engines (with RC carburetors) shall be available through normal retail channels throughout the United States.

4.3. Availability — There shall be a period of at least 60 days between the introductions of engines to said retail channels and the use of the engine in a contest.

4.4. Price — A maximum list price limit shall be required for the engine (with RC carburetor, ready to run) as purchased through said retail channels. The list price shall be computed at the present value of $60 as of June 1, 1976.

4.5. Modifications — No rework or modification shall be permitted to the engine as defined above.

4.6. Carburetor — Shall be supplied with the engine or specifically cataloged for the engine. It shall be subject to the same availability and production criteria as the engine. No modification shall be permitted to the throat or spray bar area.

4.7. Inspection — Any competitor at the contest may have another competitor's engine inspected for compliance with the rules by posting $15.00 with the CD. The engine and carburetor shall be inspected by the CD or his appointed official. If declared legal, the owner retains his standing and collects the $15.00 for his trouble. If declared illegal, the owner is disqualified and the protestor is returned the $15.00. The CD may request engine inspection prior to the awarding of prizes without posting a fee.

4.8. Fuel Tank Pressurization — Only atmospheric pressure shall be permitted.

5. EXHAUST EXTRACTION. (Local conditions shall determine muffler usage.)

5.1. Mufflers — When required, mufflers shall be stock, commercially available units. Only modification to the muffler inlet for the sole purpose of mounting to the engine shall be permitted.

5.2. Exhaust Extractors — When used, shall have a 1/4" slot from the end of the

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engine exhaust stack to the end of the exhaust extension. The full length of the slot must be visible from outside the aircraft and shall not be covered by any material when the aircraft is ready for flight.

6. PROPELLORS. Two blade, fixed pitch, wood propellors shall be used.

7. SPINNERS OR PROP NUTS. An AMA prop nut or a spinner, rounded in front to at least 1/8" radius, shall be used.

8. FUSULAGE. At a point, measured within the chord of the wing, the fuselage must be at least 2¾" wide. At the deepest point, the fuselage must be at least 5" deep (including windshield, canopy, pilots head or headrest.) Width and depth points need not coinside. Fillets and non-scale protuberances are not to be part of the measurement. Cross-sectional contours at the height and width measurements and at stations determining the likeness to the original aircraft, shall maintain the integrity of contours in the original aircraft. The only exception permitted shall be in the engine compartment to allow direct access to the engine for maintenance purposes.

9. LANDING GEAR(S). Landing gear shall not be retractable and wheels must be free rolling. A tail skid, if used, shall point to the rear end of the aircraft. No brakes shall be allowed. Minimum wheel diameter shall be 1½".

10. WING(S). No minimum span required; thickness shall be 7/8" measured outside fuselage wing fillets and progressing in a straight line taper to the tip. Wing area shall be a minimum of 300 square inches. A biplane shall have not less than 5/8" upper wing thickness, measured on a line projected vertically from fuselage side, as in a top view, at the point of fuselage and wing intersection. Lower wing shall be not less than 1/2" thick at projected root, provided its area is not less than 2/3rds of upper wing area.

11. WEIGHT. Ready to fly, less fuel, the aircraft shall be 2½ pounds minimum and 4 pounds maximum. Weight is to be measured at the completion of each heat.

12. MATERIALS AND WORKMANSHIP. Workmanship must be of satisfactory standards. The CD or his appointed representatives shall be empowered to refuse permission to fly or disqualify any aircraft, which in their opinion, is not up to reasonably safe standards in either materials, workmanship, design details, radio installation or condition as the result of damage.

13. RACING NUMBERS (Optional). Racing numbers shall be at least 1½" high and placed in scale racing positions.

14. REGISTRATION NUMBERS. Registration numbers shall be at least 1½" high and shall consist of the last 2 or 3 numbers of the entrant's AMA number and placed on the upper right and lower left wing panels. The letter N will precede the registration number and the initial of the entrant's last name shall follow the registration number. **Alternate:** Registration numbers at least 1" high may be placed on both sides of the fuselage.

15. STARTING TIME. Contestants will have a maximum of 1½ minutes to start their engine and prepare for take-off. If, after 1½ minutes has elapsed, the contestant is not prepared for take-off, the contestant may not fly or run his engine on the course area, and is

given a score of 0 points for that heat. If determined at a pilots meeting before the race, the heat may be started when all the pilots and callers are ready, before the 1½ minutes have elapsed.

16. IDLE REQUIREMENTS. The contestant shall be required to demonstrate a controlled, engine idling landing at the completion of each race heat. If, in the opinion of a designated official, this requirement is not fulfilled, 1/2 point is deducted from the contestants heat score.

17. FUEL. Fuel shall be commercially available, contain not over 15% Nitro, and shall be supplied and dispensed by the hosting organization.

18. RACING PROCEDURE AND SCORING.

18.1. Standard 2 mi. course length (Figure 1) — Procedure and scoring shall be in accordance with all paragraphs under Operation of the Race and Scoring of the Formula I & II RC Pylon Racing Rules.

18.2. Short Course Length (Figure 2) — Same as 18.1 except: The contestant shall fly for 10 laps only. After the completion of each heat, the pylon judges and starter will note any cuts and score the heat in the following manner: 4 points for first, 3 points for second, 2 points for third and one point for fourth. If a pilot cuts one pylon and still finishes the race, only 1 point is awarded. If a pilot cuts twice, a 0 is awarded for that heat. Planes finishing without cuts will be given full points awards, i.e., first across the finish line with one cut will be awarded only 1 point! Second to finish, no cuts will receive 4 points, etc. This course is intended to be run without flagmen at the number 1 pylon, and is recommended if there is insufficient manpower to run the race.

18.3. Racehorse starts shall be used unless conditions exist which are considered hazardous by the CD. Regardless of the starting method used, all timing starts with the drop of the first flag.

19. HEAD GEAR. All personnel required in the flight line area (between pylons) shall be required to wear hard hats.

20. AIRCRAFT CONTACT. In the event of mid-air or take-off contact between aircraft, all participants to the contact shall be directed to land as soon as possible. 1 point shall be awarded to each of the contact participants and the heat shall not be rescheduled.

21. ADVERTISING. Advertising of the event to the media should include at least the following information: Long or short course, muffler requirements, if any, and brand of fuel to be used.

■

Remember, these are only proposals at this time and must be approved by the AMA Contest Board and, even if approved, will not be in effect until 1978. We encourage your support of this QM rule package and hope you will convey this support to your district representatives. Individual letters and club letters would be very helpful in getting these important rule changes approved. □

RADIO SPECTRUM

from page 14/11

72MHz, only which is not licensable in Britain; we only have the 27MHz band. Also, I feel that better servo-amp IC's

are becoming available, eg., the EXAR, and I am after first rate servos.

I did wonder about building a new Classic system, but using up-to-date servos, but I would be worried about compatibility. Also, the Classic Tx uses older IC's in the encoder, and none in the Rx, although the RF link is excellent.

Also, I keep wondering if RCM will be publishing a new do-it-yourself system which will be just what I want?

I am sure many others must be in the same dilema, and I should be very grateful for your comments and advice.

Yours sincerely,
Alan G. Hood
Dundee, Scotland

I hear through the grapevine that RCM is planning a new series of do-it-yourself RC, which I'm sure will appeal to many readers. I understand that kits will be available and, also, repair service in case it doesn't work as advertised. Another solution to your problem might be to take a look at the kits offered by Ace RC. I have looked at their transmitter electronics which features an integrated circuit encoder and an outstanding RF section. Recently, they sent me a sample of their new servo which uses the new Signetics NE544 servo amplifier, which I mentioned a few months ago. The NE544 looks like a great improvement over the NE543 formerly used by Ace and World Engines. It contains built-in output transistors, but has the proper leads brought out so one can add external PNP's for "high performance." I was impressed that Ace had added the external PNP's. In fact, they included all of the options available. Signetics designed the chip so a manufacturer had the option of adding external parts to optimize the deadband and minimum pulse and to add linear timing, or to eliminate the external parts and make a small, cheap servo amplifier. Ace has added all those parts and included dual damping resistors. The results look good and should be easy to duplicate. I'm in the process of running tests on this servo and will report the results later, but I can tell you this — it will work on as little as 3.2 volts, draws only 6ma at idle, and has negligible voltage and temperature drift. Looks like a winner.

★ ★

Dear Mr. Oddino,

How narrow can I make the passband on an RC receiver without degrading the command pulses? Do not consider the oscillator stability either in the L.O on transmitter.

Thank you,
Max Osborne

The typical RC receiver must detect "pulses" that have a width of 300 to 400 microseconds. The pulses are actually

the time the transmitter is turned off. The bandwidth necessary to transmit a pulse train is determined by the rise and decay times of the pulse. This bandwidth F is approximately given by $F \approx 1/2\ t_r$, where t_r is the rise or decay time, whichever is smaller. The RF bandwidth is then $F_{RF} \approx 1/t_r$ for amplitude keyed carrier. Let's assume we can tolerate a 150μ sec. rise time. The bandwidth is equal to:

$$F = 1/2 \times 150 \times 10^{-6}$$
$$F = 3333\ Hz$$

You could argue that we could stand a longer rise time and, therefore, a narrower bandwidth. But let me throw in the following from a handbook "Reference Data for Radio Engineers".

Pulse-position modulations: By the use of wider bandwidths, an improvement in the signal/noise ratio at the receiver output may be obtained. This improvement is similar to that obtained by frequency modulation applied to a continuous-wave carrier. Since ppm is a constant-amplitude method of transmission, amplitude noise variations may be removed by limiting and clipping the pulses in the receiver. An improvement threshold is then established at which the signal/noise power ratio s/n at the receiver output is closely given in decibels by

s/n = 18 db + (nif)

where the noise improvement factor (nif) for pulse-position modulation is given by

(nif in dbl) = 20 log$_{10}$ (δ /tr)

where

δ = peak modulation displacement

t_r = rise time of received pulses

You can see that a receiver with a wider bandwith might actually result in a "quieter" system. Then when you do consider oscillator stability, you probably will decide a bandwith of about 5KHz is ideal.

★ ★

A story from the recent 1976 NSRCA Masters contest might help someone save his airplane. Bob Davalos has been flying a Super Cuda in Novice competition quite successfully this year, but he was mighty lucky during this contest. Bob ran his antenna through the fiberglass fuselage and ran it up to the top of the rudder in the normal fashion. He even tied a small piece of wood inside so a pull on the antenna wouldn't pull on the receiver. However, he didn't put any tubing through the fuselage. He took off on one of his flights with the antenna loose from the rudder and, when he landed, there was no antenna outside the fuselage. The fiberglass had made a nice clean cut. I wouldn't have believed you could fly an airplane with that little antenna.

I hate to do this, but if I don't, I know I'll get a jillion letters wanting to know what kind of radio Bob uses; so I better tell you and save a lot of work for the post office. Gee I hate to say this. He was flying one

of those great S & O systems. Now don't get mad, I've been pretty good for two years about remaining neutral. In fact, I've been accused of working for Kraft.

Anyway, whatever brand you use, be sure to run the antenna through a grommet, or tubing, if you use fiberglass fuselages.

Caio! □

ENGINE CLINIC

from page 12/10

several inches behind the firewall, use a fuel line several inches longer than it need be just to facilitate easier refueling, and then wonder why the engine sags. Model engines, unlike automobile engines, do not have a fuel pump (excluding those that now use the Perry pump) and depend on venturi vacuum to draw the fuel. The smaller the engine displacement, the shorter the distance it can pull the fuel.

If your tank is properly positioned with no excess fuel line, then it is possible your engine just needs more running time. Most of the Merco's I have seen were fitted a bit tight and did take a little longer than normal break-in period.

Dear Clarence:

I have all your articles from the column's inception and have found much enlightenment from same. Perhaps you have some ideas on the following.

Since switching to synthetic oil based fuel 3 years ago, I have encountered an intermittent problem of plug failures. Symptoms are a sudden engine failure when throttling back to idle, or when disconnecting starting battery after starting with the throttle in idle position. Changing the plug cures the problem. A casual look at the plug reveals nothing wrong and a normal orange glow is observed when battery voltage is applied. A closer look with a 10 power glass reveals a thin, glass-like coating or a round droplet on the straight part of the plug filament which is welded to the plug shell. When observed with battery voltage applied, using the 10X glass this area of the filament does not glow as it does on a new plug used for comparison. Plugs are Fox or K & B idle bar.

My first thought was that this was a melted silica deposit from fine sand ingestion, however, there was no other evidence of this such as excessive bearing wear or scoring of sleeve, etc. I always use a Perry filter in the summer. Also, I have seen this problem occur while winter flying from clean snow so this pretty well rules out the sand theory.

Next, I turned my attention to the post flight lubricant I was using. This was Marvel mystery oil, a light general purpose lube, which I replaced with a light mineral oil used in aircraft instruments, but the problem still remained.

On removing the tops from the cans of

a fresh 6 gallon case of synthetic oil used to mix my fuel (Castrol Super M) it was noticed that the oil in one can was slightly opaque, the remaining cans were water clear. No problem was encountered when the clear oil was used, but when the opaque oil was mixed the problem again started. My fuel is 5% nitro, 22% oil.

Recently I have observed the same problem with a commercially blended fuel which I am reliably informed contains a new Ucon lube developed for model engine use known as YT-773. This is a polypropylene glycol whereas the Castrol product is a polyalkylene glycol so it would appear that the problem is not confined to one manufacturer's oil, nor a specific type of synthetic oil.

This last occurrence was with a Super Tigre .40 which, when turned over by hand, had extremely high compression. Plugs in this engine would last only one or two flights before fouling took place.

Incidentally, I have found that the deposit is removable by soaking the plug in a cold carbon cleaner such as Magnus 662-CDX for 48 hours, making the plug fit for further service.

I do not feel the problem is caused by lean running, although it would probably be aggravated by it. I always carefully set the needle on my OS .60's and OS .40's and they are still going strong after many hours of use with no parts replacement.

I would be interested in your comments on the above and you may wish to bring my findings to the attention of the readers of your column who may be encountering the same problem and throwing away plugs which are easily salvagable.

Yours truly,
Don Hancock
Manotick Ont., Canada

I ran the above letter as I felt that it would be of interest to others who might have experienced Mr. Hancock's findings. I have seen the small glass bead build-up on the straight portion of the glow plug element wire but never found it to have any adverse effect. This is a residue build-up caused by the burning of the oil in the fuel, possibly in conjunction with other impurities in the fuel. I have never seen this small bead build-up in only a few flights. It usually takes many gallons of fuel. Evidently, Mr. Hancock has hit on a condition that accelerates the formation. I have no answers here so if we have any readers who might be able to shed some light on the matter, let us hear.

Dear Mr. Lee:

In your column in the June issue of RCM, you mentioned a source of materials and tools known as Coles Power Models. I wish to order the catalog and

have been unable to locate a mailing address for the company. Would you please address the enclosed envelope to Coles and drop it in the mail. Thanks.

I think your column is great. Sometime if you run out of things to discuss, I would suggest a dissertation on exactly what goes bad when an engine goes "over the hill", and has an extremely narrow needle valve adjustment. Some years back I owned a Super Tigre .23, which ran very well for a number of years. Then, it developed the narrow range on the needle valve, making it impossible to adjust it for a complete flight. Obviously the engine was worn out, because of its long life of steady use, but it still appeared to have good compression. Exactly what wears out to develop this situation. Your comments would be appreciated.

Yours truly,
Duane F. Hartman
Columbus, Ohio

The address of Coles Power Models is P.O. Box 788, Ventura, California 93001. By error their address did get omitted from the column. I did mention it in a column shortly after but many readers seem to have missed it as I keep getting many requests for the address. For those who missed the original mention, Coles is an excellent source of various types of metals in small quantities, brass, steel (no aluminum), etc. They have many hard to find materials such as Teflon bar and sheet stock, gasket material, odd size taps and dies at very reasonable prices, etc. Coles originally started as a supplier of materials for steam railroad enthusiasts — and still is for that matter, but many of their items are useful to the other types of model builders as well. They also have casting kits to build many types of steam engines, gasoline engines, etc.

Many things can cause an engine to be "over the hill". As the piston and cylinder liner lose their compression seal, there is less combustion pressure resulting in less combustion heat. When this happens, the needle valves two cycle

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ENGINE CLINIC

from page 184/10

range becomes very narrow. Sometimes only one or two clicks. Naturally, there are other factors involved in the wearing out of an engine. As the rod bushings or wrist pin holes in the piston wear, several things happen. In the case of the wrist pin holes in the piston, if enlarged beyond normal tolerances, the base compression which, in turn, transfers the fuel mixture from the crankcase to the combustion chamber, can leak out the holes resulting in less base pressure. Enlargement of the wrist pin holes, along with worn rod bushings, can allow the piston to drop lower in the sleeve, in turn, lowering the compression ratio and affecting the port timing. Any of these things can, in turn, have an effect on the broadness and how critical the needle valve setting becomes.

Dear Mr. Lee:

I haven't written to you in several years because you solved my problems and everything has been just fine. I now have a problem with a K & B .40 FR which is several years old. I have always had to lean the mixture after the first flight, but now this must be done after each flight, until it is too lean, in other words too rich or too lean and always changing. I use K & B 500 fuel, Semco muffler with pressure, 10/6 prop, and an 8 ounce tank in the Kaos 40. Another, similar engine runs just fine in the same set-up. The engine in question seems to have good compression, starts easily, idles fine, and transition is good. If the problem is simply that the engine is run out and worn beyond tolerances, I don't understand why it does everything else well.

Yours truly,
John R. Agnew
Fort Myers, Florida

John, since the engine starts easily, idles fine, and seems to have a good top end, other than changes in mixture setting, I would guess that the problem is in the carburetor. Assuming that there is no foreign matter in the carburetor, the problem is more than likely a worn needle valve. With the needle valve opened to running position, see if you can move it up and down a perceptible amount. A tiny amount of movement is okay but, if you can feel or see a definite movement, then this is your trouble. In the air, under "G" loads and vibration, the up and down movement of the needle valve is, in turn, changing the mixture setting. The only solution is to replace the carburetor.

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That about wraps it up for another month, gang. Next month I'll have a report on another old time engine — the Barker Man-ul-matic. □