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RCM radio control MODELER

THE WORLDS LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

VOLUME 13 1976 NUMBER 1

rcm

FEATURES

This months cover of a dramatic sunset contrasting a full scale jet and a Kestrel 19 was taken on the approach to Albuquerque International Airport. The lovely lady is Gloria Mills and the Ektachrome transparency is by Max Mills.

JANUARY

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FROM THE SHOP

Don Dewey

● This month we are pleased to present the results and analysis of the 1975-1976 R/C Modeler Magazine Reader Interest Survey. While RCM has conducted this Survey on an every other year basis since 1967, this individual report represents the largest scale and most successful survey ever taken in the model aviation field. Many thousands of the two page survey questionaires were completed and returned by RCM readers — many of these accompanied by one or more supplemental sheets of additional comments. Each of these survey forms, individually, was statistically computed by RCM employees assigned to this job full time until its completion. The individual questions and their answers were not only tabulated in total and by percentage, but were cross-tabulated by geographical area, by age groupings, by experience level, and by income bracket so that a true picture and an absolutely accurate cross section could be obtained. In addition, the information compiled was checked against the 1971 and 1973 R/C Modeler Reader Interest Surveys in order to ascertain wherein the R/C picture had changed during the past four years, and so that a short commentary on the impact of these changes could be noted. Following the cross tabulations, each questionnaire was read, comment similarities noted, and an analysis prepared. You will find some extremely significant changes evidenced in this survey over that taken in either 1971 or 1973.

Once completed, a copy of the fifteen page survey was sent to every member of the R/C industry so that they would know your desires and wishes for the forthcoming two years. What is presented here, in this month's column, is an abbreviated form of that report.

READERSHIP PROFILE

Occupation

Trade and General	33%
Engineering and Technical	20%
Business and Executive	15%
Student	12%
Professional	11%
Military	6%
Retired	3%

Income Brackets

$40,000 plus	2.9%
35-39,000	1.3%
30-34,000	4.0%
25-29,000	7.5%
20-24,000	15.0%
15-19,000	23.5%
10-14,000	27.5%
6-9,000	9.0%
3-5,000	3.0%
0-2,000	6.3%

Age

10-19	9.5%
20-29	20.5%
30-39	31.0%
40-49	24.5%
50-59	12.8%
60 & over	.7%
Average age 35.0 years	

Years In Modeling

0-4 years	22.0%
5-9 years	13.5%
10-14 years	11.0%
15-19 years	9.0%
20-24 years	11.3%
25 & over	33.2%

Years In Radio Control

Less than 1 year	7.0%
1-4	50.0%
5-9	23.0%
10-14	9.5%
15 & over	10.5%

A.M.A. Membership

77% currently belong to the A.M.A.

R/C Club Membership

68% belong to an organized R/C club.

Other Membership

6.0% are active members of the LSF
4.0% are active members of the NRCHA
3.5% are active members of the NSS
1.4% are active members of the NMPRA
.5% are active members of the NSPA

Amount Spent on R/C each Month (Excluding Radio Equipment)

$10-24	35.0%
$25-49	34.0%
$50-74	18.0%
$75-99	.8%
$100 plus	7.2%

Sources of Purchases

Hobby Shop primarily	70.0%
Mail Order primarily	30.0%

Again, as in 1973, one specific category of occupation has a clear majority, that being the Trade and General occupational listing. The number of consumers in the Engineering and Technical field, while slightly recovering from its decline in 1971-1973, still shows a substantial decrease from 32% in 1969 to 20% in 1975. The Business and Executive category has shown a dramatic increase in 1975 over 1973 — increaseing from 5% to 15%. This is the single most significant change in the occupational category. The Trade and General category showed a decline in 1971 and an extremely significant increase in 1973 and a decrease in 1975. However, the total percentage of RCM readers in the Trade and General category in 1975 is substantially higher than that in 1969 and in 1971. The Student category remains the same as in 1973, showing a decrease from 16% high in 1971. The Professional category has remained unchanged from 1969 through 1975, constituting 11% of our total readership. The Military Service category has varied from 6% to 8%, fluctuating 1 percentage point per year. One of the most significant changes in this years survey is the 300% increase in the number of R/C enthusiasts coming from the Business and Executive category. This category reached an all-time high of 20% in 1971 and decreased drastically to 5% in 1973.

The average annual income reported by RCM readers is exceptionally high compared to the national average income with the majority of RCM readers in the 10,000 to 19,000 dollar per year income bracket with an average annual income of approximately $14,000 per year. This reflects a $3,000 per year increase in income over the 1971 Reader Interest Survey.

The average age of 35 years is an increase of one year for that reported on the Reader Interest Survey of 1973 and the same median age is reported on the 1971 survey, although a 1.2 year decline from the 1969 report. In reality, the breakdown of the average age remains virtually unchanged since 1971 except for an increase in the 50-59 age bracket. Again, this figure, when combined with the fact that 57% of R/C Modeler Magazine readers indicated an experience level in radio control from 0-4 years indicates a rapidly growing number of RC'ers in the median age group of 30-35. In reality, a reading summary of the individual surveys indicated that we had, once again, two distinct experience levels: (1) the long

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RADIO SPECTRUM

BY JIM ODDINO

● In most parts of the country it's that time of year when modelers are sitting around the pot bellied stove telling lies about how great their planes flew last summer or dreaming about how great they're going to be next season. I thought I'd add a little stimulus to the dreamers and, who knows, somebody might come up with a breakthrough in R/C modeling.

One dream I'm sure everyone has had is to have some sort of autopilot in their model to hold it on heading and keep the wings level. Just to be able to enter a maneuver perfectly every time would improve every pattern flyers score. If a racer could punch a button and the plane would assume the proper heading with the wings level, instead of the usual flailing around, I'm sure his times would go down; and of course an autopilot would save many airplanes for the beginner. So, generally speaking, it looks like an autopilot would be a desirable addition to our systems.

When you consider autopilots, the first thing you normally think of is gyros and then you forget the whole thing for models. The electrostatic autopilot seemed to solve that problem, but apparently wasn't consistent enough to be a viable solution. Now I think there might be a solution on the horizon but it's going to take some work by some dedicated modelers to find out.

It turns out that our servant, NASA, the same outfit that sends men to the moon, also is continually trying to improve the state of the art on the other end of the spectrum, namely general aviation. (I'm sure the spectrum extends into model aircraft, but I doubt if those projects are funded.) Anyway, they looked at the problem of making a gyroless autopilot for general aviation aircraft, such as your basic Cessna, and it looks like they did it with hardware that could easily be built into a model

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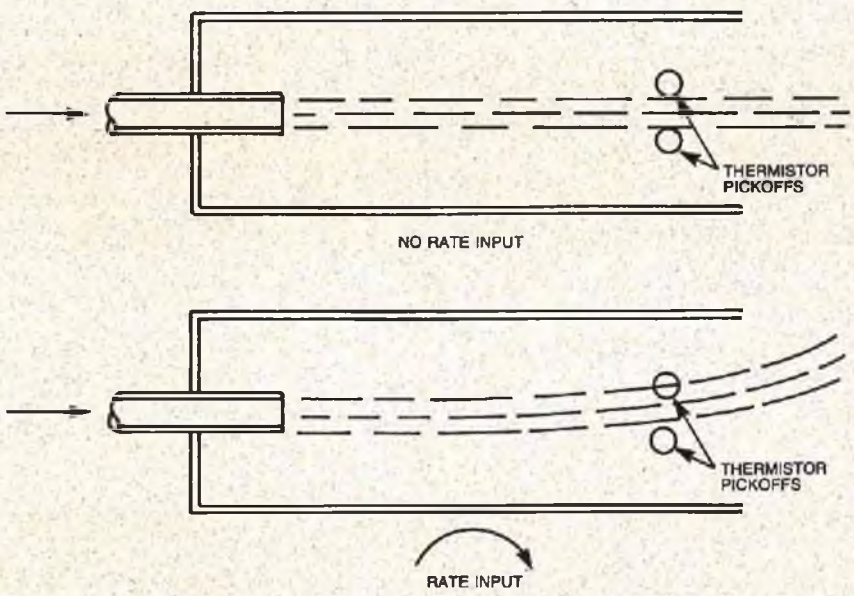


FIGURE 1 - LAMINAR JET RATE SENSOR CONCEPT

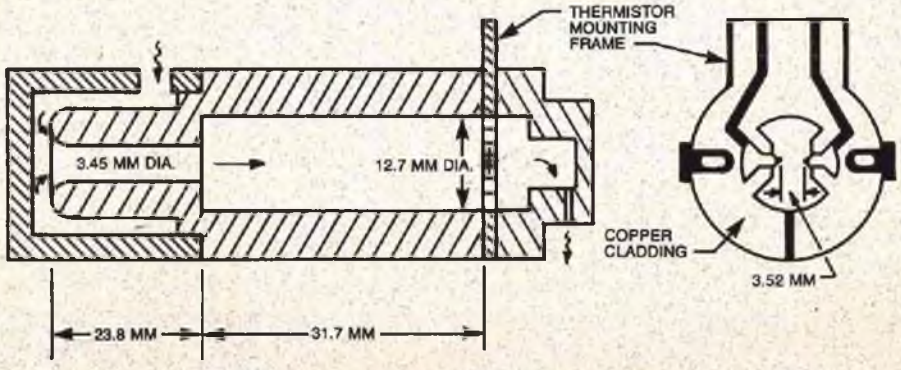
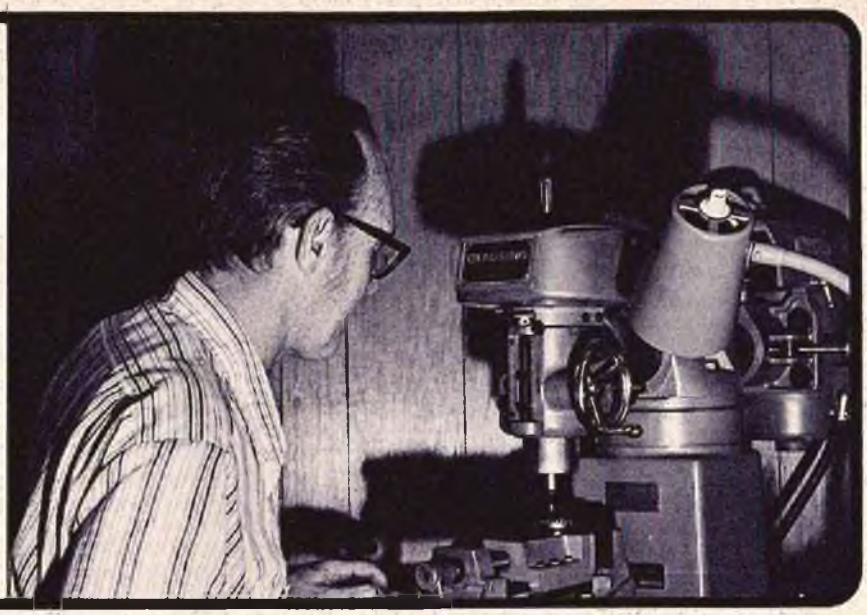


FIGURE 2 - LAMINAR JET RATE SENSOR

engine clinic

By Clarence Lee



●At the time of this writing, the temperature here in the Los Angeles area has been running in the mid-nineties, which makes it a little difficult to start thinking about cold weather and its associated starting problems, etc. However, by the time you read this column, Winter will be here and the colder weather underway. The following letter from my old buddy, Darrell Yonkers, brings to light a problem some of you fellows in the colder areas of the country may run into, especially the guys that fly when the temperature is in the 30's and lower.

Dear Clarence,

As you know from some of my past letters, we fly the year round up here in Alaska and the fact that the temperature is frequently well below zero, sometimes shows up some rather odd problems. Such a problem showed up on one of my '74 series Lee Custom Veco .61's. You may already be aware of it but if not this letter may save somebody a few gray hairs.

Since I'm the ultra-conservative type (model airplane wise), I just got my new Veco flying last November, and since it has worked well for me for 10 years, I'm still using K & B 100 with castor oil. However, since Clarence and all my buddies say this fuel system using muffler pressure works really great, I did decide to give it a try. Would you believe it didn't work worth a darn? The engine would go dead rich, or maybe die lean (ouch), in general it just wouldn't hold a needle setting. The cure was disconnecting the muffler pressure. Reconnecting it caused, and causes, the trouble to recur.

The problem almost has to be slugs of cold castor oil in the vent line to the fuel tank. I had a similar problem with castor oil on the tip of the vent line in a regular tank set-up years ago. Whether this trouble would occur with synthetic oiled fuel, I don't know. As it warms up this spring, I'm anxious to see at what temperature the problem goes away.

Also have a question. Has K & B checked out the new fuel pump and carburetor at low temperature? The viscosity of glow fuel increases noticeably at very low temperatures and it could affect system operation. We won't be able to check it out for ourselves till next winter, but if we have problems we'll let you know.

Thanks Old Buddy.

Darrell Yonkers
Alaska

P.S. I forgot to mention, I did do a complete fuel tank overhaul when the problem first occurred and it didn't help at all. The muffler pressure tap was open and clean too.

The solution here is pretty simple and that is to use a fuel containing synthetic oil. The synthetics can tolerate considerably lower temperature than castor oil without turning to goo. Synthetics would be particularly beneficial for fellows using engines with the Perry pump/regulator. Even in warmer weather, castor based fuels will start to turn gummy in an engine if allowed to set for a few weeks. This could very well cause the small valves in the Perry pump/regulator to stick. This is one of the reasons John Perry recommends that a piece of fuel line be connected from the inlet to the outlet of the pump if the engine is to be left idle for any length of time. This stops the drying out of the fuel which would, in turn, cause the valves to stick — especially with castor based fuels. The use of synthetic oils would help considerably.

Dear Clarence;

I bought a Fox 36 R/C about a year ago and ever since, people have been telling me what a mistake it was. I was told that Foxes have a poor piston/cylinder fit, and that aside from making them difficult to start by hand, the engines wear themselves out while being broken in. The hobby shop I go to refuses to sell Foxes for this reason. Is this true, and would careful hand-lapping help?

I would appreciate it if you could answer a few more questions.

(1) Does an increase in engine rpm directly indicate an increase in engine output?

(2) The Fox 35 Stunt is made with lower compression for easier starting. Wouldn't this lower the power of the engine?

(3) Can idle-bar glow-plugs be used successfully in standard engines?

(4) Why are rear-rotor engines more powerful than front-intake engines?

(5) Here is my final problem: I have a very old .049 that refuses to drop down into four-cycling. Even if the needle valve is opened wide, this engine will, within about 10-15 seconds, speed up until it is running at a full scream. What could cause this?

Thank you for your patience.

Sincerely,
Paul Hearsey
Victoria, B.C. Canada

Generally speaking, Paul, I have always found the Fox lapped piston engines to have excellent piston/cylinder fits. Naturally, one will come along occassionally that might be a little tighter or looser than desirable but this is the price you pay when getting into mass production. Every manufacturer has this problem. In 99% of the cases, when modelers complain about the piston/cylinder fit, the modeler himself is to blame. Many times fellows will start up a brand new engine and forget to open the needle valve far enough. So the engine starts up and dies lean several times before the modeler finally gets the engine to run rich enough. Each time the engine died lean, the piston or sleeve was scored.

Many times modelers will take a brand new engine, stick it on their test stand, which is usually a box (or their field box) and proceed to run the engine in at the flying field, the engine setting only a foot or so off of the ground, and more often than not at a dirt field. The engine is broken in and worn out all in the same running. Then, when it turns out to be a real turkey, the engine manufacturer is to blame! As for hand

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CUNNINGHAM ON R/C

BY CHUCK CUNNINGHAM

●To the confirmed model aircraft enthusiast, nothing is quite so rewarding as looking up at a bright blue, windless sky, and knowing that today you can go flying. It doesn't matter if you are a ukie bug, a free flighter, or an RC'er — the feeling is the same — a beautiful day, one that you can spend flying to your heart's content.

The feeling is even greater if you are a recently soloed stick thumber. You have been dreaming of the day that you could go out to the field and put in flight after flight by yourself. You don't need anyone to help you get up into the air or back down on the ground, the sky is yours. You load up with beverage and fuel, and off you go. But, how many times has a recently liberated flier brought home a pile of sticks after a session such as this, muttering "that lousy radio!" It happens, and happens more than you know. Why? Often, because of our ever loving batteries.

Thousands of words have been written on the subject of batteries in the past few years and all kinds of testers have come on the market. There are all kinds of chargers, as well. But, most of these items are purchased by the more knowledgeable flier, the guy who has been around for awhile, and understands that his radio is only as good as the batteries. To the beginner it is a pocketbook bending experience just getting an aircraft, engine, and radio, so the little refinements are left for another month. Sure, you can get along without all of these goodies — a lot of us did for many years — but a lot of us also paid for this with needless crashes. It really does not matter if you have a brand new radio, or you have purchased a used radio. The radio may be perfect, and probably is, but the batteries may not be. When you were learning to fly, and you were lucky to get in two or three flights with help from other fliers, the batteries didn't get much of a work out. Perhaps they were only on for thirty or forty minutes each flying session, and then got a good charge when you came home. Great, there's nothing wrong with this. But then, that fateful day arrived when you loaded up your gear and lots of fuel and spent the day just shooting landings. How much time did you put on your batteries, an hour, two hours, two and a half? If you got that much time without a problem, you were lucky. I'm not trying to tell you to stay at home, and don't go — what I am trying to tell you is to check both the receiver and transmitter batteries before each flight. Not simply by turning on the set to see if everything works, but by purchasing one of the many expanded scale voltmeters now on the market, and using it. And, to check the meter on the front of your transmitter — it will tell a tale also.

Checking for the life left in your batteries will save you lots of time and money in the future, and your investment will seem very small by comparison. If you are lucky, and can get out to fly for long flying sessions, then build or buy a fast charger so that you can always fly with fresh batteries. This one item seems to me to be a must for the soaring fraternity, especially the slope soaring bunch, as fantastic flight times can be built up. Think about it — the batteries that you baby, just may save your neck.

★

I received a letter the other day from a flier in Australia, asking for some help and advice on setting up an airshow — one that would be really meaningful both to the pilots and to the spectators. This is a big order, and I will try and pass along some of the ideas that I know have worked for others in the past, and then, I should like to hear from some of you readers who have been successful in putting together an air show. What gadgets and gimmicks have you developed that would be of interest to others? Dick Dakers, our Australian correspondent asks the question . . . "How about articles describing how to make and tow a banner; how to achieve an effective smoke trail; how to make and fire rockets from wing tips; smoke cartridges; designs for aircraft to produce special effects; how to simulate bombing runs and blow up targets; tips on formation flying; and the thousand-and-one other ideas that must exist among the modeling fraternity."

It is a large order, isn't it? To begin with, not all demonstrations need to be war-like. The general public is just as interested in seeing R/C aircraft fly as it is in seeing R/C aircraft imitate their more war-like big brothers. To be effective, an air show should be **planned.** Too often it just **happens**. All too many times a group of modelers are asked to put on an exhibition, and the group just shows up and flies. This isn't too bad for spectators who have never seen R/C before, but, why not develop a bit of teamwork, and build a real air show.

The most interesting aspect is to have a variety of aircraft. For example, some simple trainer types to lead off, a glider display, then a biplane doing free style maneuvers, followed by a pattern bird with retracts. Then try a racing aircraft; a good helicopter and pilot, and the crowd will be eating out of your hand.

A simple air show can be built around just a few, different aircraft. If you have a good, big bird, fly it at the same time that a good 1/2A racer is flying, and demonstrate the contrast. People are amazed at what our type of aircraft can do. And, during the flying, don't forget the spin. This always excites a crowd of unknowing spectators more than any other "stunt." I don't know why, but I always hear more remarks about a spin than anything else.

Once you have developed this simple air show format, then work up a simple combat with aircraft towing streamers. You don't have to make close passes, but the crowd will enjoy it. Formation flying is extremely difficult to do, because it takes practice on the part of two or more people to get it done, and often these two people are not available. It's much easier to stick to individual stunts.

The simplest way that I know of to build a bomb release is to use an EK releasable tow hook, the kind that releases the winch line or Hi Start when you pop the servo. It is easy to install and strong enough to carry a pretty good size water bomb. A nickle balloon, filled with water, makes a good bomb. A parachute can be dropped by the same method and is a crowd pleaser. I have seen "bottle rockets" used in launching tubes for rockets, but I don't recommend that you try this as it is extremely easy to set an aircraft on fire, or to set grass on fire if you succeed in launching the rocket. A number of years ago, my good pal, Bob Lutker, developed a master bomb release. It was back in the days of reed radios, so the radio weight was a good load anyhow for the aircraft to carry. Bob developed a system using a series of micro switches to trigger off each bomb. As I recall, he equipped his low, swept wing aircraft with eight rather sizable bombs. Then each time that he nudged his elevator trim lever, the servo moved another notch and hit a micro switch which, in turn, opened a circuit to drop a bomb. Well, on the bench, it worked great, but in practice, it never got off of the ground. The engine was a Merco .49, and the all-up weight of Bob's aircraft was about 11 pounds, with a wing area of about 750 square inches. The darn thing never did get into the air. We were flying from a grass field and the plane would roar down the grass field looking like a pregnant duck trying to get airborne. The point is, don't make it too heavy, whatever mechanics you devise. An overloaded aircraft isn't too desirable at anytime, much less at an air show.

Another crowd pleasing gimmick to do is to tow a glider aloft, and then cut it loose to come back to the ground. The glider must be modified to tow from the center of the nose, and the towing point on the tow plane should be from a saddle rigged on top of the fuselage just aft of the wing. Don't tow from a hook at the tail! As the glider rises above the tow plane, it will lift up the tail and give the tow plane pilot a fit. Frankly, I have always wondered how to hook up a harness to tow a banner. Looking at banners being pulled by full scale aircraft, it seems that the banner is a simple affair held in the vertical position by the airstream. If any of you readers have been successful at towing banners, how about sharing your

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THERE'S ALWAYS A BETTER WAY

Here is one RC'ers suggestions for a few of the problems that can be utterly frustrating for the lack of a simple answer.

BY L.S. WIGDOR

Perfect Fuselage And Wing Fit

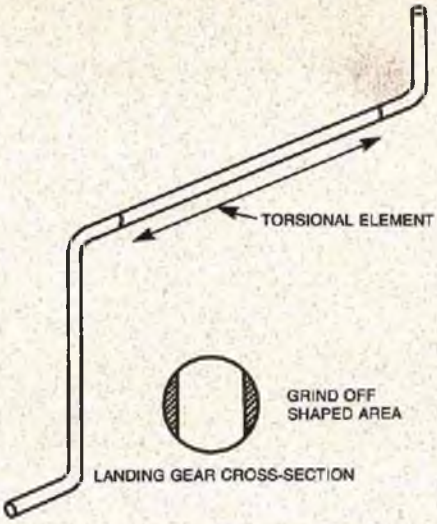
Looking at Figure 1, rub the fuselage back and forth sideways over the wing until the saddle is perfectly mated to the wing contour. The wing saddle is, for this purpose, covered with sandpaper attached to the wing surface with Scotch, or masking, tape.

Oil Proof Wing And Fuselage Seal

After painting or MonoKoting your aircraft, tape waxed paper over the wing center section. Apply a generous bead of silicone rubber to the fuselage wing saddle. Assemble the fuselage to the wing and tighten down the wing bolts. Clean off the excess silicone rubber from the outside of the joint and allow to cure for 24 hours. Finally, remove the tape from the wax paper and lift off the wing. Remove the waxed paper from the wing saddle. Use your wife's scissors to cut the cured silicone rubber flashing from the inside of the fuselage. You will find that you have an absolute oil proof seal between the wing and the fuselage.

Achieving Correct Torsional Rigidity Of Landing Gear

Anyone who has built small tail dragger aircraft, particularly those under 50 ounces in weight, may have had trouble with over-stiff gear resulting from the use of 1/8" wire, particularly now that soft wheels are so difficult to obtain. This gear can easily be made more resilient by grinding down the torsional element of the gear. Grind off a bit at a time until the required resiliency has been achieved as shown in Figure 2. Now, when you land your model with a perfect three-pointer, it will hug the ground and not bounce up again.

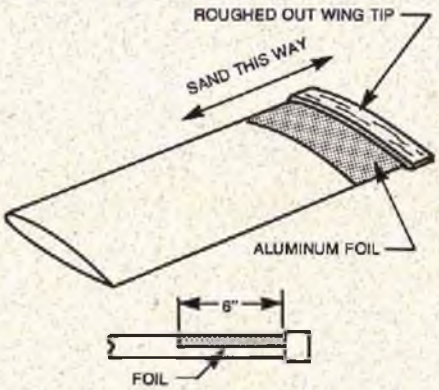


Obtaining Proper Wing And Stabilizer Incidence Setting

In order to obtain a perfect wing and stabilizer incidence setting every time, mate the wing to the fuselage before you fit the stabilizer. It's much easier to adjust the stabilizer incidence because the sanding area and contour is much shallower. This doesn't mean that you needn't worry about the fuselage to wing incidence — it's just that for the last fraction of a perfect relationship between wing and stabilizer incidence, it's easier to sand the fuselage seat for the stabilizer last.

Accurately Sanding Wing Tips To Match Wing Contour

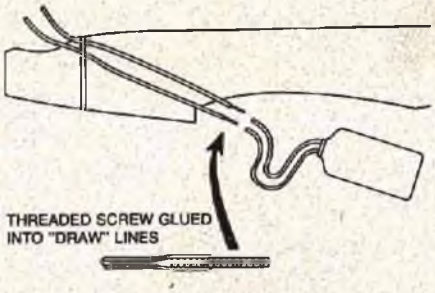
First, glue the roughly shaped wing to the tip rib. Obtain some aluminum foil about .003" or .005" thick. Wrap this over the wing structure and butt-up to the wing tip. You can then use a coarse sanding block, sanding spanwise. The aluminum foil will protect the wing structure while you cut off the surplus wood. When the contour of the tip is sanded down to the surface of the foil, remove the foil and lightly sand down the last few thousanths of an inch with fine sandpaper as shown in the sketch.



Threading Fuel Lines Through Blind Firewall Holes

How many times have you had to remove your fuel tank at the flying field and then had a terrible time getting the fuel lines back through the firewall?

To avoid this problem, obtain two or three 18" lengths of smaller-than-usual fuel line such as 1/8" OD. Cut the heads off two or three 1" long machine screws that are a snug fit inside the lines you have prepared as above. Clean any grease off the threads and, using silicone rubber cement, glue 1/2" of the machine screws into the prepared 18" lengths of small diameter fuel line. Now, feed the lines through the firewall from the front until they emerge through the wing saddle. Insert the free ends of the machine screws into the tank lines and pull back through the firewall, easing the tank back into position as you go.



A Cheap Source Of Paper Towel For Your Field Box

While it may draw some snide comments at the field, you can fit a 6" length of 1" diameter dowel vertically to a convenient place on your field box and put a roll of toilet paper on it. There'll be plenty for both you and your friends and it's an extremely economical way for wiping down dirty aircraft. □

Quarter Midget

BY
DON DOMBROWSKI
AND FRED REESE

QUICKIE 200

RACING AT RANCHO

RCM's racing editor with his First Place winning Upstart at the Pioneers 1/2A meet. Don used stock engine, prop and Red Label Cox fuel.

Randy Wilson of Valencia, California, Second Place RC Craft Tigercat. With Ron Clem calling, Randy turned in the fastest time of the meet.

Jim Bronowski of the Merced County RC Club placed Third with Bob Aberle designed "Nothing Special". Stock TD .051 and 5½/4 Cox Gray prop.

● In September we were invited to attend the Sunnyvale, California Pioneer's Annual 1/2A Pylon Race sponsored by RCM and also to sit in on a rule discussion meeting. The reason for the meeting was to create a standard set of racing rules for California 1/2A racing. At the meeting there were representatives from Sacramento, Merced, Sunnyvale, Oakland, Los Angeles, Ventura, Valencia and Orange County. We could not possibly work out all of the details at one meeting, but enough was established to give basic parameters and people were selected to work out further details. We were selected to coordinate and assemble the results. The meeting and dinner were held at a local restaurant and the meeting was emceed by Ken Willard. The meeting went well with good discussions but was cut short as we all had to get up early the next morning for the race.

The race itself, was held at the Pioneer's field in Sunnyvale. The weather was perfect and there were 22 entries. The May, 1971 RCM rules were used, including the 330', two pylon course. Everyone agreed that a three pylon course would be better and safer and would be used in the future. All take-offs were by ROG using a staggered start at one second intervals. We did not see any ground collisions and few airplanes had any problems taking off from the ground. Each pilot's helper was required to release his airplane on his flag, not before or after or be disqualified. As can be expected, this starting procedure caused a few heated discussions. The Formula One scoring system was used with a make-up lap for one cut, with two cuts giving a zero for the heat. With only one pylon judge at each pylon, four airplanes per heat, and no communications system, there was a constant hassle about who cut, did he make up, and what was the resulting finishing order of the airplanes. These problems have been eliminated in Quarter Midget racing when a ten lap, no make-up system of scoring is used. One pylon cut results in automatic fourth place points, while two cuts results in a zero.

The race scheduling was efficiently run by Dick Aubert, the CD, and six rounds were flown. RCM donated the trophies, including a large Perpetual Torphy. Merchandise prizes were donated by the local hobby shop, Sig, Kraft and included three kits from Ace RC. A "Tigercat" kit was also donated by RC Craft to the fourth place finisher.

The racing was good and there was plenty of competition with fast racers but consistency proved to be the most important factor. Your editor, Don Dombrowski's Upstart was certainly not one of the faster airplanes but after six heats he had won five and placed third in another, giving him 22 out of 24 possible points for the win. Don flew a tight course but allowed himself enough margin so that he did not have a cut all day. Don used a new stock TD .051 on suction and stock 6/3 Cox gray props and Cox Red Label Racing fuel. The fuel tank was a one ounce, round Sullivan with a fixed pick-up and the vent tube bent around to face forward inside the tank. With this combination, Don did not have to change the needle setting all day and his engine ran smoothly at 19,000 on the ground. Many of the engines were highly modified and used

Race Results Sept. 21, 1975 Sunnyvale, California

PLACE	NAME	AIRCRAFT	PROP	CONTROL
First	Don Dombrowski	Upstart	6/3 stock Cox gray	A&E
Second	Randy Wilson	Tigercat	5/3 balanced Cox gray	A&E
Third	Jim Bronowski	Nothing Special	5½/4 Cox gray	A&E
Fourth	Bill Van Gunten	Nothing Special	6/4 TF wood cut to 5½	A&E
Fifth	Scott Christensen	Rickey Rat	6/3 Cox gray cut to 5½	R&E
Sixth	Gary Acord	1/2A Stick	5/3 stock Cox gray	A&E

1ST ROW (L) : Fourth Place finisher, Bill Von Gunten, also flew a stock 'Nothing Special'. Bill used Top Flite wood 6/4 props cut down to 5½". (R) C & F team of Scott Christensen (L) and Bob Fish (R) both flew Scott's 'Rickey Rat' design on RE. Note tape on wing – Scott made the wing thickness gauge for the race and his wing wouldn't pass without adding the tape. Wings had to be constant chord thickness of 7/8" and covering could not sag to less than 7/8" between the ribs. 2ND ROW (L): Gary and John Acord of Ventury County Comets both flew GMC Models '1/2A Sticks'. Gary placed 6th with Stock 5/3 Cox Gray props and side tap pressure. (R) Lee Helsel placed 7th with his 'Hibird'. Wing is from a 'Jr. Falcon' and fuselage is a modified 'Upstart'. Ship was fast and flew well. 3RD ROW (L): "Now look, dammit, I'm doin' my job . . . " Ken Willard and 'Bushman'. (R) Jim Meeker and his '1 O'Clock Special'. His two year old son stepped on the wing at 10 O'Clock the night before the race. Jim finished 12th.

cut down props, pressure, and high nitro fuels yielding rpm figures over 22,000. Although the hopped-up engines were considerably faster, they resulted in zeros for most users at least once during the day due to failure to start, blown plugs, or broken crankshafts. Only two or three people got points in every heat.

Randy Wilson's Tigercat was one of the fastest airplanes and he turned the fastest time of 1:34.4 for the meets. Average times were about two minutes. Randy's engine was modified by enlarging the ports, having a very loose piston-sleeve fit, and using a Kirn needle valve and pressure tap. Randy used high nitro fuel and balanced, 5/3 Cox Gray props. We found that fuels with higher than 50% nitro will burn up a plug with each run.

In order to ROG, the Tigercats were fitted with wire wing tip skids and were given a good push. The Quickie 200 was helped on take-off by a light push but Don's Upstart

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A forty year friendship is a strong bond between John Brodbeck, Sr. (L) and Irwin Ohlsson (R).

MODEL AVIATION HALL OF FAME

IRWIN OHLSSON

RCM attended a testimonial dinner in honor of Irwin Ohlsson's 1975 election into the Academy of Model Aeronautics Model Aviation Hall of Fame.

The dinner was sponsored by the BIRD Club of Carson, California and among the nearly one hundred guests were many famous pioneers in engine powered model aviation. The testimonial speeches recalled many humorous memories and the reminiscing over some of the unselfish deeds by Irwin brought a lump to the throat of several of the speakers. Since the speakers were long time friends of Irwin, and were thoroughly familiar with his contributions to model aviation, their speeches were primarily paying homage to the greatness of the man.

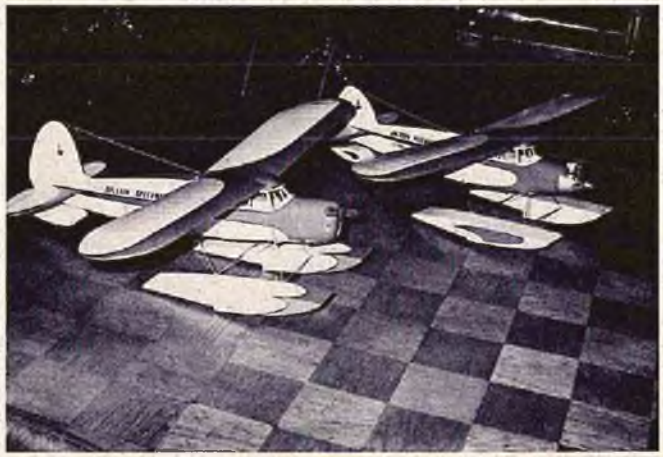
Who is Irwin Ohlsson? There are undoubtedly many modelers who haven't been in model aviation long enough to know that Ohlsson was one of the most famous names in modeling during the 1930's and 1940's. As John Brodbeck so aptly expressed it:

"Irwin Ohlsson was the Henry Ford of the model engine industry. He was the first to mass produce reliable power plants at prices youngsters could afford and tremendously expanded the gas engine category of model flying."

(continued on page 138)

Photo collage, by Al Doage, traced Irwin's early rubber powered modeling to his present R/C seaplanes.

Immaculate replicas of early Ohlsson prize winning designs were displayed by Dan Lutz.



EDITOR'S PREFACE

The model publications and almost every kit manufacturer in the industy have been designing trainers since R/C flying began in the early 1950's. These models have been created in all shapes and sizes, and a few have endured through the years when they have proven to be truly successful beginner's models. The rest have passed into obscurity.

Designing a good trainer is a difficult task, more difficult in our judgement than the design of a good flying Scale or Pattern aircraft. It is not easy for an experienced flier to recapture the lack of knowledge and shaky knees that preceeded his first efforts. To analyze the problems facing the novice; to develop solutions to these problems; then to verify the solutions by a rigorous testing program, demands the highest level of design ability and insight. Rarely does a talented designer take a clean sheet of paper and create a truly unique model aircraft specifically tailored for the R/C Novice.

There are many excellent trainers available today. Most of these are for .19 to .60 sized engines, and many require 3 or 4 channel radio equipment. This type of model will handle heavy wind better than a smaller airplane and they are very popular today. They do, however, offer significant drawbacks to the prospective R/C pilot. The most obvious one is the initial investment in materials, engines and accessories and radio equipment. Not so obvious, is the additional skill level required to build many of these models, particularly those which require sheeted and cap stripped wings, carving and shaping blocks and other construction techniques the experienced builder takes for granted. Most important is the fact that the more popular trainers require the assistance of a skilled flier to trim out the aircraft and provide flight instruction. This is great if such assistance is available, but what about the guy who lives in the boon docks and has to get it all together by himself?

The Q-Tee, designed by good friend Lee Renaud, offers an alternative method of starting in R/C. This is a unique approach by an outstanding model designer and uses a carefully thought-out systems engineering concept. By using a low cost, easy starting engine which is available in every hobby shop and most work benches around the country as the basis for the Q-Tee, he has achieved a minimum cost way for the novice to try R/C flying. So simple that it's obviously a breakthrough in attracting newcomers to our hobby – yet no one else has approached the problem in this unique manner.

To most of us who have been involved with R/C flying for a number of years 1/2A R/C is associated with racing or small pattern ships. The Q-Tee is a very different breed of cat. As radios continue to shrink in size and weight and the pressure of urban sprawl makes large flying areas more difficult to find, we believe more and more fliers will be attracted by the advantages of this type of model.

The Q-Tee offers the stability and slow speed required for the beginner who has not yet mastered the sticks. Set up as a trainer it will putt-putt around until the tank runs out, then glide flat until you touch down. With the advanced set-up it can bore holes in the sky, fly inverted, perform all rudder/elevator stunts, yet still give you a glide many sailplanes would envy.

No matter what your skill level, we suggest that you read Lee's article. Perhaps you might enjoy a fun-fly ship you can keep in the trunk of your car until the next good day. Even if not, you can teach your own or the neighbor's, kids how to fly an R/C model. If there are no kids around the Q-Tee is still great for wives or girlfriends. Build one!

Don Dewey

Q-TEE

BY LEE RENAUD

The Q-Tee is an R/C power model designed for the novice builder and flier. The design was approached with the following objectives in mind:

1) Simple rugged construction so that someone with no previous building experience could easily duplicate the model.

2) An inexpensive systems approach which would minimize the investment for the person who wants to try R/C flying but has limited funds.

3) A model which could be easily transported to the flying field, even on a bicycle, with all support paraphenalia minimized.

4) A model which could be flown in a restricted space, such as a local schoolyard, parking lot, or field. It must be easily hand launched by the flier, without an assistant.

5) Smooth, stable flight characteristics for hands-off flying with the ability to return to level flight without constant control for the beginners. In addition, an intermediate flight envelope for stuntability as more skill is gained.

These goals are not easily accomplished and much thought, drawing board time, and test flying took place before the design was finalized. All design is a compromise, and

sport/trainer type models offer a most difficult challenge. So that you may better understand how the Q-Tee evolved we will explain this process in some detail.

Goals 2, 3, and 4 established that the best approach would be a 2 channel .049 powered model. Although there are many kits and previously published plans available for this type model, most use the Cox Tee-Dee series engines and are fast flying and highly maneuverable. This model was designed around the Cox Reed Valve engines, specifically the Golden Bee or Black Widow. These engines are inexpensive, readily available, start easily and have an excellent muffler available. They use small props and very little fuel and an important bonus is the built-in starter spring. The only field items required are a can of fuel and starting battery, with a spare glo-head, wrenches and screwdriver as deluxe additions. Cox even sells those items either separately, or in a neat plastic case, Part No. 990. Please don't use the more expensive and higher power Cox Medallion or Tee-Dee series engines, you just don't need the higher performance.

To minimize radio equipment cost only rudder and elevator control was considered. The smaller engines don't throttle very well anyway and the power on/power off speed ratio is not high. Ailerons were not considered as they require more skill to install and align. We consider the 2-3 channel brick style radios as most suitable for the beginner as they simplify installation and make it very easy to fly several different models with one radio system. Take a look at the systems offered by Cannon, Kraft, or EK and pick the one you like best — they all work well. Of course any conventional airborne systems using small servos will also work well. There are many such radios available, several of which offer optional 225 mah battery packs, an easy way to save 2 ounces of flying weight.

Previous experience with 1/2A powered models indicated that a target flying weight of 18-20 ounces was suitable for a muffled

Golden Bee engine. The desired flight characteristics, particularly slow flying speed dictated a wing loading of 10-11 ounces/sq. ft. This meant a wing area of 250 sq. in. would be about right. To conserve wood and covering material, a span of 36 inches was selected, and a constant chord layout adopted.

With the power plant, radio system and wing planform determined the next step was to finalize the overall layout. The parasol wing position was chosen to provide a high center of lift. Combined with positive wing incidence and a generous horizontal empennage, this layout ensures good longitudinal stability and a nose-up tendency under power. A large amount of down thrust is used to prevent excessive climbing under power. Generous dihedral is used to ensure adequate spiral stability. A two wheel gear was chosen since easy ground handling was not a consideration. With major airframe elements determined the overall lines could now be finalized. The final configuration is reminiscent of home-built aircraft popular in the thirties, and many current EAA home-built designs. We think that the lines are visually appealing and appropriate to the flying characteristics of the model. Everyone who has seen the prototypes agree, and almost all have said, "That's a real cutie." Now you know why we selected the name **Q-Tee.**

The secret of successful flying of all model airplanes is a lightweight accurately aligned airframe. This is particularly important in the smaller size models as a weight increase of only 2-3 ounces will make power flight marginal and the increased flying speed makes control more difficult for the inexperienced pilot. For those reasons we carefully considered the structure of the Q-Tee and tried several variants before selecting the materials and construction shown on the plans. The resultant airframe is very easy to build and very crash resistant. Most important, it is simple to assemble accurately and requires no special tools or jigs. Additionally, repairs are very easy and the structure is rigid enough so that any of the currently available film coverings can be used. Please don't "beef-up" the structure as it is not necessary and flight performance will be degraded.

If you have read this far and think that the Q-Tee is the model to introduce you to the sport of R/C Aircraft, send off to RCM for a copy of the full size plans of the Q-TEE and Volume I of the Flight Training Course. (See special offer on page 166 of this issue.) Then visit your local friendly hobby shop with a copy of the materials list and select everything you need. While you are waiting for the full-size plans, study the photos, instructions, and magazine plan to completely familiarize yourself with the building sequence. This will pay off later when you start to build.

Note that in addition to the materials required to build the Q-Tee you will need a few tools, supply items and a work surface. For this size airplane we recommend an inexpensive 24" x 36" wood drafting board as an ideal work surface. They are flat and true, easy to push pins into, and can be easily picked up and stored if you are working with limited space. Alternately a sheet of Celotex or similar material makes a good surface.

You should have a model knife and/or single edge razor blades, a razor saw, metal straight-edge, pliers, small hammer, and a hand drill available. A few hardwood sanding blocks, assorted grades of sandpaper, straight or tee-pins and masking tape will also be required. The type of adhesives used are largely a matter of personal choice. Wilhold Aliphatic, Titebond, and similar glues are excellent for general construction. Hobbypoxy Formula 4 or Devcon 5-minute epoxy are recommended for the cabane structure and fuselage former/side joints, and the wing center joint. We used Hot Stuff entirely to build our own prototypes as we feel the time and weight saved is well worth the additional expense. Just be sure to follow the warnings on the bottle and make sure all joints fit tightly.

Q-TEE

Designed By: Lee Renaud

TYPE AIRCRAFT
1/2A Sport
WINGSPAN
36 Inches
WING CHORD
7 Inches
TOTAL WING AREA
250 Square Inches
WING LOCATION
Parasol Wing
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL, Each Tip
1¾ Inches
O.A. FUSELAGE LENGTH
27 Inches
RADIO COMPARTMENT AREA
(L) 7½" X (W) 1¾" X (H) 2"
STABILIZER SPAN
12⅜ Inches
STABILIZER CHORD (Incl. elev.)
4½ Inches (Avg.)
STABILIZER AREA
56 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
3⅝ Inches
VERTICAL FIN WIDTH (Incl. rudder)
4½ Inches (Average)
REC. ENGINE SIZE
Cox .049-.051
FUEL TANK SIZE
Cox Engine Tank
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Two
CONTROL FUNCTIONS
Rudder and Elevator
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Ply & Hardwood
Wing	Balsa and Hardwood
Empennage	Balsa
Weight Ready-To-Fly	16-20 Ozs.
Wing Loading	9.24-11.56 Oz./Sq. Ft.

When the plans arrive we suggest that you cut out all parts required to build the airframe. Bend the landing gear to the pattern shown on the plan. To cut the wing ribs we suggest making two templates of 1/16" ply and pinning 18 3/32" x 7/8" x 7⅛" balsa rectangles between the ply templates. The resultant sandwich can be shaped to contour, notched then separated to provide the ribs. We find that preparing a personalized kit in this matter reduces overall assembly time and gets the model completed quickly.

CONSTRUCTION

The construction sequence described, progresses from the most simple steps through more complex building requirements. If this is your first model, we suggest you follow the sequence shown. The advanced modeler will, of course, ignore all instructions anyway. To reduce overall building time, we suggest that you skip forward to the next step while the glue is drying. Just work carefully and be sure you understand all construction steps before cutting. Cut the plans apart if this is more convenient. Cover the plans with Handiwrap or similar, to prevent gluing the wood parts to the plan.

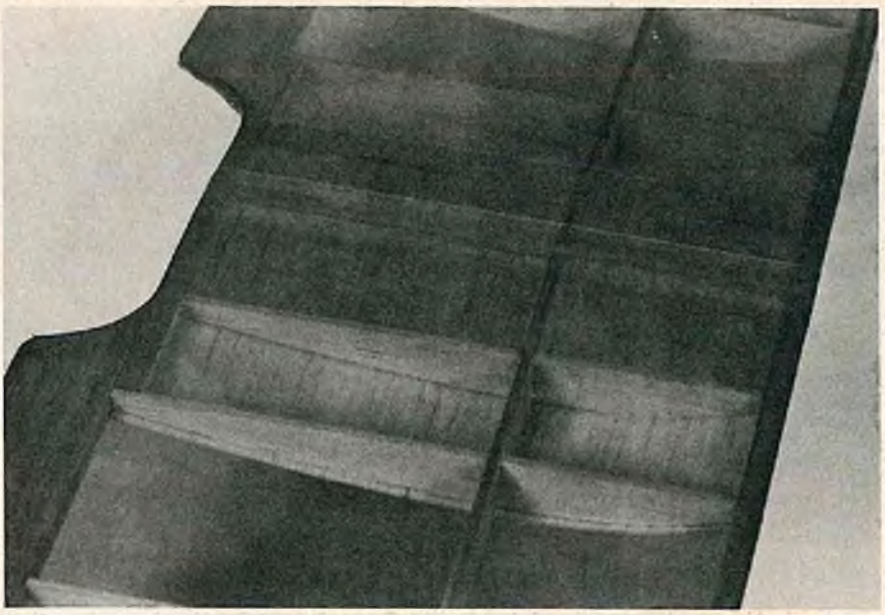
Tail Surfaces:

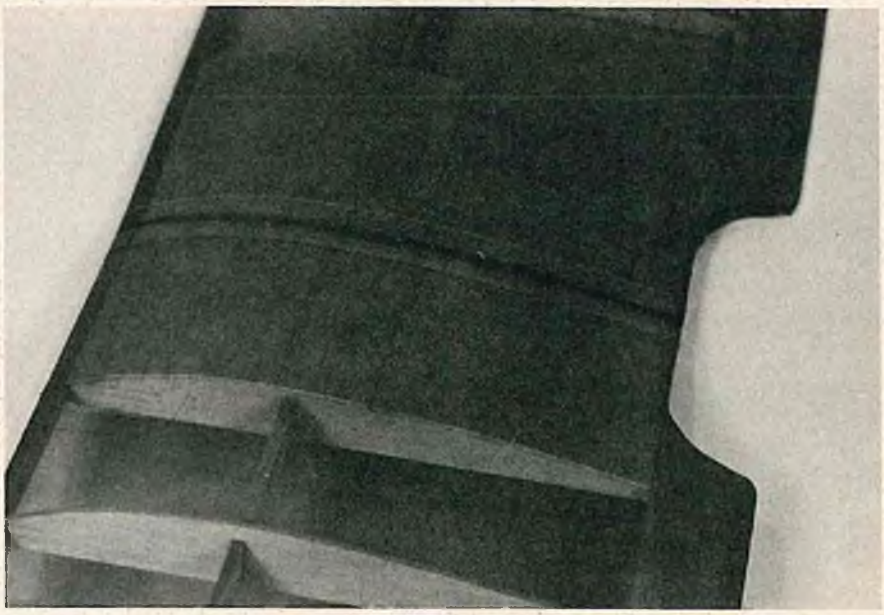
1) The rudder is cut from a strip of 1/8" x 1⅜" x 17⅞" balsa. Lay the strip against the plan and mark the correct length. Check carefully then cut. (The balance of this strip is used for the elevator.)

Now, lay the rudder over the plan and cut or file a notch in the leading edge, to clear the elevator tie. Round off the corners then round all edges and sand smooth.

2) The rudder is made from a piece of 1/8" x 3" x 3⅜" balsa. Sand both edges square and straight, align over plan and cut off the top front corner, using the cut line to line up your straight-edge. The triangle which you cut off is now butt glued to the front of the rudder. When the glue is thoroughly dry, sand the outline smooth and round the leading edge and top. Be careful not to round the bottom edge, where it fits between the stab center ribs.

3) Use the plan to locate the holes in the rudder for the control horn. Mark the holes and use a 3/32" diameter drill, checking carefully that the holes in the rudder, line up with the holes which are molded in the horn base and nut plate. Locate the hinge positions from the plans and use a #11 X-Acto knife blade (or similar) to cut a 1/2" long slot in the front edge of the rudder. Work very carefully and be sure the slot is exactly on the center of the wood. Run the blade back and forth in the slot and trial fit the hinges until the tab is fully inserted in the





The top photo shows the underside of the wing center section. Center photo is a view of the upper surface of the center section. Photo above shows Cox .049 and Cox muffler.

rudder and the crease is lined up with edge of the rudder.

Align the fin and rudder and mark the hinge positions on the fin. Cut slits in fin trailing edge and fit hinges. With the surfaces pushed together, check that the rudder swings freely and moves at least 30° each side of center. Check that all edges line up and final sand all over. Lay these parts aside until later.

4) Lay the elevator stock in place over the plans and trim to final length. Cut a 1/8" deep notch in the leading edge, so that the 1/8" diameter dowel tie fits snugly. Be sure the edge of the dowel is aligned with the front of the elevator and glue the dowel in place. Pin the elevator in place over the plans and mark the cut-out which provides rudder clearance. **Don't** cut this section out yet.

5) Cut the trailing edge to exact length from a strip of 3/16" x 1/4" x 36" balsa and pin in position tightly against the elevator. Cut one tip and center rib from the 3/16" x 11/16" x 11⅞" strip, and use these as patterns to cut a second set. Be careful that all edges are straight and square for tight glue joints. If you are using aliphatic or similar glues, we suggest that you pre-glue the end grain of these parts. This is easily accomplished by applying a coat of glue and letting it dry for 10-15 minutes before applying the final coat of glue. It is also wise to trial fit the parts together, before using any glue and to correct any mistakes before continuing. Pin the end ribs in place, gluing them to the stab trailing edge. Also pin and glue the center ribs in position, using the rudder as a gauge to space the ribs apart. Cut the leading edge pieces from the 3/16" x 1/4" strip, and fit the center joint so that both pieces butt tightly together, then pre-glue this joint. Apply glue and pin the leading edges in place.

6) Cut the truss ribs from a 3/32" x 3/16" x 36" strip. Fit these snugly in place, working from the center toward the tip, and being careful not to force the leading or trailing edges out of position. Pre-glue all joints, then glue in place. This completes the elevator assembly and we suggest that you leave this pinned in place at least 8 hours before removing from the work surface.

7) Install the hinges following the same procedure used on the fin and rudder. Remove the hinges and sand the elevator, rounding all edges. Now carefully cut out the Vee shaped section being careful not to cut into the elevator tie. Round the leading edge and tips then use a sanding block to sand the top and bottom surfaces smooth. Be sure that all ribs are flush with the leading and trailing edges as any high or low parts will show up as flaws when you cover the model. Check the fit of the rudder in the space between the center ribs and that the elevator tie does not hit the rudder in full throw positions. Correct any problems now, before covering. This completes the construction of the tail surfaces and now you are ready to tackle the wing.

Wing Assembly:

1) Separate the stacked ribs and trim 1/16" from the top surface of the six center section ribs (W-1 and W-2) to allow for the top surface sheeting. Trim 1/4" from the trailing edge of 4 of these ribs (W-1) to allow clearance for the 3/16" x 1/4" balsa trailing edge strip which fits between the W-2 ribs. Pre-glue the leading and trailing edge of all ribs.

2) Use a small square or straight-edge to cut 4 pieces 1-5/16" wide and 4 pieces 3⅛" wide from the 1/16" x 3" x 18" sheet. Be sure that the 1-5/16" wide pieces are all exactly the same width. Cut 4 gussets from the 1/8" x 1/2" x 3" strip following the method shown on the plan, so that the grain runs diagonally to provide maximum strength.

3) Smooth the plans out flat and tape them tightly to your work surface, then cover the wing area with a piece of Handiwrap. Note that the wing is built flat in one piece then cut apart at the center joint after assembly is complete. Now pin the trailing edge in place over the plans, using enough pins to hold it flat and secure. Cut the 3/16" x 1/4" strip to fit between the W-2 ribs and glue it to the trailing edge. Slip the tip W-3 ribs over the spar and pin the tip ribs in final position gluing them to the trailing edge and spar. Be sure the tip ribs are square with the work surface. Next, install the (2) W-2 ribs butting tightly against the ends of the center strip and trailing edge. Be sure the lower surface of all ribs are tight against the work surface and that the spar is properly aligned.

4) Install the two W-1 ribs at the center of the wing being very careful that they are properly aligned. Be sure to leave a 1/16"-3/32" space between these ribs so that there is clearance for your knife or saw blade when you cut the wing apart. You may now proceed to install all the W-3 ribs in both panels, gluing them to the spar and trailing edge. Place a drop of glue on the leading edge of all ribs and press the pre-shaped leading edge against the ribs. Use pins to force the leading edge tightly against the ribs and to hold it firmly against the plans. Try not to pin through the wood unless absolutely necessary as this may weaken the structure or split the leading edge. Check once more that the leading and trailing edges, spar, and all ribs are tightly against the work surface.

5) Trim two pieces of the 1-5/16" wide sheet to fit snugly between the leading edge and spar (save the cut-offs). Glue these to the center W-1 rib leading edge and spar, pinning the sheet tightly to the work surface. Next, glue the 1-5/16" x 3" pieces in place behind the spar and trim the cut-offs to fit between these pieces and the trailing edge strip. Now glue the W-1 rib against the edge of the bottom sheet and to the L.E. spar and T.E.

6) Install the tip rib gussets, trimming to fit if necessary, so that the gussets are tight against the ribs and leading and trailing

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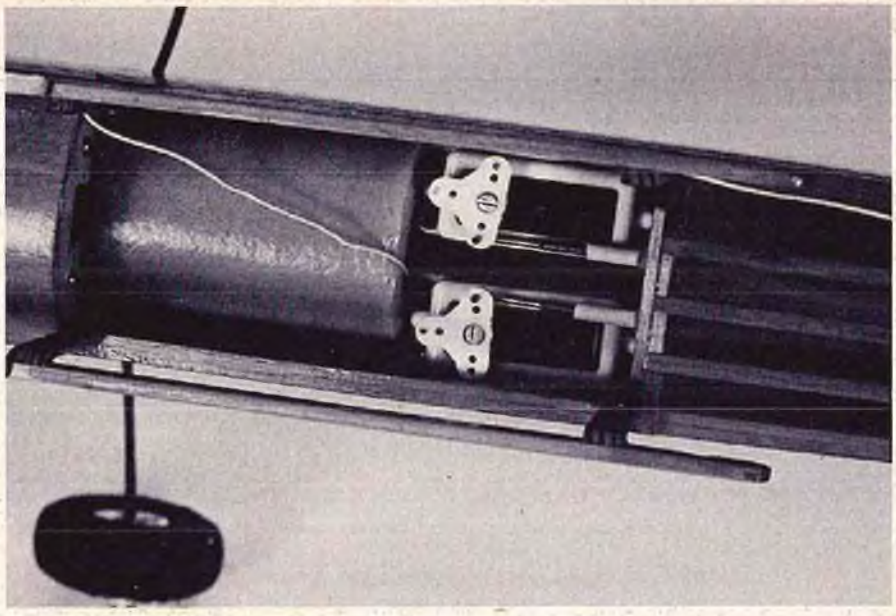
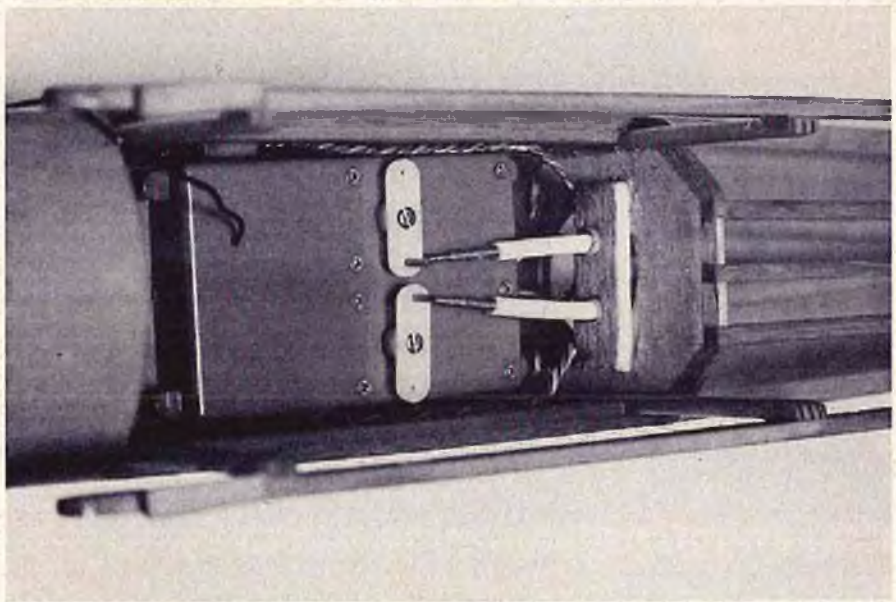




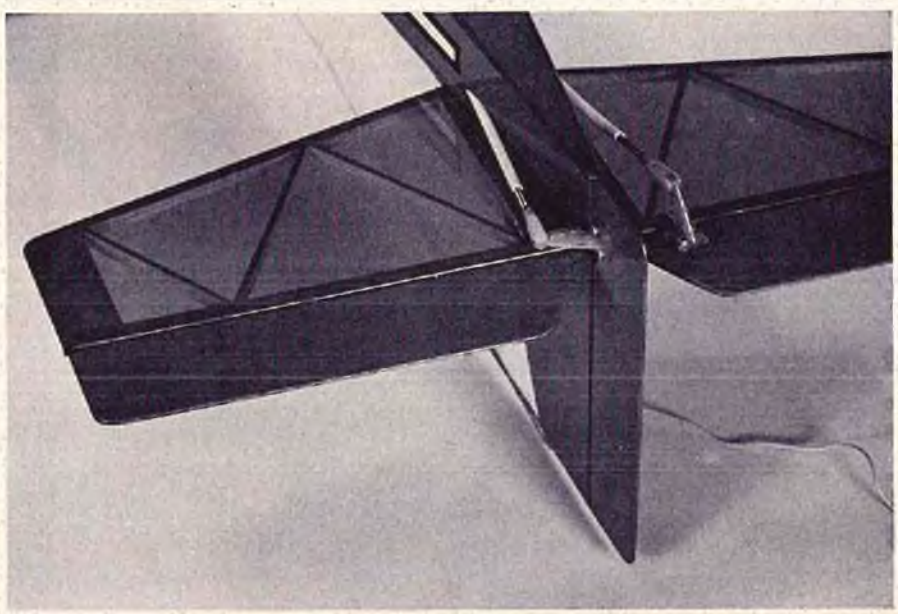
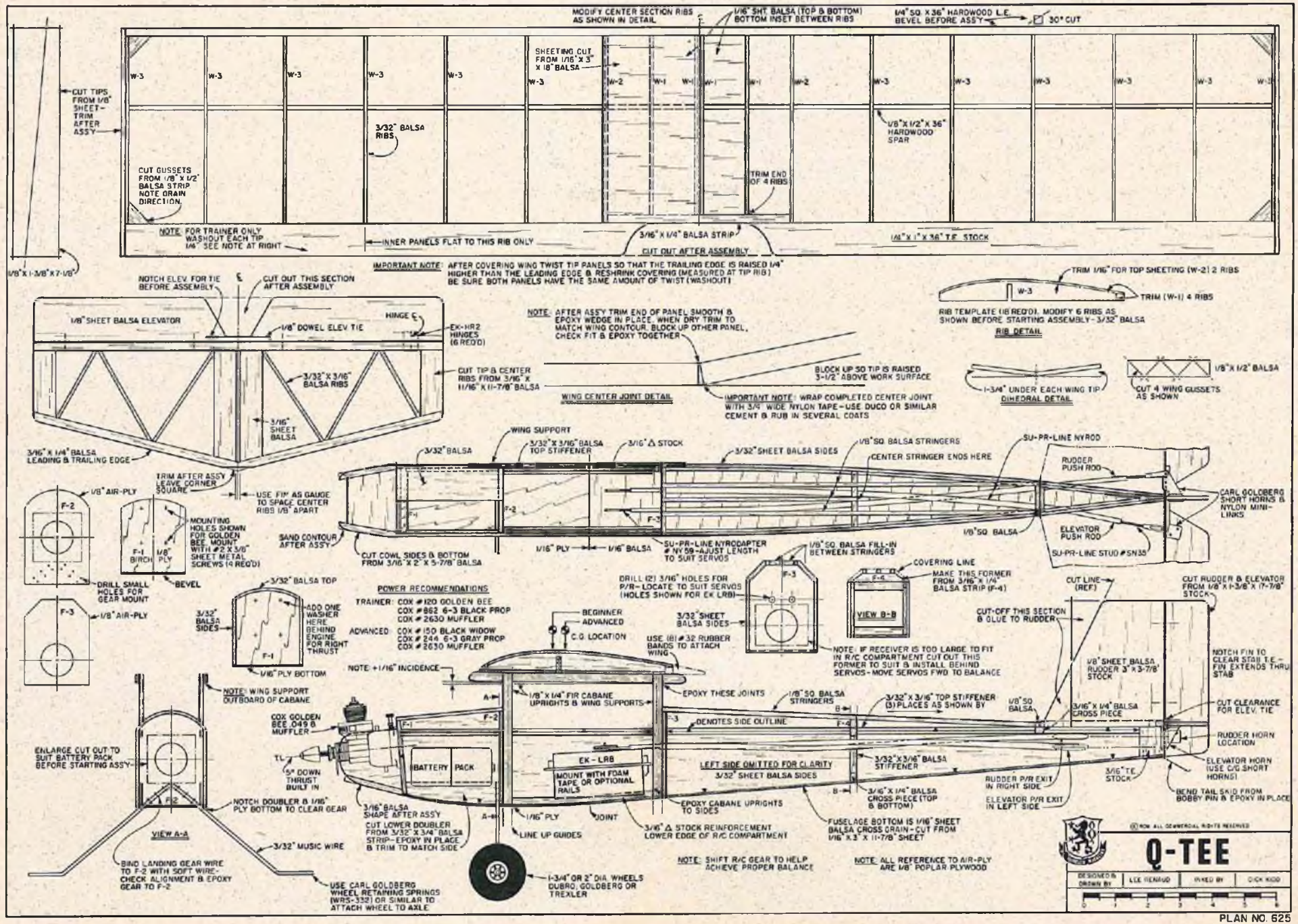


Photo at top shows a typical two servo installation. Foam wrapped receiver in front. Center photo shows a typical two-channel brick installed. Photo above is a view of the tail surfaces and pushrod connections.


MODIFY CENTER SECTION RIBS AS SHOWN IN DETAIL
1/16" SHT. BALSA (TOP & BOTTOM) BOTTOM INSET BETWEEN RIBS
1/4" SQ. X 36" HARDWOOD L.E. BEVEL BEFORE ASSY
30° CUT
SHEETING CUT FROM 1/16" X 3" X 18" BALSA
CUT TIPS FROM 1/8" SHEET - TRIM AFTER ASSY
3/32" BALSA RIBS
1/8" X 1/2" X 36" HARDWOOD SPAR
CUT GUSSETS FROM 1/8" X 1/2" BALSA STRIP NOTE GRAIN DIRECTION.
TRIM END OF 4 RIBS
NOTE: FOR TRAINER ONLY WASHOUT EACH TIP 1/4" SEE NOTE AT RIGHT
INNER PANELS FLAT TO THIS RIB ONLY
3/16" X 1/4" BALSA STRIP CUT OUT AFTER ASSEMBLY
1/8" X 1" X 36" T.E. STOCK
1/8" X 1-3/8" X 7-1/8"
IMPORTANT NOTE: AFTER COVERING WING TWIST TIP PANELS SO THAT THE TRAILING EDGE IS RAISED 1/4" HIGHER THAN THE LEADING EDGE & RESHRINK COVERING (MEASURED AT TIP RIB) BE SURE BOTH PANELS HAVE THE SAME AMOUNT OF TWIST (WASHOUT)
NOTCH ELEV. FOR TIE BEFORE ASSEMBLY
CUT OUT THIS SECTION AFTER ASSEMBLY
1/8" SHEET BALSA ELEVATOR
1/8" DOWEL ELEV TIE
HINGE
EK-HR2 HINGES (6 REQ'D)
3/32" X 3/16" BALSA RIBS
3/16" SHEET BALSA
3/16" X 1/4" BALSA LEADING & TRAILING EDGE
NOTE: AFTER ASSY TRIM END OF PANEL SMOOTH & EPOXY WEDGE IN PLACE. WHEN DRY TRIM TO MATCH WING CONTOUR. BLOCK UP OTHER PANEL, CHECK FIT & EPOXY TOGETHER
CUT TIP & CENTER RIBS FROM 3/16" X 11/16" X 11-7/8" BALSA
BLOCK UP SO TIP IS RAISED 3-1/2" ABOVE WORK SURFACE
WING CENTER JOINT DETAIL
IMPORTANT NOTE: WRAP COMPLETED CENTER JOINT WITH 3/4" WIDE NYLON TAPE - USE DUCO OR SIMILAR CEMENT & RUB IN SEVERAL COATS
TRIM 1/16" FOR TOP SHEETING (W-2) 2 RIBS
TRIM (W-1) 4 RIBS
RIB TEMPLATE (18 REQ'D). MODIFY 6 RIBS AS SHOWN BEFORE STARTING ASSEMBLY - 3/32" BALSA
RIB DETAIL
1-3/4" UNDER EACH WING TIP
DIHEDRAL DETAIL
1/8" X 1/2" BALSA
CUT 4 WING GUSSETS AS SHOWN
WING SUPPORT
3/32" BALSA
3/32" X 3/16" BALSA TOP STIFFENER
3/16" Δ STOCK
3/32" SHEET BALSA SIDES
1/8" SQ. BALSA STRINGERS
CENTER STRINGER ENDS HERE
SU-PR-LINE NYROD
RUDDER PUSH ROD
CARL GOLDBERG SHORT HORNS & NYLON MINI-LINKS
1/8" SQ. BALSA
ELEVATOR PUSH ROD
SU-PR-LINE STUD #SN35
TRIM AFTER ASSY LEAVE CORNER SQUARE
USE F1M AS GAUGE TO SPACE CENTER RIBS 1/8" APART
1/8" AIR-PLY
F-2
F-1 1/8" BIRCH PLY
MOUNTING HOLES SHOWN FOR GOLDEN BEE MOUNT WITH #2 X 3/8" SHEET METAL SCREWS (4 REQ'D)
BEVEL
SAND CONTOUR AFTER ASSY
CUT COWL SIDES & BOTTOM FROM 3/16" X 2" X 5-7/8" BALSA
1/16" PLY
1/16" BALSA
SU-PR-LINE NYRODAPTER # NY59 - ADJUST LENGTH TO SUIT SERVOS
1/8" SQ. BALSA FILL-IN BETWEEN STRINGERS
DRILL SMALL HOLES FOR GEAR MOUNT
F-3
1/8" AIR-PLY
3/32" BALSA TOP
3/32" BALSA SIDES
F-1
1/16" PLY BOTTOM
ADD ONE WASHER HERE BEHIND ENGINE FOR RIGHT THRUST
POWER RECOMMENDATIONS
TRAINER: COX #120 GOLDEN BEE
COX #862 6-3 BLACK PROP
COX #2630 MUFFLER
ADVANCED: COX #150 BLACK WIDOW
COX #244 6-3 GRAY PROP
COX #2630 MUFFLER
DRILL (2) 3/16" HOLES FOR P/R - LOCATE TO SUIT SERVOS (HOLES SHOWN FOR EK LRB)
COVERING LINE
MAKE THIS FORMER FROM 3/16" X 1/4" BALSA STRIP (F-4)
VIEW B-B
NOTE: IF RECEIVER IS TOO LARGE TO FIT IN R/C COMPARTMENT CUT OUT THIS FORMER TO SUIT & INSTALL BEHIND SERVOS - MOVE SERVOS FWD TO BALANCE
CUT LINE (REF.)
CUT RUDDER & ELEVATOR FROM 1/8" X 1-3/8" X 17-7/8" STOCK
CUT-OFF THIS SECTION & GLUE TO RUDDER
BEGINNER
ADVANCED
C.G. LOCATION
3/32" SHEET BALSA SIDES
USE (8) #32 RUBBER BANDS TO ATTACH WING
NOTE: +1/16" INCIDENCE
EPOXY THESE JOINTS
1/8" X 1/4" FIR CABANE UPRIGHTS & WING SUPPORTS
1/8" SQ. BALSA STRINGERS
3/32" X 3/16" TOP STIFFENER (3) PLACES AS SHOWN BY
1/8" SQ. BALSA
3/16" X 1/4" BALSA CROSS PIECE
NOTCH FIN TO CLEAR STAB T.E. - FIN EXTENDS THRU STAB
CUT CLEARANCE FOR ELEV. TIE
RUDDER HORN LOCATION
ELEVATOR HORN (USE C/G SHORT HORNS)
BEND TAIL SKID FROM BOBBY PIN & EPOXY IN PLACE
NOTE: WING SUPPORT OUTBOARD OF CABANE
COX GOLDEN BEE .049 & MUFFLER
DENOTES SIDE OUTLINE
ENLARGE CUT OUT TO SUIT BATTERY PACK BEFORE STARTING ASSY
TL
5° DOWN THRUST BUILT IN
BATTERY PACK
EK-LRB
MOUNT WITH FOAM TAPE OR OPTIONAL RAILS
LEFT SIDE OMITTED FOR CLARITY
3/32" SHEET BALSA SIDES
3/32" X 3/16" BALSA STIFFENER
3/16" X 1/4" BALSA CROSS PIECE (TOP & BOTTOM)
3/16" T.E. STOCK
RUDDER P/R EXIT IN RIGHT SIDE
ELEVATOR P/R EXIT IN LEFT SIDE
NOTCH DOUBLER & 1/16" PLY BOTTOM TO CLEAR GEAR
3/16" BALSA SHAPE AFTER ASSY
CUT LOWER DOUBLER FROM 3/32" X 3/4" BALSA STRIP - EPOXY IN PLACE & TRIM TO MATCH SIDE
1/16" PLY
JOINT
LINE UP GUIDES
EPOXY CABANE UPRIGHTS TO SIDES
3/16" Δ STOCK REINFORCEMENT LOWER EDGE OF R/C COMPARTMENT
FUSELAGE BOTTOM IS 1/16" SHEET BALSA CROSS GRAIN - CUT FROM 1/16" X 3" X 11-7/8" SHEET
VIEW A-A
3/32" MUSIC WIRE
BIND LANDING GEAR WIRE TO F-2 WITH SOFT WIRE - CHECK ALIGNMENT & EPOXY GEAR TO F-2
USE CARL GOLDBERG WHEEL RETAINING SPRINGS (WRS-332) OR SIMILAR TO ATTACH WHEEL TO AXLE
1-3/4" OR 2" DIA. WHEELS DUBRO, GOLDBERG OR TREXLER
NOTE: SHIFT R/C GEAR TO HELP ACHIEVE PROPER BALANCE
NOTE: ALL REFERENCE TO AIR-PLY ARE 1/8" POPLAR PLYWOOD
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Q-TEE
DESIGNED & DRAWN BY
LEE RENAUD
INKED BY
DICK KIDD
0 1 2 3 4 5 6

PLAN NO. 625

ABOVE: Wolfgang Matt from Liechtenstein was declared world individual scoring champion. BELOW: World Champion R/C aerobatics team from U.S.A. with stars in their eyes from winning, and from facing the multitude of flashbulbs. L. to R: Don Lowe, Team Manager; Mark Radcliff, Dave Brown, and Rhett Miller, with team members wearing World Championship team medals and displaying the FAI team championship trophy.

9TH RC WORLD

Wolfgang Matt of Liechtenstein is new R/C Aerobatic World Champion as United States brings home top team honors.

How could you paint a word picture of the Ninth R/C World Championships held in Bern, Switzerland from September 8th through September 13th?

Seventy-six contestants, speaking many different languages, and representing 27 countries . . joy and dejection . . mountains . . flowers . . applause . . gold, silver and bronze medals . . wind and mud . . then sun . . meeting new people, all sharing a common bond and experience . . thousands of pictures being taken . . camaraderie and sportsmanship . . autographs . . and, finally, memories.

Only if you were there could you truly see the magnificence of the Ninth R/C World Championships. It would be virtually impossible to capture the spirit of the Internats in prose, so we'll simply give you a few of the statistics and let the pictures tell the story. The Championships were organized by the Aero Club of Switzerland on the beautiful airfield of Beltmoos, along the Bern-Interlaken Highway. The airfield has a long paved runway which lies in the northwest-southeast direction. The sun, when it was there, was behind the pilots and judges almost all during the day. In the southeast, the Eiger and Jungfrau offered a magnificent panorama, snow-covered as they were.

The two R/C flight lines were approximately a kilometer apart — thus, you can imagine the amount of walking the press representatives had to do! An enormous tent lodged the Information Office, the Red Cross, the kitchen, and the model park. The tent could accommodate about two thousand people, fortunately, for it rained extensively during the six day meet.

On Wednesday, the 10th of September, it was a warm day with an overcast sky and no wind and the first rounds were completed normally. On the following day, Thursday September 11th, the skies were heavily clouded, although it was again warm with virtually no wind whatsoever. By 10:30 in the morning it started to rain although flying continued until noon. The deluge started at 1:00 p.m. and went on until 4:00 that afternoon. Flying re-started at 4:15 and continued on until 7:00 p.m. with the last pilot to fly that day performing his maneuvers in semi-darkness! Almost a dozen fliers who were scheduled for the days competition were unable to fly on Thursday.

Friday the 12th of September brought with it an overcast sky, some brief intermittent showers, and almost no wind. Then, once again, the downpour began from 4:30 p.m. and didn't stop until midnight! The time lost the day before could not be made up, and the Ninth World Championships were substantially behind schedule by Saturday the 13th of September.

The final day brought with it sunshine at last, warm air, some rare cumulus clouds, and a light southwesterly wind. The final flights, delayed the day before, were made between 7:00 and 8:30 a.m. We could say, without doubt, that the fine weather on this particular Saturday, saved the World Championships, since the last flight took place at 4:15 p.m. It was fortunate that these flights were completed on Saturday, since the following day it did not stop raining at all!

Insofar as the organization of the Ninth R/C World Championships are concrened, it was excellent in all areas — from the choice of the site, to the large automobile parking facilities, to the highly efficient information office. The spectators were close enough to the flight line to see all of the activities and yet still be safe from any possible mishap. Each field guard had his own dog, convincing the crowd not to "misbehave" in any fashion! And crowds there were — as the Swiss people cheered, applauded, snapped thousands of pictures, asked for endless autographs, and even let school out early one day in order that the Swiss children might see this World Championship event.

The only shortcoming was a problem with frequency control and eventual interferences. In fact, it was only on Tuesday that the Swiss Aeroclub realized it was simply impossible to fly on frequencies between 27.025 and 27.075 MHz. Despite every effort made that evening, it was impossible to obtain a couple of 27 MHz crystals within a one hundred mile radius around Bern. The officials of the Swiss PTP control car, limited themselves to check the exact transmitter frequency of the pilot flying at the moment. They said it was useless to rig their special antenna even 15' above the ground for, in that case, all they could see on their oscilloscope was interference! Fortunately, there was also a factory control car from Microprop factory and those people were extremely well equipped. In fact, it was due to the Microprop officials that several models were saved during those four days of actual competition. In spite of their efforts, however, several planes were shot down, including those of the Japanese pilots Naruke and Matsui, as well as Bruno Giezendanner of Switzerland.

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PHOTOS AND TEXT BY ANDRE DENEVE AND JOHNNY CLEMENS

CHAMPIONSHIPS

R/C WORLD CHAMPIONSHIPS













29


29
CURARE


-AHET


47


BLUEANGEL


BLUEANGEL


PEPSI


PEPSI

9TH R/C WORLD CHAMPIONSHIP RESULTS

Place	Name	Age	Country	Model	Engine	Radio	Wt. (oz.)	1st	2nd	3rd	Total
1	W. Matt	27	Lie.	Atlas	Webra Speed	Simprop	131.6	4775	5060	5015	14,830
2	H. Prettner	24	Aus.	Super Sicroly	Webra Speed	Simprop	129.5	4660	4785	4760	14,205
3	D. Brown	39	USA	Phoenix VI	Super Tigre ABC	World Engines	126.6	4505	4490	4670	13,665
4	T. Yoshioka	28	Jpn.	Blue Angel	Enya	Digi-Flight	125.2	4565	4565	4455	13,585
5	T. Okumura	24	Jpn.	Marionette	O.S. FSR	O.S.	130.5	4545	4170	4635	13,350
6	M. Radcliff	30	USA	Phoenix VI	O.S. FSR	World Engines	134.0	4390	4385	4550	13,325
7	I. Kristensen	28	Can.	Saturn	Super Tigre ABC	Pro-Line	134.7	4330	4305	4480	13,115
8	N. Matt	21	Lie.	Atlas	Webra Speed	Simprop	137.9	4245	4310	4510	13,065
9	R. Miller	17	USA	Compensator	Webra Speed	Pro-Line	129.1	4400	4350	4220	12,970
10	G. Hoppe	34	Ger.	Sultan 5	Webra	Micro-Prop	126.3	4375	4255	4335	12,965
11	B. Kjellgren	20	Swe.	Mach I	Webra Speed	Kraft 72	131.2	4750	4360	4180	12,815
12	I. Matsui	43	Jpn.	Corsair	Enya	Micro-Sport	125.2	4330	3985	4215	12,530
13	G. Bertolozzi	20	Italy	Kosmo 3	OPS	Simprop	129.5	4340	3805	4375	12,520
14	H. Neckar	32	Ger.	Mephisto	Webra Speed	Varioprop	128.4	3935	4180	4375	12,490
15	K. Matke	47	Ger.	Ol. Flipper	Webra	Varioprop	140.0	4065	4185	4225	12,475
16	G. Werion	23	Bel.	Mixer S	OPS	Micro-Prop	141.1	4150	4130	4140	12,420
17	B. Giezendanner	29	Swi.	Scorpion	Webra Speed	Pro-Line	128.0	4165	3855	4310	12,330
18	E. Giezendanner	34	Swi.	Scorpion	Webra Speed	Pro-Line	132.3	3975	4055	4210	12,240

TEAM RESULTS AND STANDINGS

Place	Country	Score
1	USA	39,960
2	Liechenstein	39,115
3	Japan	38,100
4	Germany	37,930
5	Austria	37,385
6	Switzerland	36,475
7	Canada	36,140
8	Sweden	36,075
9	Italy	36,035
10	France	33,735
11	Great Britain	31,965
12	South Africa	31,210
13	Norway	30,035
14	Holland	29,710
15	New Zealand	29,955
16	Australia	29,015
17	Mexico	27,570
18	Luxembourg	26,205
19	Denmark	26,055
20	Yugoslavia	25,800
21	Ireland	22,385
22	Argentina	22,235
23	Belgium	21,880
24	Israel	13,650
25	Spain	11,205
26	San Marino	9,625

PHOTOS, PAGE 32: 1ST ROW (L) Third Place winner, Dave Brown of U.S., and his Phoenix VI. (C) Bruno Giezendanner of Switzerland used a radical design, the Scorpion. (R) B. Bertolani's Kosmos 3, placed 20th for Italy. 2ND ROW (L) One of the forty Webra speed engines on the field, this one belonging to Yves Van Gompel of Belgium. (C) Mark Radcliff, U.S.A., placed 6th with his Phoenix VI. (R) Yves Van Gompel, Belgium, with his Mixer S. 3RD ROW (L) U.S. team watches last flight of Japan's Yoshioka. (C) Rhett Miller and Compensator with U.S. Team Manager. (R) A Kosmo 3 flown by G. Bertolozzi of Italy to 13th Place. 4TH ROW (L) World Champion, Wolfgang Matt and his Atlas. (C) The two friends who dominated the world championships, Matt and Prettner. (R) B. Kjellgren of Sweden took 11th with a Mach I. PHOTOS, PAGE 33: 1ST ROW (L) Second Place winner, Hanno Prettner of Austria. (C) The team entries from Canada. (R) Hanno Prettner returning from flying site after his final flight. 2ND ROW (L) Note negative dihedral in Prettner's Super Sicroly, providing better roll stability. (C) T. Paulsen of Norway was flying a semi-scale version of the Spitfire. (R) Japan's T. Okumura with his Marionette. 3RD ROW (L) T. Yoshioka of Japan with superb Blue Angel. This was probably the best finished model seen in Bern. (C) Japan's Yoshioka with Rhett Miller, U.S.A. (R) The judges, whose skill was as important as the competitors. 4TH ROW (L) Gerard Werion of Belgium prepares his Mixer S for flight. (C) Belgian supporters watch Werion's second flight. (R) 26 countries were represented at the 9th World Championships.

1ST ROW (L): Flying to Frankfurt, Germany, the U.S. Team drove from there to Bern, the capital city of Switzerland, in rented VW buses. Here, team member Dave Brown is discussing problems of travel with Bill Northrop, U.S. FAI judge,; team manager Don Lowe; and team member Mark Radcliff. (R) The U.S.A. team stopped in the Heidelberg area to rest and practice. That evening the group visited at a meeting of the Schwetzingen, Germany R/C Club. In the same area the U.S. team was invited to practice on the beautiful flying field of the R/C club of Oberhausen, near the Rhine river. 2ND ROW, (L) Dave Brown and Rhett Miller are wondering where passengers will ride with the VW's completely full of the boxes containing the team's planes. Getting these huge boxes through customs made for interesting traveling problems. (R) Welcoming speeches from the Swiss Aero Club to the teams from 26 countries were made at the opening ceremonies. LEFT: Part of the interested crowd at the meets opening ceremonies. After welcoming speeches, hundreds of pigeons were released at mid-field signifying the official start of the competition. 4TH ROW (L) All was not fair weather at the World Championships. U.S.A.'s Dave Brown prepares to fly in the rain. (R) Autographing "jeans" was a new keepsake idea at the World Championships. Here a U.S. team member "gives" autograph to the wife of an Italian team member.

RIGHT: Rhett Miller fell victim of repeated bad luck with rain, wind, and flight time problems, but still made an excellent team contribution. Rhett's father, and team manager Don Lowe, assist. 2ND ROW (L): Dedicated judges were the unsung heroes of the Championships, for four days sitting in the sun, rain, wind, and cold, sorting out the ever-so-fine differences in the flying of the world's finest radio control pattern pilots. (R) U.S.A. team member, Dave Brown, Third in individual scoring, with his greatest supporter, wife Sally. 3RD ROW (L): U.S.A.'s Dave Brown with beautiful glow of pride upon winning Third in individual scoring in the World Championships, wearing a team championship medal and holding diploma and flowers symbolic of individual winnings. (R) The team representing Japan earned Third place in the team championships, following the U.S.A. and Liechtenstein teams. A surprising number of supporters came from Japan to cheer their team on. 4TH ROW (L): U.S.A. team member, Rhett Miller, from Tallahassee, Florida, 17 years old U.S. National Champion placed Ninth in world individual scoring in spite of having to fight the worst possible weather problems. (R) Louis Castaneda of the team from Mexico is typical of the high level of sportsman and sportsmanship that is brought out by World Championship competition. He is seen here with his most enthusiastic boosters, his wife and daughter-in-law.

LEFT: Hanno Prettner of Austria, popular young Second Place winner in individual scoring receives congratulations from the AMA President, John Clemens. RIGHT: U.S.A. team member, Mark Radcliff, 20 years old from Cincinnati, was Sixth in individual scoring.

LEFT: Austrian team posed in front of the impressive and unique flag display which is a tradition at the FAI world events. (R) The closing victory banquet, attended by over 500 enthusiasts, was held in the historic Kornhauskeller (corn cellar) whose subterranean vaults were used as a granary and wine cellar as far back as the year 1714. The Kornhauskeller has been used as a restaurant and banquet hall since 1798, and since 1896 has been the central banquet hall of Bern.

With regards to the contestants, there were, perhaps, a dozen fliers who could have captured the World Championship. From the outset, it is indisputable that Wolfgang Matt and Hanno Prettner dominated the competition. Yoshioka, former World Champion as a result of a five man fly-off in Gorizia, was beaten by Dave Brown of the U.S. in the fourth round with a score of 4670 points to end up in 3rd Place behind Matt and Prettner.

Our own Mark Radcliff ended up in 6th Place with young Rhett Miller in 9th which, combined with Dave Brown's third place title, won the team victory for the United States, edging out Liechtenstein and Japan. The U.S. team made a much better showing than two years ago in Gorizia where they took 5th, 8th and 11th which they parlayed into a 3rd, 6th and 9th at Bern.

Once again, this year, there were some surprises in the flying circle. Norbert Matt, Wolfgang's brother, moved from 39th place in the Eighth World Championships to 8th Place in the Bern competition, while Canada's Kristensen moved from 14th in Gorizia two years ago to 7th Place in Switzerland.

Insofar as overall statistics are concerned, there were 14 Pro-Line radios, 12 Simprops, 11 Krafts, 10 Futabas, 5 Multiplexes, 5 Graupners, and 4 Microprops, which accounted for the majority of radio systems used.

With regards to the World Championship's contestants choice of engine, 50% of the competitors used the Webra Speed .61 for a total of 38 engines. In addition there were 9 O.S. Max engines, 6 HP's, 6 OPS's, 5 Webra .61's, 3 Enya's, 3 Super Tigre .61's, 2 Ross .61's, 2 Kraft .60's, and 2 Rossi .60's. The average age of the Ninth World Championship pilot was 32 with fourteen years experience in modeling and nine years in radio control.

To break down the average statistics and come up with a composite aircraft entered in the Ninth World Championships, it would have a wing area of 700.55 square inches, a stabilizer area of 179.78 square inches, a wingspan of 63", a weight of 129 ounces, and a wing loading of 21.08 ounces per square foot.

All in all, the Ninth R/C World Championships was a resounding success. Of course, the contest had its problems as does any competitive event, but all-in-all, the Swiss Aeroclub did a magnificent job of hosting the 76 contestants and team support members that represented the 27 countries entered in this years Internats.

Our congratulations to Wolfgang Matt for his well deserved victory as the 1975 World R/C Champion. Our congratulations, too, to the U.S. Team and to Team Captain, Don Lowe, who put it all together for the U.S. and brought our team home victorious. □

FLIGHT TRAINING SEMINAR

Learning to fly an RC helicopter rapidly and painlessly using proven training aids.

BY DON DEWEY

● This month, as we continue our discussion about learning to fly the R/C helicopter, we'll begin by dispelling a few rumors about the difficulty of learning to fly rotary wing aircraft.

To begin with, we are all guilty of making helicopters seem much more difficult to fly than they actually are. If one were to compare learning to fly a helicopter to a "full-house" pattern aircraft, we would definitely say it is **not more difficult** — only **different**. Both are "heavier than air" craft that are capable of successful flight. However, wherein the fixed wing aircraft is capable of maneuvering through the roll, pitch, and yaw axis, the helicopter is capable of vertical ascents and descents, sidewards flight and backwards flight. The rotary winged aircraft is capable of landing and taking-off in a spot just large enough to clear its rotor blades and, with the chopper, the R/C pilot obtains a feeling of third dimensional maneuverability as compared to a fixed wing machine. As we will see in a minute, the same control functions are used, insofar as the transmitter is concerned, and only the **responses** are different than the fixed wing aircraft. The key to this comparative discussion is the word **different**.

In the helicopter, we have a cyclic control which controls direction by tilting a swashplate. On a Mode 2, two-stick transmitter, this is the right hand stick, or the primary gimbal on a single stick transmitter. Pushing the stick forward (down elevator on a fixed wing aircraft) drops the nose of the helicopter and moves it forward in flight when adequate throttle is applied. Pulling the stick back (up elevator in a fixed wing aircraft) moves the helicopter rearward — a function that is impossible with a fixed wing aircraft. Moving the primary control stick to the left (left aileron on a fixed wing aircraft), moves the helicopter sideways to the left, and, conversely, moving the stick to the right (right aileron on a fixed wing aircraft) moves the helicopter to the right.

In the case of helicopters with collective pitch control of the main rotor, this is normally connected by mechanical mixing between the servos in the helicopter and operated from the throttle stick on the transmitter — in the case of a Mode 2 transmitter, the left hand stick and, in the case of a single stick transmitter, the throttle control lever on the right hand side of the transmitter. In the case of a fixed pitch main rotor, the throttle control simply increases the rotor speed, providing increased lift. When the lift of the main rotor — and you think of this as a circular wing — exceeds the weight of the helicopter, the helicopter then becomes light and begins "skimming" over the ground. As additional rpm is applied to the main rotor blades, the lift of the main rotor "disc," or "wing" far exceeds the weight of the machine and the helicopter rises vertically until some form of cyclic control is given, providing it with another mode of directional travel.

The left and right motion of the left hand stick on the Mode 2 transmitter (rudder on a fixed wing aircraft), or the knob on a single stick transmitter, provides collective pitch to the tail rotor. The faster the throttle is increased or decreased, the faster the torque reaction (swing) of the tail. Thus, when you move the throttle very slowly, you don't have torque problems if the tail is properly trimmed since the increase of rpm's occurs also in the tail rotor and the increase in lift takes care of the necessary compensation.

Now for the subtle relationship between the two sticks. Advancing the throttle and tail rotor collective (secondary effect on roll and pitch axis) will modify the helicopters attitude in roll and pitch so you'll have to correct **instinctively** on the main rotor, while opposite cyclic variations on the main rotor can slow down the engine's rpm (as drag increases), or increase the lift (translational lift effect) so, in the former case you have to increase power, otherwise you lose altitude and, in the latter case, you have to reduce power to prevent gaining altitude. In both cases, you have to fight torque — which, in turn, affects the attitude and so on. What we are trying to point out here is that you must develop absolute coordination on all four control functions which must be automatic by reflex since you do not have time to think about the necessary corrections.

All of this may sound overwhelming and somewhat frightening, but visualize it in another fashion — if you were in a nose down, one wing tip down situation, close to the ground with a high speed pattern aircraft, you would also have to coordinate several functions at once in order to safely avoid damage to the aircraft — you would not have time to think right aileron, up elevator, right rudder, and reduced throttle — if you did not react by **instinct** you would undoubtedly end up with a destroyed aircraft. In the case of the helicopter, chances are since you will be learning close to the ground and you are not moving forward at a high rate of speed, the only damage would be a tip over with a resultant broken main rotor blade and a twisted flybar — thus the damage would be far less than would be encountered with a fixed wing aircraft. Again, flying either a fixed wing aircraft or an R/C helicopter, requires training the reflexes as well as an automatic response on the controls to a given attitude of the machine — all of which is simply a matter of training. Again, we will repeat that it is not more difficult, only **different**.

Now let's go back and discuss the difference between a Mode 2 and a single stick transmitter which, in itself, is somewhat controversial among helicopter pilots as it is among fixed wing pilots. We will also discuss whether to "fly the nose" or "fly the tail" — another highly controversial discussion.

First of all, while any R/C experience is of value in advancing your own progress in either fixed wing aircraft or in R/C helicopters, the experienced fixed wing pilot will have some instinctive reflexes to overcome when he begins to fly the R/C chopper. For example, the instinctive reaction of the fixed wing pilot who finds himself in difficulty, is to chop the throttle and apply some up elevator — with a helicopter this is instant disaster! Remembering how a helicopter functions, reducing the throttle reduces the main rotor rpm, and thus the lift, so that the weight of the machine now exceeds the lift of the blades and the helicopter is falling. Applying up elevator will drop the tail of the helicopter and the combination of the two "panic reactions," so familiar to a fixed wing pilot, will cause a tail-down, free fall all the way to terra firma! The "panic switch" on a helicopter is to apply momentary full throttle with a small amount of forward cyclic (down elevator) — which will increase the lift of the main rotor blades causing the helicopter to climb while the small amount of forward cyclic will straighten out the tail and put the helicopter into a forward flight mode. Thus, the application of full throttle and a small amount of forward cyclic will cause the helicopter to go into climbing forward flight rather than crash to the earth when the throttle is decreased.

To many fliers, trying to fly a helicopter with a two stick transmitter (Mode 2) is somewhat similar to patting your head and rubbing your stomach. To others, it is completely natural to separate the cyclic

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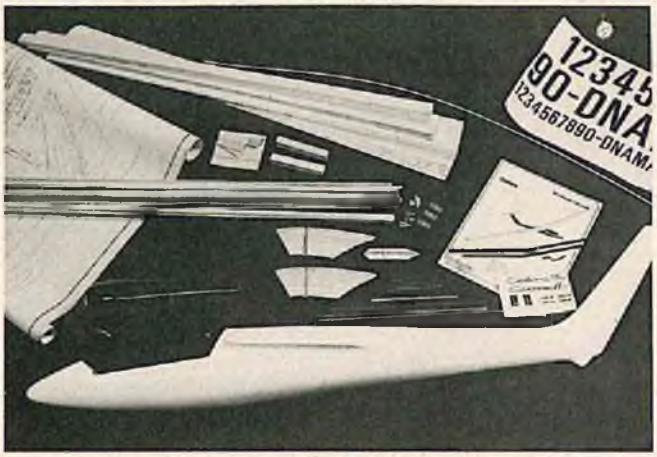
RCM PRODUCT TEST

Windspiel Models
COBRA 17



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

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

● The Cobra 17 is manufactured by Windspiel Models, and was designed by Peter H. Bechtel. This is a sport and competition sailplane designed for Open Task Soaring with a wingspan of 121.5" and a total wing area of 717 square inches. The kit includes a built-up wing and empennage with a white Gelcote and polyfiberglass fuselage. Hardware items in the kit include pre-bent wing wires, wires for tail, control cable for stabilizer, rudder horn, NyRod tubes for rudder pushrod, four quick links, Du-Bro solder links, plywood for servo tray, brass tubes for wing and stab, hinges and tow hook. Also included are two Windspiel decal sheets and two scale decal sets for both the Cobra 17 metre and 15 metre versions. The weight of our prototype ready to fly was 52 ounces with a wing loading of 10.4 ounces per square foot. The wing, rudder and stabilizer were covered with MonoKote. This is an excellent kit with the instructions extremely well written and with good quality material used throughout. The construction is quite easy and the finished sailplane is a good, fast, and competitive Open Class sailplane that would also be highly recommended for the intermediate sailplane enthusiast for both slope and thermal soaring. The kit is well worth its price of $84.50. □

SPECIFICATIONS

Name	Cobra 17
Aircraft Type	Sailplane
Manufactured by	Windspiel Models 835 Piner Road Santa Rosa, California 95401
Mfg. Suggested Retail Price	$84.50
Available From	Both Manufacturer and Retail
Mfg. Recommended Usage	Sport Sailplane, Competition
Wingspan	121.5 inches
Wing Chord	7¾" - 4½"
Total Wing Area	717 sq. in.
Fuselage Length	45 inches
Radio Compartment Dimensions	(L) 11" x (W) 3¼" x (H) 3"
Wing Location	Shoulder Wing
Dihedral	12 degrees (total)
Airfoil	Flat Bottom
Wing Planform	Straight Taper
Stabilizer Span	22¼ inches
Stabilizer Chord (incl. elev.)	4¾ x 3¼ inches
Total Stab Area	87.6 sq. in.
Stab Airfoil Section	Symmetrical
Stabilizer Location	T-Tail
Vertical Fin Height	11¼ inches
Vertical Fin Width (incl. rudder)	7 x 4 inches
Mfg. Rec. Engine Range	NA
Recommended Fuel Tank Size	NA
Landing Gear	NA
Recommended No. of Channels	Two - Three
Recommended Control Functions	Elevator, Rudder, Spoilers
Basic Materials Used In Construction:	
Fuselage	Gel-Kote, polyfiber glass
Wing	Built-up Balsa, Spruce
Tail Surfaces	Balsa
Hardware Included In Kit	Very complete hardware package
Plan Size	3' x 6' (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (6 pages)
Construction Photos	No
Kit Includes	Shaped Parts
Mfg. rec. flying weight	52 ounces
Wing loading based on rec. flying weight	10.5 oz./sq. ft.

RCM PROTOTYPE

Weight, ready to fly:	52 oz.
Wing Loading	10.4 oz/sq. ft.
Covering and finishing materials used	MonoKote
Engine Make and Disp.	NA
Muffler Used	NA
Radio Used	Not Given
Tank Size Used	NA


EXPERIMENTAL
N1ULL

STEPHENS AKRO

A Stand-Off Scale model of the famous E.A.A. design that has added its share of the fifty plus trophies won by the author in competitive flying. A magnificent aircraft for .40 to .60 engines designed by Don Condon.

● The model in this article represents my exact thoughts for stand off scale. By this I mean the following:

(1) It must fly well and be as easy to fly as any scale model can be.

(2) It must have true scale outlines, and look as much like the real thing as possible, without a lot of frills or difficult structure which means heavy wing loading.

(3) It must be attractive and unusual and, above all get you enough static and flight points to win some hardware.

I think it does all these things pretty well, so now for a little background and history.

This model is patterned after the one owned by Leo Loudenslager of Walkil, New York. Leo is an airline pilot, and the most promising young aerobatic pilot to come along in recent years.

He very nearly made the last United States Aerobatic team for international competition, and is a sure bet to be one of the best in this country soon.

The airplane is a Stephens Akro, an E.A.A. design, somewhat modified to fit Leo's needs. Photos and three views were taken from the following magazines: Air Progress, October, 1973 and the E.A.A. publication, Sport Aviation, January, 1973.

If you're still interested, let's start like this:

Wing

I suggest building the wing first, because it helps in fitting to the fuselage later, and you must have it completed to build the canopy hatch.

Full size inside and tip patterns are given for foam cutting. The dihedral is not shown on the plans, but is cut into the foam. Using 2" thick foam, just keep the tops of both patterns near the top of your foam block.

and the dihedral will be cut in the bottom of the wing only. The top of the wing is level. The reason for all the plywood in the tip is to protect it from scuff damage, and to provide a good base for the hardware screwed to the tip for horizontal and vertical reference lines. The ailerons are foam, too. After sizing the piece you cut out of the wing blank, and sheeting to match the wing airfoil, the rest of the wing is pretty much like all foam wings, and the plans show all you need to know.

Fuselage

Start by cutting out all bulkhead frames as follows: #1 and #2 are ¼" aircraft plywood; #7 and #14 are ⅛" balsa; #13 is ⅛" plywood; all the rest are ¼" balsa.

Because of the midwing design, it is necessary to get some strength up front to hold that engine solid. Two things accomplish this: The four ¼" dowels between the firewall and #2 bulkhead, and the 1/32" ply doubler on each side that runs from #1 to #13, from the thrust line to the bottom of the fuselage. The little weight it adds is well worth the added strength.

Now lay out a center line (fuselage bottom) on your building board, and mark the spacing for all bulkheads. I found it easier to cut scrap balsa to put under all bulkheads to bring them up in height so that the thrust line on the side is perfectly straight and level, with #3 sitting flat on the board. This also assures a no-twist fuselage. Don't forget to cut clearance holes in all bulkheads for the pushrods first.

Cut the 1/16" balsa sides and 1/32" ply doubler the same size. Glue together and install against the sides of the bulkheads, the top being even with the thrust line pre-marked on the sides of all formers. The stab and rudder fin should now be shaped and installed.

Cut two #14 from ⅛" balsa. Glue one to #9 and #10 and tack glue (lightly) the other on top of it. Using a straight edge, sand the necessary bevel into both #14's to conform with the top former shapes. Remove the top #14 and save for building the canopy hatch later.

Put 1/16" scrap balsa behind all panel joints for help in gluing the top sheeting.

Install the 3/32" soft top sheeting next. Wet the top surface, bend to fit, and hold with masking tape till dry.

Install the tank floor and sides and Tatone mount now, then sheet over the tank section. Put the wing into place and finish fitting to the fuselage if necessary.

Use 1/4" x 1" hard balsa as wing saddles inside both sides and under the wing for added strength and stiffening in this section.

Now cut a piece of wax paper slightly wider than the fuselage and tape to the wing center. Next cut pieces of 1/16" sheet for the deck floor. Glue together and cut to the fuselage width from #3 to #9.

Fit formers #3-4-5-6-7 and the #14 you made before. Add glue backers along the sides between all bulkheads for gluing top sheeting later on. Drill two ⅛" holes through #2 and #3 at about the angle shown on the plan and epoxy in pieces of ⅛" music wire for the front hold down pins. Now apply the top sheeting after making sure all the framework fits tight to the wing and bulkheads #3 and #14. After sheeting and removal, drill a ¼" hole down through the rear where shown and install a piece of ⅜" dowel for strength. Now drill a hole for the rear hold-down bolt.

Canopy

I went the hard way and made a wood plug and molded my own canopy from butyrate plastic, but a little shopping around will find you a commercial canopy that you can fit to shape.

The landing gear should be bent and installed as per the plan and pictures before the fuselage bottom is sheeted. Mine was made from a piece cut from a 50' roll of sewer clean-out tape.

STEPHENS ACRO

Designed By: Don Condon

TYPE AIRCRAFT
Stand-Off Scale
WINGSPAN
57 Inches
WING CHORD
Root, 12⅝" — Tip, 6¾"
TOTAL WING AREA
542 Square Inches
WING LOCATION
Mid-Wing
AIRFOIL
Semi-Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL, EACH TIP
Flat Top (7/8" at tip)
O.A. FUSELAGE LENGTH
37⅞ Inches
41¼" (nose to rudder tip)
RADIO COMPARTMENT AREA
(L) 10" X (W) 4" X (H) 2"
STABILIZER SPAN
19¼ Inches
STABILIZER CHORD (incl. elev.)
5" (Avg.)
STABILIZER AREA
92 Sq. In. (approx.)
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
6½ Inches
VERTICAL FIN WIDTH (Incl. rudder)
5" (Average)
REC. ENGINE SIZE
.45-.60 Cubic Inch
FUEL TANK SIZE
11 Ounce
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Four
CONTROL FUNCTIONS
Rud., Elev., Ail., Throt.
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Balsa, Ply, Foam
Empennage	Balsa and Ply
Weight Ready-To-Fly	108 Ounces
Wing Loading	28.7 Oz./Sq. Ft.

Cowling

I think the cowling is the strongest and easiest you can build for this shape. At least, it's easier than molding!

Temporarily, mount the engine about 3/8" to the rear of where the permanent mount will be. Cut out the front cone from ¾" soft pine. Next drill a 1" hole into the back, (center line) about ½" deep. Now drill the rest of the way through with a 5/16" drill and bolt to the crankshaft. This spacing will assure prop clearance when you permanently mount the engine.

Make the ¼" ply main former fit around the Tatone mount, and make sure the sides and top are flush with the fuselage sheeting. Screw in place where shown against the firewall.

Glue part #1 on each side of the main former with the front edge flush with the front face of the main former and the top flush with corner 'A' of the former.

Next glue the two ⅛" x ¼" spruce stringers from the notch marked 'A' in the front cowl along the top edge of #1 to the rear cowl line. Bevel slightly to follow the curve of the top front sheeting. Now glue the two #3 cheek formers ¼" from the rear edge of piece #1 on each side.

With a straight edge and sanding block, or Dremel Moto-tool, bevel the front pine cowl former, from point B all the way over the top to point B on the other side. This gives the top and side pieces a flat firm gluing surface.

Now cut and fit the top cowl sheeting and piece #2 to fit. The latter glues down the center of the ⅛" x ¼" spruce side pieces, to the front former and the top of the ¼" main former. A little wax paper on the top fuselage sheeting just behind the main cowl former will keep the glue from making the cowling a permanent part of the airplane.

Next glue the top edge only, of the 1/32" #4 pieces to the other half of the ⅛" x ¼" spruce and let dry completely. After the glue dries, wet the plywood on the outside and glue to the front former and piece #3. Hold in place with masking tape.

The last piece is the bottom #5, which should be cut somewhat over size first, and a slot cut for the engine head, then glued to the bottom edges of the front former, main former, and the side sheeting.

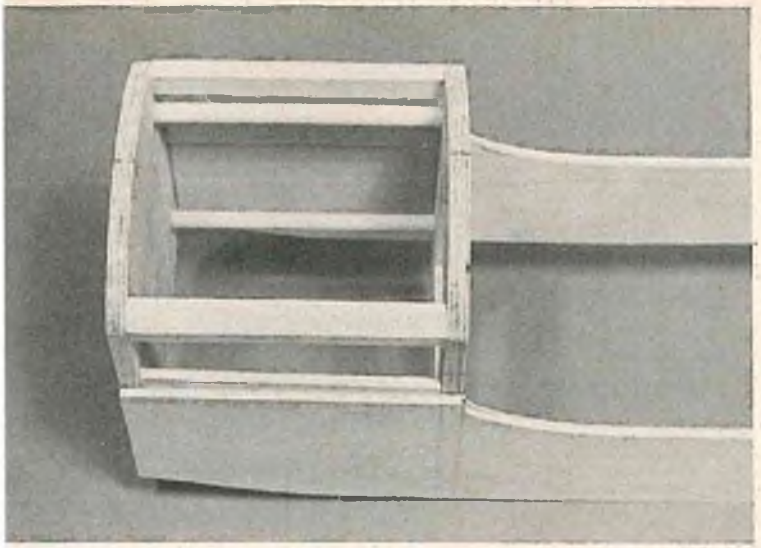
A piece of ⅛" x ⅛" can be glued inside on the bottom edge of the side sheeting for better gluing of the bottom piece if desired.

When dry, remove the two screws in the main former and the whole thing should slide off the front.

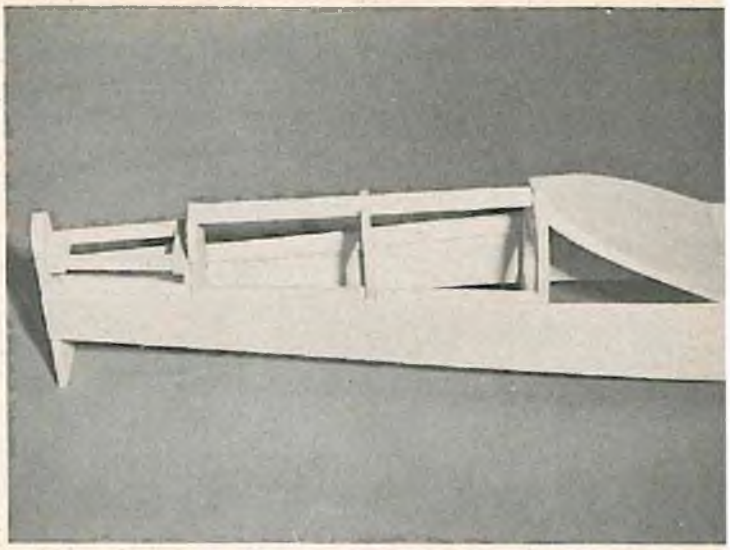
Sand the front edges to shape and cut the oval shape in the pine front. Cover the whole thing with a layer of light glass cloth and two coats of resin. The two bubbles are shaped from soft balsa block and installed on each side at this time. The finished cowl is very strong, easily repaired if needed, and no heavier than molded fibreglass or heavy ABS sheet. The photos should clear up any points in question.

The simulated tube framing of the elevator, rudder and ailerons is done as

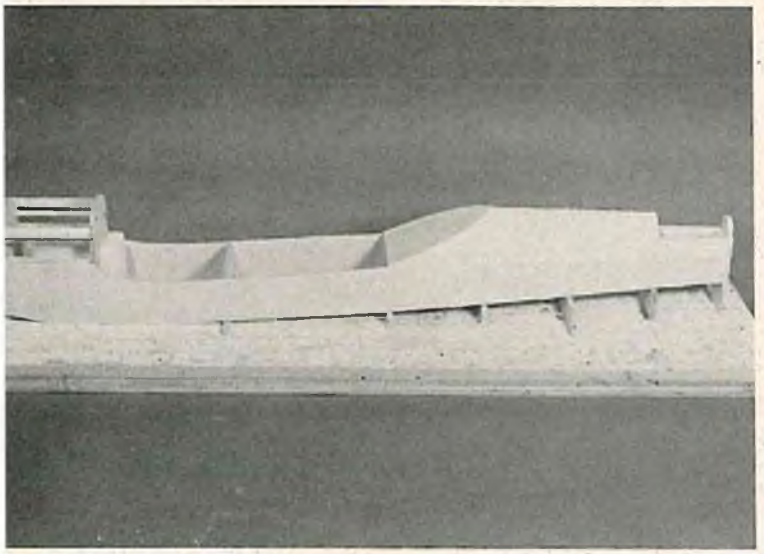
text to page 106



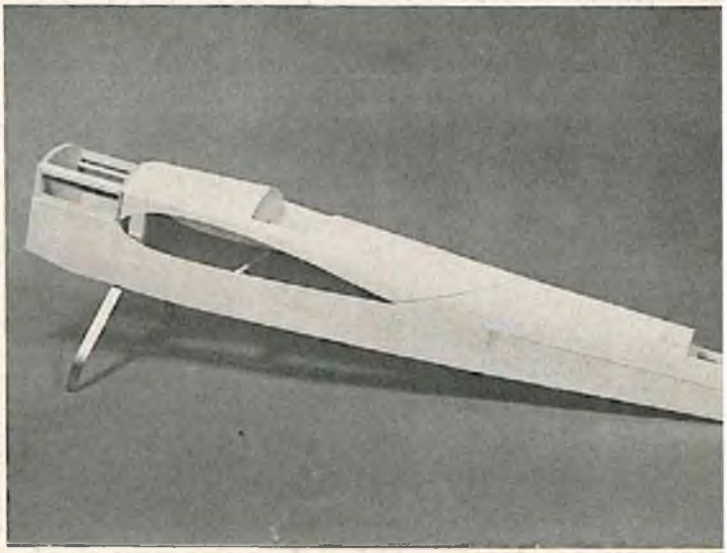
A close-up view of two plywood nose section bulkheads and partially completed fuselage.



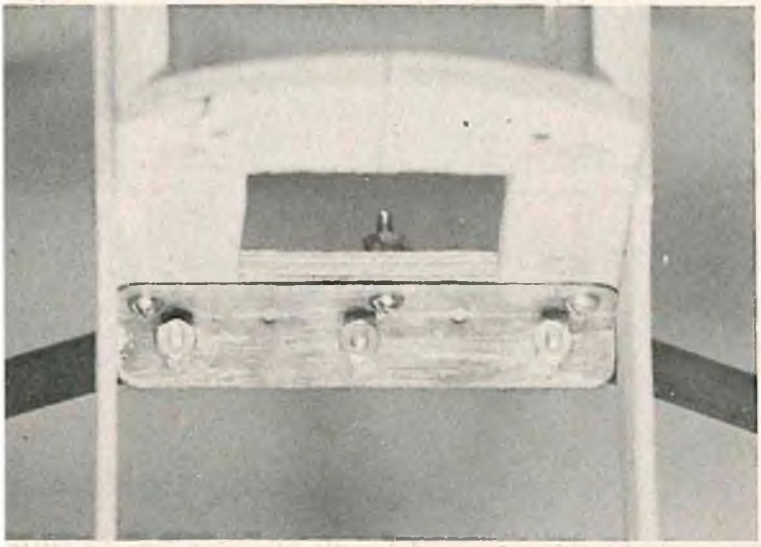
Close-up details of the basic framework in the aft section of the fuselage.



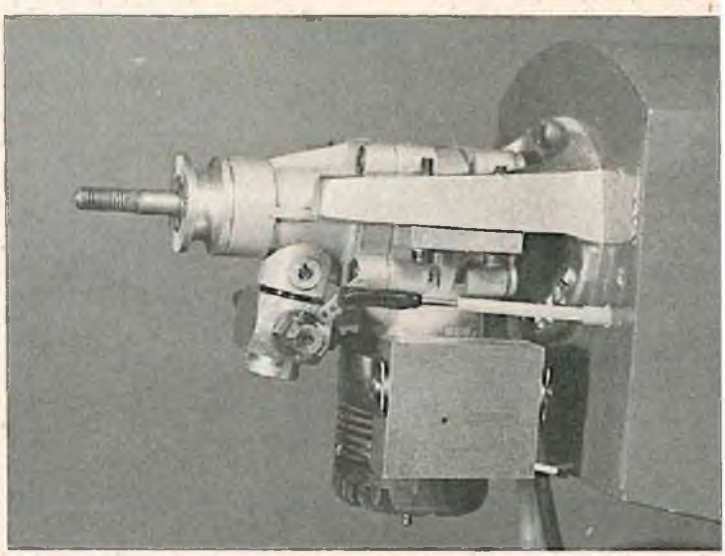
The Akro fuselage being built on a flat building board. Note shims to hold fuselage.



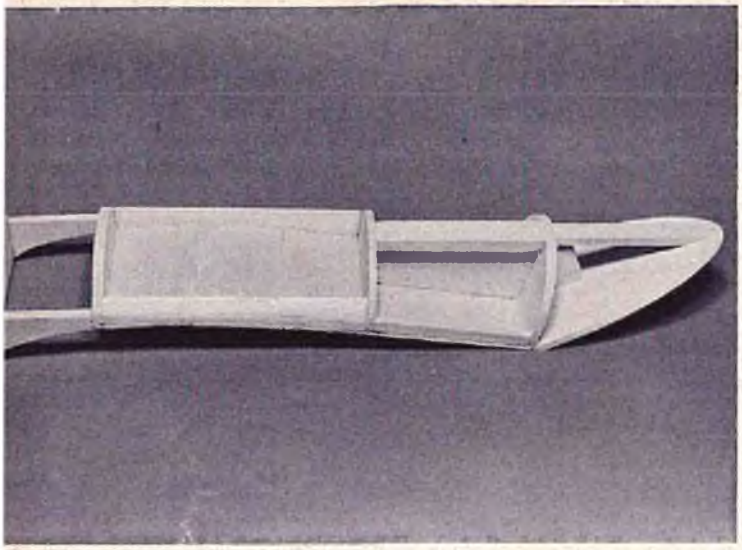
The fuselage with landing gear attached and the center section fitted in place.



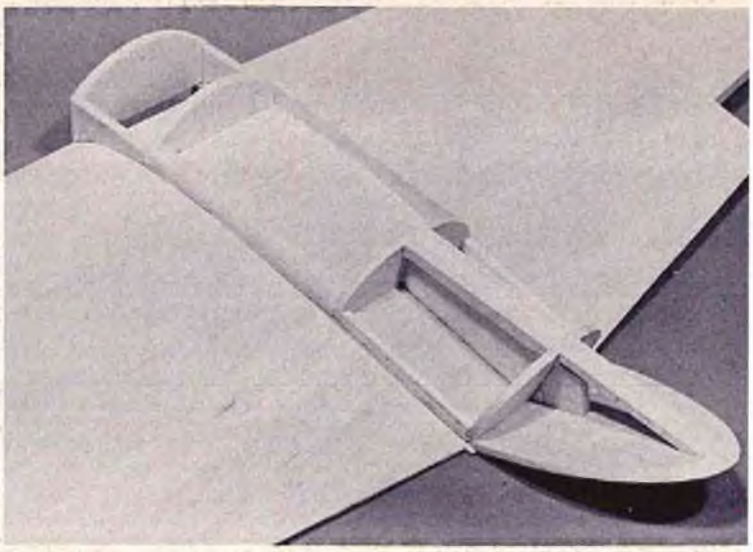
View of metal landing gear bracket bolted to ply former and dural gear.



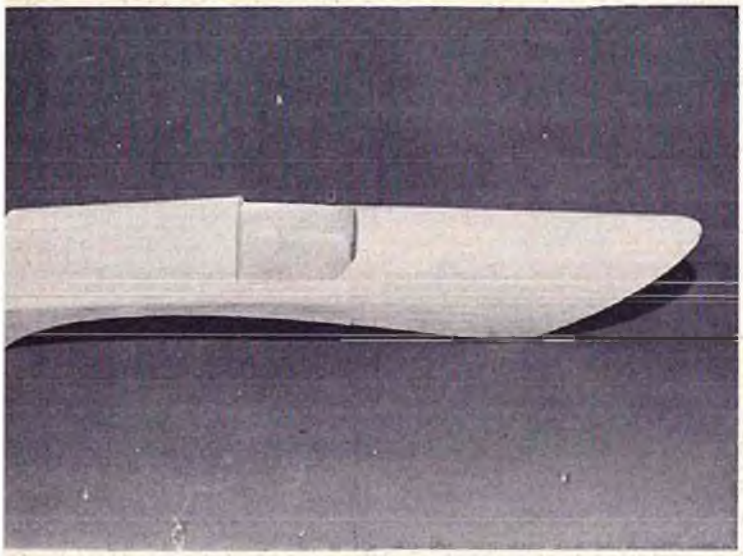
The .60 mounted inverted on a Tatone long mount. Note muffler and throttle pushrod.



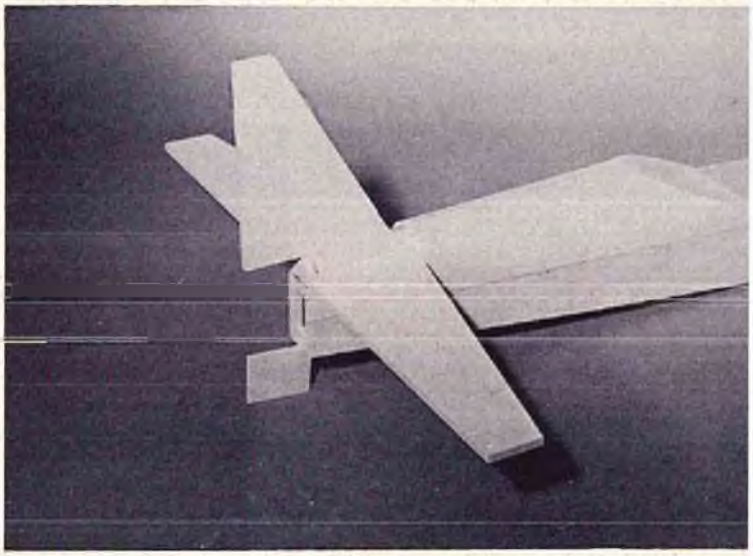
Basic construction of fuselage top deck prior to sheeting.



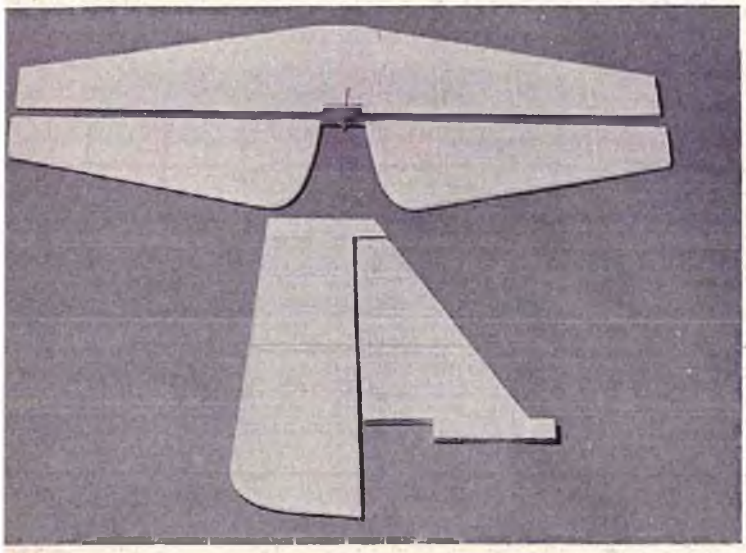
Fuselage top deck resting on balsa covered foam wing to check for proper fit.



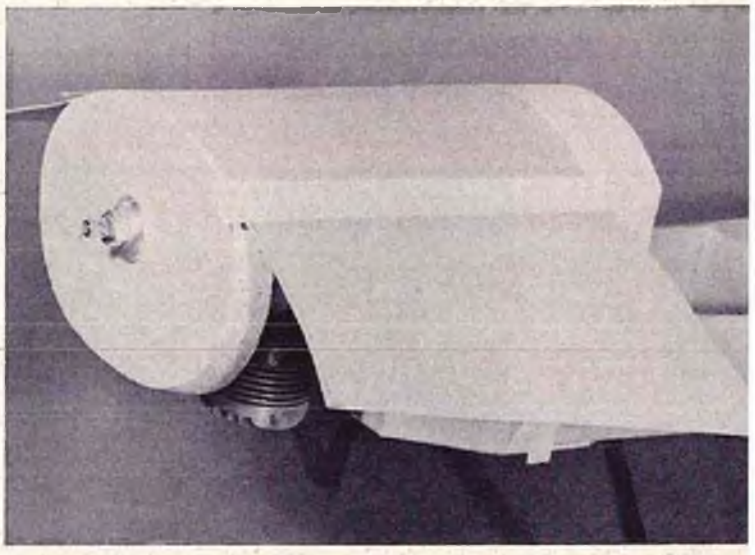
Fully sheeted top deck with cockpit area cut out.



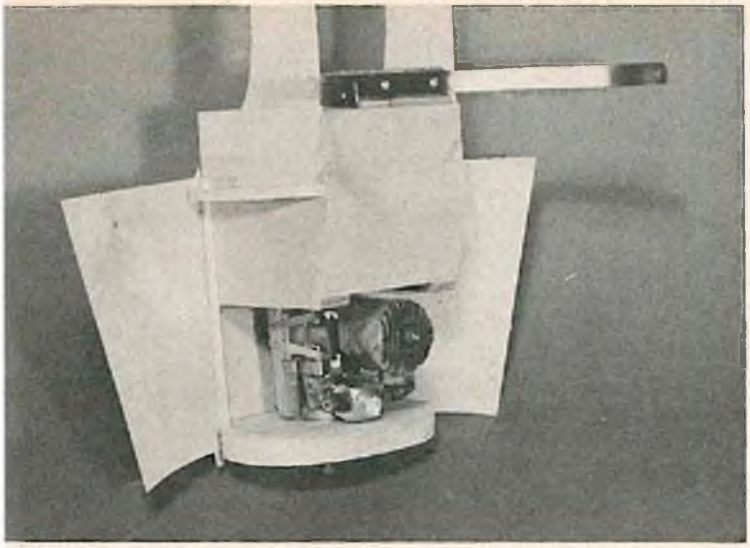
Rough-cut sheet balsa vertical and horizontal stabilizers set in place to check fit and alignment.



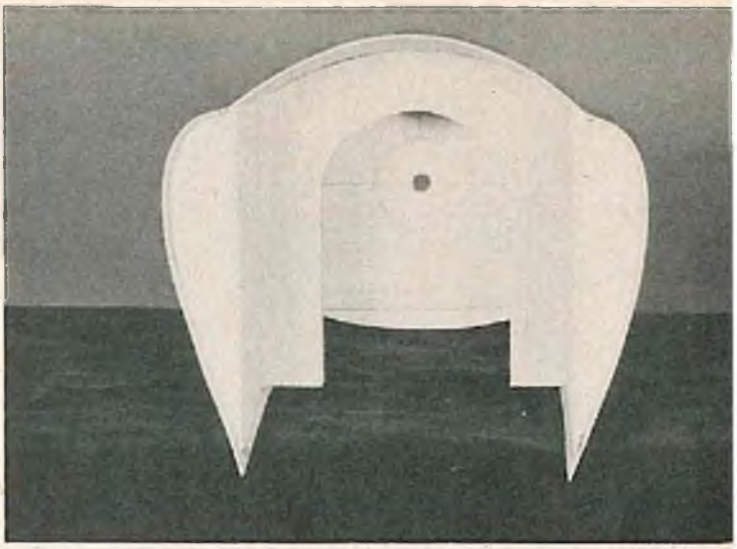
Finished stabilizer, elevators, vertical, and rudder, with simulated ribs.



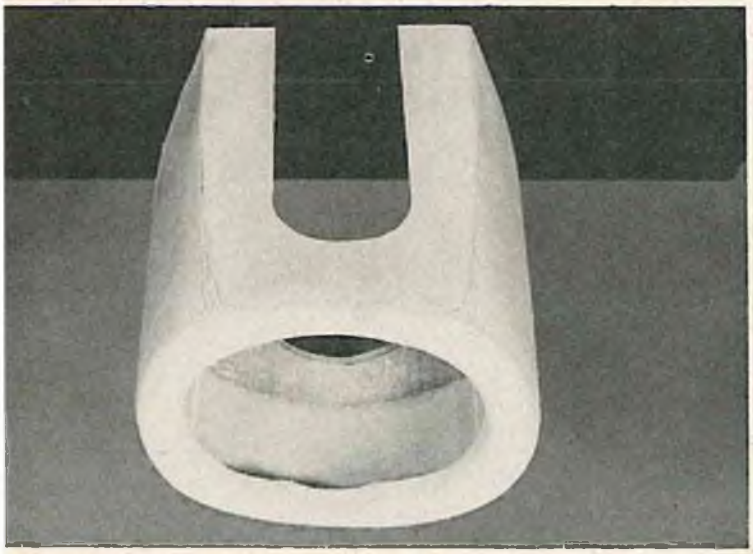
Front nose block held in place with prop nut and washer as cowl sheeting is applied.



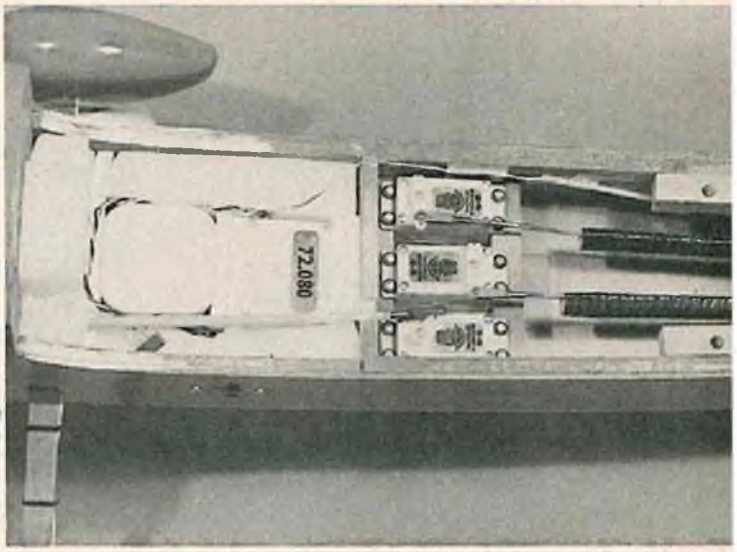
The sheeting laid back to show temporary mounting of engine. Note stuffing in carb and exhaust.



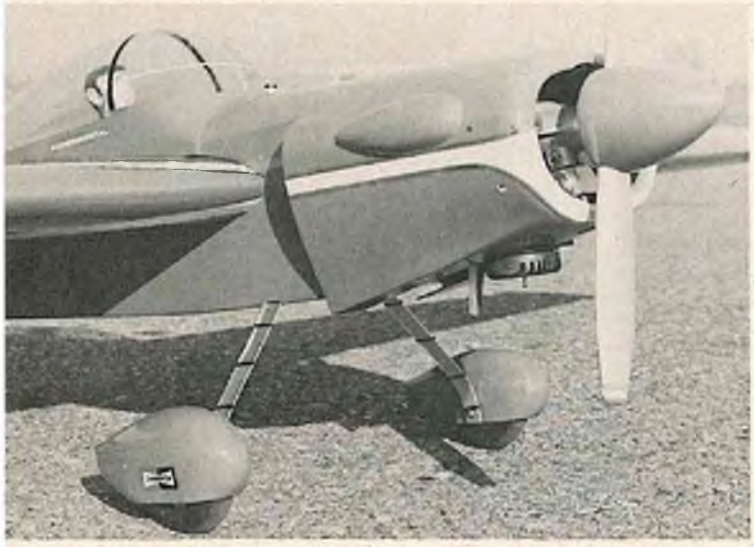
Rear view of cowl prior to cutting out front block and final sanding.



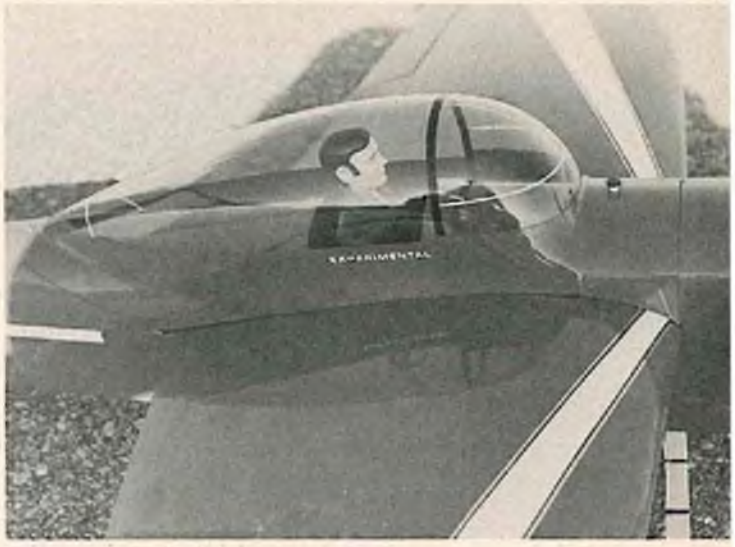
Completely formed cowl, ready for final sanding and finishing details.



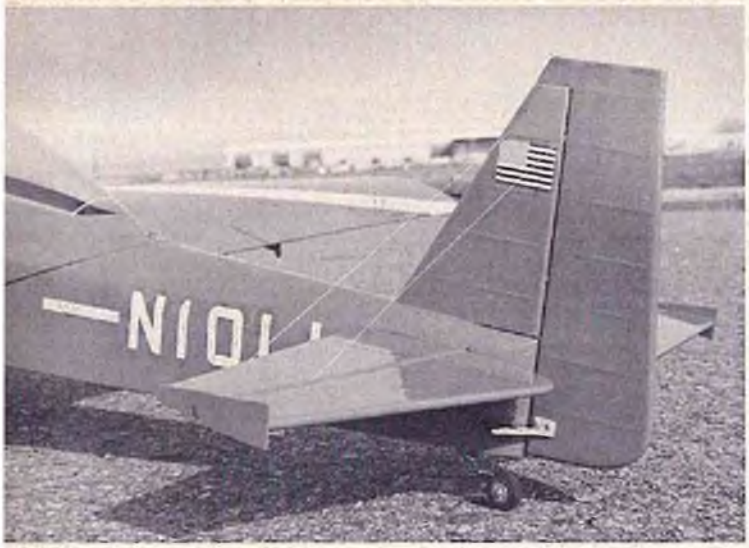
With wing and top deck removed, there is easy access to all of the radio equipment.



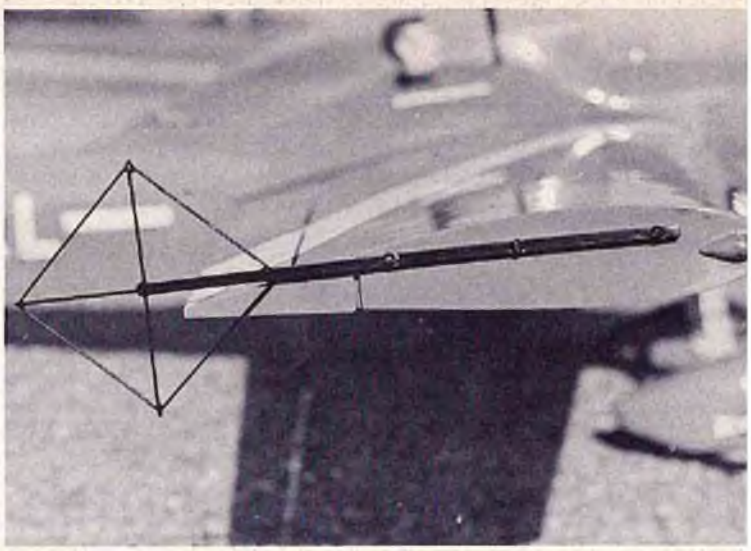
Close-up of cowl, spinner, and landing gear on the finished Stephens Akro.



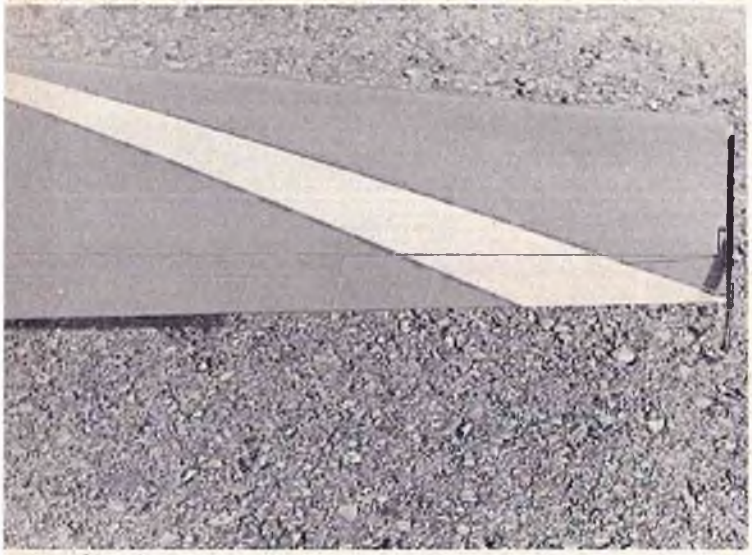
Note smooth fairing of canopy into fuselage. How's that for a mirror finish?



Tail details, including fin braces, stab tips, and simulated ribs are evident in this photo.

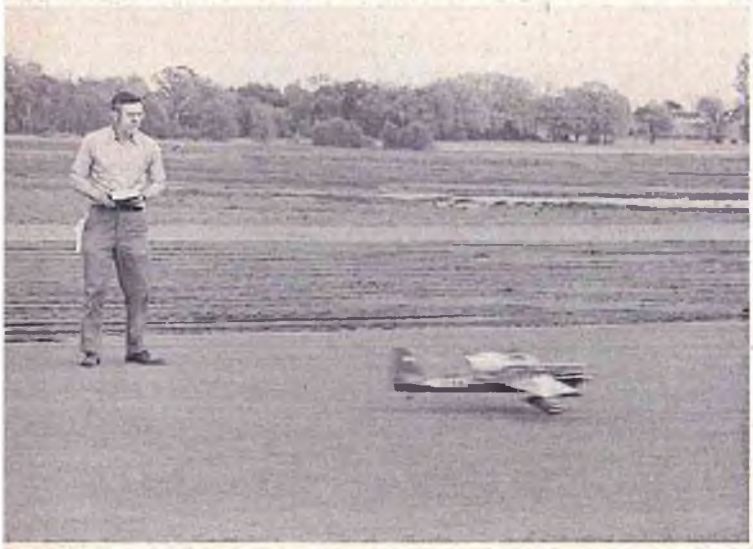


An added touch of realism – scale details include maneuver reference diamonds on wing tips.



Note simulated ribbing used on ailerons as well as tail surfaces.

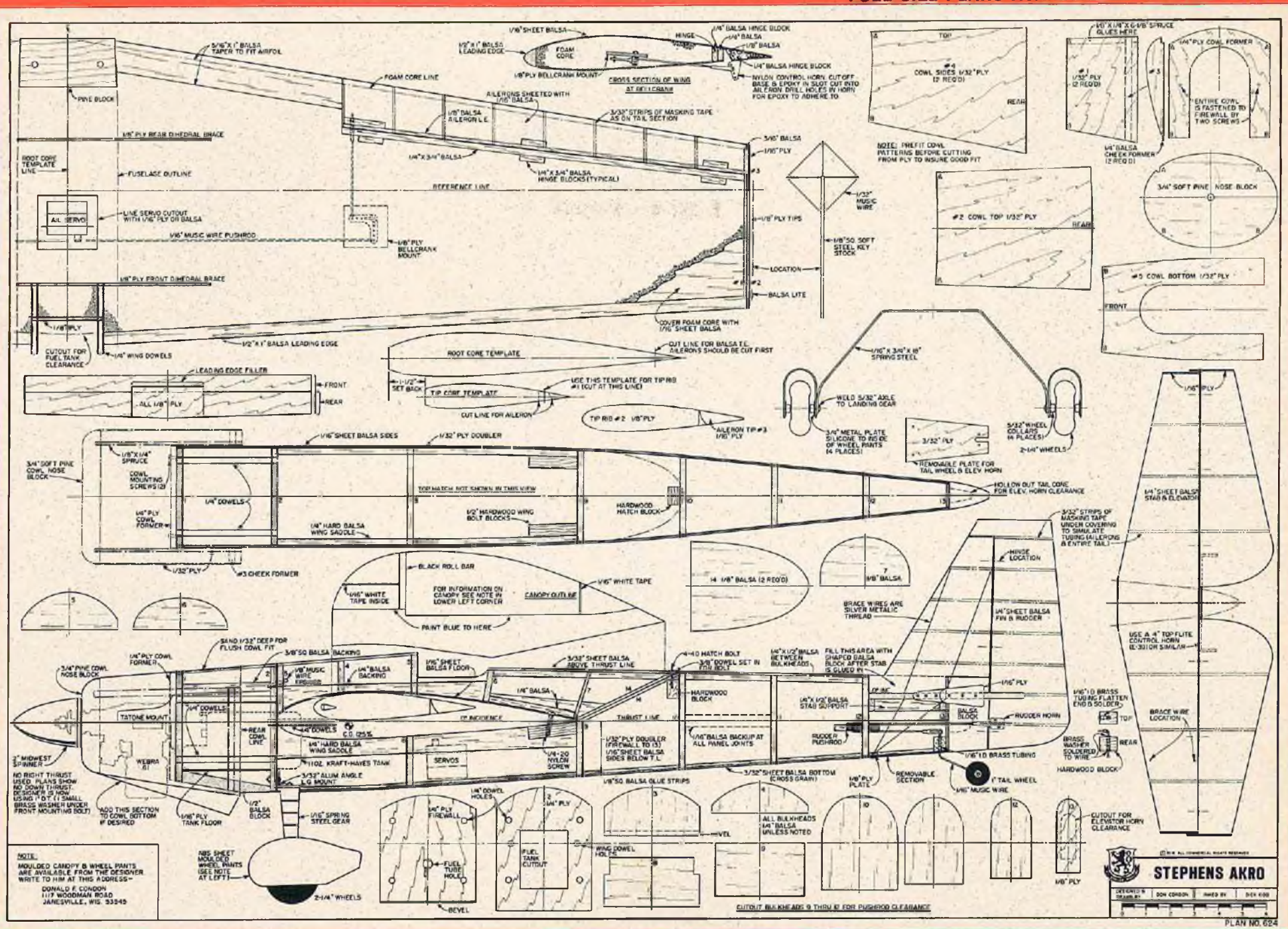
The author makes a low pass with the fast and highly maneuverable Akro.

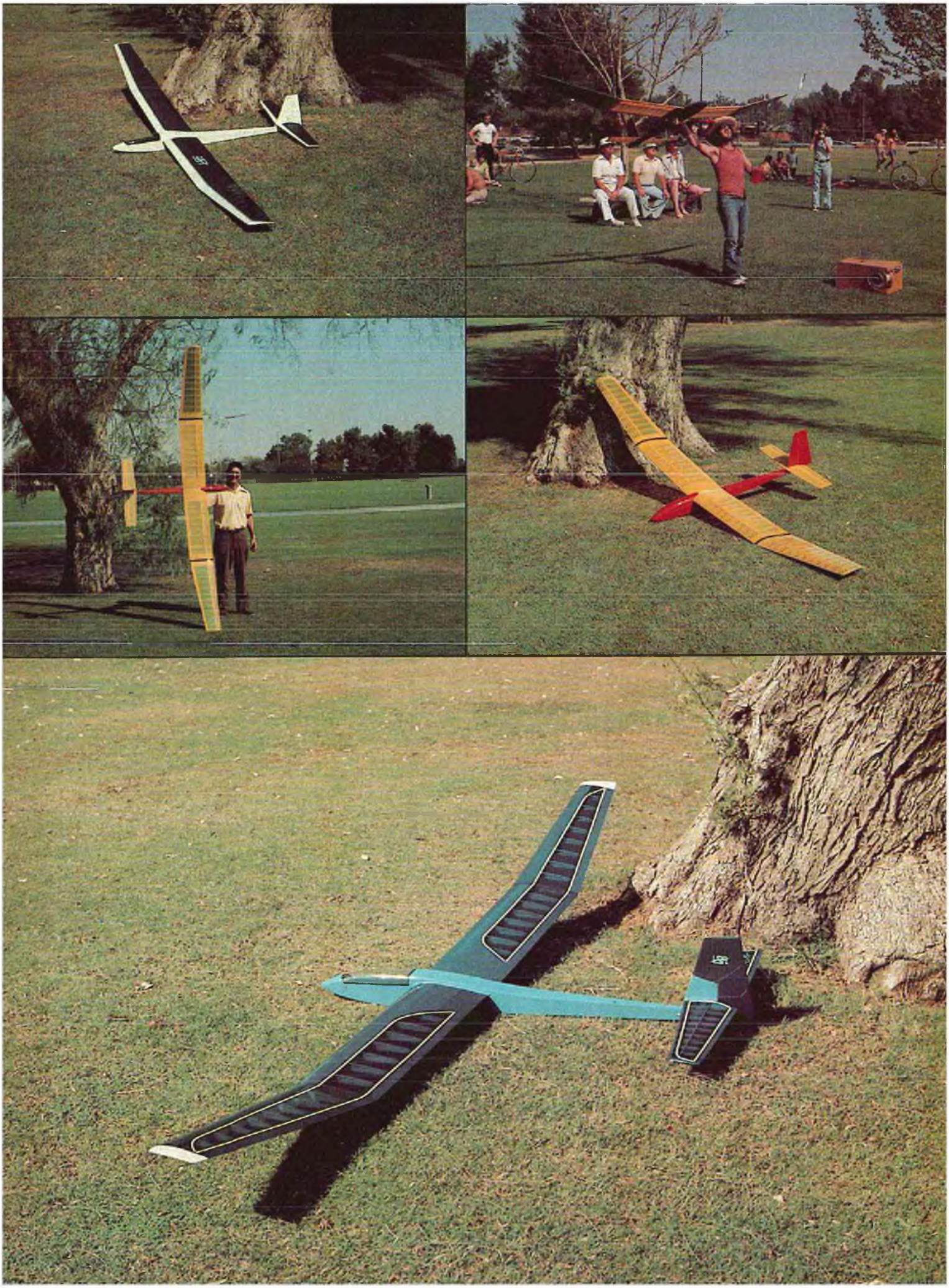


A touch-and-go looks like this – ground handling is excellent, even from grass fields.

Don Condon and his pride and joy. Latest trophy was from the 1975 Sig Manufacturing Co. Contest.

FULL SIZE PLANS AVAILABLE — SEE PAGE 166





PARAGON

A 118 inch span sailplane that is easy enough to fly for the pure novice, yet highly competitive for the veteran flyer. With a 6.4 ounce wing loading, the Paragon is one of the lightest Open Class machines around, but penetrates like a much heavier ship. The ballast compartment can hold over three pounds of weight. If this isn't enough, it's ideal for night flying with chemical lights.

By Ed Slobod.

Sailplane flyers, are you getting tired of the same old thing each time you go out to fly?

Would you like to fly at night for a change of pace?

No, I'm not crazy — free-flight people have been doing it for years here in California (they **really** are crazy). But flying sailplanes at night is not insane, just different. And that isn't the only reason to try night flying. It is an excellent way to find out how your sailplane compares under relatively uniform conditions to other sailplanes. And, a number of people can fly the same sailplane to see who is the better pilot.

Assuming that you do it in the Summer months, you will find the air to be warm and still and there will be thermals. Not "trash movers," of course, but enough to give flights of from 5 to 8 minutes from a Hi-Start. You will soon discover that some sailplanes are better than others for night flying. We have found that a good sailplane for night flying should be able to make full use of the Hi-Start for maximum altitude, have a light wing loading for minimum sink, and be "hands-off" stable, especially around the pitch axis. Since the lights are usually attached to the wing tips or the wing polydihedral joint, it is relatively easy to see rolling or turning, but pitch instability can give you the cold sweats even on a warm night. Details about night flying and how to do it follow the section on adjusting, trimming, and flying.

I must confess, at this time, that the model being presented was not designed primarily for night flying. As it turned out, however, there are few, if any, changes I would make if I were to start from scratch with maximum performance for a night flying sailplane as a goal.

As a manufacturer of several sailplane kits, I had more than a casual interest in what the contest and sport flyer wanted in the way of a sailplane kit. I had concluded that from a performance standpoint, the majority wanted high launch capability, light wing loading for minimum sink, the ability to climb in light lift, good handling, small circle capability, slow flight for more precise spot landings, and provision for easy ballast addition for penetration and speed runs when needed. In anticipation of future wider use of Thermal Sensors, a place for the sensor should also be provided.

The prototype model designed to the above requirements was completed, by coincidence, the day of a scheduled night flying session and while I did not intend to put it up in the dark, I thought some testing could be done at twilight. One hand glide verified C.G. position and the next flight was on the Hi-Start. Several more flights followed with the model averaging about 5 minutes per flight. As darkness fell, I would have been content to stop flying right there, but was persuaded by my flying buddies to

put two chemical lights on and give it a try. A number of flights followed with different pilots, the best of which was for 7 minutes 45 seconds by Jerry Krainock. Since that time a number of night sessions have been held and the Paragon has yet to be out-performed.

For those of you who prefer to fly during the daylight hours, you might be interested to know that the same model was hand-launched by Bill Nibley at Pierce College on September 7, 1975, for a thermal flight of 73 minutes 13 seconds, and was brought down because of concern about the condition of the internal batteries.

CONSTRUCTION

Clean off your workbench and put fresh sandpaper on those sanding blocks. Regardless of which component you choose to assemble first, I would advise cutting out all the parts for the entire model before beginning assembly. You can trace the parts on tracing paper to make patterns which are then cut out and rubber cemented to the parts to be cut out or you can get two sets of plans and use one set for the patterns which are cut directly from the plans. Parts that are similar, such as main panel ribs, can be cut in stacks using one template. After all the parts are cut out and all other necessary material obtained, assembly can be started.

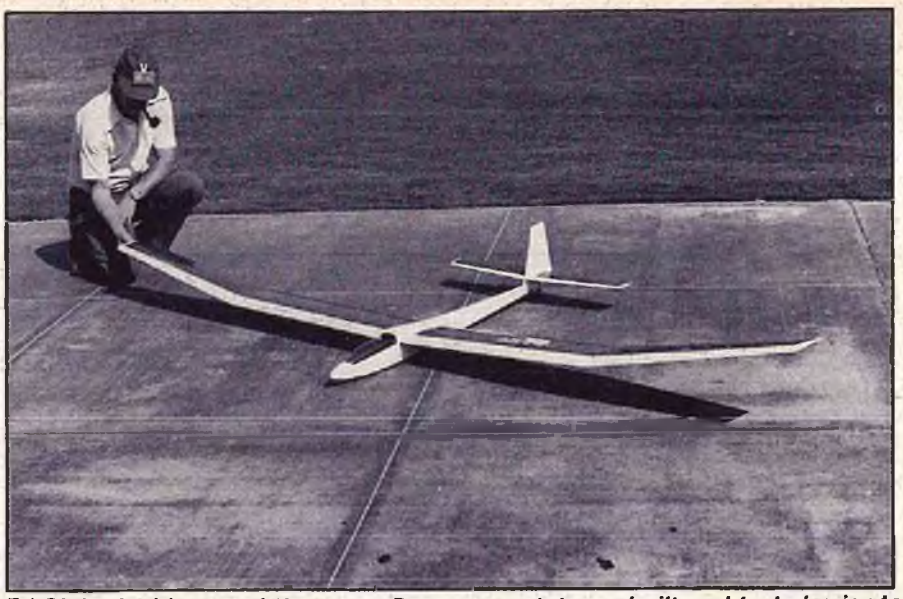
Wing:

Since the wing takes the most time, starting with it will enable you to do other things when various parts of the wing cannot be worked on while the glue is drying. Wing construction is quite conventional with the exception of the center and tip panel joiners and, here, you will have to pay attention to the recommended assembly procedure.

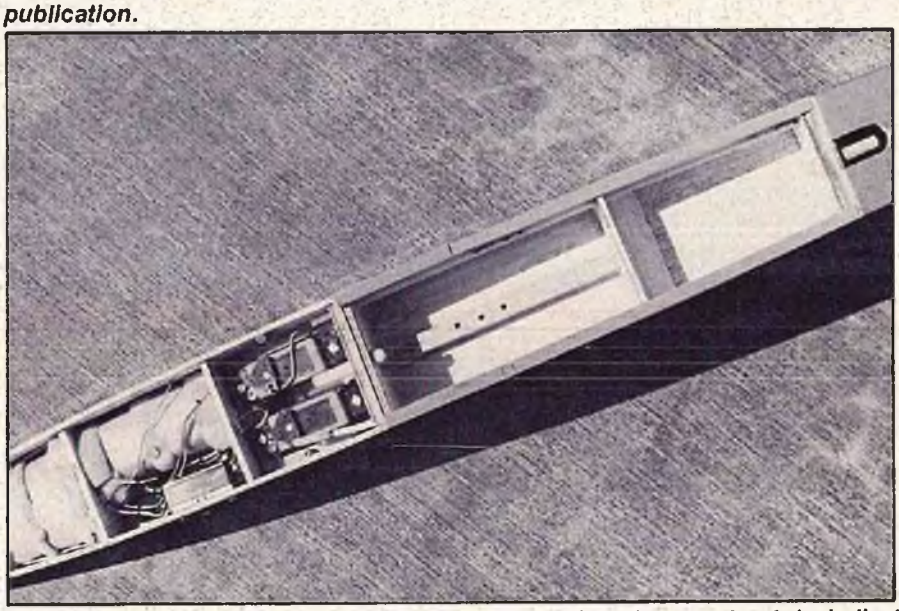
Start the wing by first laying the main panel trailing edge over the plan and marking the location of the ribs. Cut the rib notches to about 1/8" depth. Now pin the trailing edge to the plan (over wax paper, of course). Use a metal straight edge to be sure that the trailing edge is truly straight. Next, pin down the bottom main spar of 1/8" x 3/8" x 29½" spruce; once again using the straight edge. Slip the wing ribs in place, but do not glue. Pin the leading edge in place, making sure that all ribs touch. If you have cut the ribs in stacks, they all should fit the same. If, for some reason some do not, correct by adjustment of the size of the spar notch. You may now cement all the ribs in place **except ribs W1, W2, and W3.**

Mix up some 5 minute epoxy and epoxy the 3/8" hardwood main panel joiner to the bottom spar, making sure that the bottom ridge is directly over the wing centerline. Cut W1 apart to clear the joiner and cement in place, angling slightly to allow for the dihedral. Next, extend the depth of the bottom spar notches in W2 and W3 as required to clear the spar joiner. Cement in place. If you haven't already cut the shear webs, do it now. Remember that the grain of the balsa shear webs is to be vertical. Epoxy the 1/16" plywood shear webs and cement the balsa shear webs.

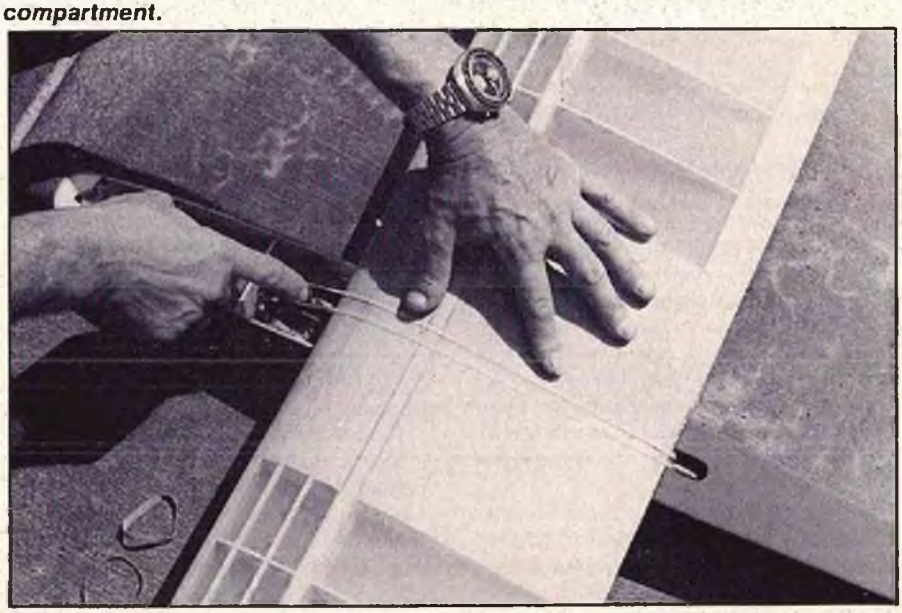
If you have another building board, you



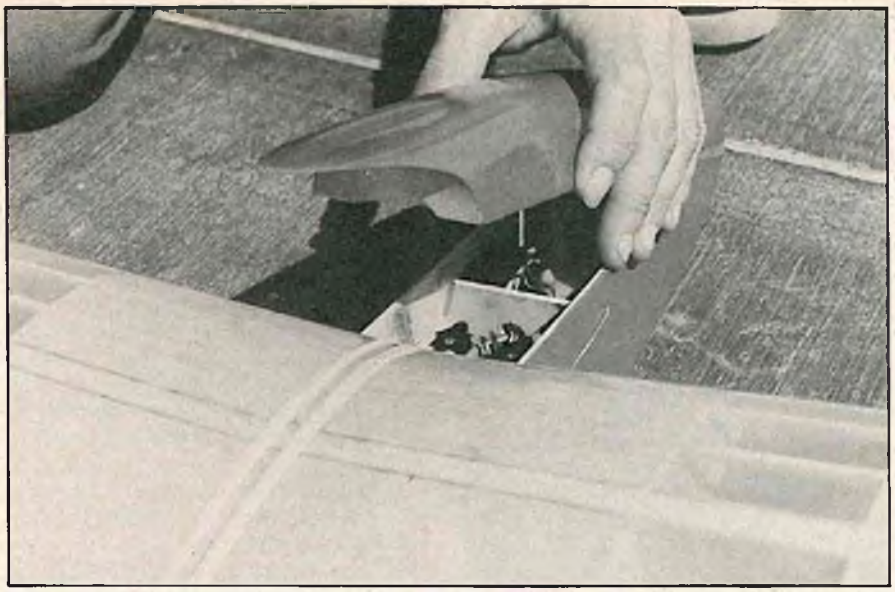
Ed Slobod with one of the many Paragon prototypes built and tested prior to publication.



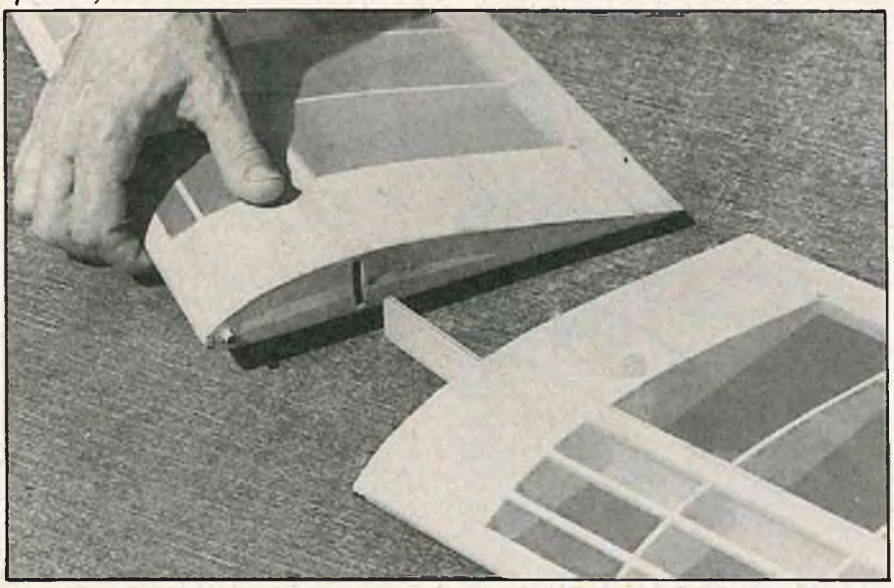
Plenty of room for the radio installation. Note adjustable tow hook in ballast compartment.



Installing the wing center section. Dowels for rubber bands are internal to reduce drag.



Note canopy pin-NyRod hold-down. This is a carved block, but clear canopy is optional, if desired.



A plywood spar joiner used to plug in wing tips. A strip of tape around joint holds panels securely.

Dick Kidd, left, and Don Dewey, right, watch as author puts Paragon together for flight tests by RCM's Editor.

can begin the opposite main panel, while the glue is drying on the first one. **Do not** glue in ribs W1, W2 and W3 (not yet, anyhow)! When the glue has thoroughly set up in the first main panel, it can be removed from the building board and the excess material of the leading and trailing edges and spars trimmed square for joining to the opposite main panel. Place the exposed portion of the main joiner on the opposite main panel bottom spar — push together and check for fit. Trim as required. Prop up the first panel so that the joiner is flush against the opposite panel bottom spar and epoxy in place. Now ribs W1, W2, and W3 can be cemented in place as before. Add the top spar and the shear webs. Don't put in the ply pieces between ribs 5 and 6, they are to be installed later.

The tip panels are next and construction is straight-forward. However, do not install Rib 7 and be sure to taper the trailing edge by trimming the inside edge as shown on the plans. Epoxy the tip panel joiner between the top and bottom spar, making sure that they are perpendicular to the spars and centered.

The next step is to build up the outer panel joiner box. To do this, cut a slot in Rib 6 between the spars and just wide enough to clear the tip joiner. Slip the joiner through the slot and check the fit of the main panel to the tip panel. The joiner should touch the upper and lower spar and the outer panel should be elevated 5¾" measured at Rib 19. Trim the tip panel leading and trailing edges and spars as necessary for a good joint and also site down the spars to be sure that the tip panel does not sweep forward or aft. When you are satisfied with the fit you can remove the tip panel and cut the plywood plates that fit between the upper and lower spars and between Ribs 5 and 6. Coat the portion of the ply joiner that protrudes from the tip panel liberally with Vaseline. Apply 5 minute epoxy to the edges of the plywood plates and slip in place. Now slip the joiner into the main panel and pin or tape to hold alignment. Clamp the ply plates against the joiner.

Wait until the epoxy has started to set up and carefully withdraw the joiner. Wipe off the Vaseline and re-insert the joiner to make sure that nothing has moved. The fit should be snug. If the fit is sloppy you will have to thoroughly clean the joiner and add a layer or two of epoxy to build up the thickness so that the fit is snug. Slip the joiner into the main panel and tape in position. Cut Rib 7 apart to clear the joiner and glue in place. Be careful that you do not glue the panels together. Do the same with the opposite wing panels.

Next, install the 3/16" dowel aligning pin and the 1/16" ply aligning pin support. To do this, separate the main and tip panels and drill a 3/16" diameter hole in Rib 6. Glue the dowel in place, using a balsa spacer between the dowel and the leading edge. Now drill a slightly oversized 3/16" diameter hole in the tip panel. Put the panels together to check that the dowel indexes with the hole. If not, open the hole as

Don Dewey gets ready for a Hi-Start launch as Ed Slobod hooks up tow line.

RCM's Editor circles the Paragon overhead in order for Dick Tichenor to get this photograph.

The author prepares for a night thermal flight. Note chemical lights at dihedral break.

necessary. The leading and trailing edges should be properly aligned and taped. Smear some Vaseline over the protruding portion of the dowel and glue the 1/16" ply alignment pin support to Rib 7. Repeat for the opposite panels. Glue in all 1/8" x 1/8" hard balsa turbulator spars. Fill in between Ribs W1 to W3, W5 to W6, W7 to W8, top and bottom with 1/16" sheet balsa. Add the 1/8" balsa gussets at the tips.

The wing tips are made from 1" triangle stock. After the glue has dried, the upper surface is carved to match the contour of Rib 19. This will automatically shape the wing tip. Carve and then sand the leading edges to shape. (See plans for contour.) Go over all glue joints with a second coat of glue. Give the entire wing a thorough sanding with progressively finer sandpaper, finishing with #400 grit wet or dry, used dry. Cut a notch in the trailing edge as shown on the plans and epoxy in a piece of 1/16" diameter wire. Finally, cover the center section, top and bottom with 2 ounce fiberglass cloth and resin. When dry, sand smooth and you are ready for covering.

Fuselage:

You probably have noticed from studying the plans that the forward fuselage sides and bottom are constructed from three-ply, 1/8" plywood. This special plywood is for door skins and should be available from your local lumber yard. If you cannot obtain this type of plywood, you can use the standard 1/8" plywood available at most hobby shops. The difference will be a slight increase in weight but since most of the plywood is used forward of the C.G. you will require less nose weight, so don't worry about it.

Assuming that all the fuselage parts are cut out, the next step is to epoxy the ply and balsa sides together to make up a full fuselage side. Make sure that both sides are identical. To check, put both sides together and if there are any differences, trim as required to make them exactly alike. Now take one of the sides and pin it over the plan. Epoxy Formers 3, 4 and 5 in place, making sure that they are flush with the bottom edge of the fuselage side and perpendicular. Let the epxoy set up. Next put 5 minute epoxy on the upper edges of the formers and place the other side on top of the formers. Put weights on top to hold the side in position. Now, before the epoxy sets up, go all around the outside perimeter with a square to be sure that both sides are exactly in line with each other. With one blade of the square on the work bench the other blade should contact both edges all around as you move the square around the fuselage. When the epoxy has set up, the fuselage may be removed from the workbench. Next, epoxy Former 1 and the 1/2" triangle stock just aft of Former 1. Join the aft ends of the fuselage after sighting from the rear so be sure that both sides have the same amount of bend. The remaining formers can now be epoxied in place. If necessary, Former 2 may be relocated to accomodate your particular servos.

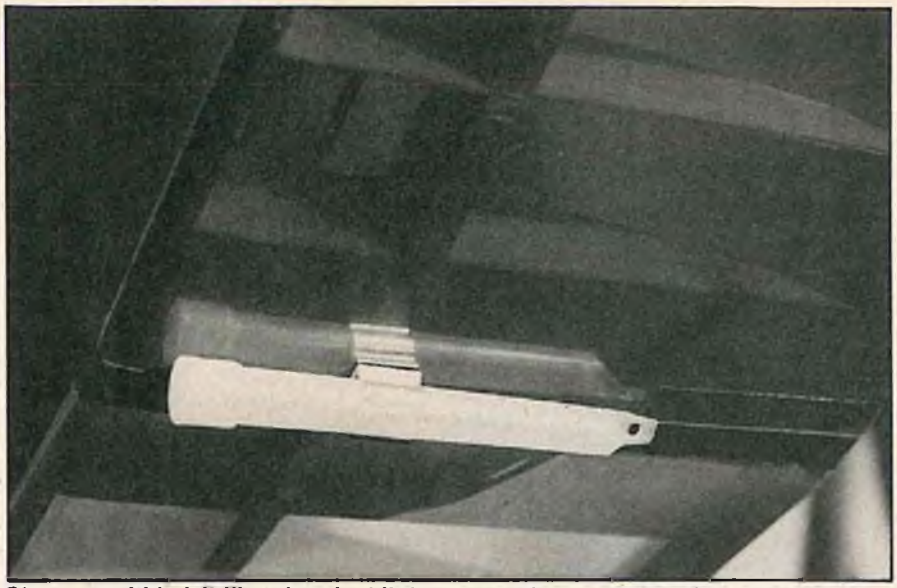
Pre-drill the tow hook block and trim for a

good fit between Formers 5 and 6. Epoxy in place. Now add the triangle stock at Formers 5 and 6 and the 1/16" ply splice plates. Cement the nose block in place. Add the ¾" triangle stock. Trim to fit by removing material from the side that contacts the nose block. Trace the hatch block profile on a soft balsa block and cut to shape. Install a length of 3/16" diameter dowel in the hatch as shown on plans. Now carefully cut a slot such that the dowel will index with the slot and hold the front of the hatch block down firmly. Bend a piece of pushrod wire (with the threaded portion removed) to the shape shown on the plans. Using a Dremel tool cut a slot in the hatch block about 1/8" deep to receive the wire. Cut two pieces of inner NyRod about 3/4" long and slip over the ends of the wire. Insert the wire into the slot. Place the hatch block in position on the fuselage and, looking up from the bottom, see if the NyRods are touching the inside surfaces of the fuselage sides. If they do not, bend the wire so that they do. Remove the hatch block and epoxy the wire in place. Before the epoxy sets up, replace the hatch block to check that the NyRod sleeves are still touching. Reaching in from the bottom, apply epoxy around the NyRod sleeves. If you have done a good job, the hatch block will be a close, snug fit to the fuselage. If the fit of the wire to the NyRod should work loose, a slight bend in the wire will make it tight again.

The next step is to install the servo mounting supports, located to suit your servos. Before installing the pushrods, you should check the rotation of the servos and route the pushrods accordingly. Try to avoid having the rods cross diagonally over the ballast area as this will make installation and removal of the ballast difficult. Be sure to epoxy the pushrod sleeves to the fuselage everywhere except where it is not possible to do so. Now epoxy the plywood bottom in place. Cement in the 1/8" balsa top and bottom. Next, epoxy the 1/4" diameter dowel wing hold-downs in place, as well as the 1/8" plywood dowel support plates. Use plenty of epoxy here and note that each dowel is angled slightly downward. Next, glue in the 1/8" x 3/8" balsa strips between Formers 3, 4, and 5 on both sides and cap these, when dry, with pieces of 1/4" x 3/16" balsa. Trim these last pieces as noted on the plans to give 1/8" of incidence.

Place the fairing block back on the fuselage, then carve it and the nose block to a rounded shape. All other fuselage corners should be slightly rounded, except where the 1/4" triangle stock is to be cemented to the fuselage for additional stab support. Cement these pieces on now. When dry, sand flush with the top of the fuselage.

Remove the hatch block. Mix up a good supply of 30 minute epoxy and go over every joint that you can reach. Apply enough to form a fillet. When the epoxy is dry, you will find that you will not be able to twist the forward part of the fuselage — it will really be strong! Fuselage covering, if



Close-up of hi-visibility chemical light snapped into place in fuse clip. Cyalume lights available from RCM.

With two chemical lights attached to wing panels and one to the Hi-Start, a night flight begins.

Thermal flying at night adds a "third dimension" to soaring. Note casual, one-handed attitude!

any, is optional but light fiberglass over the entire fuselage is recommended for additional strength, resistance to normal scuffing and abrasions, and as an excellent paint base.

Tail Surface:

The horizontal and vertical stabilizer construction is fairly obvious and requires no special comment. The only feature which you might find different is the use of a hardwood stern post. This is built-in as part of the fin and is epoxied to the fuselage after the vertical stabilizer assembly has been constructed and covered. You may use any type of hinge that you choose. Scotch Magic Mending Tape was used on the Paragon and we have had absolutely no problems. A solid strip is used on the unbeveled side of the surface and three or four cross strips equally spaced inside the bevel. This type of

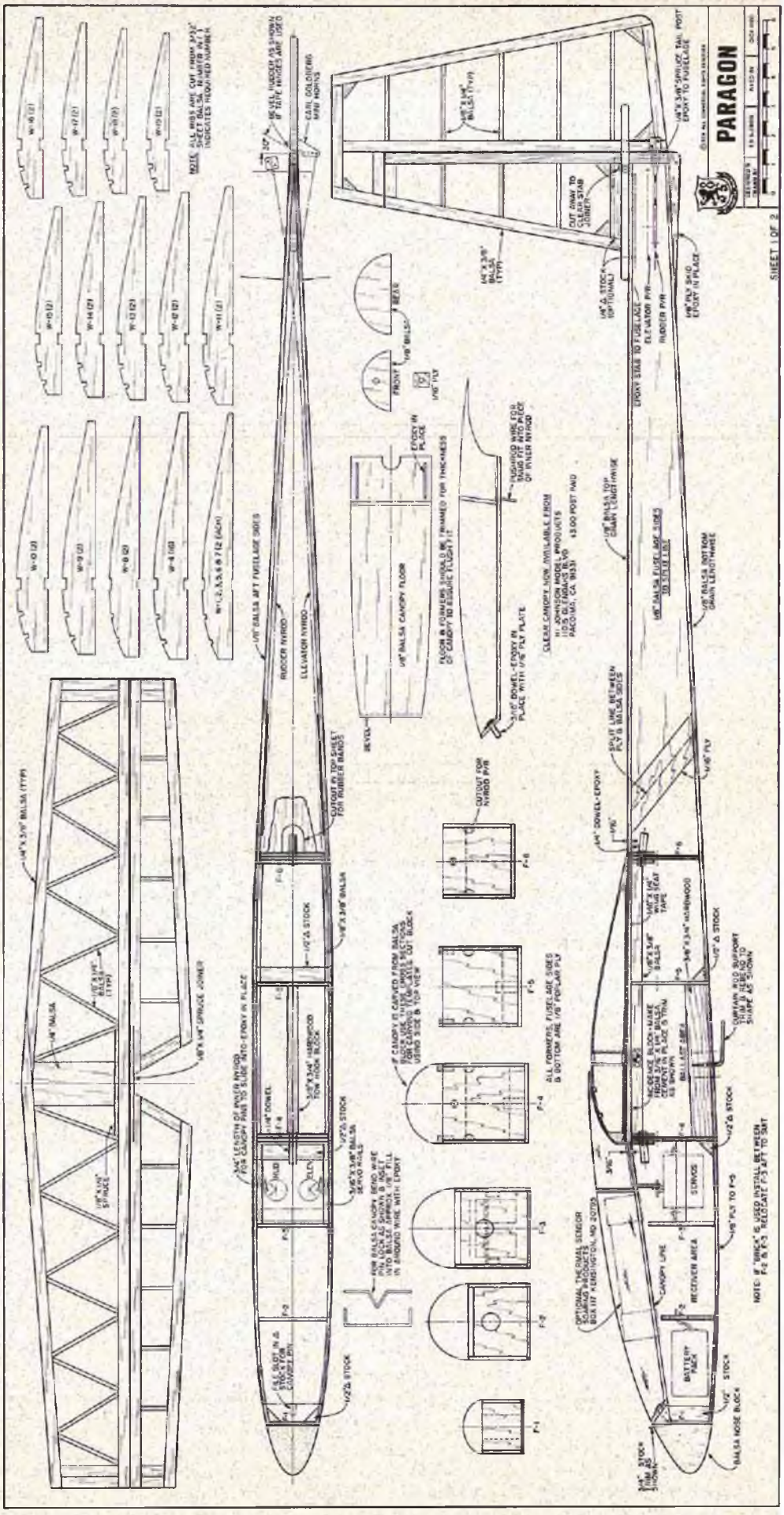
to page 100

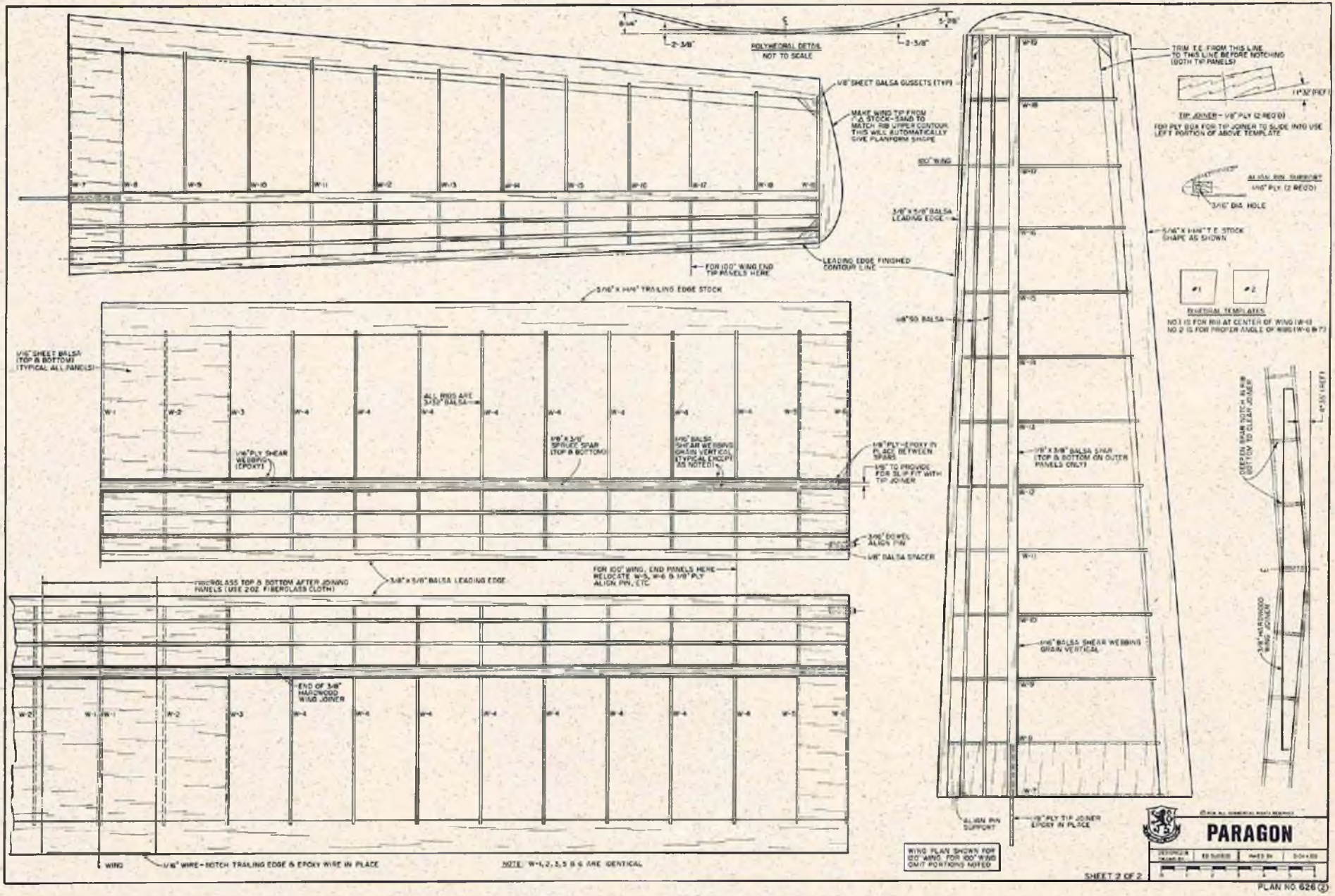
PARAGON
Designed By: Ed Slobod

TYPE AIRCRAFT
R/C Sailplane
WINGSPAN
118 Inches
WING CHORD
10 Inches (w/tapered tips)
TOTAL WING AREA
1080 Square Inches
WING LOCATION
Top of Fuselage
AIRFOIL
Flat Bottom 12%
WING PLANFORM
Constant Chord Center
Panels w/tapered tips
DIHEDRAL, EACH TIP
8¼ Inches
O.A. FUSELAGE LENGTH
50½ Inches
RADIO COMPARTMENT AREA
(L) 9" X (W) 2½" X (H) 2¼"
STABILIZER SPAN
28 Inches
STABILIZER CHORD (incl. elev.)
5¼" (Avg.)
STABILIZER AREA
144 Square Inches
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
11⅝ Inches
VERTICAL FIN WIDTH (Incl. rudder)
6½" (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, Ply and Spruce
Empennage	Balsa and Spruce
Weight Ready-To-Fly	48 Ounces
Wing Loading	6.4 Oz./Sq. Ft.

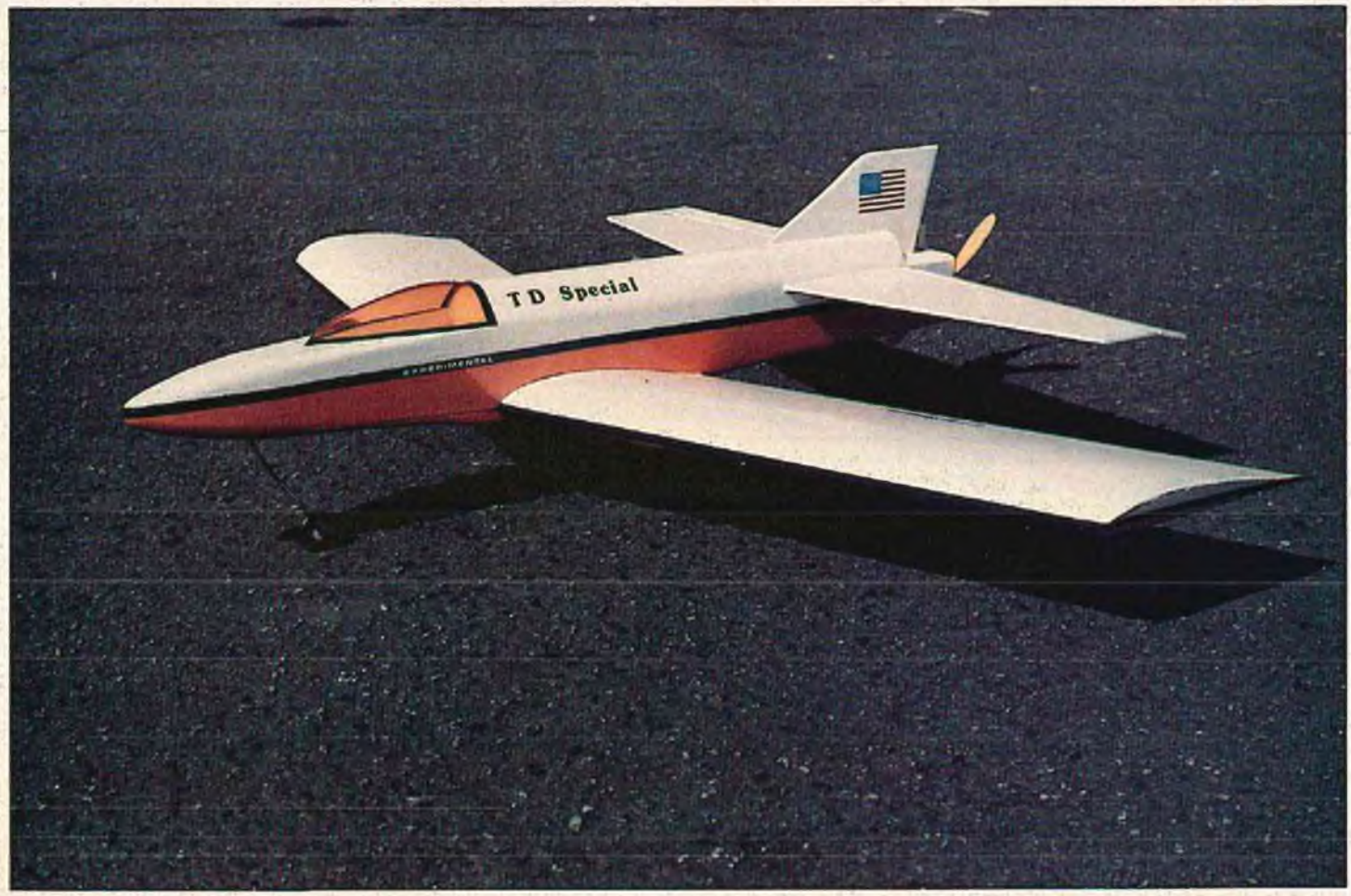




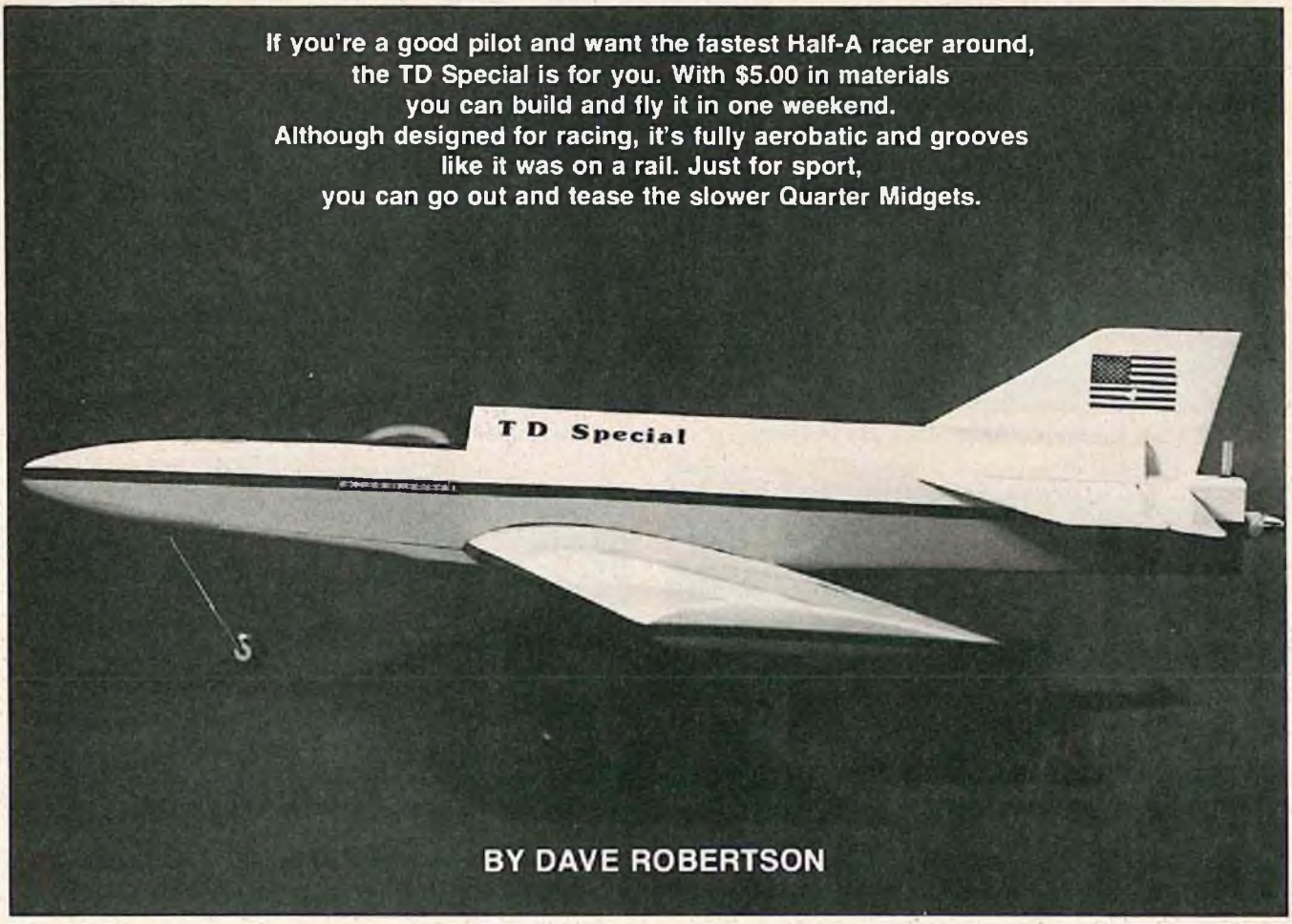
FULL SIZE PLANS AVAILABLE — SEE PAGE 166

SEE PAGE 89 FOR CYALUME® CHEMICAL LIGHTS FOR NIGHT FLYING.


T D Special


T D Special

If you're a good pilot and want the fastest Half-A racer around, the TD Special is for you. With $5.00 in materials you can build and fly it in one weekend. Although designed for racing, it's fully aerobatic and grooves like it was on a rail. Just for sport, you can go out and tease the slower Quarter Midgets.



BY DAVE ROBERTSON

Several months ago a fellow flying buddy of mine talked me into building a 1/2A kit for an upcoming race out at the Sepulveda Basin. I built the kit and flew it but, for a racer, it just didn't seem to have the speed I thought a Cox .049 should be able to deliver. Having a wild imagination and being willing to try anything once, I started asking some basic questions and did some thinking about what could be done to produce something that would meet the basic standards for the 1/2A class, yet be as drag free, get the most penetration, and be as fast as possible using a stock engine and convenient building materials.

I talked to Kent Thomas, another fellow flyer, who has been flying a swept wing design of his own for several years. His planes are fast for a sport type model and penetrate extremely well. Kent said he uses a 20 degree sweep back, so I asked if 30 degrees would be too much. He didn't know, and I didn't either, but 30 degrees is what I decided on. As it turned out, it isn't too much.

Driving home on the south bound Santa Ana freeway at five in the afternoon, gives you lots of time to think, and on a particular Friday I was stuck in that jam going nowhere. Still trying to come up with some good design, I began thinking about the basic points suggested earlier. Drag: Control surfaces create drag; prop blast over the fuselage has got to create alot of drag; the swept wing will increase penetration, thereby less drag. A pusher type aircraft has got to produce more thrust because there is nothing in the way of the prop blast. All these things were racing through my mind when I finally pulled into my driveway. I pulled out a piece of shelf paper and started drawing some lines, using basic dimensions from other 1/2A planes I have flown and came up with a basic design. That same evening I started construction and Sunday afternoon I took this new creature out to the flying field. Building time — two days. Cost — about $5.00, less engine and radio which I already had on hand.

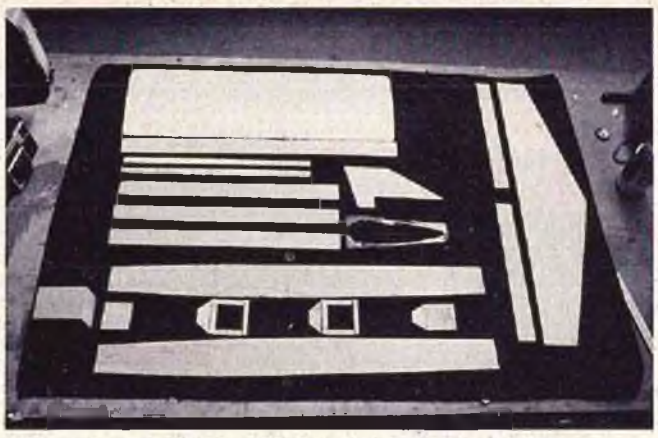
I would rather not comment on the first flight! If you have ever flown a tail heavy airplane with too much throw in the control surfaces, you will know why! Every afternoon I went back out to the field after making one adjustment or another. On Wednesday afternoon I fired it up, checked the controls, headed the plane into the wind and let go. The nose wheel lifted off the ground, the main gear lifted off, and I had my hands on 23 ounces of dynamite! The speed was there — the roll rate was slow but positive, and the elevator effective but not overly sensitive.

On the second flight that afternoon I tried loops and rolls and all that fun stuff you do on weekends with an airplane. With the T.D. Special, loops are instantaneous, climbing speed the best of any ship in its class I have flown, inverted flight good with some down elevator, even outside loops are possible with enough airspace. The one maneuver that was slow was the roll — very slow. For racing, which is what this plane is all about anyway, the roll is plenty as you will see when you turn this plane into pylon #1.

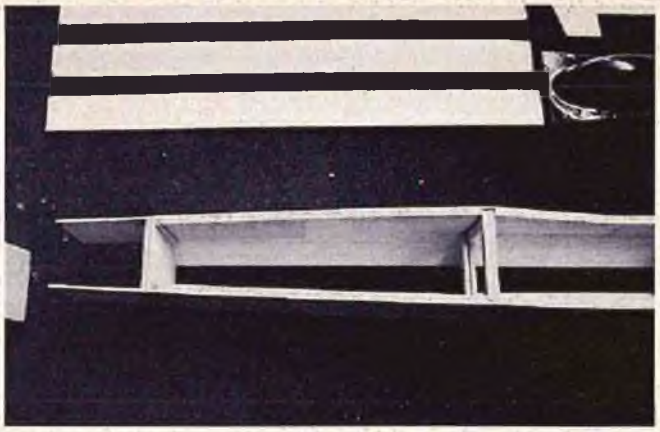
The construction of the T.D. Special is basic and very much like many kits currently on the market. Attention must be paid to the wing hold-down, as it is unique. The design is sound, and adding wood that isn't on the plan may make the model stronger, but it will also make it heavier. To keep it fast is to keep it light.

(continued on page 97)

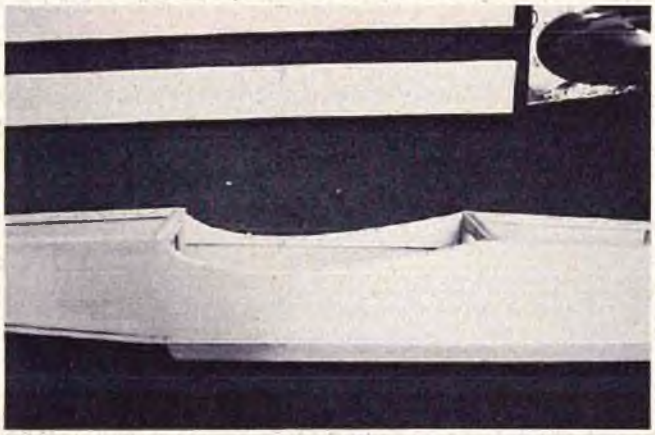
TD SPECIAL



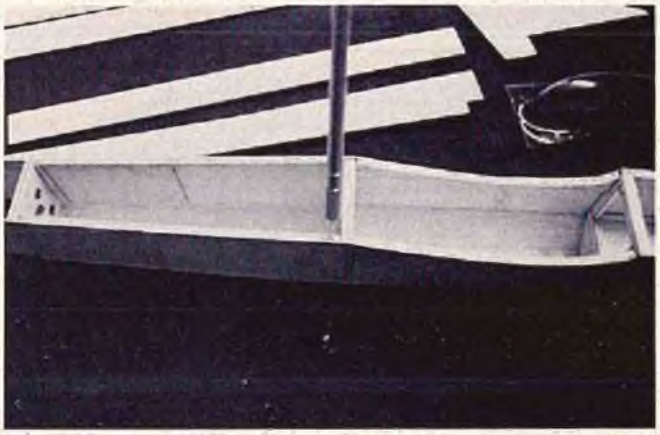
All wood parts for the TD Special are cut out first.



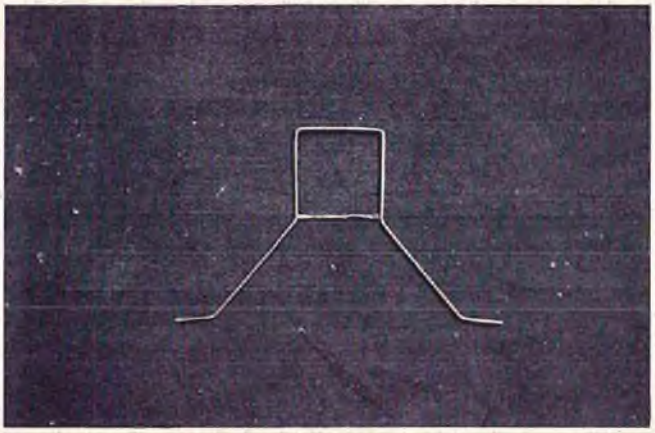
Fuselage sides being joined by the bulkheads.



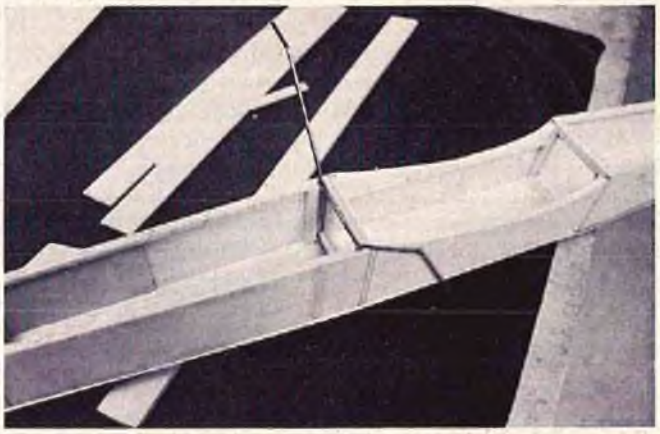
Wing saddle doublers in place. Accuracy important here.



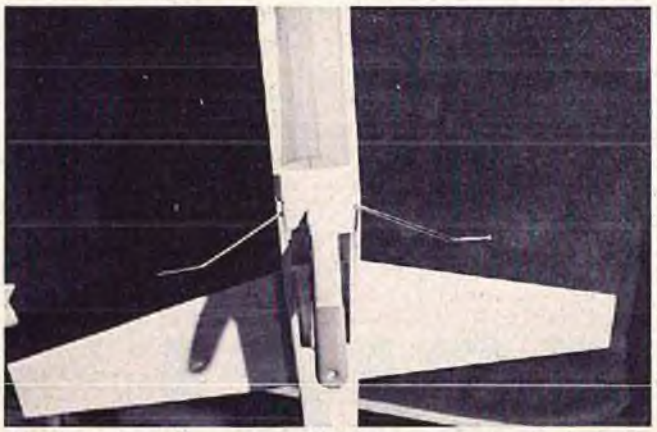
Notching the sides for main landing gear clearance.



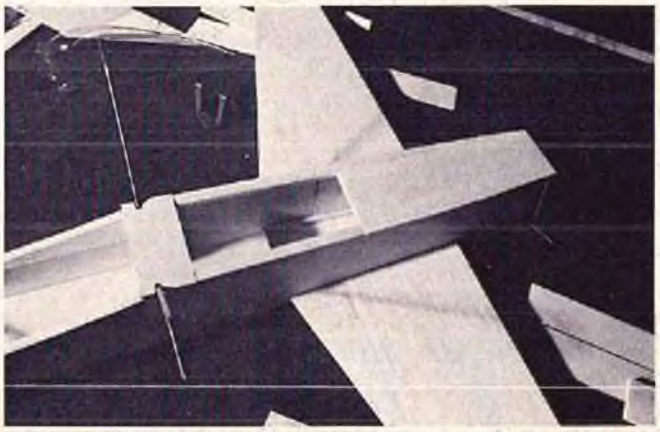
The formed wire main gear held in tension.



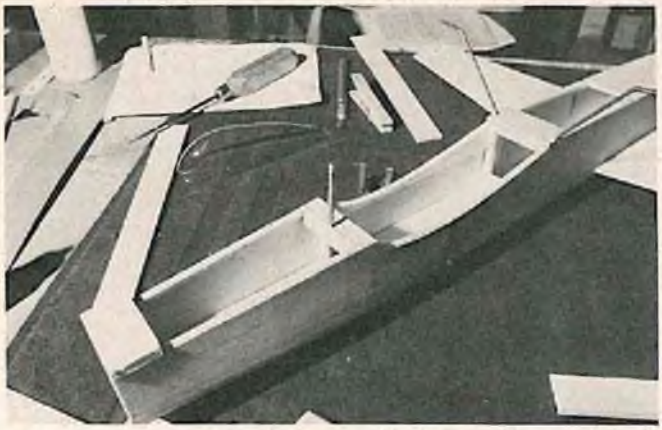
The main gear installed between fuselage braces.



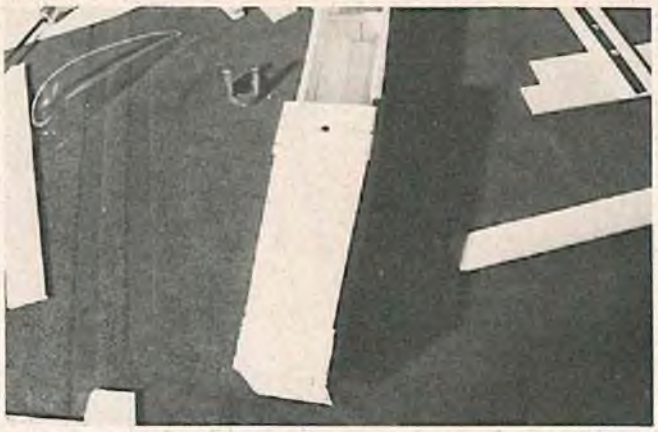
A clamp used to hold ply gear cover in place.



Fuselage with sheeting in place. Mixer installs in open area.



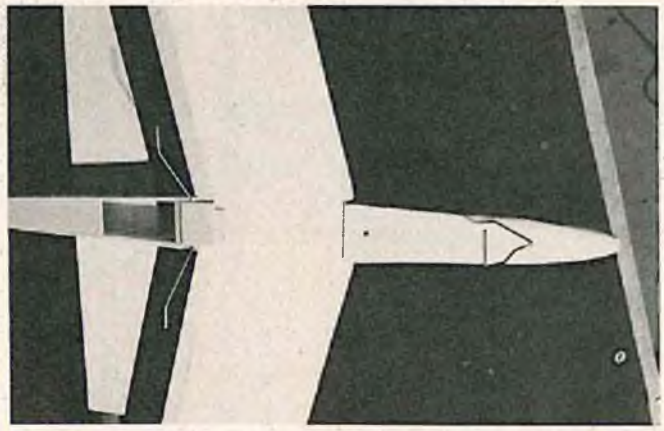
A center punch is used to locate bolt for ply wing plate.



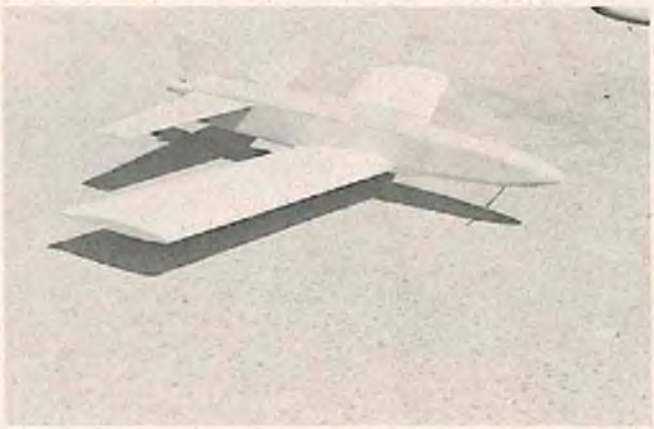
Plywood wing hold-down installed on fuselage.

View of firewall. Note hole for fuel lines.

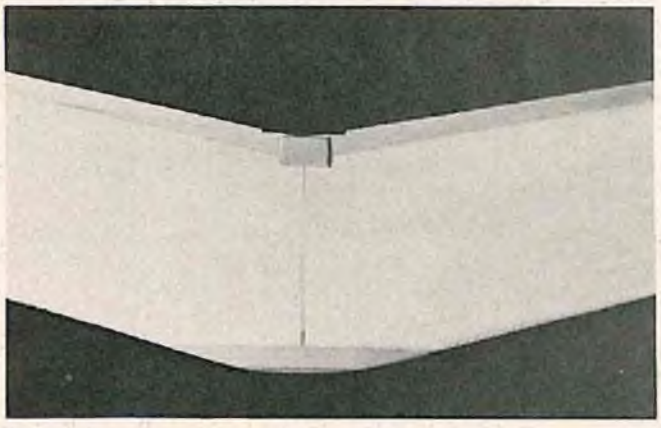
Nosegear installed with J-bolts.



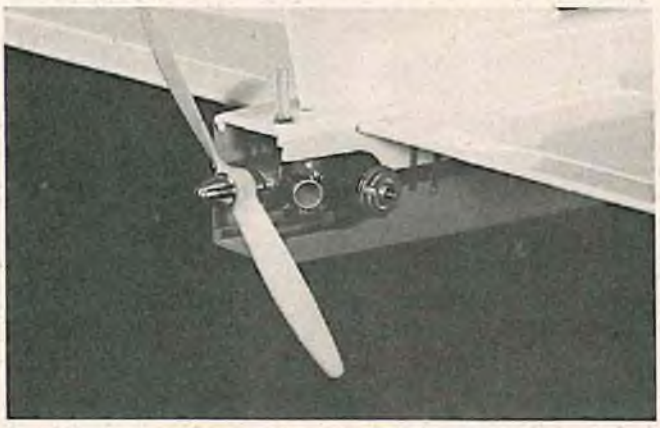
Bottom view of completed aircraft, prior to covering.



Overall view of TD Special prior to covering.

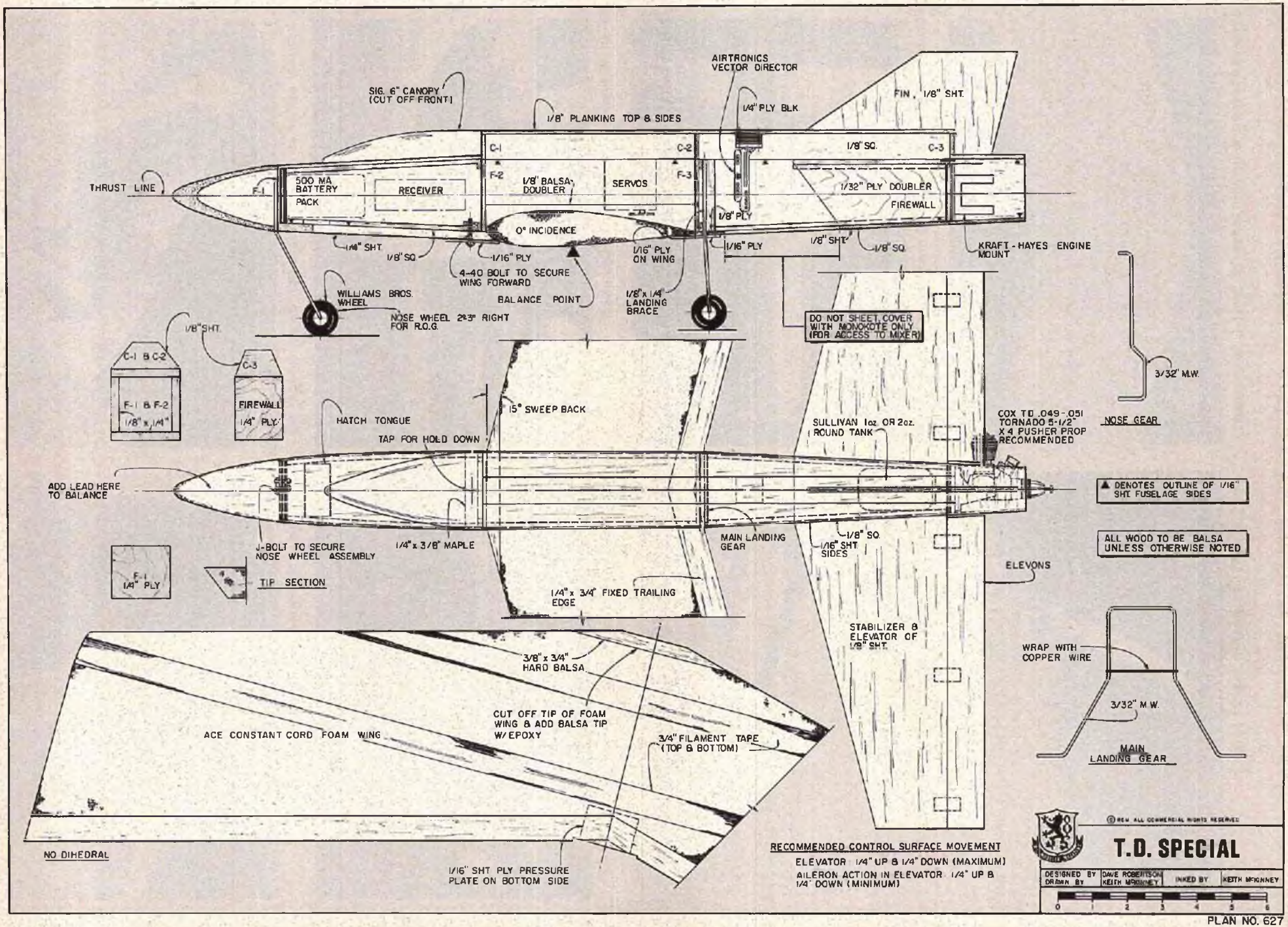


View of Ace foam wing with balsa T.E. and L.E. Note sweep.



Cox T.D. .051 installed in rear of aircraft.

FULL SIZE PLANS AVAILABLE — SEE PAGE 166



PLAN NO. 627

ON THE LINE!

the soaring scene
by lee renaud

Support Your National R/C Soaring Organizations

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Chicago, Illinois 60639

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210 Venetian Way
Winter Park, Florida 32789 R

●Since this column will appear in the January issue, allow me to wish all of you a happy and joyous holiday season. It may be of interest that these words are being written in early October, for the January issue, which goes on sale in December. This schedule is necessitated by magazine preparation and distribution requirements and should be considered when submitting announcements to this column.

A little mental arithmetic will show that this is the first "On The Line" column which includes reader feedback. Please remember to allow at least 3 months to receive a reply to your requests, because of the publication schedule.

☆

We have received many letters in response to our "Where Are You" editorial (October '75 RCM). The majority of these indicate that the writers would be happy to join the LSF or NSS, but don't know how to contact the organizations. The following excerpt from a letter by R. Tennyson of San Mateo, California, is typical:

"Ever try to join the LSF or NSS? I've been trying for the last 4 months to find an address on either one! You look. There is an occasional notice in a magazine or two, but they are hard to find . . . Don ought to publish a list of organizations and their addresses. I finally found a member who had the LSF address, but a half dozen others didn't."

I did look and found that Dr. Tennyson has a point. One of the problems that is easily overlooked by those of us who have been involved in R/C soaring since the beginning, is that we assume everybody has the same knowledge that we do. In order to avoid the difficulty in locating the LSF and NSS, the current address for both organizations will be included in the column masthead every month. Perhaps if the club newsletter editors picked up this idea and included it in their publications, the information would be readily available to newcomers and to those who don't read RCM.

Jim Stone of San Pedro, California, writes . . . *"I have heard of the LSF but have no idea at all what it is about. In addition, I have never and don't plan on ever entering any contests. I fly my planes just for the fun of it and the thrill of watching it soar."*

To Jim and other readers who wonder why they should join the LSF, we offer the following suggestions:

(1) Read the word poem by Jim Gray, LSF #872, published on page 63.

(2) Fill in the form at the bottom, include 30 cents in stamps, and Airmail it to Chicago.

(3) Go out and perform the tasks for Level I Achievement and display the logo on your sailplane.

(4) Walk a little taller because you know the inner satisfaction of joining a select organization where skill and ability, and not money, are the membership fees.

☆

Dave Mullins of Louisville, Kentucky, writes: *"I find that most R/C clubs are 95% concerned with power planes and 5% (if we're lucky) with sailplanes. I feel that it is important for the novice, as well as the experienced flier, to be associated with a soaring club locally, as well as, nationally. How can people who want to form a soaring club get started? We, in Louisville, would like to form a soaring club, but lack the knowledge necessary to get going. Maybe you could point us in the right direction or, at least, tell us who to get in touch with."*

I certainly agree with Dave, that a local club is the best vehicle to increase individual skill and gain soaring enthusiasts. Unfortunately, the situation in Southern California is not typical of other parts of the country, and I can't give you all the answers. (We have 11 clubs with over 1000 members in the L.A. Basin who are **exclusively** devoted to R/C soaring!) The best way to start would be to write to AMA Headquarters c/o Carl Wheeley, 806 Fifteenth Street, Washington D.C. 20005. Ask for information on AMA chartered clubs. This will get you started and perhaps some of the other club secretaries might send copies of their newsletters to: Dave Mullins, 7908 Bala Ct., Louisville, Kentucky 40291. If someone who has successfully formed an R/C soaring club would submit their suggestions, we will include them in a future column.

While on the subject of clubs and how they can contribute to individual achievement, we offer the following thoughts from Perry Neuschatz, President of the SFVSF:

Dear Lee,

Here are some thoughts in response to your request for input on "why it is better to fly in a group than all by yourself." To help your readers understand why you asked me that question, here's an outline of some of this season's accomplishments by members of our club, The San Fernando Valley Silent Flyers.

Just a small segment of the entries in the recent Michigan State Sailplane Championship Contest.

A typical scene at the MRCS Contest. Mick Lasker flying, Al Krugler timing. Jim Hazlett with Cirrus.

At the SOAR Nats, club members placed as follows: Terry Koplan and Chris Adams placed 2nd and 4th in Open Class; Pete Rambo and Rick Pearson took 2nd and 3rd in Standard Class; Ken Wagner took 2nd in Scale; Pete Rambo won the scholarship with the unpronounceable Polish name; **and** *we had the top* **two** *team rankings, although the three guys in the second team have dual citizenship in SULA.*

At the LSF Tournament, Bill Nibley took first overall and first in Open Class, and Rick Pearson and Terry Koplan took 4th and 5th places in Open; Loren Blewitt was 3rd in Standard Class; and Ken Wagner and Terry Koplan took 1st and 5th in scale.

It seems that through some combination of chemistry, good fortune, coincidence and/or other factors, we have more than our share of good competition flyers. We also count four manufacturers of sailplane kits and accessories among our members, including Frank Zaic who too rarely graces our meetings with his presence and comments. The products of at least two of the manufacturers are direct results of club activities.

It is my very strong belief that the flying quality and the kit designs come directly from the interaction of the individuals at flying sessions, at meetings, but especially at bull sessions, lasting into the wee hours after the meetings. There's a lot of talk that starts with "wouldn't it be great if . . .", and then somebody is liable to go off and design something new, or organize a 20 mile cross country race (more about that later), or get about a dozen guys signed up as CD's so that a like number can make an attempt on an FAI world record. We've gotten together several assaults on the cross country distance and altitude records, and one of our earliest members, Jerry Krainock, holds the cross country record at 27.2 miles and the free distance record of 33.5 miles.

Three years ago, when most of the guys were just learning to fly gliders, the flying sessions were known as "Sunday, Bloody Sunday," with an average of 8 crashes. I personally retired the **Arbor Day Award** *for three landings in trees, out of five flights and then, for the greatest number of launches with receiver turned off, was presented the* **Marconi Award.** *But now there are a lot of good flyers trying to stay in the air, and they compare notes on trimming for thermal and speed, location of tow hooks for best launches, etc. We also have informal pickup contests during our Sunday flying sessions for the benefit of beginners and those who may need LSF contest points. That the environment is healthy for newcomers is clear: a novice can come out to the field and watch Rick Pearson practicing two-minute precision while listening to a countdown on his tape recorder, or watch Koplan or Nibley do an 80° launch. Then when the novice is learning, he can learn the best way to do something and have a good standard by which to judge his efforts.*

A newcomer to soaring will certainly be well received when he turns up for the first time at any glider flying session and will be sure to have help in trimming, testing, launching and learning to fly. That's no

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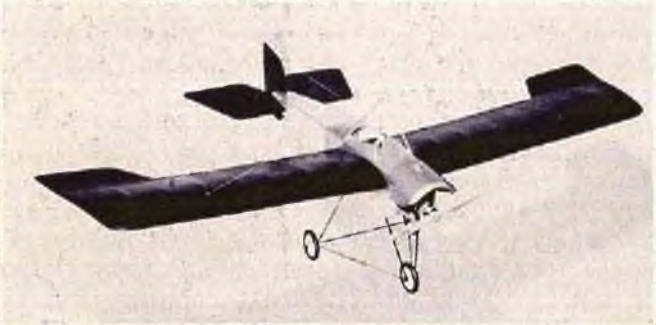
Beautiful trophies at Michigan contest were crystal seagulls on semi-precious stone bases.

A planned landing of a Ka6 - - - note the left tip in the landing square!

THE STATE OF THE ART OF HALF-A RC

PART II BY LARRY RENGER

Scale: Flyline Stearman C3B.



Scale: Peterson Products Lincoln Beachy.

Scale: Flyline Curtiss Robin.

Scale: Competition Models Taube.

By this time you would be about ready for anything! And just about anything is ready for you too! Take scale models, for example, Sterling, Guillow's, and Comet all make stick and tissue scale models which are compact but still can be easily adapted to R/C. Practically any subject airplane can be found, even multi-engine jobs! There are, however, some kits available which are designed strictly to be R/C scale models, but just 1/2A size. The beautiful *Curtiss Robin*, *Bellanca Skyrocket* and *Stearman C3B* from Flyline Models are prime examples of this breed. These kits range from one to three channels depending on their size and wing area. With 236 square inches of wing, the *Robin* would be best flown with two servos, the *Stearman* at 295 square inches should easily handle three, and the *Bellanca* with only 164 square inches would do well to carry nothing heavier than the Ace Baby pulse system and a .020 engine. Jetco makes a *Cessna 170*, a *Rearwin Speedster* and a *Piper Super Cruiser*. These kits were originally for free-flight gas power, so they should carry a 1 channel standard Ace pulse system nicely. Sig Manufacturing rescued much of the old Berkley line of kits which now include a *Super Cadet*, *Stinson Sentinel*, *Piper Super Cruiser* and *Cessna Bird Dog L-19*. These are all in a class which I would call adaptable to R/C rather than designed specifically for that use. Competition Model's *Taube* and Peterson Product's *Lincoln Beachy* recapture the flavor of the early days of flight.

If scale models don't do it for you, let's go racing! RCM created 1/2A racing, and most of the intermediate class models fit within the current 1/2A pylon rules:

(1) Engine 0.0519 cubic inch or less displacement.

(2) Weight between 20 ounces and 32 ounces.

(3) The fuselage shall employ a minimum cross section of 8½ square inches at the widest point.

(4) The wing shall have a minimum 200 square inch area, constant chord, no taper, minimum wing thickness 7/8 inches.

(5) The appearance should be scale-like of full sized propeller driven aircraft which have competed in closed course or cross country air racing.

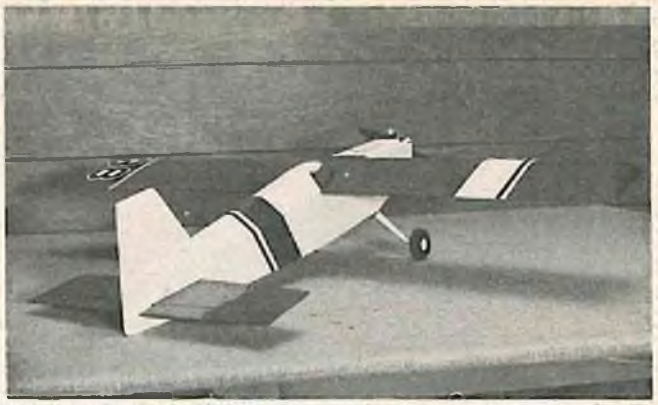
Ace made the first 1/2A racing airplane kit. The model is called the *Upstart II*, a recent revision of the original *Upstart* model. Control has been changed from rudder and elevator to aileron and elevator for more positive pylon turns. Two new kits for 1/2A pylon have just hit the market. There is the *Sho-Off* by Peterson Products, similar in many ways to the *Upstart*, and for the most serious racers, there is the *Tigercat*. The *Tigercat* is comparatively expensive at $25.00, but you get a fiberglass fuselage, foam wings, and the sleekest, fastest 1/2A model I have ever seen fly. Wow! This is a direct order item only from Ron Clem, 1300 Rose Avenue, Los Angeles, California 90066. It is the only legal 1/2A racer we know of to have been clocked at 90+ mph! There have also been a wide variety of published designs for 1/2A Pylon racers. These small speedsters are really catching on around the country along with "Jr. Falcon" racing and "Quickie 200" racing events.

Racing is a type of flying where the economy of small aircraft is really visible. You only have a total of about $100.00 in the air, of which most will survive even the worst accident. Those Formula I models cost that much for either the kit or the engine, let alone $150.00 worth of airborne radio, etc., etc.! With 1/2A, you can race for the season on a gallon of fuel instead of just a day!

My own current interest is aerobatic flying. Until the relatively recent developments in lightweight R/C systems, this was out of the question. All of these models feature aileron and elevator control, light weight, and clean aerodynamics. Construction typically uses foam wings and balsa fuselage construction. Weight ranges from 19 to 23 ounces and wing area is about 250 inches^2 for these airplanes. Some couple the rudder to the ailerons for control when the model is stalled in certain maneuvers. In general, they fly very fast, smooth, open maneuvers just like the .60 powered competition jobs. Oh yes, most of them use "poor man's retracts" — no landing gear at all.

Jan Sakert's *Rimfire*, Don Dewey's *Centerfire*, and Dave Robelen's *Prophet* models were the very first attempts in the aerobatic direction. A few people have modified the *Junior Skylark*

Scale: Flyline Bellanca Skyrocket.

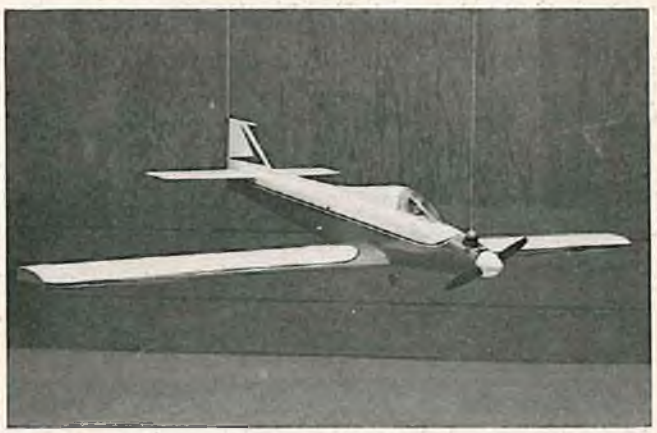


Racing: Ace Upstart II.

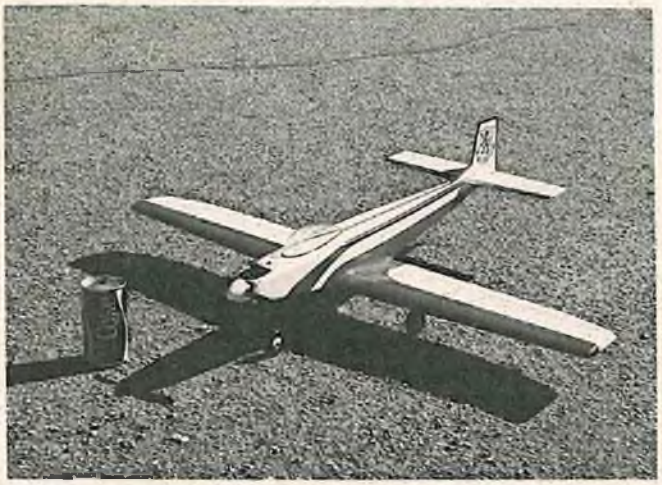
Racing: RCM's TD Special is as fast as some QM's.

Racing: Ron Clem's Tiger Cat, clocked at 92 mph.

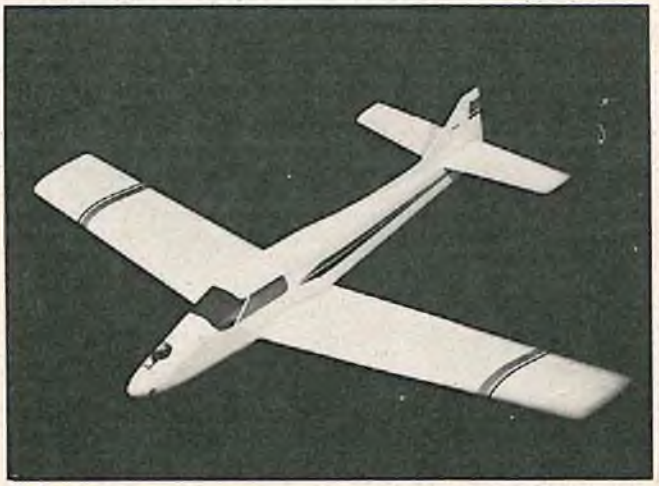
Racing: Peterson Productions Sho-Off.



Aerobatics: Ace Mach None.



GMC's Half-A Chaos.



Concept Models Vixen.

Smallest digital rig – Cannon Tini-Block.

The tiny Ace pulse proportional system.

for aileron control, and there have been other 1/2A aerobatic models such as the author's own *Slikker* design. However, the first serious, kitted, full aerobatic model for 1/2A power is Ace's *Pacer* designed by Owen Kampen. Ace has followed up with a kit for the *Mach None* designed by Tom Runge. Despite an early lead, Ace is not alone in kitting small aerobatic models. GMC Models has scaled down Joe Bridi's *Kaos* and calls it the *1/2A Chaos*. Romey Bukolt's *Vixen*, kitted by Concept Models, is another example of this breed. The most recent entry is Span Aero Products' *Eyelash* designed by Art Schroeder.

There have even been 1/2A aerobatic R/C contests! Your author feels that 1/2A aerobatic models could very well fill the current need for a beginning R/C aerobatic event. Rules for the aircraft could be exceedingly simple — an engine displacement limit and a limitation to 2 channels. Eliminate take-off or replace it with a "smooth launch" requirement which would allow ROG as an alternative. Landing could be replaced by catching the model one-handed as an alternative.

Getting back down off my soap box, there is one remaining very interesting area of 1/2A R/C flying. There are a variety of interesting sport models and adaptable kits on the market. For example, Top Flite has its "School" series of models. These were designed by Ken Willard and range from .020 power up. My own experience was with a *School Girl* (biplane, that is!). This model is a real schoolyard gem — it attracts kids from out of nowhere. At 350 square inches and 28 ounces, it flies great with 3 channels of my RS 6 in it and a Cox Medallion .049 R/C. Not much for aerobatics, but a real fun airplane. The others in this series are the *School Boy .020* and *Schoolmaster .049* high wing models and the *Top Dawg* which is styled like a midget racing model.

But wait! There are even more models in the sport category. The *Sniffer* and *Super Sniffer* come from Midwest, Dumas puts out the *Dakota Biplane*, and a variety of .020 scale models of Old Timers are made by Micro Models and Cal Aero Model. Competition Models makes two interesting all sheet wood airplanes. One is the *SST* — a canard delta model. The other is a semi-scale *Eindecker* for .020 power. Also of interest in the sport category are the *Aerobipe* from Sig and Tern Aero's *Starduster*. The *Starduster* is a very graceful parasol model of stick and tissue construction. The *Aerobipe* is a bit on the large side, but will fly nicely with a Tee Dee .049 if you keep it lightweight.

We have surveyed engines and airplanes. Now what's out there to make those control surfaces wiggle? The earliest proportional systems were "pulse proportional". These then developed into galloping about and "kicking duck". By far the lightest and smallest systems are still single channel pulse and these all come from Ace radio. Would you believe as low as 2.2 ounce airborne weight and about $70.00 cost? Really! These radios are high in quality and range. It is the simplicity of mechanical and electronic design which allow great weight and cost savings. Actuator and power supplies range from 0.010 to .15 engine size model control power, while the price stays essentially constant.

For larger, more complex airplanes, we have a variety of systems available. The practical radio gear which was developed for complex models is all digital coded proportional control. Several companies make suitable compact and lightweight systems. I happen to use RS, Cannon, and Orbit gear. Ace and Kraft make perfectly nice systems also. A good 2 channel radio for 1/2A weighs between 5½ ounces and 7 ounces, with two servos and a battery pack of 250 milliamp hour capacity.

Cannon has the smallest "brick" systems: The "Tini Block" and the "Tini Twin." Ace has the smallest servos with linear output.

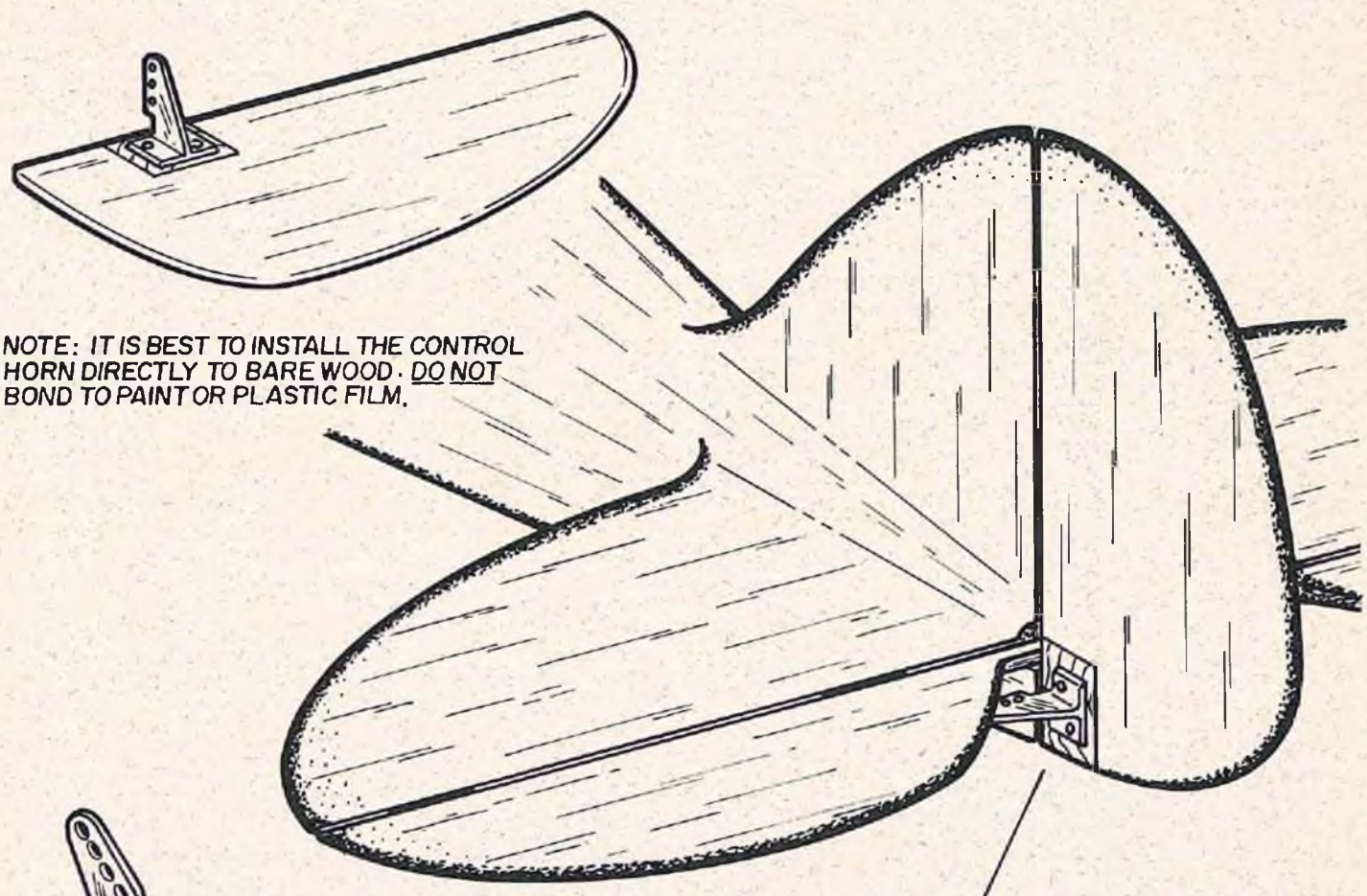
The result of all this is that you can jolly well fly anything you like with a 1/2A engine. You can fly at a local schoolyard (with a muffler!!). And the magic word is **cheap**! Wow! Do you save dollars compared to the gas hungry barges that most people fly. By flying locally, you avoid crowds and frequency problems. You don't even need to disassemble your airplane to take it home. In fact, you can probably walk home from your flying field!

With available airplanes ranging in capability from trainers through aerobatics, you don't ever have to buy a bigger engine than an .049 and you won't miss a thing! □

HERE'S HOW

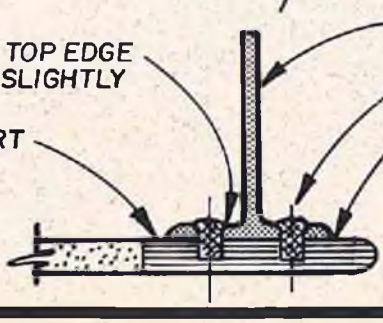
BY JERRY SMITH

INSTALLING A CONTROL HORN WITH SCREWS AND A NYLON RETAINER HAS ALWAYS BEEN A PAIN FOR ME. IF THE HOLES ARE NOT DRILLED STRAIGHT, IT IS ALL BUT IMPOSSIBLE TO PICK UP THE HOLES IN THE NYLON RETAINER. I'LL BET THIS HAS HAPPENED TO YOU. SOMEHOW THE SHAPE OF THE CONTROL HORN ITSELF MAKES IT DIFFICULT TO HOLD WHILE MARKING THE HOLE LOCATIONS. IF THIS HAS BEEN ONE OF YOUR HANG-UPS, THE METHOD PRESENTED HERE WILL MAKE LIFE A WHOLE LOT EASIER. I HAVE COMPLETELY FIELD TESTED THIS WAY OF ATTACHMENT AND FOUND IT ABSOLUTELY RELIABLE. IF YOU ARE A NON-BELIEVER, WHY NOT TRY THIS SIMPLE TEST. ZAP OR HOT STUFF A NYLON CONTROL HORN TO A SCRAP PIECE OF PLYWOOD. LET IT CURE A MINUTE. NOW GIVE IT A REASONABLE PULL — GOOD HUH? NOW A QUICK TWIST. IT COMES LOOSE! TO OVERCOME THIS WEAKNESS IN SHEAR, I SUGGEST THE EPOXY RIVETS AS SHOWN IN THE CROSS SECTION. ONCE THE HORN IS LOCATED AND ZAPPED IN PLACE, DRILL A HOLE PART WAY INTO THE PLY INSERT, THROUGH THE HOLES IN THE CONTROL HORN BASE. FORCE EPOXY INTO THESE HOLES. THIS IS WHAT I MEAN BY AN EPOXY RIVET. FOLLOW THE SIMPLE INSTRUCTIONS FOR BEST RESULTS. YOU'LL NEVER GO BACK TO SCREWS AGAIN!



NOTE: IT IS BEST TO INSTALL THE CONTROL HORN DIRECTLY TO BARE WOOD. DO NOT BOND TO PAINT OR PLASTIC FILM.

FILE OR SAND BOTTOM SURFACE OF CONTROL HORN FLAT FOR GOOD CONTACT. FOLLOW THE ADHESIVE USAGE INSTRUCTIONS FOR BONDING.



SUNDAY FLIER

BY KEN WILLARD

Good turnout of excellent pilots, with fast planes, made the First Annual RCM/Pioneers 1/2A Trophy Races a very successful event.

● Merry Christmas. Peace on earth. Good will towards men (and women!).

May your holiday season be joyous, yet peaceful and tranquil.

And so will mine — if I can ever get this !%$"+%$ 1/2A racer to run long enough to complete three rounds of racing!

Along with a rapidly increasing number of modelers, I've been getting involved in 1/2A racing. Some of you may recall that, in the May 1975 issue of RCM (if you ever got past the cover shot) I discussed some of the aspects of 1/2A racing, even coming up with the suggestion that perhaps it was time to consider the establishment of two classes — unlimited, where the only restriction on the plane was that it be powered with an engine of .051 displacement or less, and the other to be a somewhat restricted class, and that class would be for the newcomers and "sportsmen" types who couldn't go the exotic routes of design, engine modification, etc.

Well, lots of races have been held in the meantime, and I've completed one heat out of four on the average, and talked with the "experts" about the whole scene. Although I still think that two classes have merit in the 1/2A racing activity, I have to agree that the idea may be a bit premature.

The event that has made me change my thinking was the First Annual RCM/Pioneers 1/2A Trophy Races. The actual races were held on September 21st, at the Pioneers field in Sunnyvale. You'll be seeing the complete report in the column "Racing At Random" by Fred Reese and Don Dombrowski, so I won't go into all of the details.

It was interesting to note that the top five placers were from several different areas in California — Los Angeles, Ventura, San Jose, and, as I recall, Sacramento and Modesto.

Another interesting item was that the overall winner had a fastest time of something like two minutes and ten seconds, but the fastest time recorded was one minute and thirty-five seconds. The race isn't always to the swift, but to the most consistent. (I just made that up!)

As for your old Chief Sunday Flier (Mr. Bumble) the same old story: No start for the first two heats; decided that the nerves could stand the flying but not the starting, so got Paul Benezra to start the blasted thing for the third heat. Fine — off and racing, only to cut a pylon, but still managed to place second. Felt pretty good, sent the plane up high to roll over and cut the engine; plane goes ape and crashes beyond repair. No backup. Nuts. Wait'll next time.

So what made the plane go ape? "Interference!" Yeh — in the head! Per my instructions from Scott Christensen, I had everything — electric starter, spare glow plugs, double wrenched the active one so it wouldn't loosen, had spare props, cut to size and balanced, hot fuel, fully charged starter batteries and nicads in the receiver. Yup. Forgot to check the dry cell in the transmitter — it was down to five volts under load. That was enough to control the plane on the race course, but when I went up and away to kill the engine, the plane went out of range. Mr. Klutz does it again.

So much for the racing. I'll let Don Dombrowski fill you in on the results. Suffice it to say there were 23 entries, and I

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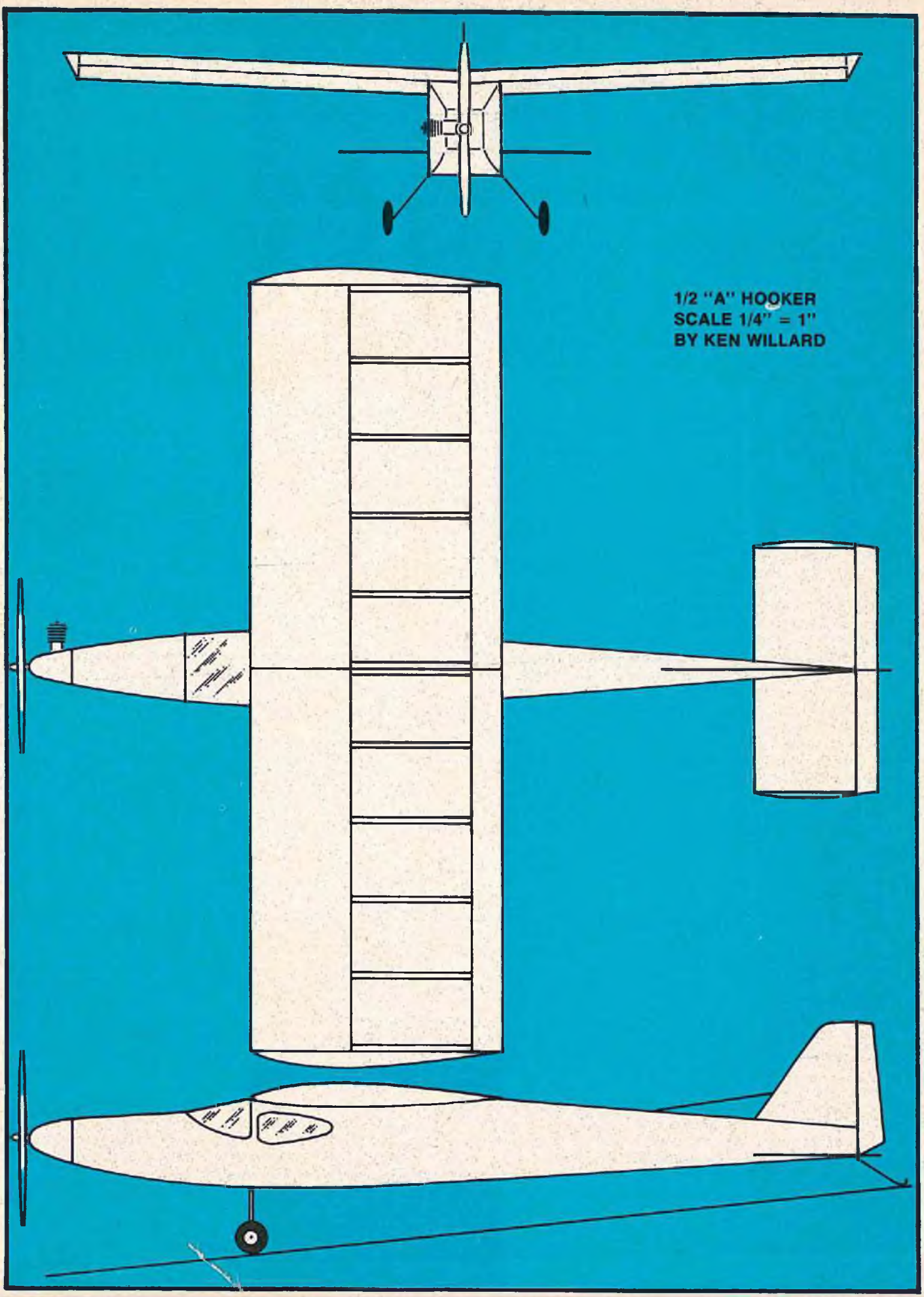
Randy Wilson with fastest racer at the RCM/Pioneers 1/2A Trophy Races – a Tigercat. Designer Ron Clem at right.

Don Dombrowski accepts RCM Perpetual Trophy (he has to defend it next year) and First Place trophy from Dick Aubert.


1/2 "A" HOOKER
SCALE 1/4" = 1"
BY KEN WILLARD

HIGH PERFORMANCE BOATING

BY GLENN CUPIT

HOW TO START AND ADJUST YOUR BOAT ENGINE

These suggestions are basic and are meant for the new boater. Our concern is to start the boat engine within two minutes (N.A.M.B.A.) or two and one half minutes (I.M.P.B.A.). The following procedure usually will assure starting on the first pull of the rope. I say "usually," because there will be times when something will go wrong — it's knowing **what's** wrong and **why** it won't start, that allows you to correct the problem and still start within two minutes.

The essential items are: starting rope, prime bottle, extra glow plug, plug wrench, hemostats, small screwdriver, rag, **hot** glow plug battery, clean glow plug clip with **soldered** terminals. Many different types of ropes are used: nylon, cotton, and leather. I prefer a braided cotton cord of the type used on venetian blinds. 3/16" diameter or 7/32" seems to work best for me. A simple handle made from a dowel will prevent blisters. Replace the cord when it becomes oil soaked. The boat stand should be strong enough to carry the downward pressure of holding the boat during starting. The stand should also prevent prop and rudder contact with the ground or table. It is advisable to extend the starting stand to act as a prop guard or shield on boats with the prop located behind the transom.

To begin the starting procedure:

(1) Remove glow plug and washer and check plug.

(2) Install hemostats on fuel line from tank to needle valve and fill the tank. If the center of the tank is level with the needle valve as recommended, the hemostats must be left squeezing the fuel line whenever the engine is not running to prevent the fuel from siphoning into the venturi and crankcase.

(3) With the boat on the stand and with the bow towards you (if you are right-handed; bow away from you if you are left-handed), have your helper hold the boat tightly down on the stand. Hold the rope in your dominant hand, pass the loose end over the top of the flywheel, down and under and up the opposite side, over the top, cross itself and grasp it with your other hand. If you followed correctly, by pulling the rope held in your dominant hand, the engine should turn in the proper direction; counter-clockwise, as viewed from the propeller. Practice pulling the engine through smartly (with the plug removed) in the starting direction, while allowing the rope to slip on the flywheel when pulling the rope back in the opposite direction. The technique is similar to shining a shoe with a rag. Do not release your grip on the rope while practicing turning the engine over. Turning the engine in the wrong direction will not clean out a flooded engine or properly draw fuel.

(4) Remove the hemostats and pull the engine over five to ten times with the throttle wide open (plug still out) or until raw fuel squirts out the plug hole (watch your eyes). Sliding the rope off of the flywheel and around the U-joint will spin the engine faster and flush the engine with fewer pulls. Make certain it is raw **fuel** and not oil which should be inside the engine, since last time it was run (we will explain later).

(5) Reinstall the hemostats on the fuel line and continue spinning over two or three times until **almost** no fuel mist squirts out the plug hole.

(6) Reinstall the plug and washer, hook up the glow lead to the plug, set the throttle at 1/4 open, with the rope back on the flywheel.

(7) **Rock** the engine in **both** directions without releasing tension on the rope. This is the only time the engine is turned in the wrong direction. **If** the engine "pops" through exhaust while rocking, it is ready to start and will usually start on the next pull.

(8) Pull over smartly in the direction of rotation and at the last moment, release the rope with your left hand (if you are right-handed). The engine should be running. If not, one of three things should have happened: (A) The engine pops once or twice or not at all, in which case it was not primed properly (too much or too little). Try pulling over two or three more times. If the same result occurs, re-prime. If you suspect flooding, remove the plug and repeat steps 1-8. If you feel it has not been primed enough, squirt a couple of drops of fuel in the exhaust or have your helper hold his finger over the carb (choke) and pull the engine over twice. Then repeat step 8. (B) The engine revs up and kills within one or two seconds, in which case the needle is too lean. Open the needle (unscrew) one turn, prime and repeat step 8. (C) The engine runs at low speed for more than two seconds, sputters, and then kills, in which case the engine is too rich. Turn in the needle (screw in) 1/4 turn. Repeat step 8.

The trick is in learning how your engine sounds (pops) **before** you release the rope with your left hand as well as learning to recognize A, B, or C quickly. After running, and getting an approximate needle setting, you will only have A to reckon with. Exception: dirt or a break in the fuel line or out of fuel, which will exhibit B symptoms.

Now that you've got the thing started, what next? Do not rev the engine any higher than necessary to keep the engine running with the boat out of the water! You may crack the throttle open once or twice to "clean it out" if you wish, but only quickly. The engine should sound **rich** when out of the water with no load. Do not run it out of the water at any speed for more than a minute since overheating can occur. Upon launching, the load on the engine will cause it to lean out. If the boat kills on launch, it is usually too lean (or too large a prop; too much pitch). Correct, restart, and re-launch. Run the boat wide open and listen to the engine. You want a definite four cycle rich condition. If necessary, bring the boat back in and readjust the needle to obtain a rich setting wide open. If a rich setting cannot be obtained, it indicates one of two things: (I) Too large a carb or venturi, or too low a tank position. (Exhaust pressure will help here.) (II) Too much prop: you should decrease pitch and/or blade area.

After obtaining the wide open rich setting, run a tank or two through the engine to familiarize yourself with the handling characteristics of the boat. After you have it under control and the engine is broken in, you can tune-in the optimum needle setting as follows: bring the boat to the bank and lean out 1/4 turn and re-launch. Repeat leaning 1/4 turn at a time until it kills. Then richen back 1/4 turn to your former setting. You are now within 1/8 turn of the proper needle setting. Re-launch and run the tank dry. If the engine kills before the tank is dry (over 1/4" fuel in tank), richen 1/8 turn. At the proper needle setting, the engine should richen up slightly when de-acellerating to part throttle and clean out quickly and accellerate quickly with no hesitation. If the engine kills when accellerating from launch, with a carb, the low speed mixture may be lean (screw in to block off more of the air bleed or rotate the low speed mixture adjustment in the rich direction; depending on the type of carburetor).

As you may have noted, the engine was never revved while holding the boat in or out of the water and a needle setting attempted! As a general rule, we do not recommend listening to the engine for rich or lean setting **except while running on the pond at top speed with wide open throttle.**

Once a setting has been obtained, it should not vary more than 1/4 turn all season, with the same fuel and prop. If you suddenly have to richen more than this, you can suspect trash in the fuel system, a pinhole in fuel line, a vacuum leak (carb, backplate, screw loose, etc.) or in the case of ringed engines, a worn out ring. (Last year at the Internats, I won a heat only to

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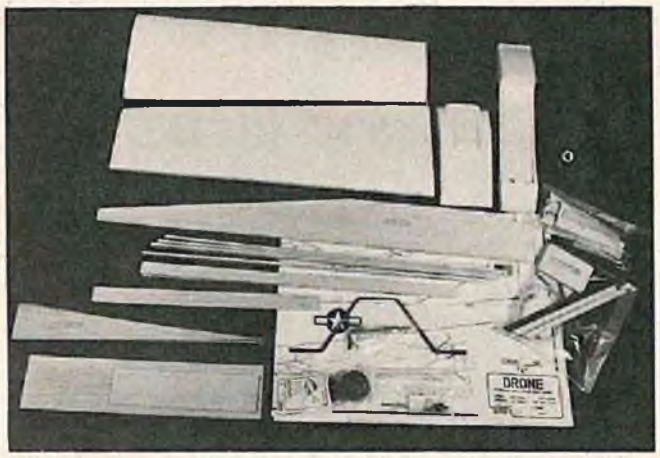
RCM PRODUCT TEST

Wing Manufacturing DRONE



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

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

● The Drone, designed by Ralph Andrae and produced by Wing Manufacturing, Box 33, Crystal Lake, Illinois 60014, is a very unique four channel trainer and general sport aircraft. With a wing span of 55 inches and a total wing area of 550 square inches, our prototype utilizing an OS Max .30 and Hobby Lobby 5 radio, weighed 72 ounces for a wing loading of 19 ounces per square foot. The basic materials used in construction is a balsa, plywood, and plastic fuselage with cardboard covered foam wings and conventional balsa tail surfaces. Hardware included in the kit includes pre-bent wire landing gear, spinner, tail wheel bracket, control horns, aluminum tube pushrods and end plugs, wire lengths and clevises, aileron linkage, hinges, and glass tape for the wing center section as well as miscellaneous screws. The 44" x 34" plan sheet is loaded with perspective and exploded views that make construction quite easy. The unique molded plastic wing saddle and wing fairing makes an extremely simple job of proper wing seating and alignment as well as keeping the interior of the aircraft free of exhaust residue. Our prototype was covered with blue and white Flite Cote and trimmed with the decals provided on the large colorful decal sheet in the kit. The only modifications we would recommend would be the use of triangular stock on each side of the fin at the base as well as 3/16" x 1/2" cross grain stiffeners on the stab tips. We found that one degree of down thrust was necessary with the OS Max .30. The Drone is a unique looking aircraft when completed, has exceptional flight performance, while roll response can be increased to any degree desired by adjusting the aileron linkage. Inverted flight is as good as upright and the landing speed is extremely slow to aid beginners through their first flight. The Drone is an ideal trainer, but also will satisfy the desire of the average sport flier who wants a quickly built and rugged aircraft that will provide many, many hours of excellent flight performance and trouble free flying. The price of $39.95 is extremely reasonable for this high quality kit. □

SPECIFICATIONS

Name	Drone
Aircraft Type	Sport Trainer
Manufactured by	Wing Mfg. P.O. Box 33 Crystal Lake, Illinois 60014
Mfg. Suggested Retail Price	$39.95
Available From	Both Manufacturer and Retail
Mfg. Recommended Usage	General Sport
Wingspan	55 inches
Wing Chord	10¾" root — 7¾" tip
Total Wing Area	550 sq. in.
Fuselage Length	42¾" w/spinner
Radio Compartment Dimensions	(L) 9½" x (W) 2½"x (H) 3¾"
Wing Location	High Wing
Dihedral	1½ inches
Airfoil	Semi Symmetrical
Wing Planform	Double Taper
Stabilizer Span	18 inches
Stabilizer Chord (incl. elev.)	5¼ inches
Total Stab Area	98.5 sq. in.
Stab Airfoil Section	Flat
Stabilizer Location	Top of Fuselage
Vertical Fin Height	6 inches
Vertical Fin Width (incl. rudder)	4¼" avg.
Mfg. Rec. Engine Range	.29-.50
Recommended Fuel Tank Size	8 ounce
Landing Gear	Conventional
Recommended No. of Channels	4
Recommended Control Functions	Elev., Rud., Throt., Ail.
Basic Materials Used in Construction:	
Fuselage	Ply, balsa, plastic
Wing	Foam — cardboard covered
Tail Surfaces	Balsa
Hardware Included in Kit	pre-bent wire, spinner, hinges, glass tape, control horns, clevises, etc.
Plan Size	44" x 34" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	No (many perspective, exp. views)
Construction Photos	No
Kit Includes	Shaped Parts
Mfg. rec. flying weight	68 ounces
Wing loading based on rec. flying weight	17.8 oz./sq. ft.

RCM PROTOTYPE

Weight, ready to fly:	72 oz.
Wing Loading	19 oz/sq. ft.
Covering and finishing materials used	Flite Cote
Engine Make and Disp.	O.S. Max .30
Muffler Used	O.S.
Radio Used	Hobby Lobby 5
Tank Size Used	8 ounce

NRCHA

BY DON DEWEY (N1A)

●Our congratulations to the NRCHA members who have achieved Grade Levels I, II, and III since our last listing. The Grade Level Proficiency Program in the NRCHA is not easy — it takes a lot of patience, time, and effort on the part of the individual helicopter pilot. However, the entire purpose of the program is to provide a system of increasingly difficult goals for the individual member to achieve, on his own, in order that each of us may become a better pilot by participating in the Program. On the charts you will find the names and location of each member who has achieved a Grade Level since our last report, along with the helicopters, radio equipment, and engines each participant used.

Now, with a number of members having achieved Grade Level III, we're looking for the first Grade Level IV. This is a most difficult set of tasks and will take quite some time to complete. We know several members who have accomplished half of the tasks in Grade Level IV and are working on the last group at this time. We'll look forward to awarding the first NRCHA Grade Level IV achievement pin.

□ □

As this issue was going to typesetting, we received word from Bernard Maeterlinck that Claude Bectchen set a new world helicopter distance record of 72.500 kilometers, using a modified Graupner Bell 212 Twin Jet with Graupner mechanics and a modified OPS .60 with Schluter front fan.

In addition, Ronald Cicurel established a new world helicopter speed record of 95.333 KMH, using Graupner mechanics in a Swiss Schneider custom epoxy Gazelle fuselage.

Congratulations to both Claude Bectchen and Ronald Cicurel on their world record accomplishments.

□ □

Chopper Hints and Kinks

Robert W. Rachau of Sunbury, Pennsylvania 17801, found that he had trouble getting the tail rotor of his Du-Bro Shark to come back to neutral or to negative pitch. At that time he started thinking about using Gold'N Rod for the pushrod instead of the wire provided with the kit. But, being new at the game he played it by the rules (or in this case, the instruction book). During the first flight, the wire broke at the solder joint. Later, Bob found that the heat made the .020 wire brittle and the vibration snapped it. After a few flights later, the Du-Bro EZ Connector that goes into the servo arm, vibrated out and, needless to say, Bob had his hands full with one spinning helicopter.

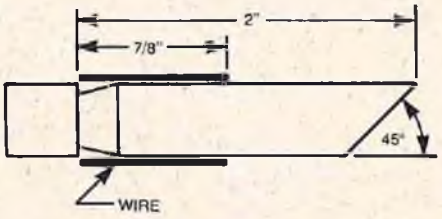
He did manage to get it back on the ground with a minimum amount of damage. That's when he decided to use the Gold'N Rod and see what would happen. After installation, he found that it gave better results in the neutral as well as the negative positions. In using the Gold'N Rod, Bob no longer had to rely on centrifugal force to

NAME	NRCHA #	HELICOPTER(S) USED	ENGINE(S) USED	RADIO(S) USED
		GRADE LEVEL III		
R. Burch, Denton TX	N14B	Du-Bro Shark	O & R 1.34	EK Logictrol
J. Levenstam, Sweden	N1S	Schluter Heli-Baby/Kavan Jet Ranger	Webra .40/Webra Speed .60	Micro Prop/Micronic
J. Minasian, Ventura CA	N74A	Kavan Jet Ranger	Webra .60 Blackhead	Kraft
S.L. Willoughby, Kansas City MO	N164E	Kavan/Willoughby Mod.	Webra .61 Blackhead	Kraft/Heathkit
		GRADE LEVEL II		
R.G. Depew, Detroit MI	N71E	Kavan Jet Ranger	Super Tigre .60	Kraft
J. Doggett, Henrietta NC	N56C	Kavan Jet Ranger/Du-Bro Shark	Webra Speed .61/O & R 1.34	Heathkit
T. Frackowiak, Erie PA	N312F	Du-Bro Hughes 300	O & R 1.34	Kraft
D. Goldstein, S. Africa	N14P	Kavan Jet Ranger	Ross .61	Logictrol Super Pro
D.W. Hamlin, West Lawn PA	N78F	Kavan Jet Ranger/Du-Bro Shark	Veco .61/O & R 1.34	Kraft
K.W. Oakley, Mentor OH	N13E	Du-Bro Shark	O & R 1.34	Kraft
M.R. Raisch, Arvada CO	N26B	Hegi Bell Huey Cobra	O.S. Max .80	Royal
G. Rodriquez, Rio Peidras PR	N1R	Original Schluter Cobra	Webra Speed .61	Heathkit
A.M. Ward, Akron CO	N1B	Kavan Jet Ranger	Webra .61	RS
L.O. Webster, Holly Hill FL	N25C	Kavan Jet Ranger	Veco .61	Kraft
		GRADE LEVEL I		
E.H. Bean, Cloverdale CA	N141A	Du-Bro Hughes 300	O & R 1.34	Kraft/Heathkit
B.T. Crisp, Ont. Canada	N17H	Schluter Huey Cobra	European Veco	Heathkit
B. Erikson, Norway	N4N	Kavan Jet Ranger	Webra .60 Blackhead	Futaba
E. Fry, Piqua OH	N162E	Kavan Jet Ranger	Super Tigre .60	World Engines
A. Gentzel, Flemington NJ	N295F	Graupner Bell 212	H.B. .61 Stamo	Pro-Line
C. Giammette, Irvington NY	N125F	Schluter Huey Cobra	Super Tigre .60	Kraft
K. Gottschall, Gladstone MO	N27E	Kavan Jet Ranger	Webra Speed	Kraft
W. H. Holt, Savannah GA	N85C	Schluter Huey Cobra	Webra .61	Kraft
C.B. Gray, Miami FL	N109C	Kavan Jet Ranger	Webra Speed .61	RS
A.F. Irwin, Champaign IL	N61E	"Das Habenbox" scratch-built	H.B. .61	Royal
W. Lampe, Australia	N5M	Du-Bro Hughes 300	O & R 1.34	Futaba
C. Larson, Que. Canada	N16H	Du-Bro Shark	O & R 1.34	Cannon
D.W. Lodge, Simi Valley CA	N164A	Kavan Jet Ranger	Veco .61	Kraft
W. Lyons, Elridge IA	N138E	Schluter Enstrom F28	Super Tigre .60	World Engines
J. Mullemeister, Australia	N6M	Schluter Gazelle	H.B. .61	Futaba
K. Neppenstrom, Sweden	N4S	Schluter Gazelle	Webra Speed .61	Futaba
P. Oparnica III, St. Albans WV	N346F	Graupner Bell 212	H.B. .61	Kraft
E. Previnaire, Belgium	N28BL	Kavan Bell Jet Ranger	G60 Blue Tigre	Kraft
J. Pritchard, Rome NY	N379F	3/4 size Polecat 30" rotor	O.S. Max .10	Cannon
B.A. Roth, Midland Park NJ	N209F	Du-Bro Shark	O & R 1.34	RS
E.J. Ruppert, Hayward CA	N124A	Kavan Jet Ranger	H.B. .61	Heathkit
J. Schell, Gibsonburg OH	N244E	Kavan Jet Ranger	Super Tigre G60	Pro-Line
C.V. Stroh, Cloverdale CA	N140A	Schluter Huey Cobra (2)	Veco .61	Heathkit
L.O. Taylor, Roseville CA	N11A	Du-Bro Hughes 300/Du-Bro Shark	O & R 1.34 (2)	Hobby Lobby
D.A. Trapp, Lexington KY	N366F	Du-Bro Hughes 300	O & R orig.	MRC
M. Winsel, Brookings SD	N235E	Du-Bro Shark/Mod. Polecat	O & R 1.34	Royal/World Engines

bring it back. Now, he flies his Du-Bro Shark with a more relaxed feeling about the tail rotor.

□ □

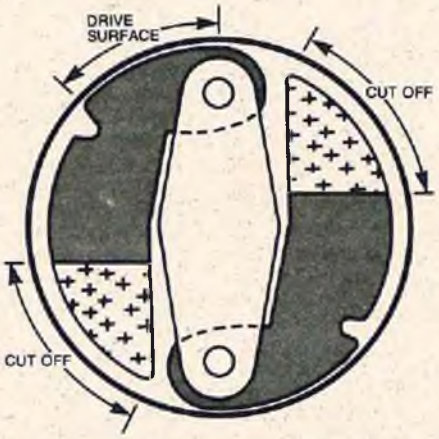
Bruce A. Roth (N209F) of Midland Park, New Jersey, mentions that, in the July issue of RCM on page 47, there was a statement as to a problem with carburetor spray and fuel consumption on the O & R powered Du-Bro Shark. Bruce submitted what he considers to be a reasonable solution. In fact, his answer to the problem was to slip on a 2" length of 5/8" diameter Tatone Exhaust-Off tubing onto the carburetor mouth and, using a bit of the supplied wire, secure the rubber coupling to the carburetor flair. It seemed to work well for him, but the length may be critical, due to the ram-tuning effect. The sketch shows Bruce's modification.



Still on the subject of the Du-Bro Shark, Lee Taylor of Roseville, California (N11A) wrote that, while reading through the September issue of RCM, he saw the Du-Bro clutch modification designed to cure a slipping clutch. Lee writes that this one kind of threw him, since if anything, his problem has always been the exact opposite. In other words, Lee has tried just about everything under the sun to get his clutch to disengage, both on his Hughes 300 as well as his Shark. As Lee writes, that engine was designed to drive a chain saw and there wasn't any way it was going to disengage as designed; even at a dead slow, battery-assisted glow plug idle! Lee adds that even the super-experts seemed to have the same problem as evidenced by a recent contest he attended.

As a result, Lee attacked the root of the problem directly. What is basically happening is that the force of the engaging counterweight portion of the shoe is far too strong for the rather weak disengaging springs that are in the clutch. Because the design of this clutch makes it almost impossible to change the springs, Lee started changing the counterweights. He started out rather gingerly, just drilling some lightening holes in the counterweights. That didn't do a bit of good so he actually started cutting off portions with a hack saw. Would you believe that Lee now has less than **half** of the counterweights left and it still takes a dead slow idle to disengage? But, as Lee points out, he has a Du-Bro chopper where the rotor will eventually stop while the engine keeps running and there is no further problems with clutch slippage.

Lee writes that most people will not be willing to make such drastic changes to the weight of the counterweights so he would recommend that they just start experimenting by cutting off a small, equal amount of weight from the tip of each counterweight, and keep cutting until they obtain the action they desire. It is not necessary, or desirable, to remove the pins from the clutch assembly — just chuck the whole clutch up in a vise and start cutting. The reason for this is that the springs inside the clutch are almost always bent on re-assembly, effectively destroying the clutch completely — so don't take it apart.



Having modified three clutches this way, Lee's experience has been that almost 30% of the counterweight mass must be removed before **any** beneficial effect is noticed and his clutches are now running with only about half of their original mass remaining.

Lee also points out that an exact balance of the two clutch shoes is not terribly important, but do try to take off the same amount of material from each counterweight. Lee did all of his cutting with a hack saw, then cleaned it up somewhat with a file. No attempt was made to balance the clutch, and no additional vibration or wear was noticed on his equipment.

□ □

New Products

From the Valley Flyers Newsletter, we learned of a supply for metric screws. This is Cal Western Supply Company, 126 East Graham Place, Burbank, California 91502 whose phone number is area code 213 849-6711. One of the Valley Flyers somehow misplaced one of the long head screws for his Super Tigre X-40 and was unable to find a 4mm diameter by 7 thread per centimeter Allen Head screw and found that Cal Western Supply Company specializes in metric screws of excellent quality.

If you wondered about the somewhat unorthodox looking mufflers pictured with this month's column, these are special helicopter units made by Wally McAllister of Mac's Products, 8020 18th Avenue, Sacramento, California 95826. Several months ago, Clarence Lee pointed out in his column, Engine Clinic, that Mac's Mufflers were among the finest produced, both from a standpoint of performance, as well as noise reduction. In obtaining these mufflers for use with several of our helicopters, we were intrigued as to the reason for the unusual shape and design.

These helicopter mufflers are primarily manufactured by Mac's Products for export to Japan and some are designed to the Japanese helicopter manufacturers specifications. They are designed for maximum cooling along with maximum noise reduction with a minimum of power loss. Wally explained to us that the theory of obtaining maximum noise reduction with a minimum of power loss is a combination of the proper size expansion chamber in

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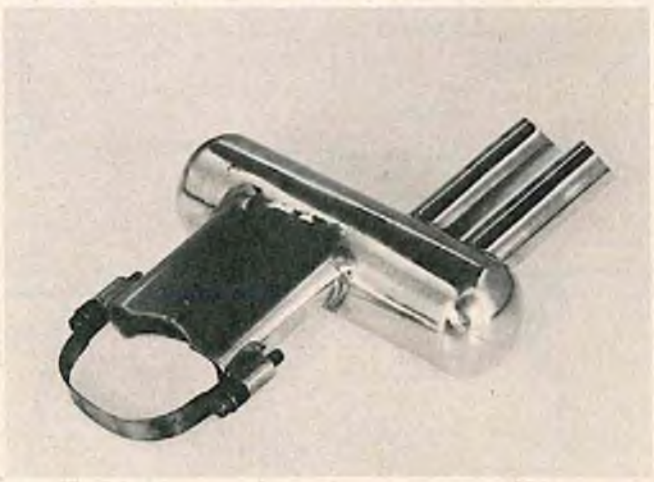
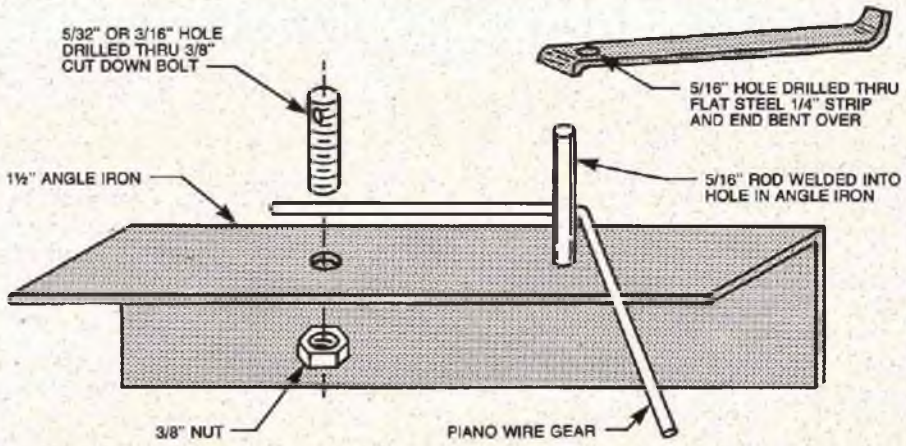
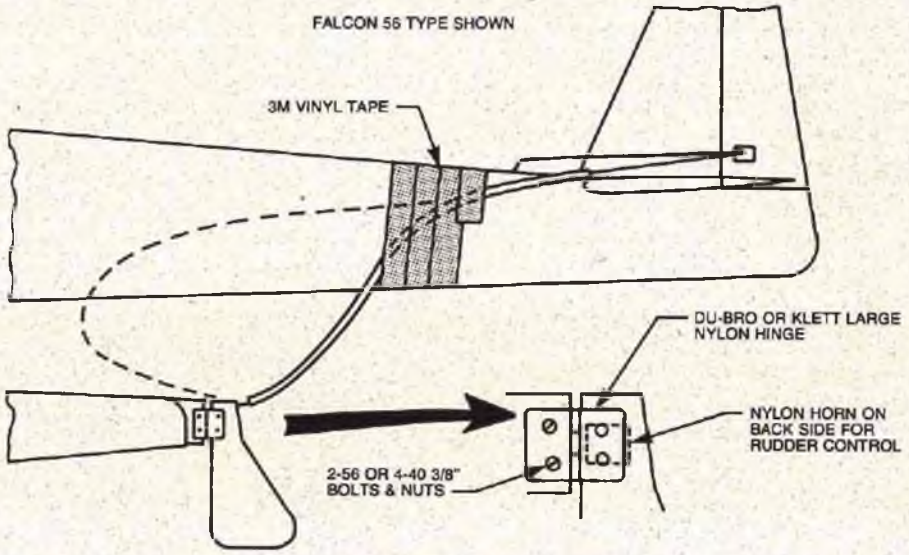


FOR WHAT IT'S WORTH

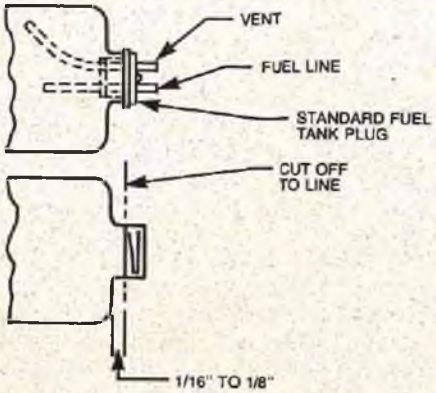
If you're looking for a wire coil landing gear bender, try the one in the sketch suggested by Hunter Close of Rankin Park, NSW, Australia, which was fabricated in 10-15 minutes from scrap while he had access to an electric welder. The coil bender has proved to be very effective and practical. Angle iron is used to allow the bender to be held in the bench vise and can be used to bend any size wire into left or right hand coils. The wire to be bent is inserted through the 5/32" hole in the bolt and tightened down securely, lying against either side of the 5/16" pin. The handle is then slipped on to the pin and, by holding the loose end of the wire downwards and turning the handle, a very tight and accurate coil can be formed.



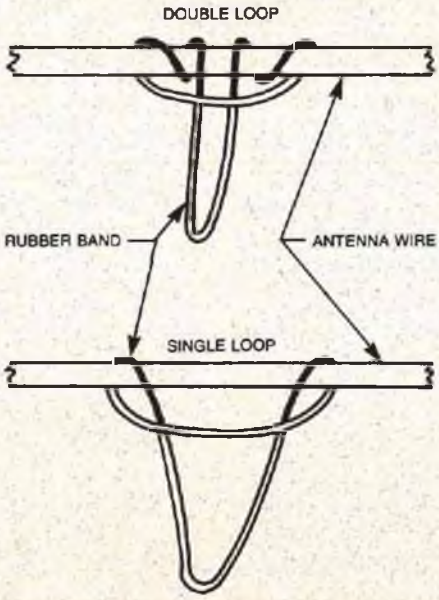
If you've done any flying off of water with a float-equipped plane, then you know the problem of getting a "friction-free, low cost, tough, hinge" on the water rudder and linkage to the air rudder. Bob Smith of Lansing, Michigan, uses a large nylon hinge on the float to hook up the water rudder. He uses a nylon elevator horn on the backside of the water rudder and a flexible NyRod between the air and the water rudders. Use 3-M vinyl tape (which can be obtained in black, white, or other colors to match your paint scheme), and tape the NyRod to the fuselage. If a reverse direction is needed, then loop the NyRod as shown by the dotted line in the sketch and tape all the way to the loop. Using this system, the connection from the water rudder to the air rudder can easily be removed when the plane is converted back to land flying.



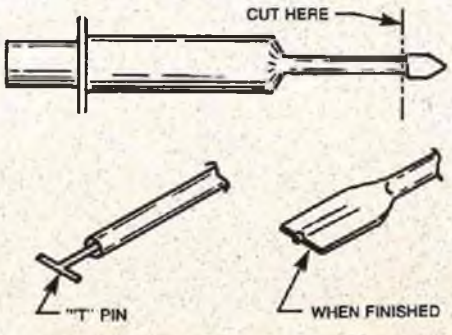
Donald W. Manvell of Rome, Pennsylvania, suggests saving your plastic glue bottles for use as inexpensive fuel tanks. The bottles, with the small applicator tops, are just the right diameter to fit the standard plugs from commercial fuel tanks. Cut, or belt sand, the neck down to within 1/16" to 1/8" from the bottle body and the plug will fit nicely. These bottles come in a variety of shapes and sizes and the glue is water soluble for easy clean-out. Don has successfully used a Wilhold 8 ounce bottle in his Aeromaster.



Ray Gareau of Laval, Quebec, Canada, suggests using a double loop knot to hold your antenna wire with a rubber band instead of the conventional single loop. This will keep the antenna tight, making it much more difficult to slip, but still protect it in case of abuse. By the way, Ray points out that a good source of the right, fine rubber band for receiver antennas are those found on celery or lettuce when one buys these articles at the local supermarket.



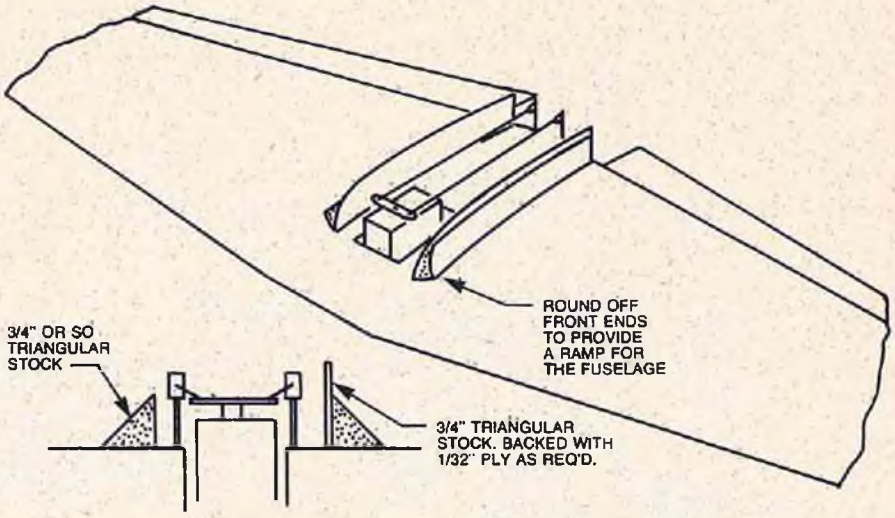
Kenneth Mays of Aberdeen, North Carolina, always had a hard time getting enough glue into the hinge slots after cutting the slots with an X-Acto knife. Finally, Ken modified an Austin Craft #545 glue gun as shown in the sketch. Cut off the end as shown, insert a T-pin, and lay on a vise and flatten about 3/4" of the end to approximately the thickness of a hinge. The metal is very soft and will not crack.



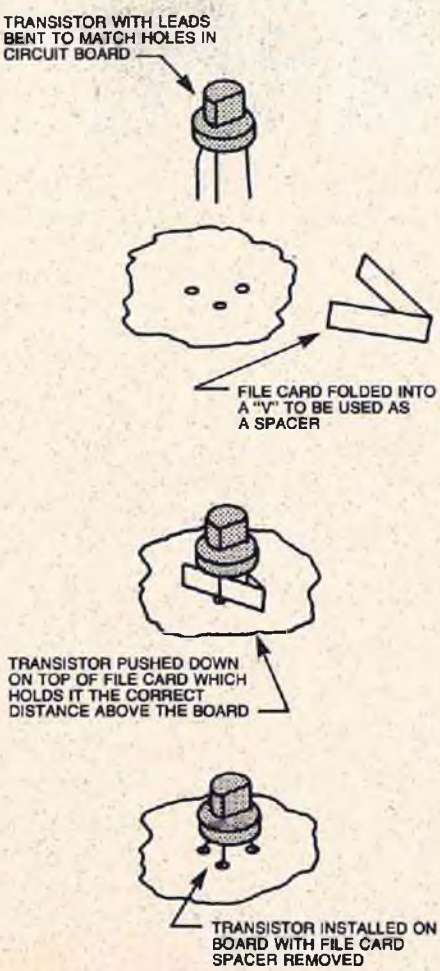
FOR WHAT IT'S WORTH

Finally, take a pair of pliers and remove the pin. You now have a perfect instrument for inserting glue into your control surface hinge slots. You can be sure that the slot is full of glue as it will start at the bottom and fill outward completely. The glue gun works equally well with G.E. Silicone Bathtub Seal.

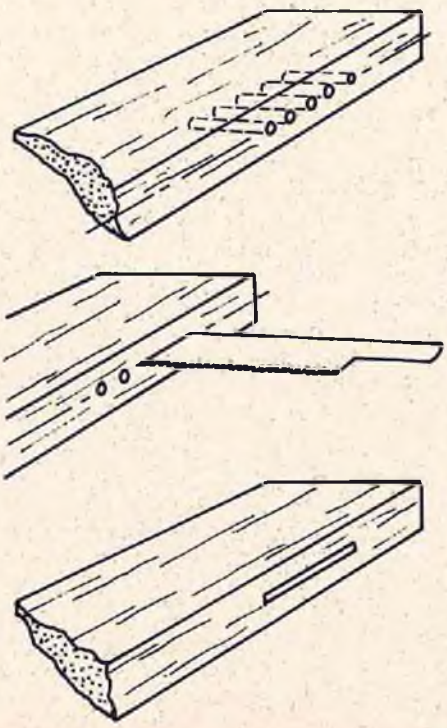
The rubber band, or nylon bolt, mounted wing is a great airplane saver, but if you've ever picked up the bits after a ground loop, only to find long gashes in the fuselage sides and/or bent aileron horns, then this suggestion from Stan Madore of Ontario, Canada, may be for you. The application is for full span aileron of flaperon equipped aircraft. The solution to prevent damage to aileron/flap servos, linkage, horns and fuselage, due to shear action on ground or tree impact, is a "ramp-shaped" triangular balsa barrier on each side of the servo linkage horn assembly to protect the wing and fuselage from one another as shown in the accompanying sketch.



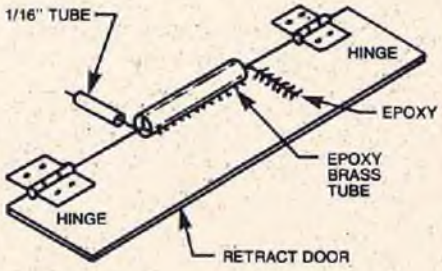
In the instruction manuals supplied with most radio kits, there is usually a note which calls for the mounting of the transistors at a certain height above the circuit board. The few kits that John Roszkowski of Clifton, New Jersey has built, usually winds up with the transistors too high or too low and cocked at a slight angle. Recently, while building the Heathkit Thumb Tach, John solved the problem in the following manner: A 1/8" wide strip was cut from an index card and folded to form a "V". The piece of index card was inserted between the leads of the transistor. The transistor is now gently pushed down on top of the index card and soldered to the board. The folded index card is then pulled out from underneath the transistor. The transistor is now at the correct height from the board (in this case 1/8") and it is level. The accompanying sketch should be self-explanatory.



Mounting hinges of the flat style, such as Du-Bro or Klett, into solid sheet rudder or elevators and ailerons can be a problem as pointed out by Robert Teed of St. Johns, Michigan. Bob has found an easier and quicker way which utilizes a finishing nail or brad the same thickness as a hinge and slightly longer than the length of the hinge. Mark a centerline on the surface, the width of the hinge. Drill a hole at each end of the mark, then drill a series of holes between them. Now, with a fine tooth saber saw blade, cut along the "dotted line," so to speak. You'll be cutting with the grain with interrupted breaks and the pieces will break out easily.



For spring loaded trap doors on a retract gear, Bill Morrison of Owen Sound, Ontario, Canada, uses a 1/8" coil spring that is 1" long. Straighten out one end of the loop in the spring and slip a piece of brass tube over the spring, then straighten out the other end for a length of about 3/4". Now, using 5 minute epoxy, secure the tube to the side of the trap door on the body. Finally, slip a piece of 1/16" tubing over the straightened ends and epoxy to the body and the trap door. See the accompanying sketch.



If you've ever become tired of screwing those 4-40 and 6-32 socket head bolts that hold your engine to its mounts in and out while you're trying to get it to fit perfectly, try this idea from Dan Hazen of Jackson, Wyoming. Take the Allen wrench that comes with the Du-Bro bolt set and straighten it out and put it in your variable speed reversible drill and use it to do the majority of the work. □

The author's wife, Nancy, poses with the unusual two channel V-1 Buzz Bomb.

V-1 BUZZ BOMB

A completely unique model with equally unique construction techniques for two channel digital rigs or the Ace R/C pulse proportional system. By James M. Petro.

● 99.9% of all R/C models of all kinds have been designed with the reflection that they are the ultimate temple for our expensive radio gear. Only Ace R/C advocates slip-in equipment for easy transfer to a whole stable of pulse rudder models. I, for one, enjoy building too much to want my digital gear locked up in only one model, and I can't afford several radios for each of my favorite planes, cars and boats. This semi-scale V-1 Buzz Bomb is my best attempt at achieving an interchangeable arrangement.

A further claim to uniqueness is the choice of construction materials. The nose cone and tail feathers on this bird are the only pieces of that expensive substitute for gold called balsa. Even these could easily be eliminated and a molding and foam-board used instead.

From the photos in this article you can decide if you want to build one. There are no three-view drawings of the completed plane because this model goes together in simple sub-assemblies that magically turn into a flying machine.

A follow-up to the V-1, using the same tube-type structure and Ace foam wing is presently in the works. It is a semi-scale WW II Japanese Baka Bomb. Ace has its series of "War Birds", and I have the "Bomb Birds"! Circular cross section planes aren't too common, but maybe a B-29 or B-36 or - - -

Oops, let's quit dreaming and start building. Round up the stuff on the Bill of Materials and we'll put it all together as sub-assemblies of: (1) Warhead, (2) Engine Tube, (3) Tail Fins, (4) Wings, (5) Fuselage, and finally, (6) Control Systems.

The V-1 is a very distinctive silhouette with high jet engine mounting and the red crepe paper "flame" streaming behind. Both rudder and "rollavator" models have had exceptional hands-off stability. We even took the .049 engine off the digital model in the field and it was a good glider without any other changes in trim or weight.

BILL OF MATERIALS

Two — Estes Nose Cone No. 31 (Cat. No. 681-BNC-70AJ)
Two — Estes Body Tube (Cat. No. 651-BT-70)
Five — Estes Coupler (Cat. No. 671-JT-70A)
One — Estes Body Tube (Cat. No. 701-BT-60D)
One — Estes Coupler (Cat. No. 651-JT-60C)
One Pair — Ace Constant Cord Wing Set
1/8" thick plywood
1/8" thick balsa
1/16" thick balsa
Ace Glider Skid
Gold-N-Rod GRF-36 Rigid Fiberglass
Piano Wire
Spruce
Small screws

WARHEAD

N-1 1 — Estes Nose Cone No. 31 (Cat. No. 681-BNC-70AJ)
N-2* 1 — Coupler (Cat. No. 671-JT-70A)
N-3 1 — Section of body tube 3¼" long* (Cat. No. 651-BT-70)

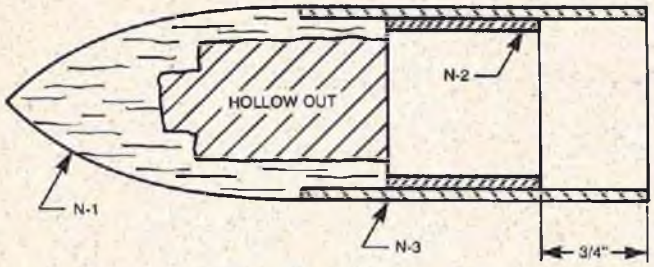
(1) The original model used an MRC digital radio and fit in easily with the material listed. Longer equipment may require a lengthened nose section; for the latter use two couplers* and a 4½" long tube.

(2) Hollow the nose cone N-1 to fit the battery pack and any possible nose weight that may be needed in the pre-flight balance.

(3) Lightly sand the inside of the body tube section N-3, clean out, and glue to the nose cone base. All body tube areas that are to be glued must be sanded to make a better bond with the plastic binder and filler used in making the tube.

(4) Coat the inside of the tube with glue only where coupler N-2 fits and slide the coupler inside all the way to the base of the wood nose cone. The 3/4" socket will fit the main body.

(5) When the glue is dry, this assembly may be finished. The original was covered with red Solarfilm.



ENGINE TUBE

E-1 1 — Body tube (Cat. No. 701-BT-60D)
E-2 1 — Coupler (Cat. No. 651-JT-60C)
E-3 1 — 1/8" thick x 1-9/16" diameter plywood disc.
E-4 1 — Gold-N-Rod GRF-36 rigid fiberglass x 6" long.

(1) Starting 1½" inside and back about 2½", roughen the inside of one end of the E-1 tube. Clean and glue coat this section and insert the E-2 coupler 2" back. Let dry.

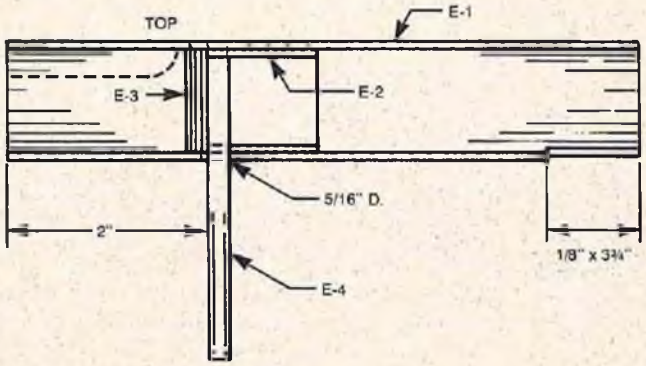
(2) Drill plywood disc E-3 for the engine screw mounting holes. Glue inside the tube and around the disc and slide the disc against the coupler. Let dry. Mark E-1 at the top so the engine mounts upright.

(3) Mark a center line along the top and bottom of the tube using a drawer or jig to draw accurate lines. Drill a 5/16" diameter hole flush with the back of the disc and only on the bottom of the tube, centered on the line.

(4) Centered on the line at the bottom back end, mark and cut a 1/8" wide x 3¾" long slot for the vertical fin.

(5) Roughen, clean and glue the E-4 rod into the tube making sure there is plenty to hold to the tube and the back of the disc.

(6) Pre-finish this assembly now, and check for proper engine fit, cutting any necessary clearance. Fuel proof the engine section.

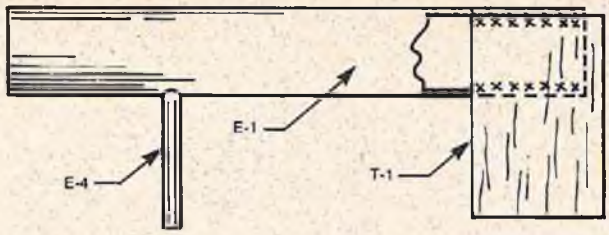


TAIL FINS

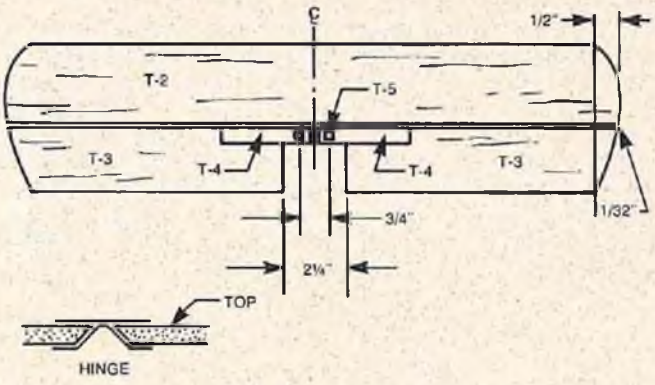
T-1 1 — 1/8" thick x 4" wide x 5⅛" long balsa.
T-2 1 — 1/8" thick x 2" wide x 16" long balsa.
T-3 2 — 1/8" thick x 1½" wide x 6¾" long balsa.
T-4 2 — 1/8" thick x 3/8" wide x 3" long spruce.
T-5 2 — short nylon control horns.

(1) Round the leading and trailing edges on T-1. Sand the inside top of the engine tube E-1 above the slot and glue T-1 at the top and at the slot, making sure that T-1 lines up with the fiberglass rod E-4.

(2) Cut out horizontal fin T-2 and "rollavators" T-3 as shown and sand. Glue the T-3 and T-4 pieces together. When dry, bevel the



hinge edges on T-2 and T-3 at 45°. Install continuous film strip hinges and T-5 control horns. For pulse rudder, join T-2 and T-3 with wires for trim changes only.



WINGS

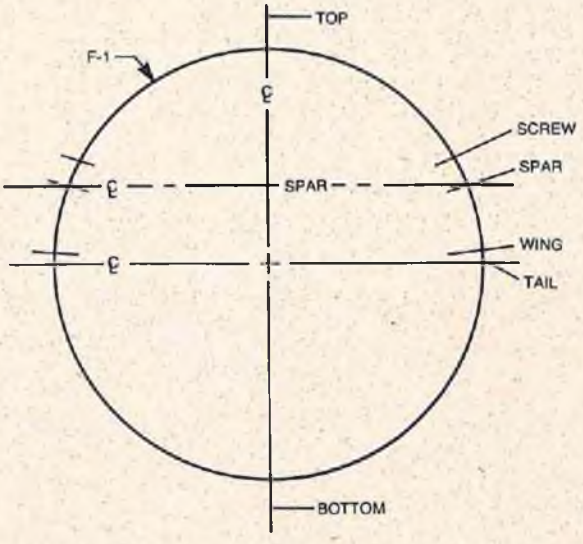
W-1 1 pair — Ace constant chord No. 136192.
W-2 2 — 1/16" x 1½" x 6" balsa.
W-3 2 — light piano wire or leading edge tape.
W-4 Fiberglass strapping tape (optional).

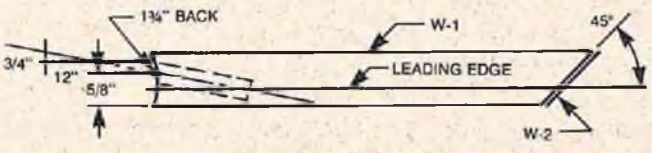
(1) Draw parallel reference lines on the fuselage tube F-1 (see pattern). Using coarse sandpaper wrapped around the tube, carefully sand the root of the wing to match the body contour using the leading and trailing edge flash marks and a reference line as guides. Check to see that the wing fits square to the tube.

(2) Make a 3/8" diameter x 5" deep spar hole in the root 1¾" back from the leading edge.

(3) Bevel the wing tip at 45° and glue piece W-2 on the flat beveled area.

(4) Sand the wing surfaces and clean. Reinforce the leading edge





with tape or light piano wire glued along the flash mark.

(5) Cover the wing with Solarfilm at this time. The optional W-4 tape may, or may not, be put on the top and bottom to stiffen the wing. The original didn't use it and the Solarfilm worked well by itself.

FUSELAGE

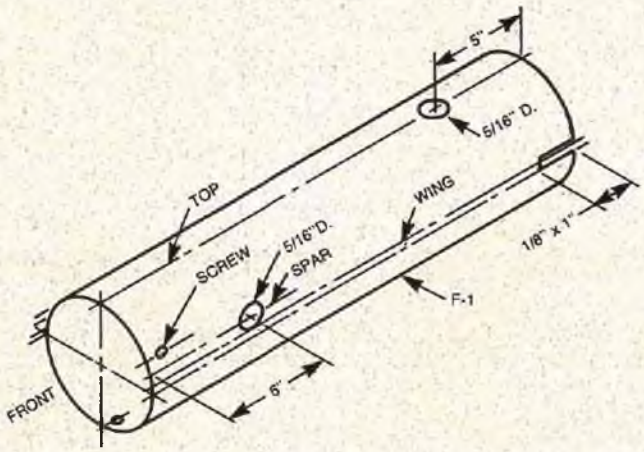
F-1 1 — Body Tube (Cat. No. 651-BT-70)
F-2 5 — Coupler (Cat. No. 671-JT-70A)
F-3 1 — Nose Cone No. 31 (Cat. No. 681-BNC-70AJ)
F-4 1 — Ace Glider Skid
F-5 3 — 1/8" thick x 1/2" x 1/2" plywood.
F-6 1 — Gold-N-Rod GRF-36 Rigid Fiberglass x 12" long.
F-7 1 — No. 4 screw and washer.

(1) Re-check the reference lines drawn on F-1. Sand the front half and the back inch inside the tube.

(2) Glue the five F-2 couplers in as indicated. Let dry.

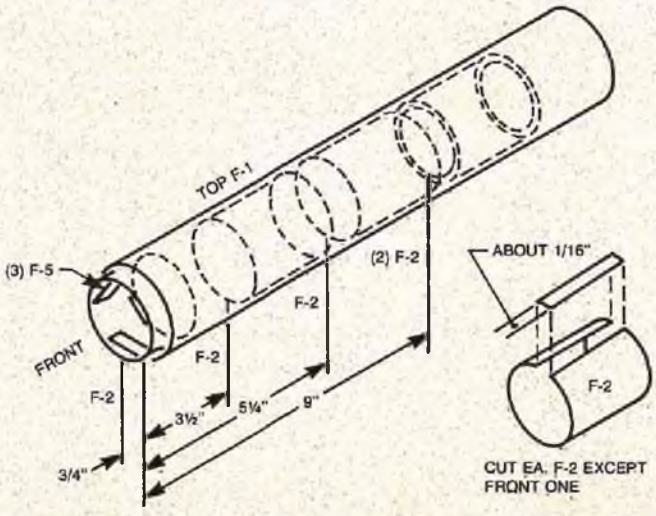
(3) Use the reference line pattern and cut F-3 in half. Hollow the lower base end for control clearance. Slot cut the upper half 1/8" x 4".

(4) Slot the back end sides of F-1 1/8" x 1" to fit fin T-2. Make two 5/16" diameter holes for the wing spar F-6 at 6" back from the front end on the spar reference lines. Make one 5/16" diameter hole as indicated on top for E-4. Glue F-6 in place after roughing up as well as the top half of F-3, matching up T-2 slots and with T-2 assembly glued in F-3. Let dry.



(5) Shape F-5 pieces to match the inside of the front F-2 coupler and glue in flush with the front edge and centered on the reference screw lines and bottom line.

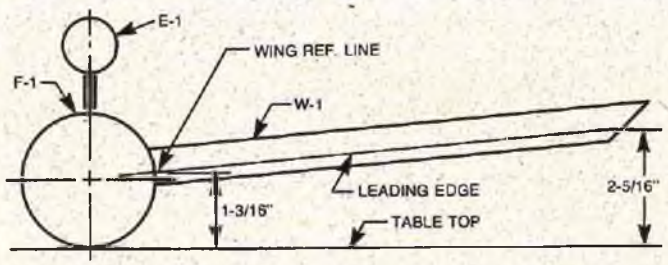
(6) Glue the engine tube and fin assembly in place using E-4 as the guide so it fits against the bottom of F-1. The engine and body tubes F-1 and E-1 must be parallel, and the support E-4 and fin T-1 must be set so the body and tail T-2 are at right angles. Let dry.



(7) Sand F-1 at the wing root. The wing is glued on by either of these two ways:

(a) Pour epoxy in the wing spar hole and coat the root. With the root up, slip the spar with the ends plugged into the hole and line the wing and fuselage up with the reference line and dihedral dimensions. After setting, add the other wing the same way.

(b) Use epoxy on the root, but fill the wing hole with Epoxylite. Slip the wings on and align as in (a).



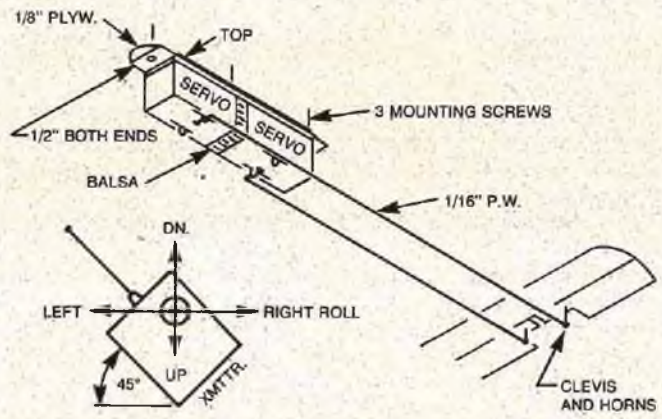
(8) Check the fit of the nose cone and lower tail cone on F-1. Now it looks like an airplane! If T-3 has 45° free movement, you are ready to finish covering the plane with Solarfilm. Use black Aerogloss inside the ends of the engine tube and openings on the tail cone. The pattern shows the size and placement for the insignias cut from white Solarfilm, MonoKote, or tape. Put the skid along the bottom.

(9) Take your pictures now and show it off before adding the screws, switches, and engine. Make them guess how it flies!

CONTROL SYSTEMS

Two-Channel "Rollavators"

(1) An extremely simple two-servo digital system built both for the V-1 and forthcoming Baka Bomb, it also fits well into conventional systems. Both servos are attached with servo tape and strapping tape to a 1/8" plywood strip. The MRC equipment used in the original worked as shown:



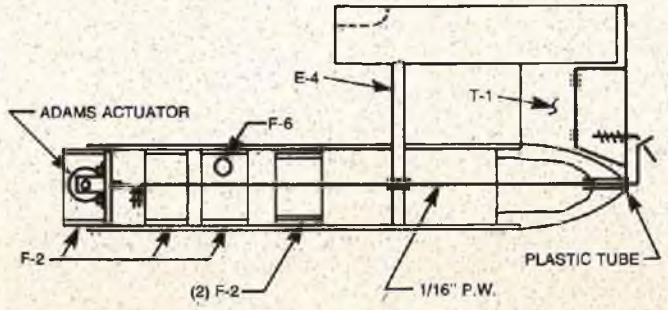
(2) The plywood strip overhangs 1/2" on each end for screwing to the body as close to the wing spar in the forward fuselage as possible.

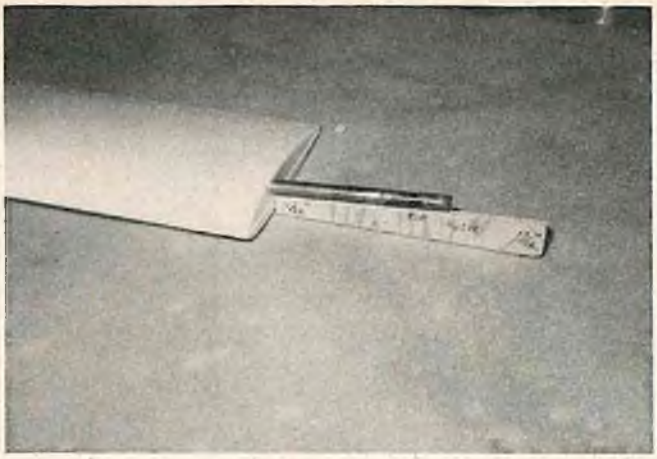
(3) The receiver, batteries and switch are located in the warhead. It is held on with three screws into the three blocks F-5. Slip the lower tail cone in place and secure with a small screw at the point.

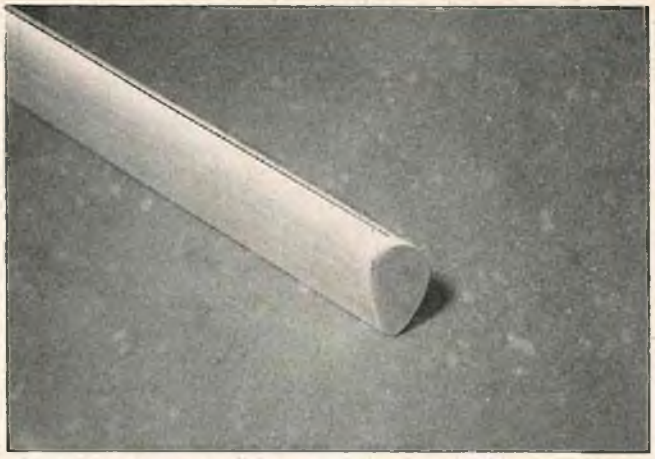
(4) Any of the mechanical mixer devices that have been illustrated in this publication can be used if you can fit them in. Then people won't wonder why you're flying your transmitter at a tilt!

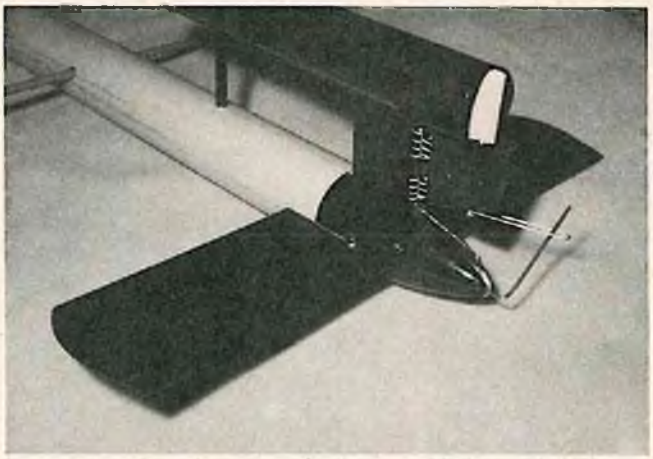
Pulse Rudder

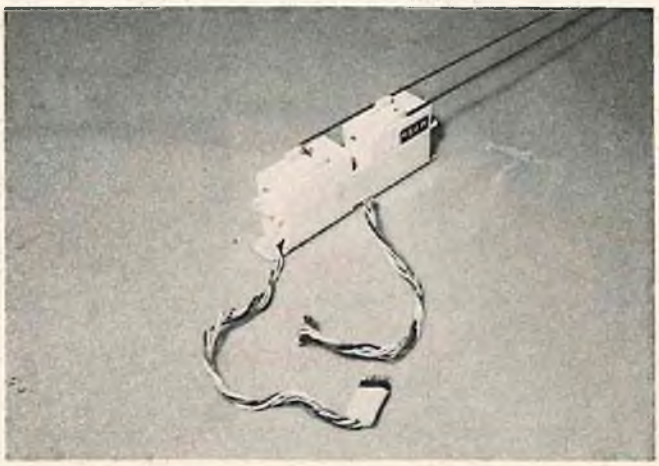
(1) Locate the actuator close to the front end of the fuselage. Cut and hinge the vertical fin with the control hook-up as shown, or as you please.











TOP ROW, LEFT: Photo of the wing root and brass coring tube. Core spar hole with jig as shown.
RIGHT: Close-up view of wing tip and music wire leading edge.
SECOND ROW, LEFT: Bottom view of E-1 engine tube. RIGHT: View of body tube with engine tube and empennage. Ace pulse proportional used in this prototype.
THIRD ROW, LEFT: Completed F-1 body tube (front and left).
RIGHT: Completed F-3 tail cone.
LEFT: Assembled twin servos with pushrods for two channel digital system.

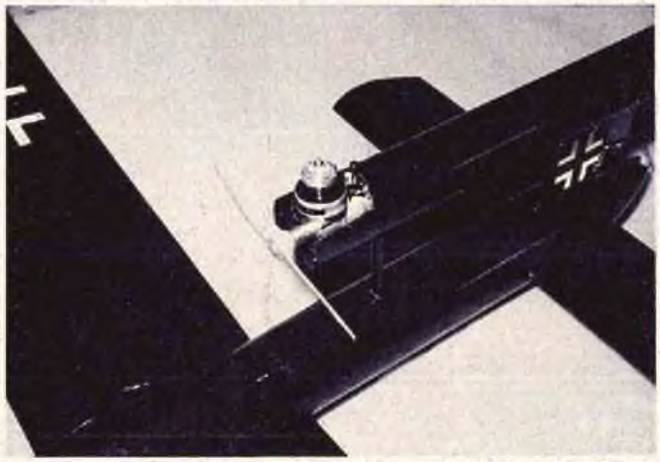
FLIGHT

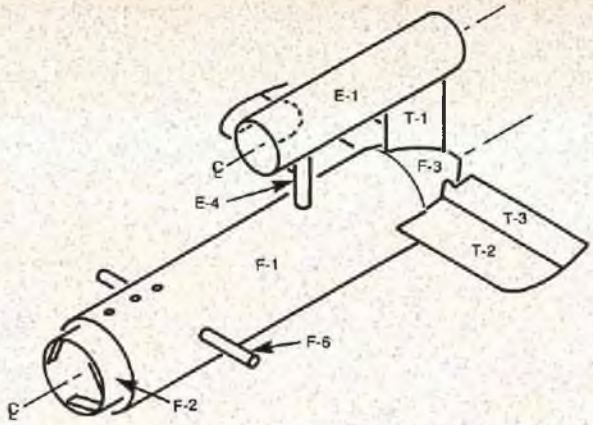
(1) The balance point should be 1⅝'' back from the wing leading edge.

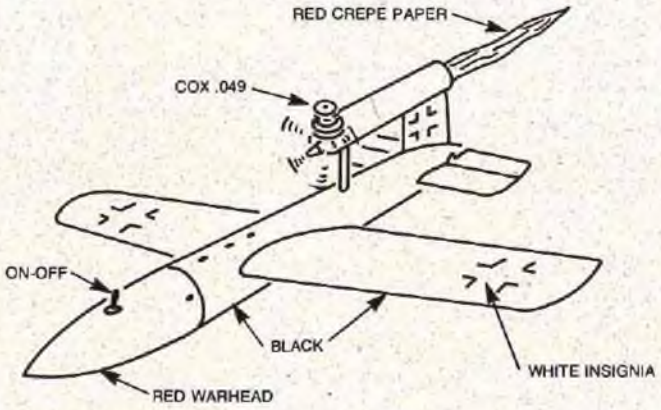
(2) With this new control system, it is advisable to find a hill and become familiar with the tilted transmitter by gliding. Throw hard and level — it will fly fast and flat. Trim and re-balance as needed. You will note more pitch action than roll response in gliding, but with power both will be equal and good. The original glides equally well with or without the engine, and there is almost no trim change either way.

(3) I prefer the Cox QZ .049 because it is quiet and keeps dirt out better, The starter spring doesn't fit in the tube, so cut it off; some is needed as a spacer between the muffler and crankcase. Run it full bore!

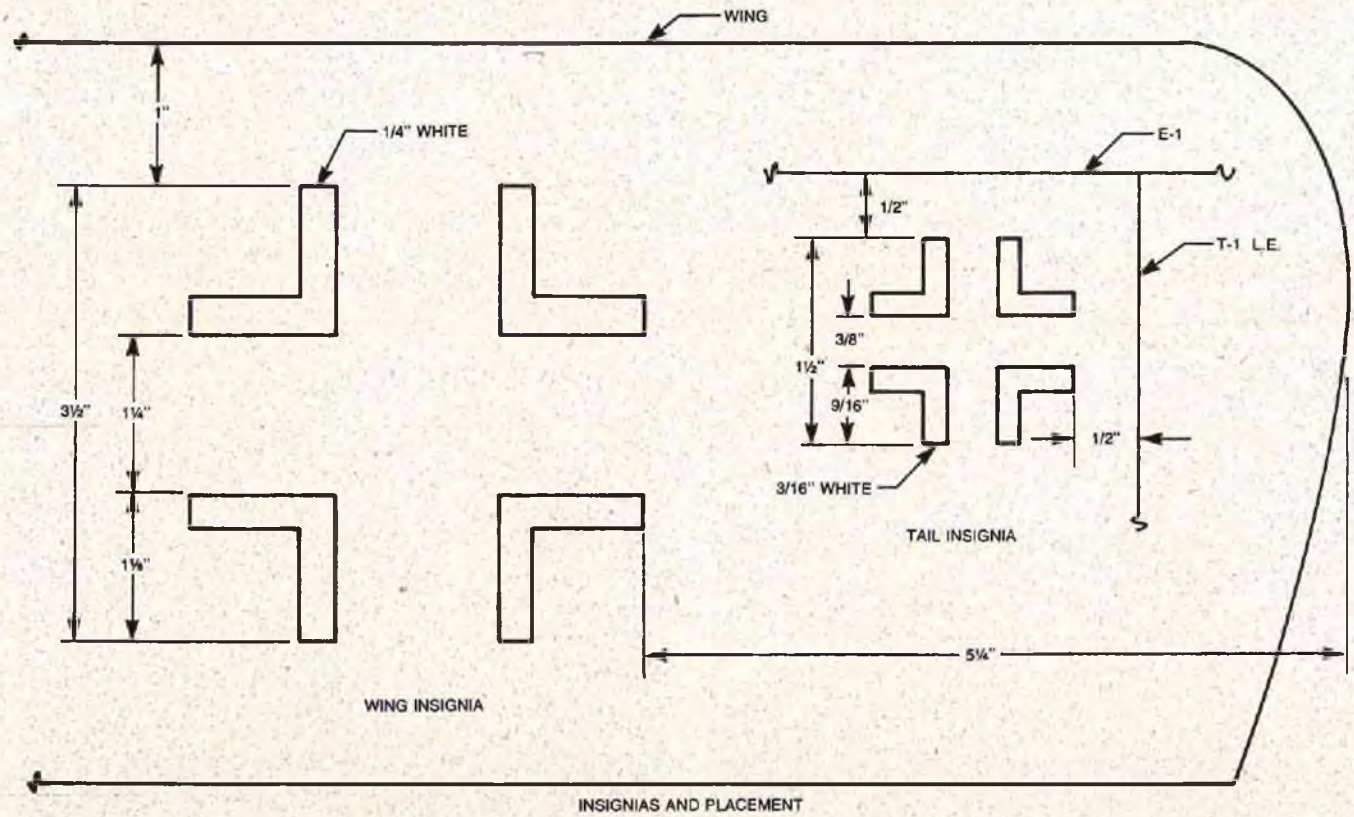
(4) Start the engine; turn on the switches; throw as in the glide test; and away it scoots. The nose will rise slightly as speed increases and starts it climbing. If you don't have enough power, belly it on the grass, now! Remember, this is roll and pitch combination for turns. Keep the nose down for a fast descent when the engine quits to give better roll control. Set the approach and it will come in ''hands-off''. Yes, you get maximum scale points for warhead first landings, because that's how the real one worked, but remember it was good for only one flight! □







The photo at the left shows the Cox QZ .049 engine installed on the nacelle mount. Starter spring has been removed for proper clearance. Shown in the sketch below are the sizes and placement of the German insignia.



PAUL DENSON'S HORSE

If you're an Apprentice Senior Citizen, or simply tired of squatting down all the time, try this all-purpose, folding aircraft stand.

● Recently I switched from flying gliders to power. I was thus faced with the dilemma of taking much more equipment to the field plus a place up off the ground to tinker and start my plane. In the glider days, a small tool box, your glider and transmitter were all you had to take to the field or slope for a day of soaring. Most of my new friends have a large box with fold-up legs, drawers for tools and small parts, a place for a gallon of fuel, compartment for starter and starter battery, a place for your glow plug battery and, sticking up on top, a rack upon which to place your pride and joy.

Since I have become an Apprentice Senior Citizen (ASC) I find that, in addition to a lack of windpower necessary to chase FF, ergo R/C, I also do not have the muscular dexterity and coordination to get that box out of the car trunk and over to the flight line. Besides, Allen's Axiom clearly states, "If you have a large field box you will find equipment enough to fill it." So, I have a small box, large enough for 1 quart of fuel, starter and battery and a few props. My wife gave me her old sewing thread box which contains a few tools and, finally, the 'horse'. Now I grant you I may need to make 3 or 4 trips from the car to the flight line, but I am only following the indoctrination given to us ASC's — "moderate light exercise daily along with caloric and cholesterol reduction in the diet."

I call it 'horse' because one of my flying buddies suggested it would look cute with a rope tail on the south end. Why not 4 legs? Simple, 3 legs will not rock, no matter what the terrain. So, you see, it is not a rocking-horse. I have seen boxes without racks for planes, the guys are down on all-fours or squatting. There are boxes without legs, but with racks for the planes, see their owners, they are crawling around the dirt, too. There are boxes with legs which would be just right if you were about 10 years old.

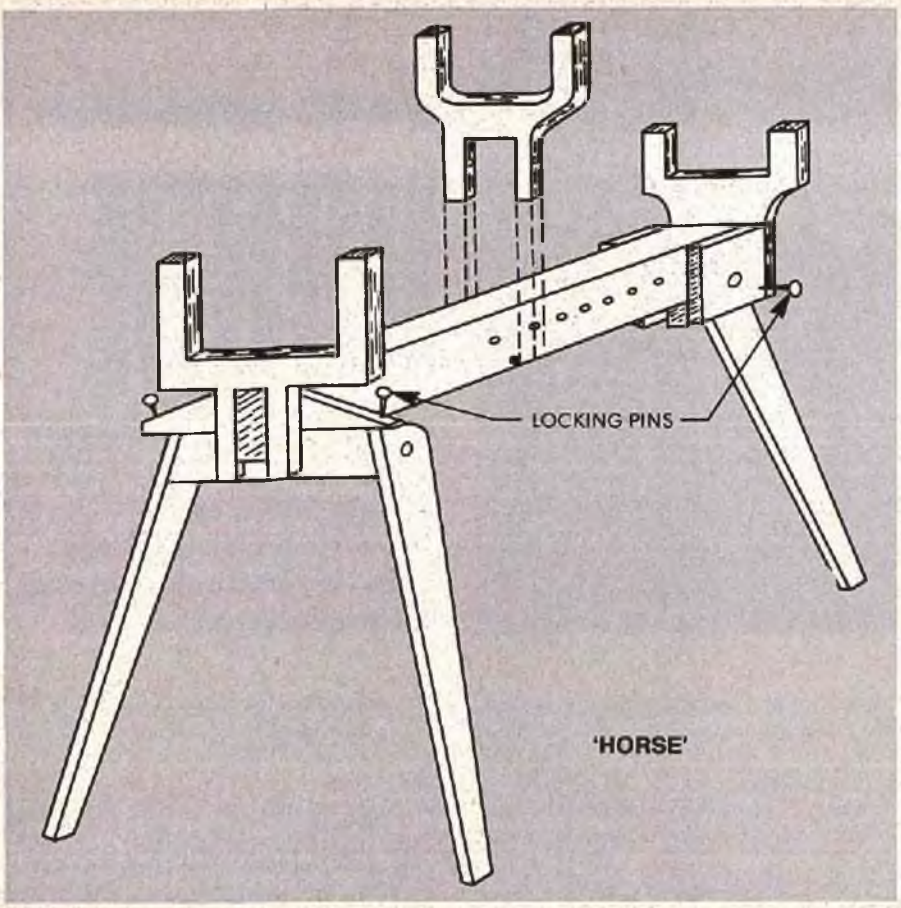
My knees just won't stand all-fours or squatting. Why not have it adult size so you won't have to put the old back out of joint? Why haven't they designed something reasonable? Why? Because it won't fit in the mini compacts we are driving today. Besides that, if you put long legs on the boxes they are using today, they would stick out from under the box when folded and how would that look aesthetically. Messy, huh?

'Horse' is tall enough for the tallest people and long enough for the longest plane. Is there a plane longer than the Antic? Mine fits. If you are flying Quarter Midgets, move the rear rack in. I would suggest you make the rear rack like a sling-shot fork with the handle notched to fit over the main body. Drill holes in the body and handle to match and it could be slid in and out to fit any particular plane then pinned in place. So, anyhow, if you are an Apprentice Senior Citizen like me, you don't need to be flying those planes that take split-second reactions which we don't have anymore. We have more like split-minute reactions!

Build one and see how much better your back feels, free from the heavy flite-box and bending over. See how much better the knees feel, free from all-fours and kneeling. And I can assure you that your chest, the area, when squatting, between your knees and your belt will appreciate your new upright posture.

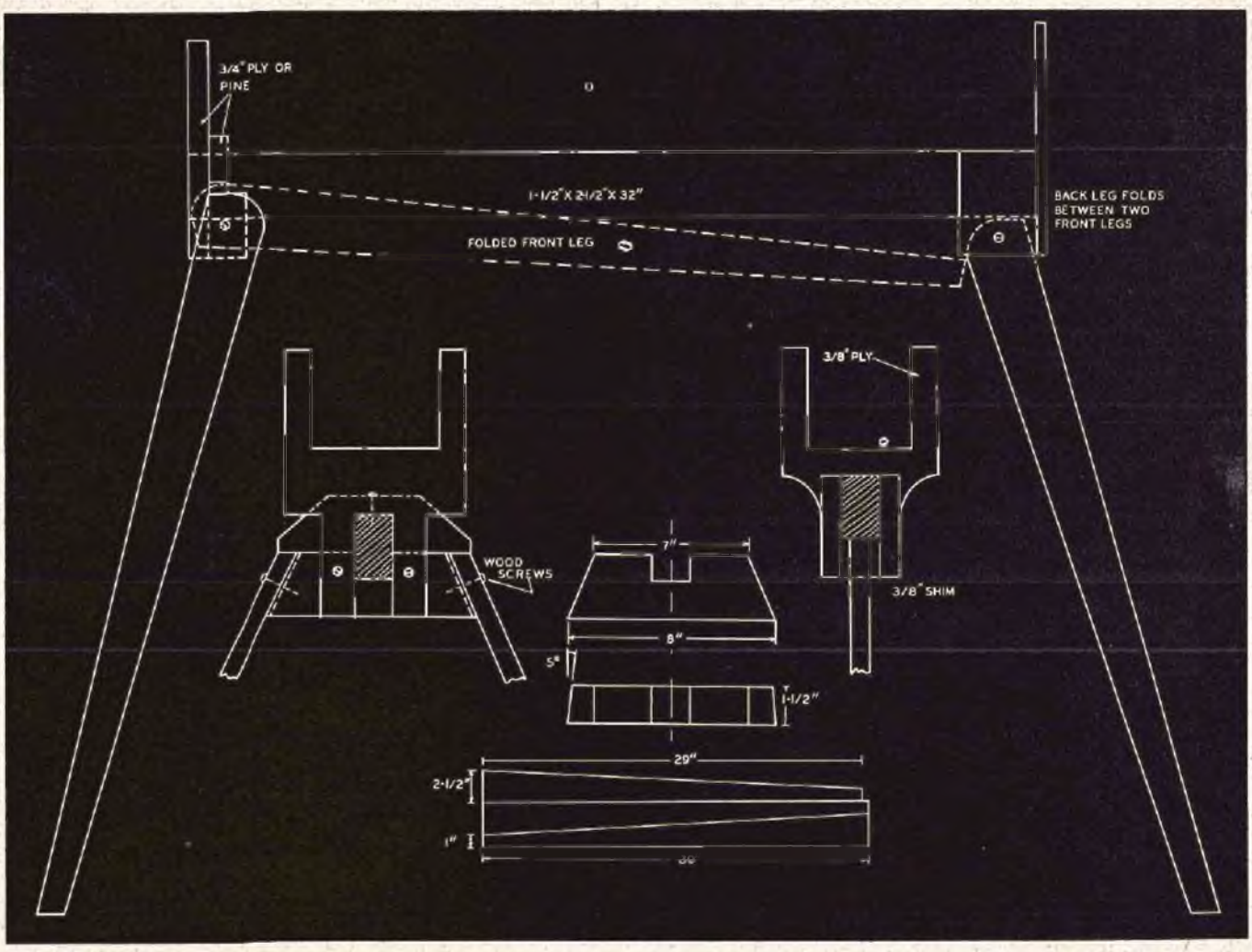
The horse in the corral . . . er, pit area. Note starting battery taped to side.

Paul's Equine ready for the trip back to the barn.



Dimensions given are for a 'horse' that is about the right height and, when the legs are folded, they do not stick out beyond the ends. The only critical part is the bar on which the front legs attach. If the ends are not cut exactly the legs will not fold properly. The first cut will determine the spread of the legs and, if you do not bevel this cut 5° the legs will not fold in at the back. I made the first cut with a hand saw, sanded it smooth with a disc sander, then tilted the table 5° and sanded the bevel. If you do not have a disc sander, it is not too difficult to make both bevels with one cut, mark it out carefully all around with a pencil and cut just outside the lines. The glow plug battery is taped to a small shelf on the body just behind the front end. It would be ideal to make clips from metal then the battery could be removed for transportation. When finished, sand all parts, apply a coat of primer and paint in your favorite colors, or frequency colors, so you are easy to find in case there are more than one of your frequencies on the field. I used spray cans of acrylic paint which did an adequate job of painting and fuel proofing.

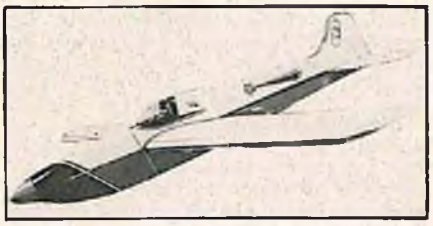
If you are afraid your .60 might pull the horse over forward, tie a brick to its tail. This hasn't been necessary in the past, but you never know. I understand that keeps horses in place. Treat your horse well, don't use a crop or spurs, he doesn't need much feed and above all — be gentle. □



will do quite well. From all indications, the IM flag is the best selling one and for two principal reasons. First, by using a very small antenna clip, the thin final antenna segment can be fully collapsed, preventing damage. Secondly, by using a small chain to attach their flag clip, the whole device is more flexible. However, since the links of the chain are of soft wire, sometimes the chain twists open and the flag clip drops off. Carl Goldberg's Models antenna clip is similar to the IM in size, and clips on just as easily. However, instead of using links, they are using a ball chain which can turn endlessly without opening up. Also, a higher quality ribbon is used. Price is 98¢ at your local dealer.

BWT BALLDRIVERS

BWT Systems, 4523 Keeler Dr., Columbus, Ohio 43227, is proud to introduce their new line of time saving Balldrivers. The Balldrivers are designed to work at any angle for those hard-to-get places. BWT has a size for every use to include 17 choices from .028 to .500" and also metric sizes from .71mm to 10mm. All sizes also are available in the L-wrench style. The BWT Balldrivers are made of high quality alloy steel and are carefully heat treated to withstand the maximum torque possible.



EYELASH

Span Aero Products, Wildwood Lane, Norwalk, Conn. 06851, introduces the Eyelash — a high performance .049-.051 kit. Styled after the popular mid-wing design Eyeball designed by Art Schroeder, the plane is capable of many maneuvers not thought possible with a small airplane. The span is 42" and the all-up weight, with two servos, is 20 ounces. Kit comes complete with foam wing cut to size, motor mount and spinner. The price is $23.95.

NRCHA

from page 73/72

. . . . . relation to the exhaust outlet tubes while making the exhaust, itself, make as many right angle bends as possible. These 90 degree "bends" in the exhaust flow are what create the quieting effect. The combination of the expansion chamber sizes in relationship to the output sizes are what determine the amount of power loss. These mufflers have proved to be extremely effective and are the highest quality available. While a complete line of mufflers are available from Mac's Mufflers for standard aircraft usage, we are not certain as to the availability of these special helicopter mufflers, but suggest that you contact Wally McAllister at Mac's Products for further information.

The Whirlybird Flite Simulator is being produced by Guy V. Palmer of 740 Fairwood Drive, Inkster, Michigan 48141 and is a tremendous advancement over the original helicopter training pole presented in R/C Modeler Magazine.

As Guy points out, since the advent of the helicopter, he has been captured by their beauty and their capabilities for many different modes of flight. But, along with their overwhelming charm, is the inherent problem of controlling one to a point of enjoyment. Guy's knowledge of these problems was not only obtained through the many volumes of the "Do's and Don'ts" but manifested in his full-size helicopter flying experiences. As he points out, not to diminish the many documented articles on flying choppers, for it was through these that a great deal of knowledge was gained, but he still maintains that the "blade busting" tactic is the most fruitful. And "blade busting," he did! From tether rope to floats, Guy labored at conquering his bladed beast. But all through his learning period, he envisioned a controlled method by which anyone could learn. Having been a design engineer all of his working years, Guy was aware of many different approaches. The one he chose, and most logically, simulated all of the helicopters different modes of flight, without allowing the helicopter to get away. Through trial and error, he has developed a very fine simulator which really works and virtually eliminates the old learning curve.

The Whirlybird Flite Simulator comes in a complete package with the exception of a bag of cement (for those who wish a permanent installation). The ground support tube is "spiked" so that even a quick installation using tightly packed dirt will work fine. The ground stanchion tube has a welded flange on the bottom portion (as well as the ground support tube) for a quick lock-unlock with the use of a 3/8" carriage bolt and wing nut provided. The hover simulator tube is an all aluminum, keyed to the ground stanchion tube, allowing a maximum of 2' hovering height. Mounted to the top of the hover simulator tube is a swashplate bearing which Guy developed. It allows 20 degrees cyclic control in any direction and also allows 360 degree yaw control. This is an addition to the fact that the helicopter can hover up to 2' on the flight simulator. On top of the bearing is mounted the heli-platform and clamp bars. This arrangement was tested and incorporated into Guy's simulator after seeing it in the February 1975 issue of RCM. For simplitity and durability, this method proved much better than our original attempts. Guy's only change was in making the clamp bars out of hardwood rather than aluminum and adding another clamp screw to each clamp bar. The complete heli-platform assembly comes assembled and is completely painted and fuel-proof. The only assembling necessary is in attaching the heli-platform to the swashplate bearing. All screws are provided and all holes are drilled. The ground stanchion tube comes primed and painted and available in six different colors. Also included is a weather cap for the ground tube so that the entire upper unit can be taken in during inclement weather or when not in use. After a practicing session, for example, the 3/8" carriage bolt is removed, and the complete upper assembly pulls out for safe storage. The weather cap is installed to protect the ground support tube from dirt and rust and has been thoroughly tested even in a foot of snow.

After many hours of problem-free practicing, Guy is quite confident in their product as is RCM. It has immensely improved Guy's own flying abilities and has proved to be a fine unit for more intensive flying skills. Being able to clamp down the helicopter in windy conditions, one can realize in a hurry the necessary corrections and control that are required. The unit is very safe and easy to use.

Guy is not advertising this unit as if it turns the beginner into a skilled pilot in one day. On the contrary, this unit will demand all of the concentration and skill of the beginning helicopter pilot. What this unit will do is eliminate the fear of crashing and give the user confidence in his helicopter. Hovering above the ground stanchion tube is difficult at first, but it should be. The simulator in no way provides a false confidence, but it will save much time and money in repairs. Quite possibly, the Whirlybird Flite Simulator and other training devices will open doors presently locked by fear and hesitant prospective buyers who would greatly add to the ranks of helicopter pilots.

Currently the Whirlybird Flite Simulator is in stock and is priced at $49.95 plus $3.00 for postage and handling. Any spare or replacement parts are available. The unit is guaranteed for one full year from date of purchase, regardless of what type of damage is incurred for normal operating use. We have tested this unit at RCM and are completely and thoroughly impressed by its practical application and do not hesitate to recommend it to your consideration.

Rotor Eaze, Box 1066, Ogden, Utah 84401 are producing replacement helicopter blades machined of selected hardwoods. The grain and weight of each set is closely matched to minimize balancing required before use. Each set is checked for flaws and airfoil consistency before packing. Since these blades are made to a stock size to fit most rotor heads, you will need to cut them to length and mount them to match your original blades. The blades should then be balanced on the same method as your original blades and finished by your preferred method — fiberglass, iron-on covering, or paint. A pair of blades from Rotor Eaze are priced at $7.65 a pair or $7.40 for two or more pairs.

Several new items have been released by Kavan for their Bell Jet Ranger. One of these is the Wash-Out Control #3329, which sees that the aerodynamics damping blades will stay horizontal regardless of the pitch position. This item provides better hovering and smaller air resistance on forward flight which means that you can fly the Jet Ranger with more speed and maneuverability. The previous guide is no longer necessary since the Wash-Out Control guides the swashplate. The pushrods to the damping blades can be hung up on the inner or the outer ball. With the Wash-Out Control it is necessary that a fourth ball is fixed to the center ring of the swashplate if not already attached. Your old swashplate will be exchanged against a new one for a slight additional cost.

In addition, Kavan has produced their Expert Rotor Blade, item #3040a, which has the same structure as the standard Jet Ranger blade, but are 10mm wider for a total width of 65mm. In addition, they are 2mm thicker and 4cm shorter. The blade axle remains the same — 17mm from the front edge. The Expert blades provide greater lift and, therby, relieve the engine which, in turn, improves the entire power range of the Jet Ranger. The blades have many other advantages which would be too great to go into in this short a column. They are highly recommended for all Jet Ranger owners. For further information on these as well as other new product releases, contact Kavan Model Aircraft, Inc., 1424 E. Borchard Avenue, Santa Ana, California 92705.

□ □

In closing this month, I am going to present a letter received from J.W. Pearce of Greystones, Australia:

Gentlemen:

I was interested in reading your February 1975 edition. The radio control bug has just recently caught me and any information on the subject is given prime reading time to gain background and a bit of know-how.

The article entitled "Hover" was particularly interesting as I had no idea that model technology had advanced that far.

In that article, however, I must admit that I was

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

NATIONAL RC HELICOPTER ASSOCIATION
R / C MODELER MAGAZINE
P.O. Box 487
Sierra Madre, California 91024

Date _____

NAME _____ **AMA #** _____

ADDRESS _____

CITY _____

STATE _____ **ZIP** _____

PLEASE FILL OUT THE ABOVE AND ENCLOSE $4.00 FOR 1976 ANNUAL DUES —

FOREIGN DUES $5.00

☐ **Renew My Membership** ☐ **New Member**

a little disturbed to read that the South Africans were using an emblem which, along with having their rating bars of bronze, silver and gold, bears a rotor blade with a kangaroo! Surely for South Africa a springbock would be more appropriate.

Maybe it is true that there is no one in Australia flying model choppers as yet, but give us time and I'm sure that this form of modeling will become apparent in this country. At that point of time the kangaroo will be most appropriate for Australian flyers.

In other words, "ow-' bout leavin' the kanga-bloody-roo in its own bloddy native land, mate!!"

In the meantime, keep the good oil flowing.

Yours sincerely,
J.W. Pearce
Greystones, Australia

Now, I'm sure, we'll hear from our helicopter friends in South Africa! Somehow, I hope we can avoid a helicopter war over the kangaroo. ☐

HIGH PERFORMANCE BOATING

from page 70

. . . . . bring in the boat and then could not start the engine easily even with an electric starter. The ring had gone over-the-hill in one heat! We quickly switched engines and went on to win .40 class. If that had not happened to me previously, I would not have realized the ring was the problem and would never have thought to switch engines because of hard starting.)

Finally, there is a definite shutting-down procedure after a day's racing which must be followed to assure long engine life. Start the engine on a stand and pull off the fuel line at about 1/4-1/2 throttle. This gets most of the fuel out of the engine. (There is still fuel in the bearings.) Now repeat Step 4, except with the fuel line disconnected. Squirt WD-40, or a similar water displacing spray, into the carb until it squirts out the plug hole. Squirt down the plug hole into the bypass ports. Literally flood the crankcase base with oil. We are doing two things: removing any moisture and fuel in the engine and flushing the bearings of fuel. Spin over and blow out as much WD-40 as possible. Now flood the engine with 3-in-1 Oil, or Marvel Oil through the carb and plug hole. Turn over slowly a few times, then replace the plug. Drain the fuel from the tank and squirt some WD-40 into the fuel tank.

This few minutes ritual done **at the pond** will assure a good-running engine from week to week and season to season. If not done, not only can gum and solids form in ball races, ruining the bearings; but the high nitro percentages (25%-50%) we use cause those grey, fungus-looking stains and etchings on aluminum internal engine parts and can actually weaken the rods and pistons. Moisture left in an engine obviously causes rust on unprotected ferrous parts (bearings, wrist pin, crankshaft, ring, screws, etc.). A rusty sleeve can be a bear to remove!

Keep your boat clean (wash inside and out with Fantastic) and lubricated, pay attention to details, and Happy Boating! ☐

SUNDAY FLIER

from page 68

. . . . . place 21st. The only consolation is that about the only way to go for me is up — or out. And I'm not gonna' go out at least until I have completed a full round of racing somewhere, sometime.

In connection with the 1/2A Trophy Races, we had a get together the night before the races, with a little attitude adjustment fuel, some good food, and a discussion of some of the proposals for standardization of 1/2A racing. Although they couldn't attend in person, the members of the P.R.O.P. Club in Seattle sent a letter outlining their thoughts, and Owen Kampen did likewise.

During the discussions, it soon became apparent that even though the interest in 1/2A racing is increasing, it isn't sufficiently great to

warrant the establishment of two classes. That became even more apparent the next day, since we had tentatively established a trophy for a separate class — the RCM Quickie 200 — but it was subject to there being at least five entries. There was only one. Yet, I am told that the Quickie 200 event is really big in the L.A. area.

So, under the circumstances, the question of an unlimited class, although raised at the meeting, didn't get discussed in any detail. Rather, the discussion centered around rules which would give designers some freedom of expression without constraining them to a "one design" concept.

One thing was for sure. Everyone agreed that the triangular course should replace the two pylon course originally established in RCM in May 1971. I, for one, was a very strong proponent, bearing in mind the experience I had in one race on the two pylon course where I was the number four pilot, and this put me right in line with the planes returning from the far pylon if they were flying a tight course; I was — and flew my plane around the pylon, made the tight turn and flew right back at myself, ducked and turned just in time to see the plane hit the ground behind me. A wider course to two pylons at the base would have prevented that — along with a better bit of piloting on my part. But you have to race these little devils to find out how excited you can get.

There was quite a bit of discussion on R.O.G. versus hand launched starts. It's true that some race sites don't have adequate runways for take-off, in which case the hand launched start is almost a must. Either that or the flying start, similar to the one which we use in the RCM Slope Racing Trophy event. The flying start has merit, and does introduce another skill factor — the ability to come roaring up to the starting line and be just a very short distance behind it at the end of the countdown — even though you're doing around eighty miles an hour.

For those of you who may be unfamiliar with the flying start, here's how it works; all aircraft are launched and airborne for a specified time prior to the actual start (fifteen seconds minimum has been established in the RCM Slope races) and must "orbit" until the actual start. The last ten seconds are counted down, similar in nature to a missile or spacecraft launch — "10, 9, 8, 7, 6, 5, 4, 3, 2, 1, START!" During that time the aircraft can be wherever the pilot wants — so long as at the command "START" the aircraft is behind the starting line. If not, then the plane has to be flown back behind the line and make a legal start. This leads to all sorts of ideas as to how it should be done. But the net result is that the guy who times his start best does get an advantage.

The R.O.G. start presents other problems — not the least of which is the controllability of the plane on the ground. The racers that have rudder and elevator control, with "taildragger" gear, have the advantage here, due to the better directional control. Racers with aileron and elevator control have it a lot tougher, although the use of tricycle gear does help. And, since the current rules restrict the number of controls to two — excluding coupled aileron and rudder, this situation will continue to exist.

So, should the limitation of two controls continue to prevail? Why?

Then the question of wing area and planform comes up. Currently, untapered wings (rectangle or parrallelogram) with 200 square inches of area are required. Also, the minimum thickness of the airfoil is limited to 7/8". But there are loopholes; if you have an elliptical "wingtip", like the old Boeing P26's, the untapered wing constitutes about half the span. And, until the rule was enforced more stringently, some fellows were spacing their ribs far enough apart so the sag between them resulted in considerably less than the prescribed 7/8" even though the rib thickness met the requirement.

Landing gear? Tricycle and taildragger are well known and accepted. But Ron Clem's Tigercat has a two wheeled gear which meets the requirement, but has a centerline location that just as well could be a single wheel. Precendent? Not really; some time ago, in full scale racing, there was a design that had a twin boom pusher

configuration, with a single wheel on the centerline.

Well, you get the picture. All is not wine and roses in this rapidly emerging class of racing. At the RCM/Pioneers event, we came to the conclusion that, for the time being, the best thing to do was to let each region continue to develop those facets of the sport which are most appealing to the local racers. Then as interest gets more and more participants, there should be a gradual evolution into some areas of general agreement, which could be used to form a guide to event directors when planning for a race. To that end, all of the flyers present agreed to a suggestion that Ron Clem and Scott Christensen try to come up with some guidelines. When they do, the results will be published in RCM and you will all get your chance to take pot shots at the hot shots.

As for me, I'm gonna' take the easy way out and assume that certain requirements will have to be met — 200 square inches of untapered wing (wingtips will be additional), 7/8" minimum airfoil thickness, standard landing gear (either trike or taildragger), 1" diameter wheels, 8½ square inches of fuselage cross section.

With that in mind, I've come up with a brand new design. Here's a three view of it. Note the span — 26"! Chord of eight inches, with 25" of wing excluding tips, gives 200 square inches. Wing section is a modified Eppler 374 — should give good pylon characteristics with that wide drag bucket — but maybe that three to one aspect ratio will be too hot to handle!

26" span? That's not even a visible means of support. Hot to handle? Fast? Responsive to a delicate touch? H-m-m-m. Reminds me of a movie I heard about — "The Happy Hooker". That's it. This little job just got a name.

"The 1/2A Hooker".

What's that, you purist? Doesn't "look like a full scale racing prototype?" Look again. Lindbergh raced his Spirit of St. Louis across the United States, and then to Paris. So, this design is a "stand off" scale Spirit of St. Louis.

Be sure to stand way off. ☐

ON THE LINE

from page 62/61

. . . . . *doubt true of any glider club, but we have made a point of designating six or eight "instructors."*

I suppose, having had to focus my thoughts by writing them down, that the single clearest understanding I have of our success, is that it started by coincidence, with two or three good fliers and a like number of creative thinkers, and that a cross-polination took place, and then a few more people got turned on, and so forth. It helps, too, that our one hundred member club is loosely run – the chief rule being that we don't have any rules unless absolutely necessary. With so many strong people, there's a danger of splitting into factions, but we've managed to avoid that through a philosophy that allows each guy to do his own thing.

Hope this answers your request, and that I haven't used a howitzer to swat a fly.

☆

Scale Views

Don Belote of the Toledo Weak Signals, writes that there will be separate awards for the Best Scale R/C sailplane's, displayed at the 1976 Toledo Conference. The models will be static judged by the Toledo Club (no proof of scale required), and no flying will be permitted. If you have completed, or are working on, a scale ship, why not plan on entering this contest? Last year there were only 5 entrants and Don hopes that 1976 will see better response from the scale fliers.

☆

The Eagle Screams

The small number of scale entrants at the 1975 Soar Nats and LSF Tourney was disappointing to me. Also the Stand-Off Scale event included in the SC² contests has drawn very limited entries. Are the low numbers of contest entrants a valid indication that interest in scale models is low, or that the contest rules and/or procedures are at fault? We don't know what the answer is, but offer the following thoughts on the subject of scale sailplanes.

The state of the art of R/C soaring has progressed rapidly and a good flying scale model is readily achievable. There are several excellent semi-scale kits available from Soarcraft and Astro Flite, all of which have done well in major contests. RCM has published several scale sailplane plans, as have many of the other model magazines. Airtronics showed a scale Javelin J-4 at the 1974 Toledo Show and a scale Duster at the 1975 Conference. Interest in both airplanes was very limited, which is why neither has appeared in kit form. Given the easy availability of kits, plans, scale data, etc., we don't think that the lack of information is the major reason for limited participation.

This leads us, then, to the rules as the most probable culprit. The 1975 rules were drawn as a compromise between the museum scale with very limited flight performance and semi-scale with contest level flight performance schools of thought. The intent was to balance the event so that flight and fidelity points were weighted equally. All the scale entrants in the LSF Tourney liked these rules and felt that they should be continued. Bob Thacker, who won at the Soar Nats and was first in Static at the tourney, feels that the 3½ minutes flight time is just right and strongly recommends that the rules not be changed. The guys who are flying the event obviously don't think the rules are the problem, but how about the rest of you?

In the 1974 and 1975 contest season, the SC² clubs have included a Stand-Off Scale event in all contests. The rules are based on the AMA Sport Scale rules for power planes and require no documentation beyond a photo of the subject modeled. The airplanes are not measured and judging takes less than 10 minutes per entrant. This event was set up to encourage newcomers and to attract entrants in scale. An out of the box kit with no cockpit detail is 100% competitive in

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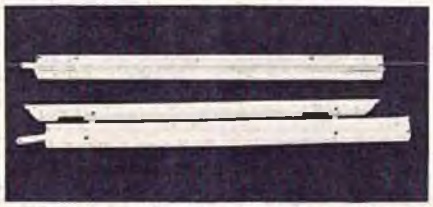
this event, yet interest remains low. There are at least ten times as many scale models sport flown in the L.A. area on any Sunday as have shown up at the contests. Why?

Perhaps we are beating a dead horse and there is just a very limited interest in scale R/C sailplanes. This is hard to understand as scale and sport scale power are very active and draw high contest entries. We don't know what the answer is. If you have any ideas, please write and share them with us.



New Soaring Products

Hobby Lobby, Route 3, Franklin Pike Circle, Brentwood, Tennessee, is marketing a set of spoilers for RC sailplanes. Manufactured by KDH in West Germany from molded plastic, this accessory is well made. The spoilers are of the fence type and require a push-pull link to activate. They measure approximately 11 inches long by 5/8" deep by 7/16" wide in the closed position. When fully extended the 11" long by 1/2" wide fence is raised approximately 1/4" above the upper wing surface. Total weight of two units is 2.2 ounces (62 grams), without actuating linkage. Available from Hobby Lobby at $12.95 a pair.

Soaring Suggestions

Since reading that there has been over 10,000 Hobie Hawks sold, Jerry Neer of Ashland, Ohio, thought his idea might help other Hobie Hawk owners.

The Hawk flies more gently for new pilots if balanced 1⅞" from the leading edge of the wing. To do a neat job and to get the weight as far forward as possible and to use less lead, he did the following:

(1) Used masking tape to secure the amount of lead needed for proper balance. Tape to the nose of the plane as far forward as possible.

(2) Removed the lead and waxed the nose of the plane.

(3) Mixed plaster of paris in a plastic container about 1½" deep (margarine tubs work fine).

(4) Placed the nose of the plane into the plaster of paris, and supported it until the plaster set up.

(5) Removed the plane from the plaster and used a butane torch to melt the lead into the impression in the plaster. Allow to cool. After it cooled, the lead was placed inside of the nose. It has the shape of the nose of the plane and can be cemented with silicone seal farther forward and more neatly than using square pieces.

☆

Michigan State Sailplane Championship

This is a detailed report of the Michigan State Sailplane Championship Contest hosted by the M.R.C.S., held on September 7, 1975, as reported by Gordon Pearson. The weather was clear, with winds gusting to 30 mph, steady at 15 to 20 mph from the southwest. Thermal activity was marginal to poor and to prove this point there were only 18 max. flights for the entire day.

There were 104 entrants with no pre-registration which delayed the 9:00 launch time until 9:30. The split in classes was 43 in Standard, and 47 in Unlimited and 10 Jr.-Sr., with 4 not flying for one reason or another. The event flown was 24 minute Q for 3 flights with no flight over 10 minutes. Landing was a 50' sq. or thereabouts, 50 points if you landed inside — zip if not. If there would have been a tie, the flight closest to 10 minutes without going over would

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be the winner. Toledo flew this event on Saturday with 64 entrants, and there was no tie score for either day. This says something for the 24 minute and spot landing contest. The winners are as follows.

UNLIMITED		
1st B. Robinson	Grand Esprit	Mich.
2nd P. Flinn	Original	Mich.
3rd K. Bates	Legion Air	Mich.
4th W. Tiahrt	Astro Jeff	Mich.
5th J. Vanderplow	Snoopy	Mich.
STANDARD		
1st J. Mrlik	Astro Jeff Jr.	Mich.
2nd W. Tiahrt	Windfree	Mich.
3rd R. Hayes	Aquila	Ind.
4th D. Leach	Aquila	Ohio
5th L. Vincek	Windrifter	Ohio
JR/SR		
1st T. Satullo	Legion Air	Mich.
2nd C. Corven	Aquila	Mich.
3rd M. Horwood	Olympic	Mich.

Points Of Interest:

Grand Esprit	12
Aquila	13
Olympic	20
Legion Air	3
Astro Jeff	3
Hobie Hawk	4
Originals	20

Three winches were used with leg power for returning the lines. This worked out fairly well with not too many delays. There was very little sandbagging so far as I could tell. I announced in the pilots briefing that I did not want any reports of this kind of poor sportsmanship displayed and, to the best of my knowledge, there was none. Besides 80% or so of the entrants didn't know what sandbagging was anyway!

The day was broken up by a **planned** landing of a full-size Ka6. This is no big deal on the West Coast, but I can assure you it was a great thrill to everyone. Mr. Jack Lepard made a perfect landing and even made the spot (our landing square). I allowed him landing points even though the nose of the Ka6 was not within the square. The only protest of the day was registered by Dave Corven, who said it wasn't fair to give Jack the points when the nose of his ship wasn't inside the square and he missed his landing points under the same conditions.

To top off this beautiful landing the tow plane came in behind the Ka6 and landed! They hooked up and flew out. The plan was to trailer the Ka6 out but the flight out, put whipped cream and a cherry on top of what was a beautiful piece of cake! Now comes the problem that was put to me by many — what are you going to do next year?

Ten cases of refreshments were acquired for the thirsty adults. They were gone well before the last flight at 6:15 PM. Five minutes after the last flight the final scoring was handed to me. The entire tabulating of the scores was done by Liz Pell and Marilyn Josaitis — one outstanding job!

Prizes were awarded during the day to everyone. There was over $1200.00 worth of merchandise donated by some **real** friends of soaring. Trophies were awarded through third place and plaques to fifth. The Perpetual Trophy sponsored by Jack Josaitis and Tom Kelly went to Bob Robinson. The top scoring Michigan Jr/Sr was awarded a new Perpetual Trophy sponsored by M.R.C.S., to Tony Satullo. The trophies were crystal sea gulls mounted on semi-precious stone bases on acrylic. They were, without question, the most unique trophies that I have evern seen. I may be prejudiced because I helped to design and make them, but I doubt it. Everyone who saw them expressed the same feeling.

In closing, the contest was a smashing (no pun intended) success. It could not have been so, if it were not for a ton of behind the scenes help from the membership of M.R.C.S., and others too numerous to mention.

Find lift. □

TD SPECIAL

from page 57

T.D. SPECIAL

Designed By: Dave Robertson

TYPE AIRCRAFT
1/2A Pylon
WINGSPAN
32½ Inches
WING CHORD
6 Inches
TOTAL WING AREA
200 Square Inches
WING LOCATION
Low Wing
AIRFOIL
Semi-Symmetrical
WING PLANFORM
Constant Chord (15° sw. back)
O.A. FUSELAGE LENGTH
24½ Inches
RADIO COMPARTMENT AREA
(L) 11" X (W) 1¾" X (H) 2"
STABILIZER SPAN
19 Inches
STABILIZER CHORD (incl. elev.)
4½ Inches (Avg.)
STABILIZER AREA
74 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
2¼ Inches
VERTICAL FIN WIDTH
4" (Avg.)
REC. ENGINE SIZE
Cox T.D. .049-.051
FUEL TANK SIZE
1-2 Ounce
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
Two
CONTROL FUNCTIONS
Elevons (Elevator and Ailerons)

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Balsa, Foam
Empennage	Balsa
Weight Ready-To-Fly	22-25 Oz.
Wing Loading	15.9-18.1 Oz./Sq. Ft.

Start construction by gluing the formers and the firewall to the 1/16" balsa sides. Add decking formers C1, C2, C3. Glue all 1/8" square stringers in place and cut out the slot for the stabilizer. Put the doublers in the wing well and in front of the firewall. Add the top decking and sheet forward and aft. Make and install the nose and main gear. Pay close attention to the main gear detail as it will keep you from tearing up your plane on those hard landings. Install 1/4" x 3/8" maple for the hatch cover supports. Make the hatch cover and sheet the bottom of the fuselage, leaving an open space to slip in a gas tank and to get to the mixer. This opening can be covered with plastic covering for a race to reduce drag. Add the nose block and sand the entire fuselage to shape. Insert the stabilizer and glue on the fin.

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TD SPECIAL

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The wing is simple. Follow the directions that come with the Ace foam cores for adding the trailing edge. Make 15 degree cuts as shown on the plan on each wing panel. Be sure to make a right and a left side. Epoxy the panels together with the bottom sides down and with the trailing edge flat on the table. Epoxy the 1/16" ply pressure plate as shown on the bottom trailing edge.

Sand the entire wing with fine sandpaper and add the balsa leading edge wedge. Put three strips of 1/2" strapping tape on the bottom and two strips on the top to keep the wing from flexing.

Cover the entire model with Solarfilm, or other low heat shrink covering. Resin the engine area to fuel-proof the balsa.

Cut the front off a 6" Sig canopy and shape to fit the long rear portion. Use Hot Stuff or Zap to hold the canopy in place, then add a good quality pinstriping tape to finish it off.

If the tank is installed as shown on the plan, a clunk cannot be used. The fuel pickup tube goes into the tank and straight down. The vent tube goes into the tank and straight up. If the tank is turned around with the front of the tank facing the front of the model, a conventional clunk fuel pickup can be used.

The original model was done in orange and white with a dark blue stripe separating the two colors. Orange seems to be the best color to use for visibility. This is a small plane and you don't want to lose it because you can't see it!

Now that you have the construction finished, go out and tease the slower Quarter Midgets as I have had occasion to do.

I wish to recognize Kent Thomas and Ken Holden for helping me with some of the ideas for this plane, and Paul Strengell, without whose help this article would not have been possible. ☐

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PARAGON

from page 54/49

hinge is easy to apply, is strong, and offers very little resistance to surface movement. If you use this type of hinge, be sure to leave 1/32" gap between the surfaces. The finished horizontal stab is epoxied to the fuselage after the MonoKote in the contact area has been removed. Next, the vertical stab is epoxied in place. Be careful in your installation and be sure they align perfectly, or as perfectly as you can make it.

FINISHING TOUCHES

Using the same 3/32" diameter drill bit that you used to drill the tow hook block, back drill through the bottom plywood using the tow hook block holes as drill guides. The tow hook is made from a drapery hanger of .135 diameter. Trim to length and bend as shown. The first flights should be made with the tow hook in the forward hole. As you become more familiar with the launch characteristics of the Paragon you will want to move the tow hook further aft for maximum climb on the launch. The Paragon goes up very steeply, even when the hook is in the first hole, so get used to this before making any changes. The hook, as you can see, is extra long and extra strong, and while not necessary for launching from a Hi-Start, you will be glad it is there when you launch with a 12 volt winch with two or more pounds aboard for those FAI speed runs.

Install your radio equipment and check that everything works properly and smoothly. Add ballast to the nose area, in front of the battery pack, to place the balance point under the main spar. This is a good starting point and you can adjust the C.G. to you own preference after you have had a few flights.

Sand the inner edges of the wing rests to match the dihedral angle and cap with seating tape. The wing is held in place with 5 or 6 #72 rubber bands. The wing should be held firmly but not so tightly that it cannot move if a wing tip should hit. Install the hatch block and trim as required to clear the wing and the rubber bands.

ADJUSTING, TRIMMING AND FLYING

Sailplanes with polyhedral wings usually do not require washout but the Paragon goes up on the launch very steeply and can be circled tightly, and a little washout is tip stall insurance, so it is a good idea to put in about 3/16". There should, of course, be no other twists, warps, or misalignments.

You are now ready for the first test flight which should be a hand glide. Throw the model hard enough to obtain about 10 feet of altitude, feed in some down stick at the top of the launch to level the model off, and let it assume its glide. Adjust any nose or tail heaviness with the addition or removal of nose weight. When you are satisfied with the C.G. position, and if nothing else strange is happening, you are ready for a Hi-Start or winch launch. There should be no surprises on the launch, except that the model gets off at a steeper angle than you may be used to. Be sure to fly the model enough to be thoroughly familiar with it before attempting any night flights.

NIGHT FLYING

In addition to the usual things necessary for day flying, you will need some form of lights to put on your model and at the end of the launch line. We have been using, almost exclusively, a form of

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PARAGON

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chemical light known as CYALUME with excellent results. RCM Products Division stocks this Cynamid product. The lights are approximately 5" long, and 5/8" in diameter, and weigh about 3/4 ounce, and the price will be 3/$4.75 pp. They consist of an outer sleeve of transparent plastic and an inner sleeve of glass. Each contains a liquid and when the glass is broken by bending the light slightly, the liquids intermix and glow. A minimum of two lights are required for each model and they are secured to the wing tips or the underside of the wings at the dihedral breaks. Scotch or masking tape will work just fine. The lights naturally grow dimmer with time, but will remain bright enough for about six hours of flying.

Your first attempts at night flying should be made on a night when there is some moonlight. Get to the field before dark, set up and make some flights to get some idea of how much area you will be using to land (of course, your landing area should be completely devoid of obstructions). If you have a choice of sites, choose one that is not near a busy street or ringed by other sources of light. When your ship is up, all you will see will be two small dots of light and you don't want to be distracted by street lights or the glare of auto headlights.

Sound scary? It really isn't all that bad. We have had more than six night flying sessions including a 15 minute precision with landing bonus contest with no damage to any of the sailplanes.

Whether flying at night, in contests, or as a first sailplane, you will enjoy the Paragon — one of the easiest, but most versatile, sailplanes you will ever fly. □

STEPHENS AKRO

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follows:

Cut 3/32" wide pieces of masking tape, press on as shown on plan, and silk right over the whole thing. Care must be taken when sanding, not to go through the silk. The finished result looks very much like tubing outlines on the original plane.

The brace wires on the tail assembly are silver metallic thread. With a needle of the correct size, come through the correct spot in the fuselage side below the stab. Go up through the stab, through the vertical fin and down through the stab on the other side, then through the fuselage side opposite the first hole.

Now connect both sets of thread with a short spring. This helps keep them tight and also helps if you hook one accidently. A small access plate under the fuselage bottom at the tail makes this an easy installation and also simplifies hooking the control rods to the rudder, elevator, and tail wheel.

Finish

I am an all-dope-and-talc man for filling, but you should use whatever method you like. Everything is silk covered except the wing, which is covered with medium silkspan. The finish is Hobbypoxy. Mix dark blue and white for the correct shade. The gold shadow strip is 1/16" Pro-Stripe.

Flying

The full sized airplane has its C.G. at 25%. The model started out that way, and never changed. Experiment if you wish, but it flew right off the board like it is. The all-up weight, minus fuel, is 6 pounds 12 ounces. With a .60 size engine, it really streaks, so is best flown at about half throttle in the air.

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STEPHENS AKRO

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I am sure the model would fly on a good .40, but I fly off grass all the time, and if I have to pull it off a bit early some time, I want it to be flying when it gets in the air. If you have power to spare, you can cut back at any time, but if you are marginal, you don't have that option. Most scale models can use the extra weight up front anyway.

That's about all there is to it. I can supply the foam cores, wheel pants and canopy for anyone who doesn't want to make his own. (Don Condon, 1117 Woodman Rd., Janesville, Wisconsin, 53545.)

Happy flying, and I hope I don't have to fly against you at a scale contest — you would probably beat me, it flies that well! □

FLIGHT TRAINING SEMINAR

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. . . . . controls on the right hand stick and the tail rotor collective and throttle on the left hand stick. Many other helicopter fliers find that it is easier to have the cyclic controls on a single stick transmitter configuration with the rudder knob controlling the tail rotor while the left hand, which cradles the transmitter in the left forearm, operates the throttle control and throttle trim on the right hand side of the transmitter. In this case, a wide elastic band should be put around the back of the transmitter case so that the transmitter, itself, is firmly anchored to your arm. Whatever is most natural to you should be your choice of transmitter configurations. If you are an experienced fixed wing pilot accustomed to a Mode 2, two-stick transmitter, then by all means use this for your helicopter. If you are accustomed to a single stick transmitter for fixed wing aircraft, then use a single stick transmitter for your helicopter. Insofar as the beginner with no previous R/C experience is concerned, it is this writer's opinion that the single stick transmitter would be far easier for him to handle. This, however, is arbitrary, and simply a matter of personal opinion. The choice in this particular case must be up to you. If you fly in a club and have a more experienced helicopter flier around, stick to his transmitter configuration since it will be easier for him to trim, test fly, and take over your helicopter in an emergency situation.

When we refer to "flying the nose," or, "flying the tail," we are referring to the action of the tail rotor collective pitch servo. In the early days of helicopters, many helicopter pilots learning on their own, stood directly behind the helicopter and, thus, the most noticeable thing to them was the yawing of the tail to the left and to the right as the throttle was increased or decreased. Thus, they hooked up the tail rotor servo so that when the tail yawed to the left they would move the stick (rudder stick) to the right to return the tail to a neutral position. While many of our earliest, and some of our best helicopter pilots fly in this manner, it is definitely **not** advisable for you to learn in this fashion. First of all, you should **ignore the tail.** When you are flying you look only to one reference point such as, in low hovering, you may look somewhere in the vicinity of the swashplate, or in a high hover position or in forward flight, somewhere near the theoretical center of gravity. Once properly trimmed out, the "problem" of the tail rotor was highly exaggerated by many helicopter pilots. In most cases, the "problem" with the tail is simply that of over-controlling on the part of the novice pilot. Torque reaction is definitely there as you advance or retard the throttle, but it is simply an unfamiliar control which you must get used to. The slower you advance or retard the throttle, the less torque problems you will have with the tail. There have been many hints and kinks published about "de-sensitizing" the tail rotor setting when, in fact, a sensitive tail rotor is to be preferred, the latter providing more response in flight with only minor movements required for

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..... lapping — if the piston/cyliner fit is very tight, then lapping would help. However, if the fit is on the loose side, lapping would only do more harm.

Taking your other questions in order:

(1) An increase in rpm does not necessarily indicate an increase in power output unless the rpm increase is with the same size propeller, i.e. if an engine will turn an 11/8 propeller at 12,000 and, through the use of engine re-work, different fuel, etc., the rpm with the same propeller is increased to 12,500, then the power output has been increased. However, if an engine will turn the 11/8 at 12,000 and a 10/6 is substituted which turns 13,500, even though the rpm is increased, the power output has not.

(2) The Fox 35 uses a low compression ratio not only for easy starting but good four-cycle power. The engine was intended for U-control stunt flying where the engine is flown in a fast four-cycle. Should the engine break into a two-cycle during maneuvers, the transition from four to two-cycle does not bring about an abrupt change in engine speed. This feature is one of the reasons the Fox 35 has been one of the more popular U-control stunt engines over the years.

(3) Non-R/C engines will work fine with idle bar glow plugs. In fact, rich running and four-cycle operation will be improved.

(4) There are two types of rear-rotor engines: those using drum valves and those using rotary discs. Power-wise, the drum valve is pretty much the same as a front rotor. In some of your smaller engines, such as the K & B .15, if the engine were of front rotor design, an exceptionally large crankshaft would have to be used in order to have a large enough gas passage. By using the drum valve, a larger diameter can be used. The rotary disc type of induction carries this even farther. For the same degrees of rotation, you have a larger opening through which the fuel can pass. The rotary disc intake becoming more efficient at the higher rpm's, hence their use in most racing engines.

(5) Many things can cause an engine to run lean. A leaking head, leaking backplate, hole in your fuel line, or foreign matter in the fuel system somewhere. This is also an indication of fuel foaming. Check your prop and spinner if used for balance. This is often the cause of this problem with the 1/2A engines.

Dear Mr. Lee:

I believe I am heeding your request that submitted questions be of general interest, so that the answer might be published and not sent individually.

I would like to have your opinion on the value or advantage of using a Glow Driver in starting an engine, especially in comparison with the many units on the market and scratch-built which work with batteries and just measure the amperage or have a light to tell whether the glow plug is intact or not?

Yours truly,
Martin Sims
Bellmore, New York

The glow driver is a very useful accessory, especially for modelers inexperienced in the running of model engines. The glow driver varies current to the glow plug so that, even if the engine is flooded, the plug continues to glow. This can also be most useful for inverted engines. However, the commercial units do sell for a pretty good price and once a modeler does become proficient at engine starting, he often figures the cost does not justify the need.

Dear Mr. Lee,

I would appreciate some information on engines running reversed. I've read all your articles since you've been writing for RCM and so far I've come up with (1) it's okay for most ball bearing engines, (2) preferably select a new engine, (3) turn the front intake plate 90°

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FLIGHT TRAINING SEMINAR

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torque compensation. Bernard Macterlinck, the NRCHA Director in Europe, has a demonstration he is fond of for beginners complaining about bad tail trim setting. Bernard hovers the helicopter with one hand in the air, flying it with the main rotor only — showing them that the tail swing is due primarily to over-control on the part of the novice pilot.

Back to the subject of "flying the tail" — this would be very similar to having all controls on your pattern aircraft set up in the normal fashion and then hooking the rudder up backwards. That is to say, instead of moving the rudder in the direction in which you wanted the nose to turn, you moved the rudder in the direction you wanted the tail of the airplane to turn. This is fine as long as the aircraft is flying away from you, but certainly becomes confusing when you're involved in some intricate maneuvers. The same is true with the helicopter. If you were standing behind the helicopter, and it was hovering three feet off the ground with its nose pointed in the wind directly in front of you, you might not see any problem whatsoever in "flying the tail." However, visualize a maneuver in which both cyclic control and tail rotor control are required to make a given turn angle. With the helicopter moving at high speed and some distance away from you, you would have to "cross-controls" in order to make that coordinated turn — in other words, you would find yourself giving left tail rotor and right cyclic in order to turn right. It is far better to hook the tail rotor up in the recommended fashion so that when you give left tail rotor the nose of the ship turns to the left, and the tail to the right, as would happen in a fixed wing aircraft. Now, when we begin the first hovering flights (the most difficult part of helicopter flying), instead of standing directly behind the helicopter, stand to the side and behind it and keep your eye on the center of the helicopter, or on the nose, rather than on the tail. Thus it would become instinctive to fly the nose of the helicopter instead of the tail. Later on, when you are required to make coordinated turns involving both cyclic and collective tail rotor control, you won't be faced with the problem of cross-controls, but will simply move both sticks to the left or to the right, or in the case of a single stick transmitter, moving the cyclic stick to the left and twisting the transmitter knob to the left, or vice versa.

That's it for this month. We discussed the various types of training gear, transmitter stick configuration, and the proper method of collective tail rotor pitch control. In the next installment we'll take that first flight — one which usually results in considerable entertainment for any spectators that may happen to be watching. In the meantime, if you have the training pole, or training dolly, put in a few more hours of practice before that first flight coming up next month. □

Q-TEE

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.....edge. Install the top center sheet starting at the trailing edge working toward the leading edge. Be sure the joint is centered over the gap between the W-1 ribs. Trim sheet for a good tight joint, and use pins and/or masking tape to hold in place. If the wood is hard to hold down, dampen the outer surface with a rag or sponge moistened with water before bending downward. This completes the basic wing assembly and the wing should remain pinned to the board at least 8 hours to avoid possible warps. (You can begin working on the fuselage while the wing is drying.)

7) Remove the wing from the work surface, carefully removing all pins or tape. If the pins are hard to remove, grasp with pliers and rotate the pin slightly to break loose any glue, then pull straight out. Use a flat sanding block at least 3" wide by 9" long, made of pine or plywood stock, with #180 or #220 sandpaper glued in place to sand the wing lower surface from tip to tip. Be careful to keep the airfoil section flat and not to change the rib shape. It is easiest to hold the wing in your hand or lap and to sand one section at a time, working along the span. Sand slowly and carefully to be sure all joints are flush. Cut away any excess blobs of glue as you progress. Cut the tips from 1/8" x 1⅜" x 7⅛" balsa as shown on the plan. Trim any excess material which protrudes beyond the tip rib and glue the tips in place aligning the bottom edge with the lower wing surface. When dry, cut off the excess material to match the top rib contour.

8) Use a small razor plane or your knife to carve the leading edge to the shape shown on the side view. Work slowly with the grain of the wood and reverse the direction of cut if the wood tends to splinter. Remove material from the corners and carve and sand the leading edge to a nicely rounded shape. Be very careful to maintain the shape along the whole span of the wing and avoid shaping to a point. This is very important as the wrong shape, or different shapes on the right and left panel will cause serious problems when you fly the model. Now you can sand the top surface of the wing, using extra care not to change the contour of the ribs. Just blend the leading and trailing edge joints, and the tips and center sheet.

9) Cut the wing apart at the center working

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from both upper and lower surfaces. Be careful not to cut into the center W-1 ribs. A razor saw or hacksaw with a fine tooth blade is the easiest way. But you can do it with a knife. When the cut is complete, trim and block sand the excess spar, L.E. and T.E. material flush with the ribs. Check that the joint is square and that the ribs meet tightly. Trim the trailing edge on one panel to the contour shown on the plans, back to the 3/16" x 1/4" strip. Use this as a pattern to trim the second panel so that both panels match.

10) Epoxy the 3/16" x ¾" tapered stock to the end of one panel carefully aligning the lower edge. When dry, carve the wedge to match the end of the panel. Place this panel flat on your work surface (use Handiwrap underneath the joint) and butt the second panel against it. Block up the second panel so that the tip is raised 3½" above the work surface and check the fit of the joint. If a gap exists, sand the face of the wedge until the gap is eliminated. Weight the first panel with magazines or similar so it won't shift around and apply epoxy to the end of the second panel. Join the panels, using pins, tape and/or weights to hold securely; check that the tip rib is 3½" above the surface and let dry thoroughly. Don't move the wing until you are sure that the epoxy is completely cured!

11) Sand the joint smooth and use Duco or similar cement to secure one end of a strip of 3/4" wide by 14" long nylon tape to the bottom trailing edge. Then raise the tape out of the way and apply a heavy bead of cement to the bottom joint. Pull tape tight and squeeze down onto the cement. Use your fingers to rub the tape down firmly in place, allowing the cement to ooze through the pores of the tape. Add more glue, if necessary, to cover any dry spots and let dry a few minutes. Now apply cement to the top surface and pull tape tightly around the leading edge, across the top and down around the trailing edge, rubbing down as you go. When dry, trim off excess tape and rub in 2-3 additional coats to further strengthen the joint, rubbing the cement into the tape and adjacent balsa. **Don't omit this step as the finished wing's strength depends on the tape and cement reinforcement!** Sand the wing all over and it is ready to cover.

Fuselage Assembly:

1) Cut two sets of cabane uprights and wing supports from a strip of 1/8" x 1/4" x 30" fir, using the plans as a guide. Pin the right side in place over the plan and epoxy the forward and aft uprights to the side, removing any excess epoxy from the surfaces where F-2 and F-3 fit. When these joints are completely dry, epoxy the wing support under the uprights using extra care that the support is exactly aligned with the plan. Add

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the 3/16" x 3/4" tapered tailpost and the 3/32" x 3/4" lower nose doubler using F-2 as a spacer to locate the doubler. Cut two sets of 3/32" x 3/16" top stiffeners to the lengths shown by the arrows and glue in place aligning them with the top edge of the sides. Note that the rear stiffener is one piece from aft of F-3 to the tailpost, and that 1/8" gaps are allowed so that F-1, F-2, and F-3 rest directly against the side. Add the 3/32" x 3/16" vertical stiffener and 3/16" triangular reinforcement between uprights and allow to dry thoroughly before removing from the work surface.

2) Pin or tape the left side to the outside of this assembly so that both sides are perfectly aligned, with their outside faces together. Epoxy the cabane uprights in place aligning them exactly with the ones installed on the right side. When dry, install the wing support using tape to align it with the right one. Install the lower doubler, top stiffeners, and vertical stiffener. Check that both sides are identical. When the glue has dried shape the wing support ends and trim the lower doublers flush with the side outline. Separate sides and pin the right side to your work surface locating it so that the landing gear hangs over the edge. Be careful not to snag the gear during the next step.

3) Before proceeding further with assembly of your Q-Tee, the fuselage formers should be checked against the radio you plan to use and modified accordingly. Former F-2 requires a cut-out to provide clearance for the battery pack. For maximum strength this cut-out should be as small as possible. The cut-out shown on the plans will accommodate any of the current small battery packs and was used on the prototype models. In any event do not enlarge the cut-out downward as the landing gear support will be weakened. Use the outline on the plan to locate the 12 holes required for mounting the gear and use a 1/32" diameter drill or sharpened 1/32" diameter music wire to drill these holes. Align the former and landing gear over view A-A, and use a few drops of epoxy to tack the gear to F-2, being careful not to plug the holes. Cut six pieces of soft wire about 1" long and bend into hairpin shape. Push a wire through two holes from the gear face and twist together tightly on the aft side of F-2. Use pliers to snug the wire firmly against the gear and the plywood. When all six pieces are installed, trim off the excess wire and apply epoxy liberally around the landing gear, and on the aft side over the twists. Check the gear alignment again and let the epoxy cure thoroughly.

Former F-1 should be marked and drilled for the engine mounting screws, using the plans as a template. A No. 55 diameter drill is best, but you can use a 1/16" diameter drill or sharpened music wire for those holes.

If you have larger size radio equipment it may be necessary to cut out Former F-3 to gain enough

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room for your receiver. Check this before installing the former! You will also have to drill (2) 3/16" diameter holes for the pushrods in Former F-3, and these must be located to suit the radio you intend to use. Now that you have all the formers ready, let's finish the fuselage.

4) Apply a bead of epoxy to one edge of Former F-1 and position on the right side so that the face of the former is flush with the edge of the side and the bottom edge is aligned. Use a square or triangle to check that the former is perpendicular to the side and hold in place until dry. Repeat this process with formers F-2 (you may have to notch the lower doubler to clear the gear) and F-3 epoxying them to the cabane uprights as well as the fuselage side. Check alignment as the epoxy cures. Allow to dry completely. 5) Place the left side assembly over the formers and check that all formers fit tightly against the side. Hold in place and use a square to check that the rear edges where the stab mounts are aligned. Correct any misalignment, apply epoxy to the edges of the formers and re-install the side. Weight or hold in place until the epoxy cures. Remove pins from the right side and remove from work surface.

6) Remove any lumps of glue or epoxy on the bottom edges of the side assembly and use your sanding block to smooth the edges between F-1 and F-3. Position the 1/16" ply bottom sheet and mark the location of the landing gear. You will have to file or cut a 3/32" wide notch about 3/16" deep from each edge to clear the wire. Be sure that the floor contacts the bottom edge of F-2 but try to avoid making the notches too large. When you're satisfied with the fit, epoxy the floor into position using strips of masking tape to hold in place tightly against the sides.

7) Place the fuselage over the top view so that the wing supports are resting on the plan and aligned with the sides. Pull the tail ends together and use a spring type clothespin or stationery clip to hold the sides together at the tailpost. Use a square or triangle to check that the tail joint is located directly above the position shown on the plans. Sight along the bottom of the fuselage to check for any twisting or a banana shape. Correct any misalignment by loosening the clamp and adjusting the side position. When satisfied, apply epoxy to the face of the tailpost and clamp the sides back together. Check alignment again. Cut two cross pieces from 3/16" x 1/4" stock and install between the sides at the location of the vertical stiffener. Slip a rubber band around the fuselage if required to hold the sides against the cross pieces. Cut the cross piece for the stab L.E. location, and glue in place. Be sure to position this cross piece so that it extends 1/8" in front of the stab. Use the stab as a gauge to check this. Cut former F-4 from 3/16" x 1/4" balsa stock using view B-B as a guide. Glue in place across the cross piece.

8) The pushrods shown are telescoping nylon tubes, which transfer the motion of the servo output arms to the control surfaces. This type of pushrod is lightweight, very easy to install, operates smoothly, and we highly recommend their use. Note that the outer tube is firmly fixed at Former F-2 and the side exit point. The inner tube slides back and forth inside this outer tube. Cut or file the slots under the stab for the outer pushrod tubing. Before installing the pushrods, place your radio equipment in the fuselage and make sure that the servo rotation will result in proper control surface movement. The elevator pushrod is pulled forward for down, and pushed back for up elevator. The rudder pushrod is pulled forward for right and pushed back for left rudder. If necessary, you can cross the pushrods in the fuselage to help obtain the correct control surface action. Now, remove the outer tube and use coarse sandpaper to scuff the surface which contacts F-2 and the sides for better glue adhesion. Reinstall the tubes in the fuselage and use Hot Stuff or epoxy to glue the tubes in place.

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9) Check that you can insert and remove the battery pack through the hole in Former F-2, correcting any problems before continuing. We suggest that you line the sides, front, and bottom of the battery compartment with soft 1/4" thick foam or equivalent. Contact cement works well to secure these pads in place and this should be done before adding the top forward sheet. Use a moist sponge or rag to dampen one face of a piece of 3/32" x 3" x 3" balsa. The moisture will expand the wood fibers, causing the sheet to curl toward the dry side. Place this sheet over the top edges of Formers F-1 and F-2, and mark the rear edge to match the contour of Former F-2. Trim this edge until it lines up with F-2 and fits snugly against the forward cabane uprights. Now, mark and trim both edges that contact the sides. These edges should be carefully fitted and beveled until the sheet fits tightly along both sides and Former F-1 and F-2. When satisfied with the fit, glue the sheet in place using strips of masking tape to secure.

10)The aft fuselage sheeting is installed with the grain running across the fuselage, and is cut from a piece of 1/16" x 3" x 12" balsa. Lay the sheet across the bottom of the fuselage with the edge touching the ply bottom, and mark the sheet for the fuselage width. Glue this section in place using pins and/or masking tape to secure. Flop the sheet over so that the tapered edge matches the side curvature, mark, then cut and glue in place, butting tightly against the first piece. Use your fingers from inside the fuselage to help align the edges. Continue this process until the entire bottom is sheeted from the plywood back to the tail end. When dry, remove the tape and trim and sand flush with the sides.

(11) The top stringers are cut from a strip of 1/8" x 1/8" x 36" balsa. Cut the two long stringers 11¾" long, and the center stringer 6⅛" long and glue in place as shown on the top view and veiw B-B. Use the remaining stock to cut the fill-in pieces in front of the stab and on the face of Former F-3 after the stringers have thoroughly dried. Sand the stringers and filler pieces so that all joints blend smoothly. Trim all ends flush with the front side of F-3 and use the stab to check that the leading edge fits tightly against the 1/8" x 1/8" cross piece and that the trailing edge is aligned with the tailpost. Slip the fin and rudder in place and correct any misalignment now.

12) Trim and sand any surplus material from the front surface of F-1. Cut the cowl sides and bottom from 3/16" x 2" x 5⅞" balsa, taking note that the cowl bottom fits **between** the sides and the grain runs across the fuselage. Bevel the aft edge of the bottom so that it fits tightly against F-1 at the angle shown on the plans, and epoxy in place. Bevel the aft edge of the sides and epoxy to F-1 and the cowl bottom. When all cowl parts are dry, carve the bottom to match the side contour and carve and sand the side pieces to match the top view. Round all edges slightly and you are finished with the fuselage assembly.

SANDING

Sanding is intended to smooth the surfaces of the wood so that the finished model will look better. Any defect will not be hidden by the final finish, but will show up more visibly. The care and patience spent now will reward you with pride when you show your model to your friends and provide you with the self-satisfaction of doing an outstanding job. The difference between a good looking or poor model is usually sandpaper and there are no substitutes. One hour with a sanding block now will provide satisfaction for the life of the model.

We suggest that the following tools and materials will make this work easier and provide better results:

A small block plane such as Sears #37057 is great for shaping the leading edges and hardwood parts. In addition, a razor plane is excellent for shaping balsa.

Several different sanding blocks, covered with

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different grades of paper, will give true flat surfaces. Emery boards are also helpful for tight corners or stubborn spots.

Use the better grades of sandpaper such as Aluminum Oxide or Silicon Carbide open coat. Garnet paper is also satisfactory, but the more common grades of flint paper wear out so quickly that their low cost is offset by the inconvenience and wasted time. Check the shelves of your local hardware store or automotive supply outlet if you can't find these materials elsewhere. We recommend that you use #120 for rough sanding, switching to #220, then to #320 or #400 for final sanding. One sheet of each grade is more than enough to complete this model. Use long strokes and blend the surfaces smoothly. A little water or saliva on dents may raise the wood fibers enough to eliminate the need for filler in most cases. Bad dents or cracks should be filled and sanded smooth.

Re-sand all surfaces with worn #320 or #400 paper by hand and you are ready to cover and finish your model.

COVERING AND FINISHING

Every modeler usually develops his favorite methods of covering and finishing models. Many times, however, a great deal of weight is added to the model trying to get a super finish. This is bad for any model, for a small airplane is disasterous. Whichever method you choose keep it light!

We strongly recommend that the entire model be covered in Super MonoKote or Solarfilm. We know of no other way to get a slick, good looking surface with minimum weight build up. You can use silkspan and dope if you prefer, but be careful to avoid warps.

If you do use one of the plastic film materials, we suggest that you apply a protective coat of fuel-proof paint to the inner surfaces of the cowl and firewall, plus the wing supports and cabane uprights. We used clear Hobbypoxy, brushed on for the prototypes, as this gives a varnished wood appearance. You might also use polyurethane varnish or any fuel-proof dope, either clear or colored. We definitely feel that these surfaces should be painted, as the covering with film is very difficult and time consuming, and the wood will become oil-soaked very quickly if left unprotected. This painting should be completed before starting to cover.

Remember that you have to see the model clearly while in flight, to be able to control it properly. Use high visibility colors such as orange, red or yellow for the flying surfaces. The fuselage can be the same or a contrasting color. A longitudinal trim stripe on the top or bottom surface of the wing will help to orient the model when it's far out. A few areas of chrome

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MonoKote or Mylar trim will give excellent visibility on sunny days. The transparent colors are very effective and look good with this type of structure. It's your choice and a good opportunity to express your individuality.

The wing is covered in 4 separate pieces, and the stabilizer with 2 pieces. Follow the instructions provided by the supplier if you use Super MonoKote or similar material. Be careful when shrinking the material to avoid warping or distorting the structure. Be sure to adhere the covering to the ribs on both the top and bottom surfaces for greater strength.

We suggest that you cover the vertical and horizontal tail surfaces separately, and then remove the material locally to assemble. We also find it easier to cover the tail surfaces before installing the hinges.

FINAL ASSEMBLY

After all parts are finished to your satisfaction, and you have checked all the flying surfaces for twists or warps, and removed any present (except the wing tip washout noted on the plans for the trainer), you are ready to start final assembly.

1) Remove a narrow strip of covering material to uncover the slot in the top of the stabilizer where the fin mounts. Also, remove the covering from the base of the fin, so that there is wood to wood contact between the fin and the stab center ribs. Epoxy the fin into the stab, checking that it is properly seated and perpendicular to the stab. Use your square or triangle and check while the epoxy is curing. Use thinner, acetone or alcohol to remove any excess epoxy.

2) Install the hinges into the stabilizer, using a pin or #11 X-Acto blade, to force epoxy down into the slot. Be sure that the molded crease in the hinges are lined up exactly with the stab trailing edge, and remove any excess epoxy that oozes out before it cures. Allow to dry thoroughly, then install the elevator, being very careful to ensure free action and to remove any excess epoxy. Next, install the hinges in the fin first, then add the rudder, once again checking that the surfaces move freely.

3) Hold the tail group in place on the top rear of the fuselage and use masking tape or pins to secure it temporarily to the fuselage. Use a strip of masking tape across the bottom of the rudder and aft fuselage to ensure that they are properly aligned. Visually check that the fin is aligned with the fuselage center line, using the top stringers as a sighting guide. Check this very carefully, as a misaligned fin will cause turning tendencies while flying. When you are satisfied with the alignment, use the point of a pin held tightly against the fuselage sides to mark the bottom of the stabilizer leading and trailing edges where they meet the sides. Remove the stab and cut away the covering material from the bottom of the stab, using the pin holes as a guide. Remove any covering material from the fuselage sides and top stiffeners where the stab mounts. Coat these areas with epoxy and re-position stab in place, securing with pins. Check alignment carefully and let dry completely before handling the fuselage.

4) Bend the tail skid from a bobby-pin (or use 1/32" diameter music wire). Drill a small hole vertically into the tail post and cut away the covering material under the skid. Epoxy the skid in place. Push the wheels over the axle ends and screw on the small spring retainers to hold the wheels in place.

5) The next step is to mount the engine on the firewall. We highly recommend that you use the muffler called out on the plans, particularly if you plan to fly near houses or buildings. This muffler causes very little loss in power, is light and effective, and is easy to install following the instructions provided with the unit. Use four #2 x 3/8" long sheet metal screws to fasten the engine to the firewall. Slip a #2 flat washer between the firewall and mounting flange in the upper right hand corner (see plans) to provide a little right and down thrust for the first flights. Be sure to tighten

all four screws snugly, but don't overtighten, as the holes in the firewall will strip.

6) Thread the #2-56 x 1 studs into the end of the inner pushrods at least 3/16". Use pliers if you can't turn the stud with your fingers. If you have access to a #2-56 tap, we suggest pre-tapping the pushrods and clevis to make assembly easier, but it is not necessary. Install clevis on the other end of the stud and position clevis so that approximately 1/8" of the stud protrudes into the slot in the clevis. Insert inner pushrod into outer tube from the rear until it comes through in the servo compartment. Spread clevis with a small screwdriver and insert pin through outer hole in control horn. Now mount control horns, lining up holes for the clevis with the hinge line. Hold in place with your fingers and use a nail or toothpick to punch through the film covering over the mounting holes. Assemble horns to the surface using the #2-56 x 5/16" long screws and the small square piece attached to the horn as a nut. (Cut horn and nut plate apart with razor blade or knife before assembly.) Check control action for binding and you are ready to install the radio equipment. Since the airframe assembly is now complete, we suggest you mount the wing on the supports with a few #32 rubber bands and stand back and admire your handiwork. (We won't tell anyone if you run around the house holding the model raised in one hand and making funny noises.)

RADIO INSTALLATION

The plans show suggested locations for brick type radios, and can be followed exactly for EK Logictrol LRB radios. For different equipment you will have to locate the equipment to suit; be sure to follow the manufacturer's instructions. Plan the installation carefully so that you don't have to keep moving things around, and check the balance before finalizing locations. Most radio manufacturers caution against the use of foam mounting tape for radio installations because of equipment failures, due to excessive engine vibration. We agree with this for larger engine sizes, but have used foam tape for 1/2A R/C and sailplanes for several years without problems.

You can use mounting rails if you prefer, as long as they are well supported on the sides. Material for rails and supports is not included.

Attach tape to the servos first, then peel off protective wrapping and press firmly against the floor. Do not try to move the servo once it has been mounted in place without replacing the tape. At this time we suggest that you connect all cables, mount the switch, install antenna leadout and run antenna rearward along the outside of the fuselage.

Secure the free end of the antenna with a rubber band or tape, letting any excess length trail behind the model.

Make up the two servo links, bending as required with pliers. Thread into inner pushrod at least 10 turns, align with servo arm and make final bend. Install through hole in arm, press on retainer and check neutral position. Adjust if necessary by screwing the clevis in or out.

You should now check the balance point of the completed model by supporting the wing on your fingertips near the center. The model should balance in a level attitude about 1/8" forward of the main spar for the first flights. Slide the battery pack back and forth if necessary to balance the model. Be sure that it is firmly secured so that it will not shift around during flight or landing. If the model still won't balance properly, then you **must** add weight to the nose or tail to obtain good flights. It is far better to add an ounce of lead to the nose, than to try to fly a tail heavy model, which will be very difficult to handle for the inexperienced pilot.

PRE-FLIGHT

At this point you are ready to make the pre-flight checks before going flying. A few minutes spent now, will give you more confidence and help to eliminate any problems at the field.

☐ 1) Inspect the model carefully. Wiggle the tail surfaces to make sure the joints are secure. Check that the radio equipment is securely mounted.

☐ 2) Check that the surfaces are not twisted or

warped. Correct any warps with low heat or steam on the surface, while you twist in the opposite direction.

☐ 3) Mount the wing, using four #32 bands on each side. Align the wing so that both tips are the same distance from the nose, and equidistant from the center of the fuselage. To check, tie a length of thread to the tail skid and use it to measure the distance to one tip at the trailing edge. Mark with your fingers and swing to the opposite tip. Adjust wing position until length is the same. We suggest you mark the lower surface of the wing on both sides of the wing supports to provide line-up marks for quick checking of wing alignment.

☐ 4) Check the balance point. Add or remove weight from the nose until it's correct.

☐ 5) Check the radio operation. Try all the control positions and make sure the controls move in the proper direction. Check that the surfaces are at neutral position when the transmitter trims are at neutral. Adjust clevises, if required.

transmitter and airplane. If you are using dry batteries, be sure they are fresh; if Ni-Cads, that they are fully charged. Remember that more radio failures occur from defective or improperly charged batteries than any other cause. Don't be a statistic!

Now let's go flying!

FLYING YOUR Q-TEE

Pick a large, grassy field, without obstructions if possible, for your first flights, even if you have to travel to find such a site. Since you are going to hand-launch the model, you don't need a paved strip or similar runway. If you can find a nearby R/C club, or someone in the area who knows how to fly R/C proficiently, by all means seek help before going flying. We will assume that you are on your own, without experienced assistance.

Before going to the flying field, run the engine at home until you are able to start it and adjust the needle valve consistently. You should also be completely familiar with the operation of the transmitter sticks and trim levers, so that you can locate everything by touch without looking away from the model. A few evenings spent hangar flying in front of an old TV movie is time well spent. Check that the controls move in the proper direction, etc., before you go to the field.

Select a calm morning or evening when there is no more than a 5 mph breeze for the first flights. You will have enough trouble coping with the excitement and nervousness of your solo flights, without worrying about wind. Force yourself to wait for the right conditions!

Start the engine and adjust the needle valve until it's running smoothly. Point the nose straight up and make sure the engine doesn't quit. **Turn on the receiver and transmitter**. Develop the habit of operating the sticks and watching the control surfaces respond **before** releasing the model! Face directly into the breeze and release the model with the nose pointed directly at the horizon and the wings level. Don't throw the ship or just let it drop — just push it forward and let it fly out of your hand. She should fly out straight and level in a slight climb.

If there is a slight turning tendency, don't worry about correcting it now. If a tight turn develops, move the stick in the opposite direction to correct. The angle of climb is controlled with the elevator and trim movement should be sufficient. If the model is hanging on the prop with the nose high, reduce the climb by trimming in down elevator. Try to keep the model upwind and flying away from you by making large, gentle S-turns. Face in the direction the model is flying at all times, even if this means looking back over your shoulder. You will find that it is easy to fly when the model is going away from you but very confusing if it is coming toward you, as the turning motions are reversed. Remember that if you do get confused with the model flying toward, push the stick **toward** the way the model is turning to stop the turn. Let the model climb all the time until the fuel runs out. Usually, the engine will burp a few times and run with more power as it runs out of fuel. This may cause the

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climb angle to steepen, so be prepared to add down elevator to stop the zoom.

The model should now be gliding and flying slower than when the engine was running. Try adding a little up trim to slow the glide even further. Make sure that you keep the model upwind as it glides and start to think about landing. Continue to let the model lose altitude until it is down to 40 or 50 foot altitude.

You should now have the model lined up with your landing path, and heading into the wing. Avoid making any tight turns and let the model fly toward the ground. Don't worry where it's going to land, as long as you won't hit something. When you get within two feet of the ground, hold slight up elevator to flare the glide path and let the model land. Don't give any commands after it contacts the ground. Don't feed in too much up elevator on the flare out as it may stall the model. The object is to land on the wheels with minimum forward speed. If you just fly into the ground without flaring the model will bounce and the landing gear will probably need to be bent forward.

Now that you are back on the ground, pick up the model and turn off the radio. Take the wing off and inspect everything, including your radio installation, very carefully. Make sure the engine mounting screws are tight and wiggle the tail to make sure it's still attached to the fuselage. Put the wing back on, fill up the tank and you're on the way to another flight. Good Luck!

For more information on building and flying R/C model aircraft, we suggest you get a copy of *RCM Flight Training Course. – Volume I.* □

Keith Storey, 9th AMA President, recalled the early day AMA problems of the 4th President, Irwin Ohlsson .

IRWIN OHLSSON

from page 22

After Lindberg's solo flight across the Altantic in 1927, Irwin designed, built, and flew his first model airplane, a rubber band powered Spirit of St. Louis. From 1929 through 1931 he taught hundreds of youngsters how to build and fly rubber powered models under a program sponsored by the Los Angeles Playground and Recreation Department. In 1933 he built his first gas powered model. It was a huge machine weighing 10 pounds, powered by a 30 cc boat engine, swinging a 24" diameter propeller. After a three day drive from Los Angeles to Sacramento, with this monster strapped to the back of his coupe, Irwin won the model airplane flying competition at the California State Fair. It was the first time a gas powered model had won this event.

Following his California victory, Irwin proceeded to design and machine his own miniature engines. Winning contests with his original models powered by his own designed engines became commonplace on the West Coast. In 1934 he opened a model shop. He then

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IRWIN OHLSSON

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began producing pneumatic model airplane wheels and kits of his contest winning gas powered models.

In 1936 Ohlsson teamed up with a friend to produce model engines. Together, as Ohlsson and Rice, they went on to become the world's largest producer of model airplane engines, fuel and accessories. The Ohlsson designed engines are a legend and are still remembered all over the world.

Influenced by the rapid growth of leisure time activities, he was one of the original organizers of the Hobby Industry Association of America. Irwin served as Vice President of the Western District from its inception in 1940, through 1945 and is a recipient of the Association's Meritorious Award, a particularly coveted honor in the business world.

He was a charter member of the famous 8-Ball Club, an organization whose members personal monetary donations met the AMA's yearly financial deficit in order to keep the Academy alive.

From 1942 through 1945, he served as the fourth President of the Academy of Model Aeronautics. His treasured AMA license No. 4 is proudly displayed on the radio controlled seaplanes he presently builds and flies.

During 1947 Ohlsson's company acquired a Douglas DC-3 airliner and Irwin initiated the first of many airlifts of deserving modelers to the AMA National Championships. These airlifts were made at Ohlsson's expense and allowed the participation of modelers who otherwise could not attend. The famous 1948 East-West Challenge Meet was made possible only because of his generosity in furnishing the DC-3 cost free to transport the West Coast team to St. Louis, Missouri. Interesting enough, he knew that his engines were not being used in this all out U-Control speed contest, the DC-3 was loaded with models powered by his competitors engines.

Irwin's foresightedness had O & R among the very first to market mass produced glow plug engines. Even now while retired (?) he is manufacturing close to ten thousand glow plugs per week. Over the years he has delivered over half the world's production of conventional glow plugs and they are all sold under other peoples' labels.

We have mentioned only a few of the accomplishments that qualify Irwin Ohlsson's election into the Model Aviation Hall of Fame. Accolades from the distinguished guests at this dinner, bear witness to his being a great human

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IRWIN OHLSSON

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being. Among the guests were these model aviation pioneers: Frank Bertelli, John Brodbeck, Al Doage, Ira Hassad, Bob Holland, Dan Lutz, Lew Mahieu, Bill McKenzie, Don Newberger, Art Snyder, Keith Storey, Sal Taibi, "Doc" Young and many others.

RCM congratulates Irwin Ohlsson on his well deserved election into the Hall of Fame. (This reporter still has an Ohlsson "23" in running condition that he purchased in 1939.) We also wish to compliment BIRD President, Joe Zingali, and his committee for a memorable evening in honor of Irwin Ohlsson. □

RACING AT RANDOM

from page 19/18

. . . . . with ailerons and elevator control took-off best with no push at all.

Aircraft designs were varied but most used fairly low aspect ratio wings with spans ranging about 24" to 30". The low aspect ratio wings do not turn as sharply, but offer less drag and higher speed. There were two "Tigercats", three "Upstarts", two "1/2A Sticks" by GMC Models, one "Quickie 200", three of Bob Aberle's "Nothing Specials", and two of Scott Christensen's "Rickey Rat's." The rest of the entries were original designs. Among the originals were a low winged "Upstart", "Miss Dara", "P-39" and two originals with tri-gear.

The course at 330' seemed a little long and was a definite advantage to the faster airplanes as they could more than make up in the straights any advantage lost in the turns. "Upstarts", "1/2A Sticks" and Quickie 200's" seemed closely matched with maybe a slight edge for the Quickie 200 provided all wings are the same length. The "1/2A Stick" is being kitted by GMC Models and sells for $20.95 and is very easy to build — in fact one was built and test flown in 1½ hours!

Failure to start was the biggest problem at the race. The engines, especially those on pressure, flood easily and often the glow plug connector is not making good contact. For reliability, the Cox Glow clip should be disassembled and the wire connections soldered. Secondly, we recommend the Kraft Glow Plug Analyzer on a dry cell battery as, from the meter reading, you can tell whether the plug is good, burned out, shorted or if the engine is flooded. If the meter reading is low, the battery-glow plug connection may be bad or the battery itself is weak or the glow head may be loose. Cox glow heads should glow bright orange for easiest starting. If the glow is weak, the engine can be difficult to start.

Third, the fuel must be filtered as the engine is being fueled. Sediment in the fuel will quickly clog the holes in the venturi and cause erratic running or failure to start. If pressure is used, there should be an easy way to pinch off the pressure line to avoid flooding while starting. Practice starting and clearing your engine before race day so you don't panic if you have trouble. Ninety seconds to start is a long time if your engine starts right away, but it is too short if a problem develops and you are not sure what it is! Experience and familiarity with your system can pay big dividends on race day. □

CUNNINGHAM ON RC

from page 12

information with us?

All-in-all, getting together a good air show act can be a lot of fun, and will provide something new and interesting for experimenters to try. The only hook-up that I have seen for a smoke trail, was to use a needle valve assembly through the exhaust stack. The needle valve connected to a small fuel tank, filled with diesel fuel. The idea is to force the fuel into the hot exhaust of the engine, thereby igniting it in a trail of smoke. Hooking up another servo to a ukie fuel shut-off valve would

give you on and off control.

★

Earlier in the column I touched on the subject of the fledgling pilot going out to the field for a days flying. One of the best bits of advice that I can give to the beginning flier is to never be completely satisfied with either your flying ability, or with your aircraft. If you desire to become an accomplished pilot, then you should set goals for yourself each time that you go out to fly. If you feel that your future interest is in pattern flying, then make each flight a bit of the A Pattern until it becomes natural to do this pattern each time that you fly. Practice making touch-and-go landings each time that you are at the field, and each time that you make a traffic approach, make it precise, not sloppy. Too many of us (and I am right up at the head of the line), just go out and mess around the sky when we are flying for fun, without any real goal. If you are serious, practice each time — it will pay off in your being a better flier, faster than any other way.

The second tip is not to be satisfied with your aircraft. Sure, it may be the very best that you can build, but it just might meet with an unfortunate accident which wipes it out or, at least, leaves it badly bent. When you have completed your first aircraft, begin immediately on the second. This way, if you do have an unfortunate altercation with the ground, you will be able to take to the air again in a much shorter period of time. You may think that after you have begun to master your first trainer type aircraft, you are ready to try a Phoenix VI for your second. **Don't** be dumb.

Never build a super bird until you are ready to graduate to the big time. Some fliers never progress beyond the shoulder wing type aircraft for this is the type of aircraft that they like to fly. It suits them, and is fun, so why worry about something else? Some modelers simply cannot wait to get their hands on a demon. Whatever your approach to the hobby, always remember that the aircraft that you are flying, should be considered expendable. If you always keep this in mind, it won't tear you up so much when the ground reaches up and smites your pride and joy.

The Winter is a good time to keep your fleet of aircraft growing, so use the lousy days and night to advantage so that when good flying weather comes again, you will be ready for it. □

ENGINE CLINIC

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counter-clockwise.

I have done this on an Enya .45 and it seems to run well, but would like to know if intake timing changes much. In other words, will this engine put out the same as running normally or is there some reduction in power, as the plane I'm making (Pusher) will need all the power I can get.

Thank you for any comments you can give.

Sincerely,
Joe Ravelle
Union, New Jersey

Generally, rotating the front plate on those engines with removable front plates, to reverse the rotation of the engine will result in a small decrease in power. Just how much will depend on the particular engine and crankshaft timing. Some engines will only lose 100-200 rpm, while others will lose 500-1000 rpm, this being the extreme, however. This is why, if a modeler has need of a reverse rotation engine, it is best (if maximum performance is necessary) to use a make of engine that can be had with a counter rotating crankshaft. As an example, the Veco .19, K & B .40 front rotor, and K & B (Veco) .61 can all be had with counter rotating crankshafts.

Every month I get several letters from modelers all hot to build a scale model jet airplane. Unfortunately the only jet engines available for model use are of the pulse jet design, the same as those used by the Germans to bomb England during WWII. The most popular model jet

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ENGINE CLINIC

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engine is the Dynajet that first appeared on the market in the mid '40's and is still available. The following letter is typical of many I receive:

Dear Clarence,

Jet engines have been around for quite some time now, but very seldom do we see them in use or have we seen written reports. I would appreciate your comments and answers.

(1) Are jet engines more powerful than "60" glo-engines?

(2) What percentage of throttle is possible and still maintain reliability?

(3) Are they more dangerous than glo-engines for explosion?

(4) Are they simple to start?

(5) In place of an air pump, would a portable air tank simplify starting procedure?

(6) A 10 minute run would require how many ounces of fuel?

(7) Are they easily destroyed from mis-use caused by overheating?

(8) Assuming no mis-use, what is the expected life span?

(9) Assuming the design and insulation problems for an aircraft have been solved, would it be a satisfactory powerplant for a heavy aircraft in the 10-13 pound range?

Thank you for any information on this subject.

Yours truly,
Robert Milne

Taking your questions in order, Bob:

(1) The use of the Dynajet has been pretty much restricted to U-control speed events. The speed records set with the Dynajet are always within a few miles per hour of the .60 size

engines, and usually a shade faster than the speeds set with conventional .60 size racing engines. So, horsepower-wise, they could be considered to be developing the same or slightly more than a racing .60.

(2) A pulse jet has only two speeds — on and off. There is no throttle capability.

(3) The jet engine itself is pretty immune to explosion. However, the tail pipe glows red to orange-hot under operation which is a pretty bad fire hazard.

(4) Just like glow engines, if you know how to start them they can be easy. If not, they can be quite difficult.

(5) A portable air tank can be used in place of a tire pump.

(6) Economy depends on the fuel used. White gasoline is the recommended fuel. However, fellows flying U-control speed are mixing some pretty exotic fuel blends. It has been over ten years since I last ran a Dynajet, so I'm a little hazy on the fuel economy. If I remember correctly, they used about 2 ounces per minute using white gas.

(7) The jet engine is pretty rugged, but it does have a reed valve that has to be replaced with considerable frequency. Overheating can only be caused by the use of exotic fuels. Unlike our conventional engines that can be tweaked too lean, resulting in overheating and damage, the jet engine has no needle valve and fuel mixture is governed by a fixed jet. Varying the jet size will vary the power of the engine but if too lean, the engine just does not run.

(8) I can't give a definite answer to this one. Just like a glow engine, there are too many variables involved.

(9) 10-13 pounds is getting to be a bit heavy. Performance would be the same as with a conventional .60 — terrible! In the case of the jet, acceleration would be considerably slower than with a prop equipped engine. 7-8 pounds would

be maximum for the Dynajet.

One other problem with pulse jets that you didn't ask about Bob, and that is fuel feed. This has always been a major problem. One air bubble will kill the engine!

Dear Mr. Lee,

I have two K & B .40-S Schnuerle engines that are about two years old, and have never been in an airplane. I bought the first one because I thought I was interested in pylon racing. I won the second one in a fun fly. Anyhow, I never got into racing. What I would like to know is, would it be practical to de-tune the engines by changing the rear rotary valve or installing a carb with a smaller venturi or maybe adding a few head gaskets to get it to idle. I would like to use the engines in some sport airplanes. Being a co-owner of a machine shop, I may be able to fabricate or modify most any part, short of making a new crankcase.

Your comments will be appreciated.

Sincerely,
Dennis Martin
Lumberton, North Carolina

No internal modification is necessary. Although the K & B .40-S was intended strictly as a racing engine, port timing, compression ratio, etc., are still in line with timing and compression ratios being used on many of your high performance pattern engines.

The first thing you will have to do is install a throttle type carburetor, naturally. The Perry carburetor for the front rotor K & B .40 has the same size neck and will fit without alteration. Something will be needed in the way of exhaust restriction to keep the plug hot. The installation of a muffler will be the easy way out but fabricating an exhaust baffle will give a more reliable idle. Wally McAllister who manufactures the "Macs" line of mufflers has a muffler available for the K & B .40-S.

I would like to mention the above comments apply to the K & B .40-S only. The newer K & B .40 Schnuerle rear exhaust engine, known as the 6.5 SR II, has been designed to operate with the short mini-pipe and, as such, does not lend itself to good idle characteristics. □

RADIO SPECTRUM

from page 6

..... airplane at a reasonable price.

The heart of the system is a fluidic inertial rate sensor. Since it is not a pure inertial attitude sensor and only senses angular rate, the system is referred to as a "wing lever" as opposed to an autopilot.

The basic parameter sensed is rate of yaw. The sensor is tilted with respect to the longitudinal axis of the airplane so that it will also sense a component of roll rate. Effectively both roll and yaw axes are stabilized by a single sensor. This worked fine in a stable airplane like the Cessna but might not work in our pattern airplanes which are on the brink of stability. (Let's hear it from you aerodynamicists.)

The fluidic sensor was chosen for this application because of its simple construction and good performance. The following description was lifted right out of the NASA Report.

"The principle of operation is shown in Figure 1. A laminar jet of air is directed across an enclosed chamber and between a pair of self-heated thermistors. When the device is subjected to an angular rotation about an axis, perpendicular to the plane of the illustration, the inertial properties of the jet cause it to be deflected as shown. The magnitude and sense of the deflection are proportional to the magnitude and sense of the rate input. Differential cooling of the thermistors by the jet provides an electrical

output signal.

Figure 2 shows the basic dimensions of the sensor used in the flight tests. Three plastic castings make up the main body and the supply and exhaust caps. The thermistors are attached with soft solder to a mounting frame machined from 1.59 mm (1/16") copper-clad phenolic, printed circuit board. The copper cladding is etched to bring the thermistor connections out to external tabs which mate with an appropriate connector. Slotted holes allow the position of the frame to be adjusted to center the thermistor pair with respect to the laminar jet. Commercially available matched pairs of glass-coated thermistors are used. They have a resistance of 2000 ohms at 25°C and a diameter of approximately 0.35 mm (0.014") and are operated at a temperature of approximately 105°C.

Flow rates in the instrument are so low as to be very difficult to measure. Minimum flow is that which just extends the active jet out to the thermistors. Maximum flow is that at which the jet flow becomes turbulent. In practice, the flow rate is gradually increased until the instrument just becomes sensitive to angular rate. The flow rate is then increased until the output signal just becomes noisy. The flow rate is then reduced to approximately halfway between these two values (about 4.72×10^{-6} m^3/s (0.01 ft^3/min) for the test insturment). Within the usable flow range, sensitivity is roughly proportional to flow rate. Since system gain is not very critical in the wing-leveler application, no attempt has been made to regulate flow precisely. A length of capillary tubing is connected between the exhaust port of the rate sensor and the aircraft's vacuum supply to restrict the flow to the selected value. (A different source would be required in a model.)

When the thermistors are properly positioned with respect to the jet, zero shift with the usable flow range is negligible. The thermistors are operated in the constant temperature mode for best time response. The time constant of the instrument was measured at approximately 0.2 second, which is more than adequate for the application.

The start-up time for the laminar jet rate sensor is negligible compared with that of a gyro, allowing the wing leveler to be brought into action almost instantly in case of an unexpected emergency."

The thermistors are part of a bridge circuit that puts out a voltage of .025 volts per degree per second. This must be amplified and then summed into our servos similar to the electrostatic autopilot circuit.

So that keeps your wings level. What about heading? NASA built a magnetometer and summed its output in with the rate sensor. This is not real straightforward because the earth's magnetic field lies parallel to the earth's surface only at the magnetic equator. However, even this problem was solved without a gyro.

I hope this has provided the talkers and the dreamers with a little food for thought but, even more important, maybe a few of you can actually come up with a piece of hardware that will work, or use these principles for some other application. I know someone is working on a device that would make your plane fly at constant speed through loops etc., using a thermistor sensor and feeding back the signal to the throttle servo. So start thinking and order a copy of NASA Report TND-7460 for all the details of a gyro-less wing leveler and directional autopilot by H. Douglas Garner and Harold E. Poole of Langley Research Center.

★

For those of you who aren't interested in autopilots, the following letter might stimulate your dreams.

Dear Jim,

In one of your first articles, you discussed future trends in R/C equipment. The general consensus was more of the same equipment but better. I was going to write to you then about some recent developments, but didn't take the time. In October's issue you mentioned that advances in competitive skill correlated strongly

with advances in equipment, this urged me to take pen in hand to describe to you one recent development. Brought on by ultra reliability requirements of the RPV programs, a new and interesting R/C system has been developed and will probably be commercially available in the future through Pro-Line who holds the U.S. Patents. This system is truely digital. The stick positions are represented by digital binary codes. These codes are multiplexed onto a carrier and transmitted to the receiver which demultiplexes them and sends the appropriate one to each servo. The servo, using stepping motors and shaft encoders, interprets the codes properly to drive the output shaft to the exact angle. What are the advantages of such a system?

First, multiple use of a single frequency. Extreme noise immunity through use of correlation detection, absolute servo linearity with super fast response and no deadboard or overshoot.

The advantages go on and on but are at present overshadowed by two important disadvantages. First – cost. Shaft encoders at present are expensive, even in large quantities. Second – stepping motors and encoders are large compared to modern servo motors and pots.

This is just one of the many developments that I'm sure are going on and I think that we'll see some very significant changes in the next few years and not just more of the same, but better.

Sincerely,
Dennis Knowlton
Electronics Research Engineer

Let me point out that what Dennis says is true. Our present systems are not truly digital but got that name because digital full-on, full-off, techniques are used. The information is actually analog with control surface deflection proportional to pulse width. In a true digital system the control surface would be commanded by a digital word made up of ones and zeros. For example:

001 could equal one degree; 010 could equal two degrees; 011 could equal three degrees; 100 could equal four degrees.

And so on. In this example we have a three bit word and can get seven combinations or seven servo positions. In order to equal our present servo resolution it would take seven to eight bits in each word command. You would have to add a few bits to identify which word pertained to which channel, and we want six to seven channels, and all this must be transmitted sequentially. We also would like to update the information every 14 to 15 milliseconds so the on-off pulses of the transmitter that represent the ones and zeros have to be very short and have reasonable rise time to be detectable. The net result is a system that requires a rather large bandwidth. This means it will be a tougher problem to reject adjacent channel interference.

There is no doubt that this would be an ideal system from the standpoint of deadband, linearity, and repeatability, so get to work. Dont't let that patent talk stop you because pulse code modulation has been around for a long time and I'd be surprised if anyone could patent its application of modeling.

★

I noticed in the November 1975 issue of RCM that a few more companies are offering fast chargers. I'm happy to see fast charging become more accepted around the country. I still get comments from a few people who didn't believe it, even though they see it work. I haven't seen the DA Enterprises power panel fast charger but my guess is that it works similar to the scheme we published in the June 1975 column. However, both their advertising and the description on page 37 of the November issue are going to cause some confusion. The ad would have you believe that the average charging current is 250 ma during the 15 minute charge. If this were true you would probably only get about 15 minutes flying from a 15 minute charge similar to the Pro-line fast charger. My guess is that they mean to say you put in 250 ma hr in 15 minutes which would be an average charging current of 1.0 amp.

There is a very profound statement on page 37

about **knowing** what is going in. This is only true if you have a meter on the charger. I've seen many people have troubles with batteries which were really charger problems. LEDS, neon and filiament lamps are better than nothing at all but there is no substitute for a meter. *(When we contacted DA Enterprises this was their reply: "The charge to the receiver is an average of 1.0 amp/per hour to 1.25 amp/per hour. Transmitter 500 ma/per hr. to 600 ma/per hr. With each unit is a chart of charge time and current so that each modeler will know what is going in along with a warning aginst excessive charging.")*

I received a prototype of Astro Flights RC system analyzer — rapid charger for evaluation. It includes a 15 minute timer which I think is a worthy addition. You can set the timer and forget it without destroying any batteries. However, I recommend you keep your eye on the meter, then you know you are really charging. Astro Flight uses a different approach to analyzing the batteries. Rather than use a voltmeter, they test the battery by monitoring current during a heavy discharge. If you don't like to spend a couple of hours discharging your batteries you probably will like this unit which will discharge a fully charged pack in ten minutes. You must depress a switch to discharge so there is little chance of discharging too far. High discharge rates will cause heating of the cells so I recommend you let them cool down before charging. Like most of the fast chargers on the market, you must have low impedance batteries.

★

Dear Jim:

Have just read your column in RCM September '75. In particular, I got all fired up about the suggestion by J. Bradley Flippin to use a CB walkie talkie to monitor 27.145, which also happens to be my frequency.

However, after my initial enthusiasm, I got thinking about it. My first query is – if the walkie talkie is superregen, why tune it to my Tx – it picks up the whole 27 band surely? Secondly – if it is superregen, then surely it is of little use for monitoring, as it will pick up the whole band! If I use a monitor, it would be to check that nobody else was switched on 27.145. Does this not then require a superhet Rx section for the walkie talkie?

I notice that Radio Shack does have some inexpensive superhet WIT's. However, they are on channels 14, 15, 16, etc., and I note that 27.145 is between channels 15 and 16. Could one of these be tuned to pick up only *27.145? I'd be glad of any suggestions you may have.*

Regards,
Jim Anderson
Hamilton, Bermuda

If you get a superhet on an adjacent channel you should have no trouble tuning it to your transmitter. There is nothing magic about having the I.F. at exactly 455 KHz. The selectivity of the receiver will probably not be quite as good if the I.F. is too far off but this might be desirable in a monitor. That way you can tell if there is someone on an adjacent frequency that might interfere with you.

★

We receive a lot of complaints about repairs and can't offer a complete solution. It is the same problem as getting your car or TV repaired. Try to establish a relationship with an individual you can trust. Remember they are all human. One problem many modelers have, is that they think the Bob Elliotts and Jim Fosgates — the guys who designed the radios — look at their equipment when they send it in for repair. Unfortunately, the serviceman does not know as much about the equipment as the designer in most cases. We got an interesting letter from Richard Boutillette of Harvest, Alabama. Richard was a little upset with Fosgate RC Service because they had put in some "fixes" in his Pro-Line that he thought Pro-Line should have put in during previous trips to the factory. He would like to see the model press publish recommended mods along with recommended sources for getting the mods incorporated.

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those responding to the survey also fly full-size aircraft! Compare this to 1973 when only 5% participated in full scale aircraft activity!

With regard to membership in the Academy of Model Aeronautics, and in individually organized R/C clubs, we are extremely encouraged by the following comparative figures:

	1971	1973	1975
% members of AMA	52%	65%	77%
% members of RC club	53%	49%	68%

As can readily be seen, AMA membership is up tremendously as are the number of individuals belonging to an organized R/C club. There are many varied reason for this, however, the prime reason given in supplemental statements on the Reader Interest Survey for Academy membership was the insurance provided and, insofar as club membership is concerned, the availability of the AMA Charter Club Program as well as the availability to club members of a regular flying site. The increase in membership in an organized radio controlled club is extremely gratifying considering the decrease in membership evidenced in 1973 over the 1971 Reader Interest Survey. Both AMA membership and organized R/C club membership are at an all-time high on the 1975 Survey. This can also be compared to the statistic on the 1975 Survey which indicated that 65% of our readers fly at a regular field with others while only 18% fly alone. 17% of those responding to the Survey indicated that they flew both at a regular field with others as well as alone. In addition, in answer to the question, "How many in your family, including yourself, build and/or fly R/C", the answer averaged 1.289 persons per family, indicating a definite increase in family participation over any previous Survey conducted by R/C Modeler Magazine.

Another evidence of change in the purchasing habits of RCM readers is that of the source of his purchase — either from a local hobby shop or from one or more of the mail order houses. In 1971, 58% of RCM readers purchased their supplies and materials from both hobby shop and mail order houses, while 37% purchased from hobby shops exclusively, and the remaining 5% bought exclusively from mail order houses. In the 1973 Reader Interest Survey these figures were definitely polarized, as 76% of our readers purchased their materials from hobby shops exclusively, while 24% purchased almost exclusively from the mail order houses. On the 1975 Survey, the mail order houses made further inroads into hobby shop sales as the figure of those who bought primarily from a hobby shop decreased to 70% while the mail order houses increased to 30%. This evidences a definite increase for the mail order concerns as well as a definite increase in volume for the hobby shop, with virtually no significant figure being indicated for "combination" purchases.

READER INTEREST AREA

Model Types

The following is a listing, in order of percentile preference, of the interest areas of R/C Modeler Magazine readers:

(1) General Sport Aircraft

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FROM THE SHOP

from page 156/2

(2) Sport or Stand-Off Scale Aircraft
(3) Sailplanes
(4) Pattern Competition Aircraft
(5) Competition Scale Aircraft
(6) Seaplanes
(7) Quarter Midget Pylon Racing
(8) Half-A Pylon Racing
(9) Rudder Only Pulse Proportional Aircraft
(10) Helicopters
(11) Open Pylon
(12) Formula I
(13) Sport or Competition Power Boats
(14) R/C Cars and other Land Vehicles
(15) R/C Sail Yachts

Radio Equipment Owned

5-8 Channel	55.5%
4 Channel	16.0%
Pulse Proportional	10.5%
3 Channel	12.0%
2 Channel	6.0%

Percentage of above built from kits or scratch: 20%

Transmitter Stick Mode of Radios Owned

Mode 2	58%
Single Stick	17%
Mode 1	15%
More than one mode	10%

Engine Size Preference

The following is the listing in percentile order of the preferred engine size in cubic inch displacement:
(1) .20 - .40
(2) .45 - .61
(3) all sizes
(4) .09 - .19
(5) .051 or smaller

Mufflers

Percentage of power fliers who regularly use mufflers: 60%

READER INTEREST AREA ANALYSIS:

In the first category listed, i.e., Model Types, General Sport Aircraft was, by far, the most popular as it was in 1969, 1971, and again in 1973. And, as in the past three Surveys, Sport Scale Aircraft was very close behind in percentage. Sailplanes maintained its third place position which it reached in 1973 moving from 5th in 1971. In 1969, Sailplanes moved up from virtually dead last position until it reached third place in overall popularity in both 1973 and 1975 edging out Pattern Competition from 3rd place in 1971 to 4th place in both 1973 and 1975. Again this year, as in 1973, Pattern Competition edged out Competition Scale. Seaplanes held their own in 6th place as they have done in 1969, 1971, and 1973. With one addition to this years Model Types, that being Half-A Pylon Racing, there were fifteen categories instead of fourteen. All categories up to 7th place remained exactly the same as they did on the 1973 Survey. Half-A Pylon racing took the 8th spot and Rudder Only Proportional moved up two positions from the 1973 Survey. What is quite surprising is that helicopters, which were virtually a new sport two years ago, dropped one position over the 1973 Survey. Open Pylon moved up one position and Formula I Racing dropped two positions in popularity. The last three categories, Boats, Cars, and R/C Sail Yachts were listed by so few people at all that it would be impossible to accurately state that one was preferred over the other since all three of these received almost no response

whatsoever.

There are several significant factors involved in this section of the Reader Interest Survey, particularly when coupled with the consensus of comments contained on those surveys. To begin with, as in 1973, Sport Scale or "Stand-Off Scale" aircraft ranked a close second to General Sport Aircraft, continuing this evidence of a desire toward more realism in radio control aircraft. This has held true for the past six years and is evidenced by the sale of kits on today's marketplace which resemble full scale aircraft rather than the "box-type" models so popular a few years ago. Rudder Only Pulse Proportional once again showed an increase as it has done on the past two Surveys, and which can be attributed to the consumers desire for small, lightweight models that can be flown out of the smallest of areas and what we would call "after-work and before-dinner" flying activities. This category showed an increase in 1971, another increase in 1973, and another major jump in 1975. The majority of those responding to the fact that they enjoyed single channel aircraft and owned single channel equipment also stated that they owned one or more digital proportional systems.

As we have done in the past two Surveys, we will once again predict that General Sport Aircraft will continue to maintain its number one position during the coming 24 months with Sport Scale pushing hard towards the number one position. We feel certain that Sailplanes will maintain its number three position, but predict little gain for helicopters during the next two years. Our prediction in 1973 for helicopters showing an increase in popularity proved to be erroneous and we would hesitate to predict an increase in their popularity at this time even with the advent of the lower priced kits available today.

R/C Power Boats, Sail Yachts, and radio controlled Cars are definitely out insofar as a wide scale market is concerned. Although the 1967, 1969, 1971 RCM Surveys rated R/C Boating in last place, the 1973 Survey showed an even more marked decline in popularity over the preceding two reports. The 1975 Survey showed a slight increase in popularity in Sport or Competition power boats only. Virtually no interest whatsoever was evidenced in R/C Cars even though sophisticated equipment for this facet of radio control has been available for almost 5 years.

Once again, in the 1975 Survey, we showed the channel preference for digital proportional systems and it is interesting to note that the 5 to 8 channel systems constituted 55.5% of the total systems owned with 4 channel accounting for 16% — an increase for the larger systems and a decrease for the 4 channel systems over the preceding year. Once again, as in 1973, Pulse Proportional systems were in third place and accounted for 10.5% of the total systems owned. Three channel digital systems increased in popularity from 10% to 12% while 2 channel systems decreased from 9% in 1973 to 6% in 1975. Perhaps the most interesting facet of this particular segment of the Reader Interest Survey is that the average number of radios owned per person is 1.881 with 20% of the total radios owned being scratch-built or built from commercially available kits. Once again, the trend towards kit or scratch-built radios is on the increase. Also, as in 1973, we asked our readers for their preference for transmitter stick mode. The mode II configuration increased from 54% in 1973 to 58% in 1975 with mode I dropping from 20% on the last Survey to 15% in 1975. Single stick increased in preference from 16% in 1973 to 17% in 1975. 10% of those responding to the Survey stated that they flew more than one transmitter stick configuration.

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FROM THE SHOP

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With regards to the brand of systems flown, the following radios were named by our readers: Micro Avionics, RS Systems, Orbit, Cannon, Royal, Kraft, Citizenship, World Engines, S & O, MRC, Heathkit, EK-logictrol, Mattel, R/C Manufacturing, Pro-Line, Ace R/C, Sanwa, PCS, Unicom, Multiplex, Min-X, Delta, Digitrio, F & M, O.S. and Testers. The following were the percentages of the major radio brands used by RCM readers:

Manufacturer	Total Percentage
Kraft Systems	22.0%
World Engines	15.0%
Heathkit	13.0%
EK-logictrol	11.0%
Pro-Line	5.6%
Ace R/C	5.5%

Note: "House Brand" radios were tabulated under the actual manufacturer. All other brand radios, other than those listed above, accounted for less than 5% each and, combined, totaled 27.9% of total radios used.

In response to the question as to whether or not the individual reader understood R/C electronics, the following was the percentage of the three choices given:

Basically:	65%
Fully:	19%
Not at all:	16%

For the second time, the engine size category showed a decrease in interest in the larger size engines (.45-.61 cubic inch displacement) with the first preference being for the .20-.40 size engine. The larger engines were in second place as they were in 1973. Those responding to the question with the comment that they flew all sizes of engines, moved from last place to third place while the .09-.19 engines were in 4th position while, surprisingly enough, the .049 or smaller engines rated last.

RCM FEATURE AND DEPARTMENT INTEREST AREAS

Departments

The following is the standing of the regular monthly departments of R/C Modeler Magazine as of the June 1975 issue in order of reader preference to the seventh place standing:

(1) Engine Clinic by Clarence Lee
(2) For What It's Worth
(3) From The Shop by Don Dewey
(4) Sunday Flier by Ken Willard
(5) Cunningham on R/C by Chuck Cunningham
(6) Radio Spectrum by Jim Oddino

(7) Here's How by Jerry Smith

Features

The following is the list of R/C Modeler Magazine features in order of reader preference:

(1) Aircraft Construction Articles
(2) Special How-To-Do-It Features
(3) RCM Product Tests
(4) Technical Type Articles
(5) Electronic Construction Articles
(6) RCM Visits Features
(7) Club and Contest News
(8) Helicopter Articles
(9) Boat Construction Articles

As evidenced in the preceding RCM Surveys of 1967, 1969, 1971, 1973, it is quite apparent that you want to know "how-to-do-it" — your preferences in both Departments and Features emphasize this desire for more and better projects, construction articles, as well as how-to features and the like. And this is exactly what RCM concentrates upon each month. An examination of the preferences for RCM's regular monthly departments shows that Engine Clinic by Clarence Lee maintains its first place position which it has held since 1969. In this particular column you are given specific information on how to deal with individual engines as well as answers to questions submitted to this department. In second place, for the third time, is For What It's Worth — the "hints and kinks" department which RCM expanded following the 1969 Survey. This year, From The Shop moved from 5th place in 1973 to 3rd place with the Sunday Flier column authored by Ken Willard in 4th place and Cunningham on R/C by Chuck Cunningham in 5th place. RCM's radio column, entitled Radio Spectrum, by Jim Oddino was in 6th place with the one page, 'Here's How', by Jerry Smith in 7th position. As soon as the results of your preferences for these various departments were in, several major changes were made in the format of R/C Modeler Magazine and its column and feature material, and additional changes will be made in the coming months based on your preference evidenced by this Survey.

If we look under the Features department, we find that your preferences for the type of features you prefer to see in R/C Modeler Magazine, closely follow your preference for column subject material, with aircraft construction articles obviously being of prime importance and special how-to-do-it articles in second place. It is interesting that RCM Product Reports is, once again, in 3rd place as it was in 1969, 1971, and 1973, with Club Contest news being virtually the least interesting aspect of the publication. Once again, boat construction articles, although listed in 9th position, received so few responses that it virtually does not rate a position on the chart. Helicopter articles, while rating 8th place, received prime exposure in

Holiday Greetings

The Editors and Staff of R/C Modeler Magazine would like to extend their warmest greetings to all of our readers, advertisers, and fellow members of the R/C Industry.

For the past several years, we at RCM have chosen to donate a monetary gift to different charitable causes, in lieu of sending holiday greeting cards with these same funds. This year we have chosen to "adopt" needy American children through the "Children, Inc." organization, and hope that perhaps our gift will help brighten their otherwise hopeless futures.

We hope that this donation will help us, in some small way, to share the good fortunes you have helped us to achieve, with those whose circumstances are less fortunate than ours.

RADIOMODELISME

The French "technical Leisure review" brings you, monthly, details of the most exciting up-to-the-minute hobby – electronics – and its application in models of all types.

When ordering your free specimen and subscription details, add four International reply coupons for Air Mail postage charges in writing to:

Radiomodelisme
21 rue des jeuneurs
75 – PARIS (2), France

MOST FAMOUS GERMAN SAILING – and oldtimer – model airplanes such as **Uranus / Darmstadt D-36 'Circe' / Kaiseradler / Messerschmitt Me 109 / Rumpler C-IV / Fokker Dr-1** (triplane) / World-Champs model **Marabu WM-69** (by Bruno Giezendanner) are issued by 'Flug & modell-technik,' the German magazine!

Sample issues with full-size plan and plans list may be ordered against $1.00 — pre-payment from

Verlag Technic
und
Handwerk,
Iburgstrasse 38,
D-757 Baden-Baden
Federal Republic
of Germany

R/C Modeler Magazine, once again, during the past two years in order to help promote this phase of R/C activity. Those interested in helicopters rated this material in first place while those who had no experience with helicopters at all rated it near the end of the scale. Since helicopter interest has dropped in overall popularity over the past two years, as evidenced by this Survey, this phase of our sport and hobby of R/C will be somewhat de-emphasized in future issues.

In response to the question, "What is your favorite construction article to appear during 1974-1975, the following were selected by our readers in order of their preference:

(1) The New Era III by Don Dewey
(2) The Aquila by Lee Renaud
(3) The Focke Wulfe FW-190 by Dave Platt

With regards to the question as to the favorite article or series of articles (other than construction articles) our readers choices were as follows:

(1) Foam by John D. Woods
(2) Hindenburg by Dick Burkhalter
(3) Helicopter Flight Training Seminar by Don Dewey

It is interesting to note that there is no pattern to the three aircraft chosen by our readers as their favorite construction articles. The first choice, The New Era III, a .19-.35 low wing Sport and Competition aircraft, while the Aquila is a Sport and Competition Open Class sailplane, and the Focke Wulf FW-190 is a Competition Scale project. With regards to the selection of Secondary articles, the series entitled Foam, by John D. Woods, the Hindenburg at Universal Studios, by Dick Burkhalter, and the Helicopter Flight Training Seminar had no relationship to each other, whatsoever. It was quite surprising to see the Helicopter series appear in the top three choices of secondary articles considering the rating of helicopter articles in general.

Since it is the policy of R/C Modeler Magazine to provide you with exactly the type of material you desire, certain changes have already been made in the format of R/C Modeler Magazine since the tabulation of this survey, as previously mentioned. With regards to RCM Product Reports, many thousands of dollars are spent by RCM each year testing, evaluating, and researching various products being produced by the R/C industry. The test pilots we use in the field know how to fly, and how to fly well. The evaluations are based upon the product itself and reports are written on that basis, not on that of advertising percentage, friendship, or any other extraneous influence. During the past two years RCM introduced a new Product Test format and, in response to the question as to whether or not our readers preferred this type of format, the answer was an overwhelming 87% in favor of the new format, 8% against, and 5% with no opinion.

PUBLICATION INTEREST AREA

Preference of Publication

The following is the listing, in order of percentile preference, of the standings of the model aviation publications:

(1) R/C Modeler Magazine
(2) Model Airplane News
(3) Flying Models
(4) Model Builder
(5) R/C Sportsman
(6) Scale R/C Modeler
(7) Model Aviation

Primary and Secondary Circulation

In response to the question as to how many people read each copy of R/C Modeler Magazine, the average was 2.067 persons. Approximately 80,000 copies of RCM are sold monthly.

Source of Purchase of R/C Modeler Magazine

In response to the question as to how their monthly copies of R/C Modeler Magazine were obtained, the following is the percentile break-

down:

Mail Subscription	55%
Hobby Shop	34%
Newsstand	11%

In response to the question, "What is your favorite ad in this issue?" (June 1975), the following was the order of preference:

(1) World Engines
(2) Hobby Shack
(3) Hobby Lobby International
(4) Hobie Model Company
(5) Hobby Market
(6) Sig Manufacturing

Once again it is interesting to note that in excess of 98% of all Reader Interest Surveys selected R/C Modeler as their first choice of model aviation publications. Model Airplane News retained its second place position that it held in the 1969, 1971, 1973 Surveys with an extremely large gap between second and third place. In the case of Model Aviation magazine, this publication was due to appear on the market but had not appeared at the time of the survey and thus its position in this survey must be disregarded. The major change this year was that, in years past, the majority of readers responding to the survey purchased the top three magazines while on this survey it was quite evident that this had changed to two magazines only, being purchased on a regular basis.

R/C Modeler Magazine Cover Preference

(1) May 1975 (bikini clad girl with old-timer on floats)
(2) June 1975 (Universal Studio's Hindenburg)
(3) January 1975 (bikini glad girl with sailplane)
(4) February 1975 (girl with hawk and sailplane)
(5) April 1975 (scale F-86 model alone)
(6) December 1974 (bikini glad girl with biplane)
(7) April 1974 (silhouette of girl with sailplane)

A study of the covers involved in this selection will indicate that RCM is maintaining the same type of covers that you have selected as your favorites.

This concludes the condensed version of the general data tabulated from the R/C Modeler Magazine 1975-1976 Reader Interest Survey. This has been an extremely time consuming and costly project, but one we are sure you will benefit from as much as we have. The thousands of replies received from you were quite explicit in your preferences — both as to your likes and dislikes. Although we have conducted this Survey every other year since 1967, we still had not anticipated anywhere near the response we received in 1975 — increasing substantially each time we take the Survey, and particularly when we consider that you were asked to complete a lengthy two-page questionnaire. As previously mentioned, a great percentage of your returns contained many additional notes and comments, all of which were read and summarized by our staff in order that we might make the necessary changes in R/C Modeler Magazine to meet your desires. And that is our business — giving you, the adult radio control sportsman and hobbyist the type of publication you want and can trust for reliability, integrity, and technical competency.

This Survey has greatly benefitted us — we have already made many of the changes suggested by you, for we intend to continue to give you the type of magazine you want RCM to be.

As we have stated in the past, this magazine is written for one person, and one person only — you, the radio control sportsman and enthusiast. And we are proud of the relationship that we have enjoyed with you during the past 12½ years. Thank you for your participation in this project. □