R/C MODELER MAGAZINE'S SPECIAL TWELFTH ANNIVERSARY ISSUE

RCM radio control MODELER

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THE WORLDS LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

VOLUME 12 1975 NUMBER 10

RCM

THIS MONTH'S COVER

The ultimate in quality and design is Soarcraft's Magnum 12. It is obvious these features also apply to JoAnn Gregg of San Jose, California. Photo by Max Mills.

OCTOBER

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FROM THE SHOP

DON DEWEY

● With this October 1975 issue, R/C Modeler Magazine begins its thirteenth year of publication.

In the very first issue of RCM, dated October 1963, the following editor's memo entitled, "At the Edge Of The Field," was presented as our first editorial:

I can remember, some twenty years back, of being ten years old and scared. Standing at the edge of the flying field, I felt a mixture of excitement at seeing the many gull-winged free-flight ships seeking thermals in the warm morning air, and the feeling of embarrassment at the crude results at my own first attempts of model building. I'd only been there a short time when a man – un-named, but never forgotten – came over to the edge of that field and helped me strap on the wing and stab. A few minutes later my first model was in the air and actually flying! That man, who spent most of the afternoon helping a young boy solo – created an image of a modeler that has never been forgotten or destroyed.

This same image has been everywhere apparent since the very beginning of R/C Modeler. When we began work on the magazine, we were told that we had a 92% chance of failure before we even got off the ground.

And so did that first model, twenty years back – if it hadn't been for the help of another modeler. When you stop to think about it, if you have a 92% chance of failure, then, conversely, you have an 8% chance of success! We hadn't been at work too long before we found the formula to success – when you take that 8% and then multiply it by the number of modelers that offered their help in a multitude of ways – that came over to the edge of the field – then we couldn't possibly fail.

So we made it to the flight line. The credit goes to each and every one of you for your ideas and suggestions in your letters; for the handshakes and the words of encouragement from those we were fortunate enough to meet personally at the Nationals. And, too, to the many members of the hobby industry for their time and efforts in helping a new venture get started. You'll find their names in the advertisements in this issue – men who are part of this image – buying space in a magazine they had never seen, written by people of whom they had never heard!

It's called coming over to the edge of the field. . .

We have begun with a challenge – to bring the finest material together between two covers of a magazine in order to provide you – the radio controlled modeler – with a panorama of the R/C world in a fashion unmatched by any other magazine or medium. It is your magazine – it will be what you want it to become. This is our promissory note to you – our editorial policy.

The true riches of any man's life is in the friendships he is privileged to enjoy – the measure of his success lies in the challenge to be of service to others. In these respects, we consider ourselves among the most fortunate.

That first issue contained 40 pages, had 25 advertisers, and, without sufficient funds for even having the type commercially set, was hand typed and manually justified on an IBM typewriter.

Today, R/C Modeler Magazine has expanded to almost 170 pages and carries an average of about 140 or more advertisers. And, today, twelve years later, the philosophy expressed in our first editorial still holds true. We are still trying to do our very best to bring you the finest publication of its kind in the world. Every two years we run our Reader Interest Survey and several people devote their full efforts for several months to tabulating and cross-tabulating the results of that survey in order that the magazine's format may be changed to suit your desires and preferences. While the current Reader Interest Survey is still being tabulated, certain trends have already been established, and certain changes and additions are being made commencing with this issue of the magazine in accordance with your request. This will always be **your** publication and it will reflect what you want to see and read in order that **your** enjoyment of this sport and hobby may be increased.

Whatever this magazine is now, or will become, is due to your effort and participation in letting us know what you want to see in the pages between its two covers.

In addition, I feel extremely fortunate and privileged to work with the finest staff of writers that have ever contributed to any publication in a technical or semi-technical

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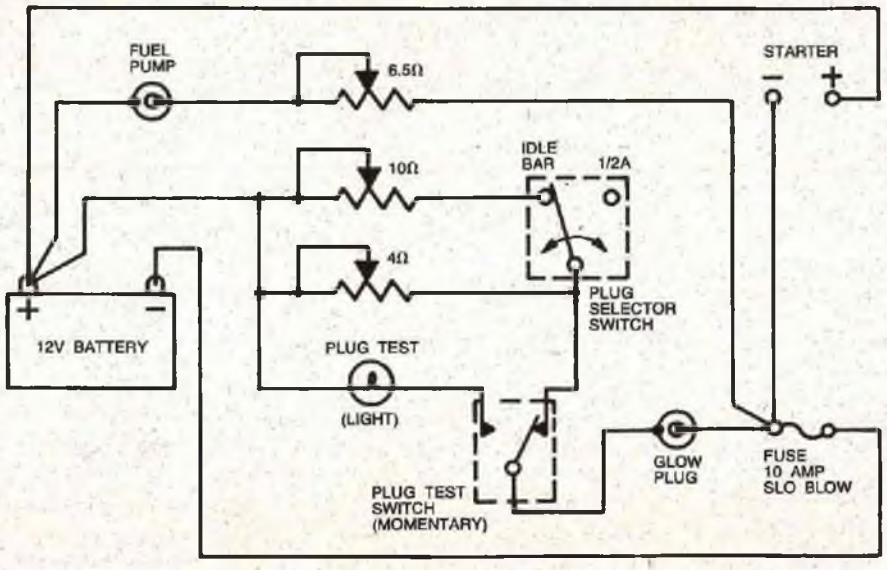

RADIO SPECTRUM

BY JIM ODDINO

● I'm writing this the day after the Master's Tournament which was held at Rough River, Kentucky. The advertisements have probably already told you what kind of radio equipment was used by the winners and I'm sure there will be other detailed reports covering all the vital statistics but I thought I'd give you a rough picture of what the top flyers prefer.

Pro-Line was the most popular RC system, used by seventeen flyers. There were ten Kraft's, four World Engines Expert's, four S & O's and one EK-logictrol. I didn't get the breakdown on single versus two stick transmitters but the finish of the top three proves either mode will do the job. Most were open gimbal models but there were a few closed sticks used. I'd say most of the guys had gadgets such as roll buttons and dual rate switches, but I don't believe you really need them with this year's pattern.

It is never easy to find out who is happy with what equipment but I got the general feeling that most of the guys were pretty satisfied compared to reactions from the last few years. The biggest problem still seems to be servos but the manufacturers are working hard to improve them. One of the problems is that engines are being developed to coax more and more power out of them. In many cases this results in more vibration which is transmitted to the servos. I talked to Jim Fosgate of Pro-Line who said that he had taken a real scientific approach to the problem by building test equipment which would simulate the in-flight vibration. Feedback pots that would last for millions of cycles on the bench showed significantly shorter life when tested under vibration. Jim was then able to make changes and determine if he was improving potentiometer life or not. When he got finished he had a number of fixes which should make the feedback pot last twenty times longer based on his test results.

While many of the Master's competitors are on factory teams, or in the radio business in some way, I still think it should be of interest what equipment is used by what I feel is the most demanding group of RC pilots in the country. Bill Salkowski talked about pattern flying at a recent Valley Flyers meeting. He went through a kind of history of pattern flying and the list of winners sounded like a 'Who's Who' of radio development. In the early days the people with the best equipment usually won the contest. In fact, they gave points for how well the radio worked on the ground. Each year it seemed like someone like a Howard Bonner would have a better servo or a Bob Dunham would have a transmitter that could command two channels simultaneously.

Jim Kirkland and Zel Ritchie were tough to beat when the first proportional radios started to appear. It was pattern champ Doug Spreng who developed the first digital system and it was Cliff Weirick who came out on top with the assistance of the first commercially successful digital system. Kraft improved on it and he became the new pattern champ. Jim Whitley and Ron Chidgey pressed for improvements which helped them win the big one, and so it has been over the years. It is the pattern flyers who keep looking for an edge on the competition that has resulted in the development of the fine equipment that is available today. I'm not saying you must go out and buy what the champ has every year, but take a look at the type of equipment these top flyers use and your chances of success will be very good.

I was also pleased at the comments I got from this elite group regarding this column. I was surprised at how many guys were building fast chargers and battery testers. Frank Schwartz, who was busy making sound pressure measurements at the Masters, said he had built the fast charger and loaned it out and then had a heck of a time getting it back. It made me want to go home and work up some more schematics!

While I was disappointed in my own performance at the Masters (next time I'll put Loctite on those bolts before the contest), I enjoyed the hospitality of the hosts and just being in this kind of company. Congratulations to the winners and good luck in Switzerland.

◆ ◆ ◆

Dear Jim,

I read your column "Radio Spectrum" each month with great interest as electronics is my main hobby and RC my second. In your May 1975 column a question was asked by another RC enthusiast concerning the reversal of servo travel. Your solution to the problem is one method of solving the problem but a second approach is by far quicker and easier (in most cases) and with less chance of messing up a good servo.

My RC equipment is the Heathkit GD-19 system and I have reversed the direction of servo travel on several occasions using their approach. To quote from their assembly manual page 88:

"Note: In some installations it may be desirable to reverse servo travel. This can be done easily by reversing the connections between lugs 1 and 3 of the associated stick control pot in the transmitter. It may be necessary to re-adjust the control housing lever to obtain proper centering. . ."

I haven't been able to look into the insides of other brands of RC equipment with the exception of the "Blue Max" system, but I feel that other manufacturer's equipment is basically the same and servo reversal can be affected with the same approach. With this method it is much easier than playing around with the insides of the miniature servos we are using nowadays. However, I don't think some fellows should try any modifications to their gear unless they know exactly what they are doing as they risk voiding any warranty or future service work in effect at time of modification.

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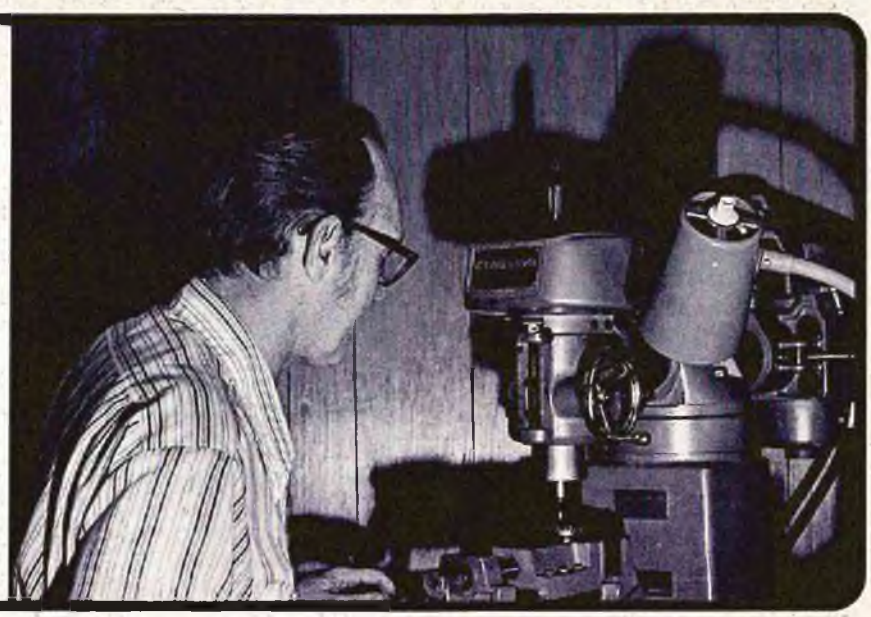
engine clinic

By Clarence Lee



● This month we will start the column off with a letter that is pretty much self-explanatory. The topic of the following letter brings up a couple of points that I would like to discuss — but first, the letter:

Dear Mr. Lee,

Today at the Pattern - Sport Scale Contest in Madera, California, one of the contestants left early to return home, namely Gene Pond.

He had left the flying site no more than 5 minutes when his car exploded in a ball of fire. He locked up his brakes and bailed out of the burning car, receiving only minor burns, but his car was totally burned along with his planes and radios. I am deeply sorry about Gene's unfortunate accident as were his fellow contestants.

Now, the purpose of this writing. Summer is coming very rapidly and all you contest types and Sunday fliers as well – take heed to an ounce of prevention – **do not** *leave your extra fuel locked up tight in an unventilated car or in your trunk as the heat that is generated inside is absolutely* **too much** *for the fuel to endure. I suggest that you purchase a styrofoam type ice or picnic type chest and put some ice inside and then your fuel cans. In this way the temperature will be kept down to a reasonable level with no danger of an explosion and/or fire. This is what I will be doing with my fuel from now on. So a word to the wise is sufficient.*

Roy Castleberry
Sir John's Hobby Center
Bell Gardens, California

I do not know at the time of this writing if the fuel in the trunk was the sole factor in the automobile explosion or if there were other contributing factors such as a short in the wiring of the car, etc. However, the fact remains that an explosion **did** occur and the presence of model fuel could only contribute to the intensity of the fire.

Carrying fuel in the trunk of the car is a practice that all of us are guilty of. In the cooler months there is no big problem, but when the hot summer months arrive a few precautions such as Mr. Castleberry suggests should be taken. Completely disregarding the apparent fire hazard, just for the sake of the fuel itself, it should be kept cool. How many times have you allowed your fuel to become hot, allowing the contents to expand, then upon loosening the lid, heard the air rush out? Well, gang, when you heard that air rush out you can also be sure that some of the volatiles in the fuel went out as well. Allow this to happen a few times and then you wonder why the "lousy engine" is getting hard to start, seems to be losing its power, etc. Then, add to this that many fellows let their fuel sit around with the lid off of the can, allowing normal vaporization to take place and the alcohol to also absorb water. This makes for a real good running fuel.

In the case of racing fuels it is most important that the fuel be kept cool. And, yet, at the pylon races how many fellows bother to keep their fuel in an ice chest? I do, and know of a few others that do, but the majority do not. And yet these same guys become very upset if they find that someone else's engine is turning a few hundred rpm more than theirs. As an example, one well known top pylon flier was having problems getting his engine to turn up at a recent Valley Fliers contest. He was using the same fuel that he had used at two previous contests — one of these being the Bakersfield Meet where temperatures got pretty warm. The fuel had been allowed to set in the sun at both contests. A change in fuel to a new batch mixed by an RC'er who does keep his fuel in a styrofoam chest resulted in the engine picking up 1000 rpm. And that's a bunch! This shows what effect allowing the fuel to overheat can have on the performance of a racing engine. It is common practice with the higher nitro fuels to use a small percentage of propylene oxide. Propylene oxide has an evaporation rate much the same as ether. Allow the fuel to become hot, open the can, and you can be sure most of the Propylene is gone. So when a fuel containing propylene oxide is used, an ice chest is a must!

So if you are going to carry your fuel in the trunk of your car — an particularly on long trips, do as Mr. Castleberry suggests. Keep it in a styrofoam ice chest with ice cubes or freeze cans.

Mr. Lee,

With the sky high price of fuel today, many people in my area are brewing their own fuel. Our club has been using castor oil in the mix but recently this oil is scarce or high priced. I realize there are substitutes for castor oil but I'm very curious as to what the performance parameters are for these substitutes. How is it decided that a certain synthetic oil is acceptable and another is not? Are there parameters of viscosity, flash point, pour point, load carrying capacity, etc., that a modeler can use to select a synthetic oil? Many of the fliers here have easy access to a wide variety of synthetic oils. If we knew what the requirements of the oil were, we could pick a suitable oil for ourselves. Can you help us.

Thanks,
Russ Burnett
Champaign, Illinois

Russ, we have discussed the synthetics many times in replies to other readers letters. Although there are certain parameters that a model fuel must meet there is no given set with which you can say this is "it," and start looking for an oil to match. Through trial and error the better synthetics for model fuel use have proven themselves. Although there are many synthetic oils available for automotive, motorcycle, snowmobile, go-kart, etc. use, only a few can be used in model engine fuel. Although many of the motorcycle synthetics would appear to be ideal for model use, many have shortcomings — viscosity is too low, flash point too low, contain additives that stain paint, etc.

Most of your synthetic oils are of the multi-viscosity rating, i.e. 10-40, 20-60,

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QUO VADIS?

An Editorial By
RICHARD C. SCAMEHORN

Reprinted From The Flying Forks Newsletter

Vocation: The work in which a person is regularly employed.

Avocation: A subordinate occupation pursued in addition to one's vocation, especially for enjoyment: hobby.

Hobby: A pursuit outside one's regular occupation engaged in for relaxation.

(Webster's Seventh New Collegiate Dictionary).

● A.M.A., N.S.R.C.A., N.R.C.H.A., L.S.F., N.S.S., N.S.P.A., S.A.M.; Nats, World Championships, Invitationals, Masters; R.C.M., M.A.N., F.M.; M.R.C., O.S., K & B, J.C.M., D & R. This list is but a few of the elements comprising the model aviation field and each of us could expand each category to fill up an entire page. What does it all mean to you? Where does the individual flyer fit in? Where do we go from here?

The above elements consist of four interest groups: (1) Membership Organizations; (2) Competitive Events; (3) Commercial Media; (4) Commercial Manufacturers. The basic purpose of each might be generally stated as: (1) Organizational direction through the strength of consolidated invididuals; (2) Increased proficiency through competitive excellence (3) Profit; (4) Profit. Our above definitions would apply as (1) Avocation; (2) Hobby; (3) Vocation; (4) Vocation. All mixed up? It certainly is confusing. Perhaps a table might make order out of chaos.

Let's examine what we have listed. Look down the vertical column labelled "Organizations."

It is obvious the word member(ship) is the most frequent thought listed — and it should be. Looking down the vertical column "Events," and the concepts of proficient competition dominate — and they should.

Now look down the columns entitled "Publications" and "Manufacturers." Here the concepts of profit and stockholders dominate — and they should.

But, does the difference in the character strike you as an issue of concern? It does to me in the same way amateur sports, including the U.S. Olympic Teams must be continuously separated from commercialism. There's nothing wrong with commercial media or commercial manufacturers competing for our hobby dollars in an effort to generate profit, but if you want to consider conflict of interests, look (for example) at the July issue of RCM magazine in its coverage of the Toledo show, pages 54-63 inclusive. There are 180 "snapshots" of the show with 145 of them showing commercial manufacturer's booths (all existing or potential advertisers in RCM). Some manufacturers were even shown twice! Now if you think that's conflict of interest, wait 'till the chips are really down.

Try a situation where the commercial media is trying to influence the A.M.A. against publishing its own magazine! Want to check it out? Look at the June issue of RCM, page 126. RCM magazine suggests — "now there can be an alternative to the A.M.A.," and it proposes the formation of the United States Aeromodelers! Don't think this was a last minute afterthought, because if you look close, you'll find an ®, meaning RCM had gone to the trouble of having this name recorded by the U.S. Government as a registered trademark for RCM's benefit! And, finally, in the most recent (August) issue of RCM, page 2, the "guest" editorial, obviously published with Mr. Dewey's approval, takes a low-brow, knock the faults of the establishment, cut at the A.M.A.

Check out the last two horizontal lines of our chart. It is obvious that each of the four interest groups try to influence all three of the others, but the last line is also true: the group with the most influence is the organization of members. The contests wouldn't be competitive if members didn't fly, and the better run contests get the best competitors.

The publications need subscribers and advertisers, or they go broke. And the manufacturers pay for their ads out of revenue from the member's last purchase of kits, engines or radios. Who's paying **all** the bills? The members: they pay to enter events, pay for media subscriptions and pay for equipment.

Individually, Don Dewey, via RCM has a louder voice than any other single A.M.A. member (he's probably a life member of A.M.A. too). Collectively, the A.M.A. membership can make Dewey's voice sound like a pin dropping on a shag carpet.

My voice says RCM with its special interests, has gone too far, proposing what would obviously be the destruction of the A.M.A. as it is known today. Whether he's grown too big for his britches or he simply thinks the time is ripe for a power struggle take-over, I don't know. But in any event, RCM should cease and desist it's devisive efforts, and Don Dewey owes an apology to some 50,000 A.M.A. members.

My voice also says the A.M.A. is most influenced by the membership. I say, stand up and be counted. Write to Johnny Clemens, John Worth, Bill Winter or your area Vice President. If we don't like what we've got, it's our **responsibility** to work for change. But to destroy the organization (rather than change it) is so negative that purpose is lost in the actions of forceful revolution.

And to each A.M.A. member who reads this editorial: Whither Goest Thou?

EDITOR'S COMMENT

The preceeding editorial was authored by Richard C. Scamehorn, Editor of the Flying Forks of Lancaster, Ohio and scheduled for publication in the August 1, 1975 issue of their newsletter. We have reprinted that editorial in its entirety with only the following comments concerning it.

In the 7th paragraph the author refers to the fact that "RCM had gone to the trouble of having this name recorded by the U.S. Government as a registered trademark for RCM's benefit!" To begin with, RCM did not register this trademark nor did any of its staff members or representatives. This trademark was registered by a group of

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	ORGANIZATIONS	EVENTS	PUBLICATIONS	MANUFACTURERS
Definition:	**Avocation**	**Hobby**	**Vocation**	**Vocation**
Basic Character:	**Interested Members**	**Competition**	**Commercial Media**	**Commercial Manufacturers**
Comprised of:	**Dues paying Members**	**Contestants**	**Stockholders and Employees**	**Stockholders and Employees**
Function and Purpose:	**Strength in Numbers**	**Develops Proficiency**	**Sells for Profit**	**Sells for Profit**
Serves the Interests of:	**Dues Paying Members**	**Contestants**	**Stockholders**	**Stockholders**
Controlled by:	**Member Representatives**	**Contest Director**	**Stockholder's Agents**	**Stockholder's Agents**
Tries to Influence:	**All Others**	**All Others**	**All Others**	**All Others**
Is Most Influenced by:	**Members**	**Members**	**Members**	**Members**

SUNDAY FLIER

BY KEN WILLARD

I feel better.

In the June issue, I wrote about some of the dumb things I've done in R/C; then I offered a year's subscription to any one of you who could do something which, in my opinion, was dumber.

Wow! We sure are a bunch of klutzes, aren't we? I don't feel quite so bad, after reading the letters you sent in. And they're too honest for me to doubt their veracity.

Since writing the column I've added to my collection of personal boo-boos. Like the dive into the hill when showing off to the ranger. And then I tried to clean my Dwyer Windmeter while standing in the wind, and zip! Away went the featherlight ball indicator. Dwyer took pity on me and sent me a small supply — wonder if they're trying to tell me something? Anyway, it's working again. Great aid for slope soaring. And I need all the help I can get.

But don't we all? Here's Clyde Wiley of Tampa, Florida, with a couple of classics:

Dear Mr. Willard,

All of us get trapped into these dum-dum bloopers and here are some of mine and some I have seen:

The forward dowel pegs used on R/C models to hold the wing rubber bands are sometimes shown pointing forward and at a slight angle up as they extend forward. This supposedly aids the release of the rubber bands in a crash. If this angle happens to come out at more than perpendicular between the bands and the pegs – LOOK OUT! The bands will hold the wing just long enough to fly the plane to altitude where an evil phenomena takes over; the bands and the pegs become automatically lubricated by the exhaust of the engine and the bands easily slip out and free of the pegs leaving your airplane free to fly earthward minus the wing by the shortest possible route – straight down. Sometimes if the bands are on tight they can pull the pegs up slightly which is just enough. I learned about this from watching my plane dive straight down from 400 ft. after the wing suddenly went fluttering off on its own leaving me with rudder – only straight down. Fortunately, I was over a large plowed field and no harm was done except to my pride. But this could be very dangerous as the action is over in seconds. My plane buried in the mud engulfing the entire engine and tank area. A cure for the problem is not to glue these forward pegs with even the slightest angle upwards, use dowels heavy enough to resist the forces of the bands holding the wing. Also, always use one band at least to lash across between the front pegs. This will hold the bands on the pegs and keep out some of the exhaust oil.

Another classic boo-boo was when I tried to hold my .19 engine in the front end of an H-Ray trainer with self-tapping wood screws that were too short. Everything went well through the flight and I was slowly throttling back the engine for a landing when ZINGO – off came the engine free and still running. This could have been worse, but I had taken the extra time to fasten a safety "keeper" which doggedly held to the engine by the throttle lever wire! This kept the plane and engine together and preserved the balance which I needed to complete the landing. The spinning prop whacked a big chunk out of the wing leading edge and everything went silent. I was able to bring the plane in safely with the engine hanging loosely by only the throttle wire. The foresight of adding the one tiny little keeper had saved both the airplane and the engine from a bad end.

Now, I make sure the mounting screws are long enough to hold properly and coat the screws with silicone glue before turning down into the wood bearers. Yes we learn something from each model.

Sincerely,
Clyde Wiley
Tampa, Florida

Dumb, Clyde, but read on.

Up in Prince George, British Columbia, Canada, Ken Legault writes:

Dear Ken,

I just received my June 1975 issue of R/C Modeler Magazine and enjoyed your column of dumb things very much. I noted at the end of your article a request for dumb things that have happened to your readers. The following is my dumb happening:

I had been flying a Sweet Stik for almost 6 months and decided to try a new foam wing on it. The bad thing was I glued the 1/16" balsa covering on the foam with epoxy glue which made the wing alone weigh over 3½ pounds, heavy but immensely strong. The old .40 I had on the fuselage didn't make this heavy beast perform properly so I put on the Veco .61, a real powerhouse. The tail surfaces on the Sweet Stik are only 3/16" balsa not the strongest. Anyway I went to the field, fired up the Veco, taxied to the take-off strip and stood with my legs straddling the fuselage with leading edge of the stabilizer against the back of my legs. I then gave full throttle to tweak the needle valve to the proper position for most power when suddenly the stabilizer snapped under the strain with the Veco screaming full power down the runway.

I was so startled, the transmitter slipped from my greasy fingers as the plane, minus stabilizer, headed skyward. As I grabbed madly for the fallen transmitter, I heard an awful balsa, foam crashing sound. I regained my composure and silently walked over to pick up the pieces thinking to myself what a DUMB thing to do!

Hoping you find the above a dumb story.
Yours sincerely,
Ken Legault
Canada

Funny, Ken, and dumb in a way, but not really all that bad. You just got all shook up by the suddenness of the action.

Bill Brown, in Medford, Oregon, has a couple of goodies:

Dear Ken,

I have just finished reading this months Sunday Flier and you are right – we all do dumb things from time to time. Usually it is the little things that get you. Take for instance the following:

(1) Take one Esquire, mix well with a little wind and blend with a McCoy 19 cleaned and ready to go by none other than your friend and mine – Dick Aubert! Having launched this rudder-only bomb, it is suddenly obvious something is wrong – No wind penetration at all. In fact, with it headed into the wind, the crazy thing is losing ground but gaining altitude in the process. What do you do? You wait for the engine to run out of fuel and the dumb thing to come down. After all, how far can you go on two ounces of fuel? Fifteen minutes later, it's a quarter of a mile downwind and about 500 ft. up. The engine still very happy buzzing along. At this point the radio runs out of range and we have a canard on our hands.

It hit the ground so hard it drove the stab right up the middle of the fuselage clear to the firewall. Like I said "Canard." It seems that someone had put the sleeve in the engine in backwards! He got even though. He managed to nominate me for the "broken prop" award at the next club meeting. It seems I crashed my transmitter which I don't want to go into.

(2) The little light tells you you're charging right? Right. But it doesn't help one bit when the wall plug and the light switch are on the same circuit! That's a beauty to find when trying to figure out what went wrong.

(3) Now when you go to the field on Sunday, you like to take more than one plane because let's face it, Sunday is not always a good day for airplanes. If you are lucky and own more than one radio, flying is greatly enhanced and more relaxed. All you have to do is take your ship from its cradle and pick up the wrong transmitter. High idle of course!

(4) Last but not least is the case of the dumb cluck who uses T-pins to hold hatch covers down. It works fine until you do a roll. The small dark object you see coming down is often referred to as a battery pack.

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CUNNINGHAM ON R/C

BY CHUCK CUNNINGHAM

● It is a clear, hot, Sunday morning in July when I am writing this month's column. In a couple of hours I am going soaring with my old pal, Helmer Johnson, and his wife, Jane. Jane has become an accomplished soaring pilot in the past year and now makes the soaring contest circuit with her husband. For many years she has aided Helmer in his enjoyment of the sport of RC by helping him decorate his aircraft, and most of all, by allowing him to do his building all over their house. For the past twenty-five years or so, I have looked on Jane as the epitome of a modeler's wife — but, in the past few weeks she has been replaced at the peak by another.

I first heard of Rosemary Edwards from Helmer as he keeps up with all of the modeling fraternity in central Texas. Rosemary Edwards is the wife of a modeler, Tim Edwards. But she is more than (just) a wife. She also **builds** his airplanes. Not only does she build them, but she also **paints** them, and installs the radio equipment in them!

This I had to see for myself, so I drove over to their home in Hurst, Texas, one noon to photograph Rosemary at work. As old Fearless Leader knows, when I get behind a camera, something is going to happen. This time I shot up a roll of 35mm film, taking pictures of models in various stages of construction, and shots of Rosemary working, and Tim just piddling around. And, would you believe it, when I got the film developed, nothing — the film had broken inside the reel and had never unwound as the advance lever was pushed. So much for the pictures. The Edwards are in their middle twenties, and live in a vast apartment complex that includes a golf course and numerous tennis courts as part of its layout. When they are not building and flying models they take to the tennis courts and the pool.

Rosemary showed me the current model that she was working on, a Senior Falcon. In a rack in the bedroom was a Top Flight P-51, and a Super Kaos, both beautifully built and well flown. Planes that she has built include an H-Ray, Ugly Stick, Two Hoss Flies, Sweet Stick, Super Kaos, P-51, Little Tex, Mini Stick, Acro Star, and the Sr. Falcon. She is also currently working on a 1/4 Midget Shoestring. She puts in about 8 hours a day at the building boards, and has several projects going at the same time. She started out in the hobby because as she puts it, "Tim is a lousy builder." After watching some of Tim's efforts she thought that she could do better, and Tim encouraged her to give it a try. Now, he builds some, and does most of the basic painting chores, but leaves all of the building, sanding, and trimming to her.

She started out in building to keep her husband flying, but now she builds aircraft on a commission basis for the Hobby Market. I tried to interest her in building a Midwest Pitts for me, but she decided that she could turn out a lot more of the simple aircraft in the same amount of time.

Currently she is beginning to teach several modelers wives the fine art of kit construction. Who knows, one day she may open a school of modeler's wives and, since I can't get Rosemary to build a model for me, maybe I can send my wife to school to learn. That will be the day!

For all of the girls that have been uptight over the time their husbands spend on this hobby and now that they have read about Rosemary, I must add one very important fact, that the Edwards do not have any children, which gives Rosemary the time to delve into model building. But, there really isn't any reason why more wives don't take up the hobby, and, who knows — one day their husbands may even teach them to fly. Tim is teaching Rosemary the art of thumbing the sticks, and one day you might even see her competing in scale. She has the ability. By the way, we fliers might take note of the fact that power boat racing is a total family involvement!

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In the August issue, I asked for an imput from around the country about unexplained radio interference. It is too soon yet to get anything from other parts of the country, but in our area we are beginning to pin down some of the causes of radio problems. At this time it appears to be not only illegally powerful CB mobile units, but also some disgruntled modelers, operating transmitters with the intention of knocking down flying aircraft. As the information develops on this, I will pass along what we discover as well as a tabulation of problems from around the country. It is a sad state of affairs when it is discovered that people are willfully shooting aircraft out of the sky. In the case of the illegal CB rigs, it is more a case of ignorance, while in the case of modelers — who can explain it? I have long believed that the group of men, boys, and some gals that engage in this hobby/sport are just about the greatest to be found anywhere, but, there must be some bad apples in every barrel.

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Most of you readers are tired of listening to me yap about the fun that I have flying my Senior Telemaster, an 8 lb. x 8' aircraft. But let me say one more thing, and then I will shut up. When I started flying it, I used a five year old Enya II. Next, I put in a brand new Enya III GB, which retains all of the fantastic starting and idling ability of the Enya II and the Enya III, with a good power boost. Then I put in a new Veco .61, complete with new fuel pump and special carburetor by Perry Aeromotive, and Customized by Clarence Lee. Now, that is some fantastic engine! I am still following Clarence's break-in instructions, but flying and breaking-in at the same time. On mid-range setting it will out pull the Enya III GB, and at high throttle (still not out of the four-cycle range), it really yanks it along. This engine has power to spare, and the pump works perfectly. The pump allows for a much larger intake area and this allows a much higher power output. The Veco muffler quiets it down well, and the combination makes for one very fantastic engine. In fact, it has me thinking of even larger aircraft. Now if the gas shortage will just allow me to keep driving my full size station wagon so I can get an even larger monster out to the field. Frankly, I've already got it in mind, and will be committing it to balsa wood as soon as the weather quits being so darn good for flying and playing tennis.

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With the current trend towards higher and higher prices for gasoline, it isn't too far out of the realm of possibility to assume that the price of gas will be bouncing around the buck per gallon level very soon. The reason why the price should be so high is one which drives me into a rage, and I won't get into my gut feelings on these pages, but this high price will make a great change in modeling as we have known it in the past. Here, in Texas, when the price rose from 30 cents to 60 cents in a year and a half it made a marked change in our life style for awhile, and then we more or less settled back to the usual way of living. There have been some economies, but vacations haven't been scrapped, and a lot of folks are still driving to contests. But, at a buck per gallon, will the family car still seem to be needed to take us to the flying field, when it may be a fifteen or twenty mile drive? Where I live, a vast piece of ground lies but a quarter of a mile away. It once was a public golf course, and then was purchased by Texas Christian University to become part of their campus. Today a lot of the land is still wide open. It is kept mowed, and each evening lots of golfers practice their shots. I have flown from it sometimes, but the fact that we push noisy aircraft keeps me from flying any but the small airplanes there. Now a tennis complex is being constructed in one corner which will prevent me from flying anything but gliders from these grounds in the future. But, the space is still there and, while I haven't flown with electric power yet, this may be the ultimate answer for this site.

How about the rest of you? How many school grounds are located near to you? School grounds would be great for flying, if it were not for the noise, and if school

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WHAT HAS THE AMA DONE FOR ME LATELY?

By John Worth, AMA Executive Director

With each issue of RCM it becomes more obvious that your magazine is running away from the pack - - more pages, more ads, more color, etc. It has a tremendous advantage simply because it is tuned to the largest and most profitable part of the model aviation market.

By contrast, AMA, even though dominated by RC interested members, must cater to all interests so as to serve the common good. This means that AMA's magazine can never truly be competitive with yours since Model Aviation must always represent a compromise of interests.

This brings to mind our discussions on the phone last February, immediately prior to the AMA magazine decision. You recommended that we seek advertising as a means of offsetting the cost of magazine production and we have done just that. But we have not pursued the idea as a dominating factor and we have been satisfied with a modest amount.

In the meantime, the magazine is operating well within the budget and has generally been well received. And, because it is a matter of optional choice by members, the magazine will be pursued only to the extent that membership support will permit. So where we go from here is up to the members which is as it should be.

That being the case, I hope we can resume the progressive explorations we were going through a few months ago. I thought then, and still do, that those phone conversations were important. I also think that the current explorations by RCM regarding the U.S.A. and such editorials as the one by Peter Bulla are useful in helping us all think about where we are going.

Whatever comes of all this can be very helpful if the aim is kept positive. Toward that end I hope you will choose to publish the enclosed response to Bulla's guest editorial - - not as a rebuttal but as further food for thought and deeper exploration of a national organization's role in serving it's membership.

■ ■ ■

Peter Bulla's guest editorial in the August 1975 RCM is a most penetrating piece of insight into the current status of AMA and model aviation. It echoes many of the thoughts I have developed during years of being involved in the AMA headquarters operation. In short, I agree that AMA needs to find the ways to better serve the sport flier and to solve the riddle of what balance to seek between attention for competition and recreational interests.

I call it a riddle because there is no really clear separation between the two interests. Both need each other. The sport flier has benefitted tremendously by the progress demanded by the competition flier: better products, numerous RC frequencies, improved insurance programs, expanded PR efforts. Unfortunately, the competition flier has not been able to support these demands in sufficient numbers - - the percentage of competitor members of AMA has been relatively small in recent years.

It's realistic, therefore, to say that sport flier membership dollars have supported organizational activities which, though tailored to competition interests, have benefitted sport flying interests. The net result has been good for all and this has had much to do with AMA's phenominal growth during the past ten years.

But what was fine until now is not necessarily good enough for the future. It was inevitable that the sport flyer, who has been increasingly footing the bill for activities which have indirectly helped himself, would seek more direct aid and services. The problem, however, is that these are not easy to come by and they tend to be expensive.

For example, legal aid to help solve local problems involves costs far above anything that current dues can provide. The same goes for the kind of PR effort it would take to have any significant local effect. Both these areas involve astronomical costs. And any matter of enforcement of local safety and/or noise standards is even more impossible. It doesn't make any difference what initials an organization has — AMA, USA, or take your pick — enforcement is something no national organization can do, unless it has local officials on the scene.

In these areas, the use of volunteer officials — who have been the backbone of AMA's history — will not work. Only a network of paid professionals can be expected to be effective (on call whenever necessary) and this would put the cost factor in a whole new world. This is not to say that we shouldn't proceed in this direction, but it means that a new appreciation must be developed for what is involved and what amount of money it will take.

In the meantime, AMA has done a fantastic job with a relatively tiny budget (compared to the National Rifle Association, for example), mainly because of a network of about 150 volunteer officers, plus hundreds of volunteer club officers. Without these people, we would not be where we are today. And to replace them with anything will cost more — a lot more.

Yet, what the AMA member is getting for his money now is a bargain. Forget the magazine question, because only those who want it have to pay extra to get it, the real cost is the minimum it takes for membership. For this fee the member gets what the following article describes:

"AMA was born during a crisis, back in the Thirties when several states banned the flying of gas engine powered models. Through organization and unity modelers were able to exert influence and get the bans rescinded. This kind of thing goes in cycles, from one crisis to another. During such crises the questioning about the need for AMA drops dramatically, as members look to and get AMA action of their behalf.

So, it was two years ago when the Federal Aviation Administration was threatening to severely curtail model aircraft flying activities. There was about a year of turmoil and uncertainty until AMA was able to temper the thinking of key FAA people and cool off the threat.

That situation is relatively calm now, although it is constantly in danger of erupting again. It takes patient, continuing, and painstaking liaison to keep the lid on. Unfortunately, it has to be low key to be effective, so AMA does not have a shining knight image glowing brightly to remind everyone that the job is being done daily.

Similarly, AMA efforts with the FCC go on constantly, not only to seek new frequencies for our ever-expanding activity, but also to protect those frequencies we have from others who would love to take them from us. It's a constant and deliberate effort to probe and defend, to justify our status. And it has been outstandingly successful, although without a lot of ballyhoo.

Meanwhile, AMA's insurance program makes it possible for most members to fly because flying site owners are assured that they are protected in the event of an accident. That protection is too often taken for granted, except for those engaged in the never-ending search for flying sites. They know that it is the number one necessity in site negotiations.

These are the key reasons why most modelers need AMA. For others there are many benefits of membership, related to competition, discounts, and other lesser reasons. But whatever the dominating reason in any individual case, the overall reason is elementary: in unity there is strength. So for whatever situation there is that threatens our activity, the strength of numbers is our basic protection.

For the same reason, modelers belong to clubs because they can gain more on the local scene as a group rather than alone. It's the same on the national scene, because an organization of over a thousand clubs can do more than one alone.

This, therefore, is the basic case for AMA. It's good enough for most people. For those yet unsatisfied because they may not like how or why AMA operates, the opportunity is ever present for them to get involved to do things better. AMA is served by over 150 volunteer officers and the need for more is constant.

In summary, our enjoyment of model aviation today results from the fact that AMA has been on the scene for almost thirty years and its officers continue to work on behalf of all AMA members. That continuance of the job, day after day, is what AMA has been and still is doing for its members, to avoid or minimize crises which can be caused by outside influences. The price of membership, to provide that protection, is one of the few real bargains still left in today's inflationary society."

I wrote that article several months ago for those who take model aviation and our freedom to fly for granted. It still applies.

If you're looking for a sport and competition sailplane that's out of the ordinary, Mike Carroll's Windhover is for you. This 99" span machine features elliptical wing tips, a short coupled fuselage, all flying stab, and magnificent performance. Sufficiently stable for the novice, it can challenge the potential of the most seasoned contest pilot.

WINDHOVER

For many years construction articles have tended to fall into two categories, sport or competition. The former included all manner of cumbersome contraptions, sporting gaudy decoration and folksy invitations to docile Sunday afternoons, while the latter advertised themselves as the ultimate answer to the competitor's needs. Windhover belongs to neither of these categories. It is not a novelty nor is it a guarantee of winning. It is simply an honest, rugged, and attractive Standard Class sailplane.

The name is taken from a Gerard Manley Hopkins work, a poem entitled, "The Windhover." Hopkins' subject is the European Kestrel, and it is my hope that those who have seen my Windhover in flight will agree that it demonstrates the grace and beauty of both the bird and the poem.

I am no aeronautical engineer. Rather, I am a reasonably proficient modeler who derives the maximum enjoyment from turning a stack of sheets and sticks into an aircraft which is uniquely my own. While I enjoy competition, neither am I an all-out competitor. My fascination with modeling stems directly from the fact that I have never lost that childlike wonder at watching things moving through the air. I suspect that I share that wonder with at least a fair percentage of my fellow modelers.

Many of Windhover's design features do not originate with me. The short coupled fuselage and elliptical tips were simply scaled down from Jim Porter's 16' Shrikes. The flying stab construction was stolen from Mark Smith's Windfree. In fact, the only technical feature in the whole airframe which I'm certain I thought-up is burying the elevator control horn in a 3/16" thick sub-fin, and undoubtedly someone has already done that, too.

Before we move to the construction sequence, I should add that my original Windhover is now well into its second full season of sport and competitive flying. The prototype, which Ed Harris built from the plans for this article, has also seen extensive use. At no time during the hundred plus

hours which these ships have logged has either of them exhibited any unstable or idiocyncratic flight characteristics. Both aircraft flew well right off the board with only minor ballast adjustments necessary to tune them for maximum performance. For those of you who would like to fly something a bit out of the ordinary, but don't want to pay the performance penalty which unusual designs often entail, try a Windhover. Then drop me a line in care of this magazine and let me know how you liked it.

CONSTRUCTION

Despite the elliptical tips, Windhover is not a difficult airplane to build, and owing to its small size its cost should be within the means of almost any modeler, even with today's balsa prices.

Fuselage:

I strongly recommend starting construction with the fuselage. The wing wires will then be available as a jig, facilitating correct tube placement in the wings. Begin by cutting out and laminating the 3/32" balsa sides and 1/32" ply doublers. After sanding these to match, carefully mark and drill the wing wire holes. Use the bottom forward portion of the fuselage sides as a zero reference. Now, add the 1/4" triangular balsa and the 1/4" square balsa vertical nose reinforcements.

Cut out the 1/16" ply formers, F1a, F2, and F3, and the 1/8" cross grained balsa former, F1, and add the 1/4" square balsa reinforcements to formers, F2 and F3. Then, cut and bend the 5/32" front wing wire and the 1/8" rear wing wire. Using the holes in the fuselage sides as a reference, mark the position of the wires on formers, F2 and F3, mount them with J-bolts, but don't glue them in place. Slip the fuselage sides on to the wires and adjust the J-bolts, with the fuselage on a flat surface. When you are certain that the dihedral angle is identical for both sides, that the front and rear wires are parallel and horizontally perpendicular to the sides, and that the sides are parallel to each other and perpendicular to the work surface, use quick setting epoxy to glue in the formers and coat the J-bolts and the inside portion of the wires. Again, be certain that everything is square, before the glue sets. If this alignment is not correct, the entire airframe will be skewed and performance may suffer drastically.

Next, cut out the 1/32" ply sub fin sides and the 1/16" ply elevator horn. Drill the appropriate holes in these, as indicated on the plan. Now, cut out the slot which allows the elevator travel by drilling a series of holes and cleaning in-between them with a jeweler's rat-tail file. Epoxy the 1/8" O.D. brass tube forward bushing and the 3/32" O.D. brass tube rear bushing into the horn. Build a generous fillet of epoxy around both, and file the forward bushing down to just under 1/8" total width. Leave enough of the rear bushing on either side so that it projects beyond the sub fin walls. Add the

Michael J. Carroll is a 28 year old graduate student in English Literature, at the University of Northern Iowa, Cedar Falls, Iowa. He expects to receive his M.A. by the time this article appears in print.
His modeling career began with control-line flying during the early sixties. He has flown radio-control since 1970, beginning while serving with the United States Air Force. For the last four years, he has restricted his activity to the design, construction, flying, and competition of radio-controlled sailplanes. He has competed in a number of soaring contests, including the last three S.O.A.R. nationals. His wife Karen is a public school teacher. They have no children.
This is his first publication.

PHOTOS BY EDWIN H. HARRIS

1/8" balsa spacers to one side of the sub fin and, when this is dry, slip both sides and the elevator horn onto a 1¼" length of 3/32" O.D. brass tube running through the forward bushing. Now, glue the sub fin sides together.

Before beginning further work on the fuselage, it will be necessary to consider the radio installation. The position of formers, F1 and F1a, will depend upon whether a brick or discrete component system is used. See the accompanying photos for a sample installation of both types.

At this point, mark a centerline on all formers, and on the two 1/4" square balsa transverse nose reinforcers when these have been cut out. Also, draw a reference line on your work surface. Pin the fuselage over this line and glue in formers, F1 and F1a, as well as the transverse nose pieces. Be careful to maintain correct alignment of the fuselage sides. Next, glue in the 1/4" triangular balsa at F1/F1a, add the 3/8" x 1/4" spruce servo rails against the rear of F1 and the front of F2, and glue on the 1/8" cross grained balsa forward bottom sheeting. Finally, add the 1/4" x 3/8" hardwood towhook block. This should be centered in the bottom of the fuselage, extending from F1a to F2.

While waiting for the glue to dry on these pieces, cut out, glue together, and sand the rudder to shape. Use medium 3/16" sheet balsa for the major part, but use hard 3/16" for the cross grained strips. A commercial rudder control horn may be substituted for the 1/16" ply horn shown. If not, cut the slot for it now, but if you intend to use a heat shrink material on the rudder, do not glue the horn on until after covering. The rudder may be hinged to the sub-fin now, or again, you may wish to wait until after covering or finishing. However, be sure that when you do hinge it, the hinges are drilled and pinned with toothpicks and epoxy.

Taper the triangular stock at the rear of the fuselage to accept the sub-fin assembly. Then, using it as a spacer, pinch the rear of the fuselage together and glue on the 3/32" balsa bottom sheeting. Also, add the remaining 1/4" square balsa cross pieces. Now, remove the sub-fin assembly (you didn't glue it in yet, did you?), and install the carrier tube for the flexible rudder pushrod. Support the tube at several places along the fuselage side and make all bends as gradual as possible. I used a fine diameter cable for my rudder pushrod, but there are many commercial products which will serve the purpose. Construct a conventional pushrod for the elevator, and attach it to the elevator horn. A threaded nylon coupler which snaps into place is ideal here for, once the sub-fin is glued in, there is no access to this connection. Glue in the sub-fin assembly, with the elevator pushrod attached, taking care to insure that the sub-fin is exactly vertical. The addition of the 3/32" balsa top sheeting, the 3/16" balsa fin and tailskid fairings, the 1/4" cross grained balsa top sheeting, the 1/2" cross grained balsa nose piece, the hard balsa nose block, and the 1/4" square spruce nose skid, complete the fuselage.

Hatch:

Before beginning work on the hatch, carve and sand the fuselage roughly to shape. Now, take some scrap 1/4" sheet and bevel two pieces of it to form the fore and aft ends of the hatch. Pin these in place and cut out the 3/16" sheet balsa hatch sides. Wedge these between the ends and glue in place. Remove the hatch frame and add the 1/2" sheet balsa top. Now, replace the hatch on the fuselage, pin it down, and sand it to shape. Begin installation of the hold-downs by driving a 1" length of 1/16" music wire through the forward end so that it can be glued flush with the inside top surface of the hatch. After marking the correct position on the cross grained nose piece, sharpen one end of a piece of 3/32" O.D. brass tube with a file and use it to drill the hole. This process is much like taking a core sample. Rotate the brass tube as you push it in and you should be able to draw out the balsa plug. The forward hold-down is completed by epoxying in the brass tube and filing it flush with the nose piece. Use the same technique for the rear hole, then, glue in that tube and file it flush. The track for the removable rear pin is easily produced using a jeweler's rat-tail file.

Flying Stab:

Begin by laying down strips of 3/32" scrap balsa over the leading and trailing edge position on the plan. Make sure that these extend just inside the line so that when the 3/16" x 3/8" balsa leading and trailing edges are pinned on top of them the tips of the lower rib halves will be supported. Also, remember to cover these shims with something so that they don't become part of the stab. With the leading and trailing edges pinned in place, glue in the 3/32" x 1/4" balsa lower rib halves. Then, before the glue dries, add the 1/8" x 1/4" spruce spars and pin them down to achieve the bottom of the symmetrical airfoil. Now, add the top rib halves. Remove the stab halves from the board when dry, and add the 3/8" x 1/2" x 3½" balsa tip blocks, and the 1/8" balsa end plates. To install the 1/16" music wire and 3/32" O.D. brass tube use a sharpened piece of tubing as described in the hatch hold-down section, above. A 1/64" shim is required between the spar and the forward wire in order to maintain exact alignment between the stab halves. I have found that a fillet of epoxy on both sides of the wire, or tube, where it passes through the ribs is sufficient to keep them in place, and no wrapping or other reinforcement is necessary. Take care when installing the stab wires and tubes to see that they are parallel, and use the elevator horn as a jig to insure correct placement. To complete the stab, drill two 3¼" lengths of 3/8" square balsa to accept the forward wires, and pin one to the end of each half of the stab. These will form the sub-fin/stab fairings. Now, sand the stab halves to shape, and remove the fairings. Mark the sides of the sub-fin assembly so that the fairings will indicate the proper neutral position for the stab when attached. Push the fairings over the brass tube which runs through the forward elevator horn bushing, and epoxy them to the sub-fin assembly. Be certain that this tube is well anchored with epoxy so that it can't work in the soft wood of the fairing. Also, mount the stab before the epoxy sets up to insure that it will be perpendicular to the sub-fin assembly. Now, file the brass tube flush with the fairings.

Wing:

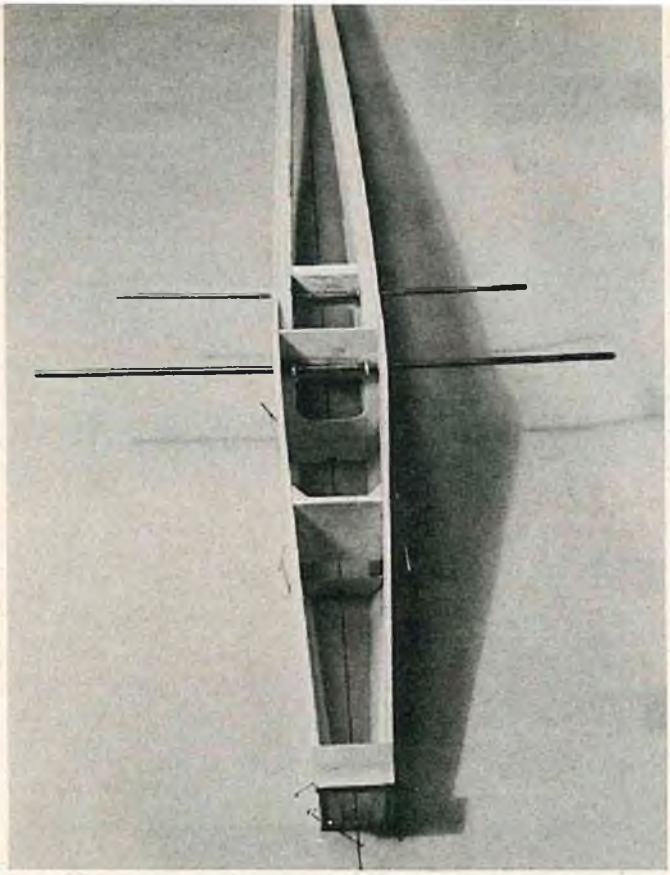
Begin wing construction by building the laminating fixture. Cut out three 1/4" ply fixture formers. Now add the 1/4" x 1/2" spruce cross pieces, allowing the ends of the bottom two to protrude 1/2" or so beyond the fixture sides. Drill some holes in the ends of these so that the fixture can be pinned solidly to the board. Next, glue the 1/16" ply top in place.

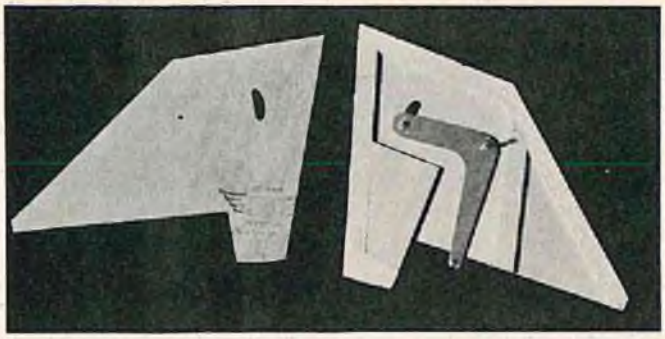
With the fixture completed, cut four 1/16" x 1/4" x 36" spruce spars in half to

WINDHOVER
Designed By: Michael J. Carroll

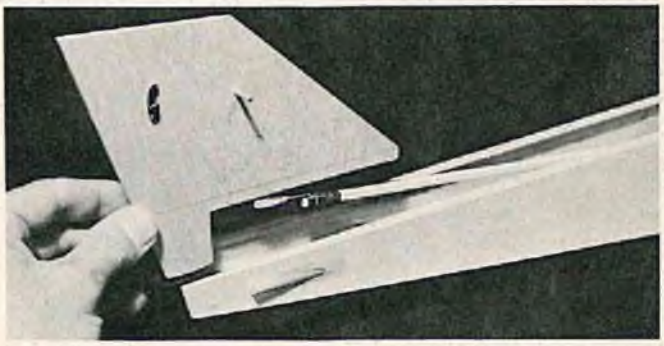
TYPE AIRCRAFT
Stand. Sport & Comp. Sailplane
WINGSPAN
99¼" (Projected)
WING CHORD
Root 9⅛" — Tip 5"
TOTAL WING AREA
703¼ Square Inches
WING LOCATION
Top of Fuselage
AIRFOIL
Flat Bottom
WING PLANFORM
Double Taper
DIHEDRAL, EACH TIP
Elliptical Tips
O.A. FUSELAGE LENGTH
36 Inches
RADIO COMPARTMENT AREA
(L) 8¾" X (W) 1⅞" X (H) 2½"
STABILIZER SPAN
23½ Inches
STABILIZER CHORD (incl. elev.)
4-5/32" (Average)
STABILIZER AREA
97½ Square Inches
STAB. AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Flying Stab on Fin
VERTICAL FIN HEIGHT
3¼ Inches
VERTICAL FIN WIDTH (incl. rudder)
7" (Average)
REC. ENGINE SIZE
NA
FUEL TANK SIZE
NA
LANDING GEAR
NA
REC. NO. OF CHANNELS
Two
CONTROL FUNCTIONS
Rudder and Elevator
BASIC MATERIALS USED IN CONSTRUCTION

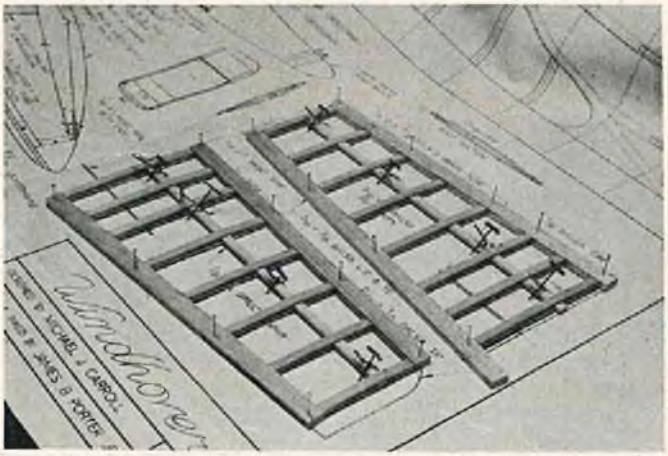
Fuselage	Balsa and Ply
Wing	Balsa, Spruce and Ply
Empennage	Balsa and Ply
Weight Ready-To-Fly	41½ oz. (w/9oz. radio)
Wing Loading	8½ Oz./Sq. Ft.



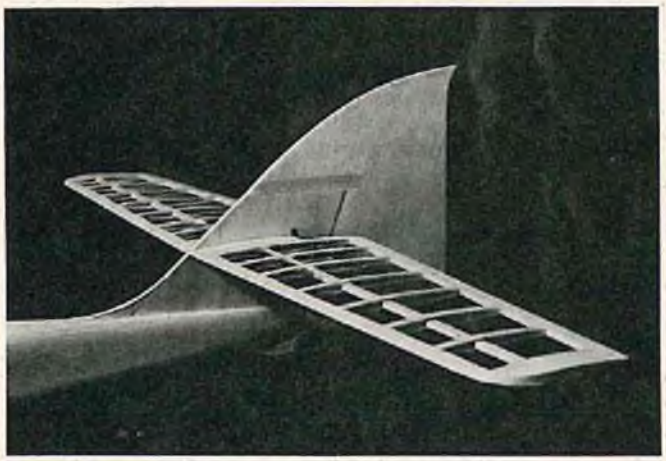


LEFT: Fuselage pinned over the reference line. ABOVE: Sub-fin halves, ready for joining. BELOW: Sub-fin assembly, ready for installation.

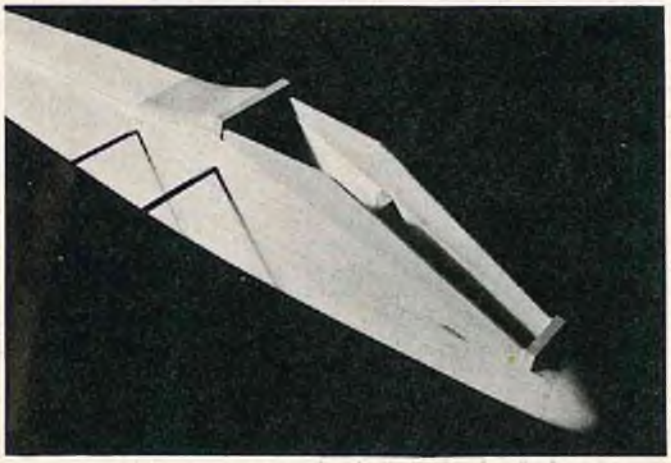




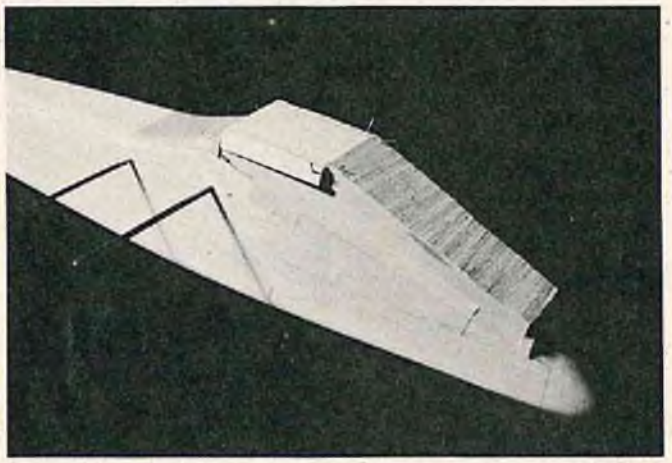
Stab halves on the plan.



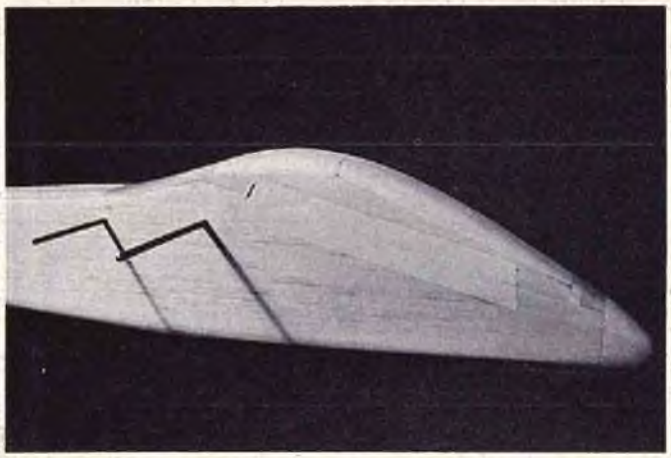
Empennage near completion.

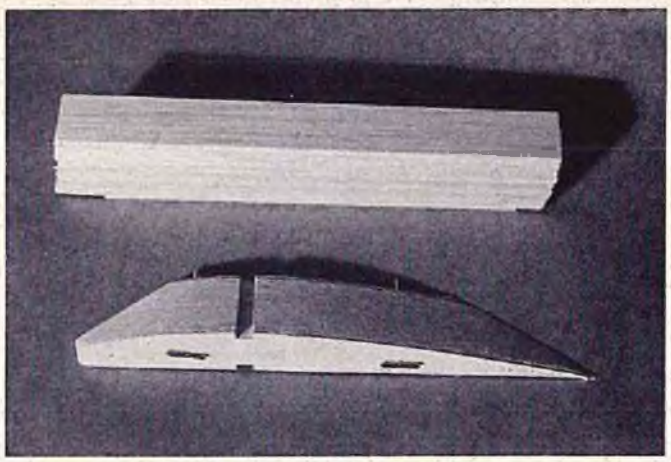


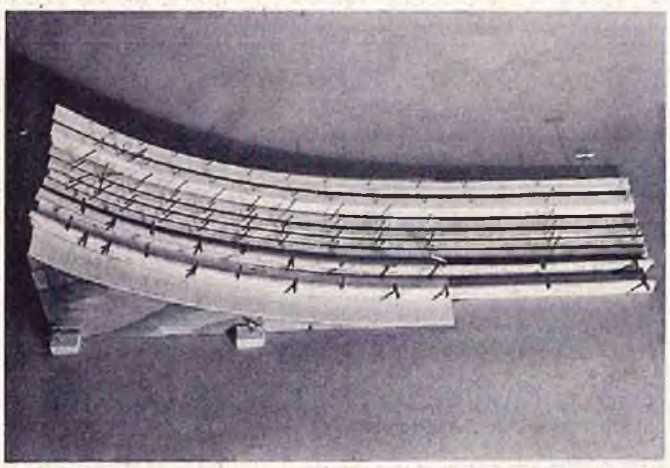
Basic hatch frame.

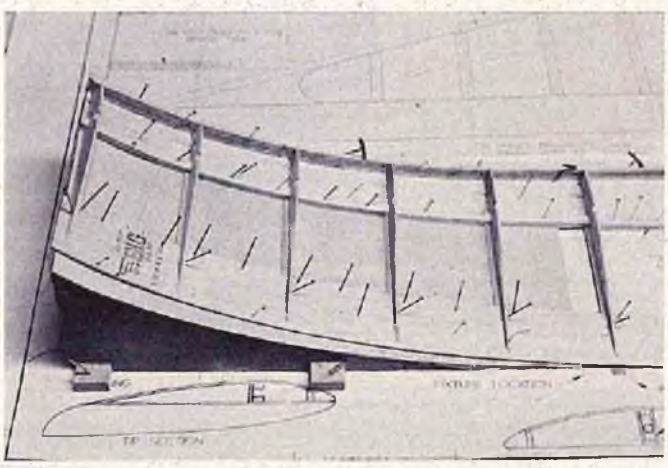


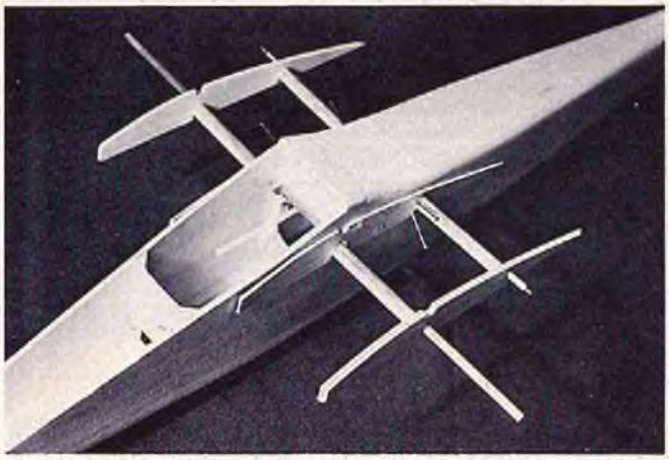
Hatch in place with top added.



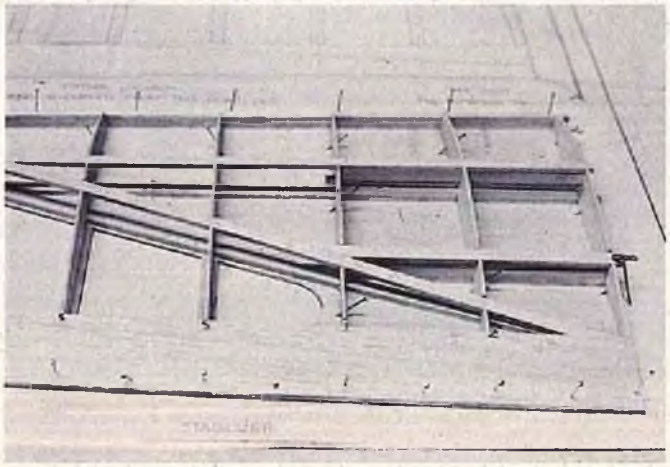


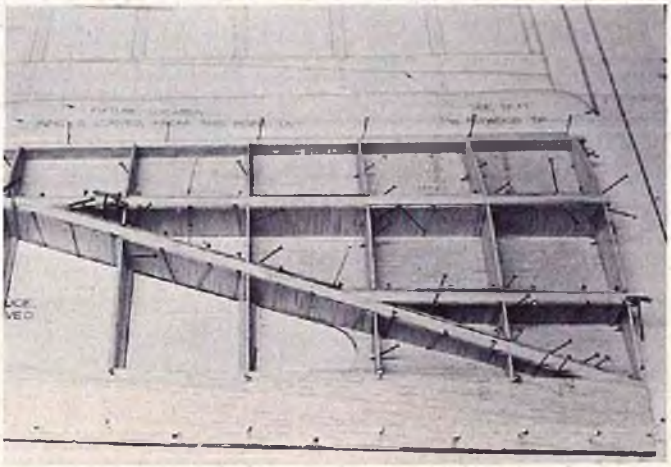


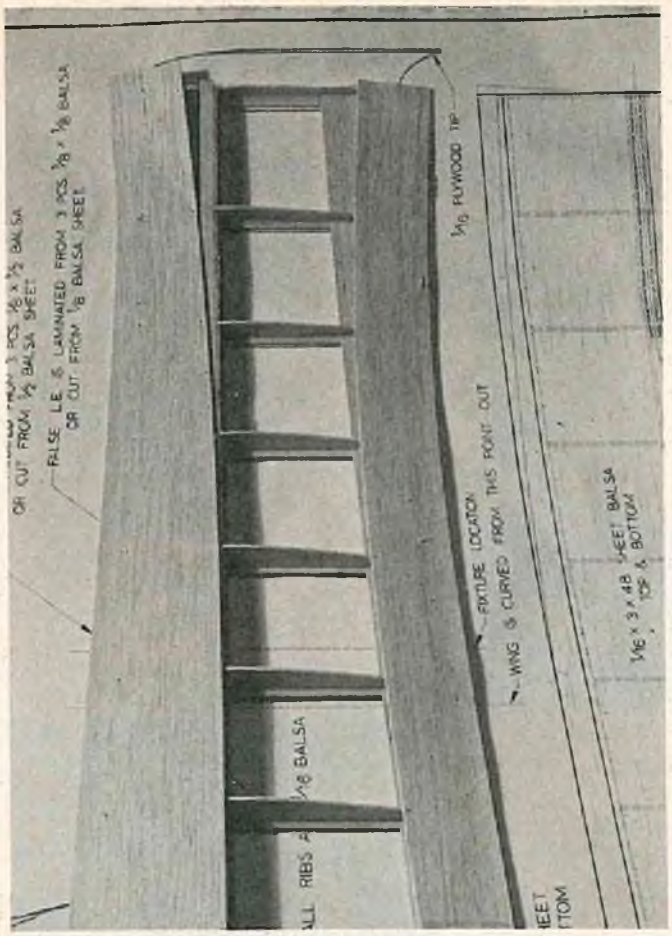




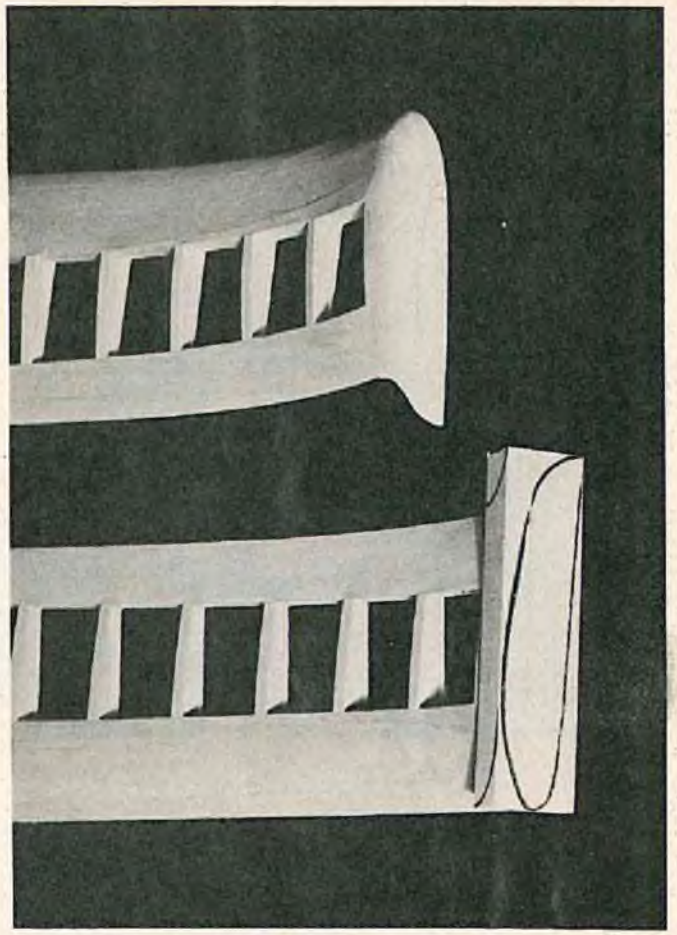
TOP ROW, LEFT: Hatch sanded to shape. TOP ROW, RIGHT: Rib blanks, before and after. ABOVE, LEFT: All laminations in place on the fixture. ABOVE: Tip in place on the fixture. LEFT: Using the wing wires as a jig. BELOW, LEFT: The sandwiched wing tubes. BELOW: Webbing in place.





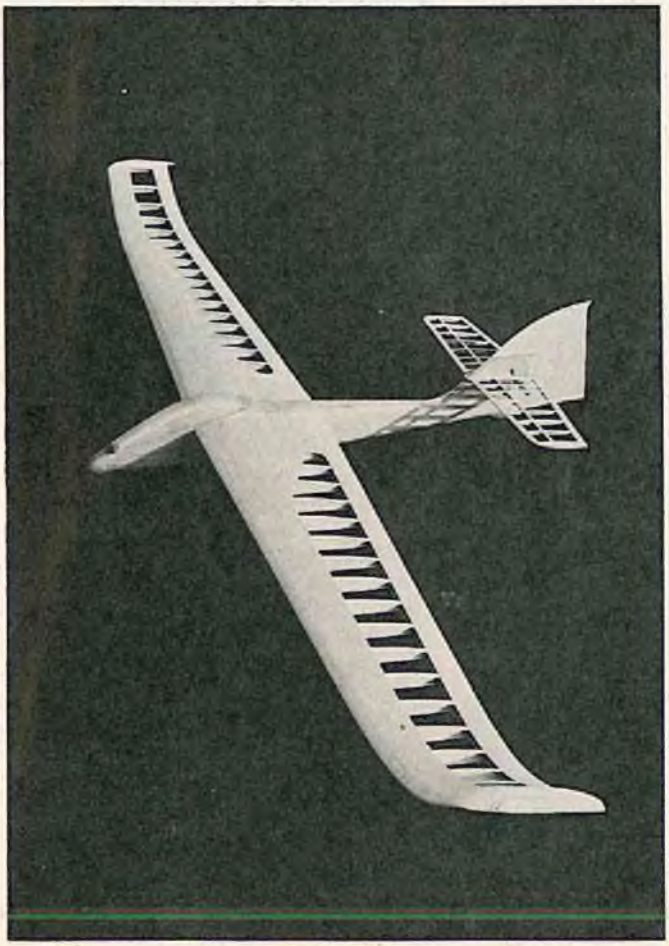


Top sheeting run-off before trimming.

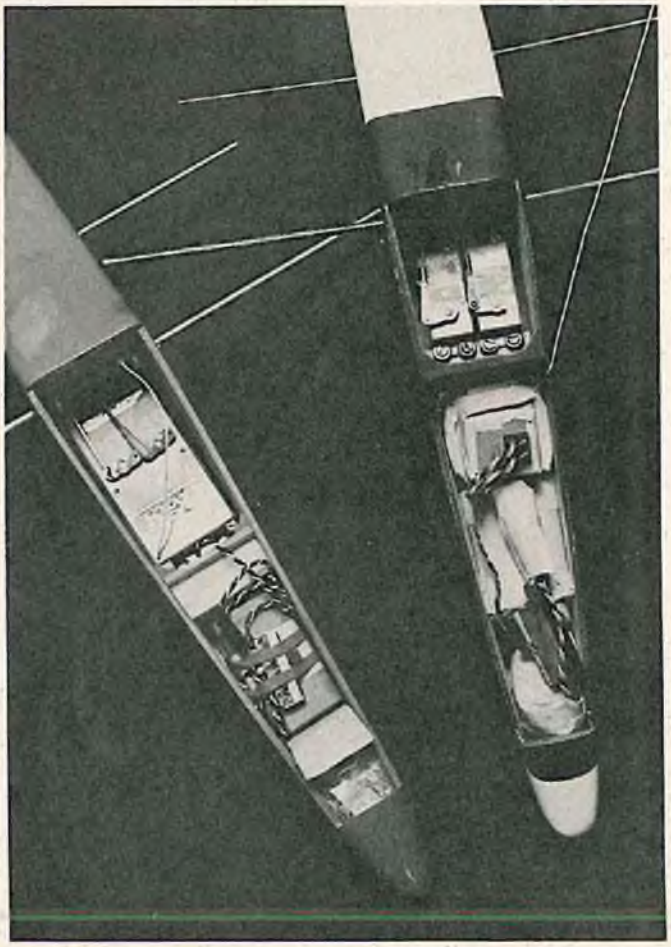


Tip block and completed tip.

The completed airframe.



Alternate radio installations.



The author, waiting to fly at a 1974 Iowa City contest.

Ed Harris and his plan's prototype on a slope near Platteville, Wisc.

form eight 18" segments. These are the spar laminations. Also, cut six 1/8" x 1/2" x 18" balsa strips, and six 1/8" square by 18" balsa strips, to form the leading edge and false leading edge laminations, respectively. Now, stack four sets of spar laminations, two pieces to a stack, and two stacks each of the leading edge and false leading edge laminations, three pieces to a stack. Glue liberally between all pieces and pin the stacks to the laminating fixture with heavy pins and a tack-hammer. Be sure that the fixture is covered to prevent gluing the laminations to it, and that the pieces are stacked neatly to avoid having to sand beyond the required thickness. Allow the bottom piece in each stack to extend beyond the top of the fixture and mark each stack at both the top and bottom of the fixture for reference. Also be certain that each stack is exactly perpendicular to the fixture base so that the same curvature exists in all the stacks. Now, splice the curved spar sections to lengths of 1/8" x 1/4" spruce, the leading edge sections to 1/2" square balsa, and the false leading edge sections to 1/8" x 1/2" balsa. The difference in height between the straight and curved pieces in the leading edge and false leading edge is due to the double taper of the wing section, so be sure that these pieces are spliced with the outside of the curve flush to the straight stock's lower edge.

BILL OF MATERIALS
(In the order of Material Type, Quantity, and Description and Notes.)

Balsa
10 — 1/16" x 3" x 48".
3 — 1/8" x 3" x 36".
4 — 3/32" x 4" x 36".
2 — 3/16" x 3" x 36", (one hard, one medium).
1 — 1/4" x 3" x 36".
1 — 1/2" x 3" x 36".
2 — 1/2" x 1/2" x 36".
1 — 1" x 2" x 12", (cut this diagonally in the middle to form the tip blocks).
1 — 1½" x 1½" x 1½".

Spruce
4 — 1/16" x 1/4" x 36".
7 — 1/8" x 1/4" x 36".
1 — 1/4" x 1/4" x 36".
1 — 1/4" x 3/8" x 12".

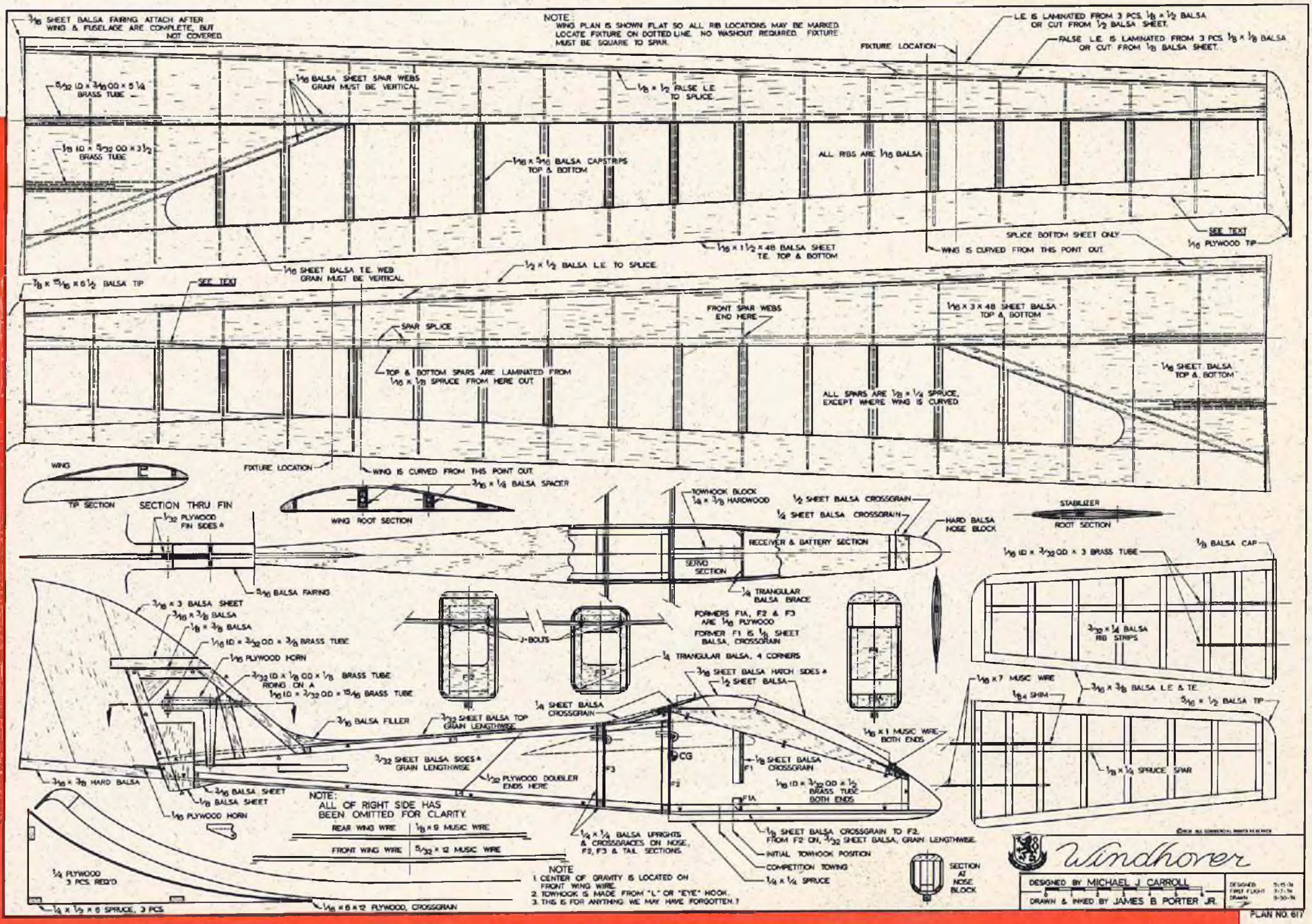
Music Wire
1 — 1/16" Dia. x 36".
1 — 1/8" Dia. x 36".
1 — 5/32" Dia. x 36".

Brass Tube (hard)
1 — 3/32" O.D. x 12".
1 — 1/8" O.D. x 12".
1 — 5/32" O.D. x 12".
1 — 3/16" O.D. x 12".

Miscellaneous
4 — 4/40 J-bolts.
4 — Control clevises.
1 — Flexible pushrod and carrier tube.

To make the ribs, first cut out the 1/16" ply root and tip templates. Using a razor saw, make full depth cuts at the positions of the sides of the spar notches, and then, drill several holes in each template to accept the T-pins used to sandwich the rib blanks. Now, cut forty rectangles of 1/16" balsa, each slightly larger than the root template. Sandwich twenty of these between the two templates, securing them with T-pins from

to page 132


3/16 SHEET BALSA FAIRING ATTACH AFTER WING & FUSELAGE ARE COMPLETE, BUT NOT COVERED.
NOTE: WING PLAN IS SHOWN FLAT SO ALL RIB LOCATIONS MAY BE MARKED. LOCATE FIXTURE ON DOTTED LINE. NO WASHOUT REQUIRED. FIXTURE MUST BE SQUARE TO SPAR.
L.E. IS LAMINATED FROM 3 PCS. 1/8 x 1/2 BALSA OR CUT FROM 1/2 BALSA SHEET.
FALSE L.E. IS LAMINATED FROM 3 PCS 1/8 x 1/8 BALSA OR CUT FROM 1/8 BALSA SHEET.
FIXTURE LOCATION
5/32 ID x 3/16 OD x 5 1/4 BRASS TUBE
1/8 BALSA SHEET SPAR WEBS GRAIN MUST BE VERTICAL
1/8 x 1/2 FALSE L.E. TO SPLICE
1/8 ID x 5/32 OD x 3 1/2 BRASS TUBE
1/16 x 3/16 BALSA CAPSTRIPS TOP & BOTTOM
ALL RIBS ARE 1/16 BALSA
SPLICE BOTTOM SHEET ONLY
SEE TEXT
1/16 PLYWOOD TIP
1/16 SHEET BALSA T.E. WEB GRAIN MUST BE VERTICAL
1/16 x 1 1/2 x 48 BALSA SHEET T.E. TOP & BOTTOM
WING IS CURVED FROM THIS POINT OUT
1/2 x 1/2 BALSA L.E. TO SPLICE
3/8 x 15/16 x 6 1/2 BALSA TIP
SEE TEXT
FRONT SPAR WEBS END HERE
1/16 x 3 x 48 SHEET BALSA TOP & BOTTOM
SPAR SPLICE
TOP & BOTTOM SPARS ARE LAMINATED FROM 1/16 x 1/2 SPRUCE FROM HERE OUT
1/16 SHEET BALSA TOP & BOTTOM
ALL SPARS ARE 1/8 x 1/2 SPRUCE, EXCEPT WHERE WING IS CURVED
WING
TIP SECTION
FIXTURE LOCATION
WING IS CURVED FROM THIS POINT OUT
3/16 x 1/8 BALSA SPACER
WING ROOT SECTION
SECTION THRU FIN
1/32 PLYWOOD FIN SIDES
TOWHOOK BLOCK 1/4 x 3/8 HARDWOOD
1/2 SHEET BALSA CROSSGRAIN
1/4 SHEET BALSA CROSSGRAIN
HARD BALSA NOSE BLOCK
STABILIZER
ROOT SECTION
RECEIVER & BATTERY SECTION
SERVO SECTION
3/16 BALSA FAIRING
1/8 BALSA CAP
1/16 ID x 3/32 OD x 3 BRASS TUBE
3/8 x 3 BALSA SHEET
3/16 x 3/8 BALSA
1/8 x 3/8 BALSA
1/16 ID x 3/32 OD x 3/8 BRASS TUBE
1/16 PLYWOOD HORN
3/32 ID x 1/8 OD x 1/8 BRASS TUBE RIDING ON A 1/16 ID x 3/32 OD x 15/16 BRASS TUBE
J-BOLTS
1/8 TRIANGULAR BALSA BRACE
FORMERS F1A, F2 & F3 ARE 1/16 PLYWOOD
FORMER F1 IS 1/8 SHEET BALSA, CROSSGRAIN
1/8 TRIANGULAR BALSA, 4 CORNERS
3/32 x 1/4 BALSA RIB STRIPS
3/16 SHEET BALSA HATCH SIDES
1/2 SHEET BALSA
1/16 x 7 MUSIC WIRE
1/8 x 4 SHIM
3/16 x 3/8 BALSA L.E. & T.E.
3/16 x 1/2 BALSA TIP
1/4 SHEET BALSA CROSSGRAIN
3/16 BALSA FILLER
3/32 SHEET BALSA TOP GRAIN LENGTHWISE
1/16 x 1 MUSIC WIRE BOTH ENDS
CG
3/32 SHEET BALSA SIDES GRAIN LENGTHWISE
1/8 SHEET BALSA CROSSGRAIN
1/16 ID x 3/32 OD x 1/2 BRASS TUBE BOTH ENDS
1/32 PLYWOOD DOUBLER ENDS HERE
1/8 x 3/8 HARD BALSA
3/16 BALSA SHEET
1/8 BALSA SHEET
1/16 PLYWOOD HORN
NOTE: ALL OF RIGHT SIDE HAS BEEN OMITTED FOR CLARITY.
REAR WING WIRE | 1/8 x 9 MUSIC WIRE
FRONT WING WIRE | 5/32 x 12 MUSIC WIRE
1/4 x 1/4 BALSA UPRIGHTS & CROSSBRACES ON NOSE, F2, F3 & TAIL SECTIONS.
1/8 SHEET BALSA CROSSGRAIN TO F2. FROM F2 ON, 1/32 SHEET BALSA, GRAIN LENGTHWISE.
INITIAL TOWHOOK POSITION
COMPETITION TOWING
1/4 x 1/4 SPRUCE
SECTION AT NOSE BLOCK
1/4 PLYWOOD 3 PCS. REQ'D
1/4 x 1/2 x 6 SPRUCE, 3 PCS.
1/16 x 6 x 12 PLYWOOD, CROSSGRAIN
NOTE
1. CENTER OF GRAVITY IS LOCATED ON FRONT WING WIRE.
2. TOWHOOK IS MADE FROM "L" OR "EYE" HOOK.
3. THIS IS FOR ANYTHING WE MAY HAVE FORGOTTEN.!
1/16 x 3/8 BALSA UPRIGHTS & CROSSBRACES ON NOSE, F2, F3 & TAIL SECTIONS.
1/16 x 1/8 SPRUCE SPAR
Windhover
DESIGNED BY MICHAEL J. CARROLL
DRAWN & INKED BY JAMES B. PORTER JR.
PLAN NO. 617

A full-size Hughes 500C flies over the Southern California coastline. This, and other photos of the popular light turbine powered Hughes 500 were provided for scale reference details for the article through the courtesy of Hughes Helicopters, Division of Summa Corporation.

RCM BUILDS THE

BY DON DEWEY (N1A)

KALT HUGHES 500

PART I

The new Kalt Hughes 500 represents some of the most advanced engineering concepts available today in radio controlled helicopters. It has been designed by Yuji Oki for maximum performance and reliability, ease of construction, with an absolute minimum of tedious adjustments and maintenance. It is a part of a complete Kalt Systems Concept in radio controlled helicopters — this complete system consisting of the Basic Drive Train mechanism with Fixed Pitch Rotor System, the Collective Pitch Rotor for the advanced flier, and a choice of fuselage configurations ranging from a basic trainer, called the Flying Box, through several beautiful scale models of full-size helicopters such as the Hughes 500, the Bell Jet Ranger, the Bell 212, the Huey Cobra, and the Fairchild-Hiller.

Representing the result of many years of design and engineering efforts, the Kalt Systems Concept is designed so that you can start with a proven set of components, many of which have been factory pre-assembled and adjusted, and a rugged trainer fuselage, advancing to your choice of one of many beautiful scale fiberglass fuselages and the advanced Collective Pitch Rotor System as your learning curve and proficiency increases. While this article is concerned with the Hughes 500C fuselage configuration and the Basic Fixed Pitch Rotor System, we would recommend that you obtain the Kalt "Flying Box" training fuselage, assemble it, and use it for your first few hours of training flights. The Hughes 500 drive train, rotor head, and tail rotor system will fit right into this plywood "box-like" fuselage and allow it to absorb the "hard knocks" that will be encountered during your learning stages, thus avoiding damaging or destroying the Hughes 500 fuselage. Once you have mastered the basic fundamentals of hovering and slow forward flight, you can simply remove the drive train, rotor head, and tail rotor mechanisms from the Flying Box fuselage, and install them in your completed Hughes 500 fuselage. You will simply be substituting the easily constructed Flying Box fuselage for your Hughes 500 body until such time as you will feel confident enough to install the equipment in the Hughes 500. In the meantime, you could be finishing and painting your fuselage so that it will be ready when you are. Later, when you have mastered the training fuselage, and are capable of more advanced maneuvers with your Hughes 500, you will want to modify your helicopter to incorporate the advanced Kalt Collective Pitch Rotor System. Thus, regardless of whether you are a beginner, intermediate, or an advanced flier, your Kalt system will not become obsolete. As a beginner, your system will advance with you through the learning stages as you progress into the expert category. If you are an advanced flier, the Kalt Collective Pitch System will meet your most exacting demands for high performance, precision R/C helicopter.

Since the designer of the Kalt System, Yuji Oki, has been a friend of mine for many years, I was honored to have been asked to write the instruction manual which will be translated into Japanese for distribution with the Japanese kits.

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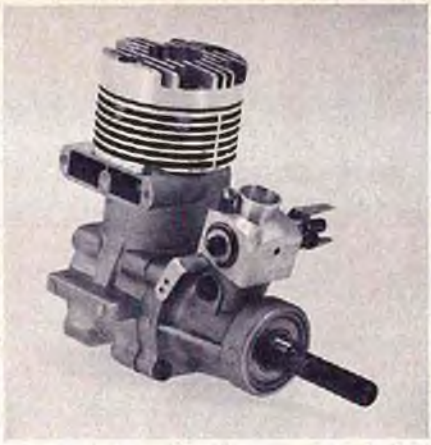
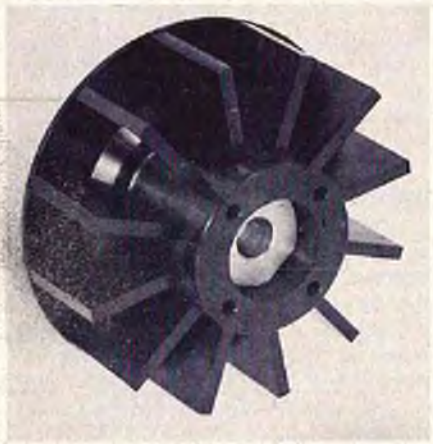
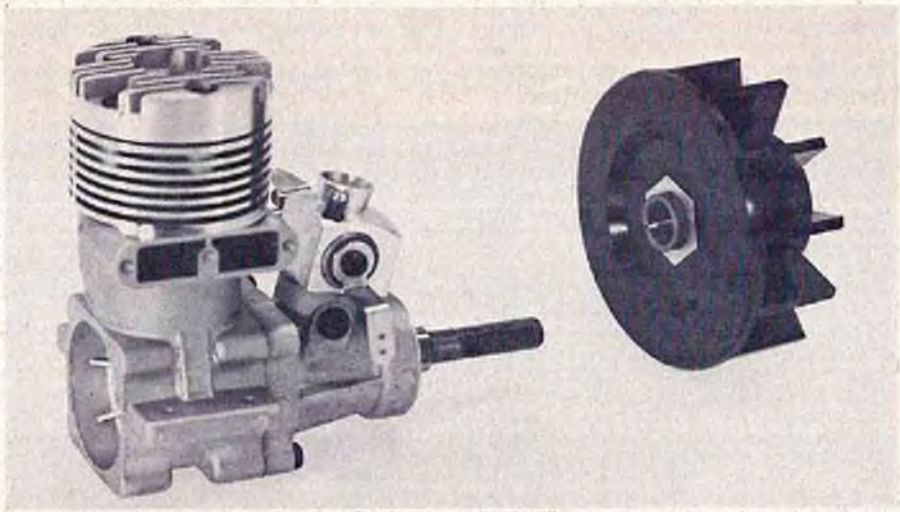
Don Dewey's construction prototype of the Kalt Hughes 500C, built from parts flown in from Japan by its designer, Yuji Oki. Photos by Barbara Norton.

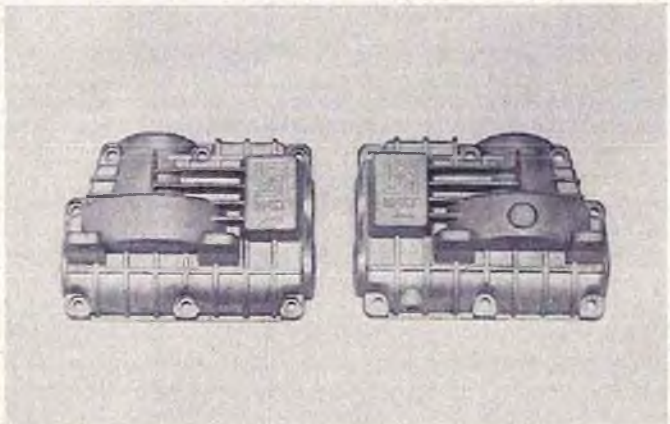


FAR LEFT: Stock Enya .45. LEFT: Drive washer removed to expose bearing. BELOW: Special split drive cone is inserted on crankshaft.

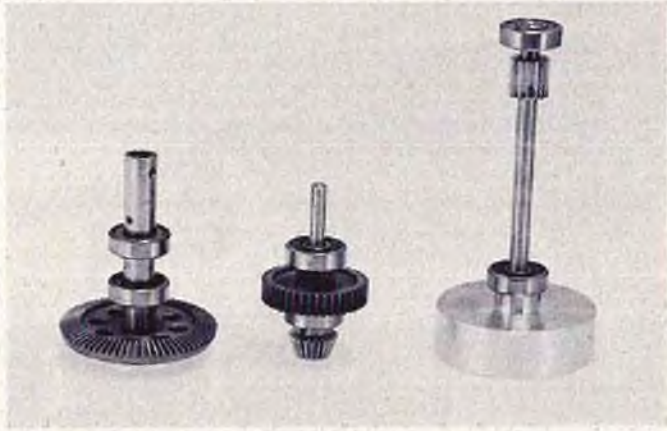


ABOVE, L TO R: The Kalt Hughes 500 fan assembly is molded of high impact plastic, as is the starter pulley, shown above center, and the clutch shown above right. These are extremely high precision parts and are assembled in the order shown. At the right, the split tapered drive cone is shown inserted into the fan unit, prior to installing on the Enya .45, modified as previously mentioned. The starter pulley and clutch are then installed and secured with two 3mm socket head screws. Any .40 to .60 engine can be used with the Kalt Hughes 500. If the collective pitch version is selected, a .60 cu. in. displacement engine is recommended.

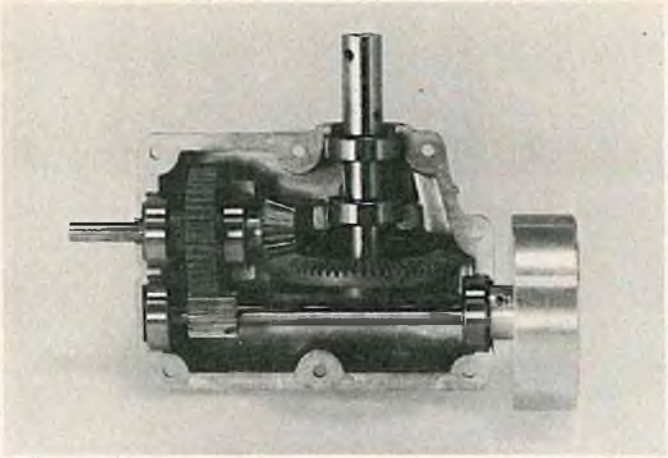




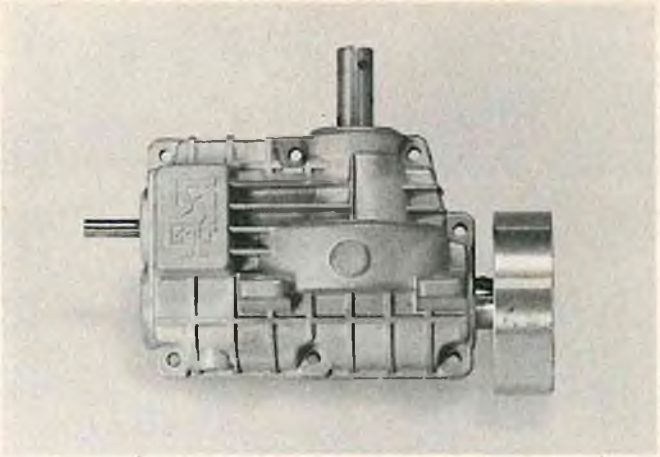
The two halves of the Kalt Hughes 500 transmission case.



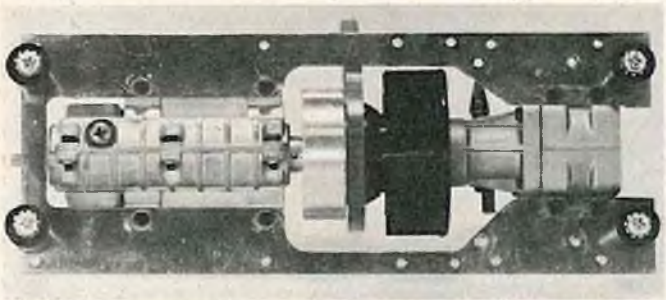
Internal gears and clutch bell housing, to be installed in case.



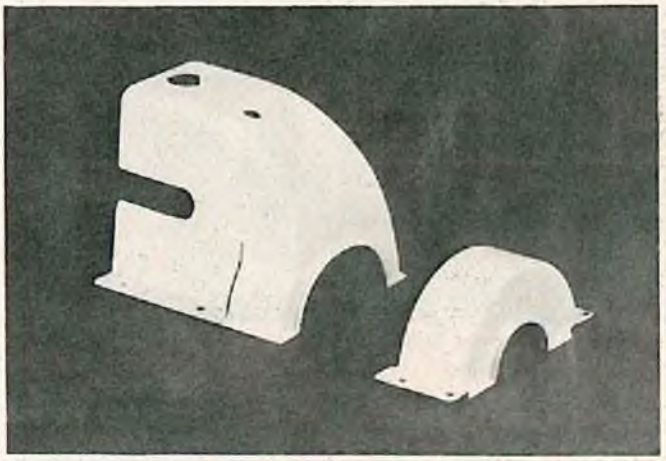
The transmission gears installed in one case half. Gear faces are smoothed out on wet-or-dry paper before mating.

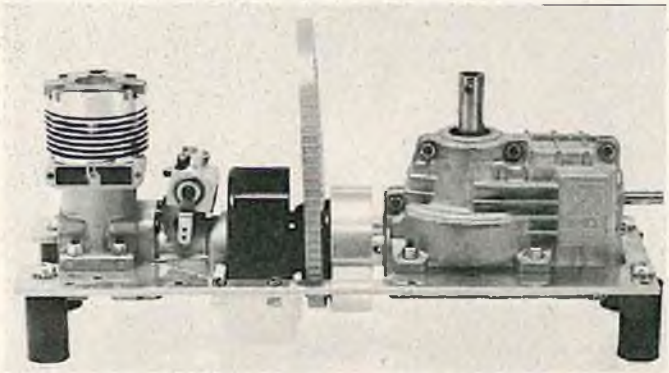


Transmission case halves are joined with Stabilit Express Epoxy. Latter used on case flanges and in bearing races.

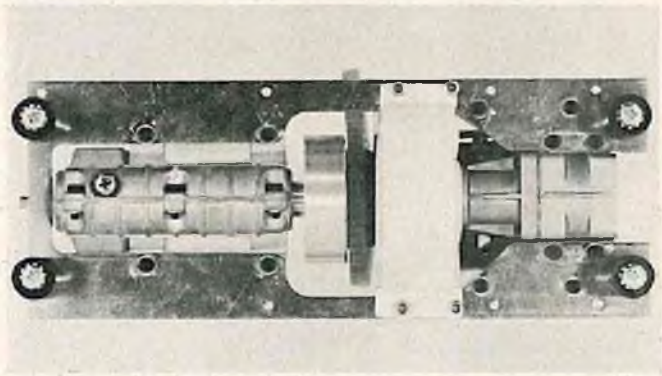


ABOVE: Engine with fan, pulley, and clutch, mounted to drive train mounting plate. Transmission is then mounted to plate, slipping starting belt in place prior to installing Bell housing over clutch. At right are the two pieces of the cooling shroud. Note access holes for exhaust, glow plug, idle adjust and needle valve.

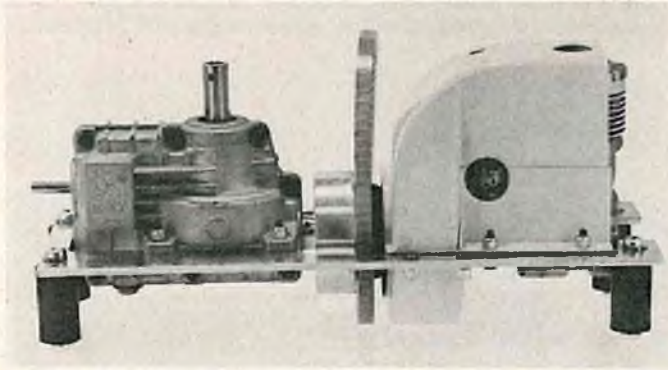




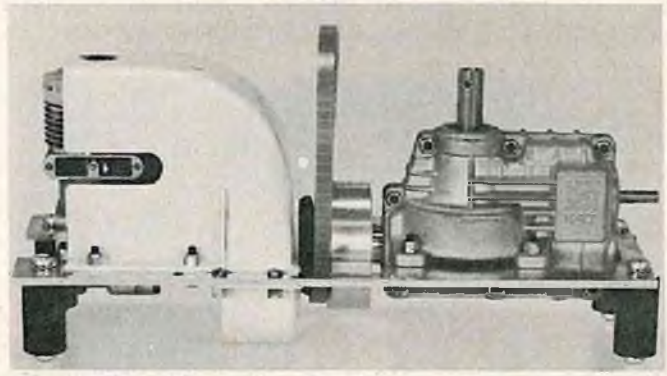
Lower half of cooling shroud installed on drive train mounting plate. Note rubber shock absorbers.



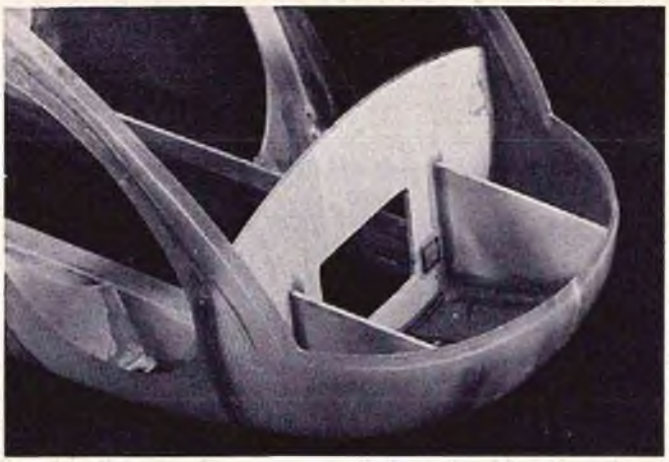
Bottom view of lower half of fan shroud. Make sure fan does not hit shroud at any point.



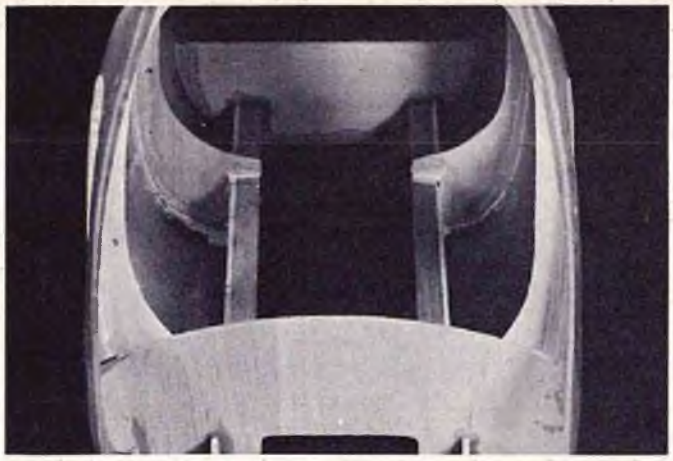
Upper half of cooling shroud. Note needle valve cut-out in plastic shroud. Glow plug access hole at top.



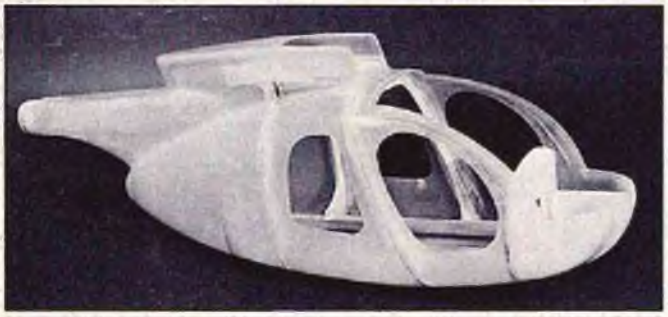
Opposite view of cooling shroud showing exhaust cut-out. Muffler will be mounted backwards, pointing toward rear of helicopter.



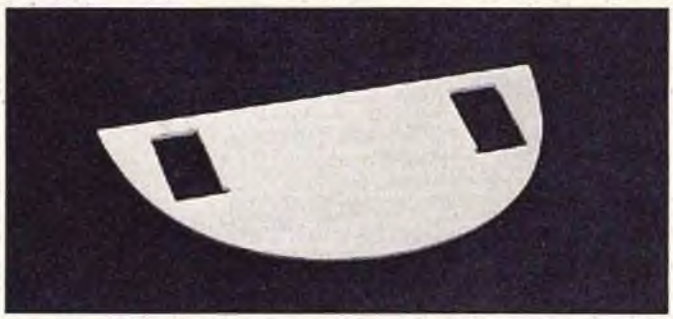
Forward bulkheads installed with resin and glass cloth. Note fuel tank cut-out.



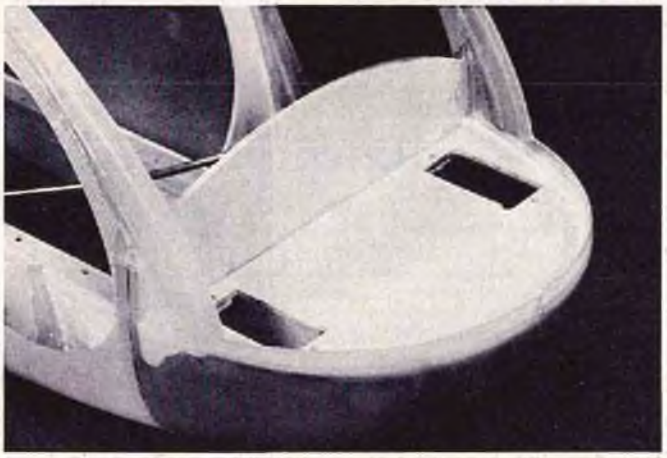
Aft bulkheads installed in similar manner and joined to hardwood drive train mounting rails.



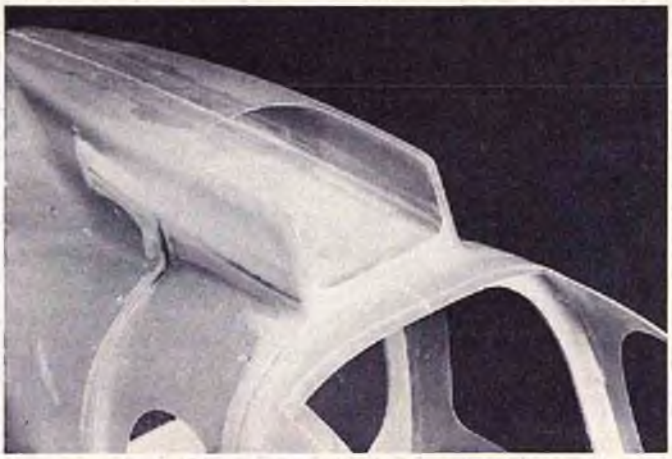
The front half of the fiberglass fuselage with main bulkheads installed.



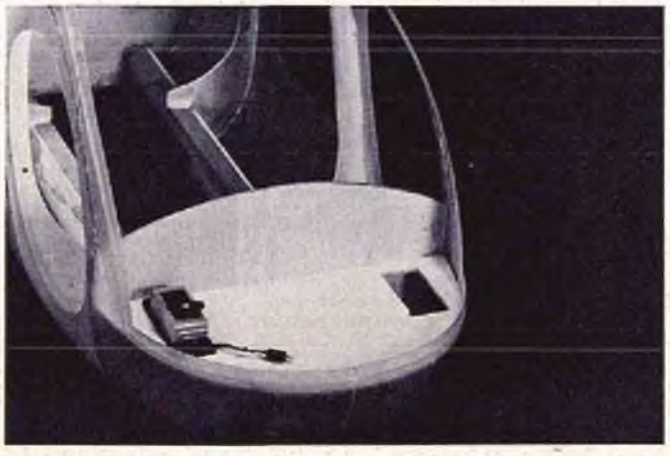
The forward servo mount bulkhead with cut-outs for tail rotor and throttle servos.

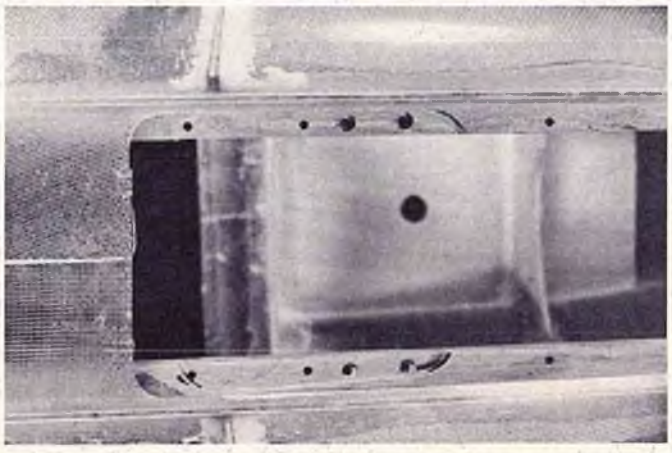


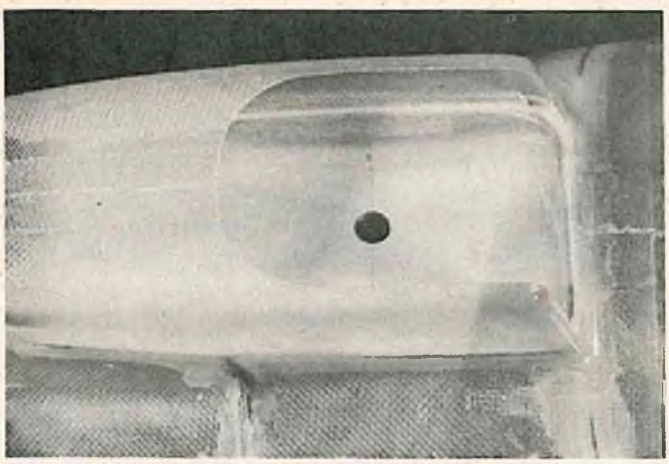
ABOVE: Servo mounting bulkhead secured in place with resin and micro balloons. BELOW: A servo mounted in place for trial fit. Radio box will go between servos.

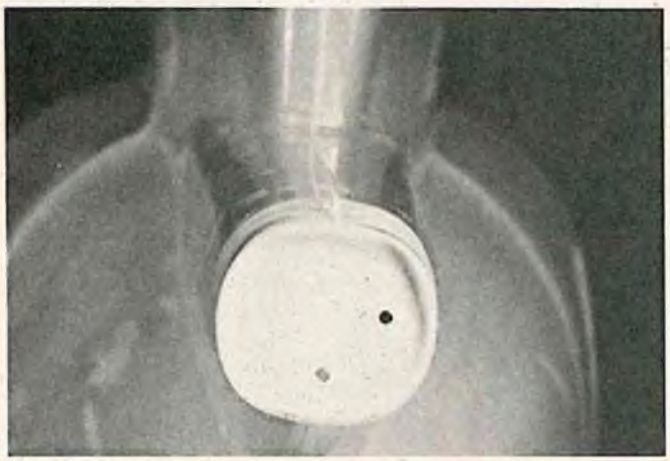


ABOVE: Top bulkhead in place, prior to drilling clearance hole for main rotor shaft. BELOW: Clearance area for shroud flanges ground out of hardwood mounting rails.

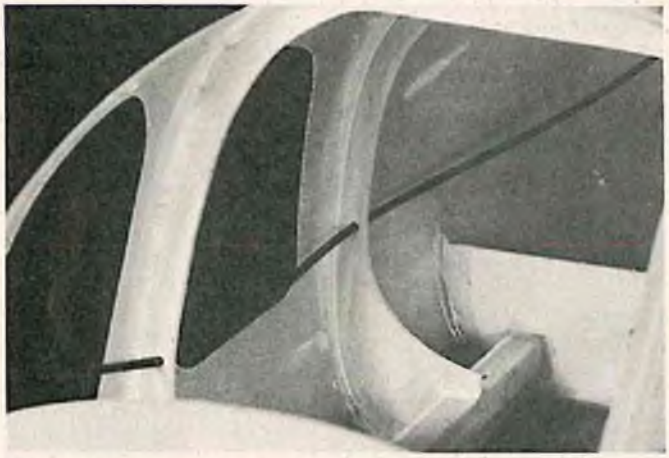


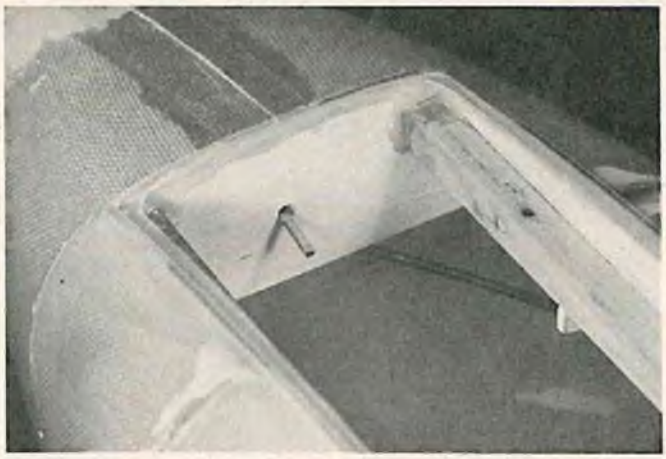


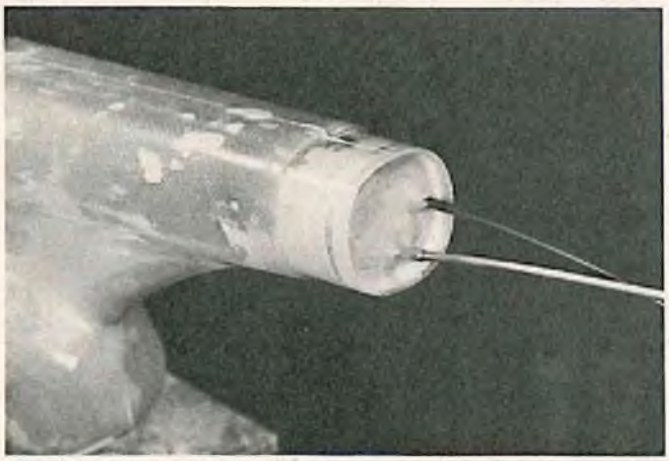




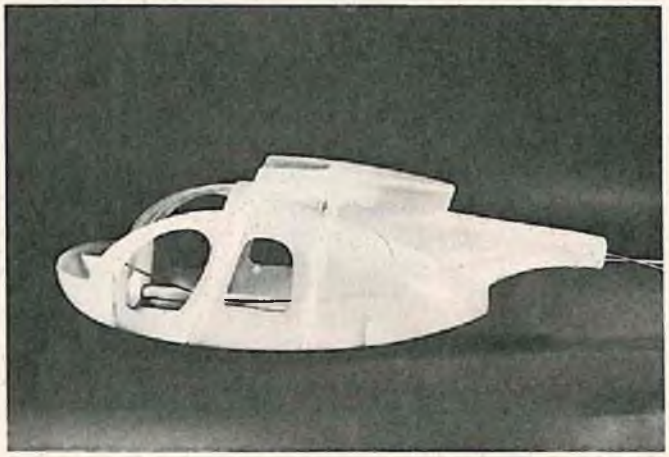
ABOVE, LEFT: Hole drilled in top bulkhead for main rotor shaft. ABOVE: A Dremel Moto Tool is used to cut out windows on each side of fuselage. A piece of screen is later epoxied to the inside of both cut-outs. LEFT: Rear view of front section of fuselage before tail boom is joined. Hole at bottom is for brass tubing drive shaft housing. Hole above, and to the right, is for the tail rotor pushrod cable housing tube. BELOW: Although hard to see, this is the tail rotor drive shaft housing bent to shallow "S" shape shown on side view of plans.



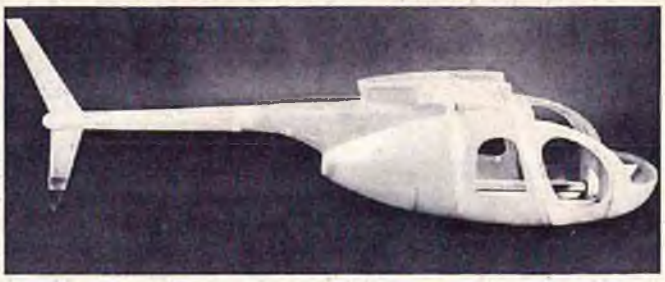




Views above show the black plastic tail rotor pushrod cable housing installed through the bulkheads to the front servo mount. If any binding occurs, Gold'N Rod pushrods can be substituted.

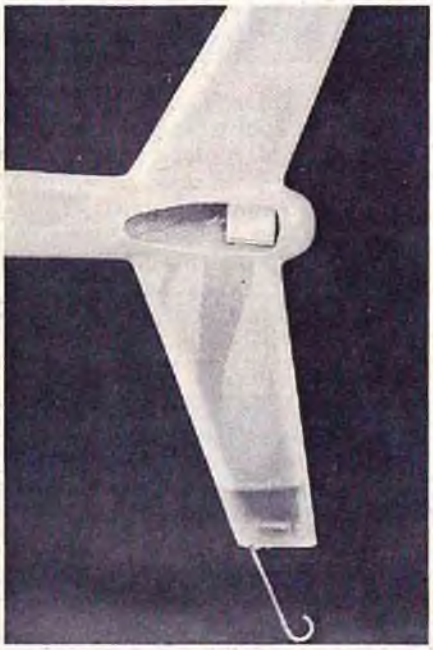


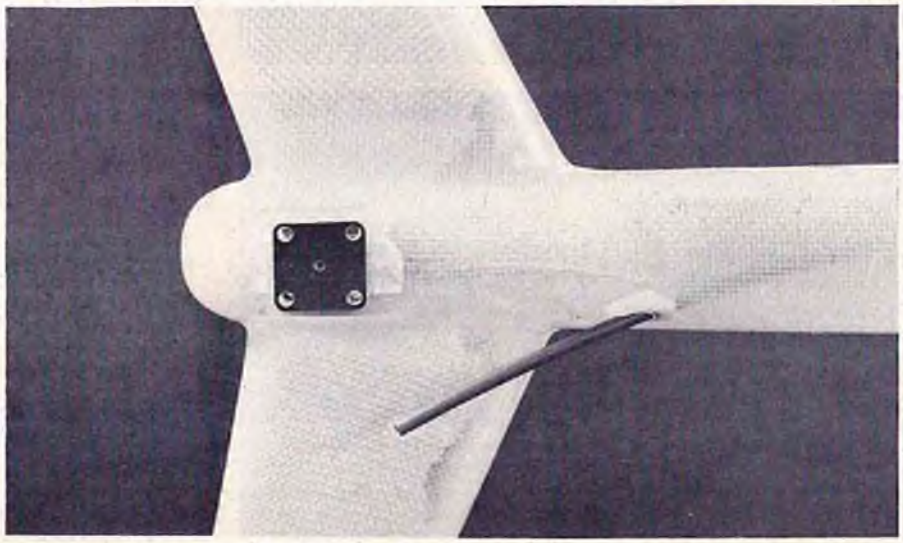
The brass drive shaft housing extends through an oversize hole in the aft bulkhead to enable exact alignment after drive train is installed. Both tubes extend through aft section of forward fuselage section.



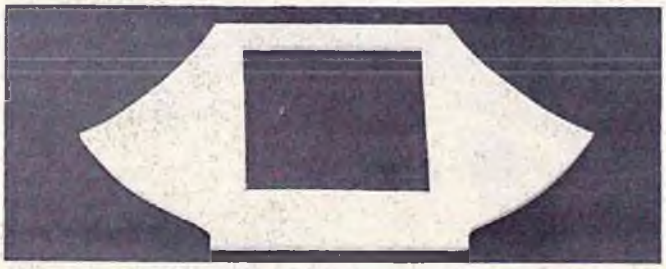
Tail boom joined to forward fuselage section with micro-balloons and resin.

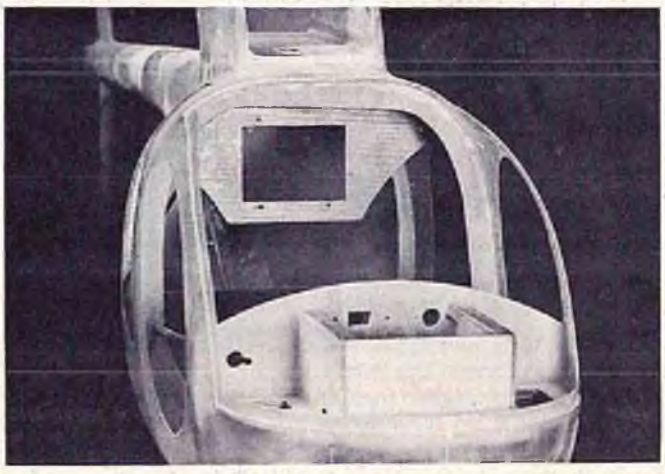
Close-up of tail boom – fuselage joint showing micro-balloon – resin filler faired out.





LEFT: Tailskid wire is bent to shape, inserted through small hole in fin, then resin poured in through gear box hole opening to secure skid. ABOVE: Gear box plate held in place temporarily with double sided Scotch Tape in order to drill mounting and pitch rod holes.





Views above show the plywood receiver and battery box constructed between the tail rotor and throttle servo cut-outs. Directly above is the plywood bulkhead and servo mount for the two cyclic servos. The mount is shown installed with glass cloth and resin at right.

HERE'S HOW

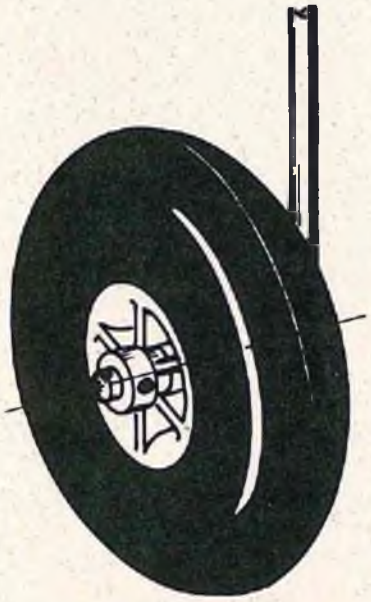
BY JERRY SMITH

WHAT? YA GOTTA BE KIDDING! BALL BEARINGS IN MODEL AIRPLANE WHEELS? JERRY SMITH HAS FLIPPED HIS LID — HOLD ON FANS, NOT REALLY.

THE OTHER DAY I RAN ACROSS SOME MINIATURE INSTRUMENT BALL BEARINGS. AS I ROLLED THEM IN THE PALM OF MY HAND, THE THOUGHT CROSSED MY MIND, WOULDN'T THESE WORK GREAT IN MODEL AIRCRAFT WHEELS. WELL WHY NOT. MY GOOD FRIEND BOB HEIDE DID THE MACHINING ON THE HUBS AND BEFORE LONG THE BEARINGS WERE INSTALLED. THE WHEELS WERE, IN TURN, MOUNTED ON THE AXLE. END-PLAY AND SIDE-PLAY WERE VIRTUALLY NONEXISTENT. AND, OF COURSE, THE ROLLING FRICTION WAS CUT DOWN CONSIDERABLY. I WAS THOROUGHLY IMPRESSED WITH THE ADDED PERFORMANCE OF THE BEARINGS.

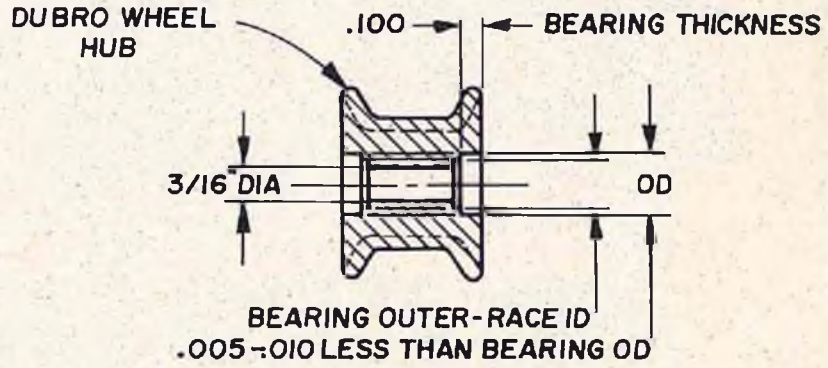
TAKE NOTE THAT A BRASS TUBING SPACER IS INSTALLED BETWEEN THE INNER-RACES OF THE BEARINGS. WHEN INSTALLED ON THE AXLE, THE INNER-RACES ARE CLAMPED TOGETHER WITH THE SPACER BY A WHEEL COLLAR TO KEEP THEM FROM ROTATING. THIS PERMITS ONLY THE BEARING TOLERANCE TO BE TRANSMITTED WHEN THE WHEELS ARE LOADED.

LET'S FACE IT. BEARINGS OF THIS SIZE ARE EXPENSIVE. HOWEVER, IT ALL DEPENDS ON YOUR DESIRES. IT IS POSSIBLE. PERHAPS SOME WHEEL MANUFACTURER, IN THE NEAR FUTURE, WILL OFFER WHEEL BEARINGS AS AN OPTIONAL ITEM WITH THEIR WHEELS.



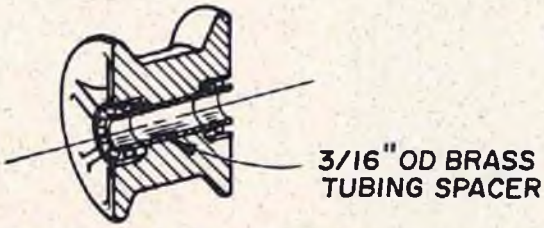
THE SUPER WHEEL!

NOTE: THE SIZE OF THE BEARINGS I FOUND WERE: 5/16" OD X 5/32" BORE AND .100 THICKNESS. ANY BEARING APPROX THIS SIZE WILL DO.



WHEEL HUB MACHINING

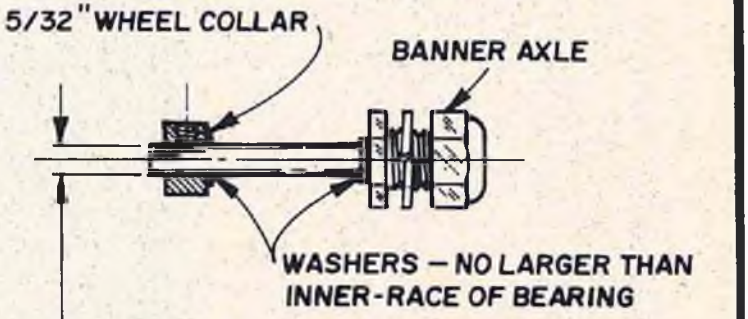
IF YOU CAN'T MACHINE THE HUB YOURSELF, LOOK UP A FRIEND WHO CAN.



HUB WITH SPACER AND BEARINGS INSTALLED

BEARINGS ARE INSTALLED IN HUB WITH A SLIGHT PRESS FIT. SPACER MAY FIT LOOSER.

BEST AXLE TO USE



IF NECESSARY TO SIZE AXLE TO FIT BEARING BORE, CHUCK IN DRILL MOTOR. WITH MOTOR RUNNING FILE AXLE TO PROPER SIZE.

John Baxter, LSF 24, at Albuquerque, New Mexico, with his twelve foot Solarcraft Magnum he used to record First LSF Level 5 Achievement. Beautiful van belongs to popular RCM cover photographer, Max Mills.

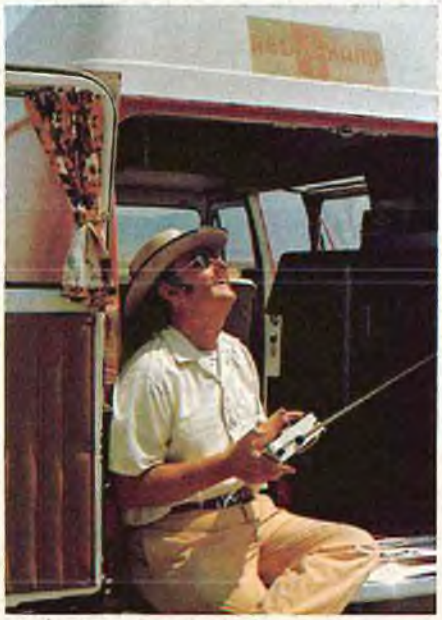
JOHN BAXTER FIRST LSF LEVEL 5

Five years after its inception, the LSF awards the first Grade Level 5, soarings highest achievement.

● In 1969, the LSF was founded by a group of individuals who set up 5 levels of personal accomplishment tasks for RC sailplane enthusiasts. These far-sighted people conceived Levels 1 through 5 with tasks that increased in demanding performance as you reach Level 5. The levels consist of participation in contests, contest wins, spot landings, slope duration, thermal duration and goal-and-return tasks.

In 1969, the accomplishments defined for Level 5 must have seemed almost unattainable to those who started in the program. They consist of 3 contest wins in competition with 20 or more contestants, thousands of other competition points, an 8 hour slope duration, a 2 hour thermal duration and a goal-and-return of 6.21 miles out in a straight line and 6.21 miles back.

John Baxter, LSF 24, of Santa Clara, California, is the first one to complete all of the tasks required for LSF Level 5. This goal had been long sought by John since his



first participation in LSF programs in 1969. In 1971, John was the second individual to complete Level 4 in LSF and has spent the last 4 years working toward obtaining Level 5.

John's LSF number 24 means that he was the 24th individual to join the program of LSF. His being the first to obtain Level 5 is only overshadowed by the impressive growth of the LSF organization itself. Since 1969, this organization has gained international acceptance by soaring enthusiasts the world over with an impressive membership of 1430 in 16 countries.

Being an enthusiastic supporter of LSF, we present the following account of the task accomplishment of John Baxter obtaining the first LSF Level 5. John heard of the fantastic thermal conditions in Albuquerque, New Mexico, and decided to go give it a try with his new Soarcraft

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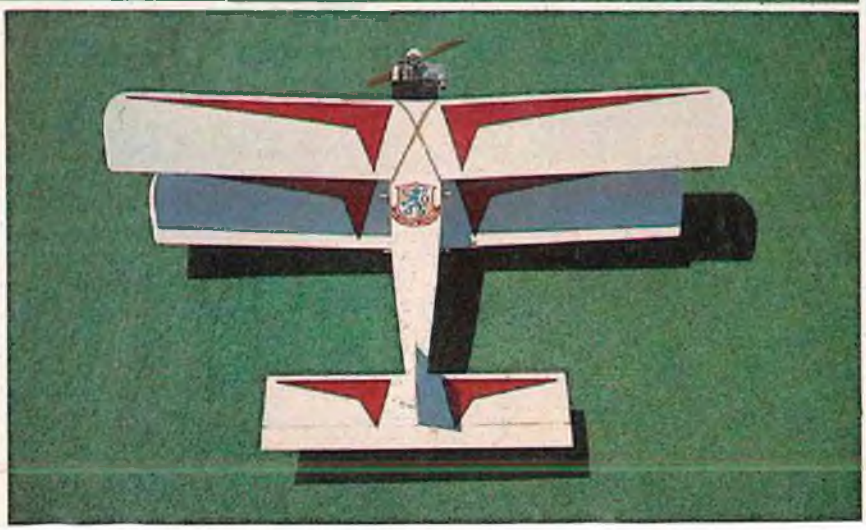
Quickie Bipe

BY GEORGE F. JENNINGS

If you want a .15 to .19 powered aircraft that attracts attention from spectators and R/C flyers alike, build the Quickie Bipe. Like all biplanes it has a certain mystique about it and, to the uninitiated, appears to be almost a magical machine. This three foot span two-winger encompasses quick construction, great flyability, economy of operation, and good looks. It is an extremely stable machine that slows down well for gentle landings, yet comfortably handles 25 mile per hour winds. Ground handling is excellent, even in windy conditions. With increased surface throws, it is capable of snappy aerobatic performance. Best of all, it won't put a big dent in your pocketbook.



● Late one evening this past Spring, Jim, my flying buddy, and myself were returning from a goodwill mission. Having visited one of the newly organized R/C clubs that seem to be springing up in the Michigan Northland, we had departed all of our knowledge to the group in short order and started home. As usual the topic of conversation was what R/C plane to build next. A rather in-depth discussion was taking place as to the virtues of Fred Reeses' 'Quickie' published in RCM back in 1972. This plane had since become our club plane since it featured quick construction, great flyability, economy of operation, and good appearance.

The discussion finally shifted to biplanes and the comment was made, "Why not design a small bipe along the Quickie lines that encompassed quick construction, great flyability, economy of operation and good looks?" This turn of events necessitated pulling off the road at the next restaurant with some subsequent serious doodling on the napkins while consuming large quantities of coffee. That night the Quickie Bipe, was born.

If you want an aircraft that attracts attention from spectators and R/C flyers alike, build the Quickie Bipe. The Quickie Bipe, like all biplanes, has a certain mystique about it and, to the uninitiated, appears to be an almost magical machine that somehow demands greater levels of competence to build and fly than the monoplane. To the already confirmed bipe flyer, nothing could be further from the truth. The Quickie Bipe is an extremely stable flyer. It slows down well for gentle landings, and handles high winds with ease. The prototypes have been comfortably flown in winds up to 25 miles per hour. Ground handling is excellent even under windy conditions.

A real plus for the Quickie Bipe is the ease with which it can be constructed. This design overcomes the drudgery of long hours in front of the workbench. Construction is strong, light and fast. Prototypes have weighed in at 2½ lbs., including radio, and with 460 square inches of wing area, gives a light wing loading of 12.54 ounces per square foot. In addition, because of its compact size, .15 to .19 engine, and three channels, the Quickie Bipe won't put such a dent in your already bent pocketbook.

This pert little aircraft reminds you of the homebuilt movement which, like R/C, is growing by leaps and bounds. If you have read this far, you must be sufficiently intrigued, so let's build. We'll start with the wings since they will be needed for fuselage construction. **Remember,** a light airplane flies better. Your finished plane with radio, engine, wheels, tank, and covering should weigh no more than 2¾ lbs. — shoot for 2½ lbs. and have a better flying aircraft. Use Titebond for all glue joints unless 5 minute epoxy is specified. Five minute epoxy is heavy and can easily add several ounces of weight to the aircraft if used carelessly.

Top Wing

☐ Join two 3" sheets of 36" long, 1/16" balsa together for wing sheeting in the following manner: Butt the two sheets together flat on your building board, making sure they fit tightly along the entire length. Sand the edges lightly with a sandpaper block if necessary to get a tight fit. Run a strip of masking tape the entire length of the seam. This tape serves as a hinge. Turn over and fold back the two sheets and apply a bead of glue the entire length of the joint. Fold back flat with tape side down and wipe off excess glue that has squeezed out. Run a second strip of masking tape down the seam on this side. Set aside to dry.

QUICKIE BIPE
Designed By: George F. Jennings

TYPE AIRCRAFT
Sport Biplane
WINGSPAN
38" Top — 34" Bottom
WING CHORD
6⅜ Inches
TOTAL WING AREA
460 Square Inches
WING LOCATION
Bi-Plane
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
1¼" Top — 1" Bottom
O.A. FUSELAGE LENGTH
25⅝ Inches
RADIO COMPARTMENT AREA
(L) 7" X (W) 2½" X (H) 3¾"
STABILIZER SPAN
16 Inches
STABILIZER CHORD (incl. elev.)
4¼"
STABILIZER AREA
68 Square Inches
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
5 Inches
VERTICAL FIN WIDTH (incl. rudder)
3½" (Average)
REC. ENGINE SIZE
.15 — .19 Cubic Inch
FUEL TANK SIZE
4 Ounce
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Three
CONTROL FUNCTIONS
Rudder, Elevator and Throttle
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Balsa
Empennage	Balsa
Weight Ready-To-Fly	44 oz. max.
Wing Loading	13.8 Oz./Sq. Ft.

☐ Repeat the above step and join the second two 3" sheets to make the second piece of top wing sheeting.

☐ Using a straight edge, cut the **bottom sheeting** to a width of 5-13/16" and leave 36" long. Mark this as bottom sheeting with a ballpoint pen. Top sheeting need not be altered. Simply mark as top sheeting.

☐ When dry, peel off the masking tape from both pieces of sheeting you just joined.

☐ Pin down a 1/2" sq. soft balsa leading edge to your wax paper covered building board.

☐ Pin down the bottom sheeting so that it butts against the 1/2" sq. leading edge after adding glue.

☐ Pin the 1/16" x 3/8" x 36" filler strip to the back of the 1/2" sq. leading edge after adding glue. See plan.

☐ Glue the two center ribs in place 1/16" apart. Angle the center ribs slightly apart at the top to get the correct dihedral angle. The plans call for 1¼" dihedral under each wing tip.

☐ Starting at the outboard ends of the sheeting, glue in the remainder of the ribs spacing them 2¾" apart. See plan.

☐ When all ribs have dried thoroughly, trial fit the top sheet where it butts against the leading edge. Bevel the trailing edge. Glue the top sheet in place being sure to get glue on every portion of the ribs, leading edge, and trailing edge where the top sheet comes in contact. Use pins to hold in place at the leading edge and weight the sheeting down with 4" stacks of magazines until dry, preferably overnight.

☐ When dry, carve the leading edge to shape with sharp knife.

☐ Use a sharp knife or razor saw and cut the wing in two halves at the center section. Using a sanding block, **carefully** sand the center of the wing for a proper fit and the correct dihedral.

☐ Pin down one half of the wing and squarely block up the other half of the wing to 2½". Coat both surfaces with 5 minute epoxy and join.

☐ Sand the center section of the wing lightly and wrap a 3" to 4" band of light cotton or dacron cloth, Celastic, or fiberglass cloth completely around the wing. All materials except Celastic are saturated with Titebond. Celastic is simply soaked in dope thinner and applied. **Do not eliminate this step** as virtually all the center section strength comes from this wrap.

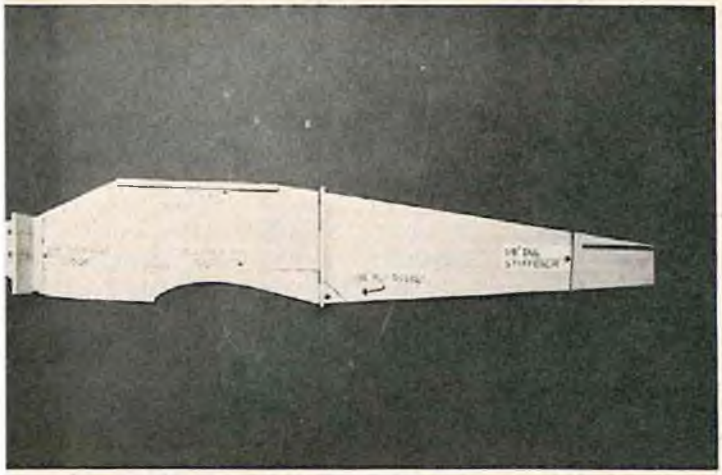
☐ Add the tip blocks.

☐ When the center section wrap is dry, carve the wing tips to the contour of the airfoil. The tip shape will form automatically as you carve. Sand the entire wing carefully and set aside for covering.

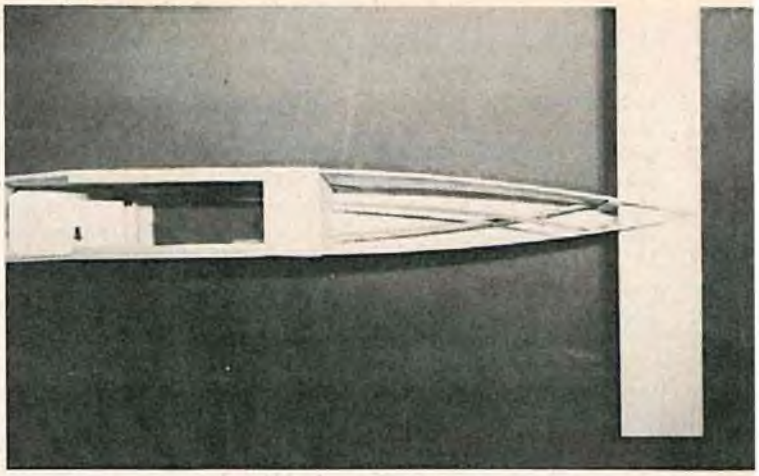
Lower Wing

☐ Cut four sheets of 3" wide 1/16" balsa to a length of 32 inches.

☐ Repeat each of the previous steps used to build the top wing in exactly the same order as before. The lower wing rib spacing is 2½". See plan. **(Note)** The dihedral should be the same degree angle as the top wing. Since the lower wing is shorter, there should be only 1" of dihedral under each wing when joining the two wing halves. This means pinning down half of the wing and blocking the other half to 2".



After gluing wing saddles, 1/16" ply gusset, 1/8" balsa tail stiffener, and 3/8" triangle stock to each side, epoxy the firewall and rear former in place to the right fuselage side at 90°.



Install the outer pushrod cases before sheeting the top of the fuselage. Rough up the plastic pushrod housing with coarse sandpaper and use 5 minute epoxy to secure to fuselage bulkheads.

LEFT: Tank installation should be made prior to adding the 1/16" plywood windshield piece. The 1/4" balsa nose blocks are added at the same time. ABOVE: The wings are built in one piece and, after adding the top sheeting, cut the wing in half with a razor saw or sharp knife. BELOW: Each tip block is a 1" wide length of triangular balsa stock. Carve the tip to the airfoil contour and the tip shape will form automatically.

Fuselage

☐ Using medium weight 1/8" balsa sheet, make two fuselage sides. Unless you can secure 6" wide balsa which, incidentally, will be very costly, use 4" wide sheet and splice on a 1" piece to get the necessary width. Use the same masking tape method you used to join the wing sheeting for splicing.

☐ Mark the location of the firewall and the former on the fuselage sides. Make one left and one right side.

☐ Fit the 1/16" balsa doublers to the fuselage sides between the firewall and the former. Run the grain vertically. Coat both doublers and fuselage sides with contact cement and press in place when tacky.

☐ Cut out the slot for the stab, and add the 1/16" plywood gussets as shown for the wing hold-down dowels. Add the 1/8" tail stiffeners, 1/4" square balsa top wing saddles, and the 1/8" balsa lower wing saddles to each fuselage side.

☐ Decide what engine and radial mount will be used. A Kraft-Hayes mount is recommended. Position the mount and mark the holes. Install 4-40 blind nuts in the firewall. Cut off the excess lengths of the bolts so that they are flush with the firewall. Grind the back of the mount to yield 1° of right thrust and 1½° to 2° down thrust.

☐ Epoxy the firewall and rear former to one fuselage side in the position you marked on the fuselage side. Be sure both the firewall and former are 90° perpendicular to the fuselage side.

☐ Join the other fuselage side with 5 minute epoxy, making sure the entire fuselage is completely square.

☐ Add the 3/8" triangle stock firewall back-up braces behind the firewall.

☐ Glue the 1/16" plywood fuselage bottom in place using a bead of epoxy where the ply bottom contacts the firewall. When cured, glue the rest of the ply bottom down securely with Titebond using rubberbands and weight to hold in place until dry.

☐ Add the 1/8" plywood landing gear brace as shown on the plan.

☐ Find the exact center of the firewall and former and mark with a ballpoint pen. Next, using the line on your plan from the fuselage top view, align the two marks with the line on your plan and pull the fuselage sides together at the rear so that the center is on the line. Glue in this position and clamp with two spring clothespins. You should now have a perfectly aligned fuselage.

☐ Glue on the 1/16" balsa bottom sheeting from the trailing edge of the lower wing on back towards the tail. **Make sure this is crossgrain as shown on the plan.** Add the 1/16" ply tail piece.

☐ Before gluing on the crossgrain top sheeting, trial fit the wing hold-down dowels and put both wings in place with rubber bands. Be sure the wings set parallel to each other when viewed from the front. If necessary, trim the wing saddle slightly on one side of the fuselage.

☐ Trial fit the stab in the fuselage slot using the wings as a reference point to line up the stab parallel with the wings. When perfect, epoxy the stab in place, checking several times as the epoxy cures to be sure nothing shifts.

☐ After the stab is cured, remove the wing and dowels and plan your servo or brick installation, but don't install them as yet. Install the outer pushrod cases by drilling 3/16" holes through the rear former and out the fuselage sides at the appropriate locations. Taking coarse sandpaper, rough up the pushrod cases where they go through the former and fuselage sides and epoxy in place at both ends. Bevel the pushrod case where they exit the fuselage sides so that they are flush with the side.

☐ Now add the 1/16" crossgrain top sheeting. Be sure to add the 1⅜" x 3" x 1/16" ply piece just behind the top wing trailing edge.

☐ Add the vertical fin, making sure it is 90° perpendicular to the stab at the location shown on the plan.

☐ Add a strip of 1/4" triangular stock to each side of the fin as shown on the plan. Also add 1/4" triangular stock to the under-side of the stab on each side of the fuselage. This provides a great amount of strength — **do not eliminate this triangular stock.**

☐ Next plan your fuel tank installation and drill appropriate holes through the firewall for the fuel line before adding the forward 1/16" ply top. Then glue the ply top in place. A 4 oz. tank fits nicely and

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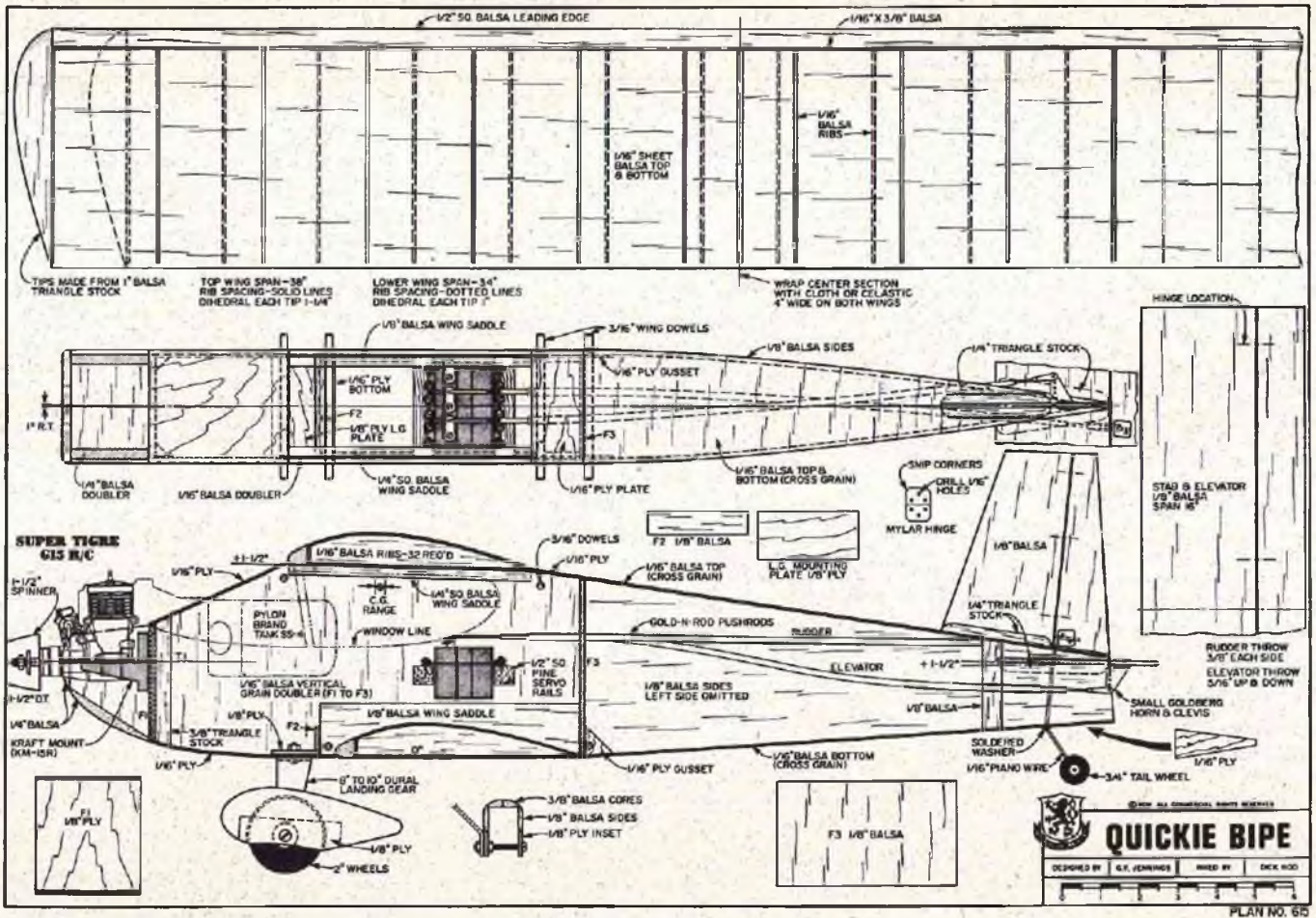

FULL SIZE PLANS AVAILABLE — SEE PAGE 158

ON THE LINE!

the soaring scene
by lee renaud

Support Your National R/C Soaring Organizations

Editor's Preface: R/C Modeler Magazine is pleased to introduce its newest monthly feature, "On The Line," a coverage of the soaring scene by Lee Renaud. While Lee is certainly no stranger to the world of silent flight, nor to the pages of R/C Modeler Magazine, I would like to give you a little bit of his background.

A Californian for the past five years, Lee is a native of Boston, Massachusetts, and, before starting Airtronics after moving to California, was a professional Aeronautical Engineer. Lee also has a strong background in electromechanical engineering and holds a Bachelor of Science degree from Catholic University in Washington D.C.

Insofar as his modeling activities is concerned, Lee has spent thirty years of his life in modeling and was, at one time, one of the nation's top Wakefield competitors as well as participating in Nordic competition. He was also active in sport and competition free-flight activities turning to R/C soaring ten years ago.

Lee has made many notable contributions to the sport and hobby of radio control, foremost of which was the design of the Olympic 88 and 99, considered by most soaring buffs to be one of the finest sailplanes ever designed and almost universally accepted as the ideal trainer for the newcomer to R/C sailplanes. His Esprit and Grand Esprit designs have been widely accepted in competition circles and, along with the Olympic, are always in contention in soaring contests around the world. The Aquila, Lee's most recent sailplane design (May 1975 RCM) has already established a new standard for competition sailplanes, gaining many contest wins and places in both Standard and Unlimited class contests. In addition, during the past five years of my association with Lee, both as a friend, flying partner, and through his kind offices in acting as a technical advisor on soaring matters pertaining to the magazine, I have always found Lee to be extremely objective, analytical, and generous with his time and assistance almost to a fault. His ability to absorb information, separate fact from fancy, and to present concise, factual information to others is, indeed, a rare gift. This will be borne out by the many clubs who have invited Lee as a guest speaker and who have had the opportunity to hear him discuss matters pertaining to R/C soaring, as well as asking him a multitude of questions on all aspects of this facet of our sport.

R/C Modeler Magazine is indeed privileged to welcome Lee Renaud as an Associate Editor and feel certain that you will enjoy reading his monthly column as well as participating in it by submitting soaring news, hints and kinks, and general soaring information that he can share with other RCM readers . . . Don Dewey.

● The phone rang a few days ago and a sultry voice asked me to "hold please for Mr. Dewey."

Of course I was thrilled that Don had come down from the mountain and placed a call to me, and eagerly waited to learn what he desired. As it turned out, he was asking me to edit the Soaring Column for RCM!

While I was extremely honored and flattered that Don wanted me to write the column, I told him that I couldn't accept the responsibility as time was just not available. In addition, I felt that as a manufacturer of R/C sailplane kits and accessories, that it would not be appropriate for me to write a column devoted to soaring.

Further discussions with Don convinced me to assume the position of Soaring Editor under the following conditions:

(1) The Soaring Editor will not comparatively rate the kits and merchandise available to the soaring enthusiast. In fairness to others who earn a livelihood through the manufacture of such products, we will avoid all discussions of "The Best Widget." Of course, the RCM product tests conducted by other members of the RCM staff will continue to appear in the magazine. We will also publish any reports or reviews from other sources which we feel would be of interest to soaring enthusiasts.

(2) I will not separately answer letters directed to this column requesting information on product availability or "how to do its." Whenever we receive a letter which we feel would benefit RCM's readers, we will publish the letter and any answer in the column. Otherwise, please understand that we can't find the time to respond to the volume of mail received.

By the way, don't infer from the title of this column that we are not interested in slope flying, I just couldn't see "On The Cliff" with Don Dewey in control!

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If you are reading this column, then you are interested in R/C sailplanes and soaring. This gives both you and I a common interest and through the pages of RCM, this common interest will allow us to share our knowledge and ideas. It is my sincere hope that we may become closer friends through the majesty of soaring flight. To achieve this goal, I will need your help, since this column can only be successful if we all contribute material to it.

We ask the secretaries of all clubs actively involved in R/C soaring, both American and overseas, to send copies of their club newsletters to RCM, c/o Soaring Editor, if they are not already doing so. We also would appreciate a copy of Contest Results including the names of the models flown, either kit or original designs, along with photos of the winners and their models if possible. Anyone manufacturing or merchandising a product intended for R/C sailplanes is invited to send product information, photos and, if possible, a sample of the product for test and evaluation by RCM's regular staff of reviewers. In addition, we would like to encourage each of you to submit material and ideas to this column. Perhaps you have learned this through experience, a technique in building or flying, that will help another modeler to better enjoy the sport of soaring. If so, please let us know — we will provide artwork and text if you don't feel you can handle these areas. It's not the words but the ideas that count!

I would like to develop a format in this column similar to that of "Engine Clinic" by Clarence Lee. That is; to select reader's letters and to answer them in the column. This approach will provide information to a wide audience of readers and also help us to better understand your problems and the type of article you would like to see in the pages of RCM. In addition, we will report on new products, soaring contests, and LSF and NSS news. Any AMA actions or rules affecting R/C soaring will also be covered.

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The Contest Trail

By the time you read this column the 1975 contest season will be drawing to a close in most of the country. We will report on the Soaring Nats, AMA Nats soaring event and 1975 LSF Tournament in future issues. Dan Pruss, C.D. of the S.O.A.R. Nats, reports over 175 pre-registered entries, more than ever before. In talking to various fliers around the country, it seems that, not only are there more contests than in past years, but also that entries are up.

Here, in Southern California, the local soaring clubs have formed a group called

1975 SOAR NATS FLASH!

Nearly 200 entrants competed in the 1975 contest at Lockport Illinois July 21 through 23. The top places were dominated by California entrants who swept Standard and took 2 of the top 5 Unlimited Places. Competition was intense with very close scores in all events. Full details of the meet in next month's issue.

STANDARD		UNLIMITED	
1. Mark Smith	5257	1. Frank Deis	5260
2. Pete Rambo	4833	2. Terry Koplan	5193
3. Rick Pearson	4680	3. Greg Smith	5191
4. Rod Smith	4615	4. Chris Adams	5127
5. Don Edberg	4541	5. Bob Gill	5050

Scale was won by Colonel Bob Thacker and his Bowlus.

Junior Team: Rocket City R/C Open Team: SFVSF.

$(SC)^2$ consisting of 11 clubs in the Los Angeles/San Diego area. These clubs run contests monthly from March to November. The Torrey Pines Gulls hosted a contest on May 31st as part of their two-day annual meet in Hemet.

$(SC)^2$ Results

1. Jim Wiseman — Hobie Hawk
2. Dave Thornburg — Windrifter
3. Bob Freymouth — Windfree
4. Mark Smith — Windfree

Overall Results

1. Mark Smith — Windfree
2. Dave Thornburg — Windrifter
3. Jim Wiseman — Hobie Hawk
4. Don Edberg — Aquila

THE EAGLE SCREAMS

From time to time we will take advantage of our position and editorilize about soaring matters. These editorials are the author's opinions only and do not necessarily reflect the views of RCM's editor and management. Here's the first of a sporadic series.

Where Are You?

A recent article in the L.A. Times financial pages stated that Coast Catamaran had sold over 14,000 Hobie Hawks in the past year. From conversations with other kit manufacturers, a minimum of 10,000 other sailplane kits were sold during the same period of time. This is almost 25 thousand sailplane kits in a single year, without considering imported kit sales!

Even if you allow for the fact that some modelers built more than one kit, this still means at least 10 -12000 modelers bought R/C sailplanes during 1975. Perhaps all these models were not built and some are still sitting on dealer shelves. Let's say that only half of these kits were actually flown by a modeler during the year, leaving 5,000-6,000 active sailplane pilots.

Now comes the question — given at least 5,000 modelers flying R/C sailplanes, why is the total membership of the National Soaring Society (NSS) struggling to top 700 members? Why has LSF membership during the past five years only reached 1,200 total? (It can't be the dues in the case of the LSF, as membership is free.) I don't know the answer and discussions with NSS and LSF officers, as well as with modelers, has added little insight. Are R/C sailplane pilots typically anti-social or anti-organization? Are they not interested in soaring fraternities? Do they not know of these organizations or, perhaps, not understand their purpose? If you have any ideas on this subject, please share them with us.

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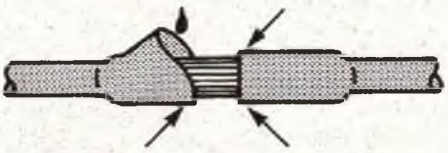
Soaring Suggestions

G.T. Zimmer of West Monroe, Louisiana, recommends the use of Hot Stuff which will eliminate tying knots or using special rubber plugs for joining Hi-Start rubber. First, use a 1" piece of dowel (3/16" diameter for small tubing or 1/4" diameter for the larger tubing) and sand the dowel with fine sandpaper. Next, pull the rubber onto the dowel, working your way around the circumference. Pliers can be used if needed. Do this on both ends of the dowel for a splice. The rubber does not have to touch in the middle. The next step is to peel back the rubber on one side of the dowel with your thumb as far as you can. Then, place a large drop of Hot Stuff under the peeled dowel and let the rubber back down easily to prevent splattering. When dry, do the same for the opposite side of the rubber (four times for a splice). Tie rings can be done the same way using small screw eyes. Simply wrap the dowel with wire and epoxy to prevent splitting. The author has been using this method for over eight months now without a single failure.



Robert J. Levy of Springfield, Ohio, after flying his Drifter sailplane for about a year, noticed that the 1/16" balsa fuselage bottom was developing some cracks due to a few too many "bounce and go" landings. The balsa had been pushed in by ground impact, but it appeared that the crack line could be joined easily with Hot Stuff or Zap if the balsa could be restored to its original flat condition. In the past, Bob would have cut away some of the top sheeting so as to be able to push the bent sheeting down against the bench surface and then apply epoxy. However, because of the quick bonding of these new adhesives, as well as its penetrating quality, he was able to avoid cutting any of the top sheeting. He simply took the hose from his tank-type shop vacuum cleaner, flipped on the switch, and used the suction to draw the crack and bent balsa into its original shape. A few dots of Hot Stuff applied while the suction held the sheeting in place did the trick. For safety sake, Bob added a few more drops at 1/4" intervals along the crack line after he removed the suction. The total repair time was five minutes instead of a much longer period of time.

While this procedure was used on a flat fuselage bottom, Bob thinks it could be adapted to curved surfaces such as wing sheeting, etc. When he thinks of the time it has taken him to repair dented and cracked leading edge sheeting, he knows that he's going to try to extend the use of his "suction clamp" technique.

While building his Gryphon sailplane, Mark Collins of Redwood City, California, found Hot Stuff to be helpful in firming up soft balsa. After making a slot for the hatch tongue, he simply applied several drops of Hot Stuff in and around the slot in the nose block. This has prevented the hatch from loosening from repeated opening and closing. Mark applied the same technique for installing the music wire wing tip skids. The tip blocks were fairly soft balsa so the plans called for an outer brass tube inserted in the tip block. This was not necessary after applying some Hot Stuff to the hole punched for the skid as the surrounding wood becomes very hard. In fact, Mark had to use a rat-tail file to re-open the hole for the skid!

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That's it for this month — we'll look forward to your suggestions, your ideas, as well as your comments and criticisms for this column. Address all correspondence to R/C Modeler Magazine, c/o The Soaring Editor, P.O. Box 487, Sierra Madre, California 91024. □

Don Reutlinger's scale hydro, Miss Budweiser, shown by Sande Anderson and Charlene Reese.

RENO POWER BOAT RACES

NAMBA INTERNATIONAL DISTRICT 9 CHAMPIONSHIPS

BY DICK TICHENOR

● The biggest little city in the world, Reno, Nevada, was the scene of one of the largest radio controlled power boat races ever held. Commodore Donald Dees and Vice Commodore Carl Gustafson directed the small but dynamic Reno Model Boaters club through the July 4 - 6, 1975 meet with 228 entries. Thorough preparations, willing workers and cooperative contestants allowed the 160 heats to be run smoothly.

North American Model Boat Association, International, District 9, includes Arizona, California, Nevada and Utah. This significant race also drew entries from Sweden, Canada, Hawaii, Louisiana, Illinois and Washington. NAMBA, Int'l. President, Al Metelak and District 9 Director Jim Henry attended and raced. Twenty-five clubs were represented at Reno.

This was the first major race to be held at Reno. The air density at that altitude degraded the power of the high-performance engines considerably, however, there were plenty of closely contested heats as that handicap was equally imposed on everyone. Sunny 90° temperatures with very light breezes made excellent boating weather. Lots of sun tan lotion was used.

RC Boating has quietly grown and matured into a major sport. Hull designs,

RCM at work – Dick Tichenor interviewing the lovely Marjanne Belfrage and Anette Lindeberg. They accompanied their husbands, Sten and Chris from their homes in Stockholm, Sweden, to participate in the races.

1ST ROW: (L) Contest Director and Commodore of Reno Model Boaters, Don Dees, won Best Scale Hydro Trophy with trailer mounted Maverick. (C) Heat times were recorded with electronic timer featuring a digital readout. (R) NAMBA President, Al Metalak and son, Gary with their Class B Hydro. 2ND ROW: (L) NAMBA District 9 Director, Jim Henry, with an example of a new sport class boat that is gaining interest. (C) Glen Paykoff tells John Brodbeck about the K & B engine in his Class A Crawdad Hydro that won 3rd. (R) Charlie and Pat Pottol of Marine Specialties with Scale Hydro entry. 3RD ROW: (L) Conrad Cupit driving as dad, Glen, calls. (C) Jeff Schmidt tinkering with his 3rd place winner in Class C Hydro, a JVS Claim Jumper. (R) Frank Hu and Joyce came from Hawaii to race. 4TH ROW: (L) Norma and Bob Jerome from Edmonton, Alberta, Canada with their Old Vienna. (C) 1st place in Scale Hydro went to Leonard Feeback and his Pride of Pay-N-Pak. (R) One act of the launching ballet. 5TH ROW: (L) Fred Diel placed 2nd in Scale Hydro with his Gale V. (C) Al Metalak launches and retrieves Leonard Feeback's Scale Hydro winner. (R) The world's fastest scale boat at 63.9 mph is this Thriftway Too by Bill Hornell.

1ST ROW: (L) Charlie Pottol and his Scale Hydro, Pay-N-Pac. (C) Typical engine installation. Gear arrangement on left is fuel mixture control. Exhaust throttle is for speed control. (R) Mark Chamberlain was 4th in Scale Hydro with his beautiful Miss Technicolor. 2ND ROW: (L) Keith Chamberlain and his Scale Hydro, Notre Dame. (C) Larry Ingelson ran a JVS U95 Hydro – Pam assisted. (R) Vern Schmidt with a JVS Sport .40 Hydro. Vern is the 'V' of JVS. 3RD ROW: (L) This Dumas Pay-N-Pak belongs to Roger Newton. (C) A colorful trio of Claim Jumpers photographed on the ready line. (R) Mark Chamberlain's Miss Technicolor getting underway. 4TH ROW: (L) Pal Jennings' 1974 National Scale Champion was 5th at Reno. (C) The proper technique for a smooth launch. (R) A photograph of the ready line preparation. 5TH ROW: (L) Leonard Feeback's Scale Hydro back-up, the famous Miss Bardahl. (C) Jeff Schmidt gives Wes Neighbors advice on Wes' Hydro. (R) Jim Whitlatch holds world speed record for 6 lap oval at 1:33 with this Northwind hull in Class C Mono.

LEFT: Miss Nevada, Sherri Ann Lowe, was guest of honor in parade to open the Reno Boat Races. Parade was sponsored by the City of Reno Parks and Recreation Department. BELOW, LEFT: Merrily Hornell driving, husband, Bill, calling. RIGHT: The family groups patiently wait their call-up. BOTTOM ROW, LEFT: Bud Vanderbush with his Dumas SK Daddle Class B Mono. RIGHT: Gene Stallard with Class C Mono. Boat's name, 'Mom's Mink,' tells us something.

On opposite page, the top photograph of the hard working contest staff illustrated how a small club can efficiently run a large meet of this magnitude. In the center photo, Sten Belfrage and Christoffer Lindeberg from Stockholm, Sweden, pose for RCM's photographer. The bottom photo on the page opposite is of Howard Hole of Honolulu, Hawaii, who took 4th in Class A Hydro with his off-shore racers.

powered plants, drive trains and control mechanisms have been refined and integrated into very efficient machines. Craftsmanship to produce the beautiful boats seen at Reno is a matter of pride among the participants. We were impressed by several facets of this competition. Friendliness and good sportsmanship were prevalent. Competitors helped each other in any way they could. They were even nice to a fat old magazine photographer (Thanks!). In many cases it is a family activity with the wives and children driving the boats. Age is no factor and entries ranged from 8 years upward. In one heat a 10 year old boy was winning a particularly close race with his expert driving when he ran out of fuel and stopped 3 feet short of the finish line. The other contestants and spectators were almost as disappointed as he was. Quite a few of the successful competition participants not only make their designs available to their competitors but some will build up hulls, accessories, etc., for them. It is this kind of attitude that has made RC power boating the solid sport that it is.

Rather than try to describe the boats and races, we feel the photo coverage can say it much better.

RCM congratulates the Reno Model Boaters who were assisted by the Sacramento Model Boat Association and the City of Reno Park and Recreation Commission for conducting these outstanding championship races. ☐

North American Model Boat Association, International District 9 Championships Races At Reno, Nevada. Hosted By The Reno Model Boaters.
July 4 — 6 1975
228 Entries

Winners

Class A Monoplane
1. Ed Fisher
2. Ralph Henry
3. Bruce Wren
4. Art Hammond
5. Dick Norsiksien

Class B Monoplane
1. Ed Fisher
2. Russ Kominitsky
3. Tom Steele
4. Mike Beauregard
5. Howard Hole

Class C Monoplane
1. Ed Fisher
2. Jim Whitlatch
3. Bruce Wren
4. Larry Ingelson
5. Pat Pottol

Class A Hydroplane
1. Duane Gilger
2. Bill Webster
3. Glenn Paykoff
4. Howard Hole
5. Howard Power

Class B Hydroplane
1. Wray Freitas
2. Charles Pottol
3. Jeff Schmidt
4. Red Blackford
5. Don Nicklaus

Class C Hydroplane
1. Ed Fisher
2. Wally Stewart
3. Jeff Schmidt
4. Roger Newton
5. Frank Snowden

Scale Hydroplane
1. Leonard Feeback — Pay-N-Pak
2. Fred Diel — Gale V
3. Roger Newton — Slo-Mo-Shun IV
4. Mark Chamberlain — Miss Technicolor
5. Pal Jennings — Miss Bardahl

Best Scale Hydroplane
Don Dees — Maverick

Quarter Midget

BY

DON DOMBROWSKI

AND FRED REESE

RACING AT RANDOM

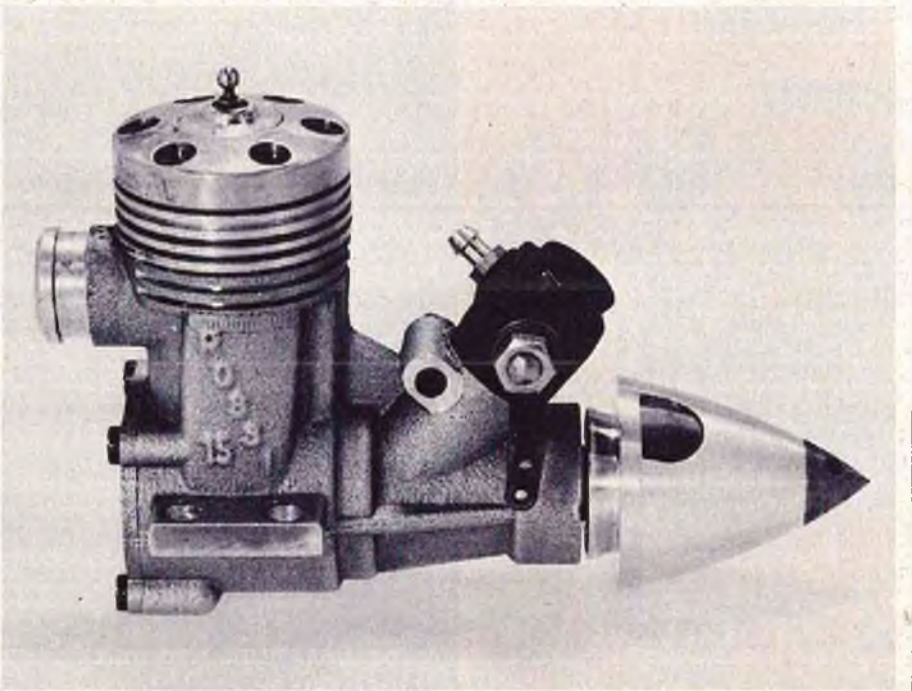
Last month we wrote that a Rossi RC 15 was available and had been declared legal by the AMA Contest Board and that we would report on the engine's performance. Subsequently Don ordered one from the C.T. Finley, Inc. distributors and Joe Zdankiewicz raced it at the June 28 race at Chula Vista.

The top end performance of the Rossi was outstanding. Even when flying a wide course, Joe was easily lapping the other airplanes. The Rossi was turning 22,000 rpm on the ground with a 7/5 Rev Up Series 400 prop which is at least 3000 rpm better than Joe's ST 15 on the same prop. The Rossi engine, itself, is a superb engine as you probably already knew. The Rossi 15, FAI version, has been fitted with a Perry carburetor by the Finley Company and is being sold as the Rossi RC 15. However, the Perry carburetor on our test engine vibrated loose with each running and had to be tightened each time. Sealing with RTV did not completely cure the problem. The idle on the ground was good at about 4000 rpm but the engine quit in the air every time when landing. The idle adjustment on the carburetor is very critical and sensitive to achieve both low idle and good transition from low to high throttle. The engine often quit abrubtly at about 3/4 throttle or when it was pulled back to idle. The low end capabilities were reasonable on the ground but very poor in the air. We talked to Dan Kane in Chicago and to Jay Sternberg in New York and both reported similar experiences. After spending approximately 10 hours adjusting the idle and test flying, **not once** did our test engine land running.

The problems are not the fault of the Perry carburetor. The engine is just not ported or timed for low speed operation. The Rossi 15 is a pure racing engine designed to operate between 25,000-30,000 rpm on straight FAI fuel. Rossi did plan to introduce a new engine with different timing and porting and with an RC carburetor of their own, but may have dropped the project when they heard the response to this version. We have a copy of a letter from Mr. Rossi stating that he has not sold any R-15 engines for RC to the Rev Up company.

In the past we have interpreted the QM Engine rule to include only RC 15 engines from the original engine manufacturer and this is the way the AMA Contest Board interpreted the rule just a year ago when Misjon Industries asked about the legality of the Rossi. A year later, William McGraw wrote to Frank Ehling, the AMA Technical Director, stating that he had received 1000 Rossi .15 RC engines and that they would be released for sale on June 14, 1975. The fact that these engines already existed, even though they were not by the original manufacturer, apparently caused the AMA Contest Board and its Director, Bill Northrop, to re-appraise the QM engine rule and declare the engine legal for QM racing. In spite of the AMA ruling, many clubs and racing associations will continue to interpret the rule as before and dis-allow the Rossi from competition. Other groups are setting a $60.00 cost limit for engines used in competition in those areas.

Congratulations AMA, you've managed to do it again! The results of the AMA interpretation of the engine rule without consulting people involved with QM racing, and many other inputs, indicate more than ever that we need a national organization devoted only to Quarter Midget racing. We feel that we are **not**



RACING SCHEDULE

OCTOBER	
4	Quickie 500 & SP — SAC, Chicago (CPC).
4-5	(MARA).
5	FI & QM — SAC, Chicago (CPC).
5	1/2A & SP — Centerville, VA (NVRC).
12	QM — York, PA (CPNA).
19	1/2A & SP — Centerville, VA (NVRC).
19	1/2A — Sacramento, CA (CMM).
25	Quickie 500 & SP — Monroe, NC (SEMPRA).
26	FI — Monroe, NC (SEMPRA).
NOVEMBER	
9	QM & Quickie 500 — Tamiami Park, Miami, FL (Tropic Aero).
16	1/2A — Sunnyvale, CA (Pioneers).
23	Quickie 500 — Sacramento, CA (CMM).
28,29,30	QM — West Coast Champ., Chula Vista, CA (RCM & CV).
DECEMBER	
21	1/2A — Sacramento, CA (CMM).
30	FI — Tangerine, Orlando, FL.

being represented within the AMA just like other special interest groups that have formed similar organizations in order to make themselves heard. As it is, people that are **not involved in racing** are making decisions that determine how we **race.**

A new organization QMPRA, Quarter Midget Pylon Racing Association, is being formed with the help of R/C Modeler Magazine and support from the NMPRA. QMPRA will be complete within itself and will control and act as advisors for any rules, changes or interpretations regarding QM racing. It is important that the organization represent the general feeling of the country and not just one area. For the present we will act as reporters through this column and will keep you informed of the progress of establishing the new association, QMPRA. We expect QMPRA will be functioning and soliciting membership by the first of the year.

★ ★

Early results of the RCM Readers Survey indicated that we must enlarge our coverage of racing to include Formula I, 1/2A, Quickie 200 and Quickie 500 in our column. While covering all racing events our emphasis will continue to be on Quarter Midgets as it is the current racing class with the most participants. This means that we need input on Formula I and Quickie 500 events from you. We like pictures of airplanes so send us clear, black & white prints and as much information about the pictures as possible. Please note any special features of the aircraft. When sending race results, try to include the flier's full names, aircraft, engine and props.

★ ★

The good news this month is the large number of pylon racing clubs or associations forming to promote racing. The concept pulls the interested people together and more is accomplished than when working within a traditional club. It also means a stronger voice that can be identified and called upon for opinions. We certainly appreciate receiving the newsletters and bulletins you send us.

Reading the Central Pennsylvania Pylon News got me on this subject. Their's is an active and growing organization scheduling monthly races. Most of the racing clubs include QM if they are not completely QM oriented. These are in the order of Club, Location, and Events:

CPC — Chicago, QM & FI; CPPRA — Pennsylvania, QM; FMPRA — Florida, FI; MARA — New York, QM; NCPL — Minn. & Iowa, QM & 1/2A; QMRC — So. Calif., QM; RMPL — Colorado, QM; SEMPRA — So. East, QM, FI, Quickie 500.

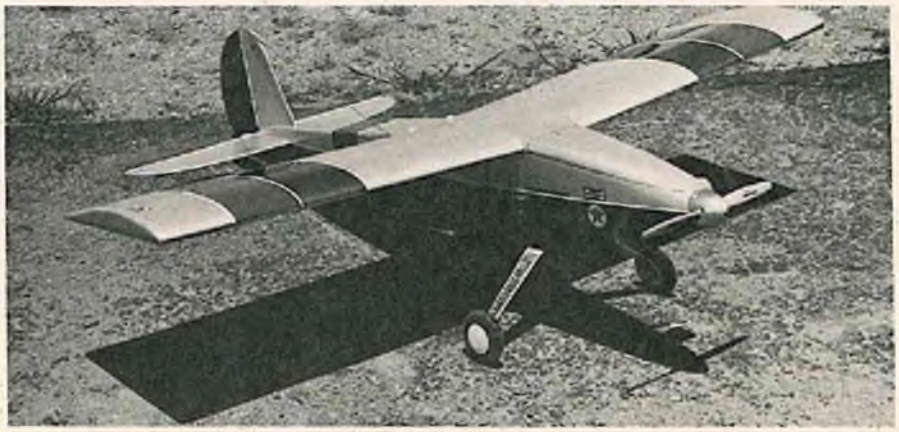
If we missed you let us know!

We have reports that QM races are being held in Germany, Australia, Canada, England, Italy, Sweden and Czechoslovakia. QM is becomming a truly international event.

★ ★

The prop manufacturers have really

to page 124



TOP: Where it's at! Three "Spirits" bending around the No. 1 pylon at the Denver Eagle's field. The race was part of the second race of the season for the Rocky Mountain 1/4 Midget Pylon Racing Association.
CENTER: The most popular 1/4 Midget in the Rocky Mountain Pylon Racing Association – the "Spirit." The model in the picture was built by Travis McGinnis of the Denver Eagles R/C Club. Travis is 3rd in season standings – his Spirit's are 1-a-s-t! K & B 15, Royal radio. Photos by Col. J.A. de Vries.
ABOVE: Contestants and winners of the FORKS Annual Invitational QM race on June 1, 1975. Severe thunderstorms on the preceeding day reduced the number of entries. BACK ROW, L to R: Fred Johanson, Bob Gademer, Bill Gademer, Bob Penko, and Bob Mellen. FRONT ROW, L to R: Billy Johanson, Don Love (2nd place), Ed Weesner (1st place) and Ed Nobora (3rd place).

SOME RANDOM THOUGHTS ON SOARING

By Tony Estep

● One of the things that model magazine columnists forget too easily is that few of the participants in this greatest of hobbies have any interest in contests, rules, and all the trappings and appurtenances of competition. On the other hand, everybody benefits from the techniques and equipment used by top contestants, especially in soaring. R/C soaring is one of the few areas of model competition in which the equipment used by the top-scoring expert may be identical to that used for sport flying by any Sunday flyer. And I think it's logical to claim that every Sunday sailplane jockey would like to make his plane stay up longer, land closer, thermal more consistently, and so on. So this article, and its successors, will be devoted to passing on a random collection of hows and whys from the successful flyers I have met in and out of competition. We'll try to pass on suggestions about designs, modifications to existing kits, launch techniques, spoiler systems, and whatever other ideas I can run into that might be fun and useful to the growing multitude of silent pilots.

A recent article about modifications to the popular Cirrus kit has stirred some comment in the soaring ranks. This particular set of modifications was first worked out (as far as I know) in 1970 by Milt Woodham Sr., who at that time lived and flew in Huntsville, Alabama. Since then, these "bent-wing Cirruses" have become very popular in that section of the country, and among the most successful proponents of the plane is Clark Fitch, who has flown one in each of the last four Nationals, finishing in the top twenty each time, and twice in the top ten. As was readily apparent from the drawings and pictures, the version shown in RCM had much too much dihedral for maximum performance, but this is easily cured. The easiest way to get the polyhedral about right is simply to turn the beveled spar joint over when splicing (see Fig. 1). Then reduce the bend in the pins, if necessary, until the total elevation under the tip is 9". If you build the tip polyhedral per the RCM drawings, simply straighten the pins to produce 4 degrees dihedral in the inboard panel.

Clark's Cirrus has been evolved and modified over the years until the present version has spoilers, flaps, polyhedral, a thermal sensor, and probably some other goodies as well. The tendency among the Huntsville and Tullahoma flyers who fly this plane is to leave the rudder/fin unmodified, but a slightly higher fin seems beneficial, and Al Clarke, a bright and colorful young aero engineer from Huntsville, tells me that he prefers the higher fin (though I've never known anyone who has tried the balanced arrangement).

Greg Smith and his red, white, and blue original 'Lucky Ed' – winner at Tullahoma.

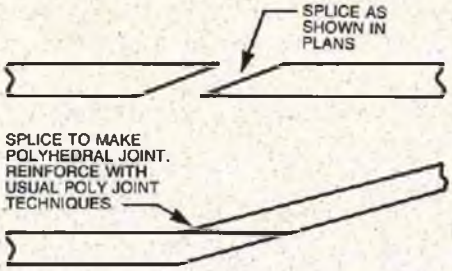


FIGURE 1

I dwell on this particular group of flyers because they are best known for flying this type of modification to the Cirrus, but also because they represent a fine source of new ideas in soaring. The recent Tullahoma NSS contest provided an example of what I mean.

The overall winner of the high-point trophy for the two day contest was Greg Smith, flying his twelve-foot original. I'll pass on a number of useful design and flying ideas which Greg uses to good effect.

Greg's plane has a polyhedral wing with straight root panels and very little taper in the tips, utilizing a Gottingen 801 airfoil (see Fig. 2). The wing is a three-piece affair with plug-in tips and a solid center section. It screws to the fuselage with nylon bolts.

The fuselage is made of foam planked with balsa, built up over a plywood keel. It has a ballast capacity of 2 lbs. Greg candidly admits, "It's a terrible construction technique, and we'll never use it again." The "we" Greg refers to is he and his dad, Orvel, a meteorologist with NASA. Orvel is one of the nicest and most interesting guys I've been privileged to know, and his grasp of important essentials of design has provided Greg with a big cannon to shoot in his assault on the NSS championship.

Greg's launches are a wonder to behold, despite the high wing loading of his plane (10½ oz. minimum). The ingredients to a high launch are a strong, **inflexible** wing; a high-lift good technique. One of the refinements of a good technique is the grand style, major league, King Kong heave-ho. Greg's teammate, Frank Deis, explains it this way: "I have Greg throw my plane, and I throw his, for a simple reason. The guy who's trying to fly and work the winch can't throw it as hard as his helper can — and that first 10 or even 20 feet, straight up, uses up zero line, so it's added right on to the top of the launch."

To that I can add that when you're wrestling with a winch, a transmitter, and a 7 lb. 13 foot plane, you just can't do the job consistently and smoothly each time.

Frank is another of my favorite people, also a design type from NASA, who in the past has flown his original Windsong with excellent results. This year, he is trying out a Legion Air, and he did quite well with it despite unfamiliarity with the plane, finishing a close second to Greg on Saturday in the 10-minute event. To give you some idea of what it takes to succeed in the typical NSS contest, on Saturday the winds were 10

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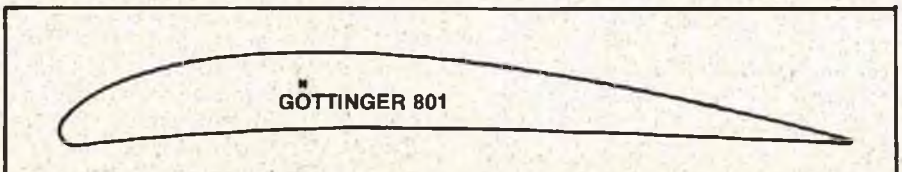
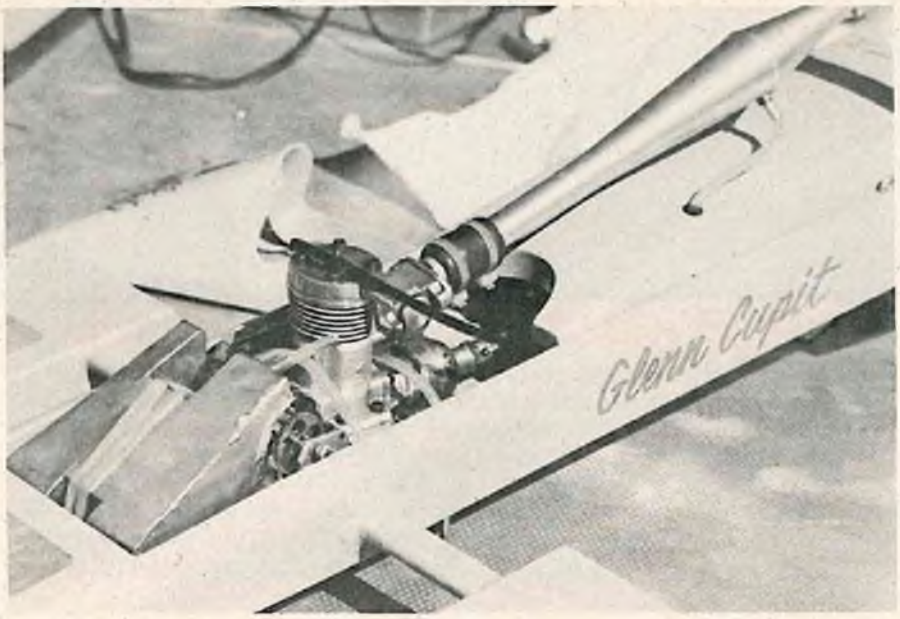


Sta.	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upr.	1.2	3.8	5.15	6.8	8.0	8.9	10.2	11.1	—	11.8	11.6	10.75	9.45	7.7	5.6	3.0	1.7	0.4
Lwr.	1.2	0	0	0.2	0.4	0.6	1.0	1.4	—	2.0	2.2	2.1	1.95	1.6	1.1	0.5	0.25	0

FIGURE 2



HIGH PERFORMANCE BOATING

BY GLENN CUPIT

● Our regular series of technical articles will be resumed next month. We have been to San Antonio, Indianapolis, and Reno to boat races and on vaction during the past few weeks and presently am driving between San Francisco and L.A. with a stop-off at R/C Modeler Magazine's office on our way home to New Orleans.

I would like to use this month's column to discuss some things which relate to R/C boats, but probably would not be voiced in the scheduled technical series of articles.

The original purpose of my articles was to make it easier for me to answer the most commonly asked questions of my customers, who were new to boating. I was spending all of my time writing duplicate answers and advice to similar questions from boaters from all parts of the country. I was beseiged with these requests **not** because I was a boat expert (which I am not!); but because by hobby shop is unique in that we have **only** R/C boats (no planes, etc.), and my new customers had no one else to ask! So, it became my responsibility to find the answers to these technical questions.

My background (15 years) is automotive. I taught high school industrial arts, worked for Chevrolet Motor Division and, for the last 10 years, I was the Service Manager at a large Chevrolet dealership. My hobby from 1956-1966 was drag racing (everything from a stock '57 Chevrolet to supercharged, nitro burning AA/Fuel dragsters) and brief stints with go-carts and trail bikes. I started Performance Hobby Supplies as a tax shelter from my salaried position at the dealership. In 1974, I left the automobile business and entered the R/C boat business full-time. I began boating in 1966 after we sold our last dragster. I built all of our race cars and had a fairly well-equipped shop (lathe, mill, welding equipment, etc.). I was thoroughly familiar with two-cycle engine performance theory and hop-up (go-carts and bikes), but had never done any model engine modification or flown control-line speed. My first two years in boating were disastrous! I found the model engines responded to the same hop-up techniques as their larger counterparts and I had some dynamite engines with full pressure, giant venturis, exhaust throttles, 65% nitro, etc. But, I could never seem to get them started during pit time or keep them running during a race!

Finally — I realized that sheer power did not win races! On the other hand, reliability and simplicity along with efficient props did!

At the 1968 Chicago IMPBA Internats, Joey Albeanese, my brother Robby, and I went up with a trailer full of boats with gear drives, pressure bleed valves and all kinds of trick stuff. None of us finished a heat! In fact, I never finished a lap! I blew two engines, had to swim after my boat, and generally made an ass of myself for two days! I packed everything up, rented a camera, and spent the remaining two days taking one hundred dollars worth of photos of everybody's boats — tops, bottoms, linkages, drive set-ups, props — everything!

These photos and two days were the beginning of any successes I may have had during the past few years. The conversations, meetings, and ideas from super competitors such as: Ed Kalfus, Ed Hughey, John Bridge, Bill LeFeber, Dick Schnell, Ed Keedy, Kurt Rothlisberger, Randy Vitek, Gary and Marianne Preusse, Griff Parker, Chuck Spera, Milt and Ron Braunskidle, Ron Witt, Jack Bucknell, Earl Mundt, George and Steve Meuller, Mike Meelbush, Al Metelak, Jim Fetters and many more, helped me tremendously with my boat racing hobby.

I had learned the long, hard, expensive way that to have fun and be competitive at R/C boat racing, did not require expensive, super re-worked engines, exotic drive set-ups, or high nitro fuel.

All it took was simplicity, neat workmanship, attention to detail, sharp corners on the hull, a good ball bearing engine, a free and properly aligned drive line and, most of all, an efficient, sharp, balanced prop!

This digression was necessary to explain the formulation of these technical articles.

I have always been a listener and a learner. I have very few original ideas. My ideas and conclusions, almost always, are the results of many different innovations and combinations of ideas that I have picked up from many individuals. My articles are simply my understanding and observations of many successful techniques of others along with gleanings of conversations with boaters and craftsmen all over the country. This is the base I used when answering the technical queries of my customers.

The first three articles were written and printed on flysheets and given away at Toledo last April. Dick Tichenor picked them up and gave them to Don Dewey. Don called me and asked permission to run the flysheets as articles. I agreed, but questioned Don, "How come all of a sudden you like boats?" Dewey explained, he never really disliked boats but could not find good technical "how-to" information, so therefore could not get overly excited about boat racing in the past. He told how Steve Muck and Jim Whitlatch had written boat articles in 1966-1967 (which I still have) for RCM. The boat section was discontinued, because, at that time, most of the top boaters on the West Coast were very secretive and did not wish to share their ideas or "trick stuff" with others, so Muck's sources were apparently limited.

This "closed mouth" and secretive outlook of participants of a technical, competitive sport or hobby **always** limits and retards the growth of that sport or hobby. (Some past examples: tether race cars, control-line speed, pylon racing, drag racing, etc.). It is only after free exchange and sharing of information (through a publication), that rapid growth is noted.

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RCM SENIOR

TEXT AND PHOTOS BY

BEN STRASSER

First produced as a kit in Germany, only a few were exported to the U.S before the kit was discontinued. Reviewed by RCM in the April 1973 issue, the Senior Telemaster has become one of the most popular and sought-after designs in the country. RCM was fortunate to secure the publication rights to Alexander Engel's magnificent 95" span aircraft. A few minor modifications have been made to improve the structural integrity of the model, although little could be done to improve the outstanding flying characteristics of this magnificent aircraft.

RCM SENIOR TELEMASTER
Designed By: Alexander Engel

TYPE AIRCRAFT
Sport & Exhibition
WINGSPAN
95 Inches
WING CHORD
14⅛ Inches
TOTAL WING AREA
1313 Square Inches
WING LOCATION
High Wing
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL, Each Tip
3 Inches
O.A. FUSELAGE LENGTH
65¼"
RADIO COMPARTMENT AREA
(L) 14" X (W) 3¾" X (H) 6"
STABILIZER SPAN
34¾ Inches
STABILIZER CHORD (incl. elev.)
9-9/16"
STABILIZER AREA
320 Square Inches
STAB AIRFOIL SECTION
Flat Bottom
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
9½ Inches
VERTICAL FIN WIDTH (incl. rudder)
7½ Inches (Average)
REC. ENGINE SIZE
.60-.80 Cubic Inch
FUEL TANK SIZE
12-14 Ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Four
CONTROL FUNCTIONS
Rudder, Elevator, Throttle, Ailerons
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply, Spruce
Wing ..... Ply and Balsa
Empennage ..... Balsa and Spruce
Weight Ready-To-Fly ..... 104 Oz.
Wing Loading .... 9.2 Oz./Sq. Ft. (incl. stab)

No doubt about it, you're about to be the proud pilot of one of the biggest model airplanes on the block! First you get yourself a balsa tree . . . or forest? It sure takes a lot of sticks. This isn't the ideal plane to build in an apartment closet. The plans alone are big enough to paper an average outhouse twice over. You'll find out for yourself as you unfold them!

While the new version of the Sr. Telemaster looks like the original machine once kitted in Germany, the new one boasts some design changes. The changes were made both to simplify the construction and to offer a stronger airframe. The barn door ailerons have been changed to strip ailerons. They're easier to build and set up and they offer a stronger wing trailing edge. Heavy spars, full length 1/2" x 3/16" strips running along the front of the wing, a 1/4" ply spar dihedral brace coupled with a 1/8" ply leading and trailing edge dihedral braces add up to a wing that's almost strong enough to make a diving board for the local swimming hole! A dorsal fin has been added to the vertical fin for strength. The stabilizer has been re-designed to make it more twist resistant and the fuselage construction has been changed to make the building easier and the airframe stronger.

This new ship will fly just like the one Chuck Cunningham has mentioned a few times in his column in RCM. "The airplane that I was flying yesterday and have been flying for the past several months is one that I have mentioned before. It is the fantastic Senior Telemaster, a German kit that is no longer in production. I sincerely hope that either the kit can be started up again in Germany or someone in this country can get the kit rights to it and produce it here." Well Chuck, you can stop lending out your plans, here comes the "fantastic Senior Telemaster," one more time.

As far as the construction on the new version goes, we're sure you'll agree that it's simple. Not a lot of little pieces to be glued in place here and there. The plane takes a while to build, though, because there are a lot of big pieces to be glued together. To make the construction notes easy to follow, the first time a part is used, the name of the piece is given in italics. The star (☆) is used to indicate that we've said all we're going to say about installing a particular piece and it's time to get out the glue.

In this article we've included a list of the additional materials you'll need to get the plane built. When it comes to finishing the plane, any of the possible covering techniques may be used, including MonoKote. That's what we used to cover ours. Incidently, if you want to cover the plane with one color and don't mind a few patches, you can get by with 3 rolls of the stuff. For two colors it will take 4 rolls; 3 rolls for the wing and 1 roll for the fuselage! Gad, that's enough to cover 4 half "A's", 2 .19 sized ships, . . . Ah well, just think about how beautiful it will be up there. With a little headwind, you'll be able to hold it still in the sky above you to shade you, your family, and your car!

We're flying our ship with a Veco .61 and an 11½/7 prop. A friend of ours who also has been flying one for a year has an .80 on his. Sure takes-off fast. About 3 feet of roll on the runway and it's up. Our radio is one of the new Hobby Lobby 6 RC systems.

Now it's time to get started. Move out the living room furniture, roll back the rug, lay down your building board and plans, get out your balsa forest, bucket of glue, and here we go.

THE WINGS

To make the building go more quickly, both of the wing panels are shown on the plans so you can build them both at the same time. In looking at the plans you'll find that the root rib and ribs #2 and #3 are in two pieces. They have been designed this way because of the 1/4" ply dihedral brace. When you glue these two piece ribs in place on the first wing panel use the 1/4" ply dihedral brace as a spacer to set them up. When you glue the ribs onto the second wing panel you'll glue the dihedral braces in place while gluing in the ribs.

TELEMASTER

Take a look at the plans to check out the wing tip detail shown. When you install the spars, let them hang over at the wing tip. Then cut them to size and to the proper angle when the wing tip piece is installed. Since the wing has a flat bottom, it is most easily built on top of the plans on a flat workbench. Cover the plans with some waxed paper and you're ready to go.

Pin down the bottom *1/2" x 3/8" MAIN SPAR*. ☆ Pin down the bottom *1/2" x 3/16" STRIP*, *1" x 1/2" LEADING EDGE*, and, *3/4" x 3/8" TRAILING EDGE* pieces. Remember, these parts should align with the root rib and hang over at the tip rib. Use a wing rib as a guide to locate the leading and trailing edge pieces as you pin them down on the plans to be sure you get them spaced for a snug fit to the ribs.

Glue the *RIBS* in place. Use a square to make sure the ribs are at 90° to the surface of your workbench. Remember to use the 1/4" ply center spar dihedral brace as a spacer when you install the two piece ribs. Wipe off excess glue from the areas relieved in the front and back rib pieces so you'll be able to slide the front and rear dihedral braces in place easily when you join the wing panels. Glue the 3/8" wide, *1/8" ply LEADING* and *TRAILING EDGE DIHEDRAL BRACES* and the 1" wide, *1/4" ply SPAR DIHEDRAL BRACE* in place on the second wing panel as you glue the two piece ribs in place.

Glue the top *1/2" x 3/8" MAIN SPAR* and the three *1/2" x 3/16" STRIPS* in place on the ribs and let the wing panels dry. ☆ Bevel the straight-edge of each *WING TIP PIECE* to 45° as shown on the plans. With the wing panels removed from the building board, use the wing tip piece as a guide and cut the spar and strips to the correct angle as shown on the plans. Glue the wing tip piece in place on each wing panel.

Glue the wing panels together by sliding the dihedral brace pieces already glued into one wing panel into the slots provided in the ribs on the other wing panel. We recommend using epoxy that sets up in 15 minutes or 1 hour for this job so you have enough time to align both wing panels accurately before the glue sets up on you. No glass and resin or other reinforcement is necessary to reinforce the wing center section. Check the dihedral as shown on the plans before the glue sets up.

Using the 1/8" piano wire and 1/8" brass tubing, cut and bend the right and left aileron torque rods. One arm of each torque rod hangs down from the bottom side of the wing to attach to the aileron servo clevis, and the other arm is inserted into a hole drilled into the aileron. Cut a 1" length of the brass tubing for the clevis end of each torque rod. Flatten 3/4" of an inch of each one in your vise.

Solder the *BRASS TORQUE ROD ENDS* onto the clevis arm of each torque rod using acid core solder. Tin the rods before you put the brass ends in place. Wash down the pieces with warm water when you're through to remove excess acid. Be sure to make one right and one left aileron torque rod assembly. After the brass pieces are soldered in place, drill the three holes for the clevis. The location of these holes should be exactly the same on both torque rods if the movement of the ailerons is to be the same.

Prepare a right and left CENTER SECTION TRAILING EDGE PIECE with a torque rod arm hanging down from the bottom side. Both torque rod arms should be located the distance from the center of the wing as shown on the plans. Put a little Vaseline at either end of each brass sleeve on the torque rods when they are glued in place to the trailing edge piece. This will prevent any epoxy from getting inside the sleeve and binding the torque rod.

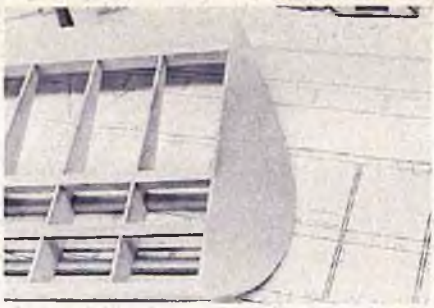
Glue the trailing edge piece — torque rod assemblies in place onto the wing. Use a straight-edge along the bottom side of the wing to assure they are properly aligned. Prepare a sanding block from 10" to 12" long. Tack glue the ailerons to the wing trailing edge. Sand the wing leading edge,

Jack Corcoran, owner of this model, gives some idea of the size of the behemoth.

One of the newer prototypes of the RCM Senior Telemaster built by Dick Gray.

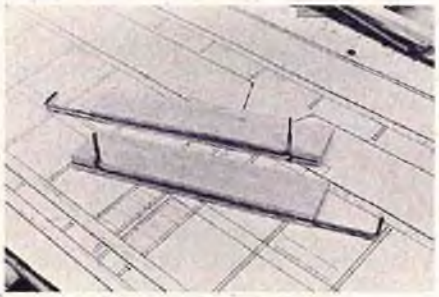
Framed up wing panel. Dihedral template used to get proper angle on root rib.

Wing tip detail – top view.

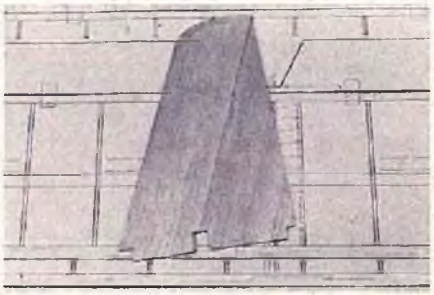


Wing tip detail – bottom view.

Plywood plate installed on bottom of left wing panel – for aileron servo mount.

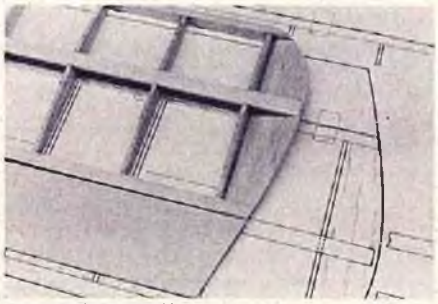


Wing center section trailing edge with torque rods installed.

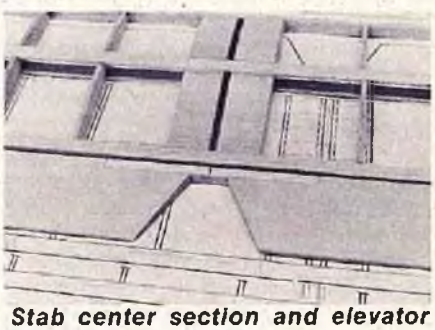


Fin with slots cut to mate with stab.

Center stab rib detail. Note lines on plans used to align the fin prior to installation of center ribs.

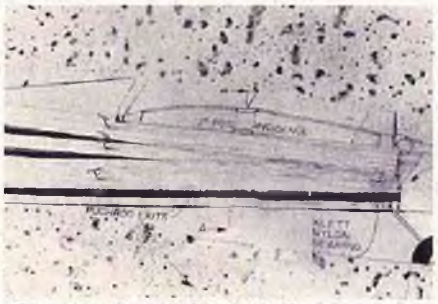


Stab tip detail.



Stab center section and elevator hardwood torque rod detail.

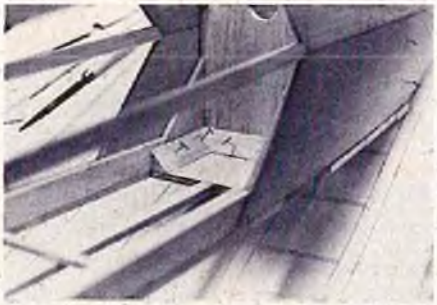
Setting up right fuse side. Spacers used under forward fuselage side pieces.



Rear fuselage side detail.

Bulkhead #1 detail. Pins used to hold bulkhead #1 triangle stock in place while the glue sets up.

Bulkhead #2 triangle stock detail.



Landing gear plate brace and triangle stock detail.

Forward pushrod support. Epoxy used on both sides of support to assure good glue joint.

Pushrod exit. Pushrods cross rear of back pushrod support.

Stab incidence block. Note glass and epoxy used around tail of fuselage to strengthen tail wheel.

Clamping engine mounting rails to fuselage side. Large clamp pulls fuselage sides together.

Fuselage nose detail. Only hatch mounting screw and engine bearer plate screws remain to be installed.

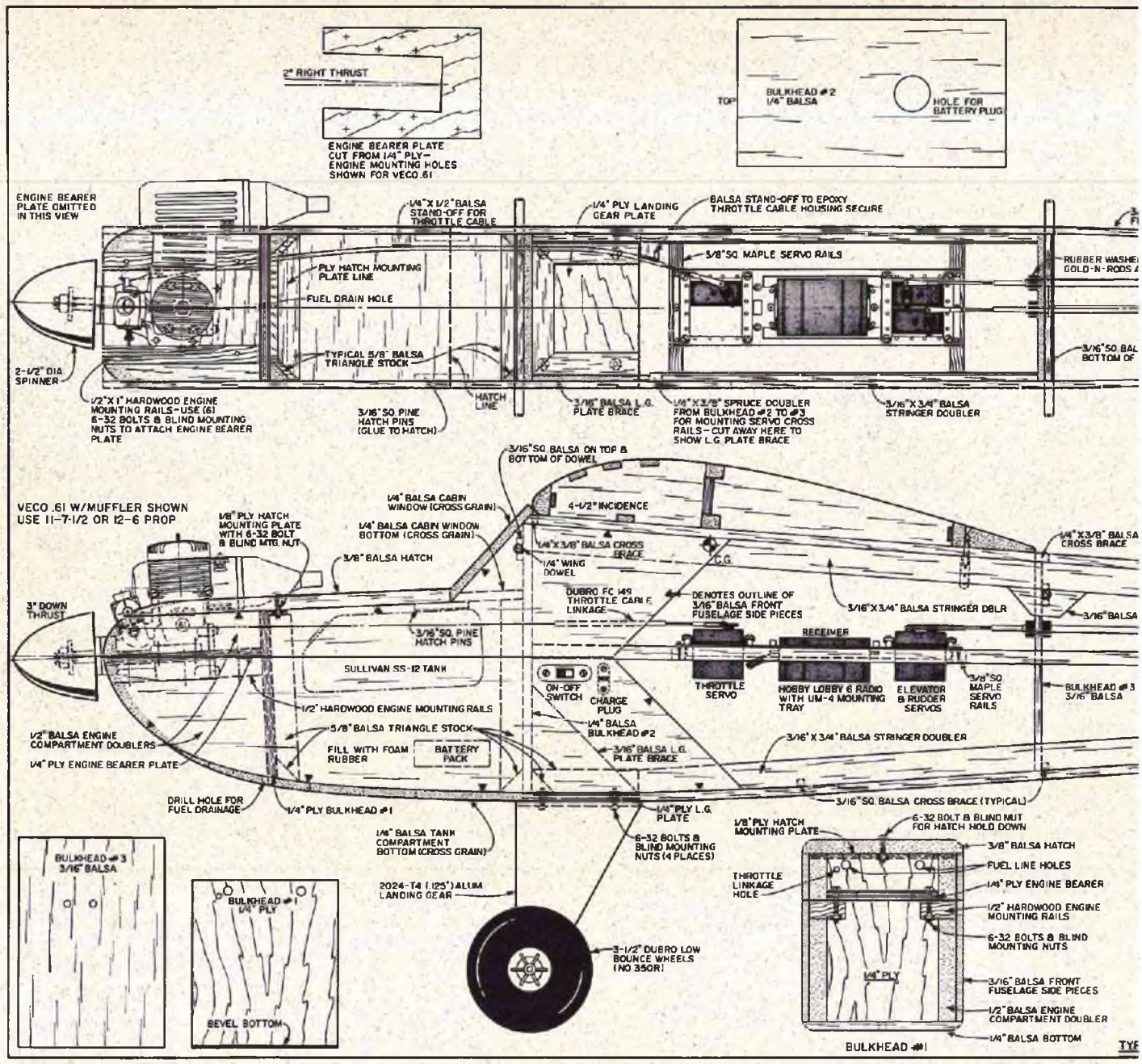
Hobby Lobby 6 servo tray and pushrod tube installation.

Balsa scrap after shaping wing L.E. and ailerons. There's enough to build another kit!

trailing edge, ailerons, and wing tips as necessary.

Break the tack-glued ailerons free from the wing and drill the hole in the leading edge of the *AILERONS* for the torque rod arms. Shape the aileron tips as shown on the plans. A groove should be cut into the leading edge of the ailerons for the torque rod to minimize the hinge gap. The leading edge of the ailerons should be shaped as shown on the wing side view. ☆ Cut the slots into the ailerons and wing trailing edge for the aileron hinges. We recommend using 5 hinges for each aileron. The outboard hinge should be located just inside of the tip rib to prevent the possibility of flutter. When the aileron is hinged, the torque rod should be epoxied both in the hole in the aileron and along the aileron leading edge. Epoxying the torque rod into the aileron hole is more insurance against aileron flutter. ☆ As shown on the plans, the aileron servo is mounted on its side to a Hobby Lobby AM-3 aileron servo mount—

Radio controlled miniature aircraft are playing an ever increasing role in the aerospace industry. At Bendix Aerospace, Systems Division, Mishawaka, Indiana, the Senior Telemaster is part of an experimental radar development program. Designated B.A.T. (Bendix Airborne Target), the aircraft carries 3¼ lbs. of instrumentation. The B.A.T. is an excellent air platform, providing specific low altitude, close-in flight patterns for the evaluation of radar tracking performance. The simulation of full scale aircraft performance by Senior Telemaster results in a substantial cost savings to Bendix. The unusual radar retor reflector antenna configuration, mounted on top of the wing, has little effect on the flight characteristics. Weighing in at 12 lbs, fully loaded (19.5 oz./sq. ft.) the B.A.T. is powered by an ST .71. A 14 oz. fuel tank allows air time up to 15 minutes. Built and flown by RCM's Jerry Smith, the B.A.T. will easily handle instrumentation loads up to 4 lbs.



or the equivalent for your radio. The aileron mount is screwed down to a 1/8" scrap 1½" x 2¼" ply plate glued to the bottom of the left wing panel as shown on the plans. The center ribs should be notched out for the ply plate so the surface of the plate is flush with the rib. The two scrap 1/4" balsa plate supports are installed with the grain running parallel to the ply plate. The aileron servo mount is screwed down to the plate after the wing is covered. The servo wheel is oriented directly over the center rib and aligned with it. ☆ With the servo temporarily mounted in place on the wing, hold the wing upside down and balance it by holding it at the center of the leading and trailing edge. Glue nails or other weights onto the wing tip rib of the light wing panel as necessary. ☆ If you are going to use MonoKote to cover the plane, you'll probably cover the wing and ailerons first, then install them. If you paint the plane, you may hinge the ailerons before or after they're painted, depending on how you prefer to work. The wing airframe is complete.

THE FIN and RUDDER

This is the simple part of the job. Glue together the three *1/4" balsa FIN SECTIONS* that make the *FIN*. Wipe off the excess glue while it's wet. It's easier to wipe if off now than sand it off later. Do not glue the dorsal fin in place yet.

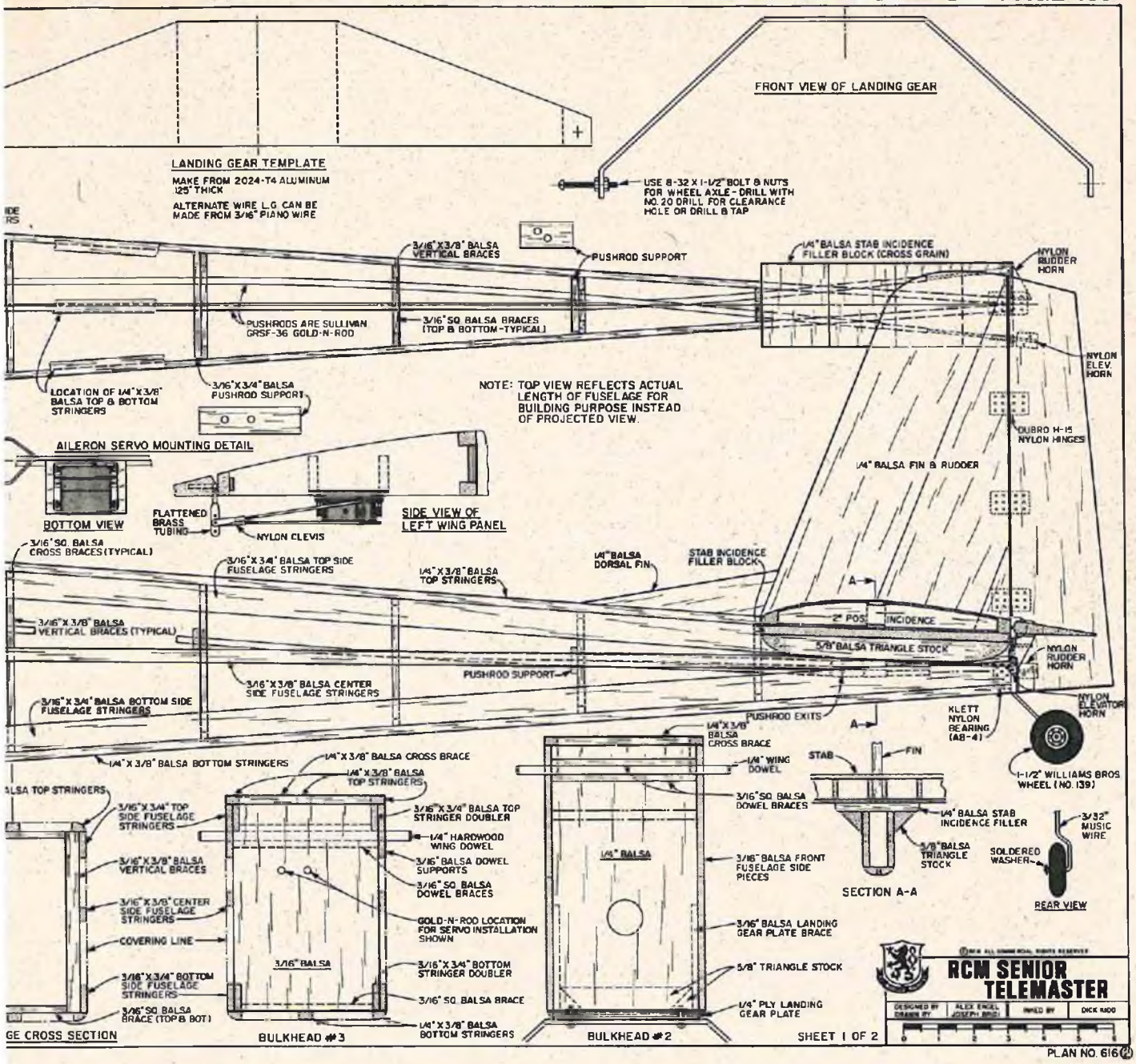
Cut the notch in the leading edge of the *RUDDER* (not the fin) for the elevator hardwood block. Notch out the bottom leading edge of the rudder 1/8" for the tail wheel strut. Shape the rudder leading edge the same as the elevator (not the stab) leading edge as shown on the plans side view.

THE STAB and ELEVATOR

The stab is built-up on top of the plans as were the wing panels. Note that the lines for the fin slot (the area between the two center ribs) extend beyond the leading and trailing edge of the stab on the plans. That way you'll be able to find the lines to align the center ribs when the stab bottom sheeting is in place. Cover the plans with waxed paper. Pin down the *1/2" x 1/8" BOTTOM SPAR*. Set up the spar so it hangs over on both ends.

Using one of the larger stab ribs as a guide, pin down the *1/2" x 1/2" LEADING EDGE* and the *1/2" x 3/8" TRAILING EDGE*. ☆ Cut and glue the bottom *1/16" balsa FRONT* and *REAR CENTER SECTION PIECES* in place. The forward piece is glued between the leading edge and bottom spar. The rear piece is glued between the bottom spar and the trailing edge. Only the top center section sheeting to be installed later is slotted for the rudder. ☆ Glue the 5 larger size *RIBS* in place on each side of the stab working from the tip rib toward the center.

FULL SIZE PLANS AVAILABLE — SEE PAGE 158



Since the fin fits down into the stab, it is used as a spacer when installing the center ribs. First, however, the fin will have to be relieved to fit into the stab between the leading and trailing edge. A slot will also have to be cut into the fin for the stab spar. Refer to the stab side view shown on the plans. Using the fin as a spacer, glue the two *CENTER RIBS* in place. Use a square to assure the fin is at 90° to the workbench. The ribs should touch the sides of the fin. Pin the ribs in place, then remove the fin while the glue sets up.

Add the other two *CENTER RIBS* at the outboard ends of the balsa sheeting. ☆ Glue the *TOP SPAR* in place. ☆ Put the fin back in place temporarily and glue the *1/16" balsa top FRONT* and *REAR CENTER SECTION PIECES* in place so they butt up to the sides of the fin. Remove the fin while the adhesive sets up. ☆ Cut the *3/8" x 2½" balsa ELEVATOR HALVES* to shape. Relieve the halves as necessary to get a perfect fit of the *1/4" x 3/8" HARDWOOD BLOCK* that connects both halves. This block may be cut from the 1/4" ply sheet. With a piece of waxed paper between the elevator and the stab trailing edge, glue the hardwood block in place with the elevator halves pushed up to the stab trailing edge. Pin the halves in place while the glue sets up.

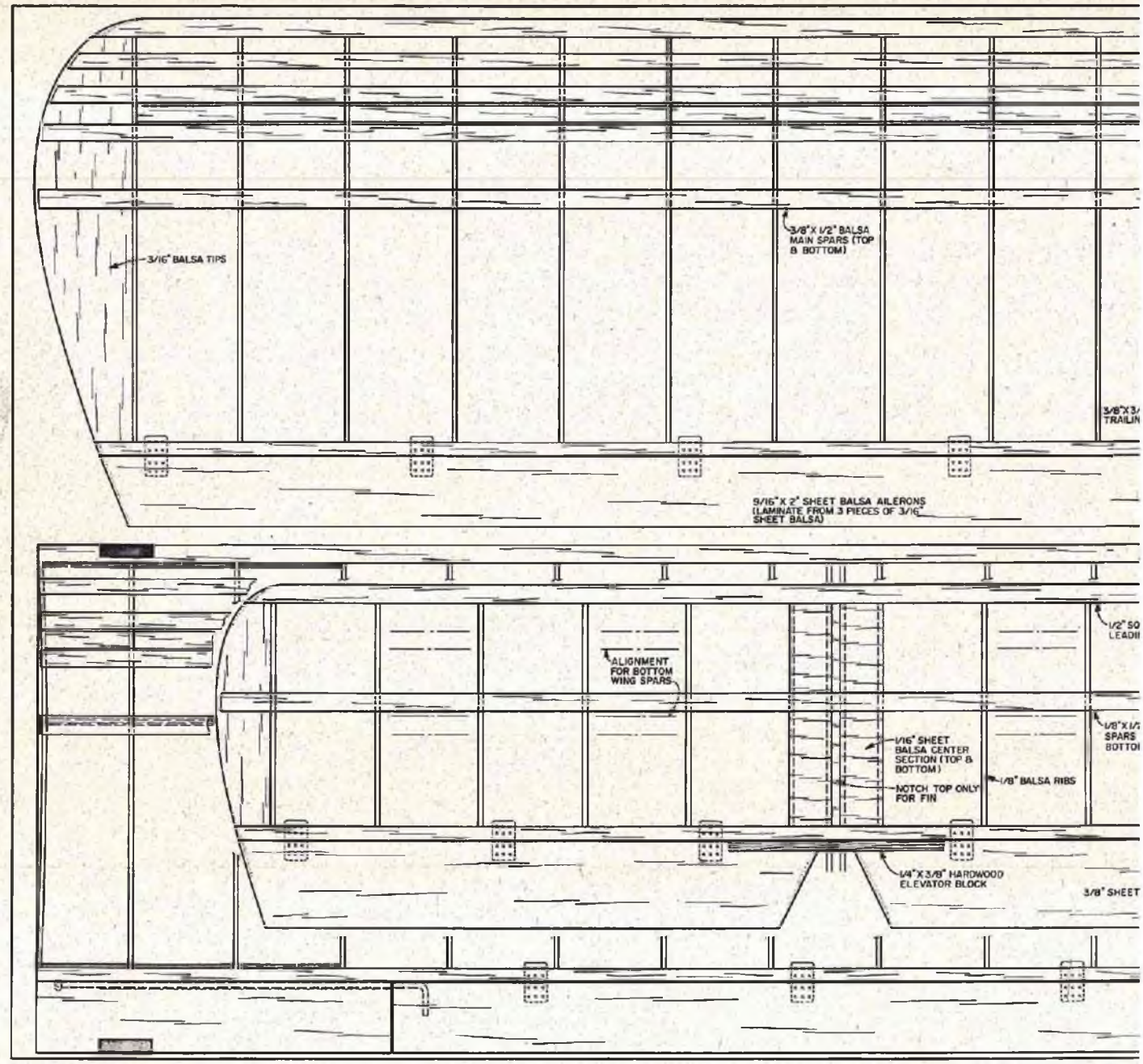
When the glue has dried, remove the elevator from the building board and shape the leading edge as shown on the plans side view. ☆ Remove the stab from the building board and install the *1/8" balsa STAB TIPS*, working as you did to install the wing tips earlier. ☆ Support the stab from the center at the leading and trailing edge to do a tip/tip balance. Add weight to the light stab tip rib as necessary to balance the stab. ☆ Sand the stab leading edge, tips, and spars as necessary. The stab airframe is now complete.

THE FUSELAGE

As the old free-flighters among us have known for years, when assembling a plane with built-up fuselage sides, it's critical that both sides be built exactly the same. One technique they've used is to build up one fuselage side directly on top of the other fuselage side. That's the technique we'll use with this big one too.

Locate the *TOP and BOTTOM 3/16" sheet balsa FRONT FUSELAGE SIDES*. These pieces run from the nose of the plane to behind bulkhead #2. Working on a flat surface, butt glue the top and bottom pieces of the front fuse sides together. Wipe off excess glue. ☆ Holding the two front fuselage side pieces up on edge as they'll be installed in the fuselage, mark the inside of the right piece "right inside" and the inside of the left piece "left inside."

Next the location of bulkheads #1 and



#2 and the engine mounting rails will have to be drawn on the inside of the two fuselage side pieces. To do so, use a ruler and extend the bulkhead and engine bearer lines drawn on the fuselage plans side view. Lay the left and right fuselage front side pieces down on top of each other in their proper location on the plans and pin them in place. Using the extended lines you drew on the plans earlier as a reference, mark the edge of both pieces at the front of the top and bottom engine mounting rails and at the top and bottom and back and front lines of both bulkheads #1 and #2.

Next you'll use the marks you made on the edge of both front fuselage side pieces to mark the location of bulkheads #1 and #2. The marks should be drawn on the inside of the pieces.

After you have the location of bulkheads #1 and #2 drawn in, get out the plans and measure the location of the top and bottom lines of the motor mount rails on bulkhead #1. Measure and mark the locations on both side pieces. Then use the marks you made on the front of the fuselage side pieces to draw in lines you'll use to locate the engine mounting rails.

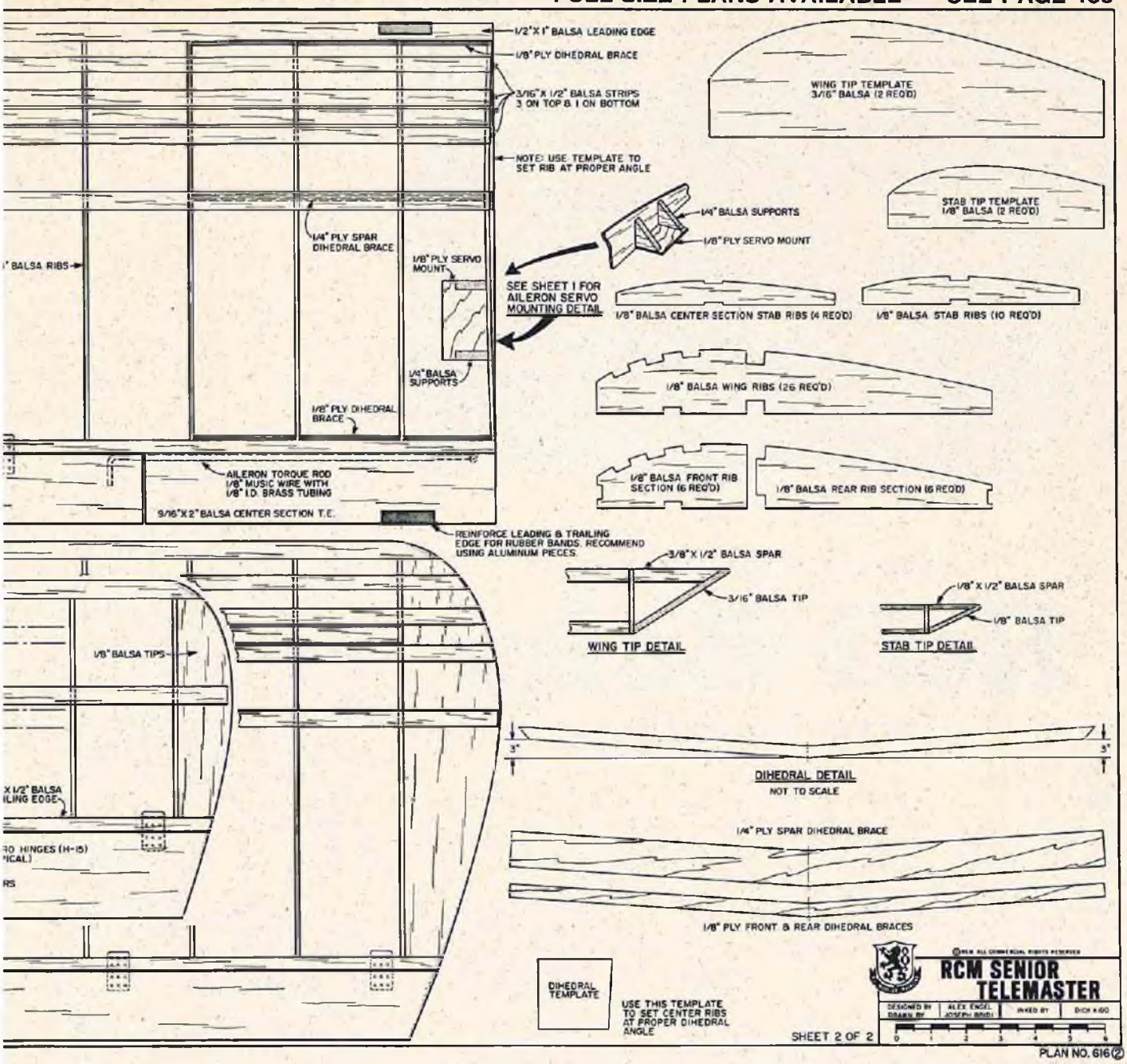
Now to begin assembling the fuselage sides. Note that when you begin building the right fuselage side after the left has been completed, the building sequence will be a bit different. Follow the sequence carefully or you might end up with two left fuselage sides! ☆ Cut the two *3/16" x 3/4" TOP FUSELAGE SIDE STRINGERS* to length. The back of these stringers are cut-out at an angle for the stab incidence filler block. Mark one stringer, stack both pieces — one for the right and one for the left fuselage side — and cut them out at the same time. To mark the angle of the cut-out, use the fuselage side view on the plans to mark the forward end of the notch.

Measure 1/4" down at this mark, then draw a straight line from that point to the top rear corner and you are ready to make the cut. Stack the two pieces and do it.

Cut the *3/16" x 3/8" VERTICAL BRACES* for both fuselage sides. With waxed paper over the plans, pin the 5 rear fuselage side vertical braces in place on the plans.

Pin the *LEFT FUSELAGE SIDE FRONT PIECE* down on the plans. The side marked "left inside" should be down so the marks for bulkhead don't show. And, this piece should be blocked up with some 3/8" balsa scrap under it.

Cut and glue the *3/16" x 3/4" TOP and BOTTOM SIDE STRINGERS* and the *3/16" x 3/8" CENTER FUSELAGE SIDE STRINGER* in place. Glue to each of the vertical braces and butt glue to the fuselage side front piece. ☆ Let the fuselage side dry.



Remove the pins from the front half of the fuselage side and put some waxed paper over the top of it and add a couple of pins to hold it in place. Then remove the pins from the back half, lay on the waxed paper and replace a few pins. Now you're ready to build the right fuselage side. ☆ Pin down the *RIGHT FUSELAGE SIDE FRONT PIECE* in place on top of the left fuselage side front piece. No blocks are used. The side with the bulkhead alignment lines should be on the side that is "up."

Cut the 3/16" x 3/4" TOP and BOTTOM FUSELAGE SIDE STRINGERS and the 3/16" x 3/8" CENTER FUSELAGE SIDE STRINGER and pin them in place while butt gluing them to the fuselage side front piece. ☆ Glue the five *3/16" x 3/8" REAR VERTICAL BRACES* you cut earlier in place onto the fuselage side stringers and let the fuselage side dry. ☆ Remove the fuselage sides from the plans.

Glue the triangular shaped *3/16" balsa LANDING GEAR PLATE BRACE* in place on the inside of both fuselage sides. The forward end of the brace should fit up to the line you drew earlier to locate bulkhead #2. ☆

Cut and install the *TOP and BOTTOM 3/16" x 3/4" balsa STRINGER DOUBLERS* on the inside of the fuselage sides in the servo compartment. The top stringer doubler runs from right behind bulkhead #2 to the front of bulkhead #3. The bottom stringer doubler is cut at an angle and butt glued to the back of the landing gear plate brace and runs to the front of bulkhead #3. Cut the angles on the ends accurately as shown on the plans since they must mate squarely to the bulkheads.

Prepare bulkhead #1 by drilling the holes for the fuel feed and vent lines and the throttle linkage. Prepare bulkhead #2 by drilling the hole for the throttle linkage. ☆ Cut the top and bottom sets of the *3/16" x 3/16" REAR CROSS BRACES.* Also cut the 3/16" x 3/16" REAR CROSS BRACES that are to be installed on the bottom of the fuselage just behind bulkhead #3 and 7½" behind bulkhead #2.

Cover the top view of the fuselage plans with waxed paper. Pin one set of the five *REAR CROSS BRACES* in place on the plans. Put glue on the ends of the pinned down cross braces and pin the fuselage sides upright in place on the plans, upside down. The vertical braces on the fuselage sides should mate squarely with the cross braces pinned onto the plans. If they don't, move the cross braces accordingly. Use a square to assure that the fuselage sides are at 90° to your building board. Add the 1/4" balsa *BULKHEAD #2 and 3/16" balsa #3* so they butt up to the stringer doublers in the

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The Heli-Baby – a giant step forward in R/C helicopters.

RCM BUILDS THE SCHLUTER

Heli-Baby

By Bernie Murphy (N1F)

Have you been putting off trying an R/C helicopter because of the four and five hundred dollar price tags? Or, perhaps, has the mechanical complexity of these machines held you back? Then, again, the repeated warnings that only a "pro" can fly them, coupled with the promise of instant disaster should a neophite attempt it, should be enough to deter anyone.

Until recently, there has been some merit to the above reasoning. The new MRC-Schluter Heli-Baby, however, has made a sizeable and noteworthy attack on their validity. This new helicopter kit is list priced at $249.95 complete (excluding only a .40 engine, 4 channel radio and GI Joe pilot). The actual mechanical assembly is simple enough for even a novice builder. As for that "instant disaster" phase, the Heli-Baby has a lot of "designed-in salvation." First, a very low profile, a wide stance pair of skids, and a low center of gravity, practically eliminates the danger of tipping over during those first anxious tests. Secondly, the component design of the rotor head, including the fixed pitch teetering head, stabilizer paddles, and rotor blades, has achieved an unusually smooth and stable rotor disc. This, in turn, produces an easily handled helicopter. In addition, the flying weight of the Heli-Baby is only 6½ pounds, rather than the 12-15 pounds of the larger machines — consider the effects of this in the case of a mishap! Further, its small size, (48" maximum overall length - 39" with rotor turned) makes the Heli-Baby easily transportable, even in a compact car.

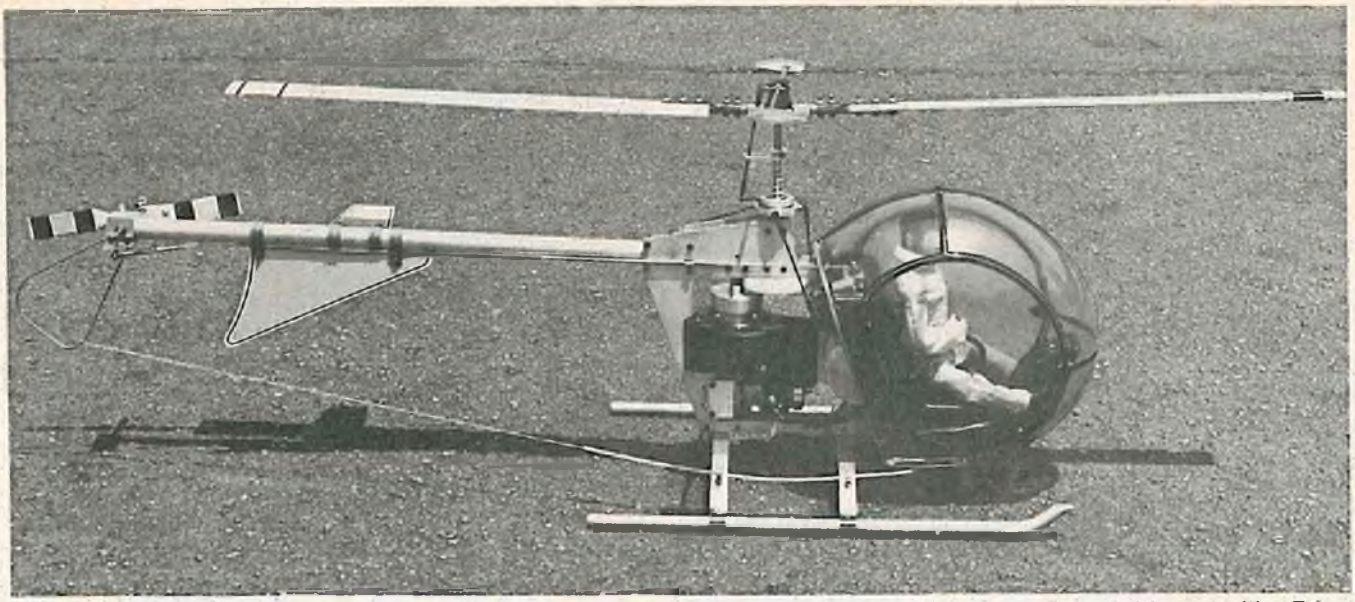
Bernard Maeterlinck, N1BL, NRCHA Director for Europe, flying the Heli-Baby.

If you get the impression that we are excited about the Heli-Baby, you are quite correct. The Heli-Baby was designed to be a rugged helicopter kit that is as simple and trouble-free as possible, both in assembly and in operation. A tough goal — well met! Both Don Dewey and I together have built no less than four of these machines, each taking only a few evenings or a weekend, with each one assembling and performing "as advertised", with no modifications.

An especially nice building feature of this kit is the packaging, all parts are packaged in numbered plastic bags, with the numbers corresponding to the assembly steps, thus greatly reducing confusion and chance of error. Many of the parts have been loosely pre-assembled in the bags so that you can see how they fit before actual installation.

The assembly instructions in the Heli-Baby kit include a full-size side view drawing, thirty-one photos, and a written text. This combination is generally adequate, although, due to the writers familiarity with the subject, combined with the translation from German into English, the written text does leave a few unanswered questions, which we shall try to clarify with our own comments and photos.

Before taking a look at the actual assembly procedure, a few tips on engines and mufflers. The Heli-Baby was designed to operate with most any good .40 cu. in. engine having a 1/4" shaft. Specifically, a Webra .40 was used in the original Schluter machines, hence, it will be a drop-in fit, and would be an excellent choice. If a muffler is to be used, a special short Webra .40 muffler is available from MRC, or if you have a lathe available, a standard muffler can be modified — see photos. On our Heli-Baby kits, we have used both Webra and O.S. .40's. The O.S. .40 will require a very simple modification. The engine drive washer is just a few thousandths too large to fit into the fan/clutch assembly. This drive washer is fitted to the engine crankshaft via a tapered collar, and may be removed by pulling straight forward. It is unlikely that you will have a small gear puller handy so, trot down to the local gas station and ask if you can borrow their battery terminal puller for a minute, it'll work just fine. Mount the drive washer on a 1/4" bolt and lock in place with a nut, chuck up in your pistol drill and have at it with a file. Once turned down to size, reinstall on the engine and check the fit of the fan. You will probably find that the



One of two Heli-Baby's built by Don Dewey. This one uses an O.S. .40, RS radio. Blades covered with white Solarfilm. Trim on blades and fins with DJ's trim sheets and tape. Trim on bubble, plywood back and floor, and seat and console sprayed with K & B Superpoxy.

fan comes back too far and interferes with the carburetor. If this is the case, slip a 1/16" thick, 1/4" I.D. flat washer between the fan and the engine. This spacer can be epoxied inside the fan recess with Stabilit Express or other good epoxy intended for bonding metal to metal. It will also be necessary to loosen the screw holding the throttle arm, and rotate the arm 90° clockwise, since the engine will be pointing up, while the control rod remains horizontal. On the Webra, a small adapter plate accomplishes this change. In the case of the O.S. .40, a stock O.S. muffler works fine. You will note that in either case, the muffler exhaust is very close to the ground. This causes no trouble, and actually keeps the chopper unusually free of exhaust residue.

stop nuts are used.

Bag #2 contains the parts for the skids which are added next. Note here that the strap spacing is slightly different from that shown on the plans. Locate the rear strap per the plans, then position the front strap to match the hole spacing in the frame. Again Loctite all screws.

The third bag is for assembly of the motor unit. Begin by removing the clutch from the fan — don't lose the loose washer inside. Slide the fan onto the engine shaft followed by the small washer and original "prop" nut. Tighten **securely** using the socket wrench supplied. Reinstall the clutch using the screws provided and Loctite. Before proceeding, lubricate all bearings. The clutch bell with gear and support block is installed into the top of the frame, and the engine with clutch installed is mounted on the engine blocks. Make certain you install the small washer between the clutch and bell housing. By lightly tightening the screws, the two assemblies can be shifted around until they are aligned properly. Note that the engine should be raised as high as possible so that the clutch is into the clutch bell as far as possible. When properly aligned, the clutch bell should spin freely, without dragging on the clutch. A little extra time on this alignment to achieve the optimum will result in a very smooth operating clutch. The tail drive pully is installed from the top and tightened via the hole provided in the frame, the Allen wrench is also provided.

The main shaft, swashplate, bearing blocks, and drive gear are contained in bag

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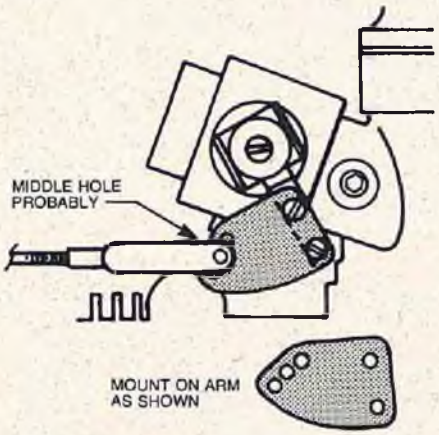
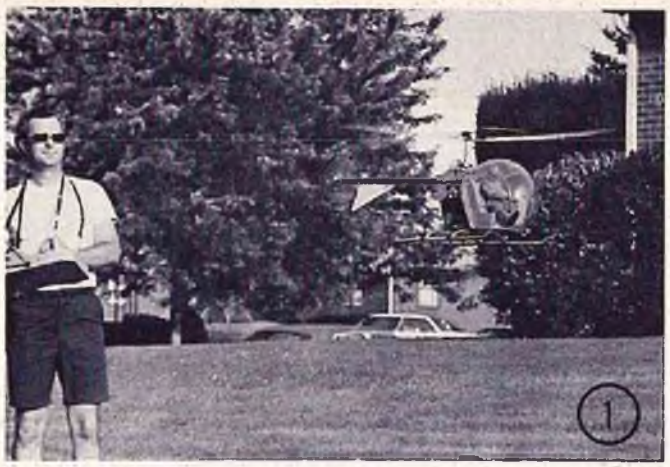
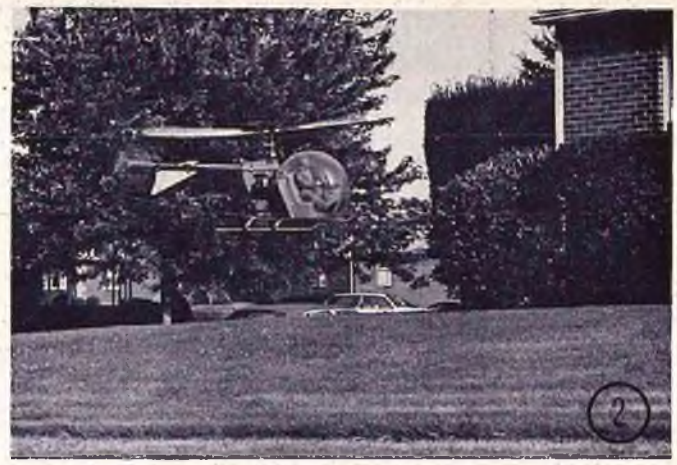
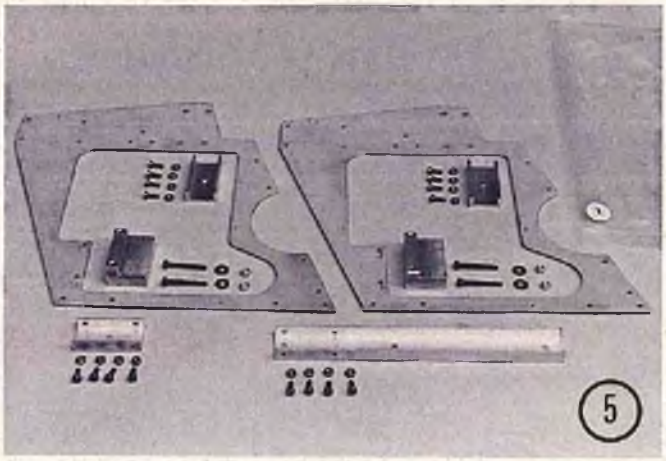


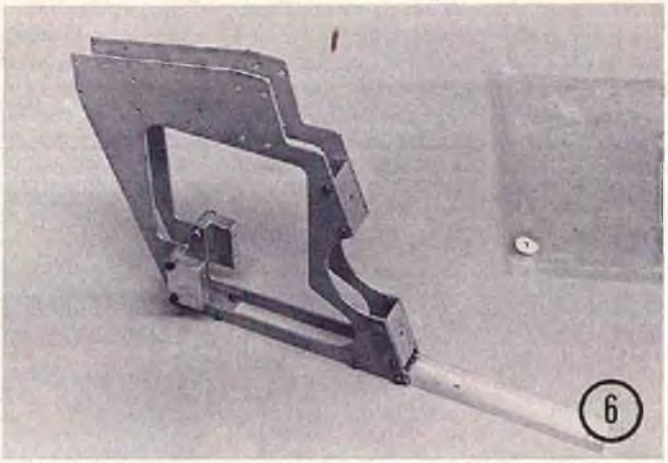
The building of the Heli-Baby begins by assembling the basic frame, using the two aluminum frame plates, the channels engine blocks, and hardware in bag #1. We would suggest that the holes in the frame sides be checked for burrs, and if any exist, they should be removed before assembly. All hardware used to assemble the sides should be secured with a drop of Loctite "C" (blue), or equivalent, unless metric elastic

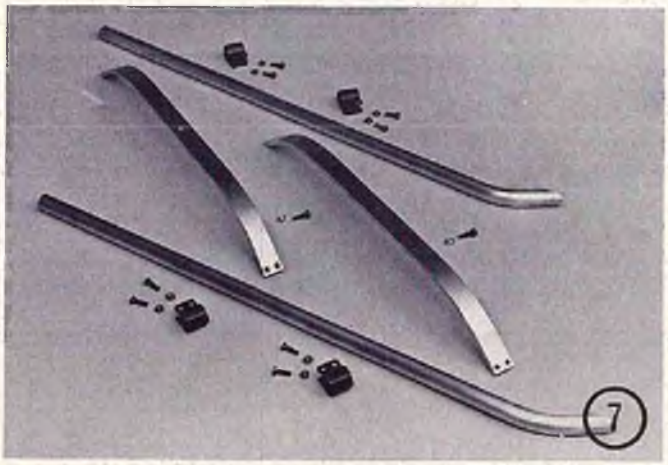
A few of the components used in the four Heli-Baby's built by Bernie Murphy and Don Dewey.



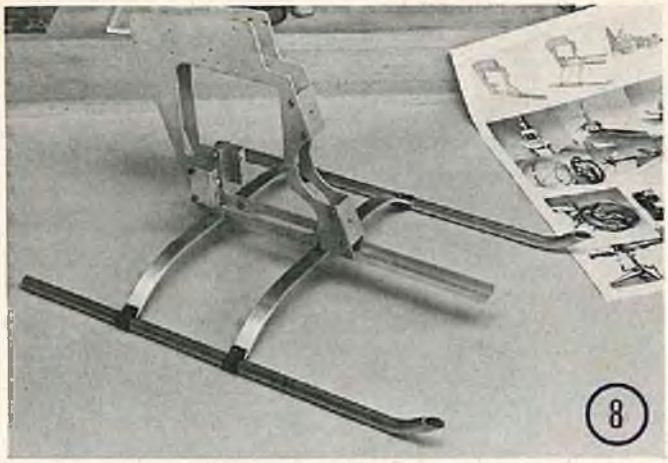


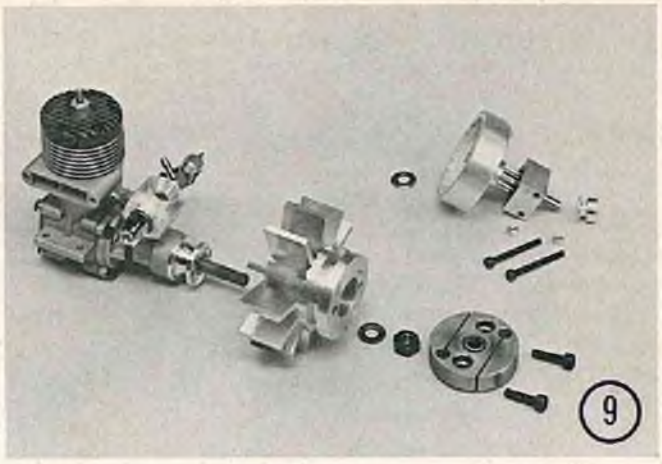


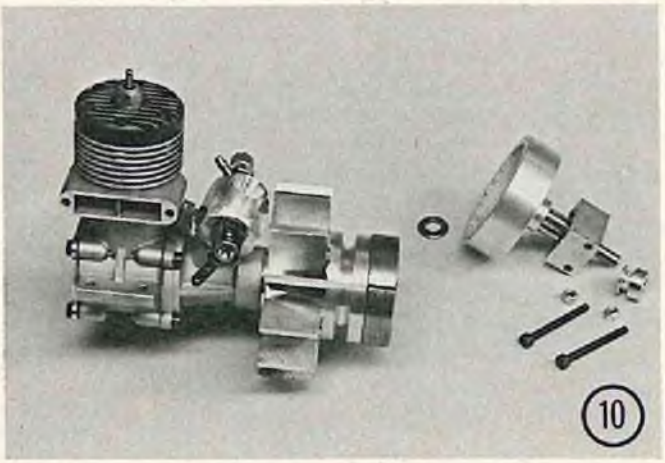


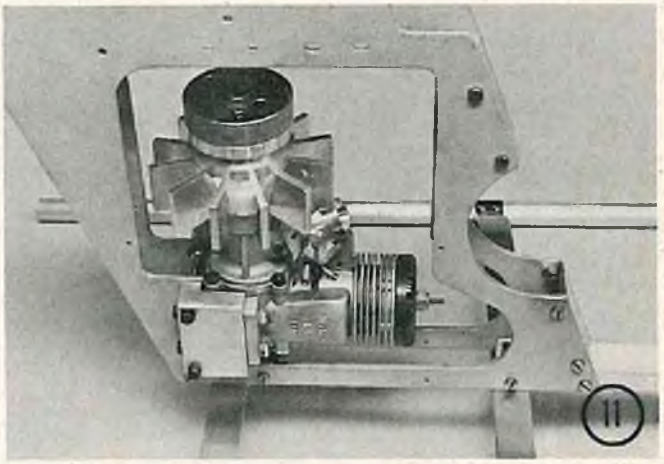


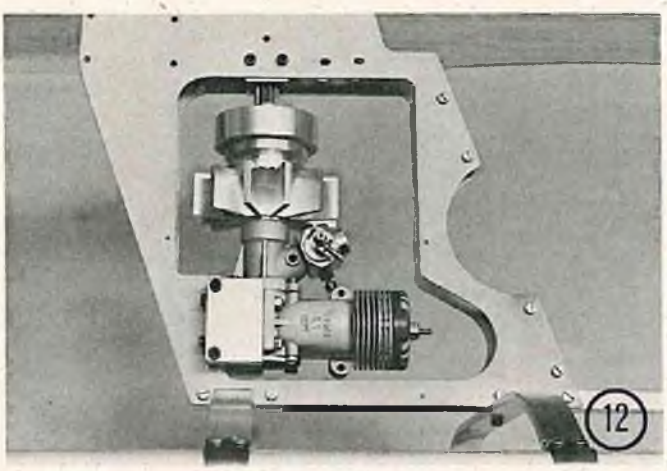
(1) NRCHA Regional Director, Bernie Murphy, better known as 'Old Knobby Knees' takes to the air. In photos (2) through (4) Bernie plays 'spy in the sky' with a neighbor's window. Wonder who she is? (5) Side frames with parts from bag #1. (6) Assembled body frame completes the first step. (7) Skid components make up the contents of bag #2.

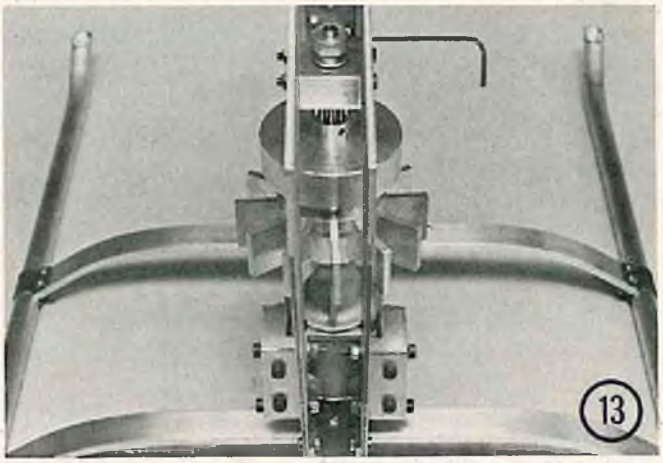


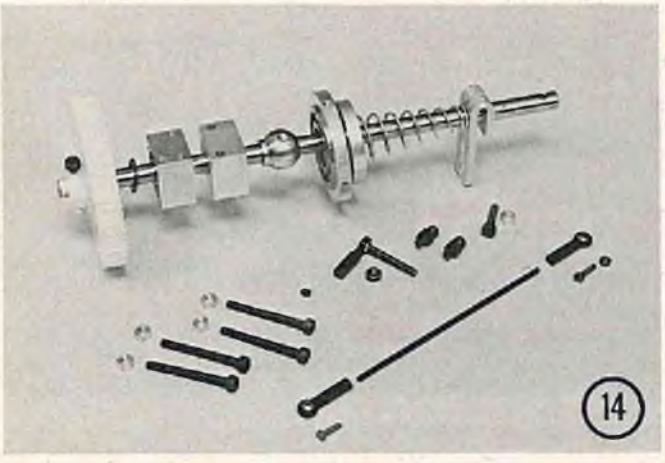




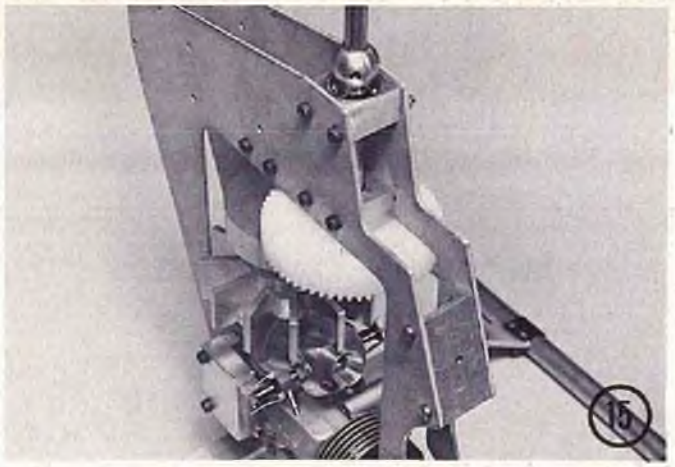


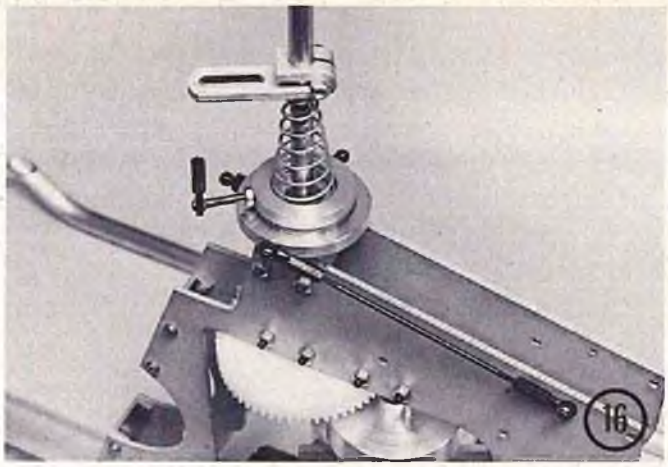


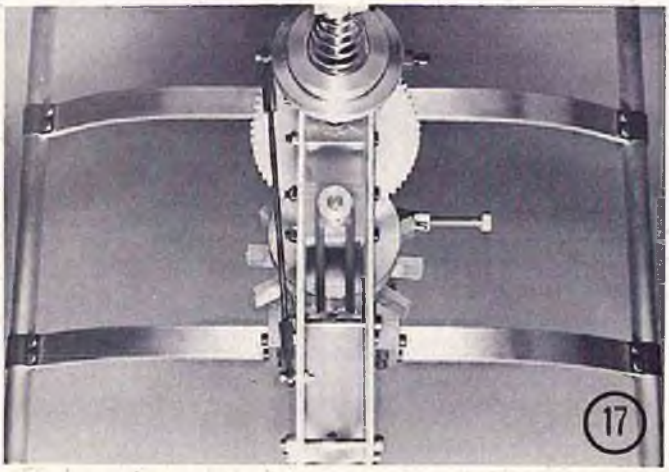


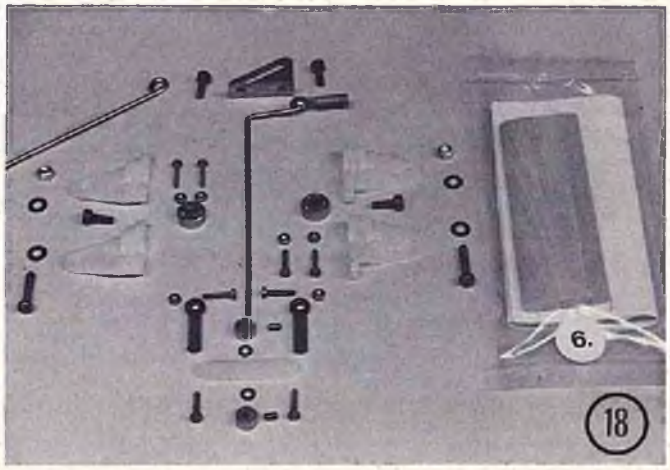


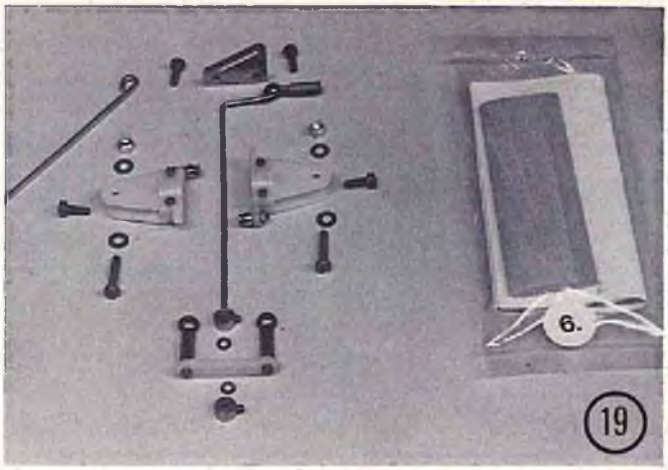
(8) Assembly and installation of skids onto the frame is covered in step 2. (9) Bag 3 contains the drive train, which mounts onto your engine in the order shown. (10) Fan/flywheel and clutch installed on our Webra .40 RC. Note that the engine drive washer must seat inside the fan, with the fan just clearing the carburetor. (11) Assembled drive unit fit loosely into main frame. (12) Clutch bell with gear and bearing block fitted to frame, and aligned with engine for free running. Note that there is a small washer inside between the clutch and the bell housing. (13) After the engine and clutch have been secured, the tail rotor drive pulley is secured to the clutch shaft, using hole provided in frame for wrench access, completing step 3. (14) Step 4 will assemble the main shaft and swash plate packed in bag 4. (These parts come loosely assembled as shown.)

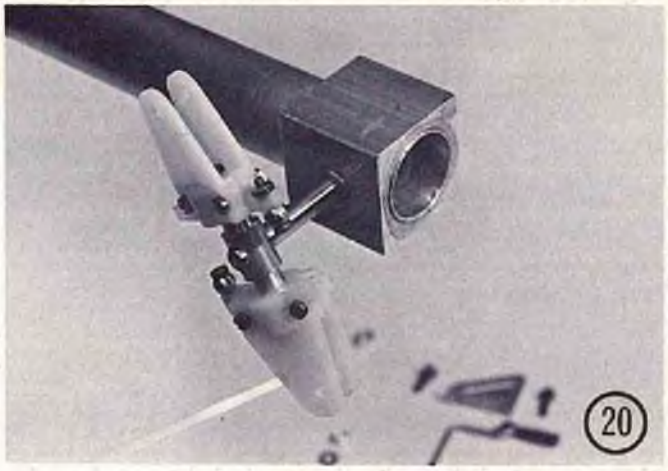


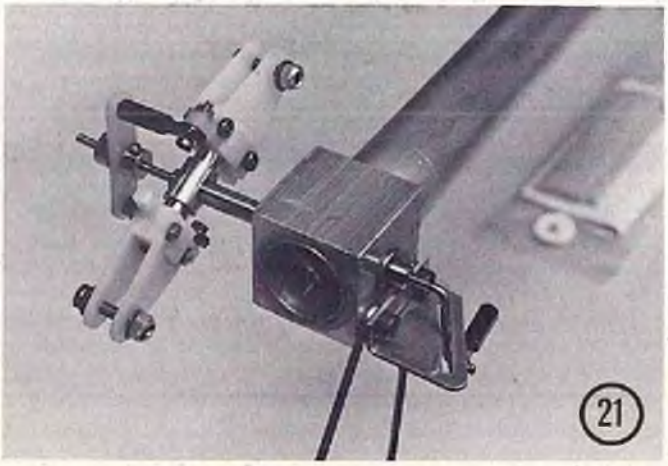




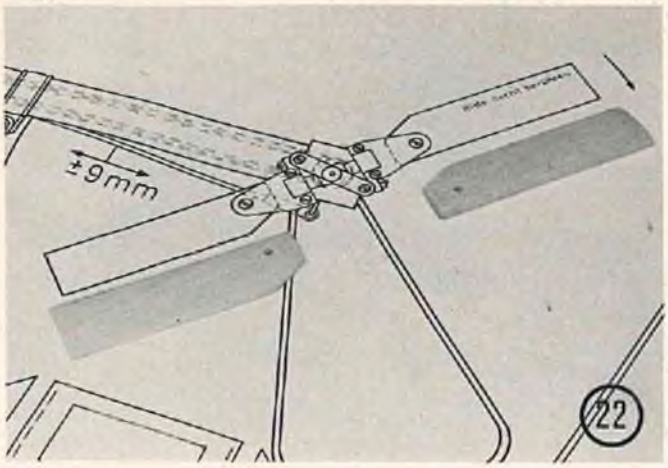








(15) The main shaft with its drive gear and swashplate ball installed in frame and gear mesh adjusted. (16) Completed main shaft with swashplate and follower in place. Note link anchored to body frame to prevent rotation of the swashplate. (17) Bag 5 contains the tail boom with tail rotor drive and belt installed. In step 5, these are bolted to the frame as shown, and the drive belt is placed on its drive pulley. (18) In step 6, the tail rotor is assembled. All of the parts used are shown. They have been placed so as to help identify their use. (19) A partially assembled rotor. Note that ball links have been separated, and the balls mounted on the blade holders. (20) Blade holders installed. Tail skid bent to shape, ready to install. (21) Completed tail rotor assembly.



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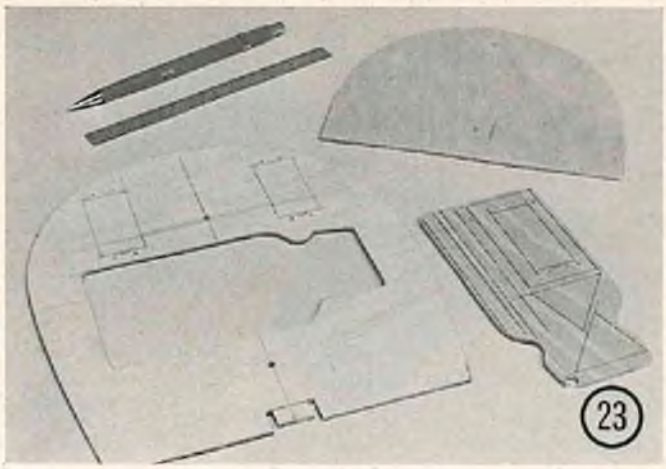

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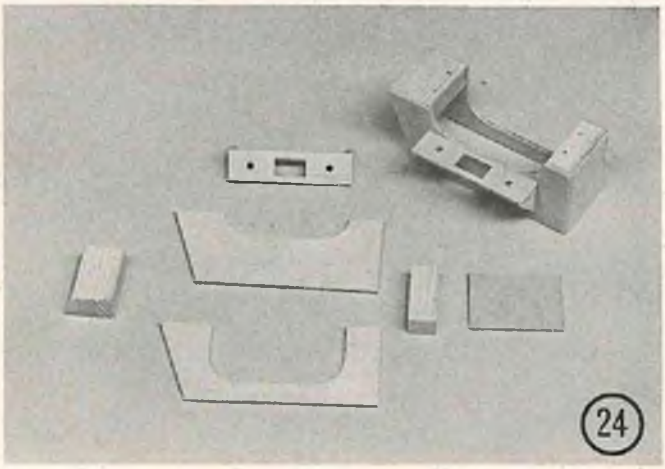

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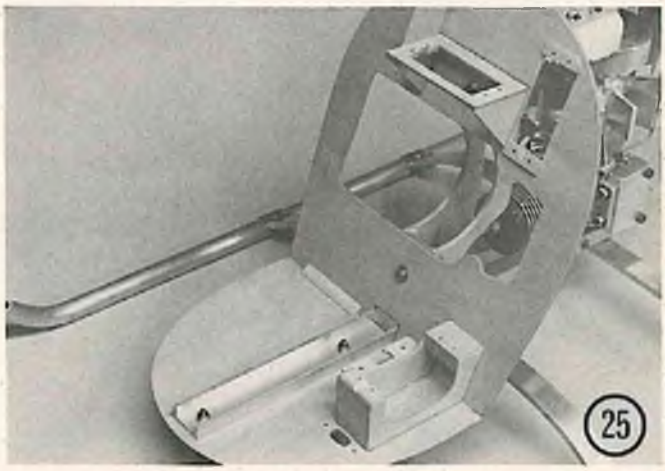

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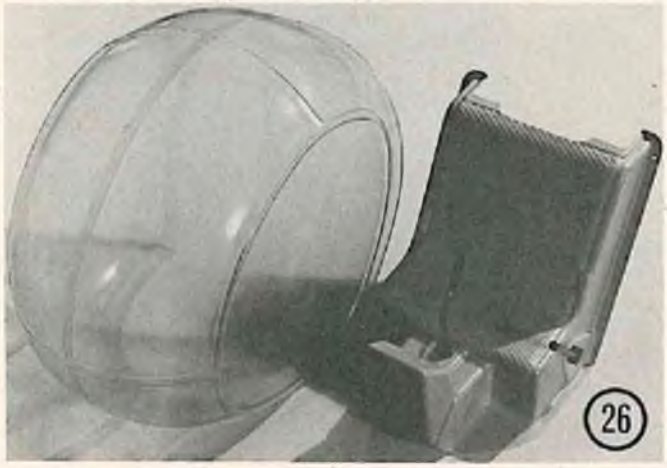

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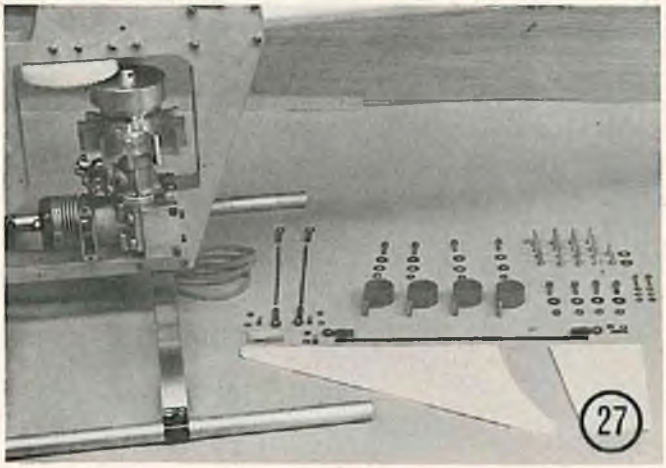

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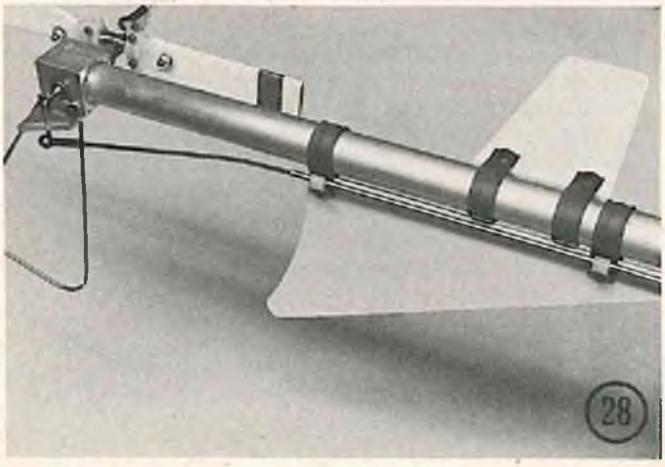

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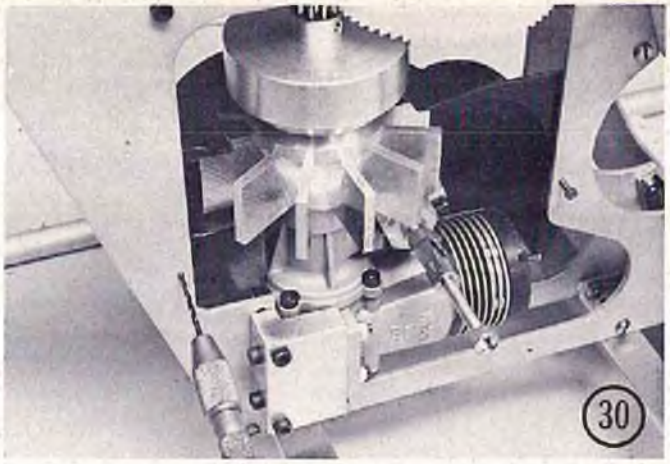
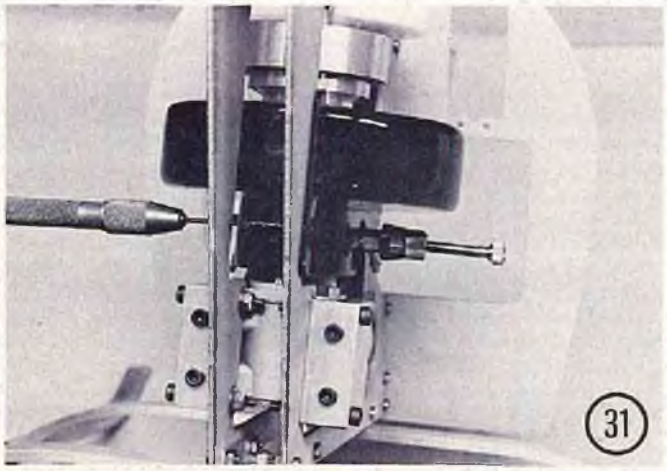
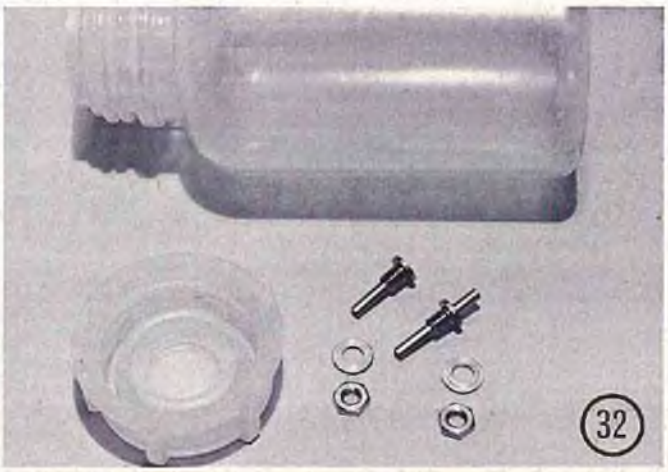
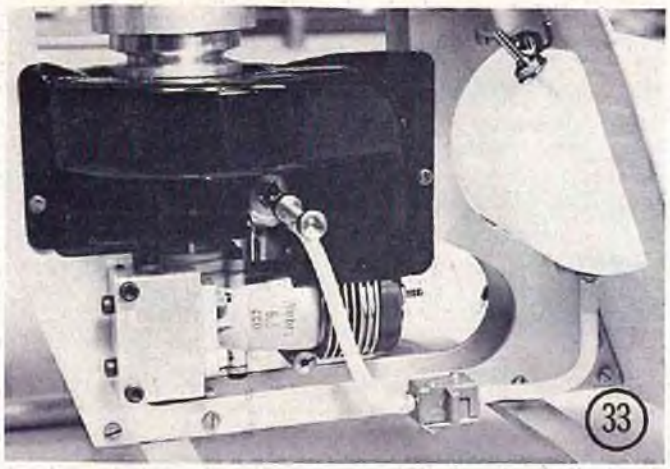
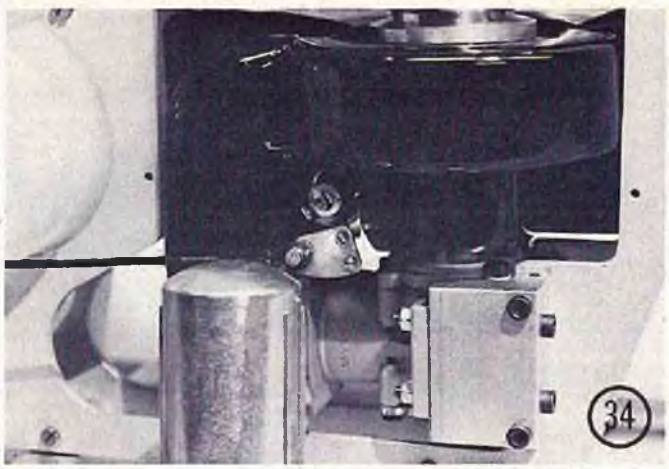
(22) Tail rotor blades must be trimmed and drilled before covering. (23) Cabin floor and rear wall. Note servo tray laid out on scrap from tank cutout. (24) A tray to support the throttle servo and switch must be fabricated. Ours is shown here in completed as well as component form. (25) Cabin floor and wall mounted to the frame. Note the opening cut into the switch bracket to allow easier mounting. (26) Vacuum formed ABS seat and polyvinyl canopy. Zap works great for cementing canopy. Control sticks fabricated of styrene rod and heat shrink tubing. (27) Bag 8 contains the parts for adding the horizontal and vertical stabilizers. It also contains all pushrods, associated hardware and servo mounting screws. (28) Completed tail boom – note modified Sig nylon landing gear clips used to hold tail rotor control tube.

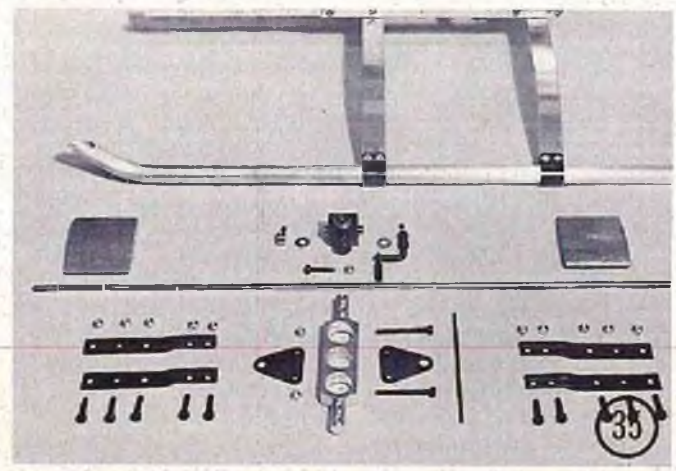




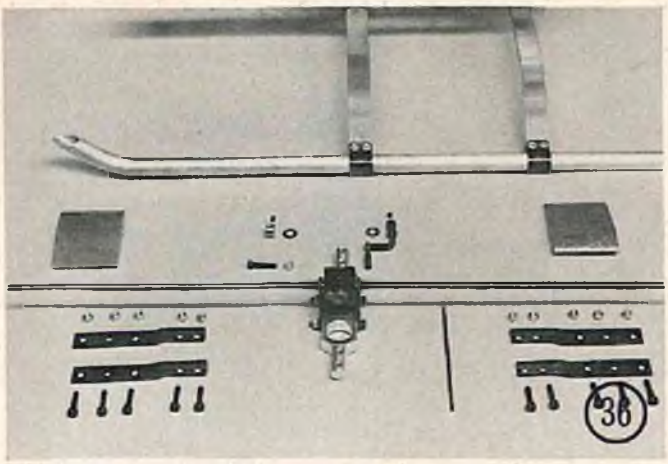


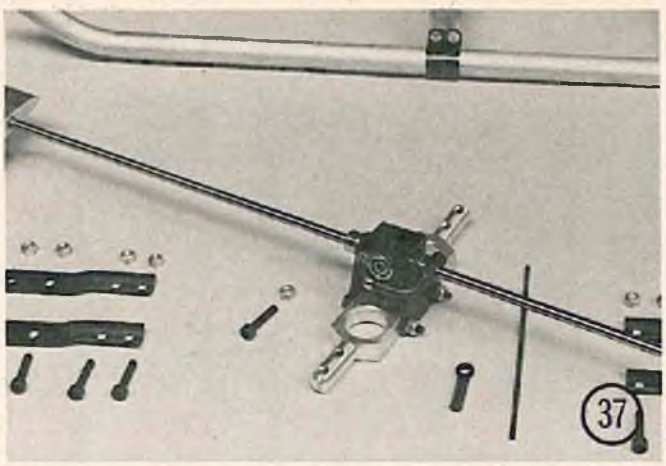


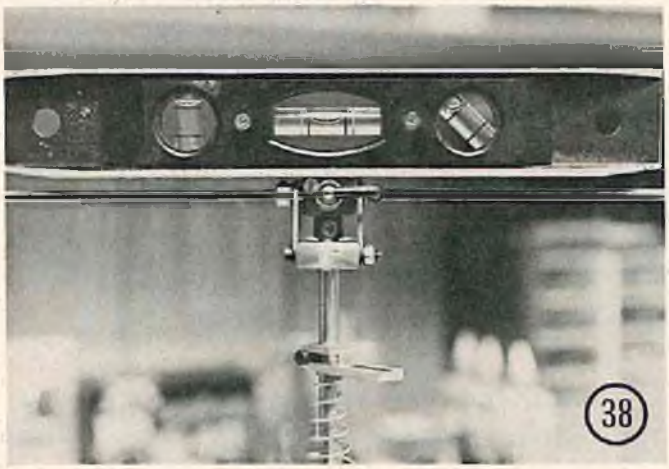


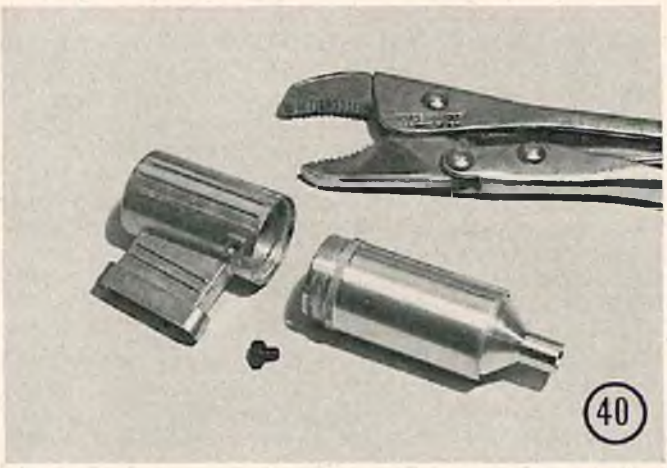


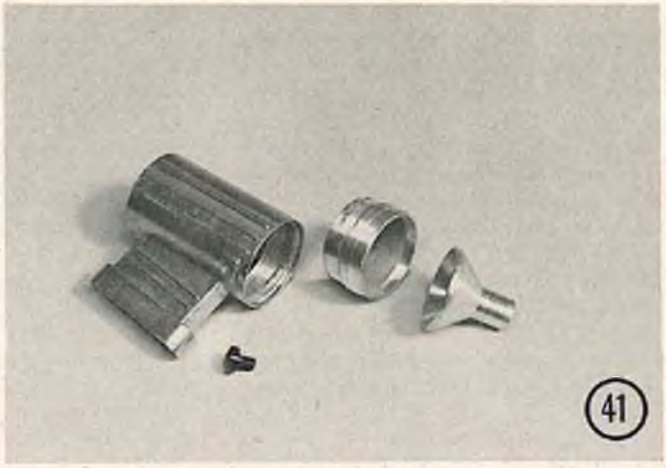
(29) Cooling duct is vacuum formed, and must be cut from its parent sheet. These shots of the trimmed parts should be helpful in visualizing where to trim. (30) Left cooling duct half is bowed or snapped into place. Holes in the frame are used to locate holes in duct. (31) With the right shell held in place, it's a simple matter to drill back thru from the other side, assuring alignment. (32) Fuel tank with its bolt in tubes. Note that the inside tube has been removed for use as pick-up – we later removed the part of the vent tube as well. (33) We added a simple "L" bracket to mount one of the new Perry shut off valves between the tank and the engine – a highly recommended addition. (34) A simple plate adapter was fitted to our Webra to allow the throttle linkage to function properly. (35) Total contents of bag 8 – enough parts to build a main rotor.

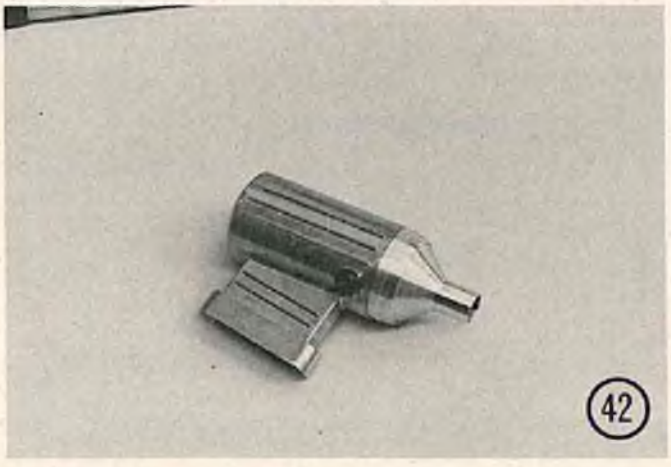












(36) The main rotor hub is pre-assembled. It is fitted to the blade mount via a pair of triangular plates and the stabilizer bar. (37) Completed rotor head – remaining parts are blade holders, control pushrod and screw and bolt for installation. (38) The easiest way we know to level the stabilizer bar. Shim chopper skids until bubble reads level. Then balance stabilizer bar until it is parallel to the bottom of the spirit level. (39) Complete Kraft radio installation – Wings Whiplash and his RCM Jumpsuit! (40) Standard Webra Muffler can be disassembled by removing the screw, heating, then unscrewing. (41) With access to a lathe, the rolled in end cap can be removed, then the tube cut down and bored to receive the cap. (42) Completed modification – end cap "rolled" back in by careful peening. If using a Webra .40, the special muffler available from MRC might be easier.

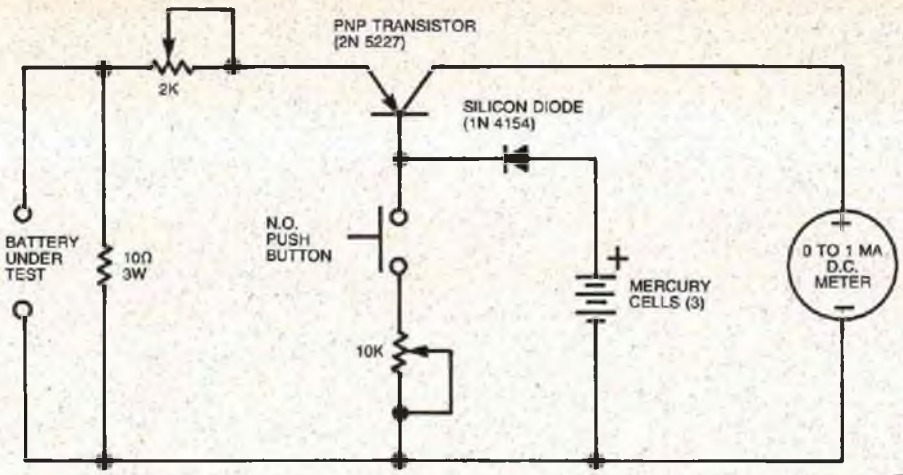
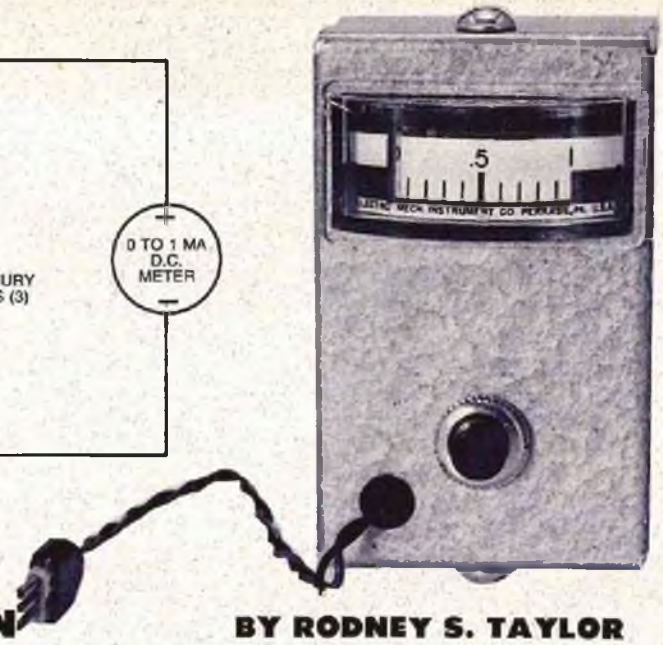


FIGURE 1
SCHEMATIC



YOU CAN BUILD YOUR OWN

BY RODNEY S. TAYLOR

EXPANDED SCALE VOLTMETER

This ESV, based on Jim Oddino's circuitry, is an indispensable tool that will perform the discharge function as well as directly reading the state of charge of a battery pack for which a discharge curve has been plotted.

● Battery testers have been receiving significantly greater attention in recent months and it is anticipated that, in the not too distant future, this useful tool and its companion, the fast charger, will become as commonplace in the modeler's tool box as a can of fuel and a starting battery are today. Rave reviews were given the automatic timer-dischargers by several of the model magazines and, although it is a very convenient device, it lacks one of the basic capabilities of the ESV — that of directly reading the state of charge of a battery pack for which a discharge curve has been plotted.

Some exceptionally interesting discussions of the ESV were included recently in Jim Oddino's Radio Spectrum Column. In the April issue, Jim supplied a schematic diagram for an ESV and this construction article is based on his schematic which is repeated here as Figure 1. As Jim pointed out, the ESV will also perform the discharge function which the Flite Life does automatically, but with the ESV, it is necessary to periodically monitor the voltage to ensure that it does not drop below 4.4 volts (1.1 volts per cell). Considering its lesser cost and the advantage of reading state of charge directly, this inconvenience of the ESV is considered minor so, let's build one.

The only component in this device not locally available is the meter. Many of you will recognize it as the output indicator used by many radio manufacturers in their transmitter. Since it is not available as a shelf item, I have made arrangements with the manufacturer to provide it for the nominal charge of $4.00 postpaid. If you price meters you will find this to be a bargain. Address your orders as follows: R/C Meters, 17433 Haynes Street, Van Nuys, California 91406. Delivery may take a few days as larger quantities must be ordered from the manufacturer who has a minimum order requirement. Therefore, to avoid delay, order your meter now.

The only other component which will be new to some of you is the printed circuit — we are going to make one! Don't panic, it really is very simple and produces satisfying results.

Figure 2 is a layout ready for you to photograph or take to your local photographer who can make a negative of the layout at a nominal cost. The layout is full size and you should insist that the negative be the same size. On your negative, the lines will be black (these will be separations in the copper segments) and the copper will be clear.

While waiting for your negative, it is time

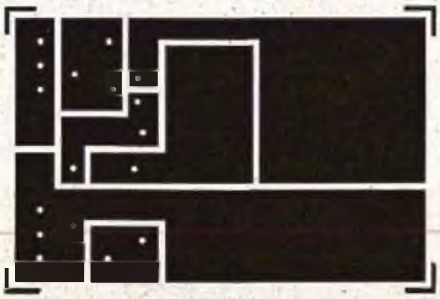


FIGURE 2
CIRCUIT LAYOUT

CIRCUIT BOARD HOLE SIZES

COMPONENT	DRILL SIZE (NUMBER)
10 RESISTOR	.65
PUSH BUTTON LEADS	.65
TRIMMERS	.55
TRANSISTOR	.70
DIODE	.70
BATTERY HOLDER	.65
METER	.70
	(ENLARGE WITH X-ACTO)
PLUG LEAD	.70

NOTE: HOLES FOR THE BATTERY HOLDER AND THE METER ARE NOT SHOWN ON THE CIRCUIT BOARD LAYOUT. THE HOLE SIZES NOTED ABOVE SHOULD BE DRILLED ON ASSEMBLY TO PROVIDE PROPER CLEARANCE.

to go shopping. A list of materials is provided and you will note that each may be obtained in a neat package at most general electronic stores such as Radio Shack, LaFayette, etc. However, this is undoubtedly the most expensive way to buy components. I listed them this way on purpose. Everybody had one of the above noted stores near him and can at least obtain the components without having to resort to mail order. Those of you with sizeable junk boxes, or those who live in large metropolitan areas where electronic surplus stores abound, will find their total cost much less and since none of the components is critical, buy where you get the best price!

While shopping for components, pick up the materials for your circuit board. You can buy a complete kit with photo sensitized board and all chemicals or you can buy the individual materials. Photo sensitized board is sold separately wrapped in black plastic. Buy a piece big enough to make a couple of boards in case you blow the first one! Also, buy the developer for the particular board you buy. The only other item is the ferric chloride etchant. Fifteen years ago I bought a bottle of photo resist, a bottle of developer, and a bottle of etchant. At my present usage rate I have more than a lifetime supply and I will never have to buy more materials. You won't need the large economy size!

Once you have your negative and circuit board materials you are ready to go to work. Use an ordinary 60 watt yellow "bug lite" for a safe light and keep sensitive material at least 7 feet away. I work in a corner of my

PARTS LIST

ITEM	MANUFACTURER	PART NO.	COST
Resistor 10Ω3W	Sprague	QR1-E10	$0.73
Diode 1N4154	Sprague	QRT-218	0.92
Transistor 2N5227	Motorola	HEP57 S-0019	1.20
Trimmer 2K	Calectro	B1-643	0.50
Trimmer 10K	Calectro	B1-644	0.39
Batteries (3 req'd)	RCA	VS 675	0.48 ea.
Box 1-7/16 x 2-9/16 x 1⅜	Calectro	H4-735	0.90
Push Button (N.O.)			1.29
Plug	(as required for your radio)		1.00
Meter 0-1M DC	Emico	122D20	4.00

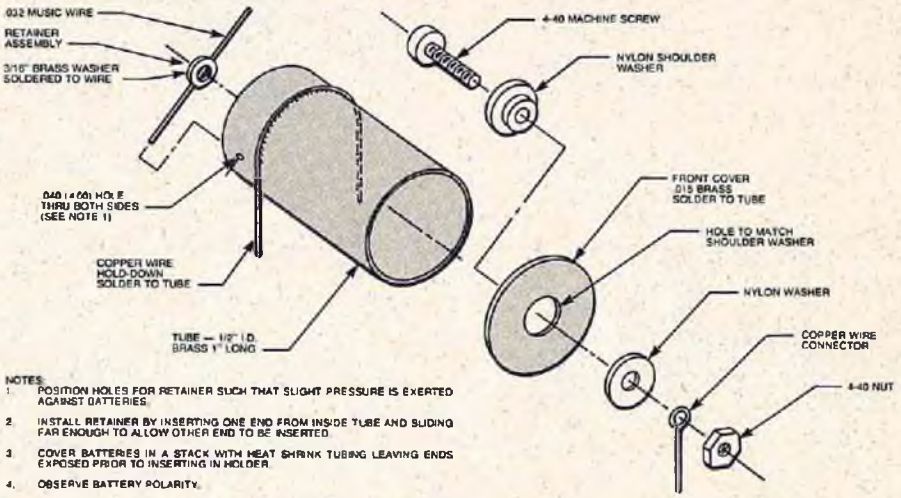


FIGURE 3
BATTERY HOLDER

Additional art and photos on page 74 — text to page 101

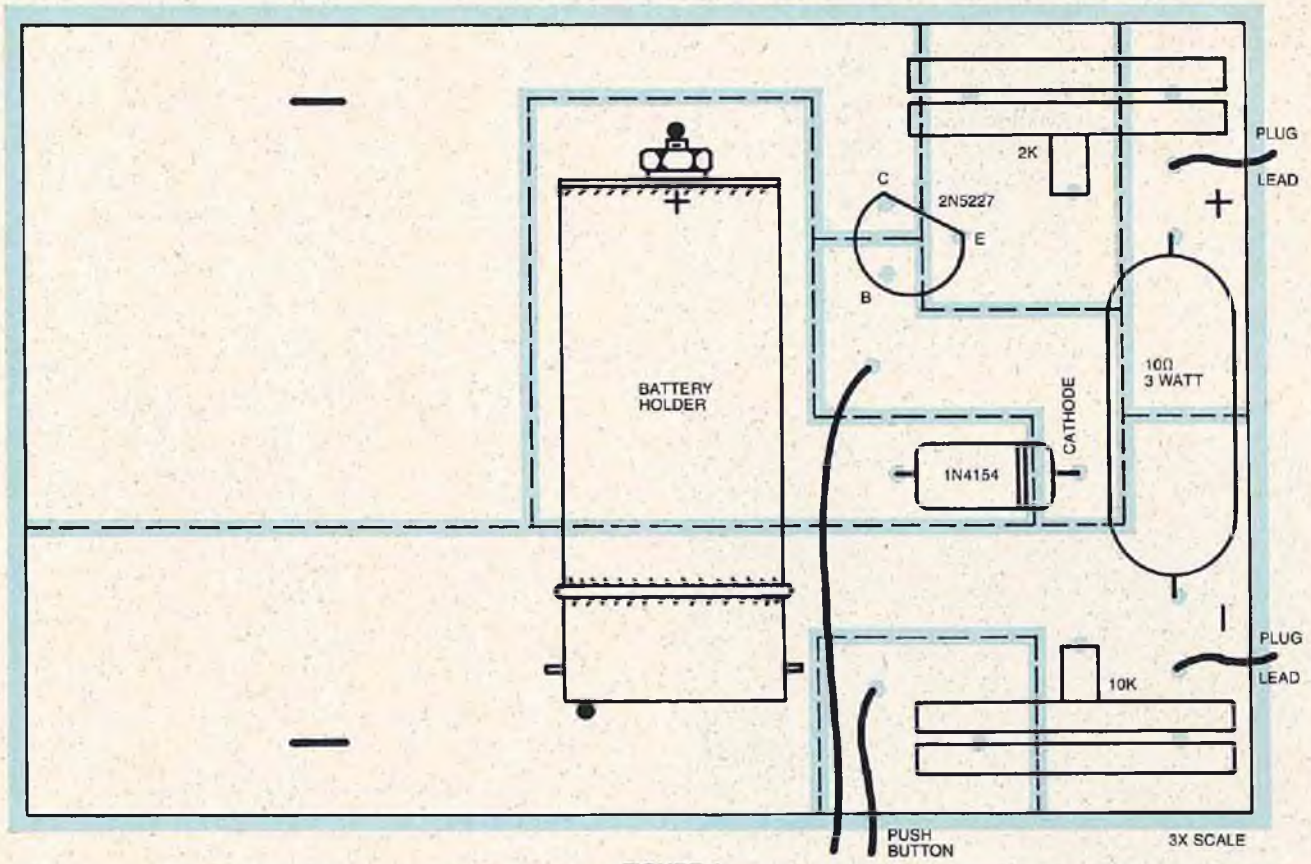
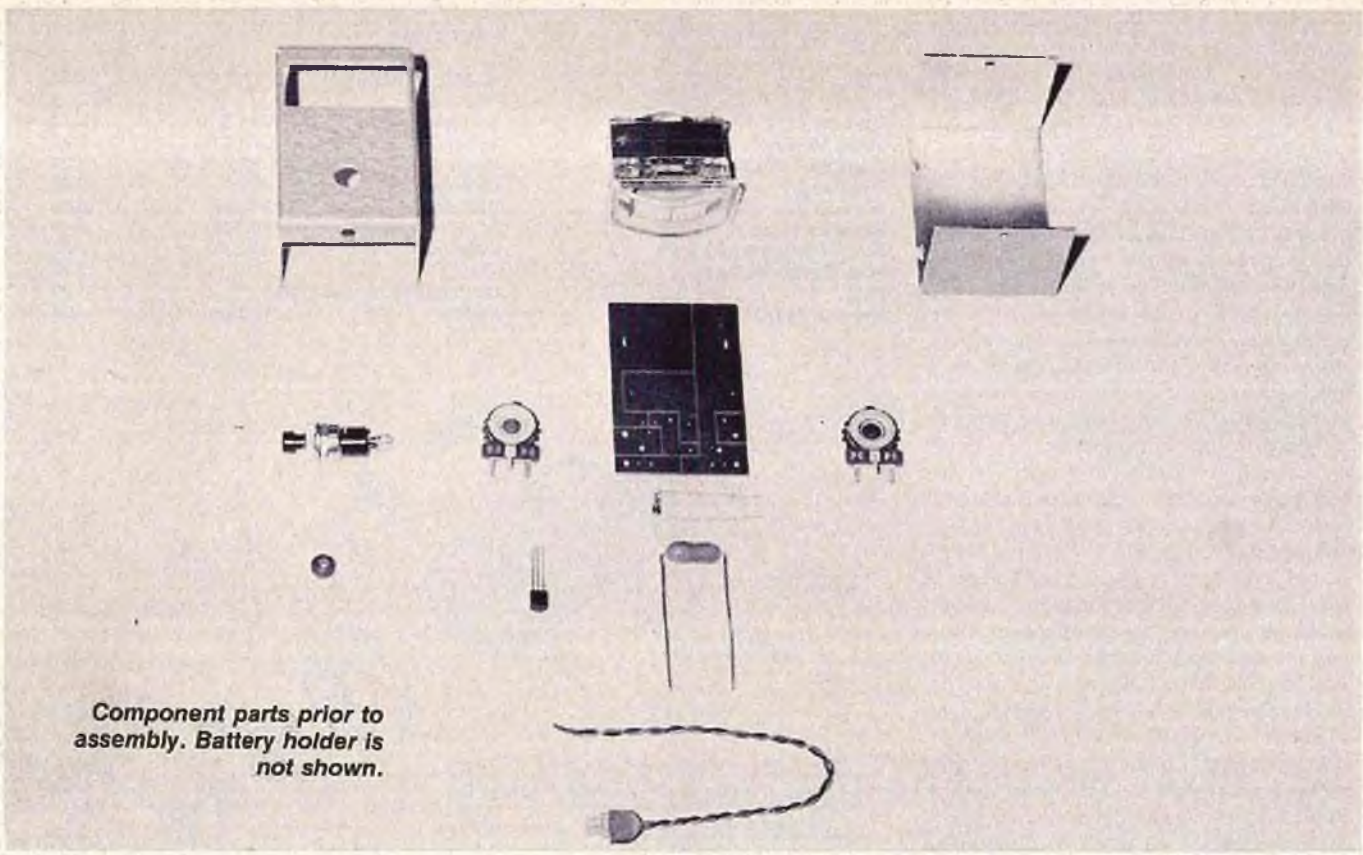
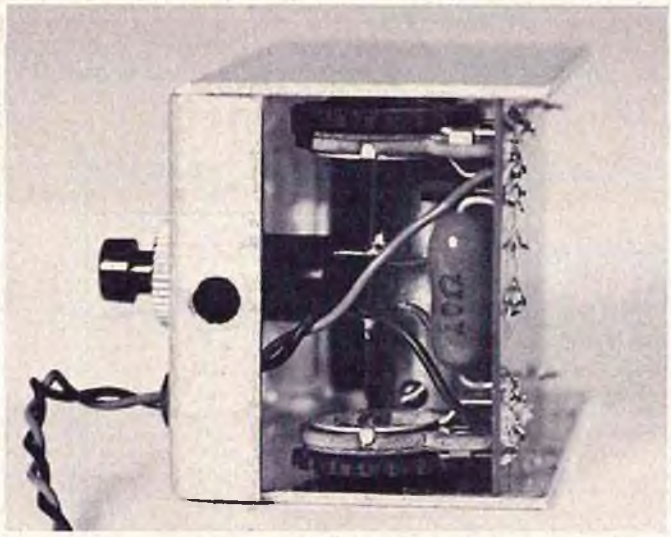
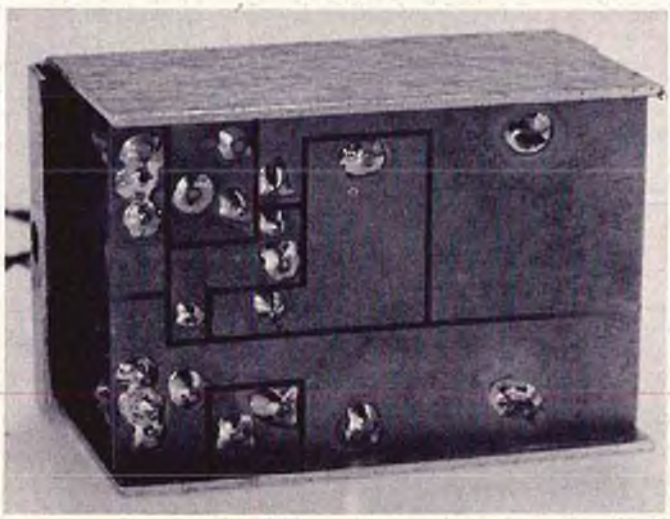


FIGURE 4
COMPONENT OVERLAY



Component parts prior to assembly. Battery holder is not shown.





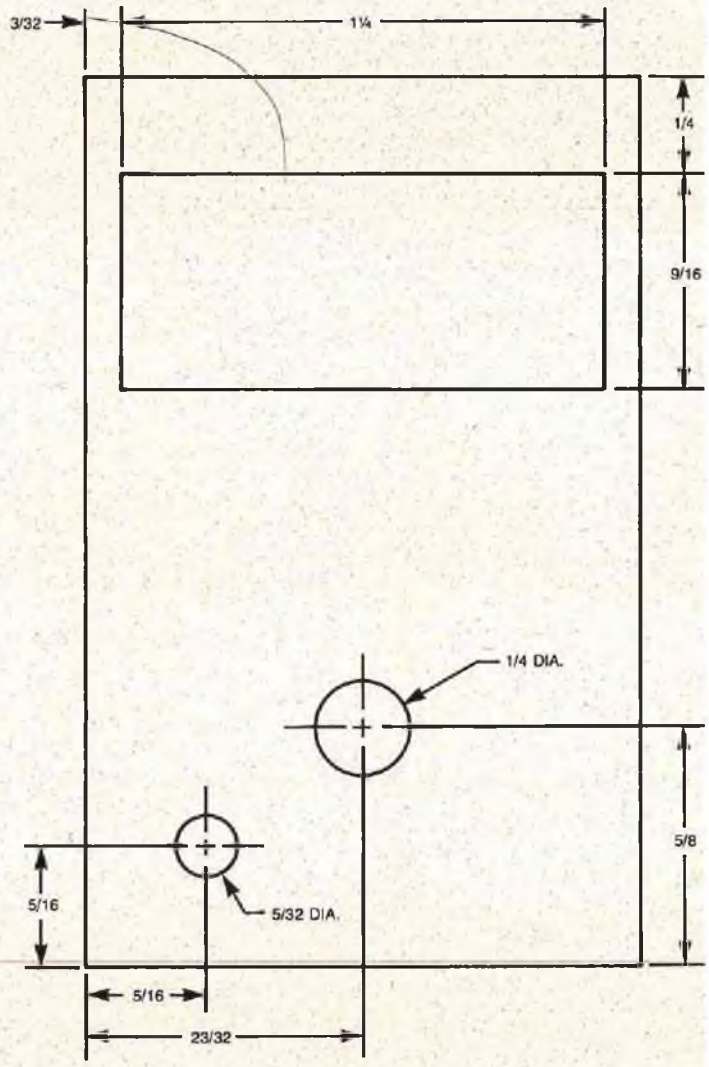
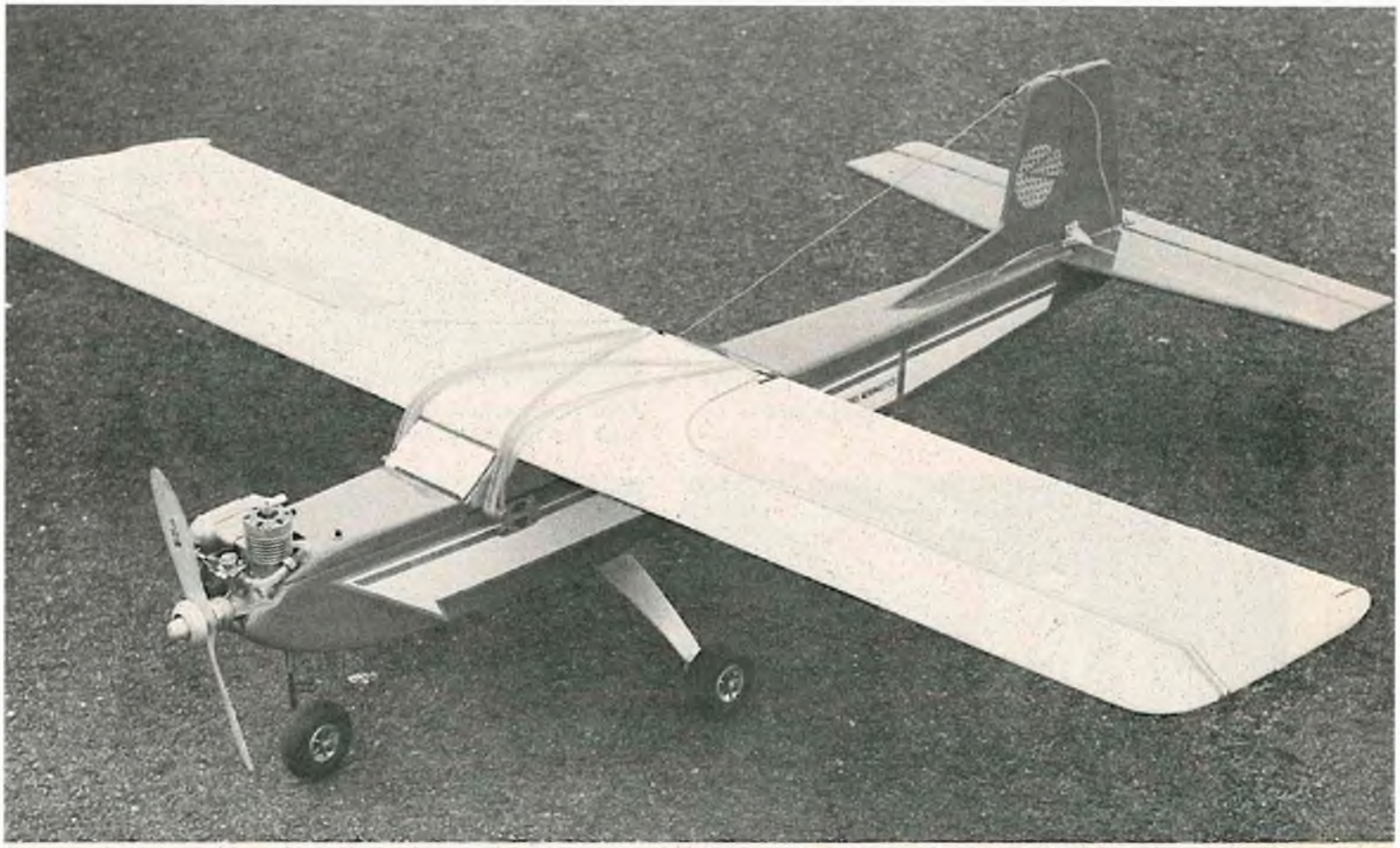


FIGURE 5
BOX LAYOUT



The finished T-20 trainer, the subject of this detailed three-part Novice Corner series.

NOVICE CORNER

Part two of a three part how-to series on building a popular kit trainer, installing your equipment, and preparing it for the first flight. Photos and text by Ben Strasser

● Last month, in Part 1, we made some general comments about Bridi's neat little T-20, we reviewed some general ideas about building, got started on the fuselage top block, and prepared the fuselage sides and bulkheads #1 and #2. Now to get on with the airframe.

Gluing the Fuselage Sides To The Top Block

It is very important that the fuselage be built straight if you are going to have a good flying plane. Follow the next building sequence carefully. Here's how it will go: First, you'll glue bulkhead #1 and #2 in place between the fuselage sides. Then you'll glue the fuselage sides/bulkhead assembly to the top block, add the engine compartment sides onto the nose of the fuselage, sheet the bottom, and, add the cabin blocks and sides and the fuselage is done.

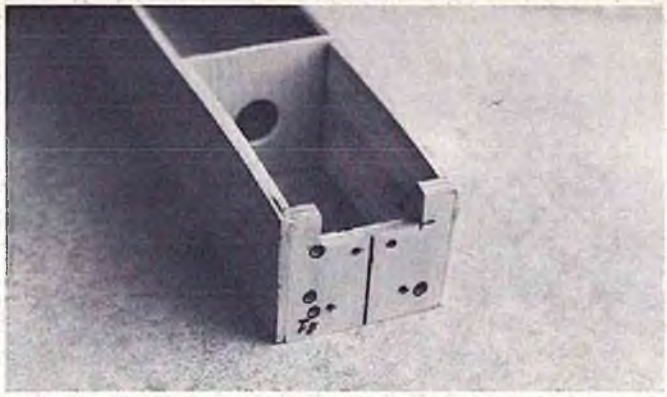
To assemble the fuselage sides to the top block you'll need a reference point so you can line up the top block, bulkheads, and hatch center lines. Pin your plans down on your building board, upside down. Use a soft pencil or brush pen and ruler to draw a straight line across the plans. The straight line should be longer than the length of the fuselage and stab. Tack some waxed paper or Saran Wrap over the plans to protect them.

Lay both fuselage sides on top of each other with the insides together. Because the elevator pushrod exits through a gap left between the fuselage sides at the tail, the sides must not be glued together at the rear. Spread the fuselage sides at the tail and insert a piece of 3/8" balsa scrap and pin it in place. Wrap a piece of masking tape around the tail to insure that the sides will stay pinned to the spacer when you spread the front end to install bulkheads #1 and #2.

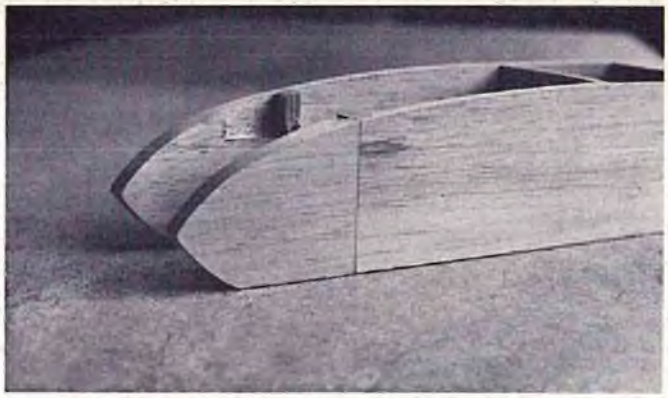
Spread the fuselage sides and glue bulkhead #2 into the slot between the fuel tank compartment doubler and the servo compartment doubler. Clamp the fuselage sides together to hold them firmly to the bulkhead. Before this glue sets up, install bulkhead #1. It should be flush with the front end of the fuselage sides and with the "top" oriented toward the straight edge of the fuselage sides. Clamp the fuselage sides to the bulkhead. Then, lay the bulkheads/fuselage sides assembly upside down on the straight line that you drew on your plans earlier. Align the sides as necessary so the center of the spacer in the tail and the center lines of bulkheads #1 and #2 line up with the line you drew on the plans. Check to make sure that the straight edge of the fuselage sides rest flat on the building board and are at 90° to it. Let the assembly dry. Remove the clamps. Remove it from the building board.

Prepare to install the pre-cut 1/2" x 3" *engine compartment sides* onto the front of

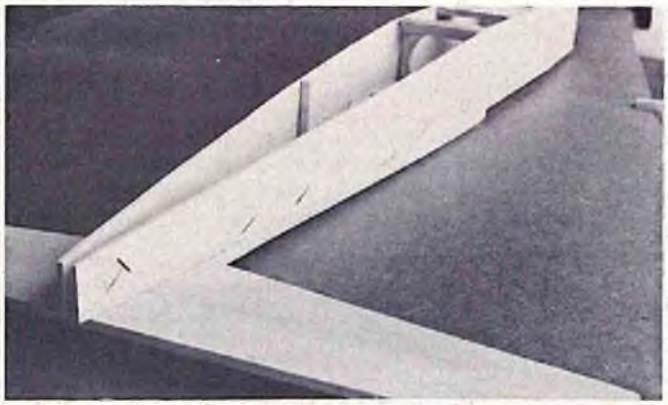
text to page 90



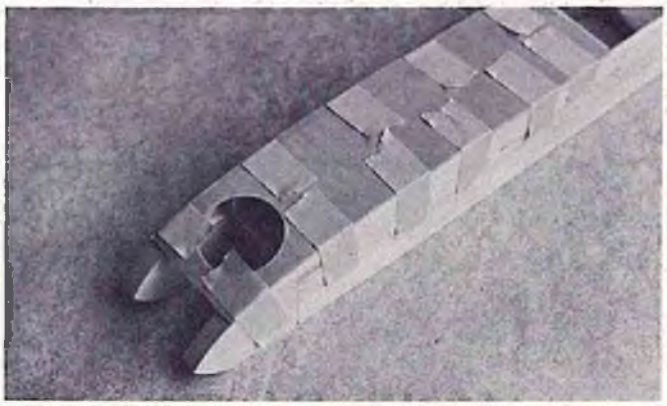
Gluing bulkheads #2 and #1 to the fuselage sides.



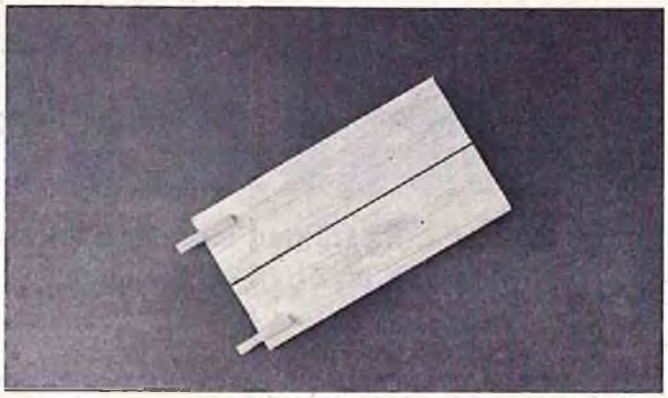
Adding the engine compartment sides to the fuselage. Note the notch cut for the steering arm clearance.



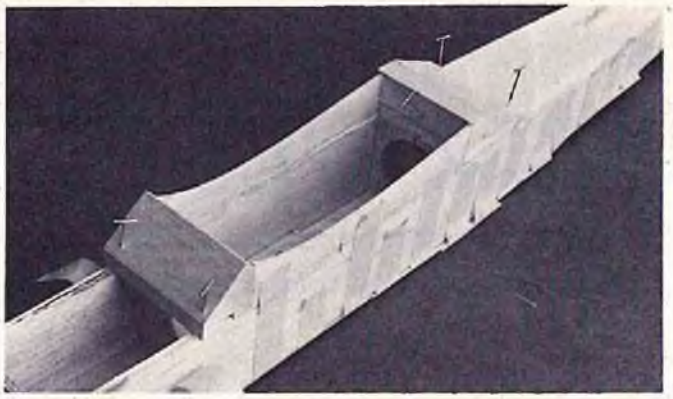
Gluing the fuselage sides to the top block.



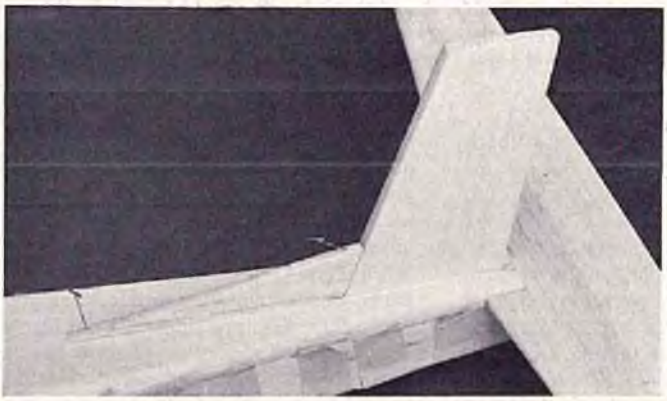
Gluing the plywood sheet fuselage bottom in place.



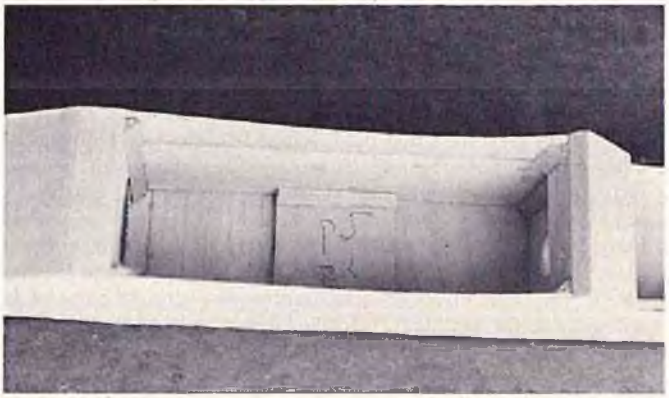
The hatch pins glued in place. The hatch is not yet relieved for a 6 oz. fuel tank.



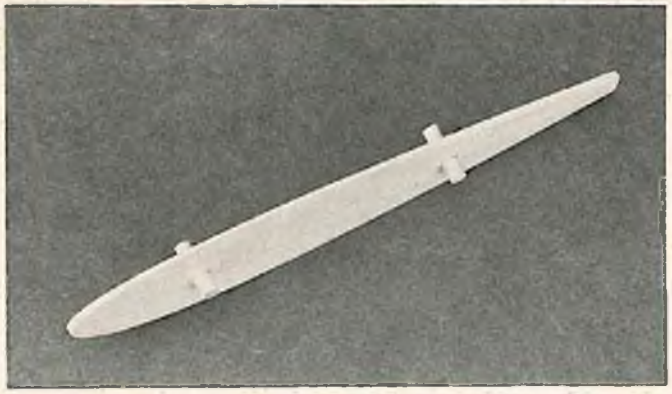
The front and rear cabin blocks and cabin sides glued in place. The tape is used to hold the bottom sheeting in place while the glue dries.



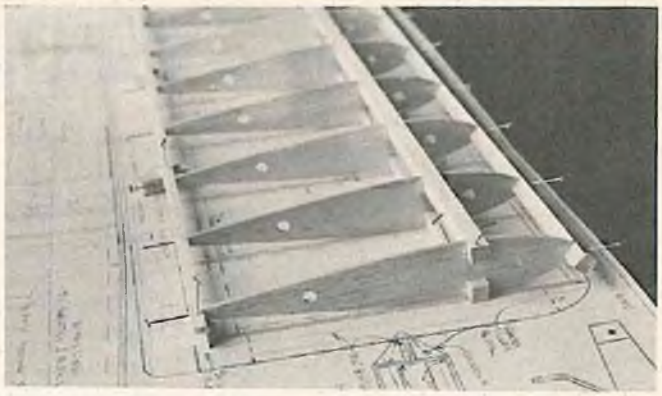
The fin and dorsal fin glued in place.



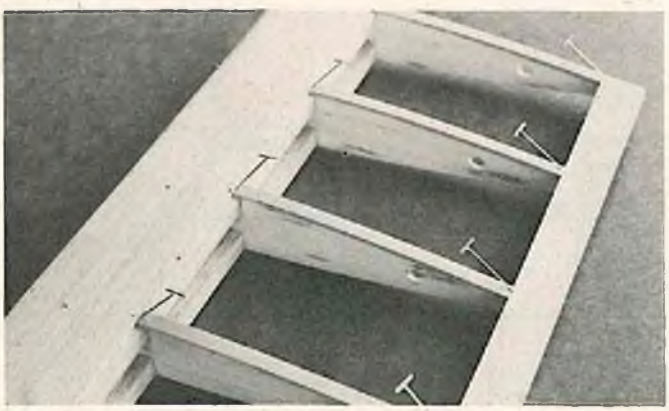
The 1/4" triangular stock glued in place inside the servo compartment.



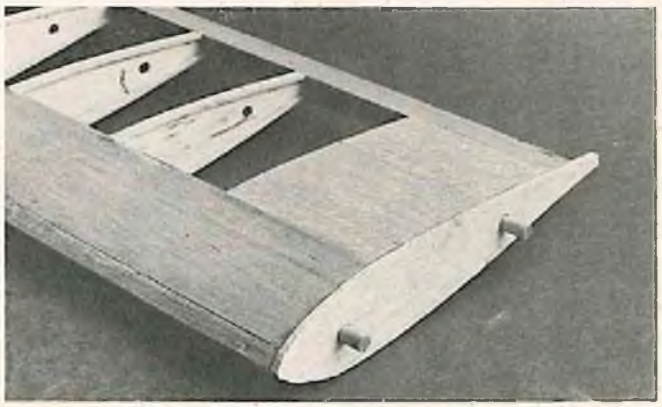
The wing center tapered rib ready to install.



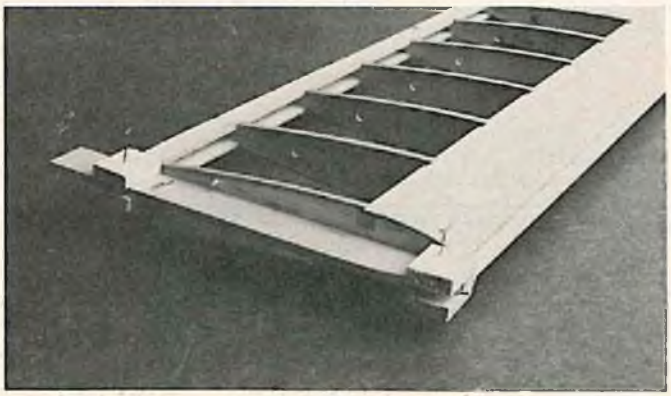
Gluing the spars, leading, and trailing edge in place.



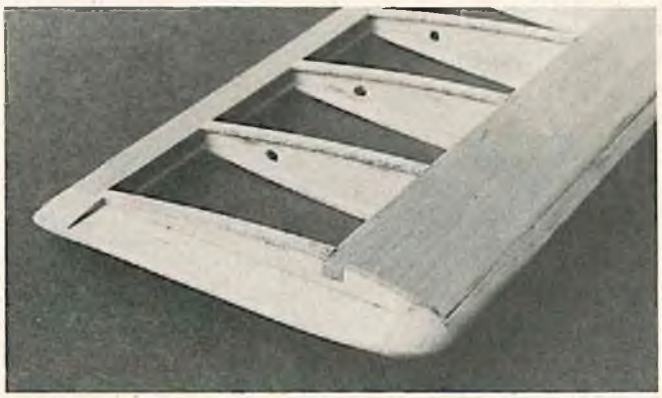
Installing the cap strips.



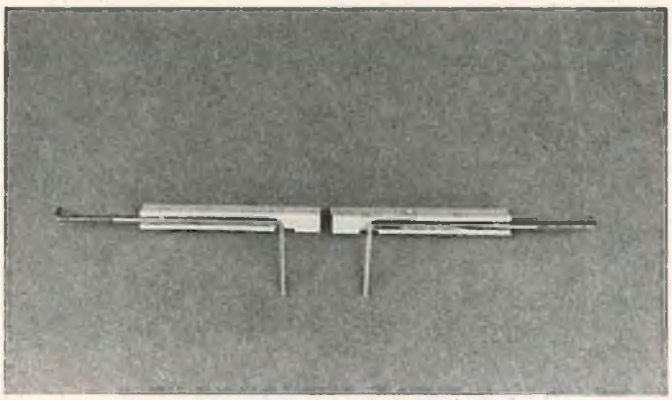
Preparing to join the wing panels.



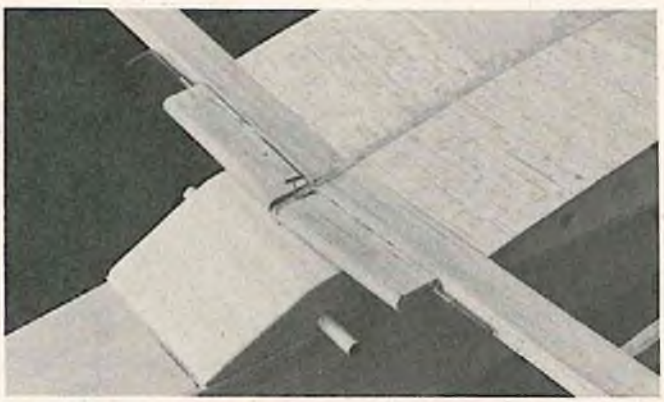
Installing the wing tip filler blocks – rough cut.



The wing tip filler blocks sanded to shape.

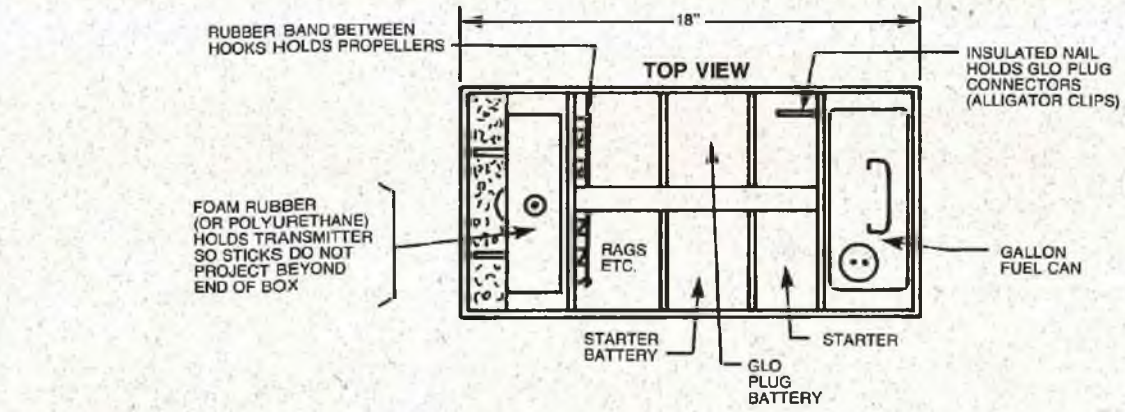


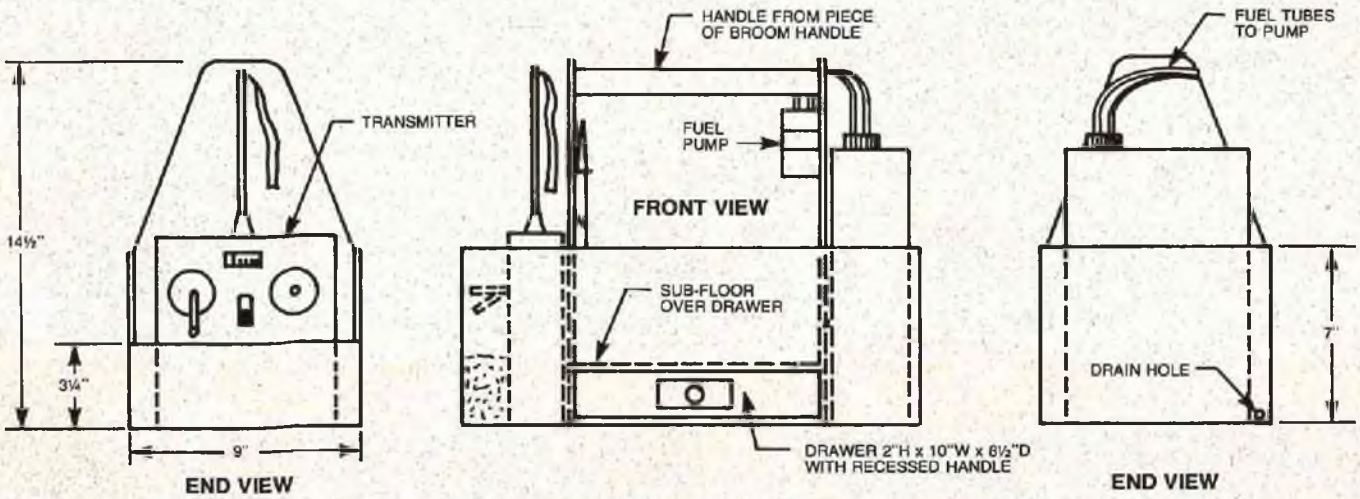
The grooved center section trailing edge blocks with the torque rods tack glued in place.



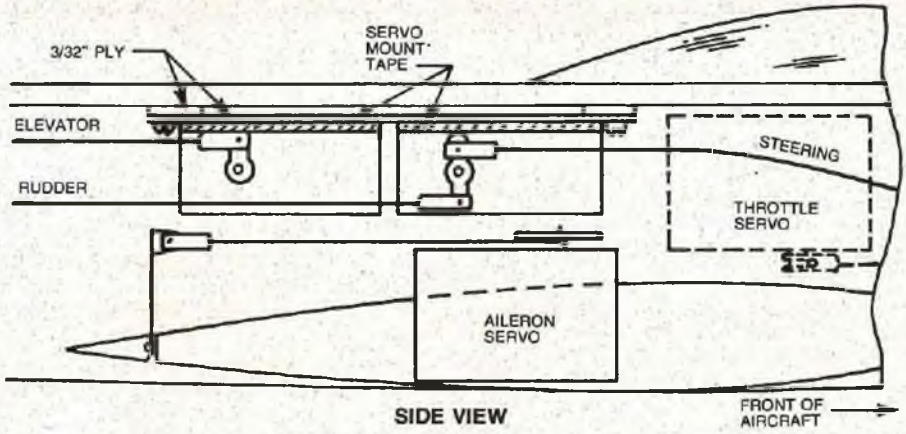
The center section trailing edge pieces glued in place.

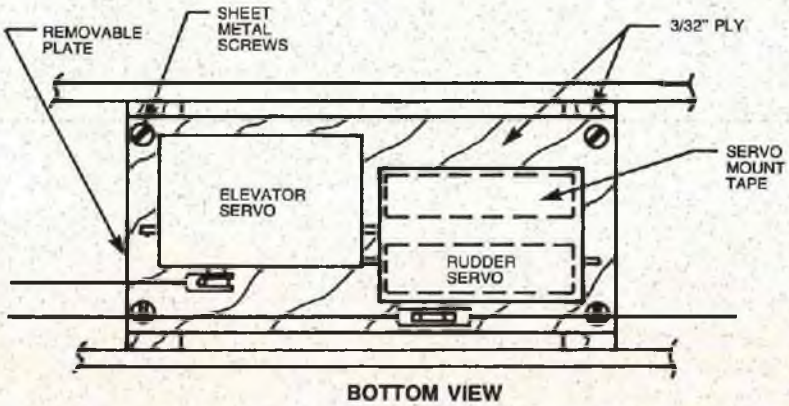
FOR WHAT IT'S WORTH





From the "Fly Paper," newsletter of the Radio Control Flying Club of Toronto, Canada we have reprinted a diagram showing the Editor's design for his new flight box. The aim was to produce a compact unit which would hold the transmitter, a gallon of fuel, starter and batteries, plus all required spares and the fuel pump. The layout is made to facilitate starting on the flight line. The box stands in front of the starboard side of the model with the drawer facing forward. The fuel and starting components are nearest the engine while the throttle control can be operated easily by the left hand. The recessed drawer handle will not snag your trousers. The material used is 3/8" plywood except for the bottom of the drawer which is 1/8" plywood. The material cost is approximately $5.00 to $6.00. The fuel and battery compartments are finished in epoxy and are provided with drain holes - - - just in case! The field box could be made about 1/2" narrower — 8½" instead of 9" — otherwise it is about as compact as it can be to carry all it does and give protection to the transmitter sticks. A good flight box is a very important piece of the contest flier's equipment.

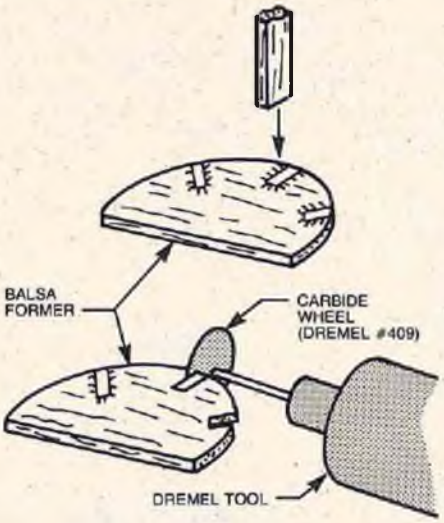




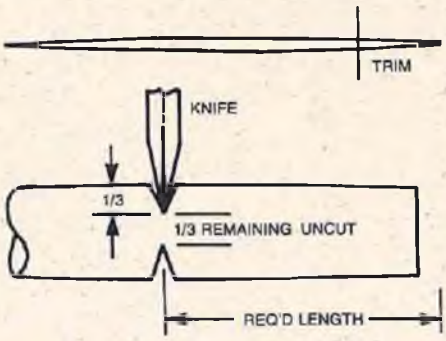
Normal servo mounting techniques for small aircraft usually results in an

FOR WHAT IT'S WORTH

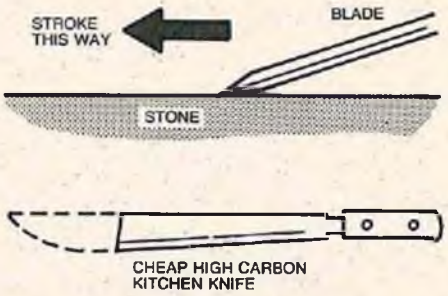
overcrowded set-up, especially around the ailerons and rudder and elevator pushrods. By mounting the rudder and elevator servos flat against the roof of the fuselage with servo mounting tape to a removable plate, the problem is solved. You can add length to the aileron pushrods to tame down the roll rate on those hot jobs. This idea was submitted by Bryce Petersen of South Charleston, West Virginia.



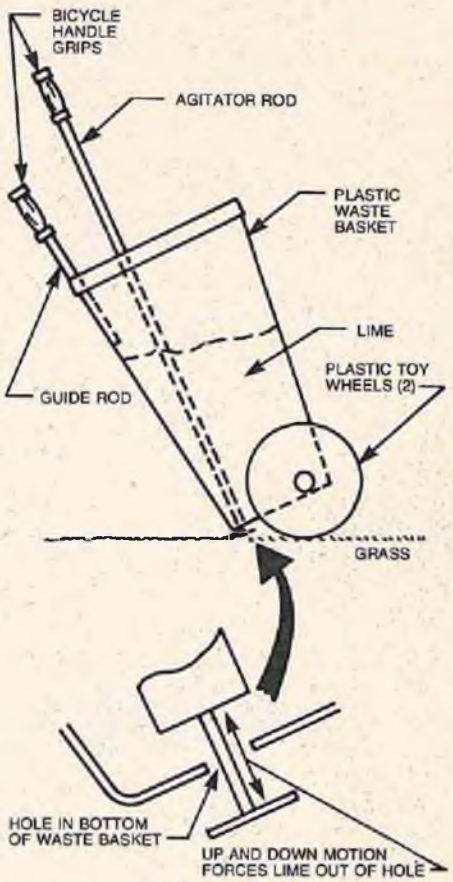
If you have ever built an airplane that used stringers in the fuselage construction, you know that frustration involved in cutting out the slots in the formers. Cutting them out with an X-Acto knife works but it is time consuming and, invariably, the former will break at one point or another, necessitating a minor but annoying glue job. The easy way to cut stringer slots is to load your Dremel Moto-tool with a holder and attach a carbide cut-off wheel (Dremel #409). Then, using a cleanly cut piece of stringer stock, indent the former at the appropriate stringer location. Then the Dremel tool with the carbide cut-off wheel attached is used to slice out the stringer slot. You will quickly note that the slot is cleanly cut and the former is still intact. The carbide cut-off wheel is small enough to cut out perfect 1/16" square slots and tough enough to handle any size stringer slots up to about 1/2" deep. The use of this tool and method has many other construction uses - - - give it a try. Remember, however, to use safety glasses when using the carbide cut-off wheel. While on the subject of using Dremel shop tools, when stack cutting ribs with Dremel Moto Shop, use the 1/4" wide blade. This blade, because of its thickness, will allow more accuracy between the top and bottom ribs, much like a miniature band saw. Also, if you are trying to be very accurate in cutting your ribs, do not try to cut a stack more than 1" thick. These ideas were reprinted from the "Modulator," newsletter of the Pioneer R/C Club, Inc.



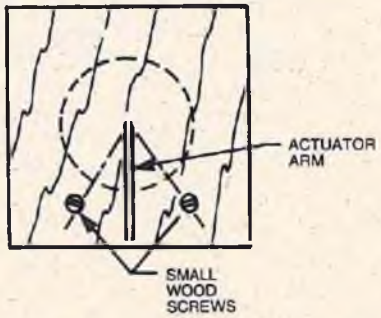
Stan Brand of Cincinnati, Ohio found a way of pinning hinges with toothpicks which is far neater than the usual method of nipping off the exposed ends with toenail clippers, leaving a small protrusion on each side which is difficult to sand without denting the balsa wood adjacent to it. Stan's techniques of pinning requires pre-cutting the toothpick, thus avoiding knife contact with the wing surface. Sequentially, the steps are (1) Drill the appropriate size hole through the wing and hinge; (2) Push the excess material back into the drilled hole; (3) Trim the toothpick end to remove the tapered portion; (4) Pre-cut the toothpick, slightly undersized of the length required, by rolling it under a knife blade. Cut about 1/3 from the outside edge; (5) Pull the toothpick through the drilled hole until the pre-cut portion is properly positioned. Move the exposed end of the toothpick 40° to each side and the hinge is pinned and the exposed toothpick removed without the use of a knife. When all the hinges are pinned, put a drop of glue over the exposed ends of the toothpicks.



Larry Renger of Costa Mesa, California points out that the best carving tools are cheap high carbon kitchen knives. If the knife is "rust free," or "stainless," it is the wrong type. The ones you want are capable of rusting, but will take and hold a razor edge. Grind off the tip of the blade as shown in the sketch. Also, as Larry points out, when your knives get dull, the proper way to sharpen them is to draw the blade into the stone, not away from it. And, to sharpen small knives when you don't have a stone, you can use wet-or-dry sandpaper, 400 grit seems to work well.



Do you fly from a grass field? Are you having a contest in a few weeks? Here is an easy way to stripe your field using lime. A plastic waste basket, toy wheels and broom handles are all that you need in the way of equipment. The agitator rod is forced up and down to force the lime out of the hole in the basket. The slower you move the striper, the wider the stripe. You will find that modelers will stand in line to use the striper. This suggestion was submitted by Bryce Petersen of South Charleston, W. Va.



Mike Sutherland of Anchorage, Alaska suggestion concerns the Adams Actuator. In the instructions from Ace R/C it says to use small plywood stops to restrict the movement of the actuator. Mike uses wood screws to restrict the arm rather than using plywood since, if you want more movement, simply remove the screws and readjust as necessary. □

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30-50, etc. For model fuel use you definitely want an oil with a lower rating of SAE 30. The lower viscosity oils are just too thin and do not give bearing fits, etc. I enough support so to speak. An oil for model engine use must also have a flash point over 480 degrees with something well over 500 degrees being more desirable. As a reference, castor oil has a flash point of 535°. Flash point is the point where oil vapors will ignite. If the operating temperature of the engine exceeds the flash point of the oil, then the oil is going to start going up in smoke.

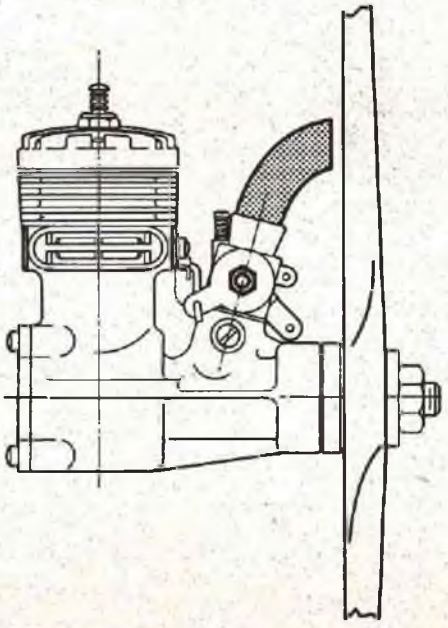
Only a few of the synthetic oils have proven to be satisfactory for use in model engines. These include Klotz Special Formula regular and super. Both of these have an SAE rating of 30-50. Klotz also markets a two cycle motorcycle oil with an SAE rating of 20-60. Do not use this as it is too thin. Other good synthetics are Ucon's MA 2270 and MA 731, and K & B's X2C formulated expressly for model fuel use.

Here are a few things to bear in mind when using a synthetic oil. Synthetic oil technology has had tremendous advances in the past few years. They have many advantages and disadvantages, the same as the old stand-by, castor oil. As far as straight lubrication, none of the synthetics can exceed castor oil, particularly when it comes to protection during a lean run. However, castor oil turns to gum in cold weather, badly varnishes an engine, can go rancid in old fuel, often gets those small white soda cracker crumbs in cold weather, etc. The synthetics, on the other hand, do not have any of these undesirable characteristics — but on a extremely lean run can break down. So set your engine properly and you will have no problem using synthetic oil. Consistently run your engine too lean and you can expect problems.

Dear Mr. Lee,

As a powerplant installation engineer for a well known manufacturer of small gas turbine engines, I am acquainted with the beneficial effects of ram air (q) on available power and specific fuel consumption for our engines. Although I am not too well versed in piston engine operation, supercharging the induction system effectively lowers the pressure altitude that the engines "sees."

It is quite obvious to me that few of the current model engine designs attempt to take advantage of either the freestream q or the propeller



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····· the fuselage by marking one of them right and the other left. Because the engine compartment sides have been designed as thick as possible to offer maximum strength and protection for your engine, one of the sides will have to be notched out a bit for clearance for the nosegear steering arm.

You've already checked out which side your nosegear linkage is to be located on and drilled bulkhead #1 for it. Now you'll need to cut a notch at the bottom, rear, inside corner of the correct engine compartment side. The nosegear linkage on the right side, notch on the right side. Or, left, left. Working on the inside, measure 3/4" up the back edge from the bottom corner. At that point draw a line 1" forward. Then draw another line down to the bottom edge. Cut out that area to a depth of 1/4" and you'll have enough clearance for the nosegear steering arm.

To install the engine compartment sides to the front of bulkhead #1, we recommend you use 5 minute epoxy. That way you can put the adhesive on one of the sides, put it in place and hold it there until the adhesive sets up. When you install the engine compartment sides make sure that the top straight edge is aligned with the top straight edge of the fuselage. Wipe off any excess glue that may squeeze out of the glue joint.

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YOU ARE INVITED TO BECOME A MEMBER OF

NRCHA

NATIONAL RADIO CONTROL HELICOPTER ASSOCIATION

Sponsored by R/C Modeler Magazine, the National R/C Helicopter Association has been established to promote and encourage active participation in sport and competition R/C helicopter flying. It is a vehicle whereby the R/C helicopter builder and flier will have a forum from which to discuss various ideas, helicopter competition rules, and provide a communications media with which to assist the Academy of Model Aeronautics in future programs in conjunction with helicopter contests. The organizational structure is very similar to other established organizations within the R/C framework such as the NSRCA for pattern fliers, the NMPRA for pylon racers and the LSF for sailplane pilots and will be structured in such a fashion as to promote helicopter activities within the existing governing body for all phases of model aviation, the Academy of Model Aeronautics.

As mentioned, the primary purpose of the NRCHA is to encourage the dissemination of information between R/C helicopter pilots as well as to establish and create a self-improvement and achievement program similar to that utilized by the League of of Silent Flight. A five step Grade Level Proficiency Program has been established with gold proficiency pins awarded for each grade level you complete successfully.

The Association is a non-profit organization whose administrative and clerical details are handled by the R/C Modeler Magazine staff on a gratis contributory basis. Membership dues have been deposited in a separate account in the name of the organization and those dues are used for actual expenses of membership cards, and physical materials necessary for the initial operation of the organization. A full accounting of all funds will be made on a periodic basis and will be certified by a public accountant. Additional funding has been donated by R/C Modeler Corporation.

As a member, you will receive a membership card in the NRCHA and will be assigned a registration number which you can use on your helicopter which will consist of the letter N followed by a number issued on a first come, first serve basis followed by a letter designating the district in which you reside. These registration numbers will not only serve as an indication of your membership in the organization, but will enable the model magazines to be able to identify the owner of a helicopter in contest photographs by simply checking the organizational file for the individual membership card bearing that number. As a member you will also have the opportunity to associate with individuals across the continent whose interest in the hobby parallels that of your own. It is our hope that each and every one of you will participate in any degree possible within the organizational structure, contributing ideas, building information, flying tips, and/or working and serving on the various committees that will be established in the future. Any assistance that you can render will be appreciated by each and every R/C helicopter pilot in the country. The annual dues have been established at $4.00 per year to cover postage, printing, etc. All additional costs will be absorbed by R/C Modeler Magazine.

YOUR DUES WILL EXPIRE 12 MONTHS AFTER DATE YOU SEND IT IN. YOU WILL BE BILLED 1 MONTH PRIOR TO EXPIRATION DATE.

MEMBERSHIP APPLICATION

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PLEASE FILL OUT THE ABOVE AND ENCLOSE $4.00 FOR 1975 ANNUAL DUES —

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Now to glue the fuselage sides to the top block. Pin the top block/stab assembly down on the straight line you drew earlier on the back of the plans. Pin the top block to one end of the line so some line is left over for the front end of the fuselage. The center line on the top block should line up with the straight line on the plans. Apply glue to the fuselage sides where they will mate with the stringers and bulkhead #3. Also put some glue on to the stringers and the sides of bulkhead #3. Pin the fuselage sides in place on to the top block. Before the glue sets up, slide the fuel tank compartment hatch under the front of the fuselage in its proper location. Align it with the center line and pin it down in place. Align the center line on bulkhead #1 with the center line on the bottom of the hatch. Pin the fuselage side to the hatch to hold them in place. Take out any pins necessary where the fuselage sides are joined to the top block to make adjustments to relieve any stresses which resist the alignment of the front end of the fuselage. Then pin the sides back down in place. When properly set up to dry, the fuselage sides should be aligned with the sides of the top block. Balsa scraps can be used as spacers inside the fuselage to hold the sides apart as necessary. Masking tape or clamps can be used to pull the fuselage sides together as necessary. Use a carpenter's square to insure that the fuselage sides are at 90° to the building board. When everything is aligned to your satisfaction, let the glue dry. The fuselage sides/top block assembly should remain pinned down until the bottom of the fuselage is sheeted.

At this point in the construction of the fuselage it's easy to mark the location of the two pine *hatch hold-down pins*. The two hatch pins are to be glued to the back end of the bottom of the hatch so they are up against the fuselage sides and extend at least 1/4" beyond the back end of the hatch. That way, when the pins are installed, they'll slide under the front cabin block to hold the back end of the hatch in place. Mark the location of the hatch pins on the hatch which you have temporarily in place under the front of the fuselage. The pins are to be installed later.

To install the *landing gear plate*, measure a distance of 3⅝" behind bulkhead #2 on both fuselage sides. Double glue the sides of the landing gear plate and the sides of the fuselage where the plate is to be installed. Install the landing gear plate so it is flush with the bottom of the fuselage sides. Use a large clamp or masking tape to hold the plate in place while the adhesive sets up.

Locate the 3/4" x 3/4" x 2-9/16" balsa *bulkhead #1 reinforcement block*. This block is installed behind bulkhead #1 on the plywood tank compartment floor. File or sand the block so

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it fits flush to the fuselage sides, to the back of the bulkhead, and, will fit flush to the fuel tank compartment floor when it is installed next. Pin the block in place while the glue sets up.

Locate the plywood *sheet fuselage bottom* which runs from the bottom of the engine compartment to within 1/4" of the back of the ply landing gear plate. Mark and cut a 2" hole in the ply sheet so the rear of the hold reaches 1/2" behind bulkhead #1. This hole serves a dual purpose in that it makes room for the nosegear spring and also assures oil drainage from the bottom of the engine compartment. Glue the ply sheet fuselage bottom in place. Masking tape may be used to hold the plywood in place while the glue sets up.

Sheet the remainder of the fuselage bottom with 1/16" balsa *sheet fuselage bottom*. The first balsa sheet should butt up to the plywood fuselage bottom sheet. The grain should run across the fuselage for maximum strength. Cut the balsa sheeting roughly to size when you glue it in place. Then sand it to the exact shape after the glue has dried. However, be sure to remove any balsa spacers or pins you used inside the fuselage before you glue the bottom sheeting in place.

When the glue has dried, remove the fuselage from the building board. Remove the spacer in the tail of the fuselage.

Using the lines you drew earlier on the bottom of the hatch as a reference, glue the two pine *hatch pins* in place on the back of the bottom side of the hatch. Leave a little space between the sides of the pins and the fuselage to allow for resin on the inside of the fuel tank compartment when you finish the area. If you are going to use a 6 oz. fuel tank, the bottom of the hatch will have to be relieved to a depth of 5/16" in the area between the two hatch pins from the back of the hatch to within 1/2" of the front. Then two 5/16" round slots will have to be cut through on the bottom side of the hatch from the relieved area to the front of the hatch as an exit for the fuel feed and vent lines.

The fuselage sides, bulkheads, top block, stab, and bottom sheeting should now be all assembled. Now we will install the front and rear cabin blocks and sheet balsa cabin sides (wing saddles). Before you get out the glue again though, find your sandpaper and feather out the back edge of the rear cabin block. It's easier now then when it's glued in place. The bottom of the front cabin block will have to be relieved 5/16" for the fuel tank. However, do not cut out an area 3/8" along each side where the block mounts to the fuselage sides (and where the hatch pins will contact the top block), and, do not relieve the area where the top block will mate with bulkhead #2.

You're going to use one of the cabin sides to align the front and rear cabin blocks as they are installed. Apply some glue to the bottom of the rear cabin block. Hold one of the cabin sides in place so it butts up to the top block. Put the rear cabin block in place on top of the top block so it butts up squarely to the rear of the cabin side. Pin that side of the rear cabin block in place. Align the other side of the rear cabin block in the same way and pin it in place to dry.

Use the same technique to align, glue, and pin the front cabin block in place. Before you pin the front cabin block in place, make sure you have pushed it back against the cabin side. Check the plans to make sure which end of the cabin sides are the front and glue them in place. Use a straight edge to assure the cabin sides are flush with the fuselage sides.

The last major job on the fuselage is to install the fin and dorsal fin. Put the *fin* into the slot in the top block and sight down from the front and top of the plane as a check to assure the fin will be straight. If it is not straight to the line of flight, modify the slot as necessary. Use 5 minute epoxy to glue the fin in place. That way you can hold it while the adhesive sets up to assure it will end up in the exact position you want it. Use a carpenter's square to make sure the fin is at 90° to the stab. Add the *dorsal fin* which glues to the front of the fin. Wipe off excess glue.

Finishing the Fuselage

There are a few minor jobs left to be done. First, temporarily mount the engine mount in place. Put the nosegear into the engine mount and relieve the reinforcement block behind bulkhead #1 as necessary so the nosegear spring will turn freely from side to side.

Install the 1/8" x 3/8" x 2-9/16" plywood *hatch hold-down plate* behind bulkhead #1 as shown in the plans. Remove all excess glue. When the glue has dried, put the hatch in place. Stick a pin through the hatch at two loactions to mark the screw holes for the hold-down screws. The pins should go through the hatch to also mark the plywood hold-down plate. Remove the hatch and check to make sure the pin marks are properly located on the hatch hold-down plate. If all is okay, drill the holes for the 4/40 hatch hold-down screws through the hatch. Drill the holes for blind nuts through the hatch hold-down plate. Use a "C" clamp to press the blind nuts in place. They should be mounted on the bottom side of the hatch hold-down plate with a bit of epoxy under the shoulder of each blind nut.

When the hatch is completed, it is held in place with two 4/40 screws, with large washers under the screw heads. Tighten the screws down until the washer is snug, but not too tight. One too many turns and you'll dent the wood. Some builders prefer to inlay a small piece of plywood into the surface of the hatch at the location of the hold-down screws to prevent denting the wood when the screws are tightened. It involves a bit more work, but is a good idea.

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Install 1/4" balsa *triangle stock* up both sides of the back of bulkhead #1, along the landing gear plate/fuselage sides joint, up both sides of the back of bulkhead #2, at the front of the cabin sides where they mate to the front cabin block, in the front and back of the top of bulkhead #2 where it mates to the bottom of the front cabin block, and, along the front sides of bulkhead #3.

Use your plans to measure the location of the front edge of the dural *main landing gear*. Mark the location on the bottom of the fuselage. Check the plans so you can recognize the front and back of the landing gear. Then, while holding the landing gear in place on the bottom of the fuselage, mark the location of the four holes to be drilled into the landing gear and landing gear mounting plate in the fuselage. The mounting holes should be located at least 9/16" inboard of the fuselage sides so they'll be clear of the triangular stock inside the fuselage.

Drill one of the holes through the landing gear and the landing gear plate. Put one of the screws in the hole, add a nut and tighten it down snugly. Get out a piece of string and check the distance from the bottom rear corner of the landing gear to a point in the center of the trailing edge of the bottom of the fuselage. Adjust the position of the landing gear as necessary. Then, drill the remaining three holes through the landing gear and plywood landing gear plate. Remove the landing gear and set it aside until the plane has been finished.

Cut or drill the slot for the rudder pushrod exit into the top block. The hole should be on the same side of the fuselage as the nosegear steering arm. This eliminates the need to cross the pushrods inside the fuselage. It also makes it possible to use opposite sides of the servo arm for the nosegear and rudder linkage.

Install the outer NyRod tubing for the throttle and nosegear steering linkage. Glue the NyRod to both bulkheads. Let the NyRod reach well into the servo compartment. It can be shortened later when the servos are installed.

Mount the engine onto the engine mount and temporarily install it onto bulkhead #1. Using the muffler and engine as a guide, relieve the hatch as necessary. The sides of the engine compartment may also have to be cut down for the muffler, throttle needle valve, etc. Modify them as necessary.

You may install the 1/4" *wing elastic hold-down dowels* into the holes provided in the front and rear cabin blocks at this time. Or, they may be glued in place after you've finished the plane so you won't have to work around them.

The Wing Panels

First, double check your building board to make sure it's flat. Then, pin your wing plans onto the building board and cover them with a piece of waxed paper or plastic kitchen wrap. Pin a 3/8" x 3/8" *notched balsa spar* onto your

building board on top of the spar on the plans. The notched side should be up. Glue the *eight ribs* and spar in place. Glue the top 3/8" x 3/8" notched balsa spar to the top of the wing ribs. Use a carpenter's square on the root and tip ribs to assure they are square to your building board. Also check to make sure the ribs are lined up from front to back with the ribs drawn on the plans.

Add the 3/8" x 3/8" balsa *angle notched balsa leading edge stock*. Double glue it in place. Press the leading edge stock firmly to the leading edge of each of the ribs. Center each rib in the notch from top to bottom. To assure the leading edge is properly aligned, lay a piece of leading edge sheeting temporarily in place along the leading edge. Adjust the leading edge as necessary so it butts up squarely to the leading edge sheeting throughout the length of the wing. Double glue the *notched balsa trailing edge stock* in place. Each rib should be firmly seated and centered in each notch. Check the backside of the trailing edge stock with a ruler to make sure it's straight.

Before you glue the leading and trailing edge sheeting in place there is some sanding to be done. Use your king sized sanding block to sand the top spar so it is flush with the top of the ribs. Also sand the trailing edge stock to the rib contour. Next you should block up the trailing edge of the wing to make sure the wing isn't twisted. If you have any 1/2" scrap balsa around you can make some blocks out of that. If not, use the 1/2" x 1" x 6" wing tip filler block stock supplied in the kit. Put a block under the trailing edge stock at the location of ribs 2 and 3, and ribs 6 and 7. Just be sure you use your glue sparingly when you apply the trailing edge sheeting so you don't glue the blocks to the trailing edge of the wing.

Put the 3/32" x 2¼" x 23" balsa *leading edge sheet* in place on the wing so it butts up squarely to the leading edge. It should overlap half the width of the spar. Put a strip of masking tape down the length of the leading edge sheet/leading edge joint so the masking tape holds the sheet in place. Fold the leading edge sheet back on the masking tape hinge and apply glue to the area of the leading edge sheet that mates with the leading edge. Also apply glue to the top of the ribs, spar, and to the bottom side of the leading edge sheet as necessary. Let the glue soak into the wood and apply more glue as needed. Fold the balsa leading edge sheet back down in place. Use a kitchen sponge to dampen the top side of the leading edge sheeting. As soon as the sheeting begins to curl, pin it down in place on the spar and the ribs. Make certain the sheeting glues to all of the ribs.

Glue the 3/32" x 7/8" balsa *trailing edge sheeting* in place. It should overlap the trailing edge stock. Glue the 3/32" balsa *wing center section sheeting* in place as shown on the plans.

The balsa *capstrips* are to be glued from front to back on each of the exposed wing ribs. The capstrips are to be cut from the 3/32" x 1/4" capstrip stock supplied in the kit. Each capstrip should butt squarely up to the back of the leading

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edge sheeting and to the front of the trailing edge sheeting. The capstrip on the wing tip rib should be installed off center so the outboard side of the capstrip lines up with the outboard side of the wing rib. Let the wing panel dry.

Remove the wing panel from the building board and turn it over. Sand the spar and trailing edge stock as you did with the other side of the wing. Pin the wing panel down on your plans complete with the trailing edge blocks. Install the balsa *leading edge sheet*, the *trailing edge sheet*, the *center section sheeting*, and the *capstrips* as you did on the other side of the wing. Wipe off any excess glue and let the wing panel dry.

Remove the wing panel from your building board and repeat the same procedure to build up the other wing panel.

Installing the Wing Tips

Cut off the spars, leading and trailing edge, and leading and trailing edge sheeting on both ends of each wing panel. Use a sanding block to sand them flush with the root and tip ribs. Using the center of the leading and trailing edge as a guide, double glue the 3/16" x 8⅛" x 1" balsa *wing tips* onto the tip rib of each wing panel. Use a carpenter's square to assure the balsa wing tips are installed at 90° to each tip rib.

Locate the two pieces of 1/2" x 1" x 6" balsa *wing tip filler stock* (which you may have used earlier as blocks for the trailing edge of the wing) and cut each piece into four equal lengths. Install a balsa filler block on the top and bottom of the leading and trailing edge of each wing tip as shown in the plans. The leading edge filler blocks are installed flush with the leading edge. The trailing edge filler blocks are installed flush with the trailing edge. Sand the filler blocks to shape.

Joining the Wing Panels

Find the tapered center rib you prepared earlier and put some 5 minute epoxy on one side and onto the root rib of one wing panel. Put the center rib in place onto the root rib with the two dowels inserted into the holes in the root rib. Make certain that the tapered rib fits squarely to the root rib and that the wider end of the tapered rib is "down."

When the epoxy has set up, trim and sand the tapered rib to the shape of the root rib. However, do not sand or cut off the trailing edge of the center rib where it extends beyond the trailing edge of the wing.

To join the wing panels, put some 5 minute epoxy on the other side of the center rib, on the dowels, and on to the root rib of the other wing panel and put them together. Make certain that the wing panels are aligned by checking both the top and bottom sides of the wing at the leading

and trailing edge. Wipe off excess glue.

Installing the Aileron Torque Rods

Locate the grooved *center section pine blocks*. Cut a slot into the bottom of the notched edge of each pine block for the torque rod arm. The slot should be about 1/4" from the center of the wing and cut back to the depth of the groove in the pine block.

Before the aileron torque rods, supplied in the kit, are glued in the pine blocks, each torque rod arm should be bent forward about 15° so they'll clear the rear cabin block more easily. The torque rod arm is the longer of the two arms bent into the torque rod. The shorter arm is glued into a hole drilled into the aileron.

To bend the torque rod arm, check the plans. Then put the *aileron torque rods* in place in the grooves in the pine blocks and hold them in place on the trailing edge of the wing. Study how you'll want to bend each torque rod arm and go to it. Check to assure you've bent both torque rod arms exactly the same amount by holding them in place onto the back of the wing with the arms hanging down from the bottom side of the wing.

Clean the outside of the brass tubing sleeve on the aileron torque rods with some alcohol and use a small amount of 5 minute epoxy to tack the torque rods in place in the groove in each pine block. Put some Vaseline on both ends of the brass sleeves to prevent any epoxy from jamming the operation of the torque rods when they are glued to the wing. Use 5 minute epoxy to glue the center section pine blocks, with the aileron torque rods in place, to the center trailing edge of the wing. The pine blocks should butt up to the tapered rib and mount squarely to the trailing edge of the wing. Use the epoxy sparingly. The portion of the torque rod arm that extends out the end should be centered on the trailing edge of the wing.

Use your large sanding block to sand the wing leading edge to shape as shown on the plans. Also sand the wing center section and use K & B medium weight glass cloth and resin completely around the top and bottom of the wing. While only three inch wide glass cloth is needed, some prefer to use glass cloth wide enough to cover the entire center section that is glassed. The edges of the glass cloth and resin can be feathered out after the resin sets up, and/or some micro balloons and resin can be used as a filler.

Finishing Up the Wing

Cut and shape the 1/4" x 1-1/16" balsa *strip ailerons*. Round the trailing edge of the ailerons as shown on the plans; don't sand them to a thin edge. The leading edge of the aileron may be prepared with a "V" shape as you did the rudder earlier.

That finishes up Part II. If you build as slowly as I do, Part III in the next issue of the R/C Modeler Magazine should be waiting for you in your mailbox. In the last of this three part series on the T-20, we'll finish up the plane, build the pushrods, install the radio, hinge the control surfaces, and make a few comments about your first flights. ❑

EXPANDED SCALE VOLTMETER

from page 73/72

. . . garage with the bug lite in the overhead fixture in the center of the garage. This provides plenty of light for easy work. Cut a piece of sensitized board slightly larger than the negative image using a Dremel Jig Saw or whatever you have. Remove any copper burrs on the edge of the board with a file. Place the negative on the board with the proper side up for correct orientation. If reversed, meter polarity will be wrong. Cover with a piece of glass to hold the negative in intimate contact with the sensitized copper. Now, expose according to the instructions with your board. Developing can be performed in an ordinary glass dish large enough

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R/C MODELER MAGAZINE'S
MODEL OF THE MONTH CONTEST
Model Of The Month Contest

This program is designed to encourage the sport and novice competition flier to submit details of his most recent kit or scratch-built model to RCM in order to encourage general model craftsmanship and the overall promotion of R/C flying.

Each month R/C Modeler Magazine will award a Dremel 261 Moto-Tool Kit featuring the Model 260 Moto-Tool. On alternate months the first place will receive a Dremel #572 Moto-Shop. The second and third place winners each month will each receive a one year subscription to R/C Modeler Magazine, or if they are a subscriber, an extension of their current subscription.

See the November 1973 issue of R/C Modeler Magazine for complete contest rules.

OCTOBER WINNERS

1ST PLACE

Paul R. Hain
297 Joanna Ct. Apt. 301
Antioch, Illinois 60002
Scratch-built Mach I
from plans drawn by N. Page.
62" wingspan, 8 lbs flight weight.
Supertigre G60 engine and
Kraft '72 Series radio.
Hobbypoxy finish over resin.

2ND PLACE

Bud James & N. Sutcliffe
62 Yungaburra Street
Villawood NSW
Australia 2163
Hawker Typhoon IB, scratch-built from D. Bryant's Elite plans. Wingspan 61", weight, 9¼ lbs. O.S. .60 Goldhead, Silvertone Radio and a home-made muffler.

3RD PLACE

R.W. Hickey Jr.
11437 Rocoso Road
Lakeside, California 92040
Built from Airtronic's Acro Star Kit. Wingspan 50.6", wing area 820 sq. in., flying weight 7 lbs. Powered by an Enya .60 engine and Kraft radio. Finished with yellow and white MonoKote and Hobbypoxy and trimmed with black DJ Striping.

EXPANDED SCALE VOLTMETER

from page 101/72

to allow submerging of the board. Develop according to the instructions accompanying your board. Pour off the developer and allow the surface of the copper to dry. At this point, the room lights can be turned on again.

The etching can also be accomplished in the same glass dish that was used for developing. Etching will require 30-45 minutes depending on the concentration and the temperature of the etchant. If your circuit board has a glass epoxy base, it can be inspected by holding it up to the light. Phenolic boards must be checked with a continuity checker by touching all combinations of adjacent copper lands after removing the remaining photo resist with steel wool.

After etching, the board can be trimmed to size and drilled. Use the drill sizes noted. Making sure that all remaining photo resist has been removed, the board is now ready for assembly. Simple, wasn't it?

The only other component requiring some discussion is the battery container. Although I am assured that mercury cells are available with solder tabs, I was not able to locate any. The cells I used are small hearing aid batteries and are individual units. I first stacked them and shrunk a piece of heat shrink tubing around them. The battery holder is shown in Figure 3 and is built up of materials from the junk box. The holder is first attached to the board then the stack of mercury cells is inserted, carefully observing polarity. The rest of the circuit board is built up using Figure 4 as a guide. This figure is a view of the component side of the board (opposite the copper which is shown in phantom). Note the polarity of the diode, the cathode being the end with the white band around it. Also observe the proper lead location for the transistor and minimize the application of heat to these two components. After soldering, clip the leads off close to the board. Save the clipped leads from the 10 Ω resistor as they will be used later.

The box is prepared by laying out the cut-outs according to Figure 5. Use a nibbling tool or drill a string of holes and file the opening for the meter to size. Use care to obtain a good fit for the meter. Drill holes for the push button and the plug lead allowing room for a small grommet to protect the wires. The meter comes with a spring clip which must be discarded. The meter is retained in the box by a fillet of 5 minute epoxy, RTV, or equivalent, on the inside. Install the push button with the lugs oriented as shown. We are now ready to install the circuit board.

The circuit board is slipped over the meter terminals and, when level, soldered to them. Use minimum heat to avoid damaging the meter housing. The other end of the board is supported by the push button leads which are made from the 10 Ω resistor clippings. Slip one lead through the appropriate hole in the board and, using needle nose pliers, insert it through one of the push button lugs. Solder to the board and the lug. Repeat with the other lead, using caution that these leads do not short on any of the components. Finally, insert the plug leads through the grommet and solder to the board observing polarity. We are now ready to calibrate.

You will need a regulated power supply and a fairly accurate voltmeter for calibration. If you don't have them, borrow a friends — it will only take you 15 minutes. Attach the positive leads of the power supply and voltmeter to the positive land of the circuit board (where the plug leads attach). Do likewise with the negative leads. Set the voltage to exactly 4.0 volts and adjust the trimmer on the left until the meter reads 0. Now set the voltage to exactly 5.0 volts and adjust the trimmer on the right until the meter indicates 1 (full scale). Reset to 4.1 volts and readjust the trimmer on the left to provide a meter reading of 0.1. Now check the calibration at 0.1 volt increments from 4.1 to 5.0 and note any errors, particularly around 4.4 — 4.6 volts. My meter was within one half graduation at each step which is pretty good for the little inexpensive meter and plenty good for our purposes. Note that the button must be depressed to obtain a reading. Now install the back of the box and let's see how we use it.

To check the battery capacity, first charge your battery pack for a full 24 hours using the charger which came with it. After charging, plug in the ESV and note the time on your watch and the meter reading (it should be full scale). Periodically check the reading until it drops to 4.4 volts (0.4 on the scale). At that point, note the time and disconnect the ESV. The typical 500 MAH pack should go one hour ± 5 minutes. If it falls short, repeat the charge/discharge cycle and check it again. If it still falls short after several cycles, check for defective cells in the battery pack with the ESV connected. Also, once the discharge time is known, keep track of the number of flights made next time out and after flying, plug in the meter. If you made 6 flights and it took 30 minutes to discharge the battery afterward (to 4.4V), your 6 flights used 50 percent of the battery capacity. You can now figure your average battery drain in-flight.

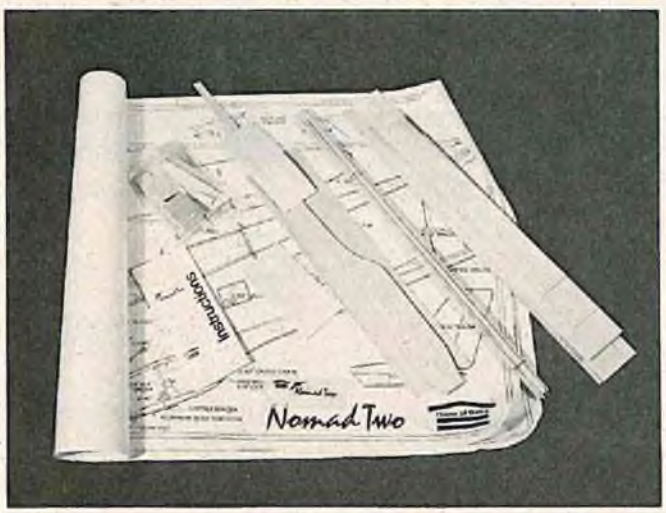
To check voltage, the meter can be used to plot a discharge curve for your battery pack. By then plugging in the ESV and reading the voltage, the approximate state of charge can be read from the curve by locating the voltage indicated by the meter on the curve.

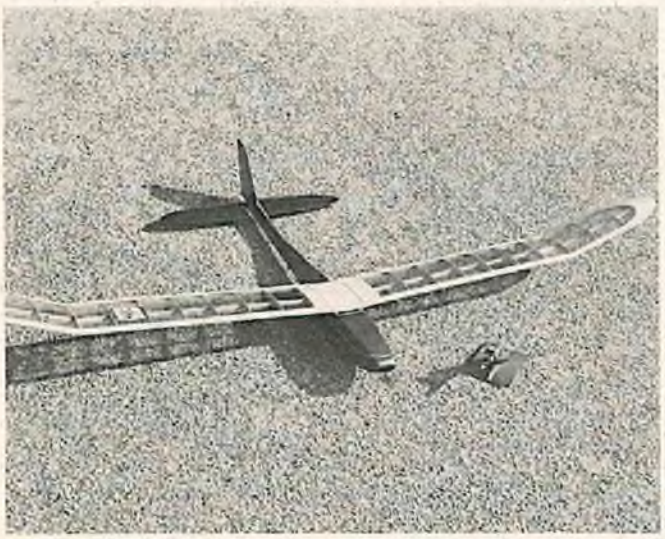
The real benefit of an ESV is when it is used in conjunction with a fast charger which will be described in a future construction article. By using both of these tools, your batteries should never be overcharged and should never go dead in flight. Like polio, the disease "battery failure" will practically be eradicated.

Happy Flying! □

RCM PRODUCT TEST

HOUSE OF BALSA
NOMAD TWO





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

● One of the most popular aircraft ever presented as a magazine plan, or in kit form was Ted Strader's Little Nomad. Now, House of Balsa, 2814 E. 56th Way, Long Beach, California 90805 has produced the Nomad Two, with a wingspan of 61" and a total wing area of 290 square inches and an all-up weight of 17 ounces for a wing loading of 8.5 oz./sq. ft. This is a slightly enlarged version of the original Nomad, and designed to accommodate most small two channel radio equipment rather than the original pulse proportional system used in its smaller predecessor.

This is an excellent kit with some unusual features including two choices of vertical fin supplied to be determined by the individual builder for the type of flying intended. There is also a removable power pod option, plus an aluminum combination belly skid and towhook. Unlike the original Nomad, the Nomad Two has one piece balsa sides. Our prototype was covered with transparent yellow Flite-Kote on the wings while the fuselage and empennage was metallic red Solarfilm with DJ's Trim Stripe. A Cox TD .020 with Cox's muffler was used. For guidance, we used the Cirrus Sport Three radio available from Hobby Shack.

Knowing that most of our flying would be towline and power, extra dihedral braces were cut from the die-cut plywood sheet from which the power pod was made. There is a very weak section in the fuselage just forward of the stabilizer and, again, a piece of ply was cut from the scrap power pod material and glued to the inside bottom

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SPECIFICATIONS

Name ..... Nomad Two
Aircraft Type ..... Sailplane
Manufactured by ..... House of Balsa
2814 E. 56th. Way
Long Beach, California 90805
Mfg. Suggested Retail Price $19.95
Available From ..... Manufacturer and Retail Outlets
Mfg. Recommended Usage ..... Basic powered sailplane
High Start & Slope
Wingspan ..... 61 inches
Wing Chord ..... 5 inches
Total Wing Area ..... 290 sq. in.
Fuselage Length ..... 28 inches
Radio Compartment Dimensions ..... (L) 10" x (W) 2" x (H) 2"
Wing Location ..... High wing
Dihedral (each tip) ..... 4½ inches
Airfoil ..... Flat Bottom
Wing Planform ..... Constant Chord
Polyhedral ..... 1½ inches
Stabilizer Span ..... 17 inches
Stabilizer Chord (incl. elev.) ..... 3"
Total Stab Area ..... 51 square inches
Stab Airfoil Section ..... Flat
Stabilizer Location ..... Top of Fuselage
Vertical Fin Height ..... 5.5 inches
Vertical Fin Width (incl. rudder) ..... 3.5"
Mfg. Rec. Engine Range ..... Cox T.D. .020
Recommended Fuel Tank Size ..... Cox 1/2 oz. tank. Mount.
Landing Gear ..... Belly Skid
Recommended No. of Channels ..... Two
Recommended Control Functions ..... Rudder, Elevator
Basic Materials Used In Construction:
Fuselage ..... Ply, spruce, balsa
Wing ..... Balsa, ply
Tail Surfaces ..... Balsa
Hardware Included In Kit ..... Aluminum skid plate,
⅛" dia. wing dowels, screws, nuts, decal
Plan Size ..... 28" x 36" — 21" x 25" (2 sheets)
Building Instructions on Plan Sheets ..... Yes
Instruction Manual ..... Yes (20 pages)
Construction Photos ..... Yes
Kit Includes ..... Shaped parts, die-cut parts
Mfg. rec. flying weight ..... 18 ounces
Wing loading based on rec. flying weight ..... 9 oz./sq. ft.

RCM PROTOTYPE

Weight, ready to fly: ..... 17 oz.
Wing Loading ..... 8.5 oz/sq. ft.
Covering and finishing materials used ..... Solarfilm, DJ's Multi Stripe,
Flite Kote
Engine Make and Disp. ..... Cox TD .020
Muffler Used ..... Expansion
Radio Used ..... Cirrus Sport Three
Tank Size Used ..... Cox

HELI-BABY

from page 65/64

Heli-Baby Modifications

It has been brought to our attention that a columnist in another magazine is preparing some self-styled 'modifications' to the MRC-Schluter Heli-Baby. No modifications to the Heli-Baby are either necessary or recommended. The Schluter factory has replaced the original round type drive belt to the tail rotor with two new pulleys and a flat belt free of charge to those who have the original belt which could have some slippage after many hours of flying. To date, R/C Modeler Magazine has in excess of thirty air hours on its prototypes and the Heli-Baby has proven to be one of the most reliable and trouble-free helicopters available to date. We urge you to build it according to the manufacturers instructions and disregard any major modifications unless specifically recommended by the manufacturer.

#4. These parts come loosely assembled, so there should be no question as to how they fit. They are assembled into the frame as directed, adjusting for a good gear mesh. Loctite the ball screws, steering arm, and holding (anti-rotation) rod into the swash plate and frame.

The tailpipe comes with the tail rotor drive shaft, pulley, and belt already installed. The belt is held in place temporarily by a short piece dowel. Sight thru the boom from the rear, and turn the dowel so that the belt makes a 90° turn, with the top of the belt at the rear, going to the left side at the front. The boom is now installed between the frame sides using the hardware in bag #5. This is a tight and close fit — do not enlarge the holes.

At this point, we should mention two things. First, we installed a Sig nylon landing gear clip under the lower forward screw head on the right side. An aluminum or steel clip will work as well and can be homemade. This clip will later hold the outer sleeve for the tail rotor control rod. Although we assembled our kits with the screwheads on the right side (arbitrary), asembly of this one screw with the nut on the right would allow for installation of this clip at a later time. Second, and most important, do not install the tail boom any further forward in the frame than shown on the plans. Mounting forward of this position will cause interfernce between the main rotor and tail rotor blades, resulting in a broken rotor blade!

Assembly of the rear rotor parts in bag #6 is a real challenge. There is really no verbal instruction, and the rotor is assembled only by means of the photos. This is relatively easy — if you've built one before! There is, however, no easy way to describe the assembly, and by carefully sorting all of the parts and studying the photos it can be assembled correctly. Note that the screws holding the bearings should be installed using Loctite (careful — no Loctite in bearings!), a drop of oil on each bearing. Blade holders have a ball mounting ear on each side — be certain that the balls are at the leading edge of the blade. The wire supplied for the tail skid is a little too long, however, bend the wire to match the long side on the plans, followed by the bottom leg. This will make the remaining leg too long to match the plan. Now simply flip over so that the leg originally bent to be the long one is in the position of the short one on the plans. You will notice that both legs are too long in this position — but equally so. I know that sounds confusing, but if you are actually building a Heli-Baby you will find that it makes sense. The entire skid becomes just a little longer than shown.

The tail rotor blades are covered with the plastic material provided, and we would recommend balancing them before installation. This can be accomplished by using a drill bit or tight fitting wire through the mounting holes, then suspending between two parallel edges. Weight the light blade with pins driven into the

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NOMAD TWO

from page 105

. . . . . of the fuselage. This would be accomplished on page 15 of the very complete instruction book that accompanies the kit. As a matter of fact, the instruction book has every single building step covered by clear photos and easy to read instructions.

Three types of flying are available with the Nomad Two and include Hi-Start launches, slope soaring, and optional power pod. If using a Hi-Start, the latter has to be modified as the wings would not take the thrust of standard surgical tubing. We cut a bicycle inner tube into a continuous strip 18' long and attached 70' of monofilament line. A word of caution, however — don't use a round ring at the parachute end — with a flat aluminum hook on the Nomad Two, it will wedge itself against the fuselage bottom. Use a "D" shaped ring instead. Launches 75' to 100' were common with even the reviewer's 14 year old son accomplishing Hi-Start launches with ease.

When tried on the slope, the Nomad Two stayed aloft with an experienced pilot, but penetration was poor. Even after adding an ounce of ballast, it buffeted and pitched. This is not a criticism of the design since it was not primarily intended for slope soaring, but we simply decided to try it.

Using the optional power assist is where the Nomad Two excells. An engine run of 2½ to 3 minutes would get the airplane above 300' and thermal flying was achieved on the first weekend of flying. 5 to 10 minutes were common even by a 14 year old pilot. As soon as the Nomad Two was landed no time was lost getting it airborne again. The engine pod is mounted directly over the Center of Gravity of the aircraft so no ballast has to be added when the engine was removed.

We rate this aircraft good to excellent and would recommend it to anyone wanting a compact multi-purpose sailplane for small two channel equipment. □

HELI-BABY

from page 108/64

tip, or a layer of trim tape. The screws holding the tail rotor blades should be just tight enough to hold them in place — yet loose enough to allow them to rotate back if they strike something — better too loose than too tight!

Other than rotor blades, there are only 2 wood parts supplied, the cabin floor & cabin back. Really there is only 1 piece of wood, since these 2 parts are outlined on a single piece of ply & must be cut out. The outlines are adequate, including the cut-out for the tank. Incidentally, by carefully cutting the tank opening the piece cut-out will provide enough wood for the tail rotor servo mount. On our kits the forward & top mounting holes were out of place by ½ hole. Check before drilling. For Kraft KPS 14 or equivalent size servos, the cut-out positions on the plans are okay, as well as the tray for the center tail servo. No mention is made about joining cabin floor & back, we chose to glue them together, supporting the joint with the throttle servo box. Don used RS radios & his photos show appropriate servo locations.

The vacuum formed seat and console must be trimmed, and if desired, the front of the console closed with a piece of scrap. We could find no way to install the pedals — at least not with a G.I. Joe pilot! So who needs 'em, anyway? If you are a detail nut, they can be mounted on a bar across the back of the console. Dewey's detailed cockpit was painted with black K & B Super Poxy and I.M. instruments were used on this console. However, he found his G.I. Joe coundn't reach the pedals - - - which he now uses as an excuse for his inability to handle the tail rotor properly!

Trim the canopy exactly to the very faint lines provided. Hint: Use a piece of tape placed along the line as a more visible guide. PVC cement is

provided for joining the canpoy halves. We preferred to tape the halves together, then permanently join with "Zap" cement followed by the removal of the tape. Installation of the canopy onto the frame cannot be described. It has been designed in such a way that it will snap solidly into place, and is held securely by a single rubber band across the corners. It sounds unlikely in their instructions but believe it, it works!

The vertical and horizontal stabilizers are installed per the instructions and plans using plastic clamps. Here again, we added a Sig nylon clip for the tail rotor shaft under each of the screws holding the vertical fin.

Installation of the radio equipment is adequately covered, though it appeared that servo tape was used to mount the throttle servo. You will note that we built a box to house this servo, as well as provide a switch mount. The brass tube housing for the throttle control rod is run through the three clips (Sig nylon) mounted earlier, instead of running the tube through the vertical fin clips as shown, since this creates a kink in the tube. A drop of "Zap" at each clip will hold the tube in place. If you find the tail rotor control rod too tight a fit in the brass tubing, replace it with 1/16" diameter music wire and only use the threaded portion of the original rod, soldered to the 1/16" music wire with a DuBro split coupler

A heavy gage vacuum formed fan housing is provided. This housing must be trimmed from its sheet. Your first impression will prove confusing, however, a careful study of the photographs and examination of the part should provide sufficient clarification.

Tank tubes are installed per the photos, being careful to position the top vent so that it doesn't interfere with the servo. The bottom feed line can have the inside tube portion removed in order to completely empty the tank. A Perry Aeromotive Fuel Shut Off was installed in the feed line, on all prototypes, and is highly advised. A Perry Aeromotive in-line, non corrosive fuel filter between the tank and engine is also recommended.

Building the main rotor head is a snap, since it is already completed, and requires only the addition of the blade see-saw and stabilizer bar. The instructions on assembly and balancing are thorough and simple. It is interesting to note that the blade holders used on the Heli-Baby have been designed to allow for easy adjustment of blade position, and pitch angle, by simply rotating the holder on the see-saw stub, then locking in position by tightening the bolts — no bending or twisting of parts required.

A minimum of painting is required, but then again you could paint the entire machine if you so desired. The same is true of the seat and console which can be detailed as you like. Incidentally, I made a neat control stick using a piece of 3/16 plexiglass (or polystyrene) rod. A hot air gun was used to heat it where we wanted a bend. The hot rod (no not a car!) can be laid on the plans, bent to shape and allowed to cool. This proved far simpler than trying to bend metal tubing. Heat shrink tubing makes an easy to install hand grip.

The instructions mention "painting" the canopy ridges with a marking pen. We found these pens were not fuel proof and would recommend sticking to a more conventional "paint". Don used black K & B Super Poxy on all canopy ridges, but after all the masking that was required he stated "(expletive deleted) on that noise. Leave it clear or use trim tape!"

A "pull starter" is included in the kit, and consists of plastic belt. The belt is wrapped around the starter pulley and pulled back and forth until you can feel the plug firing. At this point the belt is pulled through allowing the engine to start and run. Until you get some practice, this method will require a helper to hold the helicopter, but soon, you will learn to pull it through with one hand. For electric starter use, the ends of the belt can be "welded" together to form an endless belt. The welding process involves heating both ends of the belt to about 400° F (soldering iron tip), then pressing the hot ends together. Instantly dip it in cold water, then the resulting bulge can be trimmed off leaving a smooth endless belt. Note that when heated, the plastic gives off a heavy smoke, and therefore this operation is best performed outside. If you use the "endless belt" and an electric starter, don't try to stuff the belt between the side frames — just let it rest in place.

Extensive flight instructions are given and, with the single exception of the recommendation of floats for the first flights, should prove helpful. We do **not** advise the use of floats, as they raise the C.G., add to the weight and generally create a roll over hazard. We do advise that you seek assistance if this is your first helicopter. However, if no assistance is available, follow the instructions and proceed slowly.

For us, the Heli-Baby has been a most satisfying helicopter, both in building and flying. With a little care, the Heli-Baby can be successfully assembled by almost anyone, in a reasonable length of time. Completion need not take more than a week of evenings regardless of

your level of skill. The kit is really complete, we purchased only the following — 1 G.I. Joe, $4.49; 1 package Sig L.G. clips, $.25. The engine and radio were borrowed from another project (incidentally, the G.I. Joe is required for balance — otherwise ballast must be added.)

Flight characteristics of the Heli-Baby can only be described as smooth. It has none of the twitchy tendencies one might expect of a small machine, yet when commanded, it becomes quite agile. Truly a versatile combination.

The Heli-Baby is an unusual machine — it offers the novice a high probability of success yet it is a machine which will prove gratifying to the accomplished pilot.

We have only grazed the surface with our descriptions of the new MRC Schluter Heli-Baby. The accompanying photos will further describe the machine, and hopefully be of help.

The Heli-Baby is currently avialable through your hobby shop or contact Model Rectifier Corp., 2500 Woodbridge Ave, Edison, New Jersey 08817.

Just a reminder, better helicopter pilots everywhere belong to the NRCHA — do you? NRCHA makes them better! (With the notable exception of Dewey, of course!)

Till next time — Soft landings! □

RCM SENIOR TELEMASTER

from page 63/56

servo compartment. Clamp the fuselage sides to the bulkheads while the glue sets up. Also glue the fuselage sides together at the tail.

Glue the other rear *3/16" x 3/16" CROSS BRACES* you cut in place on the "up" side of the fuselage. Since the fuselage sides are pinned in place upside down, the "up" side of the fuselage is the bottom, right? Also add the cross braces located immediately behind bulkhead #3 and 7½" behind bulkhead #2. ☆ Glue the *1/4" ply LANDING GEAR PLATE* in place on the fuselage. ☆ Add the three *1/4" x 3/8" BOTTOM STRINGERS* down the length of the fuselage so they butt glue to the back of the landing gear plate.

Remove the fuselage from the building board. Add the two outside *1/4" x 3/8" TOP STRINGER*. Cut and glue the *1/4" x 3/8" CROSS BRACE* on top of bulkhead #2 and #3 as shown on the plans. These cross braces should fit between the two outside top stringers. Sand the front of the cross brace on bulkhead #2 to an angle as shown on the plans. ☆ Add the center 1/4" x 3/8" TOP STRINGER. This stringer runs from between the two top stringers at the tail of the fuselage to the back of the cross brace on top of bulkhead #3.

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RCM SENIOR TELEMASTER

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Glue the scrap balsa *WING DOWEL SUPPORT PIECES* at the location of both sides of the rear wing elastic hold-down dowels. ☆ Glue *BULKHEAD #1* in place using the line you drew earlier for reference. Clamp the fuse sides to the bulkhead to assure a good glue bond. ☆ Glue the *1/2" x 1" hardwood ENGINE MOUNTING RAILS* in place. They should be at 90° to bulkhead #1. Clamp them to the fuselage sides while the glue dries to assure a good glue bond.

Cut and glue the *1/2" balsa TOP and BOTTOM ENGINE COMPARTMENT DOUBLERS* in place. They should be glued both to the fuselage sides and to the engine mounting rails. ☆ Glue the *1/8" ply HATCH MOUNTING PLATE* to the back of bulkhead #1 and to the fuselage sides. The top of the plate should be flush with the top of bulkhead #1. ☆ Add the *5/8" TRIANGLE STOCK* to the fuselage sides behind bulkhead #1, to the fuselage side in front of bulkhead #2 and along the front and sides of the landing gear plate. ☆ While the bottom of the fuselage in the area of the fuel tank compartment is still open, cut and fit the *5/8" balsa TRIANGLE STOCK* pieces that run across the bottom back of bulkhead #1 and in front of bulkhead #2 and set them aside.

Use masking tape to temporarily mount the *3/8" balsa HATCH* in place. Reach in through the bottom and mark the location of the fuselage sides on the bottom of the hatch. Remove the hatch from the fuselage and glue the *HATCH PINS* in place on the bottom side so they will contact the fuselage sides and extend beyond the back of the hatch about 1/2".

Install the *1/4" balsa sheeting FUEL TANK COMPARTMENT BOTTOM PIECES* cross grain. Drill a hole through the bottom in the engine compartment for fuel drainage as shown in the plans. ☆ Glue the *5/8" TRIANGLE STOCK* in place at the bottom rear of bulkhead #1 and on the bottom front of bulkhead #2. ☆ Drill the 1/4" holes for the wing elastic hold-down dowels. See the plans. The holes should be located such that the dowels will rest against their respective bulkheads. ☆ Glue the *1/4" WING ELASTIC HOLD-DOWN DOWELS* in place to the fuse sides and the bulkheads. Add the *3/16" x 3/16" balsa DOWEL BRACES* onto the bulkheads at the top and bottom of the dowels.

Shape the front edge of the *1/4" balsa CABIN WINDOW AREA BOTTOM (CROSS GRAIN)* and glue it in place between the fuselage sides. ☆ Shape the bottom edge of the *1/4" balsa WINDOW FRONT (CROSS GRAIN)* and glue it in place so it overlaps the fuselage sides. ☆ Mark the location of the center of the 1/8" ply hatch mounting plate on both sides of the fuselage. Put the *HATCH* in place and mark the location of the clearance hole for the hatch hold-down screw. Stick a pin through the hatch at the location of the clearance hole. Remove the hatch and check the

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location of the screw hole. If all is okay, drill the clearance hole through the hatch and hatch plate while the hatch is taped in place. Remove the hatch and drill out the hole in the hatch plate as necessary for the blind nut. To prevent the possibility of denting the hatch at the location of the hatch hold-down screw, some prefer to inset a piece of scrap plywood in the top of the hatch at the location of the screw.

Cut and bend the *DURAL ALUMINUM LANDING GEAR* to shape. Drill the holes for the 8-32 wheel axle bolts.

Drill the four mounting screw holes through the bottom of the dural landing gear. To mount the dural landing gear to the landing gear plate, orient the landing gear on the bottom of the 1/4" ply plate as shown on the plans. When the landing gear is centered on the fuselage, mark and drill one hole through the landing gear plate. Temporarily mount the landing gear with one 6-32 bolt tightened so it's snug. (When the installation is completed, blind nuts will be installed on the inside of the landing gear plate.) Measure the distance from the rear corner of each landing gear strut to a point on the center of the fuselage at the tail. When both distances are the same, mark and drill the other three landing gear mounting bolt holes. Remove the landing gear and install the 6-32 blind nuts by drilling out the side of the holes as necessary. A little 5 minute epoxy should be used under the shoulder of each blind nut.

Cut the slot in the tail of the fuselage for the tail gear tab. Glue and pin the *TAIL GEAR* tab in place. Mark and drill the hole in the rudder leading edge for the tail wheel arm ☆ Finish sand the fuselage, fin, rudder, stab, elevator and wing to shape as necessary.

Cut out the *1/4" PLY ENGINE BEARER PLATE* as necessary for your engine. Use the lines given on the plans to draw the cut-out for your engine. If the cut-out for your engine is smaller or larger than that shown, any cut-out should be parrallel to the lines shown on the plans and equally spaced from them. Drill the holes through the engine bearer plate and engine mounting rails for the plate screws and blind nuts. One of the advantages in using the engine bearer plate is that you can change engines simply by making a new plate. No need to plug holes in the engine mounting rails.

Because the fuel tank should be located in the position shown on the plans, a couple of 3/8" square hardwood motor mount rails (not supplied) may be used to support the fuel tank or the tank may be wrapped in foam rubber. Some sponge wing seating tape stuck to the top side of the rails will reduce foaming of the fuel due to vibration from the engine.

Cut the pushrod exit holes at the rear of the fuselage as shown on the plans. Then temporarily mount the rudder and elevator servos in the servo tray. While holding the servo tray inside the fuselage in the approximate location, mark the holes to be drilled in bulkhead #2 for the Gold'N Rod. Drill the holes. If you can't get your electric drill inside and don't have a Moto Tool, a piece of brass tubing with one edge sharpened and twisted on the bulkhead will do the job.

Add the *3/16" x 3/4" PUSHROD SUPPORTS* with holes drilled for the pushrod outer tubing. Relieve the rear most vertical braces as necessary for the pushrod tubing. ☆ Install the outer Gold'N Rod pushrod tubes by gluing them into the pushrod exit holes, the holes in the pushrod supports and to bulkhead #3. ☆ The three pushrod supports are very important to prevent flexing of the Gold'N Rod that may result in loss of desired movement of the elevator or rudder. For example, to give up-elevator and get only a bend in the pushrod sure won't help the plane in a vertical dive!

Prepare the stab incidence filler block by butt gluing 2⅜" long pieces of 1/4" x 3" balsa sheet together cross grain for the proper length. Glue the *STAB INCIDENCE FILLER BLOCK* onto the back of the fuselage, making sure that the top of the filler block is at 90° to the fuselage sides.

Cut the two pieces of 5/8" triangle stock to length that is glued under the stab incidence filler block. Round both ends of each piece as shown on the plans and glue them in place. Also round off the bottom front and rear edges of the stab incidence filler block. ☆

Add two 1/4" x 3/8" spruce center stringer doublers along the inside of the servo compartment from bulkhead #2 to bulkhead #3. This piece is used to mount the servo tray rails. The 3/8" side should glue to the stringer and fuselage side. ☆ Install the outer tubing for the Du-Bro FC 149 throttle cable linkage. Let the servo end hang free until the servos are installed. ☆ Cut the holes for the switch and charging plug in the fuselage side in the forward end of the servo compartment. The holes should be cut on the side of the fuselage opposite the muffler.

Seal the entire engine compartment, fuel tank compartment, hatch bottom and ends, fuel feed and vent holes in bulkhead #1, engine bearer plate, and screw holes with resin to prevent fuel soaking. If you're covering the fuselage with MonoKote, also seal the landing gear mounting plate and screw holes with resin. If the blind nuts are installed when you do the resin job, use the resin sparingly in the screw holes. Then, before the resin sets-up, install a screw with Vaseline on the threads to assure the threads are clear. The fuselage airframe is now complete.

FINISHING THE PLANE

The Big One may be finished by using your favorite technique. Whatever approach you use, work carefully so you don't get any warps in the surfaces. A little warp on that big wing turns out to be a lottawarp! That's one reason why we like using MonoKote. If you do end up with a warp you can just heat the top and bottom surfaces of the wing, twist it back the way you want it, and let the stuff cool. Saves a lot of steaming, bending, and so on.

If you go our route, it's usually easier to cover the fin and stab before they're installed on the plane. Here's how to go at it:

Temporarily pin the stab in place onto the stab incidence block. Slide the fin into the slot in the stab and pin it in place. Glue the *DORSAL FIN* in place onto the fin. Do not glue the dorsal fin to the fuselage at this time.

Because all of the stab/fin, stab/fuselage, and dorsal fin/fuselage glue joints must not be covered with the film, draw a line down both sides of the fin at the stab. Turn the fuselage over and draw a line down the bottom of the stab along the edges of the stab incidence filler block. Also draw a line around the dorsal fin on the center stringer. Remove the fin and dorsal fin assembly and the stab from the fuselage.

Now you're ready to cover the fin. The area below the line you drew on either side of the fin should not be covered. The bottom of the dorsal fin should not be covered, and the area between the lines on the bottom of the stab should not be covered. And, when covering the fuselage, the area marked under the dorsal fin should not be covered. In addition, the top of the stab incidence filler block should not be covered. Get our your iron and put on the MonoKote.

When you are ready to glue the fin and dorsal fin, and stab in place, make sure the stab is square to the fuselage. To align it, measure the distance from each stab corner to a point on the center of the fuselage at the front of the wing saddle. With the fuselage resting flat on your workbench or table, the same point on each stab tip should be the same distance from the workbench. The fin should be 90° from the surface of the stab.

When the wing is covered, an alignment mark should be made on the leading and trailing edge of the wing and a corresponding mark on the fuselage. First check the wing saddle alignment by setting the fuselage on a table so both stab tips are the same distance from the table top. Measure the distance from the table top to the front of the spar on each tip rib. The distance should be the same, if not, sand or shim the wing saddle as

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necessary. Then, with the wing in place on the saddle, measure the distance from each tip rib to the fuselage side. When the wing is centered, measure the distance from the rear corner of each wing tip rib to a point on top of the rudder.

When you've adjusted the wing as it should be, make the alignment marks. We've used a bit of Bridi Hobby Enterprises striping tape to do the job easily.

When the elevator is hinged, 3 hinges should be used for each elevator half, with the outboard hinge located just inboard of the tip rib. Four hinges should be used on the rudder with the top hinge within 1/2" of the fin top and the bottom hinge located just above the stab. Be sure to install the tail wheel arm into the leading edge of the rudder when the rudder is hinged. Add the *ELEVATOR* and *RUDDER CONTROL HORNS*.

To prevent the possibility of denting the wing leading and trailing edge with the wing hold-down elastic bands, a piece of aluminum may be cut from a beer, or pop can, and glued around the wing leading and trailing edge in these areas. See the plans.

GE Silicone Seal may be used to make a seal for the hatch to keep out engine oil or fuel. Put a bead of the seal around the bottom of the hatch and a piece of plastic kitchen wrap on the fuselage under the hatch so you won't glue the hatch in place to the fuselage. Put the hatch in place on top of the kitchen wrap and wipe off the excess. Let the stuff dry overnight.

INSTALLING THE R/C EQUIPMENT

With all of the room in the fuselage, the radio installation is a relatively easy matter. No trouble getting your hands, screwdriver, pliers, and pipe wrench in there! If the receiver, servos, and battery are installed properly, it should not be necessary to add weight to the fuselage to get the desired CG — unless, of course, you want to make your ship heavier.

After the plane is covered and/or painted, temporarily mount the engine, prop, muffler, landing gear and wheels in place. Install the aileron servo. Put the fuel tank and battery pack inside the fuel tank compartment at the approximate locations shown. Place the receiver, switch harness, and servos — mounted in your servo tray — inside the servo compartment. Put the wing in place with a few elastic bands and support the wing at the wing tips to check the CG. Move the servos fore or aft as necessary to get the CG. For insurance you may want to set up the plane a little bit nose heavier for the first flights by placing the receiver as far forward in the servo compartment as possible. Then, after you find out how the plane responds in the air, you can re-adjust the CG according to your own preference.

When the plane balances out as you want it to, remove the wing and all of the temporarily installed equipment and glue in the 3/8" x 3/8" hardwood servo tray mounting rails. The servo rails should be glued to the 3/8" sides of the spruce stringer doublers inside the servo compartment. See the plans.

Finish your rudder, elevator, aileron, and throttle linkages as necessary. We used Du-Bro's Solder Kwik Links soldered to the servo end of the Gold'N Rod and throttle cable.

If you are going to use the Hobby Lobby 6 radio servo mounting tray, you're all set as far as mounting the receiver. Simple, clean, easy, and neat. However, if you are flying a different radio you'll have to mount the receiver in a nest of foam rubber. Because the inside of the fuselage is so roomy — to say the least — some scrap balsa may be used to build a "cell" inside the servo compartment for the receiver. Build it large enough for the foam.

The battery pack should also be mounted in foam. Because the battery pack is in the fuel tank compartment and subject to possible fuel damage if the fuel tank or line springs a leak or comes off, we recommend putting the battery pack in a small plastic bag for insurance before it is placed in the foam.

We also use foam rubber to keep the wires neat inside the fuselage. With this ship though, you may want to use pieces of wing seating tape to stick the wires to the stringers inside the servo compartment.

That's about it. With all of the equipment installed and operating without binding, double check your wing, stab, and fin to make doubly sure you have no warps. Check the CG — with the fuel tank dry. Check the operation of your control surfaces: right aileron stick and the right aileron goes up and the left one goes down and vice-versa; pull down on the elevator stick and the elevator goes up; with the throttle stick full up, the throttle should be wide open, and rudder stick to the right and the rudder moves right — when you're facing in the same direction as the plane. Check all of the screws and such, crank up the engine, and you're off for some relaxing, enjoyable, fun-time flying.

SENIOR TELEMASTER BALSA AND PARTS LIST

The following is a list of balsa sheets, balsa strips, and other materials you'll need to get the Big One built. We've tried to call the shots on the balsa as close as possible so you won't have to buy more wood than necessary. The balsa sizes are from the Midwest balsa order form. Since the 5/8" triangular balsa called for in the plans isn't available, we used 3/4" triangular stock. In some other cases though, you have some work to do to get the proper sizes of wood. For example, to cut bulkheads #2 and #3, you'll have to glue two pieces of the 4" wide sheet together with the grain running vertical to get the width you'll need. Another thing you'll run into is that to get some of the different size balsa strips required, you'll have to buy sheet stock and cut your own. While that's not the way we like it, that's the way

article, or submit a construction article, contact Don Dewey, or this writer c/o R/C Modeler Magazine, P.O. Box 487, Sierra Madre, California 91024. The following subjects are scheduled; if you would like additional subjects, or questions answered **other than those listed,** please let us hear from you.

Mounting Engine & Route Fuel Tank & Throttle Linkage & Exhaust; Installing Radio — Waterproof Box & Pushrod Seals, Switch & Antenna; Trimming — Hydro & Mono Offsetting for Torque, Rear Sponsons, Weight, Prop Lift & Prop Walk; Prop Selection — "Lifting", "Non-Lifting," Shaft Angles, Balance Point, Surface, Submerged, etc.; Rudder Placement & Linkage, Types, Offset, etc.; Turn Fin Placement Hydro, Ski, Depth, Shape; Care & Maintainence & Operation of Engine (Do's, Don'ts) Tuning; Some Effective Engine Modifications; Starting Methods, Rope (Cross), Electric Starter; Exhaust Throttles & Venturis; Tuned Pipes for Boats & Tuning; Fuel Tanks for Boats; Pressure? Non-Pressure?; Popular Boat Engines & Their Selection & Comparison; What to do About Mufflers?; Exhaust Routing; D-V's & Enclosed Exhaust Boats; Linkages — General — Principles; Radio Care & Simple Maintainence; Adhesives — Their Use in Boats; How to Work a Bronze Prop, Annealing, Hardening, Pitching, Balancing, etc.; Fuels for Boats; Lubricants — Shaft (Flex. — Conventional); Pit Tools & Needed Items & How to Start Your Engine; Flex & Solid Shaft Set-Ups; Finishing & Painting Racing Boats.

Until next month, happy boating! □

RANDOM THOUGHTS ON SOARING

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to 20 mph and there was an impenetrable low stratus cover. The sun was never visible all day, and the wind never let up. Yet Greg posted a 10 and two 9's and Frank got two 9's and an 8, but lost!

The world of Standard Class is a totally different one. Luck plays a greater role, and the pilot is thrown more on his own resources, as he must constantly be coaxing and brow-beating the plane into doing what it really isn't capable of doing! Standard Class is my own first love, and so I'd like to spend a little of your time on a discussion of what's happening in Standard.

In many parts of the country, the Windfree is the predominant choice of Standard flyers, just as the Cirrus is in Unlimited. But in the Midwest and East, many areas find that the Olympic 99 is the dominant plane. There are a number of reasons about flying style and so forth that are adduced to explain this, but the probable reason is that the launch system in common use around here are too heavy and pull too fast to give a Windfree decent launch. Thus the lower aspect ratio, high area designs like the Olympic and the newer Windrifter are steady favorites. One of the most interesting things that one notices about the wide variety of Standard designs is that aspect ratio means so little. It seems that as aspect ratio goes down, chord, Reynolds number, and airfoil efficiency goes up at a rate which is just about fast enough to make an even tradeoff.

The penetration capabilities of all Standard machines are inevitably much inferior to the biggies, but I would like to mention a few things I've noticed. One is the Osprey, a nice slick design by Ray Hayes which has good penetration, strong wings, and a slick appearance. Plans are available straight from Ray at 7310 Cliftgate Terrace, Ft. Wayne, Ind. Tell him Tony sent you.

Another factor which I'd like to mention about penetration is more controversial. The oldest chestnut in the glider game is that an Olympic won't penetrate; yet there are scores of good flyers all over the country who make their Olympics penetrate effortlessly in nasty, gusty, turbulent conditions. There is no magic to this, but just a combination of simple logic.

First of all, the Olympic has an undercambered airfoil (NACA 6409) which operates at fairly

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RANDOM THOUGHTS ON SOARING

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high coefficients of lift (C_L). This translates into slow flight speeds, because speed is proportional to the square root of wing loading divided by C_L. So to make a 6409 fly as fast as a plane with an 8 oz. loading and a flat bottom 10 percent section, it has to have a loading of about 10 oz./sq. ft., maybe even a little more. This works out to a 53 oz.Olympic. Since most of 'em weigh about 44 oz., this means 9 oz. of ballast at the C.G. So that's the first step. The next step is skillful flying. The plane has to be flown in a straight line, if you want to go someplace. And you can't be forever stalling. A reasonably aft C.G. location and somewhat reduced dihedral are a couple of big helpers here: the effect is to reduce the inherent stability of the plane, thus making it stop trying to self-correct for every gust or gradient it hits.

This all sounds counter to what you may have been told, but it's easily verifiable in a couple of flying sessions. Incidently, while you're building your next Olympic, build the stab to the 88 outline, since it has more than it needs anyway.

Last year in five contests I attended which included a speed event, an Olympic 99 placed in the top five every time. Often the differential in speed scores between the fastest and slowest Olympic was two-to-one, reflecting nothing more than the hotter pilot's ability to fly a "slow" plane fast by intelligent use of ballast and proper trim. Local ace Bob Gill, who just finished his Level IV by getting a one hour flight and a 2.4 mile goal-and-return flight (1.2 miles each way) with his 4 lb. Olympic, sums it up:

"A lot of flyers start with an Olympic, then go on to something else and learn a new style of flying. They ought to come back and try out their new skills on their old Olympic. They'd be surprised." □

RACING AT RANDOM

from page 53/52

. . . . helped us in QM racing the past two years by producing new props for the event. It is props more than anything else that has increased speed. We now have a choice of several suitable props for any climatic condition. Engines should be propped to turn about 2000 rpm lower on the ground than the optimum power rpm. This allows the engine to develop maximum power in the air as the engine unloads and rpm increases. Some engines never attain really high rpm even on lower pitched props but can still get good airspeed with 7/6 props at lower rpm. Most of the newer ST .15's and K & B .15's like to run faster on a 7/5 or even 7/4½.

★ ★

Half-A racing has been going strong all summer with many races being held just about everywhere. Most of these races are pretty casual affairs and we don't often hear the results but that is okay since 1/2A **should** be casual racing. We do get concerned though when rules are so simple as to only require .049 or .051 engines to enter, as it does work for a few races, but second and third generation unlimited 1/2A racers go very fast which can cause loss of interest by the participants. It might be better to have more guidelines and keep the racing casual.

Lawrence Ranallo of Wickliffe, Ohio, wrote just to say that he is "so fired up about 1/2A, that everytime I see a .60 ship, I want to make it a 1/2A . . ."

★ ★

Our good friend, Carl Maas, sent us a report on the RC Bees first Quickie 200 race with twelve entries:

The first Quickie 200 race was received with a lot of enthusiasm. It proved that racing is racing no matter what the level. The pylon course seems to function best at 250' due to the small size of the aircraft. Re-starts were permitted if the engine quit from fuel surge during hand launch and worked out well. All contestants and spectators were surprised by the performance and fun. Many aircraft carried names such as the "Black Baron," "Rapid Rabbit," and "Pearl Harbor Special." Carl's son, C.P. Maas, finished first with a fast time of 2:01. The Bernie Weimmer/Bill Bell team was second and Carl Maas was third with Ethan Marsh fourth.

★ ★

By the way, the fastest time we have heard concerning a QM on the standard course is 1:45.5 and comes from Ralph Lang of Richardson, Texas, flying a Skyglass Minnow with K & B engine and Rev-Up 7/6 Series 400 prop. The race was held on June 1, 1975 in Austin, Texas, by the Austin Radio Control Association. □

QUICKIE BIPE

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. . . . gives long flights. Place the tank as high as possible. You may want to add a 1/8" tank floor.

□ Add 1/4" balsa noseblocks as shown on the plan and carve to a pleasing well-rounded shape.

□ Carefully sand the entire fuselage, slightly rounding all corners using a sanding block.

□ Install the dural landing gear by drilling two holes through the gear. Line the gear up so that the wheel axle is in line with the leading edge of the wing. If you plan to take off from grass, move the wheel axle 1/8" ahead of the wing leading edge. Mark the location on the ply bottom and drill 1/8" holes. Install blind nuts. Cut off the excess length from the 4-40 bolts. Both House of Balsa 8" dural gear and Hallco B105-3 were used on the prototypes.

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QUICKIE BIPE

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☐ Carefully round the edges of the fin, rudder, stab, and elevator. Cut strip hinge material into pieces 5/8" wide and drill 1/16" holes through the hinge as shown on plan.

☐ Carefully slot the tail surfaces for the hinges. Be sure to use at least 4 hinges on the elevator and 3 on the rudder. Do not epoxy in place until the plane is finished.

☐ Using 1/16" wire for the tail wheel, bend a 90° angle and drill a 1/16" hole into the rudder at the location shown on the plans.

☐ Carefully poke the wire down through, and out, the 1/16" hole you have drilled in the plywood tailpiece on the bottom of the fuselage. Bend the wire to accept the tail wheel.

☐ Temporarily re-install the rudder with hinges and plug the wire into the rudder. When adjusted for easy movement, solder a small washer to the wire at the bottom of the fuselage. A soldered washer takes the strain from the rudder. The rudder horn straddles the wire plugged into the rudder for strength in this area.

☐ Solder the tail wheel in place. You now have a steerable tailwheel.

Finishing And Radio Installation

☐ It is recommended that one of the mylar heat shrink covering materials be used for an attractive quick finish. Prototypes used Solarfilm with Regular MonoKote for trim. Dope and other finishes can be used but you are cautioned to be weight conscious!

☐ After finishing, permanently glue the wing hold-down dowels in place. Epoxy the hinges and control surfaces in place.

☐ Install the engine, muffler, prop, wheels, tank and control horns. Trial fit the battery under the tank and receiver and servos in the main compartment. Strap on the wings and shift the servos and battery forward or back until the correct balance is achieved. The balance point should be from 2¼" to 2½" back from leading edge of the top wing and **no further back!** When correctly balanced, the plane hangs slightly nose down when suspended on the tips of your index fingers placed under the top wing on each side of the fuselage.

☐ When the position of the servos is found for correct balance, epoxy two pieces of 1/2" sq. soft pine (not balsa) across the fuselage to support the servo tray or brick.

☐ Wrap the battery and receiver loosely in foam and put in a Baggie for fuel proofing.

☐ Install the inner pushrods (yellow) as follows: Cut off a piece of 2-56 threaded rod and screw into the pushrod at least 1/8". Screw on the clevis and insert in the pushrod case. Hook to the outermost hole in control horns.

☐ At the servo end of the pushrod, screw a section of threaded rod into the pushrod at least 1/8". Make a Z-bend in the rod and put on the servo arm. Make all initial adjustments at the servo end by screwing the threaded rod in or out to achieve a neutral condition at the control surfaces.

☐ 1/32" music wire is recommended for the throttle pushrod as it is easy to bend and yet rigid enough to actuate the throttle. Be sure the throttle linkage is adjusted accurately so that the throttle servo isn't in a stalled position at high or low throttle which can drain your battery pack and damage your radio.

☐ Set up minimum throw on the elevator so that you get **no more than 5/16" in each direction.** Set the rudder throw for no more than 3/8" throw in either direction.

☐ If this is your first radio installation, get an experienced flyer to check over your work before you attempt to fly!

Flying

The Quickie Bipe is a very easy to fly, 3 channel airplane. However, if you are a newcomer to R/C, get the help of an experienced flyer for those first flights. Many airplanes are destroyed by beginners on that first flight simply

because their reflexes can't cope with an out-of-trim aircraft. Be sure the person you get to help can put his **words** into **actions**. There are two kinds of experts; flying experts who **fly** and flying experts who **talk about flying.** (I resent that! - - - Don Dewey)

Use an 8/4 prop for .15 engines and 9/4 on .19 engines. Make sure everything is straight and true with no warps. Use at least 6 rubber bands on each wing. Be sure your trim levers are at neutral as well as your control surfaces. Re-check the aircraft balance with an empty tank.

The Quickie Bipe is capable of beautiful take-offs and landings and will fly very slowly without stalling because of its low wing loading. It is also capable of aerobatics with increased control surface throws, and will loop, spin, roll, and snap although it will not tolerate sustained inverted flight and simply rolls itself upright. I hope you have as much enjoyment with your Quickie Bipe as I have had with the prototypes. □

JOHN BAXTER

from page 40

· · · · Magnum 12. When John stepped off the airplane, carefully guarding his new airplane from the gusty winds, he was eager to get started but was skeptical of the wind. He was assured that conditions should be excellent for an attempt the following day. However, Mother Nature and the Thermal Gods did not cooperate and, of the two attempts on the goal-and-return, the longest was 6.21 to the goal and only 1 mile return. However, the shortest attempt was 4 miles which pleased John to no end with the conditions.

It was decided in mid-afternoon that John would go for the two hour task, which he easily completed with a total time of 2 hours and 3 minutes. John probably would not agree how easily he attained the 2 hour task, since the lift became so vicious that several times he had to deploy spoilers. On one occasion he had to deploy spoilers for a period of 15 minutes in order to keep his 12 foot airplane in sight! Towards the end of the 2 hour flight, John forced his Magnum down to a reasonable altitude because of the length of time he had already expended on his batteries. He landed the airplane at his feet, three minutes over the two hours!

On the second day, the first launch proved to be a poor one due to a tailwind. However, John worked his airplane up from 50 feet to a dangerously high altitude in a matter of minutes and started toward the goal. He quickly realized the plane was continuing to gain altitude so he deployed his spoilers and raced three miles with full spoilers, until he breathed a sigh of relief to find some down air. Unfortunately the downer was as good as the upper and he was forced to land after a run of 5 miles.

John disassembled the plane as quickly as possible, bounced and rattled over the dirty desert road back to the starting point. The plane was re-assembled and the hi-start untangled from what seemed like every bush and cactus within a mile. Launching again, the sailplane immediately started to gain altitude for another attempt. It was ascending so quickly that John began worrying again about excessive altitude so, while the plane was only about half as high as the first attempt, he started the run again. John started pushing occasional down elevator which caused such excessive air speed, even flying upwind, they risked life and limb, racing at speeds up to 35 miles per hour through ruts and gullys until it was thought that the car was flying as high on the ground as John was in the air!

The far end of the goal and the turnaround were in the suburbs of Albuquerque itself and there was, fortunately, some paved road, where the car could be driven at 35-40 mph without being bounced around as badly. Approaching the turnaround point, the Magnum again entered lift and soared, gaining altitude and, at the point of turnaround, John was higher than he had ever been. They turned around and headed back toward the starting point.

The flight back was downwind. John was still

climbing and began to wonder just how much faster they would have to drive to keep up the airplane. We wonder what the people thought who saw these "nuts" drive by, the driver staring intently at the road and speeding on, and another man equally as intent on staring into the sky — holding a box with an antenna.

At the end of the run, John still had plenty of altitude and began to fight the Magnum down with full spoilers, through the fantastic green air of Albuquerque. To everyone's amazement, John made the total run of 13 miles in 31 minutes and he did it without making any thermal turns. It was Johns turn to buy the steaks that night since this is the custom established by the four glider fliers who have also accomplished this goal-and-return task. Over dinner that night they re-lived every bump in the road and came to the conclusion that they were flying down a cloud street similar to ones that are so effectively used by full sized sailplanes.

Congratulations, John from RCM! You have worked hard, reached the highest soaring achievement possible, and well deserve the admiration of R/C soaring enthusiasts throughout the world. ❐

KALT HUGHES 500

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The photographs accompanying this article are a few of those that we took as we progressed with the instruction manual. Space does not permit us to present the step-by-step text since there were over 20,000 words in the finished manual. However, in this two part series we will try to photographically cover some of the highlights of building this magnificent Hughes 500.

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KALT HUGHES 500

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Some of the unusual and unique features of the Kalt Systems Concept are totally different from anything you will find in commercially available R/C helicopters today. For example, the rotor head is factory assembled and adjusted, and the rotor blades, laminated of Ramin hardwood, are factory balanced and completely finished, requiring no painting or covering. The tail rotor blades are made of similar material and are also factory balanced and pre-finished.

The Hughes 500 helicopter weighs between 9 and 10 pounds, depending upon what type of radio used and engine selected. Another advantage of this Systems Concept is that any engine from .40 to .60 cubic inch displacement can be used with the Fixed Pitch System, although a .60 engine is recommended if Collective Pitch is used. You will also find that the mechanical assembly of the Kalt System is easy to assemble, and requires no finicky adjustments. For example, the main transmission is virtually impossible to improperly assemble and, once assembled, proved to be the smoothest and most trouble-free transmission available today.

Another feature of the Kalt Systems is the standardization of mechanical hardware. For example, the majority of machine screws used throughout the system are 3mm diameter socket head screws with the exception of the smaller screws used in the tail rotor and for the canopy hold-down. And, unlike most helicopters, no material such as Loctite or Torqueseal is required since elastic stop nuts are provided for virtually every machine screw in the helicopter.

You will also find that the two-piece polyester fuselage for your Hughes 500, as well as the other Kalt fuselage configurations, are of the highest quality available with virtually no surface imperfections, and a maximum strength-to-weight ratio. The builder is cautioned not to be tempted to install butyrate windows in the side windows and doors of the Hughes 500 since these are deliberately left open for maximum cooling to the engine and drive train as well as for easy access to the internal drive train equipment. During the past years, adequate cooling has been one of the biggest problems with R/C helicopters, and the open windows on the side of your Hughes 500 will provide the cooling necessary to keep your engine and drive train in maximum efficiency. The open windows in no way detract from the overall beauty of the Kalt Hughes 500, and allows easy access to your radio and drive train for any necessary adjustments.

As can be seen from the photographs, the Hughes 500C fuselage is supplied in two pieces — the forward "pod" and the tail boom. There are several reasons for the two piece fuselage, the

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KALT HUGHES 500

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main one being that it is easier to install the brass drive shaft housing and the tail rotor collective pitch guide tubing before installing the boom portion onto the forward section of the fuselage. These two sections of the fuselage mate perfectly and can be faired in with resin and micro-balloons to a point where, when the helicopter is finished, no joint is visible whatsoever.

While, as mentioned, the instruction manual is quite extensive, the basic steps in assembling the Kalt Hughes 500 consist of installing the factory pre-cut bulkheads in place in the fuselage using resin and micro-balloon fillets as an adhesive. All of these bulkheads are of plywood and fit beautifully in the interior of the fuselage with only the slightest of modifications required for individual internal fuselage variations. Once the bulkheads are installed, the brass tubing drive shaft housing is joined together with a brass coupler and bent to the shape shown on the plans. This is then installed in the forward section of the fuselage along with the black plastic tubing for the tail rotor pushrod cable. When this is completed, the two fuselage halves are joined, the tail skid installed, and a radio box fabricated to house your receiver, battery, and switch harness.

Assembling and installing the drive train is quite easy and virtually impossible to assemble incorrectly. The transmission is the smoothest we have seen and is assembled by using Stabilit Express epoxy on the case half flanges and the six bearing races in each transmission case half. The transmission is assembled with the socket head screws and bolts provided and then mounted on the metal engine mount and drive train plate along with the engine, fan, clutch, shroud, and starting belt. For our prototype, utilizing the Fixed Pitch system, an Enya .45 with Enya muffler was used.

While any radio system can be used in the Hughes 500C, we used 4 channels of an R/S system with two of the servos located in the forward section of the cockpit area, as shown in the photographs, and two of the servos mounted on a servo mounting plate directly ahead of the main rotor shaft and in a vertical position for a direct connection to the cyclic controls of the swash plate. You will need to order extension cables from your radio manufacturer in order to extend the wires from the servos to the receiver. The latter being located in a radio box between the two forward servos. All radio manufacturers have these cables or will make them up for you.

(To Be Continued)

WINDHOVER

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both sides. Be sure that the grain of the blanks is parallel to the bottom of the templates, that the template bottoms are parallel to each other, and that the spar notches are aligned. Sand the ribs to shape using a sanding block. Work across the stack of blanks until the sanding block is in contact with both templates. This insures uniform taper in the completed ribs. You will notice a marked angle in the edges of the completed ribs. For this reason, reverse the positions of the templates when sanding the other set so that this angle will also follow the taper of the opposite wing panel. When sanding is complete, use a razor saw to cut in the sides of the spar notches, employing the pre-cut templates as a guide. The excess material will break cleanly out of the ribs after unstacking. Finally, to avoid confusion, number the ribs as you unstack them, beginning with the root rib as W1.

The construction of the actual framework is begun by pinning the fixture over the plan. Remember to place the base exactly

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WINDHOVER

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perpendicular to the spar line. Using a flexible straight edge, mark the spar line on the fixture, and then mark the rib locations. Now, cover the plan and fixture, and pin and glue the 1/16" balsa bottom sheeting and capstrips. It is best to cut the 1-1/2" trailing edge bottom sheeting from one 3" wide sheet. Use one half for one wing panel and save the other for the second panel. This will insure an equal amount of flex in both pieces and avoid an unequal curvature in the elliptical tips. It is not necessary to soak any of the material in the tips, to achieve the curvature, but the bottom leading edge sheeting will follow the curve of the fixture more easily if you trim it roughly to shape. Next, glue on the bottom main spar, slanted stub spar, and tube spar, and add ribs W4 through W20.

To install the wing wire tubes, carefully mark the positions of the tube holes on rib W1. Drill the holes using a sharpened piece of 3/16" O.D. brass tube for the front hole and a similarly sharpened piece of 5/32" O.D. tube for the rear one. Now rib W1 is available as a jig. Use it to drill the remaining ribs, W1 through W3, one at a time, for both panels. Align each of these with W1 by placing them on a flat surface over a scrap piece of spar material. Also, remember to delete the rear hole in both W3 ribs. In order to insure correct tube placement in the wings, I like to use the wing wires as a jig. To do this, first cut the 3/16" x 1/4" balsa lower tube spacers to lengths which match proper rib spacing. Next slip the brass tubes over the appropriate set of wing wires, and slip ribs, W1 through W3 over these. Glue in the lower spacers to get the correct rib spacing and to add stiffness, and then, holding the fuselage beside the work surface, press the structure flat so that the bottoms of the ribs are parallel. When dry, remove the assembly from the wires and place it over the wing structure. Mark the locations of the necessary stub spar and tube spar notches on the ribs, and cut them free hand with a razor blade. Now, glue the tube assembly in place over the wing structure. Next, add 1/4" balsa scrap as necessary to bring the tube assembly to the level of the top spar. Then, add the top, main spar, stub spar, and tube spar, the false leading edge, and all required 1/16" vertical grained balsa webbing.

The top trailing edge sheeting for both panels is cut from a single sheet of 1/16" x 3" x 48" balsa, as was the bottom sheeting. When gluing this piece in place, allow the material to run-off the back of the wing as it is forced down onto the curve. The approximate line that it will take is shown on the plan. When dry, remove the wing from the board and carefully trim the top trailing edge sheeting along the back edge of the wing. The resulting piece, when flipped over, will exactly fit the space left in the top sheeting. After sanding the false leading edge to shape, repeat the above process on the top leading edge sheeting. Now, add the remaining top sheeting. Trim and sand the sheeting along its front edge and glue on the solid leading edge. Next, add the 1/16" x 5/16" top capstrips. The tips are carved from 1" x 2" x 6½" balsa blocks, which are first glued to the ends of the panels. Also, a 1/16" x 1" x 5" ply tip plate is added to the lower rear corner of the block, prior to shaping. The inside curve of the tip is best formed by wrapping sandpaper around a large thread spool, a section of broom handle, or a similar object. The 3/16" balsa root fairings complete the wings. Attach these in two pieces, one extending ahead of the front wing tube, and one extending behind the rear tube. These are then sanded to conform to the root section and the curve of the fuselage sides.

Finishing, Trimming, and Flying:

After sanding the entire structure, I applied two heavy coats of finishing resin to the fuselage and rudder. This was then wet-sanded, and sprayed with an epoxy base paint. The article prototype was finished in a similar manner, and the wings and stabs of both were covered with a heat-shrink covering material. However, I see no reason why other conventional finishing techniques could not be used.

As mentioned earlier, both aircraft flew well, directly off the board. If you use the indicated CG and towhook positions as a starting point, I am certain that you may expect similar results. The aircraft's design automatically yields a slightly nose-down attitude in flight. If you are not used to this appearance, you may be tempted to employ too much up-trim, resulting in a deterioration of performance. Also, for those of you who are used to ships with a conventional tail-moment, Windhover may seem touchy in elevator response, particularly when the speed is increased on those inevitable hot spot landings. However, with a minimum of practice, you will find that this sensation will disappear. If it does not, try limiting the elevator travel with a smaller servo arm.

The principal benefit of the ship's elliptical tips is that they allow extremely tight turns without an appreciable loss of altitude. This is of particular importance when working lift at low altitudes. You will discover that once centered in a thermal, the aircraft requires almost no rudder command to keep turning. Therefore, the best indication that you are losing center is a pronounced increase in the need for rudder commands.

Both existing Windhovers have been launched from winches, hi-starts, and hand-tows. They have been flown over both flat land and slopes, and have turned in consistently satisfying performances, even under the most extreme conditions. In fact, last year in a contest south of the Twin Cities, my Windhover took a first in class and a first over-all, in a wind that must have been gusting to 40 mph. The only damage it incurred during nine rounds of flying was a broken rudder when, before I could retrieve it after landing, the wind sent it cartwheeling across the field.

This aircraft continues to be my most satisfying design to date, and I am certain that my present skills as a pilot have not allowed me to tap the ship's ultimate potential. It is sufficiently stable to be flown by the novice, but will present a challenge to the seasoned competitor. I hope you enjoy your Windhover, as I have enjoyed mine. □

CUNNINGHAM ON R/C

from page 18

officials are cooperative. We have a muffler rule at the Thunderbird field, and we use mufflers on engines down to about .19, but even this is too loud to fly within the confines of a city most of the time. Yesterday, I was having trouble with my Sears lawnmower, and I had to tip it over to clean out its metering valve. I got to looking at the muffler system on this mower which, as 3 H.P. mowers go, is pretty quiet. It had a pipe leading away from the engine exhaust opening to a muffler located in the front of the engine. From this muffler, another pipe led to another muffler which finally exhausted the spent gasses underneath the blade housing. As I said, this is a quiet lawnmower. My other mowers have all had a small muffler located right where the exhaust gasses exit from the engine, and they have muffled about as well as those located on our engines. How about a dual muffler set-up with a pipe connecting them? Clarence Lee mentioned several things that would help to lower the sound, such as thicker walls on the mufflers, etc., but how about cascading the muffler pipe approach to develop a muffler system?

It is important. We have plenty of power, but what we also have is plenty of noise. We need to curb the noise as much as possible, and to keep as much usable power as possible, and yet try and gain flying spaces. If the loss of club flying sites in the past has not been enough incentive to really develop a quiet system, the inability of getting to the flying sites in the future may provide enough push to get brains working in high gear.

For example, would some sort of a water chamber work? How about a jacket of water surrounding the muffler body? Would a long pipe leading away from the muffler help quiet it down? I have tried a three foot piece of garden hose wired to the muffler stack, and the noise is much less, so is the glop on the aircraft, but the power is way down and the back pressure too much. Perhaps a long hose or pipe with openings in it every now and then to let some of the gas pressure escape before it gets all the way to the end. The noise of the prop is really very slight, and most of the noise is coming from the engine. The Wankle .30 with muffler attached is so quiet that it sounds much less noisy than a lawnmower, and is the quietest engine available today — and with more power than any engine of comparable size. If we could get our sound down to that of a lawnmower from 100 feet away, I think that we could fly from just about any schoolground around.

The bark simply has to go, and the sooner the better.

• • •

This months tip for the beginner is one dealing with economics. As the price of balsa and kits climbs ever higher, you must become more selective not only in what you want to build, but how you want to build it. Even if Joe has a new Super Whipper Snapper, do you really need one? Do you really need to add to your collection of balsa wood?

If the answer is yes, then when you acquire that new kit, or the balsa wood, build carefully so that your efforts and pocket book are not wasted on a poorly built model. Each model builder doesn't have to turn out a terrific work of art each time that he constructs an aircraft, but neither does he have to turn out a bunch of junk that will hit the scrap heap shortly. Be sure that the important parts are done correctly, that the hinges are installed right, and that they won't pull out. Be certain that the control system is installed so that a pushrod won't flex at the wrong time and prevent you from getting up-elevator when you need it. Be sure that the battery is protected from the fuel tank with plastic wrap. Assure yourself that engine vibration is minimized at the radio and servos by installing them according to the manufacturere's directions, and that the screws holding each of the radio components are not screwed down tight, but that the heads of the screws just touch the rubber grommets.

It's your time, money, and effort, but take the trouble to look after the little things — this will save you lots of money in the long run. □

SUNDAY FLIER

from page 16

The best thing to do in this case is to set your transmitter down and watch. Let's face it, you aren't going to do much else. That was my best engine too.

So from one "expert" to another, take heart Ken, you're not alone. Look at it this way – RCM could be located in San Jose instead of Sierra Madre, then the "great one" himself could help you over your little problems. See it wasn't as bad as you thought now was it?

Bill Brown
Medford, Oregon

I should be so lucky, Bill. Remember, I disqualified (disqualified?) Don Dewey right at the start. The Great Hacker is in a class by himself.

But for those of you who fly rudder-only, there is a way to make it penetrate. Takes a bit of practice, but it works. Put the plane in a spiral dive with rudder, bring it out headed into the wind, and as it starts to balloon from the excess speed, give it rudder and do a barrel roll into the wind, then another, and another. That way, instead of spiralling down, you are spiralling into the wind. Try it.

Lelon Miller, of Wendell, North Carolina, almost won the boo-boo prize with this letter:

Dear Ken,

Being an avid reader of your column, I feel that I must write as you requested in your "dumb" column in the June issue.

First, to put all things into proper perspective, a little of my past. I am an ex-member of civil air patrol, a modeler since a small boy (now 35 and still my wife's small boy) and last, I was an aircraft and powerplant apprentice for two and 1/2 years.

With the above info in mind, the following account of one of my "dumb" Sunday flying (attempted) sessions will tend to show my true smarts.

First flight was with a Lanier Sprint, whose engine leaned out in a wide turn at about 50' and it began to sink, to which we gave the "normal" up elevator control. The resulting stall, snap and destruction didn't dampen our spirits, because the new unflown Falcon 56 is in the car, out comes the Falcon 56 – Down the runway, up and left bank. Right aileron control results in left knife-edge and back to the ground. No damage – spirits still good. We re-connect the ailerons properly (dumb) and up again. Second flight, the bargain Ueda .19 engine spits out its entire crankshaft. Spirits are still good because we have a nice O.S. Max .35 in the flight box. So we install it, add tail weight and prepare to fly the still nose heavy aircraft. (We can handle it!). "DUMB"

We proceed to take off. Airborne and we have a monster on our hands, so an attempt to circle the field, ends in a landing in the top of the tallest pine in four counties. The last two items on the days agenda consisted of paying a kid (Conviently on hand) my last 5 bucks to climb the tree and drop out my plane and then drive home, during which my wife asked, "Could we eat out?" After my explanation, her last statement was "You sure are dumb."

Lelon A. Miller
Wendell, North Carolina

Of all the things you tell about, Lelon, the dumbest was not to have your checkbook with you! That's what my wife says.

Lord love us! Even a "man of the cloth" lays claim to the title. Reverend Robert W.L. Mark of the First Presbyterian Church in Hawley, Pennsylvania, has a few "faith testers" to tell us:

Dear Ken:

I certainly enjoyed your recent article called, "Dumb, Dumb, Dumb." It brought back many memories. I always read your articles with interest, especially the ones about water flying, which is my specialty. I also fly an Ace High Glider, which flies beautifully, but there is no thrill like seeing a seaplane take-off, fly around, then make a fine landing, and then taxiing back to the dock. I guess at one time or another I have built and flown nearly every type of seaplane and float plane.

Here are a few of my dumb mistakes:

(1) One day my son and I were trying to get my Navigator to take off without success. So we decided to try to launch it from our boat that had a 40 horse outboard on it. My son held the plane in the front of the boat, while I held the transmitter and also ran the boat motor. When we got up to a good speed, I told my son to let it go. It launched very nicely right in front of the boat, but after flying about 20 yards the engine quit and down came the plane right in front of the boat. I tried desperately to miss it but it went right under the boat and was chewed up by the boat propeller. We circled right away to check on the floating debris. Most of the plane was in little pieces floating everywhere. But fortunately a piece of the fuselage was still intact with half of the wing still held on with rubber bands. We scooped that up and found that the receiver, batteries and servos were all there, but completely soaked. However, after drying everything out the radio worked as good as ever.

(2) Another day I was flying a Seacat. Unfortunately, I launched it without turning on the receiver in the plane. It flew quite low over the water and headed straight down the lake. In a short time we realized that it was heading directly toward a boat with a lone woman in it who was fishing. As she saw it heading for her, she stood up in the boat and picked up an oar, and then waited for it to get close enough so she, in self-defense could knock it down. She looked like a baseball player holding a bat. At the last minute it veered off and crash landed in the water. I'll never forget the memory of her standing there waiting to clobber my beautiful plane.

(3) Another time at the lake, I launched my Navigator on a very windy day. I knew better, but there were people around begging to see it fly. Well, fly it did, but as I was bringing it back from a flight it headed straight for the trees along the shore. Just as I was trying to get it away from the

trees the engine ran out of gas, the wind pushed it, and it flew high over the trees and back into the woods. We all heard the sickening sound as it hit a tree trunk head on. We all raced into the woods to find it. The funny part was that it hit a tree and came down in the yard of another cottager with whom we were not on very good terms. As we got to their cottage there was my plane lying right on their doorstep. It was an embarrassing moment for us all. But they were gracious enough not to gloat over the fact that the plane was destroyed. Fortunately, it had not done any damage to their cottage.

(4) Another time I had a fine flight over the lake, but as the plane was gliding in toward our dock, the wind caught it, and before I could do anything, it flew right into the screened-in porch of our next door neighbor. There were people sitting on the porch watching everything with interest, but it was somewhat difficult to go over to them and apologize for my flying mistake. But they were good friends of ours and the screen on the porch was not broken, so everything ended amicably.

(5) I actually lost three good Navigators by letting them get so far away over the lake that they went out of sight and believe it or not, despite diligent searching, we were never able to find any of them. No doubt they glided down wind for a long distance before crashing in the tall pine trees. It is amazing how hard it is to find a plane that is lost in the deep woods.

These are just a few of the many experiences I have had over the years. Most of the mistakes I have made were dumb ones, I knew better, but in the excitement of flying I made mistakes I should never have made, because I really did know better.

In addition to my Ace High Glider, which just this afternoon I glided into the top of a high tree, where it will have to stay until the wind blows it down, I also have a Jr. Falcon on floats. I tried it

for the first time on the lake a week or so ago and it handled beautifully on the water, but refused to take-off. I have now changed to an .09 Enya engine, which is new. If that doesn't work I'll try my O.S. Max 15. The engine on it at first was an O.S. Max 10. So I keep trying and making adjustments, but I fully expect this Jr. Falcon on floats will eventually fly off the water very well. I have three channel equipment in it.

Best of flying to you,
Robert W.L. Mark
Hawley, Pennsylvania

Reverend, after all those incidents, the fact that you still have faith that your Junior Falcon will take-off water shows that you still believe.

But don't try to walk out to retrieve it!

Ted Shields almost has a winner, over in Wheeling, Illinois. Here's his gem:

Dear Dumb Dumb,

I am afraid that your impressive collection of minor mishaps and major miscalculations pale into insignificance when compared with my most devastating blunder.

Having been a C/L model builder for many years, but only recently joining the ranks of the R/C nuts, I am still ultra-cautious about such oversights as hooking up control surfaces backwards and forgetting to turn on receivers and transmitters. I did however, manage to destroy a new creation in a manner so unforgivable as to forever rank me among the klutzes of all time.

I was in the final stages of silking the fuselage of my new Ace Pacer, and must admit my mind was in the clouds with my ship doing snap rolls and consecutive loops. With loving hands, I gently lifted my object de art from the bench and temporarily placed it on the stool behind me while I cleared away the rubble from the work area. One more loop and a low pass over the field would culminate my ethereal flight plan. I hardly heard the crunch of balsa as I sat back down on the object of my hallucination to contemplate the next flight.

Sincerely yours,
Ted Shields
Wheeling, Illinois

Breaking up a plane is tough, Ted. But John Linke tops you, I'm afraid. The streets of Colorado Springs are deadly:

Dear Mr. Willard,

I read with interest your DUMB column in the June issue of RCM and it brought big alligator tears to my eyes. I've done most of the dumb things you mention. Forgetting to switch the receiver on before launching my glider, cost me a Windfree. Setting up a wide approach and landing my Falcon in a tree. But undoubtedly the dumbest was just recently. I packed up Mama, the baby and my Silent Squire and headed out for some slope soaring into a fine east wind. I got my wife and daughter into the car and laid the airplane and transmitter on top of the car to fold the front seat forward. With the airplane in the

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SUNDAY FLIER

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car. I cranked up and backed out from the parking lot and accelerated smoothly to the street. Clear left and right, I pulled out to the stop sign and waited for traffic to clear. Aha! A wide spot. I nailed the accelerator and lept forward into the traffic lane. I heard something hit the trunk, then the pavement and looked into the rear view mirror to see the transmitter laying peacefully on the highway. I immediately pulled to the shoulder and ran back after it. One car missed and a ray of hope beamed, now if the second one will just miss. Not my day I guess, the second car ran smack over the top of the transmitter with disasterous results. I waved, hollered, swore, all to no avail. Then I wept! Talk about dumb! Now I carefully make sure my other transmitter is safely in the car prior to sticking the key in the ignition.

Just thought I'd make you feel a little better about some of the things you've done. I read your column every month and enjoy it. Keep it up!

Much thanks,
John Linke
Colorado Springs, Colorado

Thanks to all of you for writing — and to the many more who did things dumb, but not quite equalling the exploits of our winner, Lawrence Ranallo of Wickliffe, Ohio. Short, but supremely stupid:

Dear Ken:

Before R/C, I always read about the stories in the newspaper, "How stupid can you get." My story is that I knew I had forgotten something. Still preying on my mind, I jumbed in the car, started it, threw the car in reverse, then lightning struck, I had forgotten the transmitter; jumped out of the car, with the motor running, the gear shift still in reverse, ran down to the basement, and as I was coming back upstairs, I saw the car slowly creeping backwards; then "Oh my God what did I do!" By the time I got out the door, the car was across the street on the neighbor's lawn, the motor still running. The neighbor came over from his backyard (this man had just moved in) with a smile on his face asking what I was doing parking my car on his new lawn. So that is how my new neighbor found out I fly R/C.

Best regards,
Lawrence Renallo
Wickliffe, Ohio

You'll be getting your subscription notice in the mail, Lawrence. Walk, don't drive, to the mailbox.

I feel better. □

QUO VADIS

from page 12

. . . . . AMA members none of whom are directly or indirectly affiliated in any way with this publication. In addition, the key to the entire object of this survey was the word "can" in the sentence "now there can be an alternative to the AMA." Just as the Republican party is an alternative to the Democratic party, and vice-versa, there can always be room for an alternative in a democratic society. And, the author of this editorial obviously failed to notice that this same survey form for the U.S.A. was run in each and every model aircraft magazine published in the United States. All of the results are being tabulated and will be forwarded to all of the special interest organizations and to the Academy of Model Aeronautics as well. Both the President of the AMA and its Executive Director are aware that they will receive the results of this survey. And this will be in the form of the original responses from the individuals who returned the survey, and not a hypothetical tally of questionable figures. The entire purpose of this survey was to determine the satisfaction or dissatisfaction of individual Academy members with a current responsiveness by the Academy of Model Aeronautics to its individual members. To date several thousand surveys have been returned to this publication – I can't speak for the number received by the other magazines – all from current AMA members, of which less than a total of 75 were satisfied with the current AMA organization.

With regards to the so called "low-brow, knock the faults of the establishment" editorial referred to in the same paragraph by the author, any publication has the right, as well as the responsibility, to show both sides of any controversy. If this were not the case, how then would the editorials appearing in this issue have appeared at all? Or, for that matter, how would any editorial critical of a position taken by RCM have appeared in past issues of this publication?

With regards to paragraph ten, I'm sorry, but I am not a life member of the Academy, but have been a Leader Member for the past fifteen years. The important point in that paragraph is that the AMA's membership **should** *make my voice, or any other individual's voice, sound like a "pin dropping on a shag carpet." In a conversation today with both John Worth and John Clemens, our mutual concern was the fact that there is a definite lack of voice on the part of the AMA member – when less than 10% of the total membership of the Academy cares enough to vote for their elected officials, and when those elected officials find it almost impossible to get an input from their own District, then they must make decisions on matters of importance to each and every member based on what they* **think** *the membership would want, and based on their own best judgement. It is for this reason that I commend you strongly for writing this editorial, and I would hope that whether the editorial be yours, mine, or someone elses, somewhere along the line – that one or more of them would stimulate the average AMA member into voicing his opinion as to what he expects as an Academy member as well as what he proposes to do for his*

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QUO VADIS

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organization. Remember that an autonomous body is diminished into an autocratic society by the cancer ation of appathy.

The only exception that I will take to your editorial is that concerning "profit and stockholder domination." R/C Modeler Magazine struggled, as any young business does and did not even break even for the first seven years. Since that time, RCM has made a profit, as all businesses must. But not one cent of dividend has ever been paid to a stockholder, and all profit has been divided into two areas – (1) Continually expanding the magazine in quality and content, and (2) Donating the balance of the profit to the very persons the editorialist is most concerned about – the "members." This year, to date, RCM has contributed over twenty thousand dollars in the form of cash outlay, to various clubs, contests, and special interest organizations for the general promotion of this hobby. In addition, the NMPRA, the LSF, the NRCHA, the IMPBA, as well as many other organizations were originally financed wholly or in part, by R/C Modeler Magazine and then turned over to their respective groups when they had become self-sustaining. All of this money was donated by R/C Modeler Magazine in the belief that we have an obligation to contribute more than time, effort, and devotion to a hobby from which we derive our own livelihood. And if you ask any of these organizations, you will find that there never were, or are there now, any strings attached to that financial assistance. The same holds true for the full color advertising donated to the Academy of Model Aeronautics and prepared at RCM's expense for them as well as the long standing offer to donate the eight or more pages per month needed by the Academy to present their news section following the demise of the original Model Aviation magazine.

All of this is simply an answer to the question posed in your last paragraph . . . Don Dewey. ❑

ENGINE CLINIC

from page 86/10

pressure rise due to the fact that the carburetor inlet is generally located just aft of the hub region of the propeller and more or less parallel to the airflow. It seems that the carburetor could be designed to take advantage of the propeller pressure rise such that engine performance is increased independently of aircraft speed (see sketch). An index mark might also be provided on the crankshaft to allow precise orientation of the propeller to synchronize the pressure pulse from a passing blade with the induction operation.

Unfortunately, I have not had the time to investigate the merits or demerits of these ideas. My question is whether any model engine manufacturer has studied the supercharging phenomenon.

Yours truly,
Richard S. Reuland, Jr.
Montreal, Quebec

The use of ram air is an old trick dating back to the beginning of model engines. I can remember fellows putting bent tubes on their old side port engines to face into the prop blast back in the late 1930's. Many of your early engine designs such as the Super Cycle had the intake cut at a steep angle to take advantage of the prop blast. Even today some of the fellows flying U-control rat race and similiar events are angling the intake on front intake engines to take advantage of prop blast. Many types of ram air ducts have been used in U-control speed, R/C pylon, etc. However, it has been found that ram air directly into the intake only causes problems obtaining a consistent needle setting. As air speed increases so does ram pressure which, in turn, effects the mixture setting. It has been proven best to get all the air

you can to the carburetor area without actually forcing it directly into the carburetor.

Dear Mr. Lee:

I am gradually learning about R/C engines from your articles. I also have your book "The R/C Engine" Vol. I, but I have only skimmed through it so far. I have a question that I have been unable to find answers to. If I have overlooked the answers in your book, please excuse me.

Oddly enough I understand pistons, rings, ports, etc., better than I do the basic procedure for adjusting the carburetor. For example, I have an Enya .29, and no directions came for carburetor adjustment. I understand that one screw is for idle and the other is air bleed, but quite frankly I don't have the guts to experiment with them and possibly learn the hard way. Is there a simple, basic procedure that covers K & B, O.S., Fox and Enya?

Sincerely,
Dennis E. Jaques
Coldwater, Michigan

Obtaining a good reliable idle can be a frustrating experience quite often due to so many variables being involved. Fuel, tank position, glow plug, particular engine in question, etc.

There are several methods of checking a carburetor for correct idle adjustment (other than if the engine keeps running). All carburetors have a screw on top that raises or lowers the idle speed. A good idle speed is in the 2500-2700 range. Many times fellows will try and idle an engine

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1975 RCM / PIONEERS 1/2A TROPHY RACES

WHERE: Pioneers R/C Airfield, Sunnyvale, Calif.

WHEN: Sunday, September 21, 1975

PROCESSING: 8:00 AM - 8:45 AM

ENTRY FEE: $3.00 — Trophies to 5th Place

RACING: 9:00 AM - 3:00 PM (Approx.)

RULES

RCM 1/2A rules. Take-off required. Starting position by drawing lot. Pilot canopy, cockpit or cabin required, but prototype full scale similarity waived. (See May 1971 issue.)

CONTEST DIRECTOR: Dick Aubert — Phone (408) 734-4224

SPECIAL ADDED ATTRACTION: RCM Quickie 200 Event (must have canopy to meet 8½ sq. in. cross-section rule — at least 1⅝ sq. in. canopy X-section). Will race with other designs, but separate trophy for highest placer, if minimum of five Quickie 200's enter.

ENGINE CLINIC

from page 143/10

below 2500 for which there is no need and then wonder why they have problems. When first trying to set the idle on an engine that may be giving problems, set the idle speed in the 2700 range until you do get the engine halfway idling. You will have to borrow somebody's tach to do this. With the engine idling, if it speeds up and dies it is too lean so the mixture needs to be richened. With engines using air bleed type carburetors (these are the ones with a drilled hole somewhere on the top or front) turn the screw in slightly which, in turn, closes the bleed hole, richening the mixture. If, on the other hand, when closing the throttle to idle, the engine gradually slows down and dies, the mixture is too rich. So back the bleed hole screw out slightly admitting more air to lean the idle mixture. These same steps also pertain to carburetors that do not have an air bleed but have an idle mixture adjusting needle.

On air bleed type carburetors you can also try the "tip" test. With the engine idling, lower the tail of the ship. If this improves the idle, the mixture is a bit rich and needs leaning. If, on the other hand, the engine dies, the mixture is too lean. Then raise the tail. If this improves the idle then the mixture is too lean and needs to be richened slightly. If the engine dies the mixture is too rich and needs to be leaned. The "tip" test will only work with the airbleed type of carburetor. Those with separate idle mixture needles usually have stronger fuel draw and will not be affected by tipping the model.

One other good test is to simply fly the model. If the engine idles okay on taxi-out but dies as the tank empties, the idle mixture is lean and needs to be richened. If the engine dies during taxi-out but gets better towards the end of the tank run then the idle mixture is too rich and needs to be leaned slightly.

Hope the above will help you, Dennis. Get over your fear of touching the carburetor screws and do a little experimenting. It is the only way you will learn and gain experience.

Mr. Lee;

I would like to get some information from you if you know the answer. I have a Wankel .30 and have heard that it doesn't put out the power of a regular .30. Could you please let me know what regular engine it is equal to in power output.

I am building an Antique Aero Products Curtiss "Robin" with a wingspan of 61½" and the plans call out for engines from .19 to .29, so what I would like to know is if I could use the Wankel .30 in this aircraft or not. I'm using 4 sub-min. servos so that takes some of the weight off the foward end also.

Thanking you,
Edison S. Berry
Montclair, California

Someone gave you some wrong information, Mr. Berry. The Wankel will put out as much power as any conventional .30 displacement engine and in some cases more. The O.S. Wankel will power any airplane intended for a conventional .29. The Wankel likes to turn up so don't bog it down with too much prop — it is not a lugger. Use a 10/6 or 10/5, nothing larger.

Mr. Lee,

As a sport RC modeler, I am interested in a reliable running engine, so I add one ounce of castor oil (Bakers AA) and one ounce of Hoppe's #9 to each quart of my sport fuel. From past articles in RC Modeler, I assume that these additions present undue engine wear, and present undue varnish accumulation.

My dealer informs me that the new engines do not need additional lubrication and that the varnish buildup is no problem (this is the same dealer that ran down the Flite-Life), so I purchased one at a Kent, Washington dealer (I still think it is a useful item).

I use only OS Max engines. I have two OS 40

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CORRECTION

The Wing Mfg. ad on page 106 of the September 1975 issue states "Introductory offer $29.95." This was printed in error and the correct price is $39.95.

ENGINE CLINIC

from page 146/10

RC, one OS 60 Blackhead RC and one OS 80 RC, all with mufflers.

Please advise. Am I correct in adding these items to my fuel, or am I merely wasting time and money on these additional items?

Sincerely,
Ken Lemke
Yakima, Washington

There is nothing wrong with adding extra oil to your fuel during the break-in, Ken. Any hobby dealer that told you different has had little experience with engines or burned a lot of engines up. It is true that many of your new engines can be flown out of the box without any special precautions other than to run them rich as opposed to the old days when many engines required a lengthy break-in. In that regard any lapped piston engine is going to require more care during break-in than a ringed engine. At any rate, the addition of extra oil during break-in is a good safety factor which I recommend. Just in case you get off a little leaner than expected, that extra oil can do nothing but help.

An ounce to a quart is a bit more than necessary. Two ounces to a gallon is ample with most fuels. Extra oil and rich running will create more varnish and carbon so best to not use more oil than is really necessary. Also, only use the extra oil for the first hour of running time. Do not prolong the rich running any longer than necessary as this only contributes to the varnish and carbon build-up.

As mentioned in two previous columns I do not recommend adding Hoppe's #9 gun cleaner to the fuel. Although it does help keep the varnish build-up down, you are using a very toxic chemical not intended for use in the combustion chamber of an engine. The fumes might do you more physical damage than any good derived from its use in your fuel. ❑

RADIO SPECTRUM

from page 6

Sincerely,
Paul E. Fillmore Jr.
Eagle River, Alaska

I received an almost identical letter from J.B. Flippin of San Diego, who also suggested the possibility of adding a switch so you could then reverse it in the future by throwing the switch and re-centering.

This solution is a good one and I have done it myself but you must keep your wits about you. Usually the reason for doing it is two different types of installations such as a high wing and a low wing aileron servo. If you want to fly both planes with one transmitter, changing the transmitter doesn't help. You will also find that, in the Kraft stick assemblies, the pot shafts are keyed and if you reverse the wires on the pot, you can't adjust the pot to neutral. One more caution; if you have separate trim pots you must also reverse them.

◆ ◆ ◆

I received a letter from Quantized Control, 19 Moss Lane, Amherst, Massachusetts 01002, regarding the "little black box" servo reverser that I referred to in the May issue. They are presently making them for 3 and 4 wire positive going pulse servos and are working on a negative pulse version for Pro-Line systems. I'll let you know more about them when I get a chance to evaluate one.

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More on battery tapping:

Dear Sirs:

I have incorporated a lead-acid battery into my flight caddy. I run my starter and my glo-plug from the battery as described in a recent issue.

There is a problem – when the cell which drives the plug runs down, naturally before any of the

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NOTE:

In the September 1975 issue of RCM on page 130, the price of a Mark's Models, Ready To Cover Windfree, was erroneously printed as $39.95. The correct price is $109.95

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other cells, the starter pulls current through the glo-plug. The first indication is a large drop in glo-plug current when the starter is turned on. In the next two or three starting attempts the glo-plug is likely to burn out from starter motor current. The addition of a five to ten amp (ten is safer) diode in series with the glo-plug will prevent this problem.

Similar preventitive measures with the fuel pump are probably not necessary, as they are not on at the same time.

Yours truly,
Charles Wright
Fleming, Ohio

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More on fast charging:

Dear Jim,

Just a quick note after reading your very fine article on quick charging. I have been field charging for two years – and most of the time I use 100ma cells for my radio, so I was surprised to see that according to your article that this is impossible. I assure you that it works very well indeed – I get about fifteen minutes flight time, with no problems except once, when I tried to get three flights off one charge! The net result equalled 2½ flights! I now charge for each flight. Depending on my patience, I dump charge for two minutes, or rapid charge from 6 volts for fifteen minutes. Either way does well. My flight pack (Cirrus two channel) is a total of 4½ oz. and 4 oz. for my Cannon, of which 1 oz. is the receiver battery.

Your comments are quite correct on G.E. vs. Gould. The 225 Goulds are sad – they deteriorate rapidly if charged in 15 minutes – I've ruined a pack that way. The seals start leaking badly. Anyhow, I think, as you say, that rapid charging is here, within two years most RC'ers will be charging in the field. In a way it's sad that this hasn't come out earlier, it could have been done five years ago (or more)!

Mitch Poling
Davis, California

I hope I didn't say "impossible," Mitch. I guess I think in terms of four servos in a plane and a little larger safety factor. However, if you really watch what you're doing you can cut things a little closer. Mattel used a very small cell in their Hot Wheels race cars which they fast charged from a 1.5 volt dry cell. So it can be done but I'd sure hate to cut it that close with my pattern airplane!

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I received some literature from Crystal Products, Box 256, Newell, North Carolina 28216. They have a line of accessories including battery dischargers with built-in clocks, power panels for your tote box, crystal testers, servo testers and expanded scale voltmeters. I have not had a chance to evaluate any of this equipment yet but it looks like they're on the right track.

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Dear Jim,

In the last issue of RCM you presented a number of letters that disagreed with your style of writing your Radio Spectrum editorial. Well, I am disagreeing too. Not with your style, but with their criticism. I do not feel that it is, or should be, within the scope of your article to attempt to present detailed construction articles on various devices. If a complex device is to be built by an inexperienced person there are 150 other pages in RCM that could be utilized.

Your June article, for example, provided exactly the information I needed to construct a rapid charger. The time you spent in researching the problem and providing the design specifications enabled anyone familiar with electronics to build such a device. No, don't present mere construction articles for the "novice." They are better off with kits, anyway. Instead, keep your philosophy and keep us "electrical engineers" happy.

In the future, you might consider such areas as

specifications on servo testers, motion sensors for use in pattern aircraft (push a button and the plane executes a perfect "M" or exactly straight and level flight, etc.), torture chamber testers for radios and servos, or one of the numerous fail-safe devices. The opportunities are unlimited.

In spite of the inappropriate criticism you have received, I (for one) shall remain,

Your avid reader,
Alfred I. Anderson

PS: How about an "Electronics Design" contest? What about the new I.C. from EXAR, the XR-2261 a Monolithic Proportional Servo IC System?

Thanks for the kind words Al. I sure could use one of those buttons that would result in a perfect figure M! The real reason for printing your letter is the question regarding the EXAR XR-2261. EXAR-Integrated Systems is a company that specializes in monolithic integrated circuits. The XR-2261 is a circuit similar to that used by Kraft except all four output transistors are external to the IC. EXAR also offers special motor driver transistors to complement the XR-2261. These transistors have built-in shunt resistors and clamp diodes for surge protection when driving inductive loads such as servo motors. The biggest drawback I can see is one of board space due to a 14 pin dip plus four transistors. I've got some samples coming and I'll give you a report on performance. EXAR is working on a hybrid that will put everything in one package and also on a new design which they hope will eliminate the shortcomings of all the existing circuits on the market. I for one am hoping that they are successful. Presumably, these amplifiers will be available on the open market just like any other IC which will make it attractive to the home builder. If all this comes about we'll tell you how to assemble and optimize your own servos. □

FROM THE SHOP

from page 2

· · · · · field. Their efforts, to bring you the very best material they can gather together, combined with the tremendous efforts of the 18 members of our office staff make this magazine possible. These creative efforts by those individuals whose names you find on the masthead of each issue of R/C Modeler Magazine are best summed up by the rationale set forth by Contributing Editor, Jerry Smith:

"One of the first things is the consciousness of the vital importance of creative effort. Be it in business, in the professions, and scientific and

technical pursuits, or in personal living. You must have a strong motivation to utilize your creative potential. An attitude of self-confidence in your ability to be deliberately creative. A heightened sensitivity to the problems that surround you — and attitude of "constructive discontent" towards situations as they exist in your life. A greater curiosity — an awareness of the many challenges in life, open-mindedness towards ideas of others. And lastly, try to improve your abilities associated with creativity. Particularly improvement in the ability to produce quality ideas and original ideas for the solution of problems."

We will always try to apply the philosophy stated in that first editorial in the October 1963 issue of RCM, as well as the rationale expressed by Jerry Smith in the preceeding paragraph in an effort to continue to bring you the finest magazine available for the radio control enthusiast. On this anniversary, I would like to take this opportunity to thank each and every one of you for your help and assistance over the years in making this publication what it has become today.

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In recent years, R/C modelers have demonstrated their technical expertise and, at the same time, received much positive public recognition by building and flying scale models of nearly every type of heavier than air vehicle. Paradoxically, the field of lighter than air (LTA) radio controlled models (blimps, etc.) remains relatively unexplored. New fabrics, films, and adhesives appear to offer numerous possibilities to R/C enthusiasts interested in constructing functional, ligher than air models. Furthermore, information on current LTA technical developments is now readily available. Modelers who are sincerely interested in learning more about state of the art airship technology should write to the Association of Balloon and Airship Constructors, 3217 North Delta Avenue, Rosemead, California 91770.

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In the August 1975 issue of RCM, there was an article entitled "Removable Power Module" authored by Dick Kolodziej. Unfortunately, there was a transposition of lines in the schematic presented with that article, and the corrected schematic accompanies this column. We apologize for any inconvenience this may have caused you.

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As previously mentioned, while the total results of the current Reader Interest Survey will not be completed for another couple of months, very definite trends have been established by the many thousands of returns that have been received by RCM and which have been tabulated to date. These trends reflect the request for additional emphasis on sport scale aircraft, soaring material, how-to information on all phases of R/C, additional helicopter material, and monthly information on all phases of model boating. In response to your request, we are pleased to introduce two new Contributing Editors, Lee Renaud and Glenn Cupit. Both of these individuals are proficient writers as well as active R/C enthusiasts. Lee will be authoring a monthly column entitled "On The Line," devoted to R/C soaring, while Glenn will be editing a monthly column on power boat racing. The Quarter Midget column has been expanded to cover all phases of R/C aircraft racing and is now entitled "Racing At Random." Additional in-depth how-to material on helicopters will be presented starting with this issue. We invite your comments as well as your editorial contributions in these as well as any other facet of our sport and hobby.

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The bad news is that, effective with the November 1975 issue of R/C Modeler Magazine, the cover price will have to be increased to $1.50 per copy. While this a highly unpleasant measure, it has been made necessary by continually increasing costs. The largest single cost, over and above the increased number of pages in RCM, is the substantial jump in Second

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FROM THE SHOP

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Class postage effective with the September 1975 issue. This was a 39% increase which amounts to several thousand dollars per month increase in postage costs. While the cover price of the magazine is being increased by 25¢, only 12.5¢ of that increase will actually go to RCM since the hobby shop and newsstand distrubutors receive 50% of the cover price for distribution and billing purposes. This 12.5¢ per month increase will offset the increased postage cost.

If it's any consolation to you, RCM is still the best buy in American model magazines on a cost-per-page basis. For example, based on the July and August issues of the various model magazines, their total number of pages, their cover price, and using a fact of 30% advertising for the other magazines and 50% for RCM (many of the other magazines carry a higher advertising content than 30%, but this gives them an edge on a number of editorial pages basis) here's how the cost breaks down:

Flying Models — 74 pages @ 75¢ per copy, 1.013 cents per page, 52 pages editorial copy (at 30% advertising).

Model Airplane News — 98 pages @ $1.25 per copy, 1.275 cents per page, 69 pages editorial copy (at 30% advertising).

Model Builder — 92 pages @ $1.25 per copy, 1.358 cents per page, 64 pages editorial copy (at 30% advertising).

R/C Sportsman — 80 pages @ $1.50 per copy, 1.875 cents per page, 56 pages editorial copy (at 30% advertising).

Model Aviation — 80 pages @ $1.25 per copy, 1.562 cents per page, 56 pages editorial copy (at 30% advertising).

R/C Modeler Magazine — 168 pages @ $1.50 per copy, .892 cents per page, 84 pages editorial copy (at 50% advertising).

As you can see, the cost per page of RCM is less than any other magazine published in this country and, in addition, is devoted exclusively to R/C and not to other phases of model aviation. This gives a cost per page of R/C editorial material far less than any of the other magazines. In addition, it's an even better bargain than our first issue in October 1963 which contained 40 pages and sold for 40¢ — a cost of one cent per page! We are sorry that this cost increase has become necessary, but we have no control over the price increases passed on to us. The only other alternative was to cut down the size of the magazine, and thus the editorial content, and this we have no intention of doing. However, for the next thirty days, we will accept new, renewal and extension subscriptions at the old rate if you would care to take advantage of this savings. Beyond that point, the new subscription rates will be in effect based on the cover price effective with the November 1975 issue of R/C Modeler Magazine.

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I don't know what this means, but I found the following note on my desk from RCM's roving lunatic, Dick Tichenor:

"I use Hot Stuff because you can't drive nails with a sponge no matter how much you soak it."

"Tell Clarence Lee that old engines never die, they just lose their bearings and get exhausted."

"Magazine editor's are difficult to reach — even their pocket calculators have unlisted numbers."

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And, with that, I think I'll hang it up for this month. If you remind me, next time around, I'll tell you about a magazine editor who doesn't know a servo from a carburetor, and a radio manufacturer's disastrous attempts at riding a Hobie skateboard down the street in front of my house.

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Due to the amount of R/C helicopter material appearing in this issue of RCM, the Helicopter Flight Training Seminar and the NRCHA column will not appear in this issue. However, both columns will be resumed next month. □

Note: Due to an unfortunate error at the printers, the lead page of the Micro-Mold Lark article, appearing on page 72 of the September 1975 issue had several lines of type missing. The following is a reprint of that page for your convenience.

The compact, 4¼ pound, Veco-Lee .19 powered Micro-Mold Lark helicopter from England.

RCM BUILDS THE

BY DON DEWEY

MICRO-MOLD LARK

The Micro-Mold Lark is the first British made R/C helicopter kit to be produced and is currently being imported for U.S. distribution by Aristo-Craft Distinctive Miniatures, 314 Fifth Avenue, New York, New York 10001.

Developed by Peter Valentine from several previous prototypes aimed to reduce the size, weight, and power requirements of R/C model helicopters, but still retain the scale performance achieved by larger continental models, the .19 powered Lark not only fulfills these requirements but has some extremely unique and unusual features.

Peter Valentine has, in the Lark, designed a model which is not only small and light, but extremely easy to build for the Novice helicopter enthusiast, and which is also docile in handling, crash resistant, and easy to repair. Designed for .19 cubic inch capacity glow engines and four channel light weight radio systems, the rotor diameter of the Lark is 41" with a fuselage and tail boom length of 37½" overall. The all-up weight with radio system and engine is 4¼ to 4½ pounds. For the sake of simplicity, collective pitch is not employed and a rigid head rotor head is used with control by cyclic pitch. As with any other conventional helicopter, two channels are used for cyclic control while the third channel is used for tail rotor pitch for yaw control and the fourth channel for throttle control to vary the lift. The stability system is based on the Hiller full-size system.

The mechanics of the Lark are tough and can withstand crash damage that would be far more serious with a larger and heavier model. Vulnerable parts such as rotor blades, flybar, and flybar paddles are inexpensive to replace as are the body and cabin. The kit includes a centrifugal clutch with needle roller shaft bearings which drives the first stage by toothed pulleys and belts to the intermediate position, then main drive to the rotors by steel and nylon bevel gear train, and the tail rotor by a flexible wire shaft and one-to-one bevel gears.

The first and most noticeable feature of the Lark helicopter, is the excellent packaging of the kit. None of the mechanical components are pre-assembled, but are packed in polyethylene bags with one bag for each major assembly. All mechanical components are factory pre-drilled and machined as necessary with the exception of the four motor mounting holes which, of course, will depend upon the motor you choose to use in your Lark.

The second feature, and one which impressed us more than anything else, is the Micro-Mold instruction manual for the Lark. We have, to date, built at least one of every commercially available helicopter kit, and we have yet to see an instruction manual as complete as the one provided with the Lark. This manual, 44 pages long, contains precise and complete step-by-step instructions that leaves nothing to the imagination, and is further enhanced by over 80 drawings accompanying many of the construction steps. These drawings are extremely well done and even the first time helicopter constructor should encounter no difficulty in building the Lark. In addition, every package of parts is numbered and a parts list is contained in the instruction manual, listing each part in each package by description, part number, and name, eliminating the possibility of confusing the parts for the various assembly stages.

Another unique and impressive feature of the Lark is the successful attempt on the part of Micro-Mold to produce a helicopter that is easy to build and functional, yet reducing the complexity to an absolute minimum. It