radio control
RC MODELER
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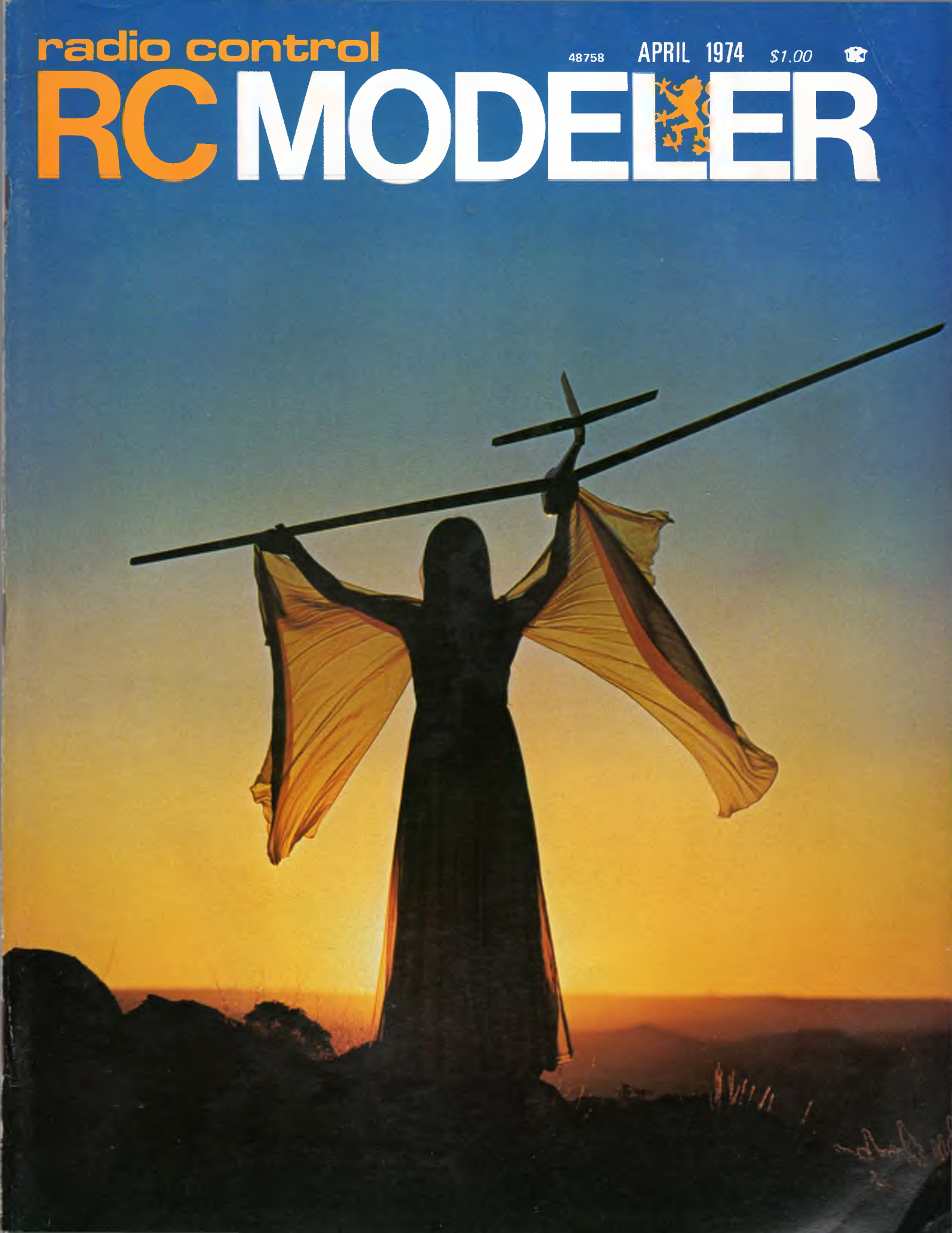

RCMODELER

FEATURES

PRODUCT TESTS

DEPARTMENTS

VOLUME II 1974 NUMBER 4

APRIL

THIS MONTHS COVER

A typical slope soaring site outside Albuquerque and a magnificent sunset enhance the beauty of Terrie Clifford and the Soarcraft "Libelle" which, incidentally has built quite an impressive name with its many contest wins. Ektachrome transparency by Max Mills.

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FROM THE SHOP

DON DEWEY

● This month, we are pleased to present you with the results of the 1973-1974 R/C Modeler Magazine Reader Interest Survey. This report represents the largest scale and most successful survey ever taken in the radio control field. Over 10,000 of the two page survey questionnaires were completed and returned by you - - - many of these accompanied by supplemental sheets of additional comments. Each of these surveys, individually, was statistically computed by RCM employees assigned to this job full-time until its completion. The individual questions and the 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 brackets so that a true picture could be obtained. In addition, the information compiled was cross checked against the 1971 R/C Modeler Magazine Reader Interest Survey in order to ascertain wherein your interests had changed during the past two years, and so that a short commentary on the impact of these changes could be noted for members of the R/C industry.

R/C Modeler Magazine would like to take this opportunity to thank each and every one of you who took the time and trouble to complete this questionnaire. The next twenty-four issues of RCM will reflect the majority desires as evidenced by the tabulated summary of the 1973-1974 Reader Interest Survey. Here are the results:

READERSHIP PROFILE

Occupation

Trade and General	45%
Engineering and Technical	18%
Student	12%
Professional	11%
Military	7%
Business and Executive	5%
Retired	2%

Income Brackets

$40,000 plus	2.5%
35-39,000	1.2%
30-34,000	2.4%
25-29,000	5 %
20-24,000	10 %
15-19,000	20 %
10-14,000	35 %
6-9,000	12 %
3-5,000	2.9%
0-2,000	9 %

Age

10-19	11%
20-29	24%
30-39	31%
40-49	24%
50-59	9%
60 & over	1%

Average age: 34.0 years

Years In Modeling

0-4 years	13%
5-9	15%
10-14	11%
15-19	9%
20-24	13%
25 & over	38%

Years In Radio Control

Less than 1 year	9%
1-4	52%
5-9	20%
10-14	10%
15 & over	9%

A.M.A. Membership:
65% currently belong to the A.M.A.

R/C Club Membership:
49% belong to an organized R/C club

Other Membership:
4% are active members of the LSF
2% are members of the ECSS
3% are members of the NMPRA

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

$10-24	44%
$25-49	33%
$50-74	13%
$75-99	3%
$100 plus	7%

Sources of Purchases:

Hobby Shop primarily	76%
Mail Order primarily	24%

READER INTEREST AREA

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

(1) General Sport Aircraft
(2) Sport Scale Aircraft
(3) Sailplanes
(4) Pattern Competition
(5) Competition Scale
(6) Seaplanes
(7) Quarter Midget Pylon Racers
(8) Helicopters
(9) Formula I Pylon Racers
(10) Rudder Only Pulse Proportional
(11) Open Pylon Racers
(12) R/C Boats
(13) R/C Cars
(14) R/C Sail Yachts

Radio Equipment Owned:

5-8 Channel	47%
4 Channel	23%
Pulse Proportional	11%
3 Channel	10%
2 Channel	9%

Transmitter Stick Mode of Radios Owned:

Mode 2	54%
Mode 1	20%
Single Stick	16%
More than one mode	10%

Engine Size Preference:
The following is the listing in percentile order of the preferred engine sizes in cubic inch displacement:
(1) .20 – .40
(2) .45 – .61
(3) .049 – .19
(4) All sizes

RCM FEATURE AND DEPARTMENT INTEREST AREAS

Departments:
The following is the standing of the regular monthly departments of R/C Modeler Magazine in order of reader preference:

(1) Engine Clinic by Clarence Lee
(2) For What It's Worth
(3) Sunday Flier by Ken Willard
(4) Cunningham on R/C by Chuck Cunningham
(5) From the Shop by Don Dewey
(6) Showcase '73
(7) Scale In Hand by Dave Platt
(8) Soaring With Don Dewey
(9) RCM Scale Plans
(10) A Page From Dick Tichenor's Photo Album
(11) Turn by Jim Simpson
(12) Basic Sailplane Design by Preston Estep, Jr.

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CUNNINGHAM ON R/C

BY CHUCK CUNNINGHAM

● 68 degrees in the house is just slightly on the chilly side. The thermostat may say 68 degrees, but everything else says, "it's cold!" As I am writing, this Winter has us in a pretty firm grip, even deep in the Heart of Texas. But, Daylight Savings Time has just made its Winter debut and, it's great! Well, it's not so hot early in the morning, but with the expanded daylight after work in the evening, we can get in some flying sessions if it would get a little warmer.

This Winter I have been doing some soaring with a number of my flying pals, and have made the interesting discovery that there seems to be all kinds of lift in the air, no matter what the temperature may be. We are not slope soaring, but flying regular thermal machines: Olympics, Floaters, White Trash, etc. Last Saturday afternoon we were out, the wind was blowing about ten to twelve (says so right on ole Jim's wind meter), and the temperature was around forty-five degrees. Gliders were going up like they were on an elevator. We didn't record super long flights, but two flights of over fifteen minutes were logged, and my best was twelve and a half minutes. If I hadn't tried it, I would not have believed the amount of lift that is operating in the frosty air. I did find that when the wind dropped down to five mph or less, the lift dropped with it. We were flying with a standard Airtronics Hi-Start which reaches a modest height. We have flown in winds over twenty mph on the same type frosty days, and at this wind velocity it's a bit more work to keep the sailplane up wind, and to find the lift, but it is there.

While on the subject of sailplanes and soaring, last October I spent an enjoyable afternoon on a ranch down near Hamilton, Texas, at the invitation of Leon York. It was a gathering of glider pilots from around central Texas, and Leon was testing out his new design that has since been kitted by Malco as the Eagle 134/118. This big machine is really a great floater, and will hang in the sky with the best of them. On its second flight it racked up twenty-three minutes, and I flew it for seventeen of the twenty-three. I haven't seen the kit as yet, but I can safely say that the flying ability of this big machine is top notch. Our old friend, Max Blose, should have a winner with this fine aircraft.

Due to the projected gasoline shortage, and the model fuel shortage, gliding and soaring should become even more popular in 1974 than in 1973. Our Reader Survey pointed out that Soaring had moved into 3rd place in overall interest, and it is easy to see why. This simply has to be the very easiest entry into R/C for the beginner. This Fall and Winter I have seen numerous beginning pilots solo their gliders after only one or two instruction flights, and after ten flights they are checking the stop watches on each flight and trying to hit the spot on each landing. Fantastic . . . The only drawback to this ease of learning a hard task is that come the Summer these same fliers may decide to take a try at a powered aircraft, and choose unwisely. A man (or woman for that matter) may be a pretty good self-taught Olympic pilot but, when he gets his thumbs on the control sticks of a Mach I or a Kaos, it's a new ball game, and one that he isn't going to win. If you are in this category then choose your entry into power wisely. Stick to a trainer type aircraft, high or shoulder wing if possible, and one that doesn't fly too fast. And, get someone who is an experienced pilot to help you get through the first few flights. That powered ship is going to fly a lot faster than your sailplane did, and will get into trouble much more easily. When you take your thumbs off of the control sticks it won't set itself upright in a nice flying condition as your sailplane did, but will aim itself right at the ground. You will have to fly it out of trouble. Take a word of advice and proceed with caution. If you are careful, you will have a good time on your venture into power. What is needed is a true transition machine to guide the soaring pilot into power flight. I have been giving some thought to this type of aircraft, and it seems to me that it should be half glider and half power. It should be powered with a small engine such as a .15. It should have ample dihedral, a flat bottom wing, a two wheel landing gear for ease of hand launching, and control by rudder and elevator only. Of course, throttle control should be used. This would allow the use of the same "brick" type radio that has become so popular for gliders, with the addition of an extra servo for throttle control. Once you have mastered flying with this set-up, then strip ailerons could be added to the trailing edge of the wing, with the ailerons either coupled to the rudder, or, the rudder disconnected from the servo and locked into place, and the rudder servo used to operate the ailerons. Control movement should be quite a bit less than that used on your glider. Limit the rudder throw to 1/2" each way and elevator to about 1/4" up and down at first until you become familiar with flying this faster machine. The landing gear should be detachable and a tow hook installation built into the bottom of the fuselage so that first flights can be made with the engine dead and the aircraft projected into the air by the Hi-Start. I will get this design down on paper and see what it can do, and if it works the way that I want it to, we will present it to you.

●

For a long time now we have been bringing to the readers of RCM a continuing series on helping the beginner really get started in R/C. It has been our intention to try to help the fledgling over the rough spots by giving him the help and advice that would ease his problems. An area that I seem to have overlooked is one that is very important - - - what makes an aircraft fly. Not the aerodynamics of it, but rather the mechanics of what makes an aircraft fly. By the word "fly" I mean just that – FLY – not just sort of "exist in the air." So many times I have heard a good kit or a good design given a bad rap because the modelers pride and joy did not live up to the standards the original prototype possessed. In some cases this was because the selling job for the kit or the magazine plan was laid on a bit too hard. No aircraft is so great that all of the others are bums in comparison. More often it is because the builder of the model screwed up his construction or his finishing, and his folly is blamed upon the poor model. Let us take a look at the things to do to insure that the aircraft that you are building will FLY.

First, construction: You must do a **good building job**. If this is your first model, then you should do everything possible to insure that your construc-

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engine clinic

By Clarence Lee

Dear Mr. Lee,

I have often wondered how the name "Veco" came into being. I understand you were the designer of the Veco .19, .61, and old .45, so thought you might be able to shed some light on the matter.

Respectfully yours,
Roger Simmons
St. Louis, Missouri

A gentleman named Gil Henry started the Henry Engineering Co. in 1946 and their first products were a line of model airplane wheels. The trade name "HECO" was first used. However, it seems that some other company had copyrighted the name previously and threatened with a lawsuit. Being right after WW II, and the old "V" for Victory symbol still being popular, the "V" was substituted for the H and the name VECO formed.

For those who might be interested in a little more history of the VECO operation, Hi Johnson, a well known gentleman in modeling circles, shortly joined Veco Products and the line was expanded to include U-Control kits and accessories. Some of their more popular kits were the Chief, Squaw, Warrior, etc. Several kits I had a hand in as designer were the Redskin for U-Control team racing, and the Tom-Tom and Tomahawk. As the business grew, it was decided to add an engine line and the Veco .29 and .31 were born. These engines were made solely by K & B at that time – the internal parts being, essentially, K & B .29 and .32 parts put into a different die cast case.

As engine sales grew, Veco Products decided to manufacture their own engine and Mel Anderson was hired for the design job. Many of the old timers out there are familiar with Mel Anderson as co-designer with Bill Atwood on the Baby Cyclone (which first appeared in 1935) and later the Anderson Spitfire. Mel designed the first 100 series Veco .19 and .35. Mel eventually left Veco and it was at this time that I became their engine design consultant, the first engine being the Veco .45 which was the production version of my own Lee .45 that I had produced in limited quantities. The .45 was followed by the redesigned ball bearing version of the Veco .19 and finally the Veco .61. Next in line was to be a new ball bearing .29 and .35. Prototypes of the .29 were made and one of these held the U-Control Proto speed record for about a year or so.

In conjunction with the model airplane business, the Henry Engineering Company had also been doing sub contract work for many of the full size aircraft companies in the area such as Douglas, Lockheed, etc. This included missile parts, electrical connectors for the atomic submarines, sub-assemblies for aircraft seats, and many other aircraft related parts. The aircraft seat business was beginning to boom as many foresaw the coming of the Boeing 747, Lockheed 1011, etc. Henry Engineering Company made the decision to devote all their efforts to the full size aircraft field with aircraft seats being the main product. With this goal in mind they decided to sell the model airplane line which was Veco products. Arrangements were made for the sale of the engines, wheels and U-Control accessories to K & B and of the Veco kit line to Dumas products. A final chapter is the most recent sale of the Veco accessory line of products to A & L Manufacturing run by well known RC'ers Bud Anders and Larry Leonard, with K & B now producing the engine line only. K & B decided to sell the wheel, tank, and accessory business in order to make room for expansion of the intended line of engines. So much for the history of Veco products.

Dear Mr. Lee:

I have 2 Veco .45's which have been out of service for several years. Both ran well, but not enough to be worn out. One is a "Lee Custom" which you prepared for me "back then!" I know very little about the insides of engines, but decided to look these over in the interest of learning.

The only problems I can see so far are: The "Custom" piston is tight in the sleeve just above the ports. I've used some crocus cloth on both pieces, with only a little improvement.

The "other" engine's piston is very free in the sleeve until about 1/8" from being flush at the top, then it gets very tight – just won't go any further (by hand). An interesting fact is that the "other" piston will go into the "Custom" sleeve easily and completely, but vice versa won't go at all!

I've read all back issues of "Engine Clinic" (I think!) and the only relevant info was that Veco .45's should fit "tighter" at the top than the bottom. What's "tight?" Should the piston be completely free throughout the sleeve? How can I determine when these piston/sleeve "fits" are correct? And, how do I produce (work) to get these "fits"? One smaller question – which way does wide side of con rod bass go – front or back?

Thank You,
Jack Dunn
Tulsa, Oklahoma

The correct piston/sleeve fit is a little hard to describe on paper, especially when the fit will vary between different makes of engines. Some

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SUNDAY FLIER

KEN WILLARD

● Everybody knows what a thermal is, right? Right!

Wrong! Did you ever look it up in a dictionary? I did – in about five, before I found the definition: "A rising current of warm air," in Webster's Third New International Dictionary. All the others left it hanging with the adjective form "of or having to do with heat."

So anyway, I found what we use as the definition when we talk about thermals. But what about the physical structure of "a rising current of warm air?" Is it like a stream of rising air, or is it a bubble?

And why does warm air rise? Everybody knows the answer to that – it's lighter than cold air. So how come, if warm air is lighter, that the higher you go (up to a point) the temperature is colder? Why doesn't that colder air sink to the surface?

Now let's confuse the issue. Although the temperature at higher altitudes is colder, the air is actually warmer than the air at the surface. How do you explain that?

Pressure is the answer, of course. If you took the air at altitude and brought it down to the surface, it would be heated by the compression, and the rate at which it is heated under normal conditions would result in its being warmer than the air at the surface, so it would tend to go back up where it came from – because it's lighter than the surrounding air at the surface.

Next question. Where does the air get its heat? Why, everybody knows the answer to that; from the sun, of course – right? Wrong again. On a technicality – but a very important one. The technicality is that the air gets most of its heat from the earth. Sure, the sun is the source of all the earth's heat, including that in the atmosphere, but the rays from the sun penetrate the atmosphere and go directly to the earth, heating up the earth, which absorbs the rays, and then transfers the heat to the air. Oh, some of the sun's heat is picked up by the air directly, but the amount is small compared to the heat received from the earth. And that, in an oversimplified nutshell, is why we have rising currents of warm air - - - or thermals.

Here's an interesting fact that you can have some fun with. It's related to all that discussion above concerning the earth's heat. Let's put it in the form of true, but misleading, statements. First, we get heat from the sun by radiation – just like you get heat from a fireplace. Now, the nearer you get to the fire, the warmer it gets, so, in the same way, the nearer you are to the sun, the warmer it gets. Therefore, since it's warmer in Summer than it is in Winter, the sun must be closer to the earth. Sorry – not here in the good ole' U.S. of A. Just the opposite; the sun is farther away from us in the Summer. So how come it's warmer? A couple of reasons; in Summer the rays hit us more directly, and they don't have to go through quite so much air, which does pick up some of the heat directly.

And now I suppose, like the old downwind turn question, I'll be getting some letters telling me that ain't the way it is – or at least the reasons I gave aren't really why it's the way it is. Great – look at all the fun we've had with the downwind turn bit – and no one has convinced everybody who flies that inertia relates to space rather than the earth's surface.

Let's get back to thermals. Earlier I asked whether they are like a stream coming up from the earth, or a bubble. They start like a stream, but end up like a bubble. Nearly all of you who have done any thermal soaring have been in the situation where a friend has gone up, caught a thermal and continued on up, so you hurriedly launch, get off the hook and race over to get the same thermal, only to find that even though you are right under him – even slightly upwind to take care of the drift, nothing happens except he stays up and you come down. You just didn't quite make it up into the base of the bubble of rising air that he was in. Discouraging, isn't it? But, next time you may be the one to hit the bubble; thermals are where you find them – not necessarily where they should be.

And where should they be? Wherever the earth has absorbed a lot of the sun's heat, became relatively hot compared to surrounding areas, and starts giving off that heat. You are all familiar with the commonly known types of surface that gives off heat – concrete runways, plowed fields, asphalt parking lots, rooftops, etc. You can pick up little risers from them fairly early in the morning, even when it's still. Later on, as a little wind starts to blow, it will carry cool air from adjacent land areas over the warm areas, and the warm air will be forced to rise and give way to the cool air. Then, the warm air becomes a "bubble" which rises through the air until it finally reaches a level where it is at the same temperature – and pressure – as the surrounding air. And that's the end of that thermal.

Another interesting fact about rising air bubbles; they tend to rise without immediately transferring some of their heat to the surrounding air. The opposite is also true; down currents (negative thermals?) don't either. In other words, up and down air movements tend to occur without gain or loss of heat; the technical name for such movement is "adiabatic." To a certain extent, we humans do the same thing. You know – when you go out to get the paper on a cold Winter morning, you can go out, get it, and get back before you've really been hit by the cold. But if you stayed outside, before long the heat transfer from you to the air would cool you down. Same thing in the Summer when you leave an air conditioned office and go out into the hot Summer air.

Now if the air which is rising doesn't tend to gain or lose heat in the process, what actually happens to the measurable temperature? It goes down, due to the decreasing pressure and resultant expansion. The rate at which it goes down, when there is the theoretical condition of no gain or loss of heat, turns out to be about 10 degrees Centigrade for every 1000 meters in altitude, providing that any moisture which is in the air in the gaseous state doesn't condense. If that happens, the rate changes – but that's another and more complex factor. For the most part, we are not too concerned with that phase, because that's above the "condensation" level, where the base of clouds form, and most of our soaring is below the clouds (although a lot of us have been seized by "thermal narcosis" and watched our sailplanes disappear into a cloud). So, let's not get too deeply into that; I used to try to explain it to Air Force cadets in primary training, some thirty-five years ago, and never did feel that they fully grasped the theory of

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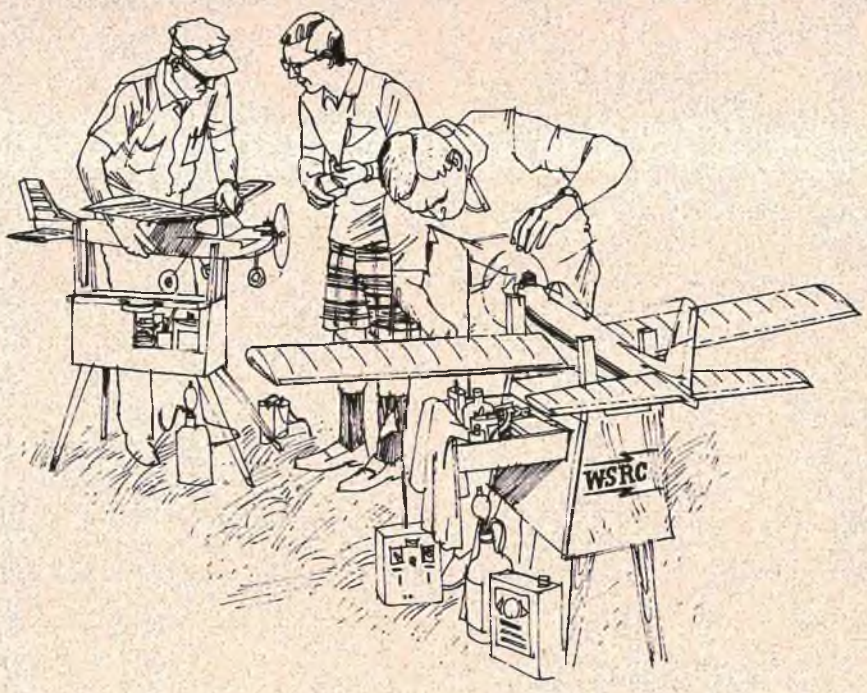

S*M*A*S*H

Or.... Some Maneuvers Are Sure Hits

BY KENNETH RIEKE

● "Well, um, well, . . ." said Brian, uncomfortably, handing me back my transmitter, "Um, actually, Kenny, um, I . . . ah . . . don't really think that – uh – we'll find too much left of it. That was, uh, pretty spectacular, if you know what I mean."

"Yeah," I replied with what I hoped was an appearance of unconcerned, It-Happens-Every-Day nonchalance. "Don't give it another thought." This came out in a somewhat strangled, high-pitched whisper.

We started – slowly – to walk toward the "landing" site, glumly watching a very pretty wing flutter slowly earthward, reminding me of the last leaf of autumn spiraling down.

The events leading up to this debacle began a few weeks earlier, with the completion of my A-Ray, an O.S. .30 powered Lew Andrews beautiful kit. This guy, incidentally, kits what seems to me to be one of the strongest, most indestructible airplanes in the model business. I am inclined to believe – following subsequent events – that his balsa is not really balsa. It is perhaps balsa coated magnesium. He has obviously hit upon his own secret formula for making this stuff easy to cut with an X-Acto blade. Fabulous.

Anyway, following an absence of some seventeen years from model building, I picked up a copy of RCM at my local newsstand. I did this merely out of curiosity to see what was happening these days in the model airplane business.

Mmmmmm. Very interesting. We never had these nice lookin' boxes with the shiny handles that obviously did things. What's propo? What's digital? What's full-house? What's a clevis? Aileron control? They kiddin'? Any control at all proved the value of prayer using the radios that I knew about. Galloping Ghost? Sounds like a friend of Ichabod's.

Many issues later, I bought my first R/C kit. The building wasn't difficult. Just very, very enjoyable. Brought back a lot of memories, and I knew when I spread out the plans to start that I was hooked again.

Well, of course, when it was finished, all bright yaller and red, I had to try it out. Only trouble was, I didn't know anybody to ask for help. But what the heck, I knew enough about flying to teach myself.

All gear installed and bench tested, I decided to do some further testing outside. A range check would be nice. So, removing the transmitter antenna, I started the engine, set up the needle valve a little, and moved the sticks on the Orbit. Boy, was it smooth. Everything worked just like it was supposed to.

Deciding to be more daring, I tried taxiing. Beautiful. No problem. Just feed in some easy throttle, and off she rolled. After a few feet, I'd back off and she'd stop. Walking over I turned it around and taxied back. A little more power this time. A little too fast rolling this time. Chop back on the throttle and, of course, nothing happened. She just kept picking up speed, and was now more than halfway across the lawn, and really moving.

So was I, because I realized that I had taxied my little beauty right on out of range. No antenna, remember?

At this point I was sincerely regretting all the beer that I had consumed over the years. I wasn't gaining, and was beginning to have visions of a forty year old dummy crashing through the neighbors tomatoes and roses as I made like a high speed water buffalo.

The Great Chase didn't last long, though. At the far end of the yard was a large pile of tree branches which I hadn't yet – very prudently, I thought now – removed.

But suddenly every little stick in that pile became crystal clear and very, very sharp. They also malevolently rotated until they were all gleaming spear-like in the afternoon sun, aiming right for my little plane's vitals.

I speeded up my own pace, hoping to grab it before it was permanently impaled. (My wife, who was expectantly observing these involved test procedures from the kitchen window, later asked why I didn't run, instead of sauntering after it.) I was getting close – about fifty feet – when it went in. I watched it lace itself around, under, and through – well, not quite through – the spear pile.

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Al Wolsky's
BUHL PUP

The Buhl Bull Pup was a small light sport plane of the 1930-1932 era. Not more than a hundred were manufactured when the company fell victim to the Depression. It was powered by a 3 cylinder Szekely engine of 45 HP. This Pup model could be called Stand-Off Scale since no attempt was made to duplicate the real Pup in every detail. Power the model with engines in the .25 to .29 size range.

WING:

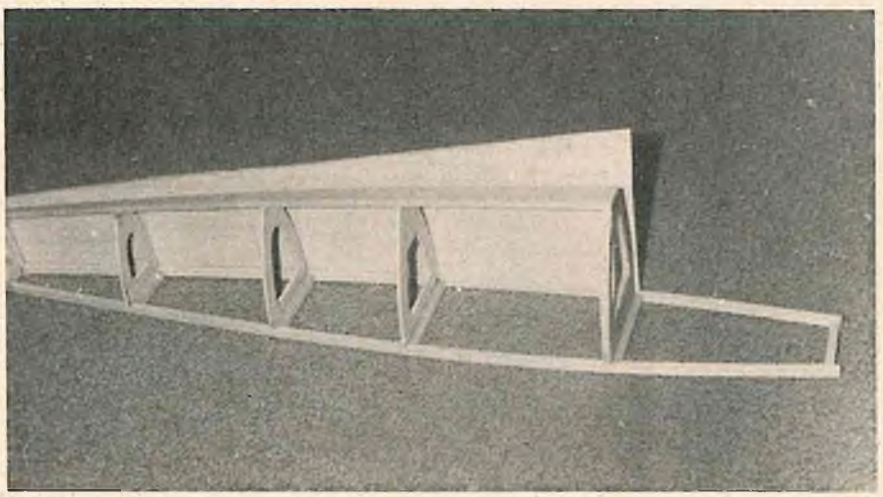
Cut the tip outlines from 1/4" sheet and glue the pieces together over the plan. Cut (2) 1¾" x 26" from 1/16" sheet (need (2) 1-7/8" x 26" x 1/16" for top leading edge) and (4) 1" x 25" from 1/16" sheet. Lay (1) 1" x 25" x 1/16" and (1) 1/16" x 1¾" x 26" over the plan. Mark the center lines of each rib on the sheet. Cut the 1/4" x 1/16" capstrips and glue the lower ones in place. Glue the tip outline in position. Note that the latter goes over the lower 1/16" pieces. Glue in the lower 1/4" square spar. Now glue all ribs in place. The top spar is next. Taper and blend in the tip outline where it meets at the trailing edge. Glue in place the 1/4" x 1/4" leading edge and the 1/16" x 1" trailing edge as well as the 1-7/8" x 1/16" leading edge. Now glue in the top capstrips. Oil the plan and use the reverse side to build the other half. When both panels are finished, cut and glue dihedral braces in place and complete the center section.

EMPENNAGE:

The tail surfaces are constructed of 1/4" sheet and 1/4" square balsa strips. Note the plywood insert at the center of the elevator.

FUSELAGE:

From the top view construct a crutch of 1/4" square balsa. To this add the formers as noted on the plans. Form the main landing gear from 1/8" wire and mount it in place on the No. 2 ply former. At this time glue the lower keel 1/4" sheet strip in place. Now take (2) 1/8" x 6" sheets and glue in place along the crutch. When this is dry wet both sheets and bring down to and glue to the keel, holding in place with pins, masking tape, etc. Cut out firewall No. 1 and the 1/4" plywood nose keel and epoxy these in place. Tack glue 2 – 2" x 6" x 5" blocks in the nose area and shape and sand to shape. Fit the wing in place and add the formers. Plank the top



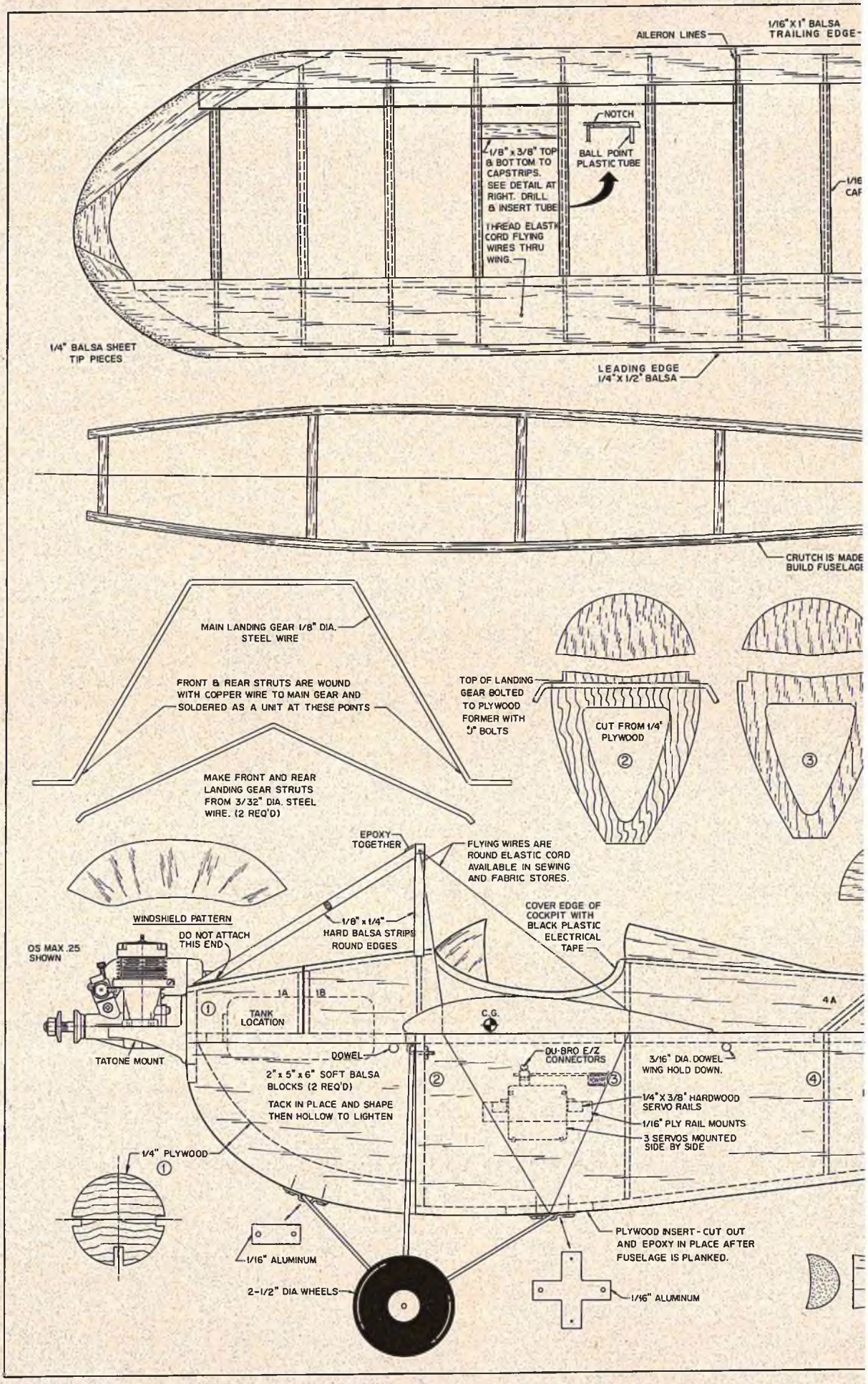
back to the tail block with 1/8" x 1/4" strips. Remove the two nose blocks and hollow out, then glue back in place. Fill in any cracks in the planking with filler and sand the entire model gradually working down to fine sandpaper.

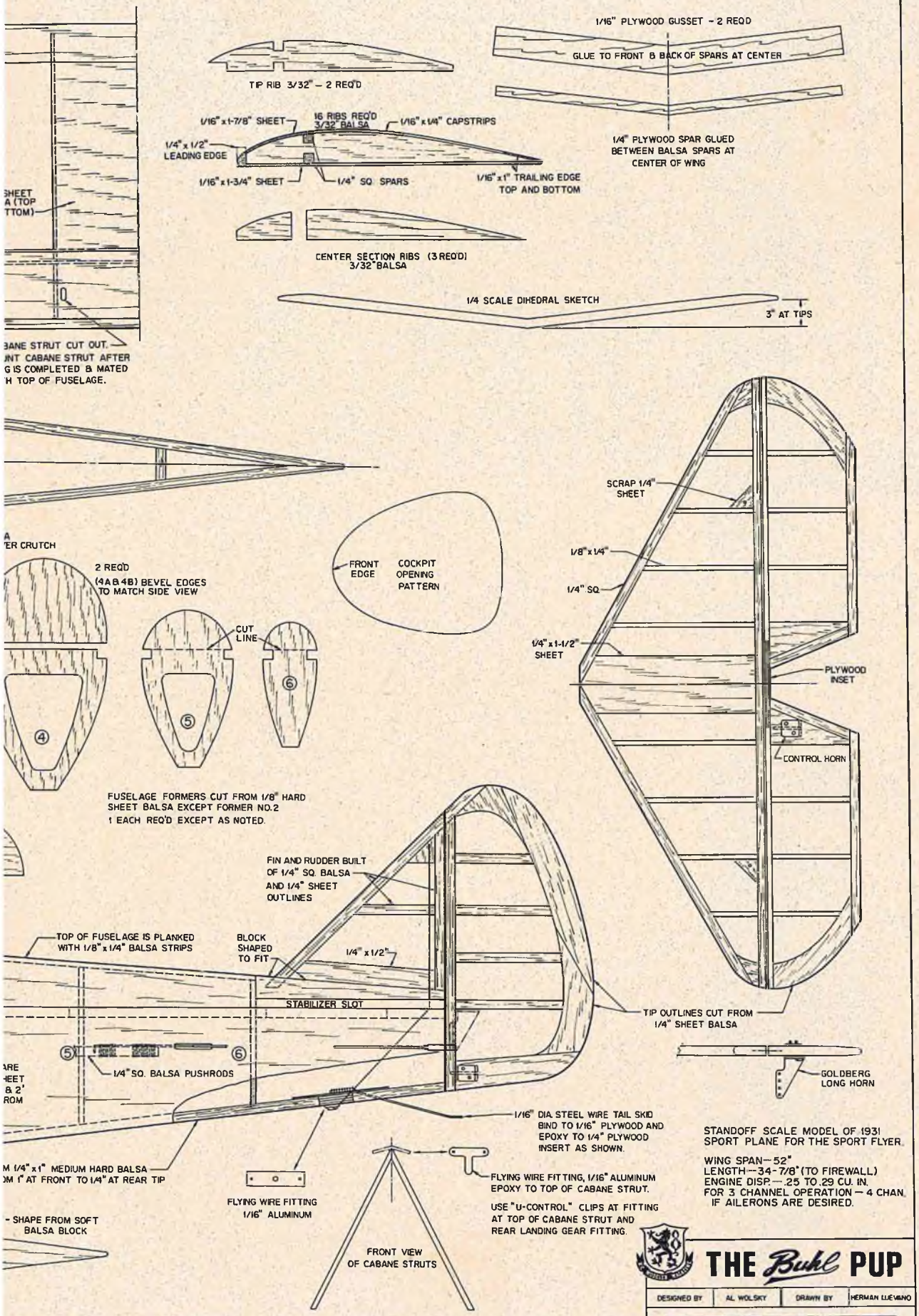
Give all wood areas two coats of sanding sealer, sanding between coats then cover with your favorite material. Mine was covered with Silray and finished with dope. The wings were painted yellow and the fuselage red. Add scale details as desired. Adding wing walks, a windshield, and two dummy cylinders 120 degrees from the glow engine would add to the appearance. When mounting the gear cut pieces of plastic sheet and insert between the gear and the fuselage to protect the finish.

FLYING:

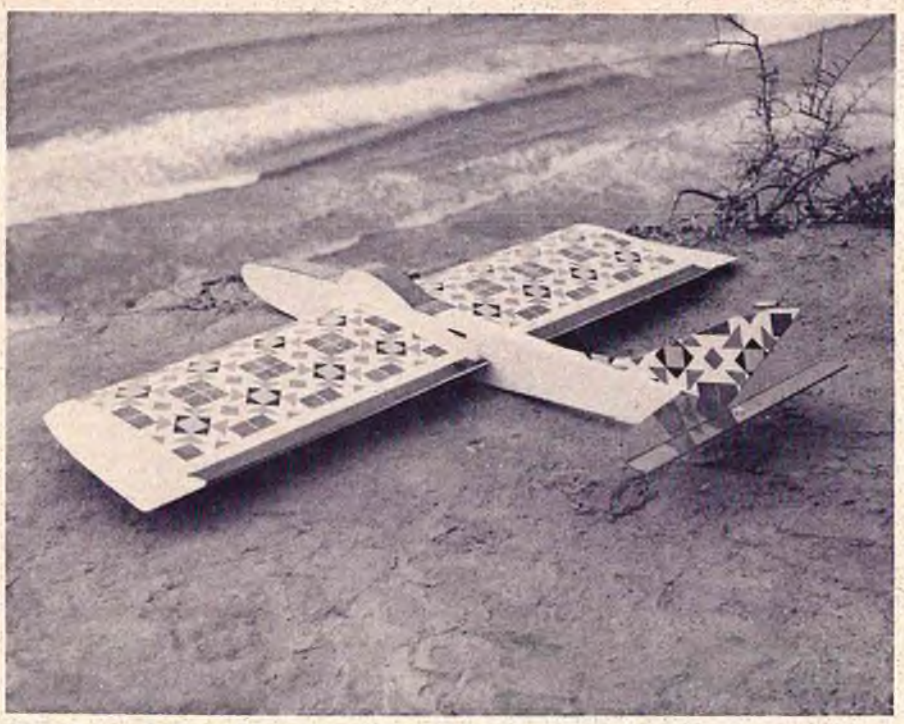
With the gear set up to track straight, the model should lift off with no problem. One thing to remember though is that both the rudder and elevator are large surfaces and the model reacts to the slightest stick movement, so limit that movement by using long horns, etc., and take it easy on initial stick movements. The Pup pictured is the author's second prototype and both present no problems whatsoever. Any three channel digital system will handle the Pup. As mentioned, two models have been built and have been powered by the new Fox .25 RC engine. This engine has ample power for the Bull Pup.

Good Flying! □


AILERON LINES
1/16"X1" BALSA TRAILING EDGE
NOTCH
BALL POINT PLASTIC TUBE
1/8" x 3/8" TOP & BOTTOM TO CAPSTRIPS. SEE DETAIL AT RIGHT. DRILL & INSERT TUBE
THREAD ELASTIC CORD FLYING WIRES THRU WING.
1/4" BALSA SHEET TIP PIECES
LEADING EDGE 1/4"x 1/2" BALSA
CRUTCH IS MADE BUILD FUSELAGE
MAIN LANDING GEAR 1/8" DIA. STEEL WIRE
FRONT & REAR STRUTS ARE WOUND WITH COPPER WIRE TO MAIN GEAR AND SOLDERED AS A UNIT AT THESE POINTS
MAKE FRONT AND REAR LANDING GEAR STRUTS FROM 3/32" DIA. STEEL WIRE. (2 REQ'D)
TOP OF LANDING GEAR BOLTED TO PLYWOOD FORMER WITH 3" BOLTS
CUT FROM 1/4" PLYWOOD
EPOXY TOGETHER
FLYING WIRES ARE ROUND ELASTIC CORD AVAILABLE IN SEWING AND FABRIC STORES.
WINDSHIELD PATTERN
DO NOT ATTACH THIS END
1/8" x 1/4" HARD BALSA STRIPS ROUND EDGES
COVER EDGE OF COCKPIT WITH BLACK PLASTIC ELECTRICAL TAPE
OS MAX .25 SHOWN
1A
1B
4A
TANK LOCATION
C.G.
TATONE MOUNT
DOWEL
2" x 5" x 6" SOFT BALSA BLOCKS (2 REQ'D)
TACK IN PLACE AND SHAPE THEN HOLLOW TO LIGHTEN
OU-BRO E/Z CONNECTORS
3/16" DIA. DOWEL WING HOLD DOWN.
1/4" X 3/8" HARDWOOD SERVO RAILS
1/16" PLY RAIL MOUNTS
3 SERVOS MOUNTED SIDE BY SIDE
1/4" PLYWOOD
1/16" ALUMINUM
2-1/2" DIA WHEELS
PLYWOOD INSERT - CUT OUT AND EPOXY IN PLACE AFTER FUSELAGE IS PLANKED.
1/16" ALUMINUM


1/16" PLYWOOD GUSSET – 2 REQ'D
GLUE TO FRONT & BACK OF SPARS AT CENTER
TIP RIB 3/32" – 2 REQ'D
1/4" PLYWOOD SPAR GLUED BETWEEN BALSA SPARS AT CENTER OF WING
1/16" x 1-7/8" SHEET
16 RIBS REQ'D 3/32" BALSA
1/16" x 1/4" CAPSTRIPS
1/4" x 1/2" LEADING EDGE
1/16" x 1-3/4" SHEET
1/4" SQ. SPARS
1/16" x 1" TRAILING EDGE TOP AND BOTTOM
CENTER SECTION RIBS (3 REQ'D) 3/32" BALSA
1/4 SCALE DIHEDRAL SKETCH
3" AT TIPS
BANE STRUT CUT OUT.
INT CABANE STRUT AFTER G IS COMPLETED & MATED H TOP OF FUSELAGE.
SCRAP 1/4" SHEET
1/8" x 1/4"
1/4" SQ.
1/4" x 1-1/2" SHEET
PLYWOOD INSET
CONTROL HORN
FRONT EDGE
COCKPIT OPENING PATTERN
2 REQ'D (4A & 4B) BEVEL EDGES TO MATCH SIDE VIEW
CUT LINE
FUSELAGE FORMERS CUT FROM 1/8" HARD SHEET BALSA EXCEPT FORMER NO. 2
1 EACH REQ'D EXCEPT AS NOTED.
FIN AND RUDDER BUILT OF 1/4" SQ. BALSA AND 1/4" SHEET OUTLINES
TOP OF FUSELAGE IS PLANKED WITH 1/8" x 1/4" BALSA STRIPS
BLOCK SHAPED TO FIT
1/4" x 1/2"
STABILIZER SLOT
TIP OUTLINES CUT FROM 1/4" SHEET BALSA
1/4" SQ. BALSA PUSHRODS
GOLDBERG LONG HORN
1/16" DIA. STEEL WIRE TAIL SKID BIND TO 1/16" PLYWOOD AND EPOXY TO 1/4" PLYWOOD INSERT AS SHOWN.
M 1/4" x 1" MEDIUM HARD BALSA
M 1" AT FRONT TO 1/4" AT REAR TIP
- SHAPE FROM SOFT BALSA BLOCK
FLYING WIRE FITTING 1/16" ALUMINUM
FLYING WIRE FITTING, 1/16" ALUMINUM EPOXY TO TOP OF CABANE STRUT.
USE "U-CONTROL" CLIPS AT FITTING AT TOP OF CABANE STRUT AND REAR LANDING GEAR FITTING.
FRONT VIEW OF CABANE STRUTS
STANDOFF SCALE MODEL OF 1931 SPORT PLANE FOR THE SPORT FLYER.
WING SPAN—52"
LENGTH—34-7/8" (TO FIREWALL)
ENGINE DISP.—.25 TO .29 CU. IN.
FOR 3 CHANNEL OPERATION – 4 CHAN. IF AILERONS ARE DESIRED.
THE Buhl PUP
DESIGNED BY | AL WOLSKY | DRAWN BY | HERMAN LUEVANO
0 1 2 3 4 5 6
PLAN NO. 555

PATCHES



BY PAUL F. DENSON

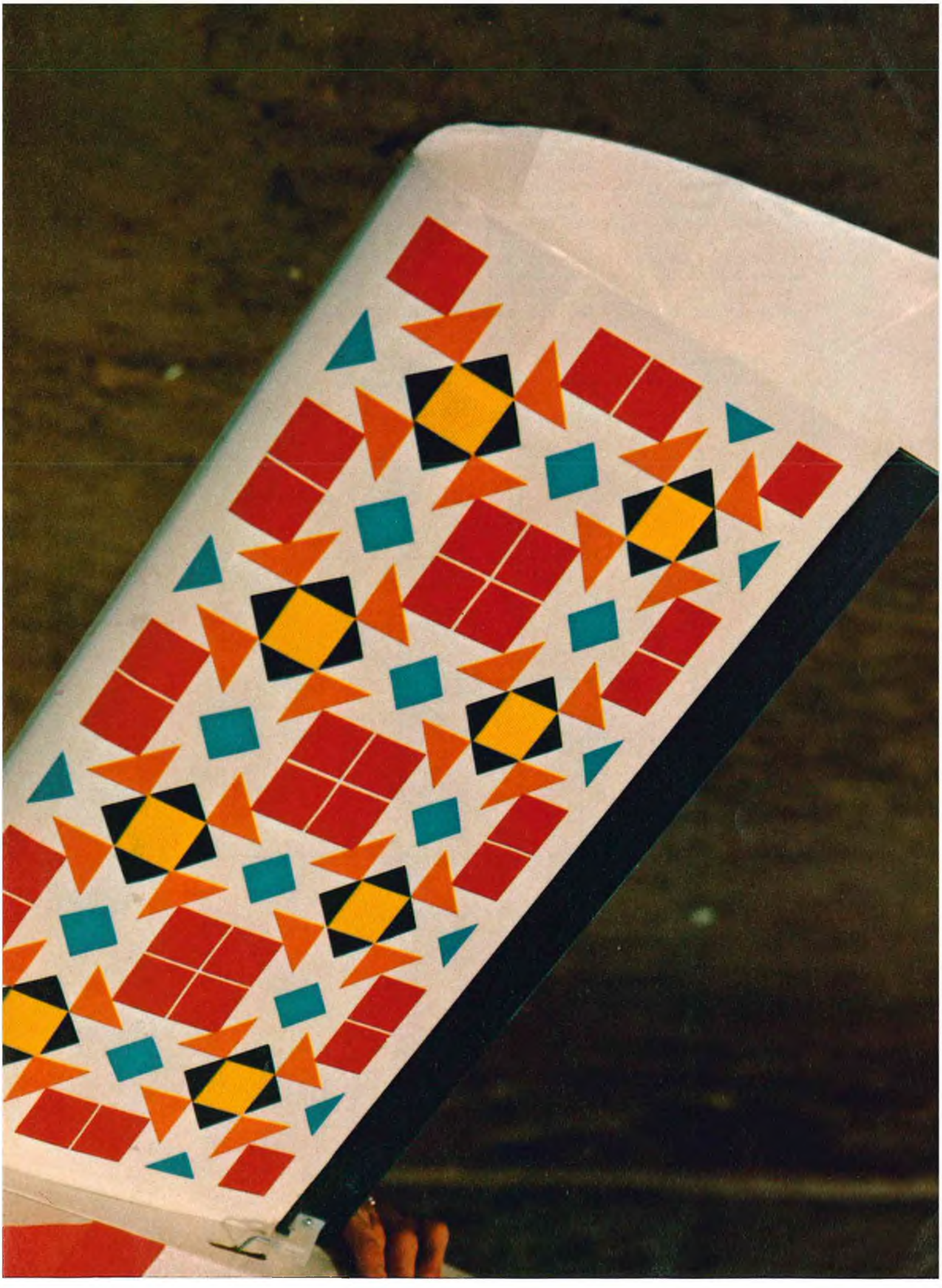
● Patches came about due to a lack of funds necessary to purchase a whole roll of MonoKote, or so my wife insisted. As a consequence, I decided I would clean out the plastic covering scrap box. Just like everyone else, you keep all those little cutoffs just like Grandmother did some years ago when all the dresses and shirts Mom and Dad wore were handmade. Then, Grandmother got all the little pieces together, sewed them into neat little squares, put the squares together in one large piece, then called in all the neighborhood ladies. They, in turn, got out the quilting frame and proceeded to make a beautiful quilt that kept you warm on those long cold winter nights.

My wife actually gave me the idea by having knitting and needlework magazines in the house. In one of these magazines I saw a patchwork quilt and got the brainstorm for Patches. Nowhere on the whole plane is there a part from a new roll of Solarfilm or MonoKote. The largest single pieces are on top of each wing panel. Without counting the covering, there are over 250 individually applied pieces.

The first task was to measure the surface and see how it could be divided into unit cells. Each wing happened to have an 8" x 16" rectangle which is divisible into eight four inch squares. The four inch square became my unit cell. I drew a four inch square on a piece of graph paper, then drew various squares, triangles, and diamonds on the unit cell until I got what I thought would be a pleasant repeating pattern. Using a steel rule and a sharp razor blade, I cut pieces of heavy cardboard to the exact size of each shape in the cell. About this time it was discovered that shapes from the neighborhood squares on the sides and corners multiplied the size and shape of certain parts, so I cut cardboard shapes for these multiples as well.

Using a wax pencil, I drew the outline of the series of unit squares on the wing. This, by the way, must be very accurately done. Then, by looking at this grid and the basic cell on the graph paper, you can count how many of each piece you will need. By laying the cardboard jigs on strips of MonoKote accurately cut to the width of the jig, all you have to do is cut the pieces to length. Triangles are cut from altitude width strips. Diamonds are cut out the same way as squares and rectangles. Color and placement will be determined by the amount of scrap of each color you have on hand.

Start the covering procedure by tacking on the corner pieces. Single and double corners will fall on the outside margin and quad corner pieces will fall in the interior of the grid. I tacked each piece down with a few pecks of the tip of the iron, which will hold them firmly in place while they

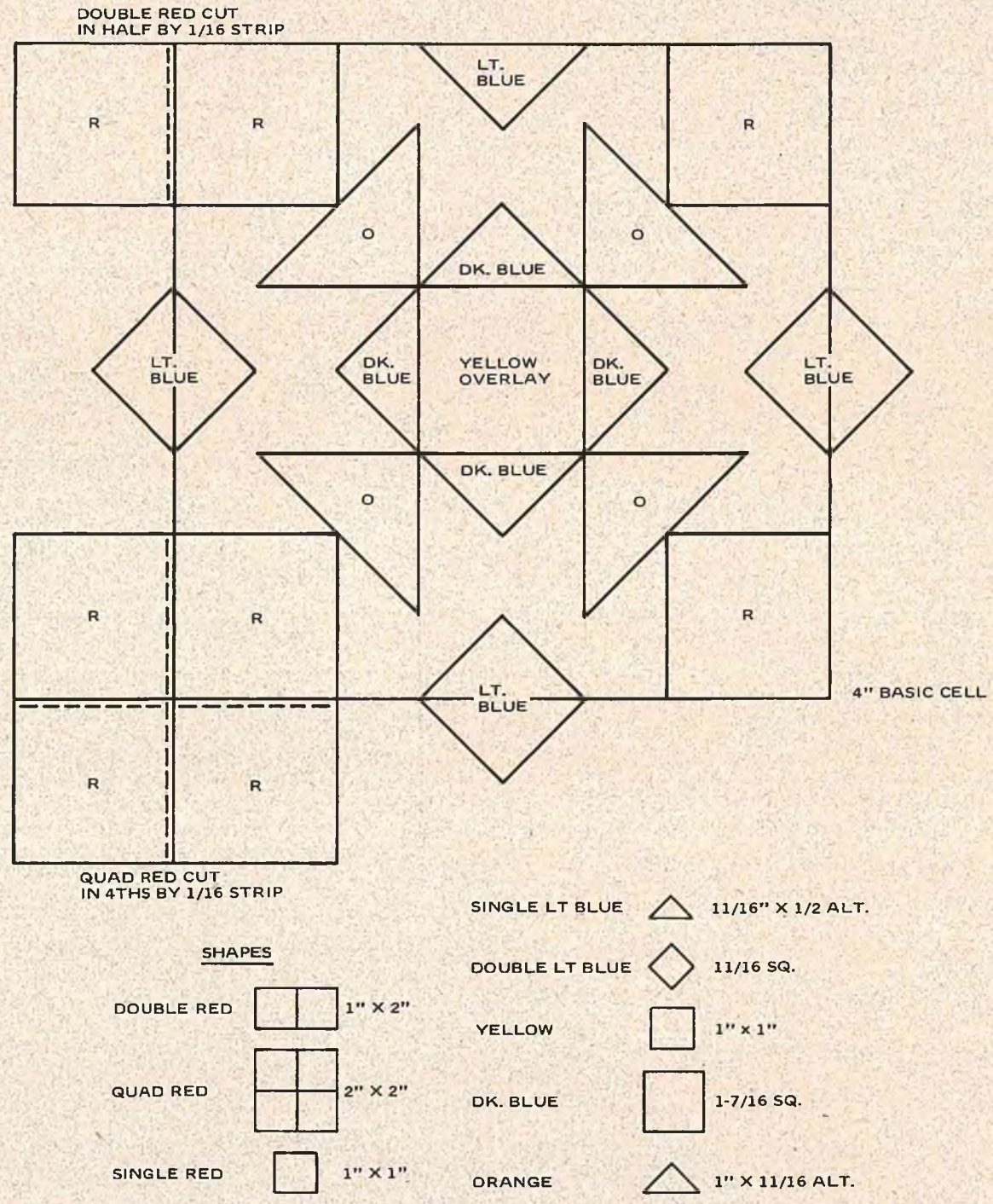


are being ironed down under a piece of tissue or silk. I had yellow only, in Solarfilm, so it was important to put this on last in order not to melt it with the heat necessary to get MonoKote to stick. The same applies for regular trim MonoKote. When you have the corners in place you can put in the center pieces then work outward tacking and pressing as you go. A little fudging is okay here and there, since it won't show unless you overdo it. An accurate ruling of the basic cells is the secret to insure things line up. The rudder is the most fun - - - I just picked a spot on the wing, then put that particular piece, a square, triangle, or diamond, in place on the rudder at an angle, then worked outward in all directions. On one side I started with the dark blue diamond overlaid with a yellow square, while on the other side I started with a light blue diamond. Multiple squares are divided by using 1/16" strips of the background color.

Have fun – design your own patchwork quilt, it really isn't tedious, it is a pleasant way to while away a long winter afternoon or two, or perhaps, even a weekend.

Besides that, I remember Scotland a few years back and how much I loved the myriad of colors in the Tartan of each of the many clans. I never could afford a kilt, but you can bet your last "wee treepenny bit" that my next plane will have the wings covered with a Bonnie Scots plaid of scrap MonoKote.

P.S: Patches is a highly modified Flite Streak used for stunt soaring at Torrey Pines. The fuselage tail moment was increased 4 inches. The width was increased to take a Kraft 3 channel rig with a 500 mil. battery pack, using two servos for ailerons and elevator. It has no ballast and weighs in at 24 ounces. □



LET'S SCRATCH BUILD

YOU CAN SAVE MONEY BY USING MAGAZINE PLANS TO MAKE YOUR OWN KIT.

By Ed Eggert

I would be the first to admit that many of the RC kits on the market excell in quality of both wood and prefabrication.

This type of quality does not come without a price since much effort goes into selecting wood, machining of parts, packaging, advertising, plus allowing a reasonable profit for the manufacturer, distributor, and retailer.

Like many RC'ers, I like to build two or three aircraft a year, but since I have other "financial burdens" in life such as a wife, three boys, mortgage, etc., the purchase of these fine kits are few and far between. The majority of RC'ers, I feel, are in the same boat and are confronted with the following:

A. Starting a family feud every time they bring a new kit home.
B. Build one plane a year and hope they get through the flying season.
C. Build something that doesn't really turn them on, but the price was right.
D. Give up RC (it does happen, not everyone would rather fight than switch).
E. Scratch-build.

With our present rate of inflation, items A and D are heard more often at the field or at club meetings. Yet, when you suggest scratch-building to these men, they tell you it's too time consuming or just as expensive as a kit, or too difficult.

I am not a fast builder, yet I find I can make up my own kit in approximately two building sessions, totaling about four hours. I might add, I usually build sailplanes, which generally have more parts than a pattern or sport ship.

Expense-wise, my kit usually comes out to approximately 1/3 the suggested retail price of a comparable kit. Even less if I don't have to buy a set of plans. (No, I don't draw my own, I borrow someone else's).

When I began scratch-building, I used to spread the cost over a period of time by buying just enough wood to build a wing or fuselage. Building like that use to dent my wallet about $2.00 per week. Thanks to a few articles that RCM has published, I now stock balsa like a hobby shop and build to my heart's content.

Now to the difficult argument. For the most part, a typical kit contains: ribs, bulkheads, fuselage sides, sheeting, and sticks. Sheeting and sticks come right out of your hobby shop's balsa bin, so that is no problem. Bulkheads, ribs, and fuselage sides, etc., have to be cut out. This is easily accomplished by making up patterns. My choice for patterns is drafting mylar. This material is durable and stiff, but quite expensive; however, a little goes a long way. For instance, I usually make a pattern for a fuselage side and then make rib and bulkhead patterns out of the middle. The fuselage patterns look weird, but it does save mylar. Another less expensive pattern material is a good grade of rag bond paper, however, it requires tape splices for long fuselage sides.

Most balsa parts can easily be cut with an X-Acto knife, while plywood requires a saw. A coping saw can be used, but it is a tedious task. Your best bet is a jig saw such as the Dremel Moto-Shop. If you have a sabre saw, Sears sells a base to convert it to a jig saw. This set-up lacks the safety features of a conventional jig saw, so please exercise caution if you go this route.

If you are going to use a foam wing, your kit is practically done. Your only problem is to decide whether to buy a commercial foam wing or cut your own. RCM publishes an excellent book, "Foam Wings," which I highly recommend if foam is your thing.

If you go the built-up route, ribs will have to be cut. My favorite technique, and one used extensively by other builders, is to cut two identical ribs from either 1/16" or 1/8" ply. Make sure they are perfectly identical since they are the key to a rib which will never allow you to face a die crunch product again. Now if you are using a wing jig, drill your jig holes in the ply ribs. If you are not using a jig, still drill two holes that will enable you to bolt the two ribs together.

Next, cut sufficient rectangles of balsa to make the number of ribs you require, sandwich these between the ply templates and bolt the stack together.

All that is left to do is carve and sand the ribs to the contour of the templates. Notches may be sawed or filed – and you have perfect ribs.

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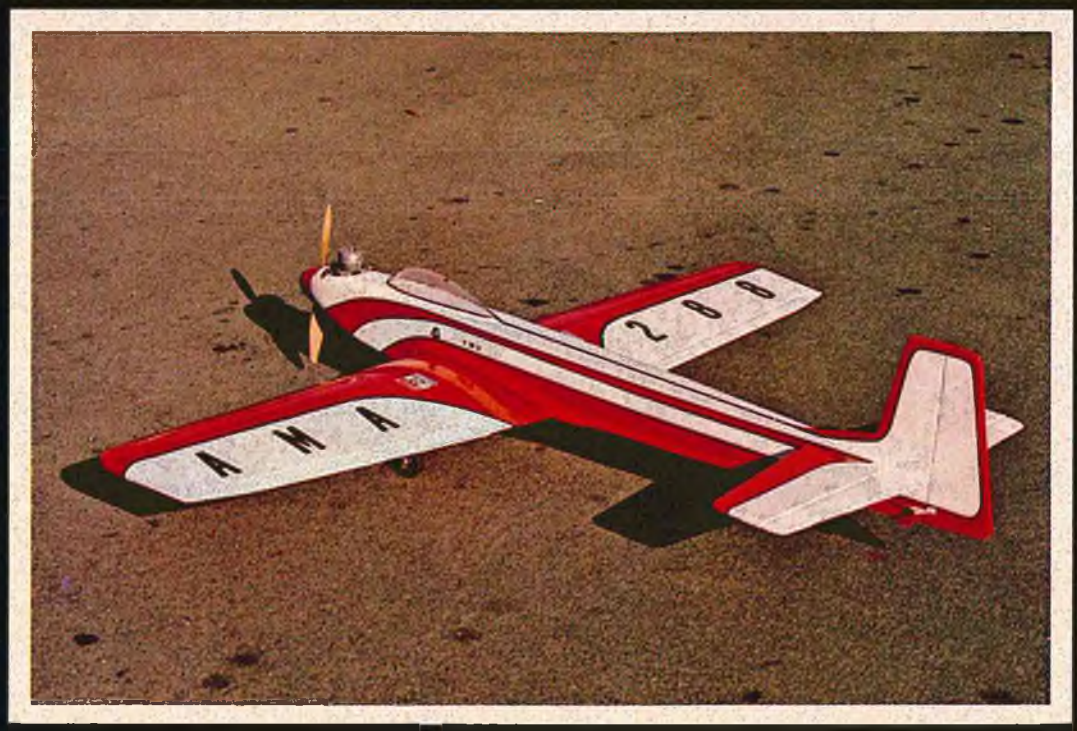
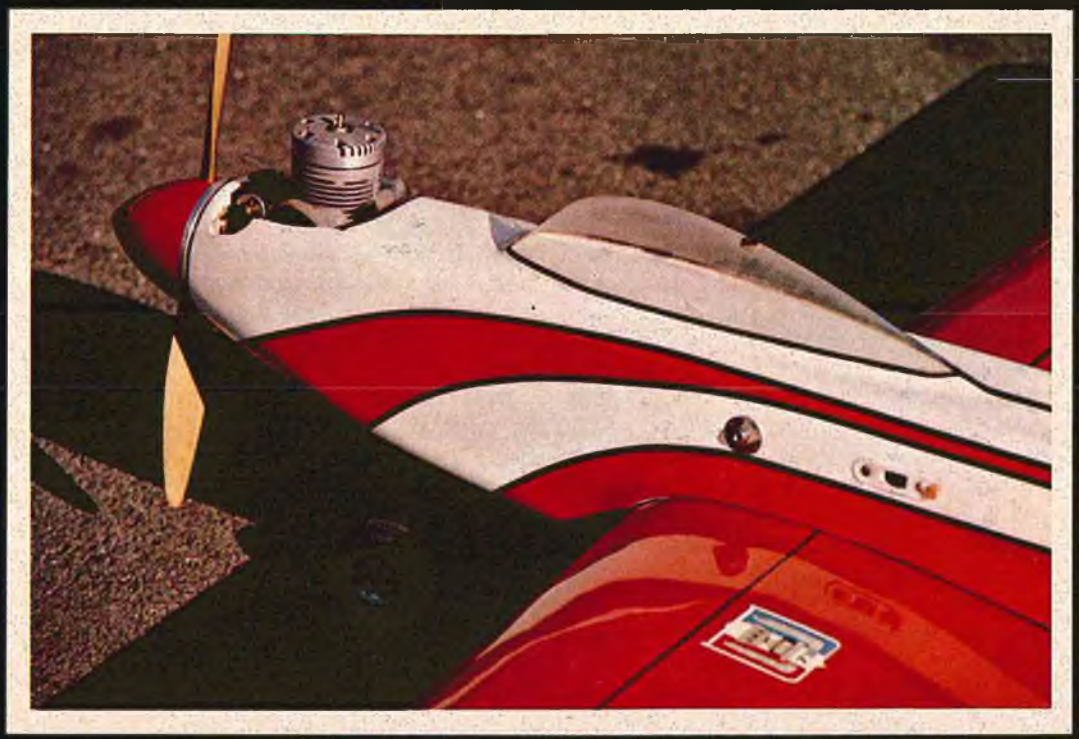




super kaos, jr.

BY JOE BRIDI

Want to save some money on your model fuel?

Have a smaller car and can't get your big one inside without driving with an open window for the wing to stick out?

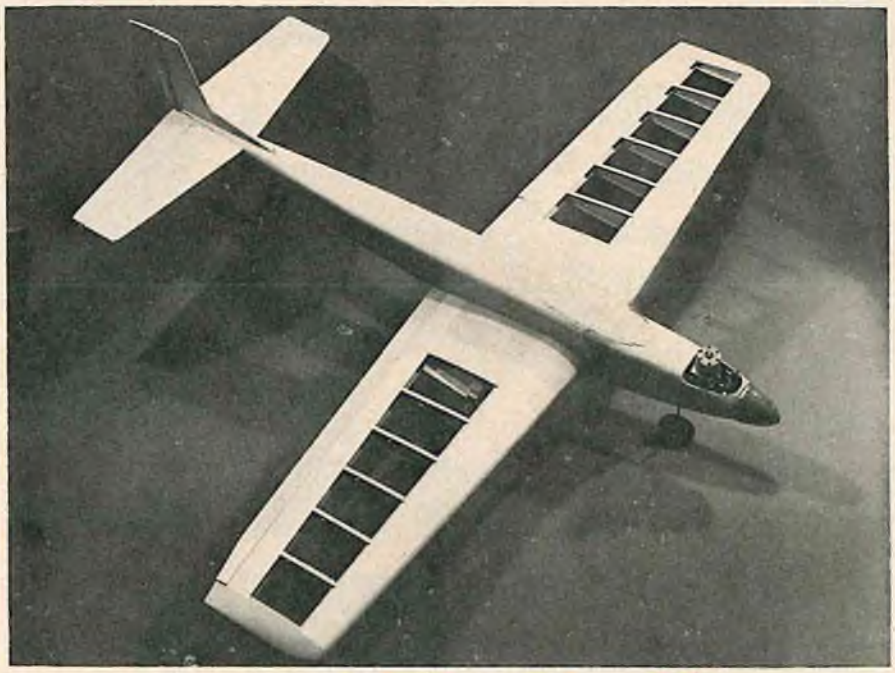
Or, how about just wanting to fly a great flying ship in the .40 range?

It's the son of the Super Kaos, The Super Kaos Jr.! Even though it's smaller in size than the Super Kaos, Junior builds just as easy and boasts all of the big one's great flying characteristics. And, though some of the other .40 sized ships make it hard work to fly some of the AMA and FAI maneuvers, the Super Kaos Jr. will make it easy for you.

Before we get into the complete building directions, here are a couple of general comments we'd like to make. We simplified the process of mounting a nose gear strut bearing by drilling two holes in the Kraft-Hayes engine mount. It not only saves money but keeps the installation easy. Before you drill out the holes you need in bulkhead No. 1, plan ahead, and get them drilled before you install it in the plane – at least before you install the balsa block at the front of the fuselage. Once you get that block in place, drilling those holes gets hard to do. Also, secure the blind nuts to install the engine mount before you glue one bulkhead in place.

Because of the tight squeeze between the nosegear steering arm and the firewall, we recommend you use NyRod for the pushrod. And just use the wire end, bent to connect to the steering arm. It can be screwed in or out to make adjustments, or, the steering arm can be loosened. Also, check to make sure that the steering arm is cut down as necessary to make sure it doesn't bind on the side of the fuselage.

Now, on with the building.



STABILIZER

Edge glue the stabilizer angled 1/4" sheet front to the 1/4" sheet rear half. When the glue is dry sand the sheet flat, but don't round the leading edge. Connect the two elevators together using the 1/16" wire and 15 degree offset horn using an epoxy adhesive. Be sure to use the 1/4" sheet spacer to find the correct distance between the two elevator halves, but don't glue it in place. Be sure that the two elevators are flat with each other. See picture number 1.

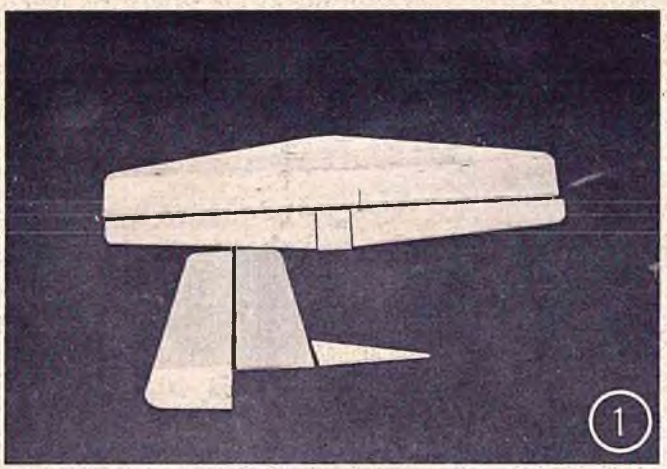
FIN AND RUDDER

Glue the pine control horn insert, rudder bottom and rudder together. Do not glue the dorsal fin to the fin. It is glued in place after the fin is glued to the fuselage.

STARTING THE WING

The RCM Wing Jig is highly recommended to assemble the wing. (See the August 1967 issue of RCM or send to RCM for a copy of the article for $1.50.) Using 1/4" steel rods through the holes drilled in the ribs, this jig can give you a true wing in much less time and work than usual construction methods. Picture number 2 shows a wing panel on the RCM Jig. Picture number 3 shows the landing gear blocks glued in place along with the 1/16" ply doublers. Be sure to make one left and one right panel. When gluing the first prototype wings together we used the new Hobby Shack model adhesive called Kwik Tak, and found it excellent. It's fast drying and it can be sanded without gumming up; a good adhesive to try. The entire panel can be completed on the jig, but **do not** glue the bottom leading edge sheeting, the false ribs, or the 1" piece of 1/4" dowel in place yet. These will be glued in later.

To build the wing on a building board **(flat board, please)** jig blocks are furnished. See picture number 5. Begin by drawing a line through the center of the tip and root rib so the line passes from the leading to the trailing edge of the ribs. Pin the spar to the building board with the notched side up. Glue the tip and root ribs in place on the spar, then glue the notched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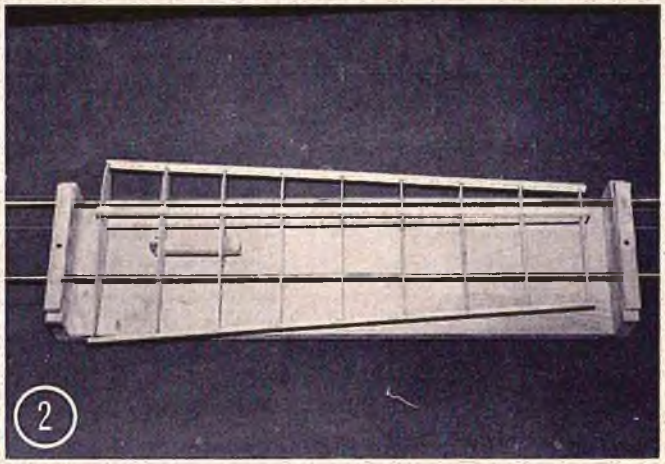
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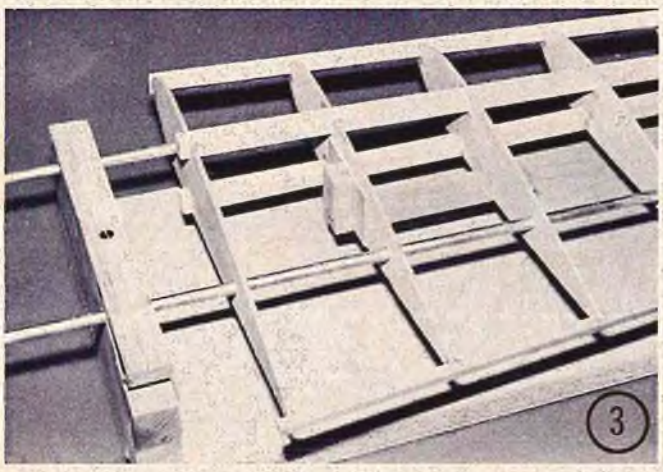
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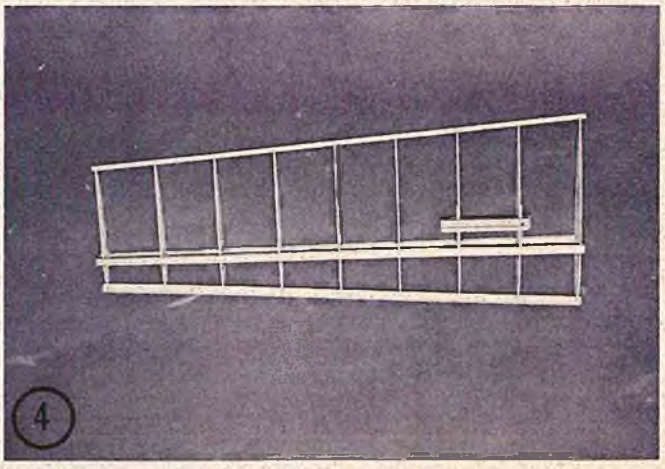
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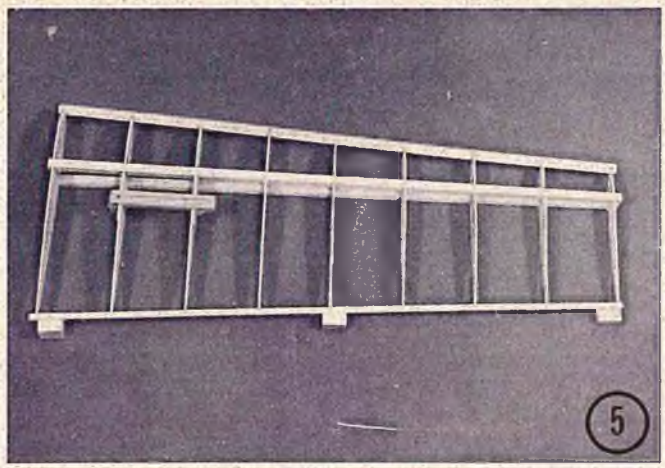
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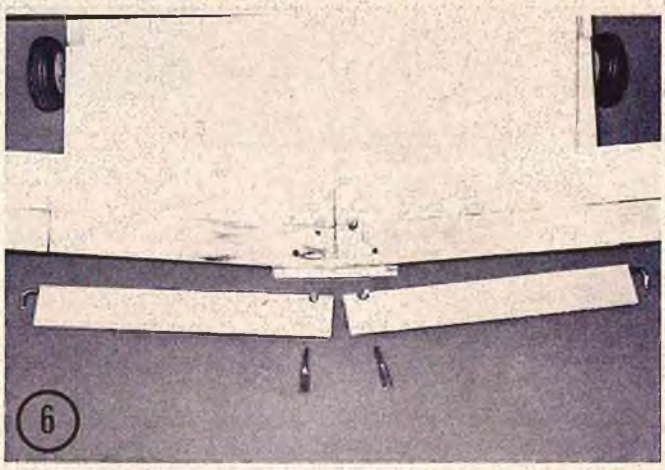
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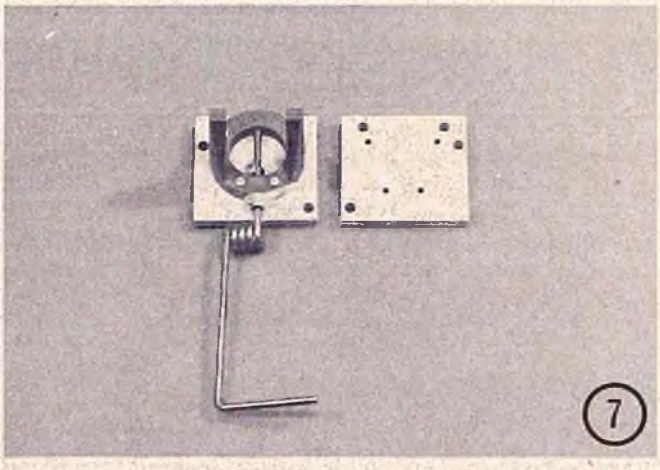
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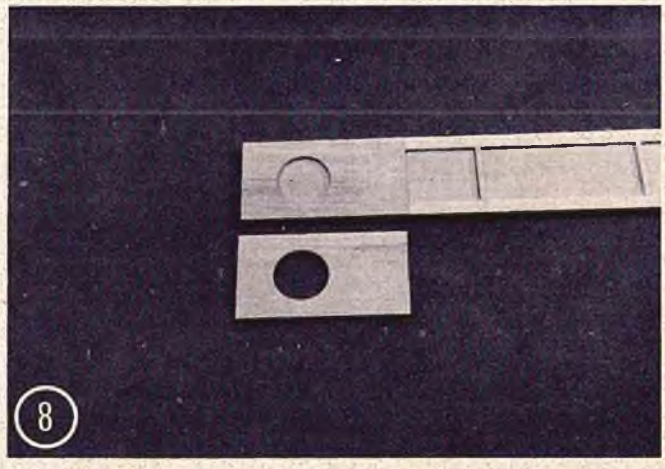
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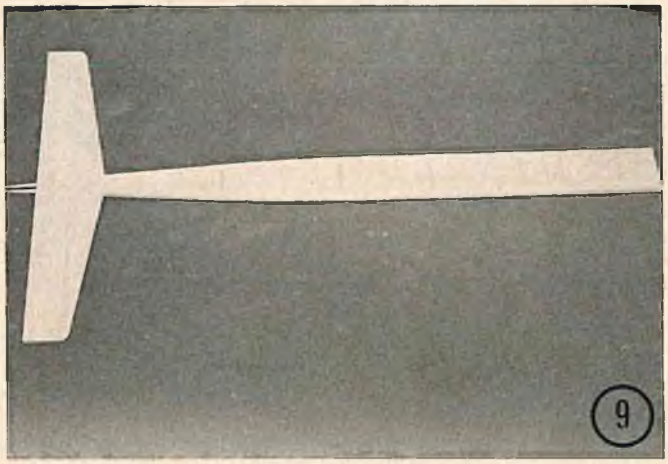
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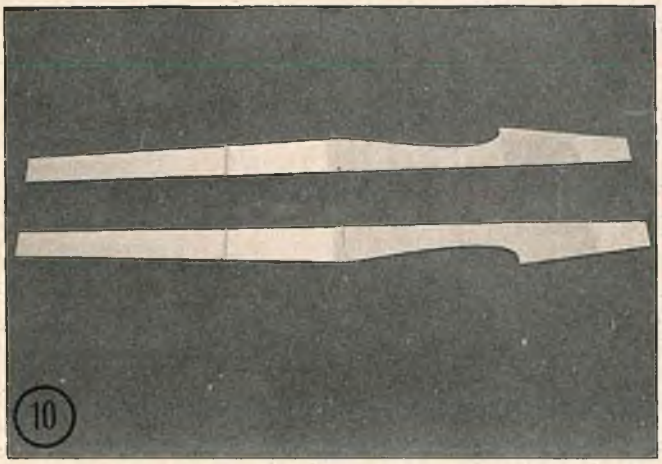
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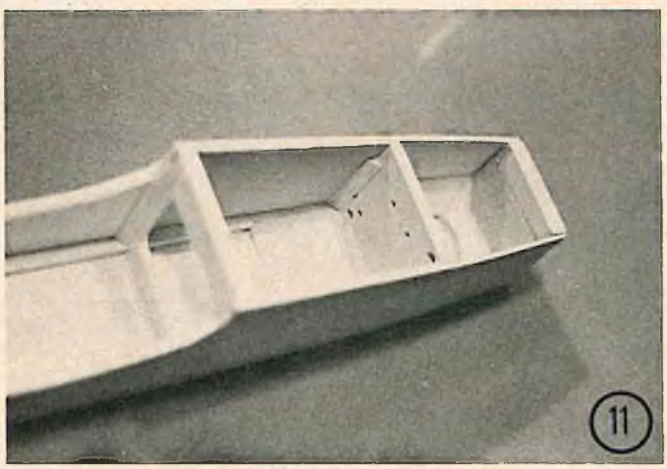
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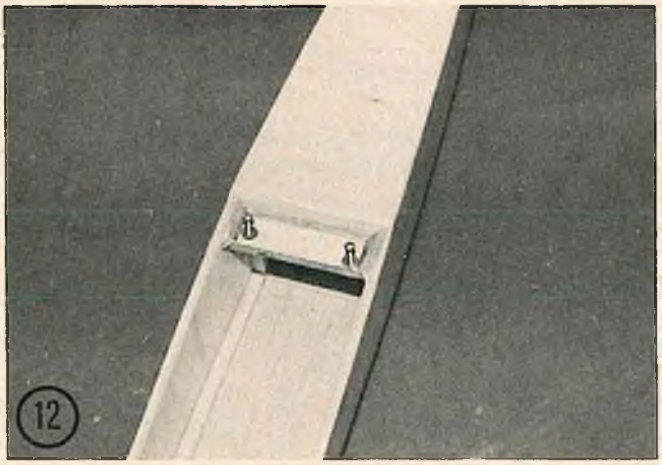
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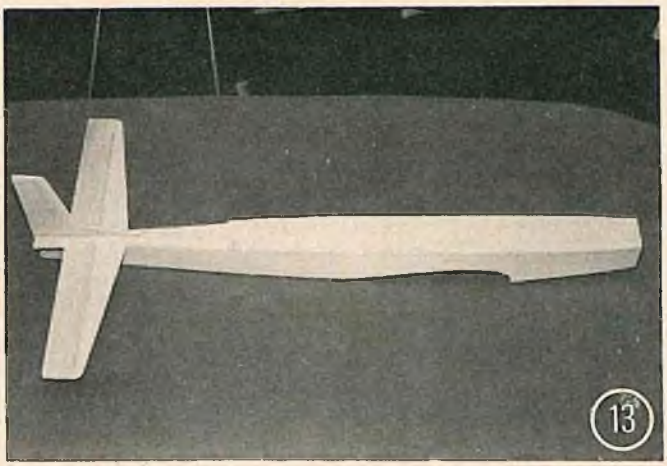
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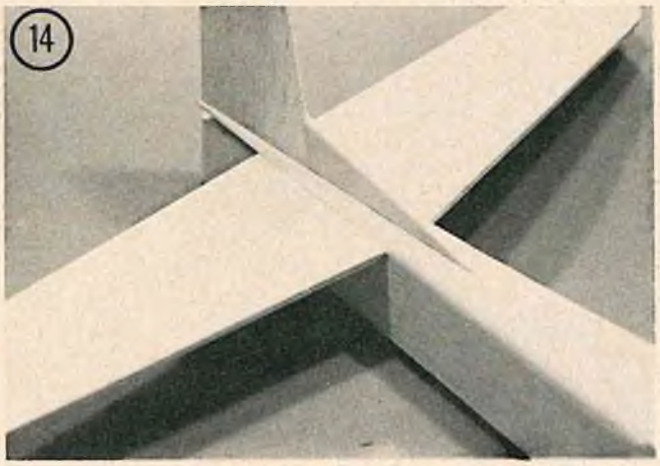
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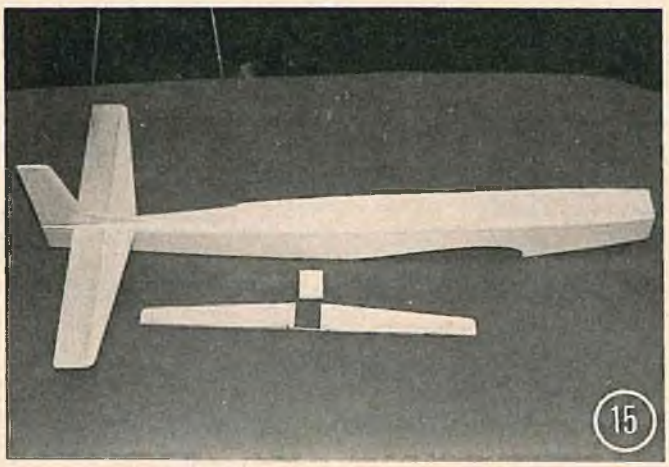
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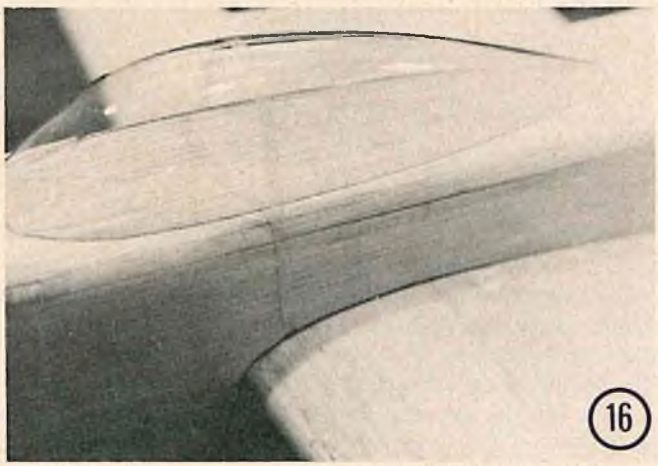
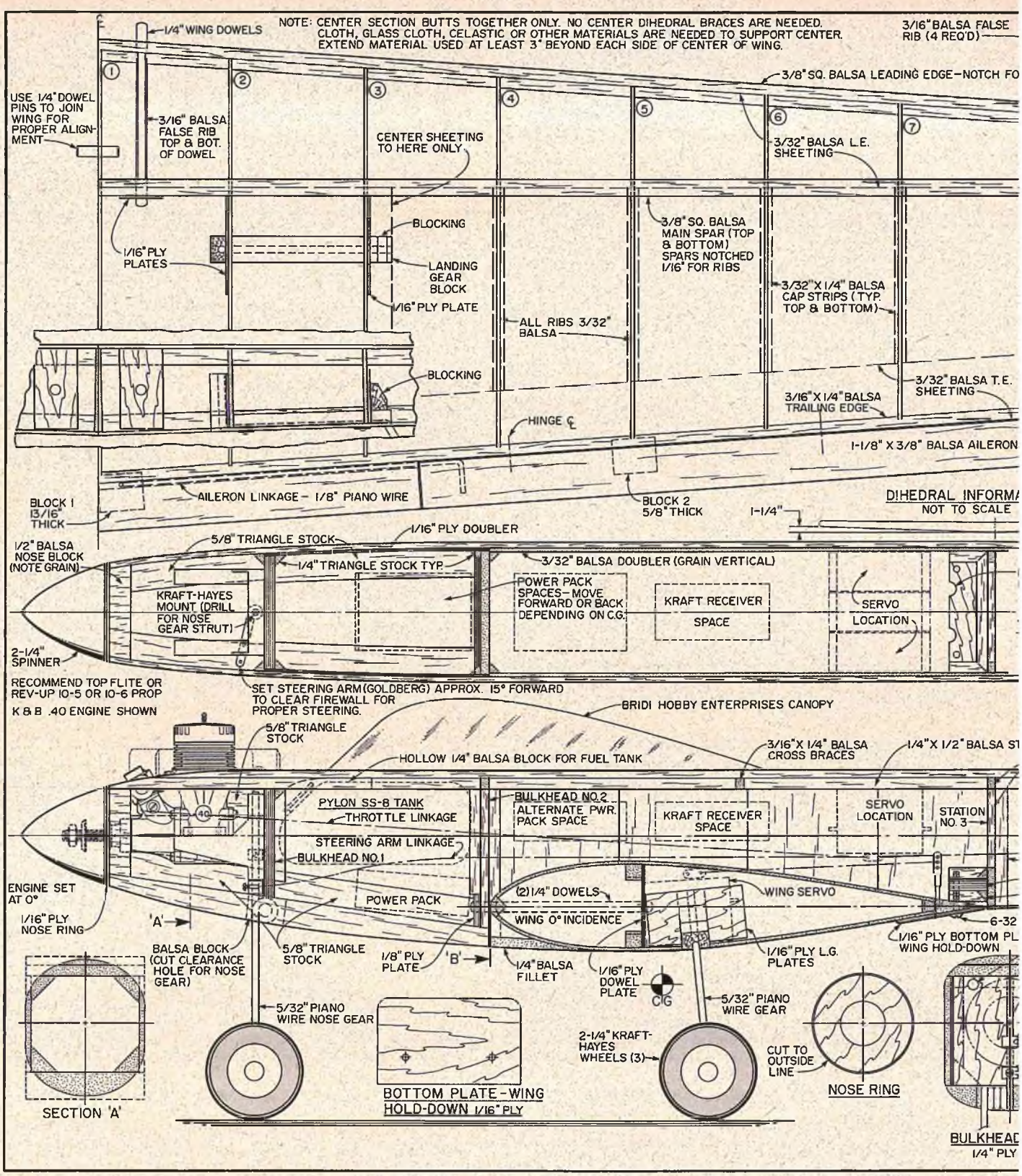

16

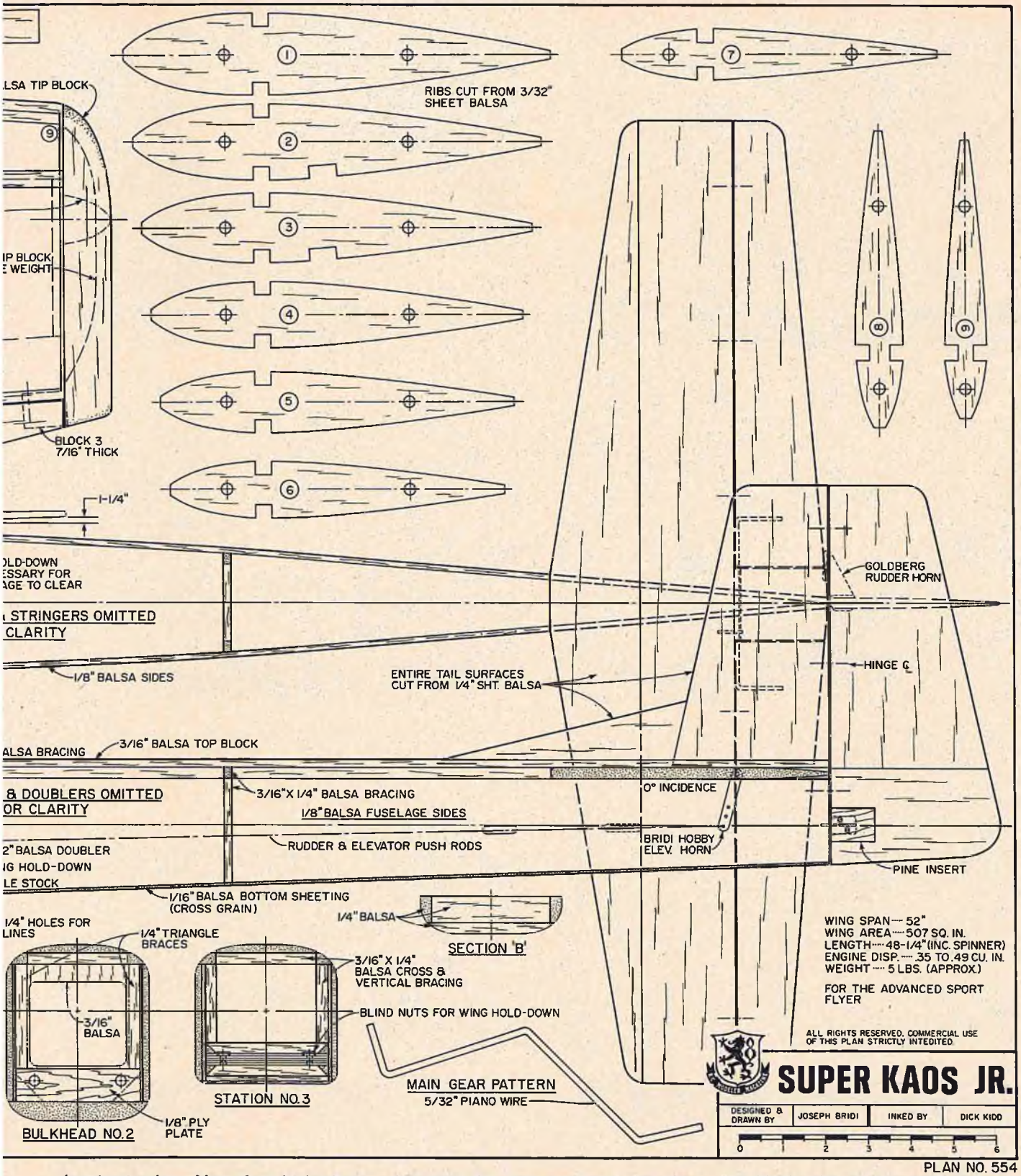


trailing edge in place onto the tip and root ribs.

With the root and tip ribs glued to the spar and the trailing edge, it's time to set up the wing on the building board. begin by placing the largest jig block under the trailing edge of the root rib so the line you drew through the center of the rib is parallel to the surface of the building board. Then place the smallest jig block under the trailing edge of the tip rib so the center line of this rib is also parallel to the board. Finally, place the middle sized jig block under approximately the center of the trailing edge. Move the jig block back and forth under the trailing edge until the trailing edge is straight. Check it with a straight-edge. Then pin the jig blocks in place.

Glue the ribs to the spar and to the notched trailing edge. Be sure that the landing gear notch in ribs number 2 and number 3 are DOWN. Do not glue the false ribs or the 1/4" dowel in place yet. With all of the ribs glued down in place, glue the top spar into position. Glue the notched leading edge to the ribs and let the wing glue dry.

With the wing rib leading edge, spar, and trailing edge glue dry you're ready to glue the front and rear



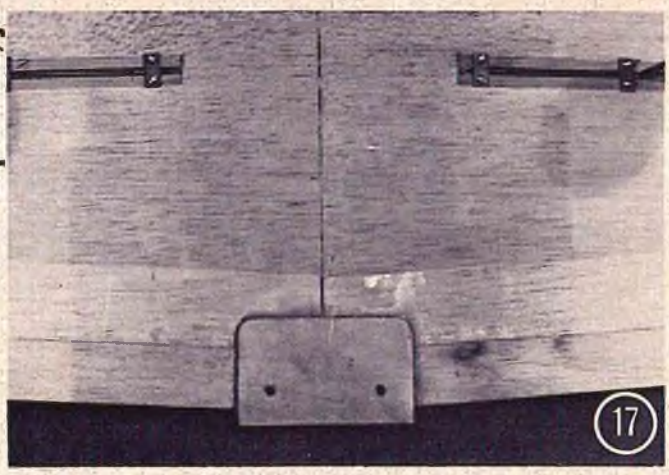
sheeting in place. Note that the leading edge of the front sheeting is tapered. When you glue the front sheeting in place it is recommended that the outside surface be dampened with water. This will cause the sheeting to curl and conform to the rib curve more easily without cracking. Then glue the capstrips and center section sheeting in place.

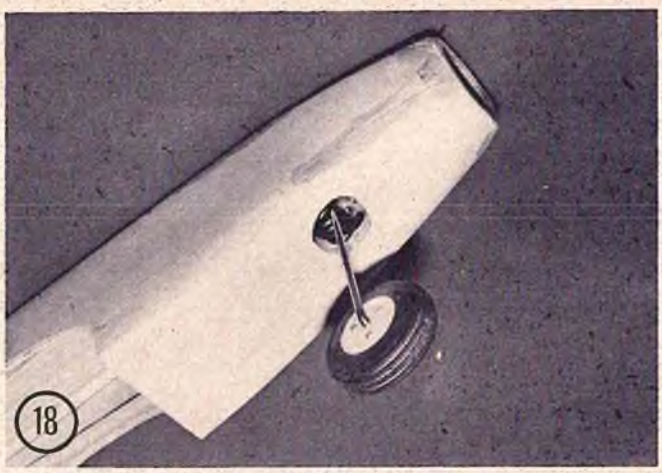
When all of the glue is thoroughly dry, turn the wing over and glue the rear sheeting in place. Do not glue the bottom front sheeting in place yet. Glue the plywood landing gear doublers to the ribs and install the landing gear parts as shown on the plans.

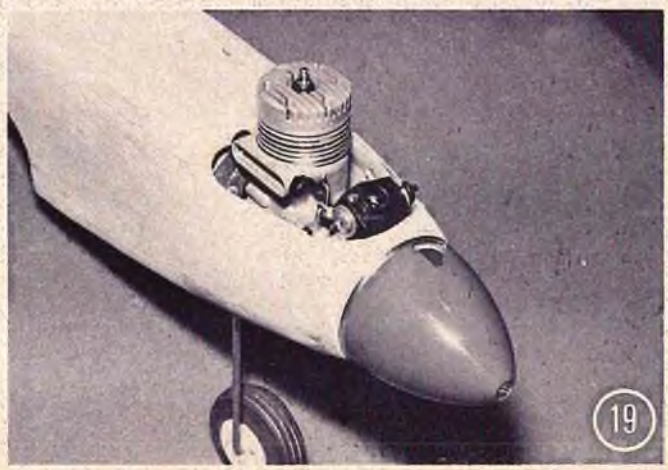
To install wing tip blocks, cut any overhang of sheeting, spars, etc., flush with tip rib; sand flat with large sanding block. If you wish to hollow tip block, glue at two small spots and sand to shape on plan; now break loose and hollow inside, then glue into position.

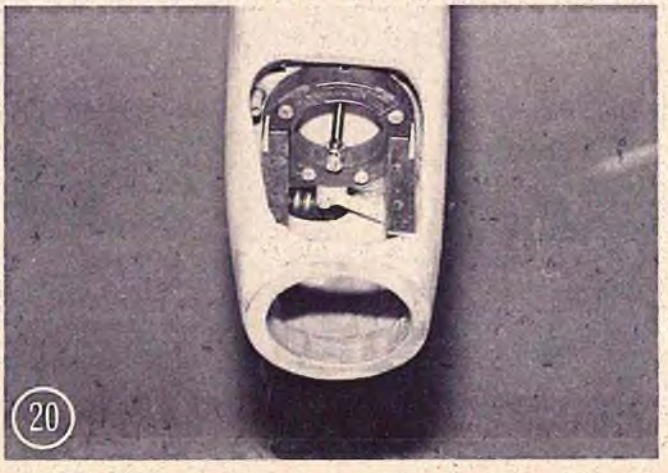
To build other wing panel repeat this process BUT BE SURE TO KEEP THE LANDING GEAR NOTCHES UP so you will have a right and left wing panel. Remember that this panel is upside down, so you will not glue the

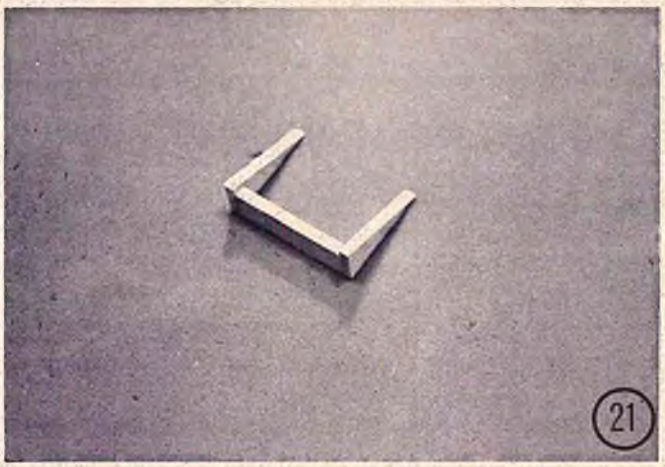
text to page 90


17


18


19


20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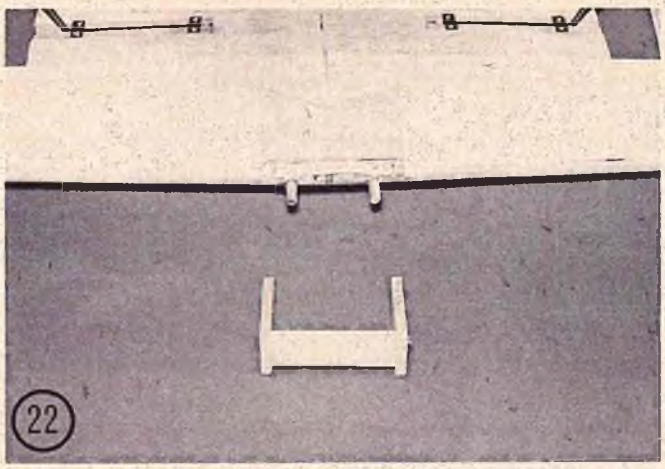
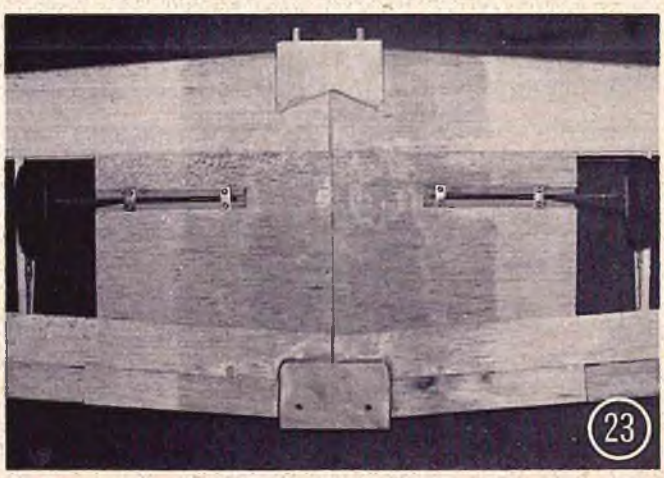
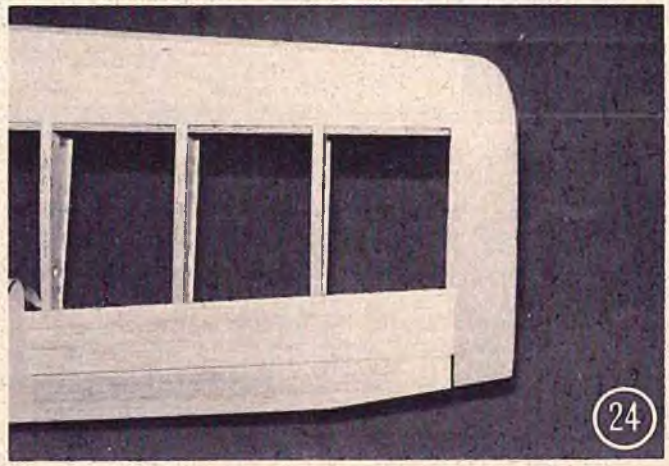

22


23


24

RCM-WORLD

SIX CHANNEL DIGITAL PROPORTIONAL SYSTEM

PART VII: TRANSMITTER ASSEMBLY

BY JOHN MALONEY

PART I. WIRING THE METER AND CHARGER SOCKET.

[ ] Step I-1. Cut two bare wires 1" long and bend over one end of each at right angles to form a foot.

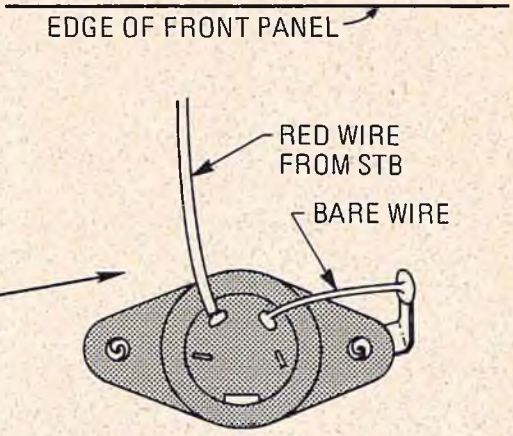
[ ] Step I-2. Figure T-8 shows the locations of the meter connections. For each bare wire just prepared, drop the foot through the hole in the meter terminal and solder it to the buildup of solder at the location indicated.

[ ] Step I-3. Now solder the bare wires to the meter terminals. Clip off excess wire.

[ ] Step I-4. Strip 1/16" of insulation from one end of a 7" red wire and carefully tin the exposed metal.

[ ] Step I-5. This is the wire that leads to the charger socket. Solder one end into the buildup of solder at the switch terminal board as shown in Figure T-8.

[ ] Step I-6. Pass the other end down through hole E as shown and run the wire flat along the inside of the front panel towards the charger socket. Tape the wire to the panel using a 2" length of adhesive tape. (Not furnished with kit.)



[ ] Step I-7. The free end of the red wire is to be soldered to terminal #3 of the charger socket. Cut to correct length, strip 1/8" of insulation, and tin both wire and socket terminal before soldering.

[ ] Step I-8. Solder a 1" length of bare wire between terminal #2 of the charger socket and the grounding lug as shown in the figure to the right.

PART J. WIRING THE ENCODER BOARD.

[ ] Step J-1. Select the following wires:
9": orange, red, black, green-white, yellow
7": green, blue, red-white, yellow-white, violet

[ ] Step J-2. Strip 1/8" of insulation from one end of each wire and carefully tin the exposed metal.

[ ] Step J-3. Refer to Figure T-9. The ten wires just prepared make up the ten-wire bundle that leads out from the right edge of the board on this figure. Insert the tinned end of each wire into the hole indicated on Figure T-9 and solder it in place on the foil side of the board. Clip off excess wire coming out of the solder buildup.

[ ] Step J-4. Dress the wires as shown in Figure T-9. Using the braided lacing cord, tie together the five wires (orange, red, black, yellow, green-white) near capacitor C5. Tie all ten wires to the right edge of the board, running the lacing cord through the small hole located there.

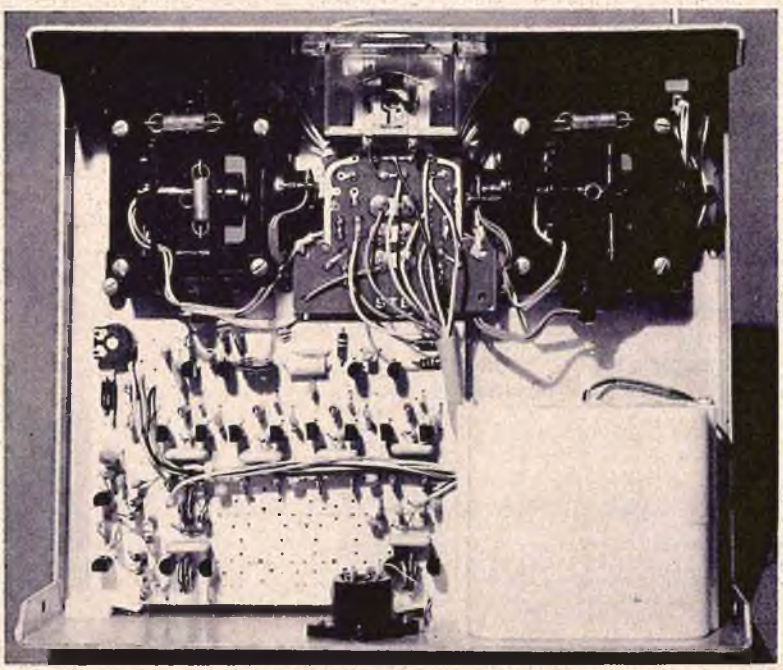
[ ] Step J-5. Slip a 1¼" sleeve of clear plastic tubing over the ends of the wires and run it down to the lacing at the edge of the board.

[ ] Step J-6. Temporarily mount the encoder board in the case. See photo below of transmitter showing mounting of encoder board. First insert the lower edge of the board into the slots in the encoder board retainer brackets. Then position the board so as to align the 3/32" diameter hole at the top edge with the hole in the encoder board upper support arm. Secure the board to this arm with a #2 x 3/16" sheet metal screw. It may be helpful to remove the battery when mounting the encoder board for the first time.

[ ] Step J-7. Figure T-8 shows where the ten wires from the encoder board are to be joined to the switch terminal board. For each wire:

(a) Locate the point to which the wire is to be joined.
(b) Cut the wire to the length necessary to reach that point.
(c) Strip 1/16" of insulation from the end of the wire and carefully tin the exposed metal.
(d) Solder the wire in place.

Encoder Board Mounted in Case



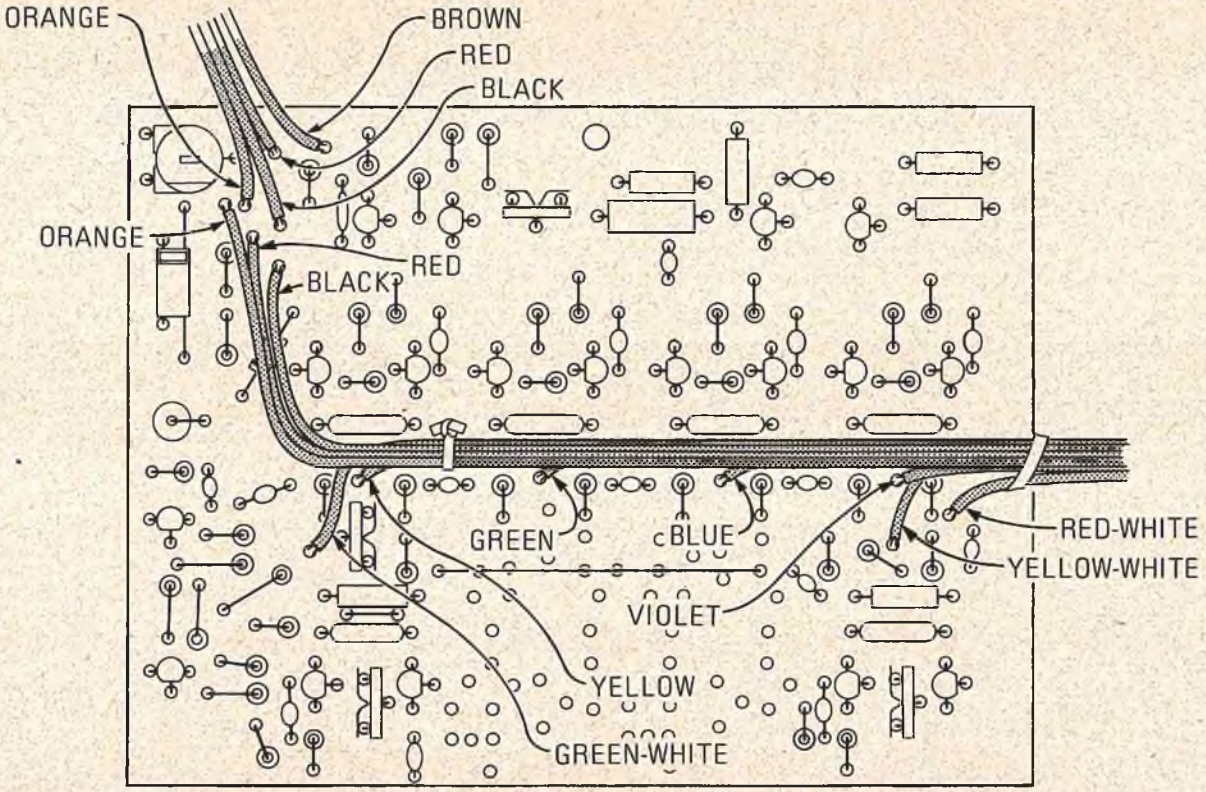
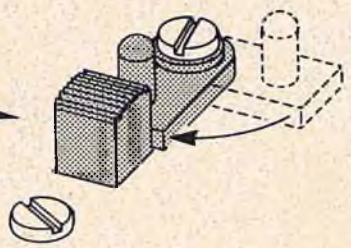


FIGURE T-9
ENCODER BOARD SHOWING WIRING
(VIEWED FROM COMPONENT SIDE)

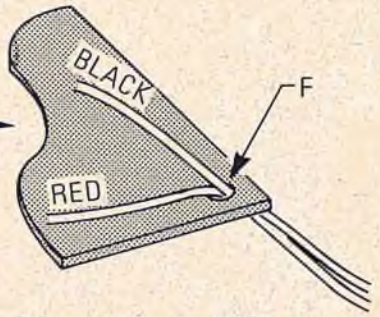
PART K (OPTIONAL). ALIGNING THE ENCODER BY OSCILLOSCOPE.

This part of the instructions may be carried out if the kit-builder has access to a fairly high-grade oscilloscope that has an accurately calibrated horizontal sweep and that can be d.c. coupled to a signal source. If the kit-builder does not have access to such equipment or prefers to skip this alignment procedure, he may proceed directly to PART L of the instructions and continue with the construction of his kit. The advantage of aligning the encoder at this time with an oscilloscope is that any trouble encountered can be remedied at this time more easily than after the RF section is installed.

[ ] Step K-1. The switch soldered to the switch terminal board controls the power from the battery. Place this switch in the "off" (down) position and lock it in place.



[ ] Step K-2. The battery connections are shown in Figure T-8. Slip a 1¼" sleeve of white plastic tubing over the red and black battery leads. Bring the ends up through hole "F" and route them as shown. Cut the leads to the proper length. Avoid shorting the leads together or to a common conductor.

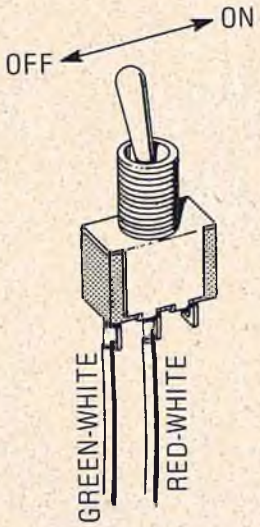


[ ] Step K-3. Strip 1/16" of insulation from the ends of the battery leads and carefully tin the exposed metal.

[ ] Step K-4. Solder the black lead to the right meter terminal and the red lead to the center switch terminal as shown in Figure T-8.

[ ] Step K-5. Insert the Rye connector from the World Dual Charger into the charger socket in the bottom of the transmitter case. Be sure the power switch on the transmitter is in the "off" (charge) position and plug the charger into a 110 volt, 60 Hz. supply. Charge the battery overnight.

[ ] Step K-6. Unplug the battery charger and disconnect the Rye connector.

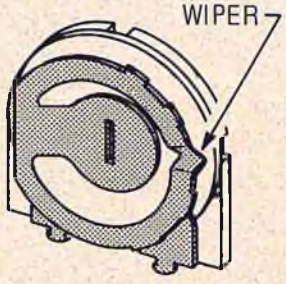


[ ] Step K-7. Set all stick controls which can be reached at the front panel of the transmitter to their neutral (middle) positions. These controls must remain at neutral during the alignment procedure. Turn the channel-6 toggle switch to "on."

[ ] Step K-8. To obtain a good oscilloscope display it will be helpful to preset the trim pots to their approximately correct positions. These positions will be specified by giving the amount of clockwise advance from a fully counter-clockwise position of the pot wiper. For example, the pot illustrated at the right is 3/4 clockwise.

Set the following pots:

(a) R57 — 1/2 clockwise
(b) R59 — 1/4 clockwise
(c) R60 — 3/4 clockwise
(d) R63 — 3/4 clockwise

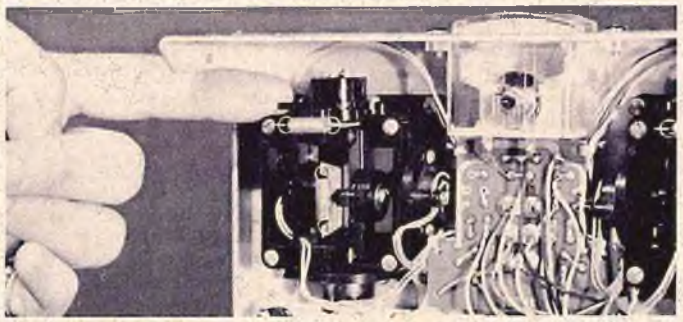


[ ] Step K-9. Connect a wire between the top of resistor R43 on the encoder board and the vertical input to the oscilloscope. Connect the transmitter case to the oscilloscope ground. Set the horizontal sweep on the oscilloscope for 1 millisecond, calibrated. Set the vertical input for d.c. coupling.

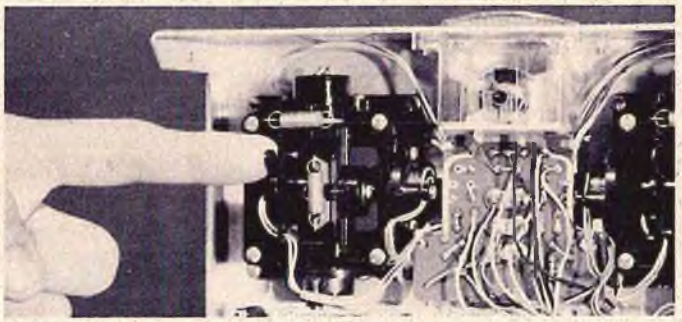
[ ] Step K-10. Turn the battery power on and observe the pattern on the oscilloscope. It should appear similar to that shown in the photograph to the right, a succession of seven negative square-wave pulses. Move a few of the controls on the front panel and note the changes in relative positions of the pulses. Return all controls moved to neutral.

Encoder Output

[ ] Step K-11. Now refer to the four photographs to the right and adjust in turn each trim tab found on the rear of the sticks: aileron, elevator, rudder, throttle, so that the four time intervals defined by the trailing edges of the first five pulses are each exactly 1.5 milliseconds in duration. These are the first four intervals illustrated in Figure T-10.



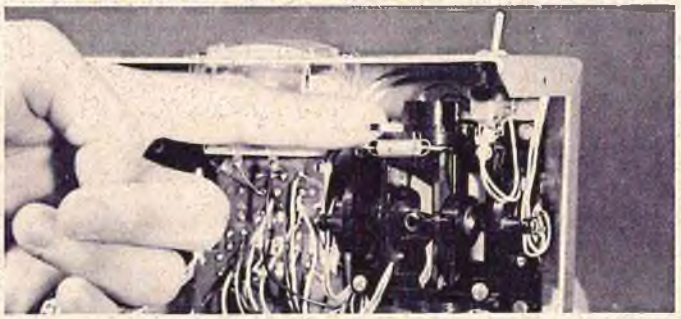
Adjusting Aileron Trim Tab



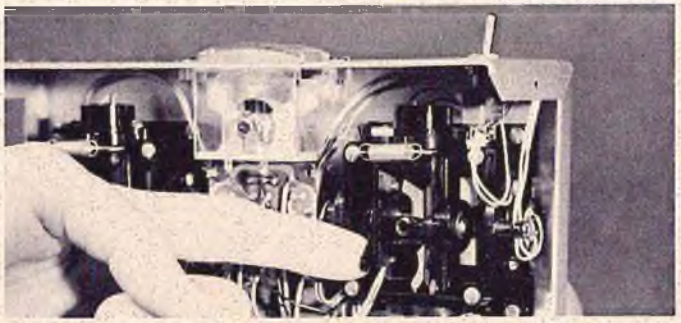
Adjusting Elevator Trim Tab

[ ] Step K-12. Adjust R60 on the encoder board so that the fifth time interval illustrated in Figure T-10 is exactly 1.5 milliseconds long.

[ ] Step K-13. Adjust R63 on the encoder board so that the sixth time interval illustrated in Figure T-10 is exactly 1.0 milliseconds long.

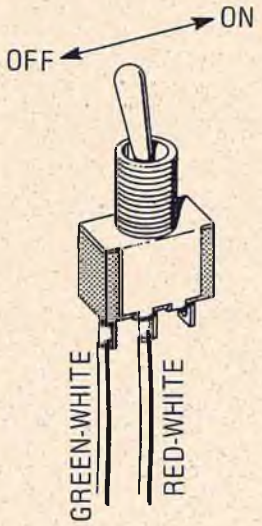


Adjusting Rudder Trim Tab



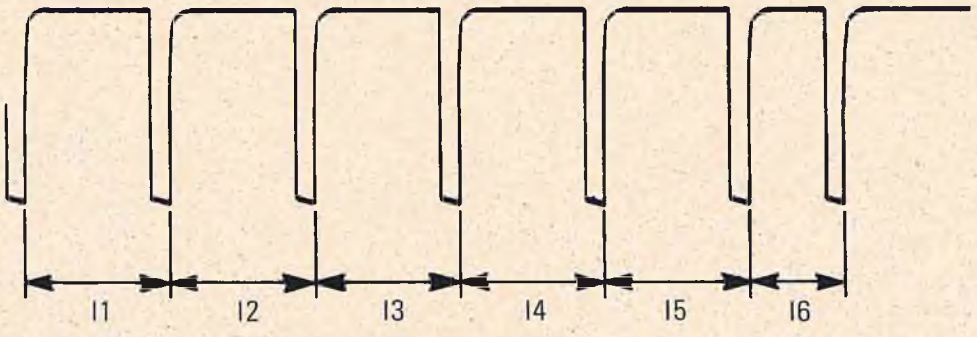
Adjusting Throttle Trim Tab

[ ] Step K-14. Now turn the channel-6 toggle switch to the "off" position. The sixth time interval illustrated in Figure T-10 should increase. Without changing the adjustment of R63, adjust R59 so that this sixth time interval is exactly 2.0 milliseconds long.



[ ] Step K-15. The "offtime" resistor R57, will be adjusted at a later time.

[ ] Step K-16. Turn the battery power switch off and lock it. Remove the wires connecting the encoder to the oscilloscope. Unsolder and remove the black battery lead from the meter terminal. Wrap tape around the bare wire to insulate it against accidentally discharging the battery.



ADJUST I1 WITH AILERON TRIM TAB
ADJUST I2 WITH ELEVATOR TRIM TAB
ADJUST I3 WITH RUDDER TRIM TAB
ADJUST I4 WITH THROTTLE TRIM TAB
ADJUST I5 WITH R60
ADJUST I6 WITH R59 & R63 (SEE TEXT)

FIGURE T-10
ENCODER OUTPUT

PART L. WIRING THE R.F. SECTION.

[ ] Step L-1. Select the following wires:

9" orange	7" black
7" brown	1" orange
7" red	

[ ] Step L-2. Strip 1/8" of insulation from one end of each wire and carefully tin the exposed metal.

[ ] Step L-3. Refer to Figure T-11. The four longer wires just prepared make up the four-wire bundle that leads away from the lower left edge of the board in this figure. Insert the tinned end of each wire into the hole indicated on Figure T-11 and solder it in place on the foil side of the board. Clip off excess wire coming out of the solder buildup.

[ ] Step L-4. Dress the wires as shown in Figure T-11. The long orange wire goes under the lead on choke L4 and under capacitor C2.

[ ] Step L-5. Pull the four long wires out parallel to the long edge of the board. Cut the wires so that they will extend 4¼" beyond the left edge.

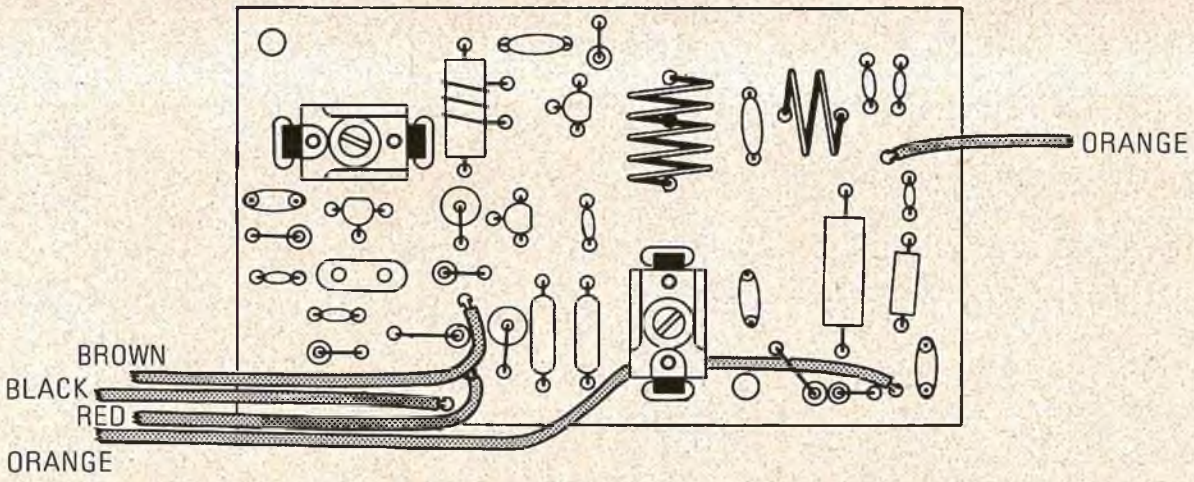


FIGURE T-11
R.F. BOARD SHOWING WIRING
(VIEWED FROM COMPONENT SIDE)

[ ] Step L-6. Mount the board in the r.f. box as shown in the photograph to the right. Place the black plastic insulating sheet between the foil side of the board and the bottom of the box. Fasten the board with two #2-56 x 1/4" pan-head machine screws as shown.

[ ] Step L-7. Insert a 3/32" inside diameter rubber grommet into the hole in the left side of the filter box. Thread the four long wires through this grommet.

[ ] Step L-8. Strip 1/8" of insulation from the end of each wire (including the 1" orange wire) and carefully tin the exposed metal.

[ ] Step L-9. Slip a 1¼" sleeve of red plastic tubing over the ends of the four wires and run it up to the grommet.

R.F. Board Mounted in R.F. Box.

PART M. COMPLETING THE WIRING AND ASSEMBLY OF THE TRANSMITTER.

[ ] Step M-1. Remove the screw holding the encoder board to the encoder board upper support arm on the aileron/elevator control stick. Ease the encoder board out of its mounting.

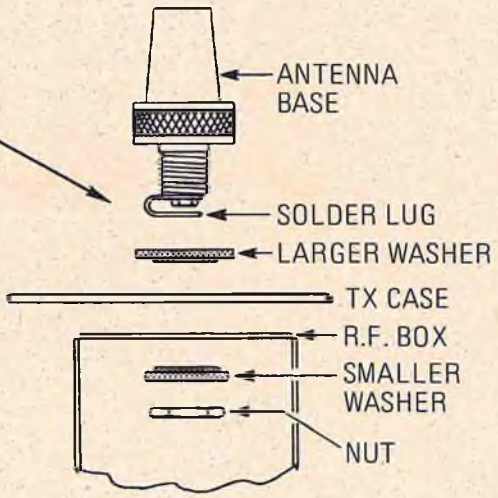
[ ] Step M-2. Figure T-9 shows how the four-wire bundle from the r.f. section is to be wired to the encoder board. Insert the tinned end of each wire into the hole indicated and solder it to the foil side of the board. Clip off excess wire emerging from the solder.

[ ] Step M-3. Remount the encoder board in the transmitter case.

[ ] Step M-4. Connect the wires from the battery to the switch terminal board as explained in Steps K-1 to K-4 of the optional PART K. If this part has been completed, only the negative (black) wire will have to be connected.

[ ] Step M-5. Mount the r.f. box in the top of the transmitter case. Use the antenna base, two fiber washers and nut as shown in the diagram to the right.

[ ] Step M-6. Bend back the solder lug attached to the bottom of the antenna base so that it cannot come into contact with the r.f. box. Solder the short 1" orange wire in the r.f. board to this solder lug.

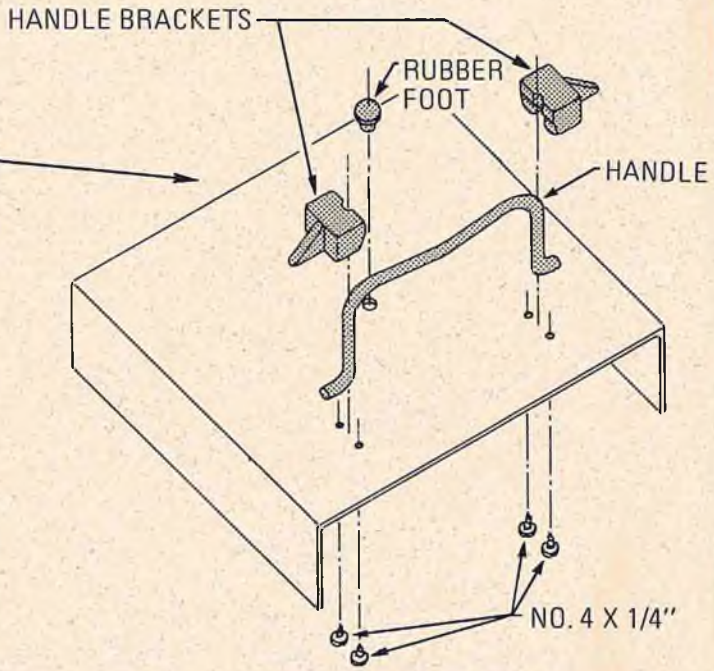


[ ] Step M-7. Install the lid on the r.f. box. The two holes in the lid must be over the tuning screws on trimmer capacitors C1 and C2. Fasten the lid with two #2 x 3/16" sheet metal screws through the small holes in the sides of the lid.

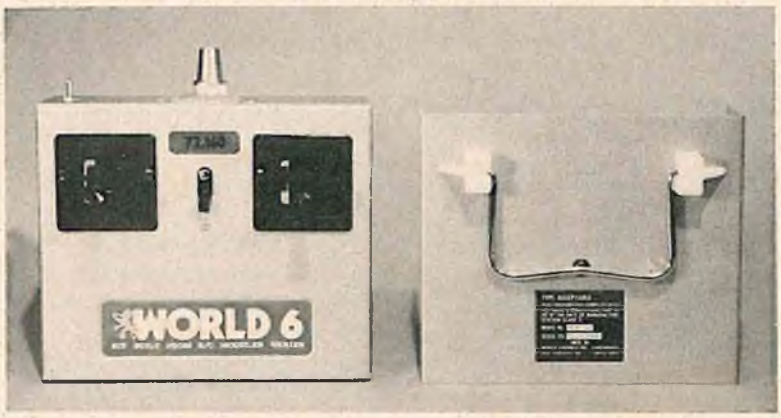
[ ] Step M-8. Screw the antenna into its base finger tight.

[ ] Step M-9. Install the rubber foot in the transmitter case back as shown.

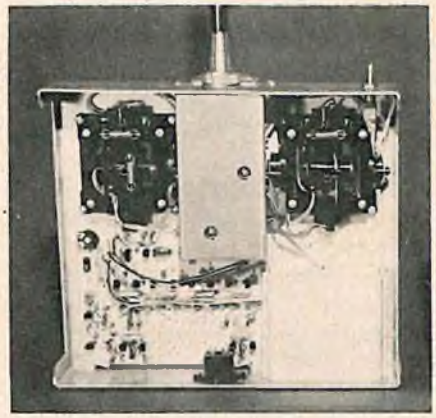
[ ] Step M-10. Mount the handle using the two handle brackets and four #4 x 1/4" sheet metal screws as shown.



[ ] Step M-11. Install the "WORLD 6" label and the frequency number label on the front panel and the "Type Acceptance" label on the rear panel as shown in the photograph below.



Front and Rear Panels Showing Placement of Labels



Completed Transmitter – Ready For Final Alignment and Tune-Up.

HANDY FLIGHT CADDY

BY GEORGE SMITH

Reprinted From The Rocket City Radio Controllers, Inc. Newsletter

The features of the flight caddy that I use at the field to hold fuel, airplane, batteries, etc., is that it is more rugged than the popular commercial units; and is convenient to use, carry, and to store. In addition, the entire cost of the original prototype was under $8.00 and you can probably beat that price with a little effort.

To begin construction, you'll need two pieces of exterior grade plywood, 1/4" and 5/8" thick, respectively, each measuring approximately 2' x 2½' or 3'. You will also need a 2' length of 1" x 8" fir which should be straight grain and clear. You're going to make the legs from the latter and you'd rather not have them bowed!

Lay out the patterns on the plywood and on the 1" x 8" board as shown in the accompanying sketches. Take care to leave the width of a saw blade between the parts. A table saw or radial arm comes in handy but is certainly not necessary. In fact, I used a hand held sabre saw with great success, using a piece of 1" x 2" material C-clamped parallel to the line of cut as a saw guide. Cut out all the pieces, sand smooth, and round the edges of the handle. At this stage, if you have cut everything square, all of the pieces are symmetrical and there are no differences between left and right and front and rear pieces.

Lay the front and rear box ends flat on your workbench. Carefully mark a vertical centerline and horizontal lines to locate the base. With the box ends still laying flat, center a yoke at the top of each end piece, clamp in place, locate the hinges in position, and establish the screw mounting holes but don't mount permanently at this time. Now you can assemble the front and rear end pieces to the base. Since these are all butt joints, the "glue-and-screw" technique is essential for permanent rigidity. Note that the front and rear end pieces extend below the base to form a "skirt." This will provide a back-stop for the legs, rigidity for the leg brackets, and a square base upon which the unit can rest when the legs are folded.

Locate the rear leg brackets (with the rear leg between them for spacing) and attach with the glue and screws through the base and through the skirt. Be sure to locate the screws in such a fashion as to leave plenty of room for the leg bolt location. The forward leg brackets must be beveled as shown in the sketch. Be sure to make one left and one right hand bevel. You'll find that mounting the bevel brackets is quite simple if you'll clamp them in place, drill through the bracket into the base for locating the screw holes, then attach with glue and screws through both the base and through the forward skirt. The attachment of the leg brackets assures that the front and rear end pieces are perpendicular with the base while you are mounting the sides of the box. So, mount the sides next. Make sure that the side pieces fit flush on the front, rear, and top. Now that the box is rigid, you can attach the legs.

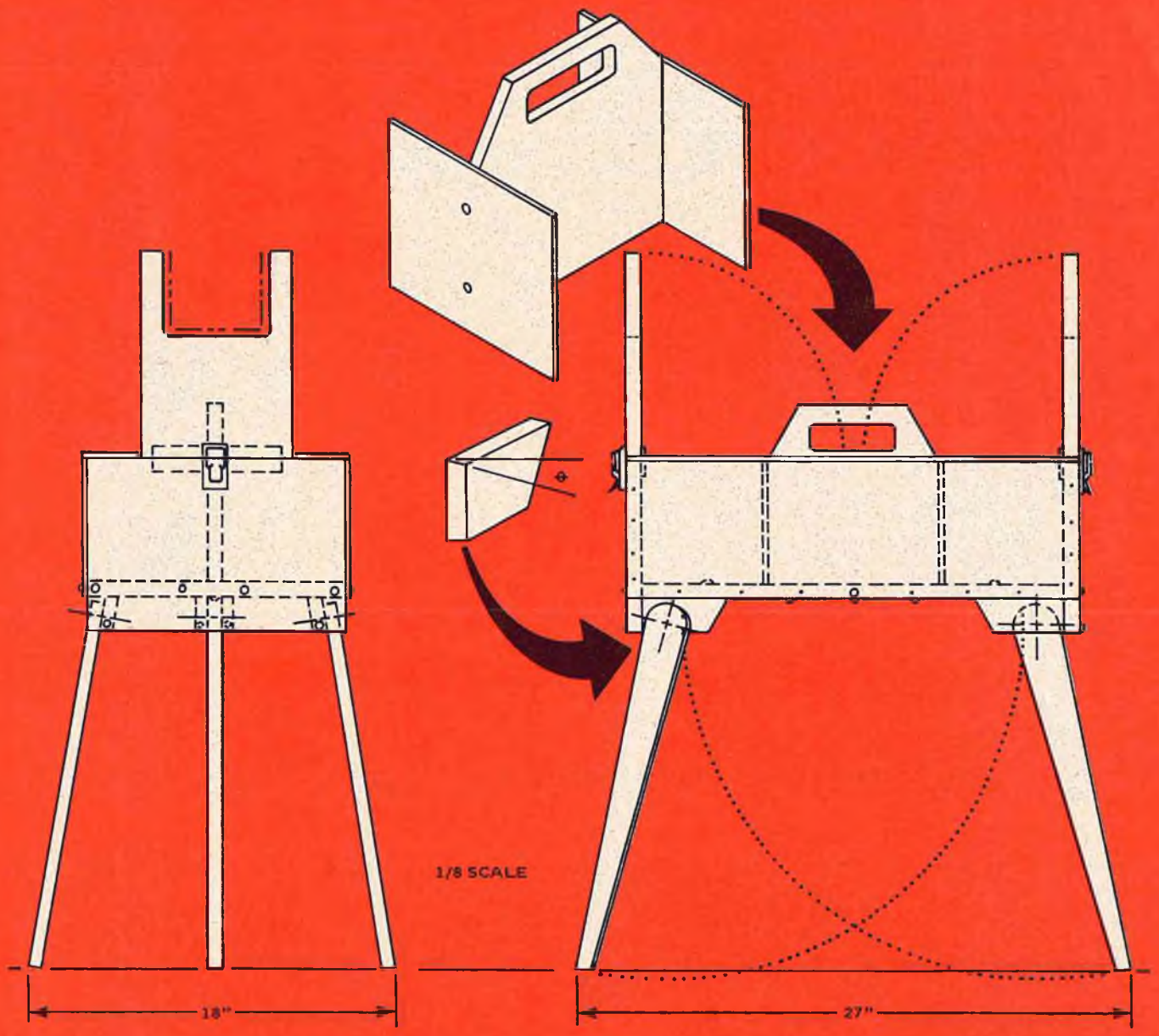
Drill a 1/4" mounting hole in all three legs. Now bevel the rear edge of the front legs at the same angle that you did the brackets. This makes sure that the legs fold and lay flush against the base. Again, be sure to make one left and one right leg. Now, for the attachment hole in the brackets - - - clamp all of the legs in place on the outside of the respective brackets. Set the legs in the extended position, resting against the front and rear skirts as stops. Check the position of the legs by standing the box on a level surface. When you are satisfied with the positioning, drill the front brackets using the leg mounting hole as a drill guide. Similarly, line-drill the rear brackets. Now put the legs aside until final assembly.

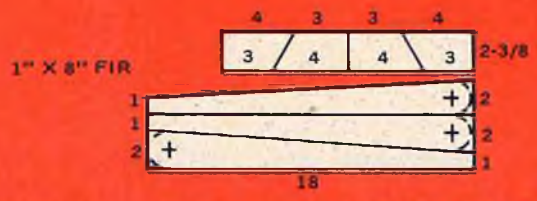
Attach the front and rear partitions to the center divider to form an "H" and mount the "H" on the centerline inside the box. You will find that three screws up through the base into the center divider are adequate. Square-up the partitions and glue to the box sides. Add a few finish nails through the sides and into partition edges for support.

The capstrips can now be glued and finished nailed in place on either side of the top. Sand all over and fill all holes and cracks. Finish the box and loose parts with your favorite fuel proof paint or varnish. The polyurethane base finishes are excellent and completely fuel proof. I used clear Varathane and like the natural grain result.

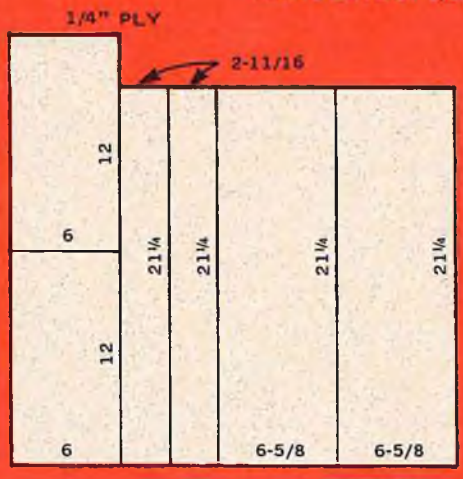
When finishing is completed, replace the yokes and mount the hinges. Brace the yokes in the full upright position and mount the "trunk lock" fasteners in place. As an alternate, the cam type of window sash lock works just as well. Attach the legs with 1/4" carriage bolts, washers, and wing nuts. Put the washers only under the wing nuts since it is the wood-to-wood friction that holds the legs in place when folded. Use rubber, leather, sponge, or any padding material you like as a liner for the yoke and stick it in place with silicone rubber. If you use a sponge material, make sure it is the close-cell variety or you'll have a fuel and castor absorber that can get pretty squashy!

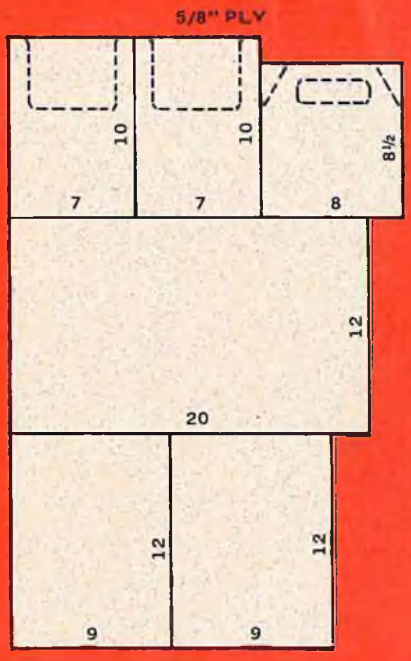
You'll find that a gallon fuel can stands in the front section very handily and that the completed Flight Caddy will allow you to take everything you need to the field in one convenient portable unit.



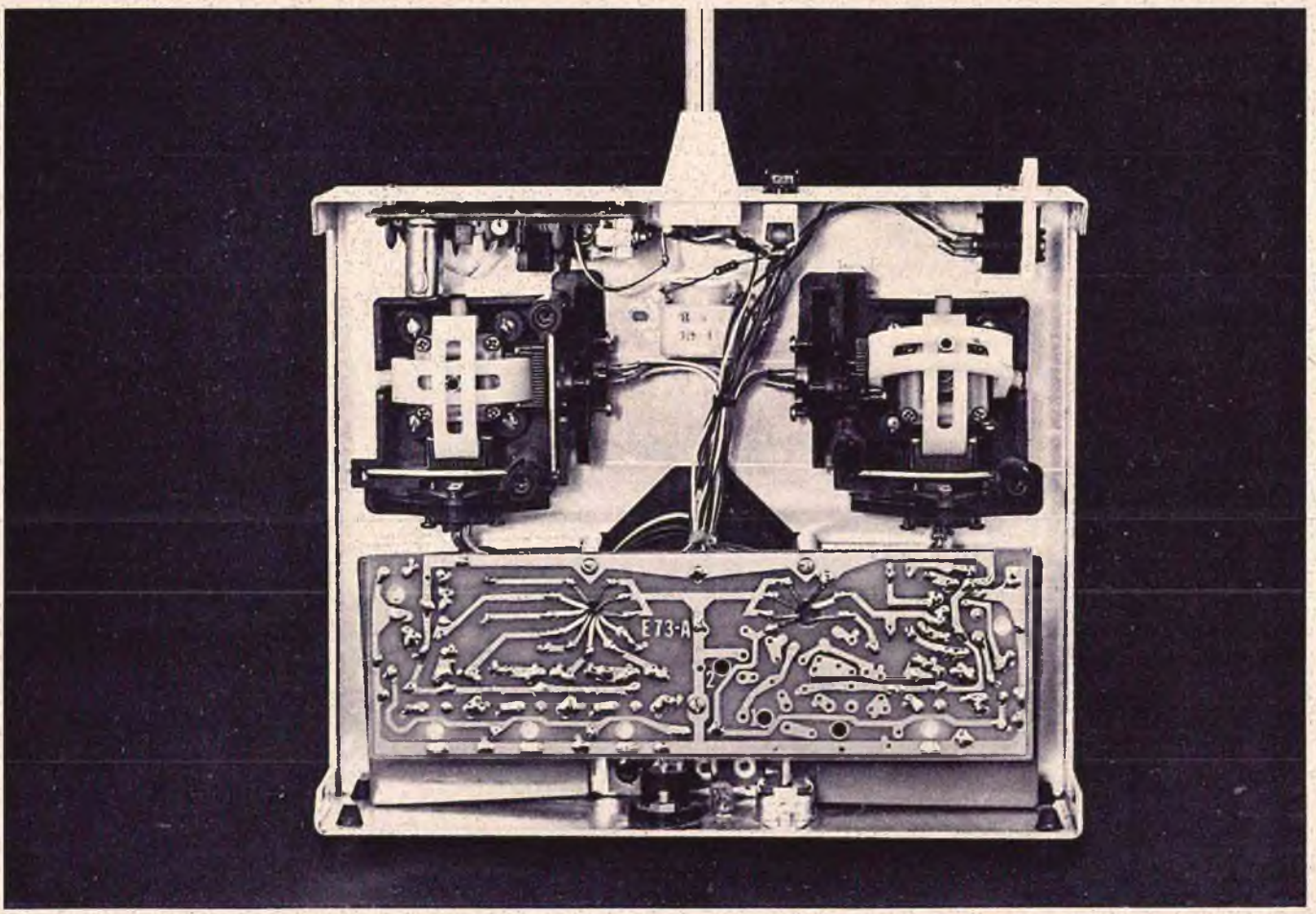


PARTS LAYOUT 3/32 SCALE





The Tower Hobbies Control 5 transmitter is available in Mode II stick configuration.



R/C MODELER MAGAZINE TESTS

TOWER 5

DIGITAL PROPORTIONAL SYSTEM

A new entry into the field of "economy" digital control systems is the Tower/Control 5 distributed by Tower Hobbies, P.O. Box 543, Champaign, Illinois 61820. Quite simply, this new system is a 5 channel radio that is equivalent in quality, performance, and reliability, to most systems in the $400.00 price range but which is sold by Tower for under $200.00!

Insofar as the radio itself is concerned, the transmitter is housed in a white vinyl-clad aluminum case with two closed gimbal stick assemblies and one auxillary channel lever located on the top left. While the closed gimbal stick does not offer quite the smoothness or "feel" of the open gimbal stick, these are very precise in operation with a minimum of "slop" around neutral. At this point, we would like to point out something that has become an erroneous belief in the "open gimbal vs. closed gimbal controversy." Most modelers look for neutral "slop" in a closed gimbal and assume this as inability for the control pot (and therefore the servo) to return to a positive neutral. This is simply not the case, as the centering mechanism is not attached to the stick but to the control pot bail, or control pot, itself. This is the exact principle of all open gimbal assemblies. There is no difference in centering accuracy between open and closed gimbals with the exception of manufacturing tolerances which cannot be blamed on the stick design.

One feature we liked about this transmitter was the provision for stick tension adjustment. Individual adjustment of each axis of control for individual preference, or "feel," may be made with an ordinary screwdriver.

Upon removal of the transmitter back we found two printed circuit boards, one furnishing the encoding chores and the other pumping RF. These are permanently connected to each other by wiring and cannot be individually removed. The layout and workmanship is good and few problems should develop in this area.

The transmitter power output is equal to many units costing much more. Stable output was observed with the antenna extended, collapsed, or removed.

While the instructions state the transmitter charge indicator (located on the bottom of the case) will not light unless both transmitter and receiver switches are "off" our specimen would light with the Tx switch in either the "on" or "off" position. This potential, but minor, problem has been brought to the manufacturers attention and will, hopefully, be corrected.

The receiver shows excellent sensitivity due in part to the use of an RF amplifier, a very unusual feature for a unit in this price range. A voltage regulator is also used to keep sensitivity relatively unaffected over a wide range of supply voltage. Good sensitivity was obtained with one cell completely removed from the four cell airborne supply. A diode second detector is used to de-modulate the received information and drive the pulse processing amplifiers and sync pulse detector. Noise immunity of the receiver is excellent.

A silicone controlled switch decoder is used to decode incoming information into separate channel outputs. The five channel outputs are terminated into an intregral block connector mounted on the receiver printed circuit board. All servos and power supply connectors are plugged into this "block" connector and are retained by a plastic comb. Use of this comb is highly recommended. An unusual feature of the receiver case is the incorporation of mounting lugs much the same as used for servo mounting. These accept rubber grommets and the receiver may be mounted in the same manner as a servo.

It is our opinion that this mounting method **not** be used with the possible exception of sailplane applications. We feel far too much vibration would be

TOWER CONTROL 5
5-Channel Digital Proportional System

TOWER HOBBIES
P.O. Box 543
Champaign, Illinois 61820

System Price: $199.00

RCM TEST DATA

TRANSMITTER

Power Input (Total): 150 m.a.
Power input to final: 600 to 1000 milliwatts RF amplifier depending on frequency.
Operating Voltage: 9.6 vdc nominal
Operating Temperature Range: 0 to 140°F.
Frequency Tolerance: .005%, crystal controlled
Frequencies Available: All 27 MHz and 72 MHz
Operation Time: 3 hours cont. on full charge
Neutral Time: 1.5 milliseconds
Control Stick Modes: Mode 1 – Mode 2
Size: 7" wide x 5.9" high x 1.80" thick
Weight: 28 oz.
Antenna: 4 section whip – removable
Frame Time: 14 milliseconds nominal – locked
Modulation Type: Pulse position
Modulation Percentage: 100%
Interaction between channels: None
Construction: White vinyl covered aluminum glass epoxy printed circuit boards
Control Potentiometers: Cermet with Niborium wipers

RECEIVER

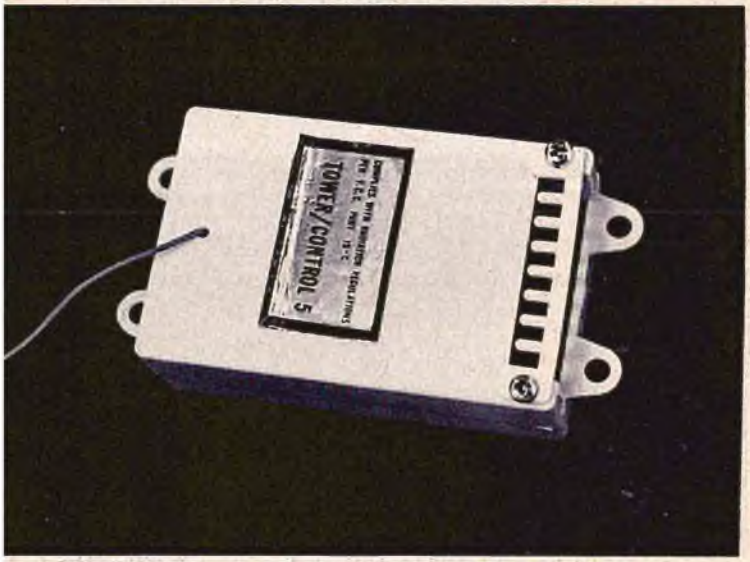
Sensitivity: 1 microvolt for 100 millivolts detected
Current Drain: 26 milliamps
Voltage Stability: 4.8 to 3.6 volts, regulated
Automatic Gain Control: 60 db min.
Selectivity: 3KC @ 6 db
Image Rejection: 4 db
Second Harmonic rejection: 25 db
Operating Temperature Range: 0 to 140° F.
Available Frequencies: All 72 MHz and 27 MHz
Size: 2.52" long x .850" high x 1.60" wide
Weight: 1.76 oz. (50 grams)
Power Supply: 4.8 vdc – nickle cadmium

SERVO

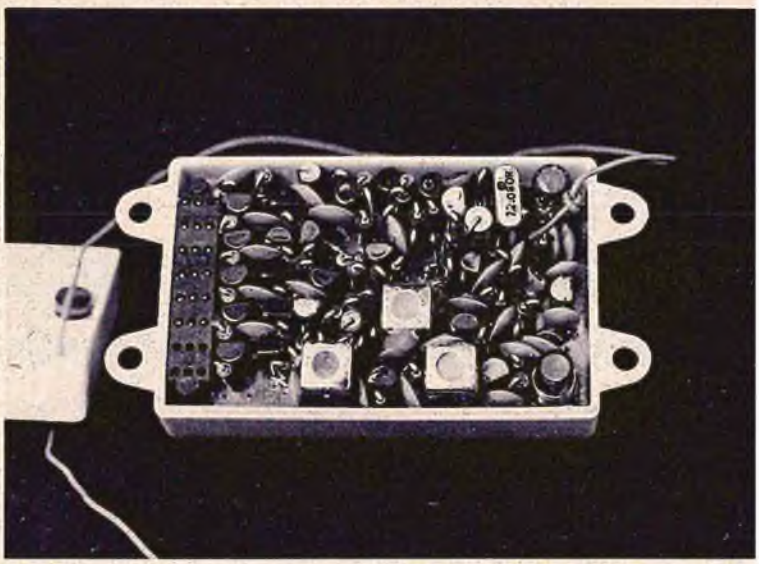
Size: 1.425 long x 1.4" high x .725" wide exclusive of mounting lugs
Weight: 1.19 oz. (34 grams)
Output: Rotary
Output Power: 4 lbs. +
Input Current: 11 milliamps
Stall Current: 400 milliamps
Neutral Time: 1.5 milliseconds
Response Time: 14 milliseconds or less .
Transit Time: .5 second for 90° travel
Centering Accuracy: ± .5%
Gear Backlash: .003 max.
Operating Temp. Range: 0 to 140° F.
Feedback Element: Cermet with Niborium wiper
Amplifier: Integrated Circuit
Mounting: Lugs ingetral with servo case

AIRBORNE POWER SUPPLIES

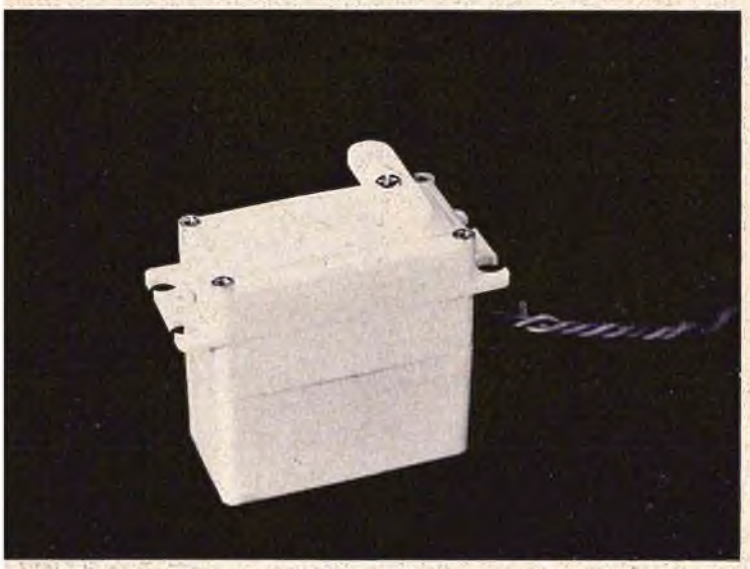
(4 cells – flat)
Size: 2.150" x 2.425" x .700"
Weight: 3.88 oz. (110 grams)
Capacity: 500 MAH
Charge Rate: 50 milliamps



The Tower/Control 5 receiver measures 2½" x 3/4" x 1½" and weighs 1¾ ounces. Servo plugs are locked in place by comb at front of receiver.



Receiver has exceptional sensitivity due, in part, to the use of an RF amplifier, a very unusual feature for a unit in this price range.



The tiny servos measure 1½" x 1½" x 3/4" and weigh only 34 grams each, making them among the smallest and lightest made. Each puts out over four pounds!

The flat battery pack is rated at 500 MAH and weighs under 4 ounces. Switch harness and charging jack are wired as an integral unit with the battery.

transmitted to vital receiver components, especially the crystal. A far better method would be to use the traditional foam rubber mounting (manufacturer recommends Sonic-Tronics #240 Protec-A-Pac) in anything larger than .15 – .19 powered aircraft.

The servos supplied with this system are one of the smallest and lightest available with an exceptionally high power output of over four pounds. Three different outputs are provided for each servo, making possible a wide choice of travel, differential outputs, etc.

The airborne battery pack and switch harness are wired as one unit with a separate connector for charging. The charge connector may be permanently mounted and batteries may be charged without disturbing any other wiring.

The total airborne weight of the system using four servos was slightly over ten ounces which makes this system one of the lightest available.

To say the least, we were impressed by the Tower/Control 5. This new system represents not only a high quality radio that will meet or exceed the performance standards of a majority of RC'ers, but also represents a total commitment by Tower Hobbies to provide an excellent radio at an unbelievably low price. This personal commitment goes beyond the quality standards involved in this product to include that personal touch in customer service where quality is more important than quantity and where customers satisfaction consumates the transaction.

As an example, Tower Hobbies checks each and every Control 5 system before it is shipped to make sure that it works properly. In addition, they enclose an FCC Form 505 for the convenience of the customer.

Reading the test data included with any review simply tells you what the reviewer has determined about that

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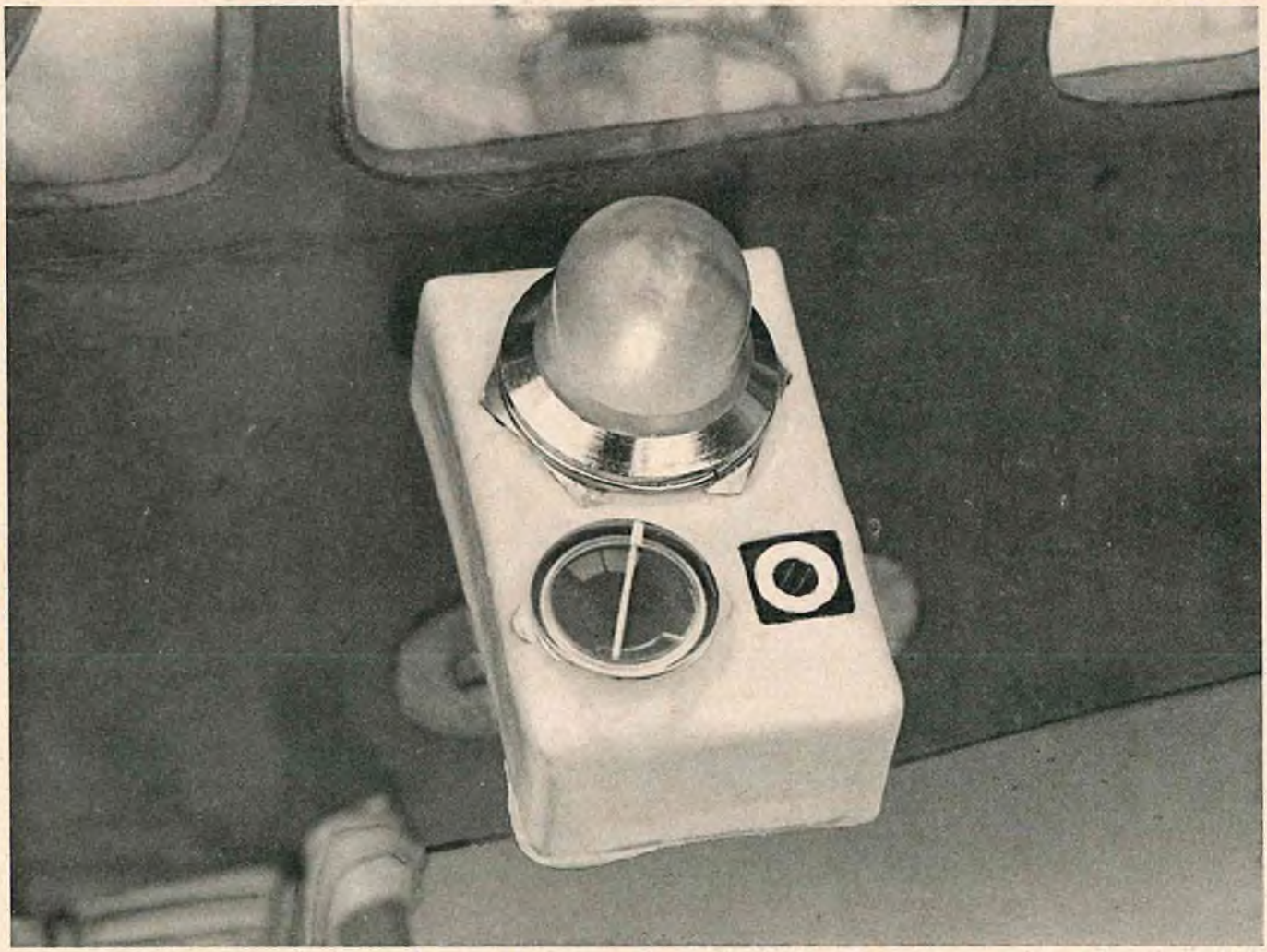

Tiny checker plugs into recharge jack located on side of fuselage. Flashlight bulb serves as correct load and also illuminates dial. Screwdriver-adjust potentiometer affords precise setting for any standard flight pack. Miniature meter costs only $1.00.

MINI FLIGHT PACK CHECKER

SIMPLY PLUG IT INTO YOUR CHARGING JACK AND FIND OUT THE CONDITION OF YOUR AIRBORNE BATTERY PACK BEFORE YOU TAKE OFF.

BY J.P. DOBYNS

Here's a miniature checker for your 4.8 volt flight pack – a test unit easy to construct, eminently portable, and guaranteed not to shoot your budget full of holes.

Assuming you use nickel-cadmium batteries, you just plug this checker into your plane's recharge jack and read the meter. For alkaline dry cells, the checker needs no alterations, but it will be necessary to rig wires and a jack to the battery pack. The checker puts a full load on your flight pack, 450 mA, and therefore the receiver switch should be in the off position when tests are made.

PARTS LIST FOR
MINI FLIGHT PACK CHECKER

P1	R/C plug, Deans (Ace Radio Control; Higginsville, Missouri 64037)
J1	Recharge jack, Deans (Ace)
L1	PR-12 flashlight bulb (Radio Shack 272-1123) and panel lamp bubble, green (Radio Shack 272-1535)
M1	0-1 mA, micro-mini panel meter (Poly Paks; P.O. Box 942, South Lynnfield, Mass. 01940)
R1	50,000 ohm, Cermet potentiometer (two for $1.00 from Poly Paks)

MISCELLANEOUS: #24 insulated hook-up wire, Devcon epoxy, Francis Products surfacing resin, Superpoxy yellow, sticky yellow MonoKote, small cardboard box, etc.

The test technique is to begin measuring the flight pack's voltage after three or four flights have been completed. When the pack's voltage eventually drops to 4.2-4.3 volts, it's wise to call it a day. If you don't, you could end up carrying home a basketful of balsa splinters, or worse, be responsible for an accident.

The flight pack is by far the most critical battery in the R/C arsenal: it has to supply servo motors, stand up to engine vibration, and live through landing stresses. You definitely need a way to put that pack to a tough test, and a 450 mA test will do it.

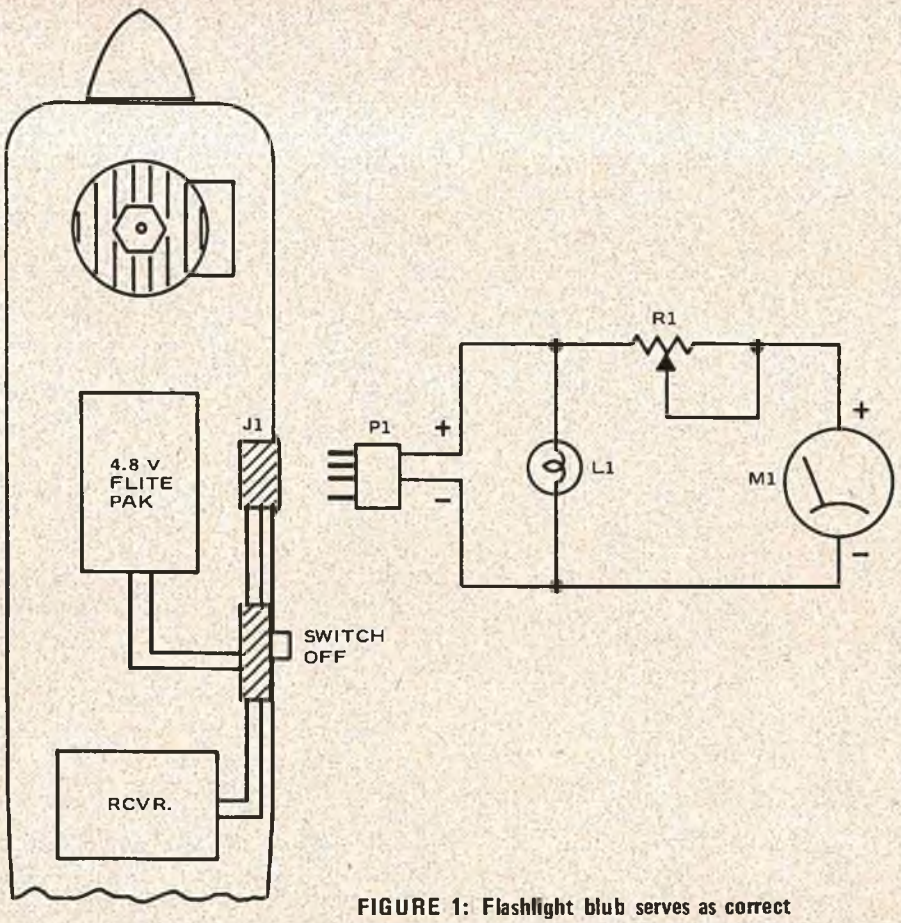

FIGURE 1: Flashlight blub serves as correct load for 450 – 550 mA flight packs. Polarities of R/C plug must match those of jack.

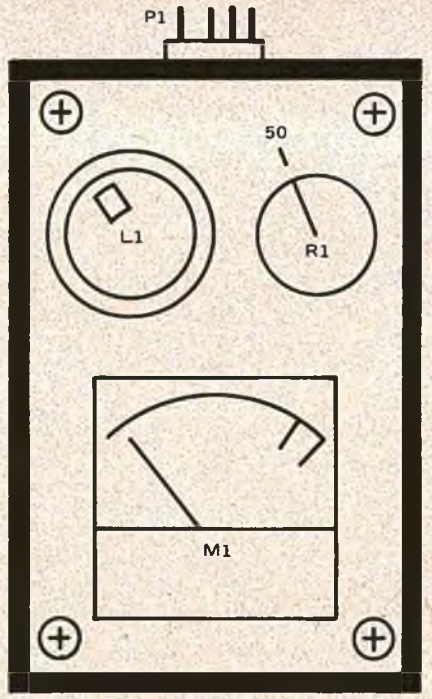

FIGURE 2: Suggested layout for full size, yet compact version. This version uses a 0-50 uA Calectro miniature panel meter (large electronic store), a 500,000 ohm potentiometer (RS 271-210) and pointer knob (RS 274-415), and mini utility box (RS 270-230). A unit like this is easier to read and more accurate. A fully charged flight pack is set to read 50 uA. When the meter indicates 42 uA, the fun is over for the day.

What about other R/C batteries – do we need special tests for those, too? Probably not. Rarely does a transmitter pack give trouble, simply because the stress on it is nothing compared to the beating the flight pack takes. Most transmitters equipped with nickel-cadmium batteries also feature a field strength meter or output sampling meter which allows a good check on the condition of the battery. Tx's equipped with a dry cell are easily checked with an ordinary voltmeter, using the transmitter's own circuit (switch on) as the correct load. For 9 volt dry cells, anything less than 8 volts is a stop sign.

What about glow plug batteries? Try this test. Insert a glow plug in the starter cord clip. The plug should glow orange. If it glows a dull red, the battery should be replaced or recharged. You ordinarily don't have much of a problem here, as glow plug batteries or even motorcycle batteries for starters are generally available from friends at the flying field, if you need help. This isn't true of flight packs.

That flight pack is something that should be checked regularly. You can do that nicely with either of the checkers shown in this article.

If you want to go all out and build a tester capable of testing any type of battery, R/C or otherwise, go to any municipal library and look up Marshall Lincoln's article, "A Better Battery Tester" in the September/October, 1973 issue of *Elementary Electronics.* This professional type unit is excellent, but don't forget the cost, which is considerable.

Do we actually need an elaborate battery tester for all R/C batteries? I tend to doubt it. Lugging a large tester to the field isn't desirable. Think small, travel light, and still fly safely with one of the units described here.

CONSTRUCTION

Figure 1 shows how simple this project is. A plug, a flashlight bulb, a potentiometer and tiny meter.

The housing is a 1" x 1½" x ½" cardboard box, originally a container for wood screws. A box this size can be found in any hardware store. Access holes for the parts are easily cut with an X-Acto knife. The parts are then epoxied in place, inside and out, with 5-Minute Devcon.

The easiest approach to the plug and jack are to use Deans connectors, which are readily available from Ace Radio Control; Higginsville, Missouri. Replace your recharge jack(s) with the Deans jack(s). This solves the mating problem (as far as R/C goes).

Use No. 24 hook-up wire to make the connections. Seal the bottom of the meter and the area around the bulb with Devcon. The bulb, of course, doesn't fit into a socket; it is just thrust into the green bubble and glued there. Since you only use the checker for a few seconds at a crack, the bulb will last for many years.

Check the box to see that there's no way it can leak (epoxy any possible leaks), then set it level on a pair of boxes as shown in the accompanying photo. Drop a few balsa chips into the box and fill to brimming with Francis Products surfacing resin. The balsa chips will tend to float, but don't worry about it; the reason for the chips is to prevent the resin from cracking as it cures. Allow the resin to cure for one hour, then trim the balsa chips off with a knife.

Next, shellac the cardboard surfaces of the box with a heavy coat of surfacing resin. After that cures, add

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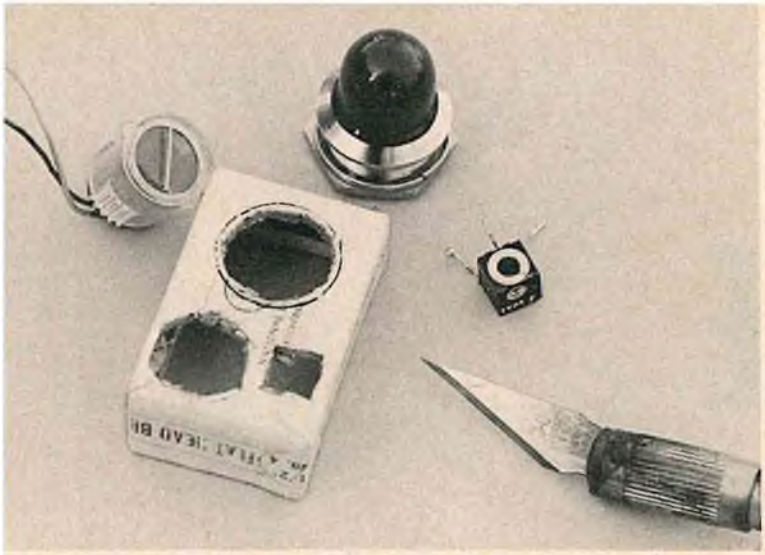
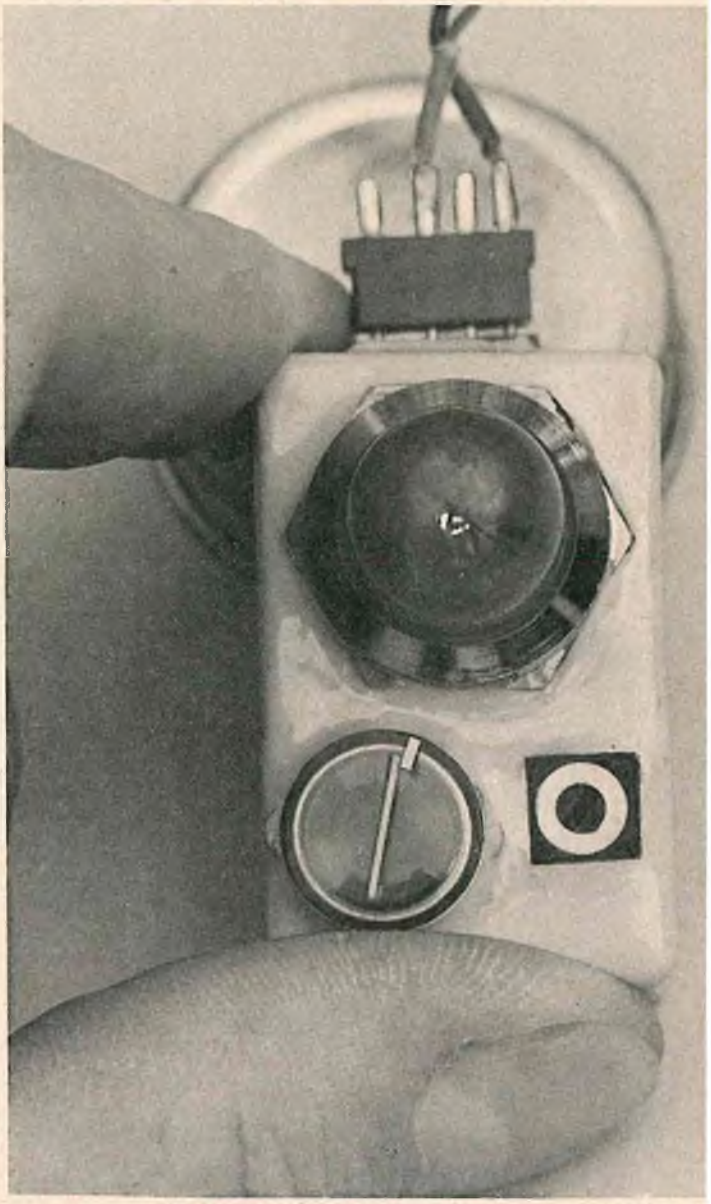


ABOVE, LEFT: X-Acto knife was used to cut holes in cardboard box to accommodate parts. Parts were then epoxied in place, inside and out. Notice that the bubble assembly includes a washer and lock nut. Normally the washer and lock nut would go inside a utility box. For this project, however, the washer and nut should be screwed up flush with the circular flange, so that the bubble will stand higher than usual. It must be done this way so the flashlight bulb's base won't protrude from the bottom of the box. **ABOVE, RIGHT:** Tester isn't much larger than postage stamp. Interior view of wired unit shows how wires are soldered directly to bulb. The base of the bulb, the base of the meter, and the area surrounding the plug were then sealed with 5 minute Devcon.

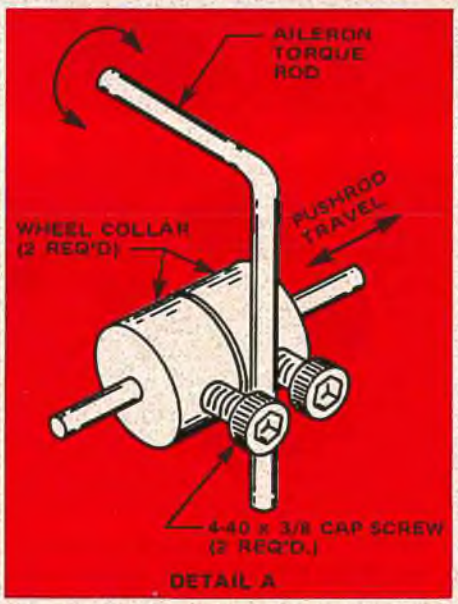
ABOVE: With the wired unit resting level on a pair of boxes, the interior of the box was filled to brimming with Francis Products' surfacing resin. A few chips of balsa were sprinkled into the box first to prevent the resin from cracking as curing occurred. The hardened resin makes the unit ultra sturdy and completely short circuit proof.



RIGHT: The tester's meter indicates that a flight pack battery has discharged to 4.3 volts; time to **STOP FLYING.** When the right side of the needle is lined up with the left side of the MonoKote marker, you have a 10% voltage drop. From this point on, the battery's voltage will drop rapidly, bringing on glitches and possible damage to the battery itself.

SIMPLE DETACHABLE COUPLED AILERONS

Here's an ingenious linkage that has an application for everything from Half-A racers to sailplanes.



BY JOHN GERLACH

Here is a method that I use to rig the aileron linkages in a removable wing when the servo, or in the case of a two channel "brick" system, the receiver-servo unit, is mounted in the fuselage of the airplane and it is impossible to use an aileron servo in the wing.

Figure 1 is an example of how one aileron only was added to an existing rudder and elevator half-A pylon racer. A Du-Bro E-Z Connector is added to the rudder servo output arm. A short piece of 1/16" music wire is installed in the E-Z Connector to locate the position of a small hole to be drilled in the bulkhead. This hole acts as a guide for the added music wire pushrod. A pair of wheel collars are added to the new pushrod prior to final installation. The 4-40 set screws have been removed and replaced with 4-40 x 3/8" cap screws. When the wheel collars are locked adjacent to one another on the pushrod the cap screw heads and, screw thread protrusion, and wheel collar bodies form a "hole" into which the aileron torque rod may be inserted and retained when the wing is installed.

The newly added pushrod assembly may be independently adjusted from the rudder adjustment by lowering the set screw in the E-Z Connector. This method of inter-connection should work well with two ailerons with either rotary or linear output servos.

If you've been considering moving up to ailerons, or using coupled ailerons and rudder on a small aircraft, try this method of connecting your strip aileron linkages to a servo mounted in the fuselage. □

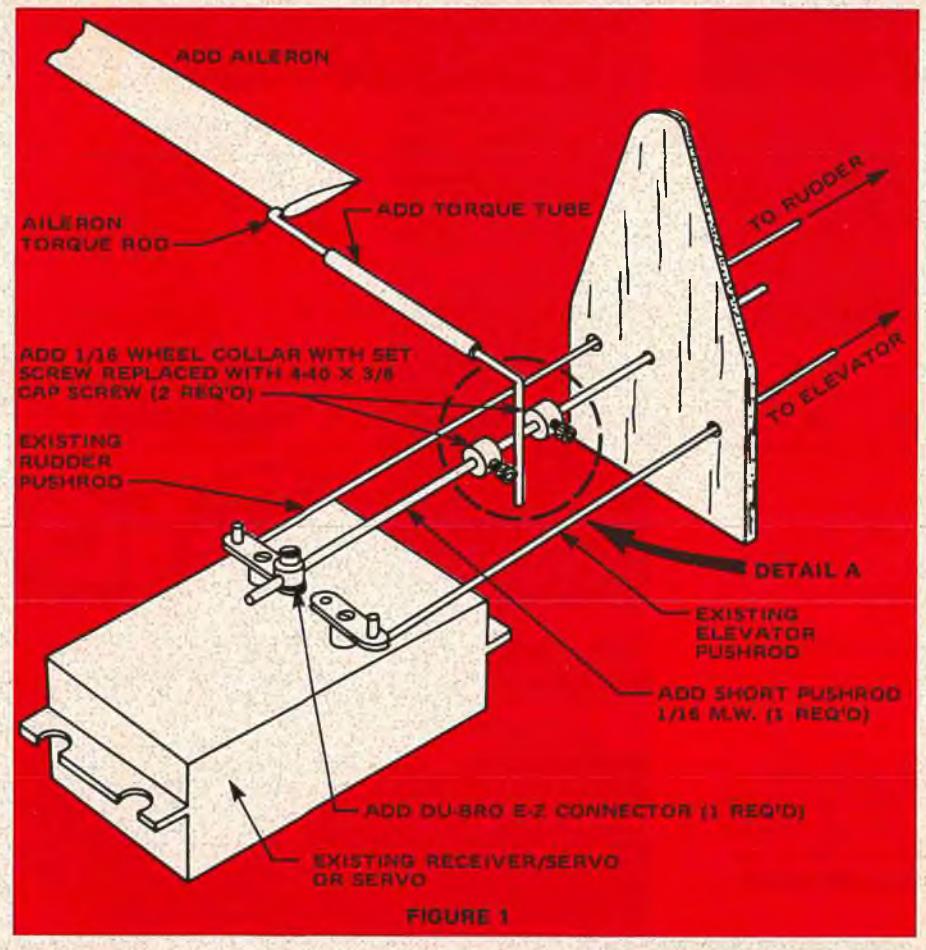


FIGURE 1

RCM TRAINER ON FLOATS

BY EARL HARTING & KEN HALL

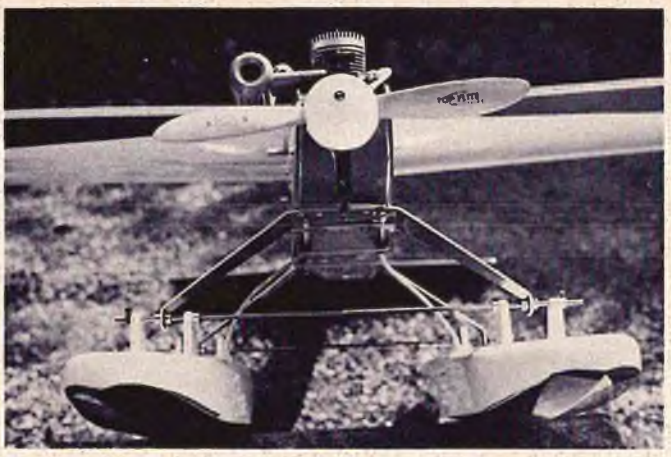
● How about a basic float design that could be used with several types of aircraft, is simple to build, sturdy and (most importantly), works well on the water? Such a design should be appropriate to both beginners and experienced modelers who, for any reason, would like to try seaplane flying to further their skills and get into a new thing.

In an attempt to accomplish this end we started with an RCM Trainer by Bridi Hobby Enterprises. This model is a very good, sound, and practical airplane that should lend itself to the novice seaplane flier. Like everything else, some limitations are recognized when attempting to design an "add-on" feature to an already successful item. The following problems were noted:

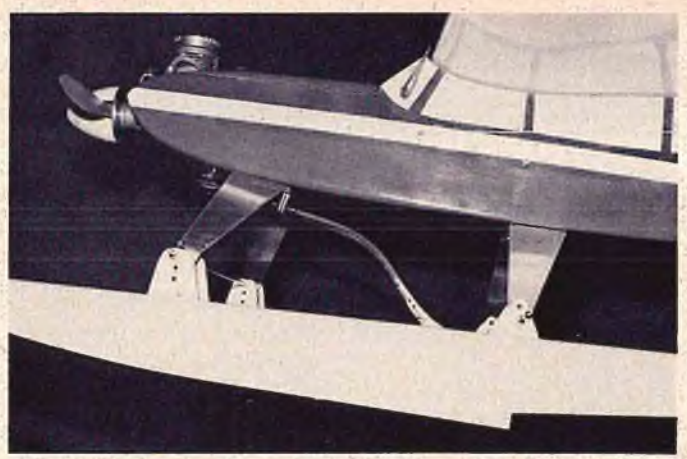
1. The float design must be simple and straightforward. Hopefully, it should be as successful in these areas as the aircraft we were planning to use.
2. No exotic building materials.
3. Easy conversion from land to water.
4. Rugged enough to take a beating and live to stay afloat.
5. Handle well on the water.
6. Modifications to the existing aircraft must be easily accomplished, keeping in mind that they may be a retro fit to an already completed model.

Now that the problems have been identified the design can be attempted. Earl had some experience with seaplanes and float design, so he did the original pencil drawings and Ken did the construction. Once the construction was along to a point that a mating of aircraft to floats was in order we got together. At first blush it looked like we had mounted the airframe on tennis shoes.

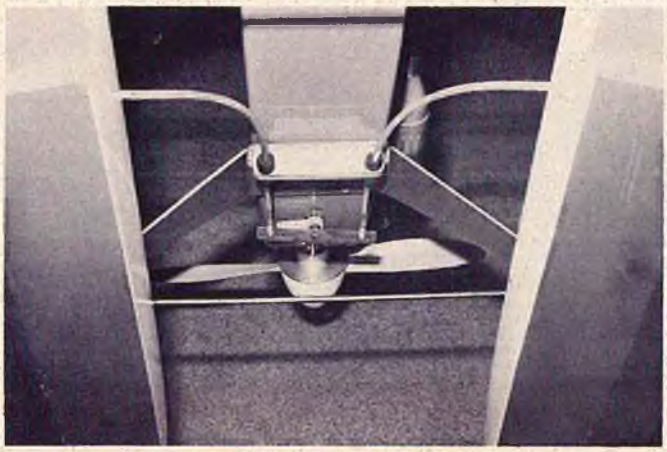
Initially we set the floats up at zero angle to the wing. Now we all know that a wing has to have some angle of attack to fly, but just how all of this good scientific stuff translates to these floats (and our airplane) was a complete unknown. The safe bet was the zero-zero set-up. To try to understand this you might visualize a trike geared airplane with an added tail wheel which is just off the ground when the airplane is at rest. When you would attempt to take such a beast off, you might not get enough rotation and, therefore, the necessary angle of



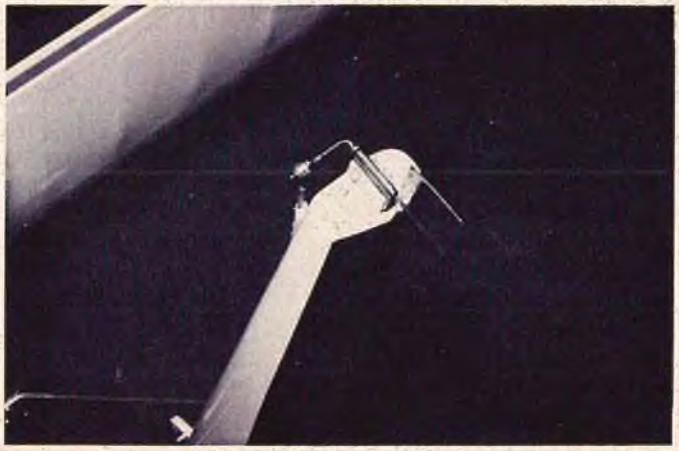
Front view of the simple, efficient float attachment.



Side view of float attachment. Steering cables in center.



Bottom view of tiller and arm and control cables.



Water rudder and steering arm attachment.

Simple styrofoam chest acts as field box.

The reward for your efforts . . . . .

attack to lift. Float planes are the same. On take-off there is a rotation but now, instead of the landing gear to act as a hinge point, it is the steps of the floats. The aft part of the float must be clear of the water far enough to allow the necessary rotation. What all of this boils down to is this – zero-zero is a safe starting point. If the wing cannot rotate into a lifting angle, it ain't gonna' fly!

Let's jump ahead here to the first flight for a demonstration of this problem. We set the model up, fired the engine off and set it in the water. There was some talk about hitting it with a bottle of champagne but cooler heads informed us the best we could do was a warm can of beer and we gave that idea up. All that was left was to try the beast out. Power was added slowly and we taxied about for awhile to get some idea of how it handled and if we were going to entertain any water spray problems. All was well, so the model was turned into the wind and full power was applied. Away she went - - - and went - - - and went. As it was approaching flank speed it finally came out of the water. Once in the air, the model flew well indeed. The landing was without incident.

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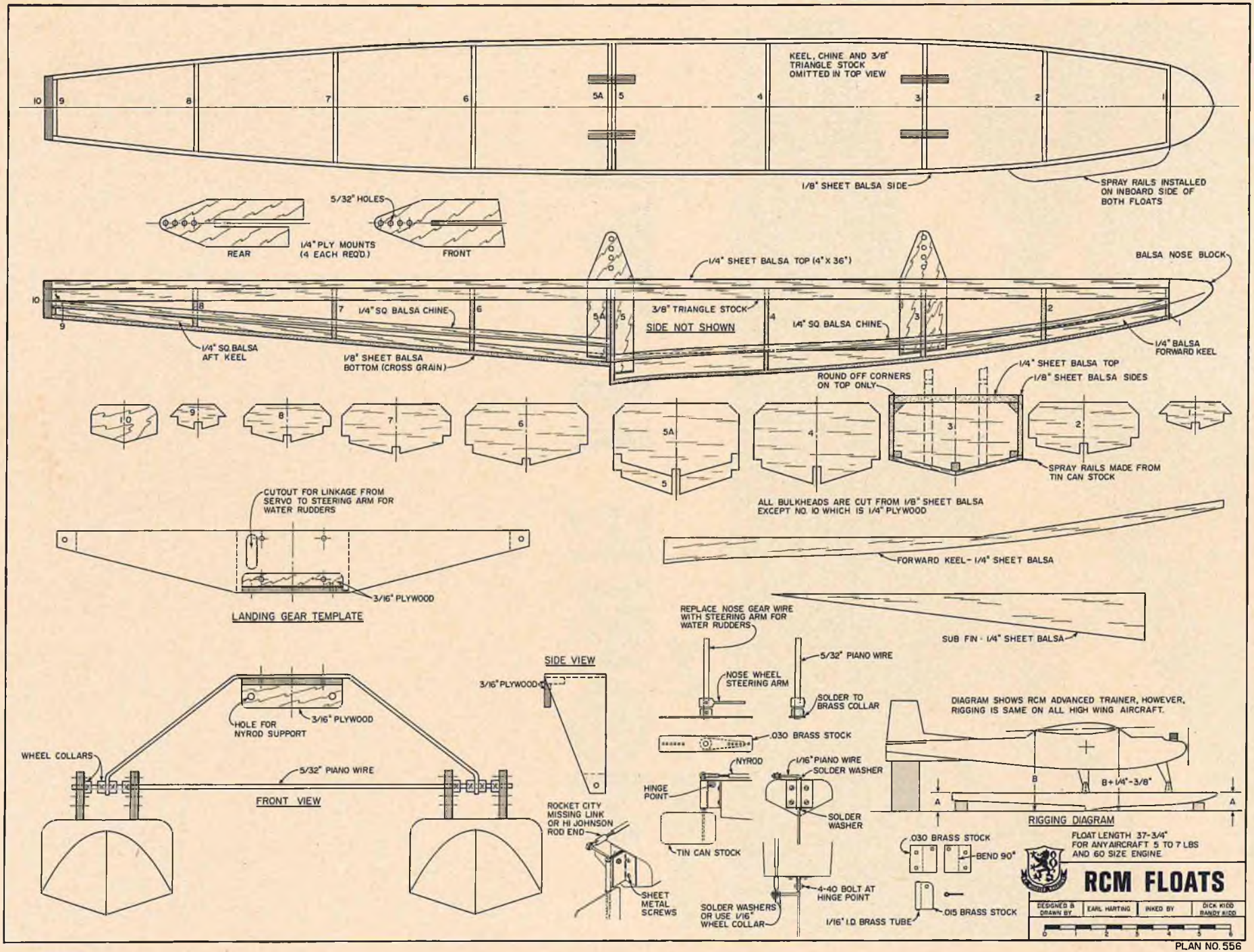
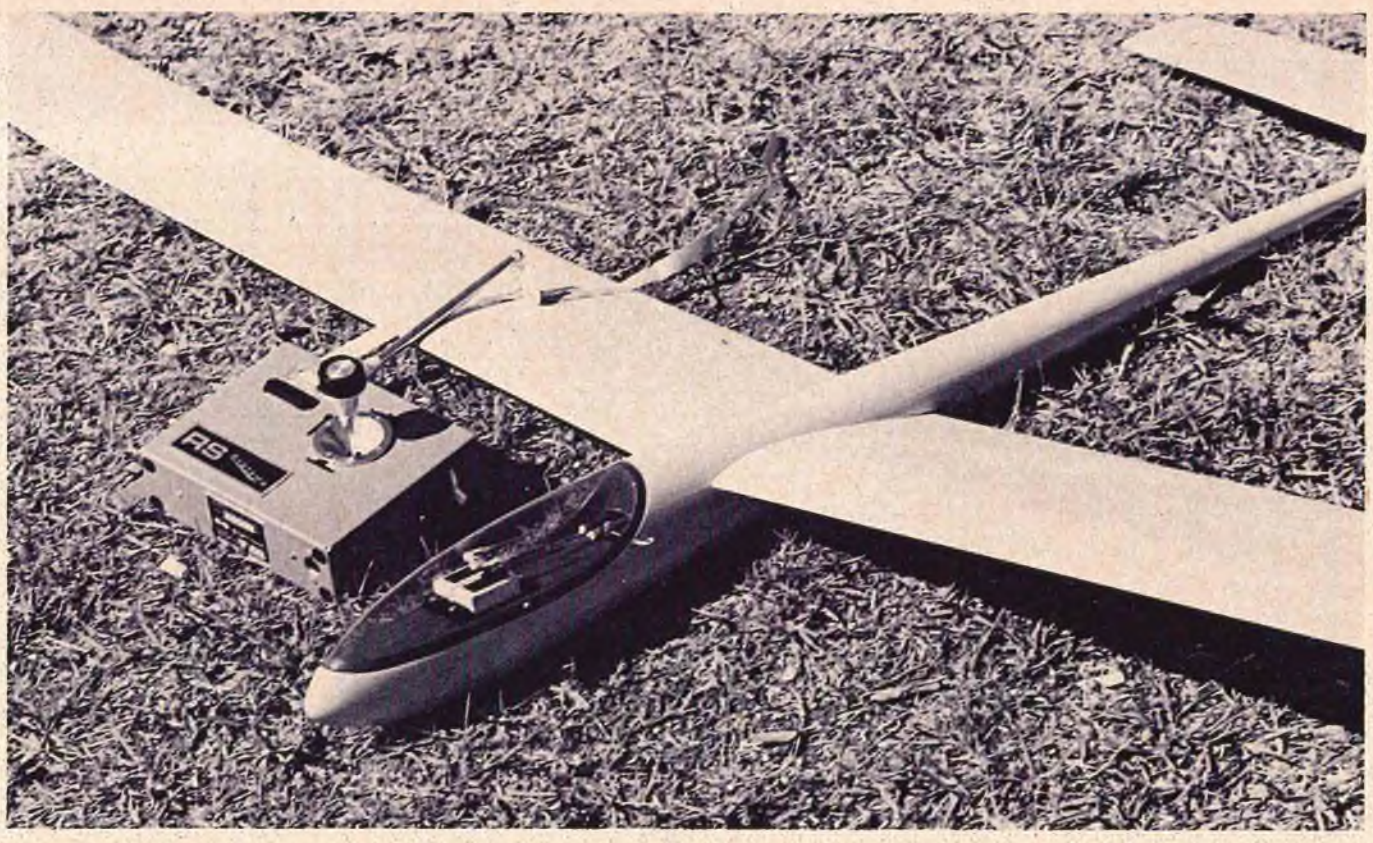

KEEL, CHINE AND 3/8" TRIANGLE STOCK OMITTED IN TOP VIEW
1/8" SHEET BALSA SIDE
SPRAY RAILS INSTALLED ON INBOARD SIDE OF BOTH FLOATS
5/32" HOLES
REAR
1/4" PLY MOUNTS (4 EACH REQ'D.)
FRONT
1/4" SHEET BALSA TOP (4" X 36")
BALSA NOSE BLOCK
1/4" SQ. BALSA CHINE
3/8" TRIANGLE STOCK
SIDE NOT SHOWN
1/4" SQ. BALSA AFT KEEL
1/8" SHEET BALSA BOTTOM (CROSS GRAIN)
1/4" BALSA FORWARD KEEL
ROUND OFF CORNERS ON TOP ONLY
1/4" SHEET BALSA TOP
1/8" SHEET BALSA SIDES
SPRAY RAILS MADE FROM TIN CAN STOCK
ALL BULKHEADS ARE CUT FROM 1/8" SHEET BALSA EXCEPT NO. 10 WHICH IS 1/4" PLYWOOD
CUTOUT FOR LINKAGE FROM SERVO TO STEERING ARM FOR WATER RUDDERS
3/16" PLYWOOD
LANDING GEAR TEMPLATE
FORWARD KEEL - 1/4" SHEET BALSA
SUB FIN - 1/4" SHEET BALSA
REPLACE NOSE GEAR WIRE WITH STEERING ARM FOR WATER RUDDERS
NOSE WHEEL STEERING ARM
5/32" PIANO WIRE
SOLDER TO BRASS COLLAR
.030 BRASS STOCK
SIDE VIEW
3/16" PLYWOOD
HOLE FOR NYROD SUPPORT
3/16" PLYWOOD
WHEEL COLLARS
5/32" PIANO WIRE
FRONT VIEW
NYROD
1/16" PIANO WIRE SOLDER WASHER
HINGE POINT
SOLDER WASHER
TIN CAN STOCK
ROCKET CITY MISSING LINK OR HI JOHNSON ROD END
SHEET METAL SCREWS
SOLDER WASHERS OR USE 1/16" WHEEL COLLAR
4-40 BOLT AT HINGE POINT
1/16" I.D. BRASS TUBE
.015 BRASS STOCK
.030 BRASS STOCK
BEND 90°
DIAGRAM SHOWS RCM ADVANCED TRAINER, HOWEVER, RIGGING IS SAME ON ALL HIGH WING AIRCRAFT.
B
B+1/4"-3/8"
A
A
RIGGING DIAGRAM
FLOAT LENGTH 37-3/4" FOR ANY AIRCRAFT 5 TO 7 LBS AND 60 SIZE ENGINE
RCM FLOATS
DESIGNED & DRAWN BY
EARL HARTING
INKED BY
DICK KIDD
RANDY KIDD
PLAN NO. 556



RCM TESTS THE HOBIE HAWK

BY BILL O'BRIEN

In the world of surfboards and catamarans, the name Hobie is synonymous with "the best," "the fastest," and many more superlatives too numerous to mention among devotees of both sports. And, mention a competitive product to Hobie owners, and you will evoke a degree of loyalty and pride of ownership so aggressive the debate is over before it began.

And the man behind that name is Hobie Alter, who has been associated with surfing since 1954 when he quit making surfboards for friends and started making them for a profit. By 1966 Alter had fifty dealers in the United States selling two hundred and fifty boards a week at an average price of $130.00. It was during that era that Hobie Alter, himself, became a blazing light in tandem surfboard competition as well as setting a worlds record for the longest ride on a surfboard, riding one of his own boards in the wake of a large boat from Long Beach to Catalina, a distance of 26 miles. It was also during this period of time that he decided to start production on a fast, small catamaran with a lot of strength and no center board. Thus, Coast Catamaran, Inc., was launched and, today, this company employs 350 persons and has distributors throughout the United States, Japan, France, South Africa, Brazil, and Mexico City. The company has sold more than 20,000 14' and 16' catamarans and about 1500 12' monocats.

Today, the forty year old chairman of the board of Coast Catamaran Corporation in Irvine, California, still works sixty to seventy hours a week researching and developing new products which he will personally "imagineer" - - - a combination of imagination and engineering - - - into production items which will have the high quality and value associated with the Hobie name.

And one of these products is the Hobie Hawk, an 8' radio controlled sailplane which has been under development for the past few years and is only now in production.

There is nothing unusual about most sailplane kits currently on the market. Exactly the opposite is true of the Hobie Hawk - - - there is nothing ordinary or usual about this graceful sailplane. It is the end result of imagineering, dedication, and thousands of hours of research, testing, and finding new methods of production techniques that would result in what Hobie Alter hoped would be the finest sailplane available to the RC enthusiast today.

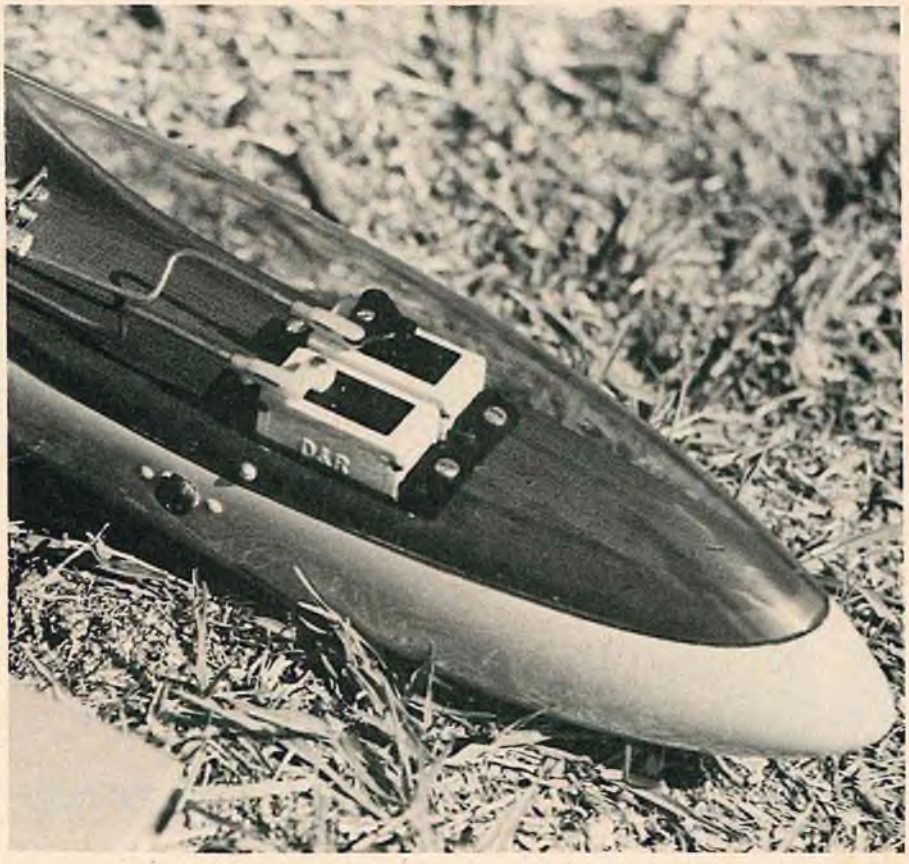
And in our opinion, Hobie Alter has done just that. As you purchase the Hobie Hawk, it is completely ready to fly, minus radio. Looking for all the world like a full scale sailplane, our prototype was so sleek that it was impossible to tell all of the revolutionary engineering ideas that went into its make-up. As an example, the front section of the fuselage is cross-linked polyolifin which can literally be beat with a hammer without breaking or cracking. From the trailing edge of the wing to the leading edge of the stabilizer, the fuselage is fiberglass, six layers of it blown into a steel mold. The tail section is a unique injection

molded ABS plasic unit – each of the pieces telescoping into the other. The joints are so smooth that it is virtually impossible to tell where the sections have been joined and, as you receive it, the Hobie Hawk is completely painted in one of several colors in a finish that is virtually abrasive resistant.

The wings and stabilizer are just as revolutionary as the fuselage since they were molded of rigid foam and covered with a layer of 1/32" thick plywood on top and 1/64" plywood on the bottom. In order to reduce weight, the material between "rib" sections have been completely routed out and the wing formed in an elliptical dihedral mold. Finally, the wings and stabilizer are completely covered with MonoKote to match the fuselage. Finally, a thick tinted canopy blends into the fuselage and is mounted with two sheet metal screws. The result is a ready-to-fly sailplane unlike anything you have seen to date.

How does it fly? The prototype we tested had a set of 8' and a set of 6' wings, both with elliptical dihedral. And, if the appearance is impressive, the flight performance is even more so. This machine, the Hobie Hawk, is one of the highest performance sailplane kits available today. In our test flights, including several fun-fly contests, it equalled or exceeded even the great thermal chasers such as the Grand Esprit, the ASW-17, the Windfree, and other well known contest designs. And this our test pilot did with the smaller set of wings which were primarily intended for slope soaring! The Hobie Hawk can be flown extremely rapid and has far more control response than that to which you may have become accustomed. But, it also has excellent low speed characteristics - - - in other words, the speed envelope is extremely wide - - - far more so than the average sailplane. As an example, the Hobie Hawk with smaller wings has been clocked at near record speed with absolutely no adverse effect. And, the machine is so rugged it can take more abuse than any model aircraft we have tested to date. The novice sailplane flier may have a little difficulty at first unless he tones down the amount of control available, but once he has mastered the Hobie Hawk, he will be capable of flying almost any other type of aircraft – if he should have the desire to do so, which is doubtful!

The name of the game in competition sailplane flying is efficiency - - - - a combination of efficiency both on the part of the man and his



aircraft. With the Hobie Hawk we have come closer to 100% efficiency than ever before. Now it is simply up to you as the competition pilot. And if you're interested in just sport flying, you can't do better than this fantastic new sailplane from Hobie Alter and Coast Catamaran. It will be available at your dealer shortly, if not by the time you receive this magazine, and will be priced at approximately $129.00. If you're not a "buy-it-in-the-box" type soaring enthusiast, Hobie has a kit form of the sailplane which will be unpainted and "un-MonoKoted" and sells for approximately $89.00. See your dealer or write to Hobie Model Co., Dept. 100, 33081 Calle Perfecto, San Juan Capistrano, Calif. 92675.

Either way, you'll end up with a sailplane that you just won't believe until you fly it. Take it from us - - - we've been there, a hundred flights or more - - - and we still find the performance of the Hobie Hawk almost unbelievable.

Tested, Approved, and Recommended by RCM. □

Jan Levenstam's Jet Ranger utilizes a MacGregor radio, Veco .61. Photo from recent Swedish competition.

HOVER

BY DON DEWEY

Before we get into a discussion of which helicopter is "best," or make any suggestions on purchasing your first helicopter, we'd like to reiterate a point that we have made before and one which we will continue to make in the future.

And that is, if you **really want** to learn to fly an RC helicopter **you can**; if you only think you'd like to, you **probably won't**. What we mean by this is simply that to master RC helicopter flying requires a degree of dedication and perserverance to continuous practice that is not demanded of the fixed wing pilot. In other words, you will have to establish a daily regimen of practice of 2 to 4 tanks of gas a day rather than practicing on a hit-or-miss basis such as a "once-or-twice-a-Sunday" program. There are no "Sunday Fliers" among those seriously interested in mastering the rotorcraft. While we don't wish to make the learning curve sound impossible, it is more difficult than learning to fly a fixed wing aircraft. On the plus side, however, is that most of your practice can be done right in your own back yard such as in the hour after work and before dinner. On the weekends, you can put in even more time until you have mastered controlled ascent and descent. From that point on you'll be "home free."

So, if you still think you'd like to learn this challenging new aspect to our sport, let's take a look at what you'll need in the way of a helicopter.

First of all, be prepared to spend between $300.00 and $500.00 for your first rotorcraft. And, as has been good sound advice in the field of fixed wing aircraft, don't try for the all-out scale winner for your first machine. It is inevitable that you will bang it around and break quite a few parts before you learn to fly. And it is very discouraging, to say the least, to have individually glued in place 10,000 simulated rivets out of cut-off pin heads only to wrap your machine around a tree on the second tank of gas! The secret is to build your first machine precisely and with close attention to the manufacturers assembly instructions. And, that first machine should be as easy to assemble and disassemble, and repair as possible.

And, far and above the most important factor is that replacement parts should be readily available. You're going to need some! There's absolutely no way around this, as any of today's proficient helicopter pilots will tell you. You're going to break some main rotor blades and possibly the tail rotor blades; perhaps strip a gear or two, break a fuselage or bend a tail boom; tear up a transmission or gear assembly - - - and you're going to want to repair it and get back in the air as quickly as possible. While many of these foreign made helicopters may have a lot of sex appeal, make sure that they have a complete stock of replacement parts available from a service center in the United States. If you have to wait for a set of main rotor blades to travel all the way from Germany or Japan, by the time they get here you are virtually going to have to start all over in your learning process due to the amount of time

Ulf Johansson won the Swedish helicopter meet with his Schuco-Hegi Huey Cobra.

A line-up of contestants and their rotorcraft at the 3rd All Japan Helicopter Contest.

that has elapsed. While virtually all of the commercially available RC helicopters are excellent flying machines, it is for the reasons just mentioned that we presented, as the second part in this Hover series of columns, our review on the Du-Bro Shark, the latter to be available by the time you read this column. Dave Gray of Du-Bro Products is, perhaps, one of the most experienced RC helicopter pilots in the world today. And, with an eye towards the new pilot in the trials and tribulations he will face in the learning process, Dave designed the shark which can be virtually field stripped and re-assembled in less than two hours. This has been the author's personal choice as a machine in which to learn to fly, and I have proven to myself the worth of this type of machine on several occasions. As an example, I once inadvertently gave full left followed by full throttle and slammed into the side of my house with a tremendous crunch. The result was a totally destroyed set of main rotor blades and a fly bar shaft that was wrapped around the folded blades like a pretzel. The tail rotor and gear box looked like it had gone through the Battle of the Bulge and the O & R engine had virtually torn itself loose from the lower mounting plate. With the spare parts on hand, the machine was actually torn down, reassembled with new parts, properly balanced, and back in the air in one hour and fifteen minutes. So, take a good hard look at the helicopters available to you, ascertain for yourself if replacement parts are readily available without undue delay and at a reasonable cost, then see if you can find other helicopter pilots in your area. Ask them about any difficulties they might have had in repair or parts procurement, then make your own decision as to the ship that's right for you. You can learn to fly on virtually any one of the RC helicopter kits available today, although there are very definite differences in flight characteristics between them. Since the author is also a novice pilot, we'll try to get opinions from some of the leading helicopter pilots, almost all of whom fly a different breed of cat from the other, and see the advantages and disadvantages of each. We'll try to do this on the

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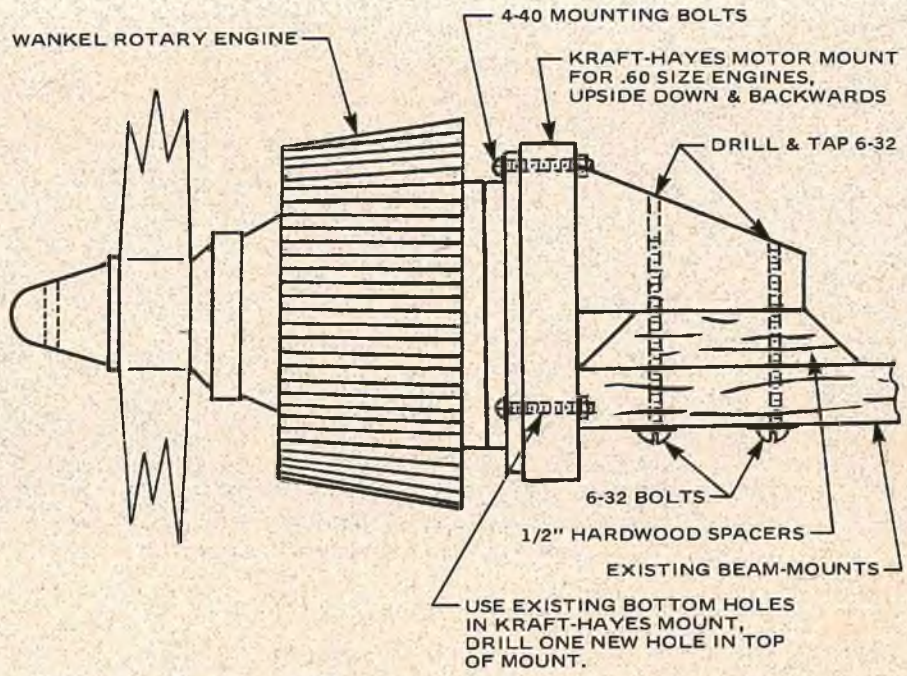
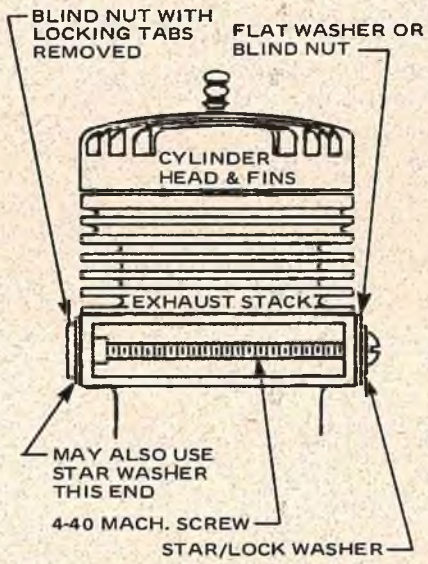
Sigeo Suzuki, winner of Japanese meet with his Kalt Huey Cobra powered by an Enya .45.

FOR WHAT IT'S WORTH

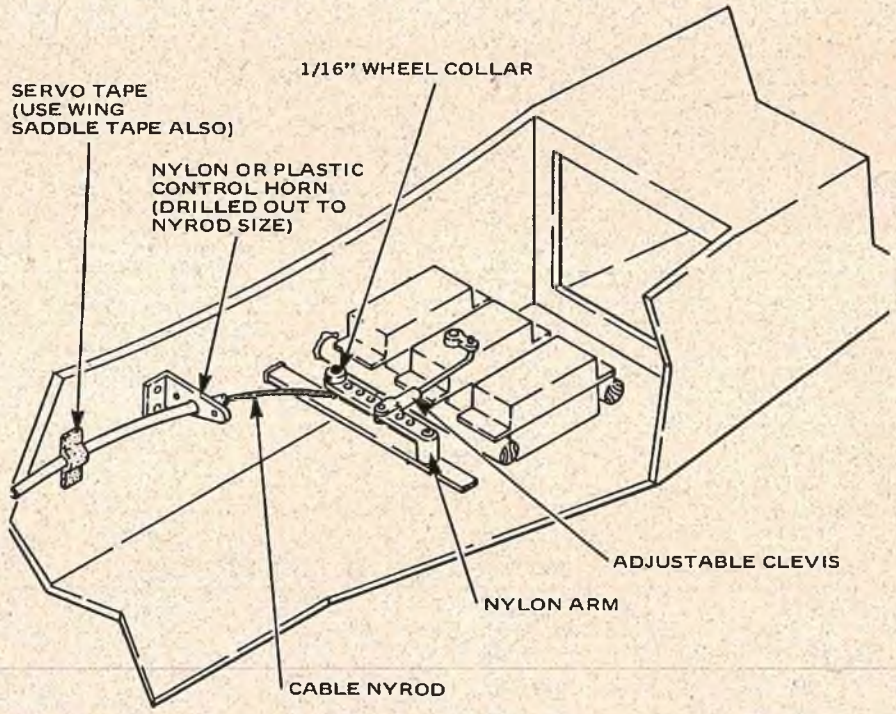
If you want to mount a Wankel engine on an airplane with beam mounts, here's the easy way to do it as suggested by George Chabot of Saugus, California. The sketch is completely self-explanatory.



Harry R. Breunlich of Victor, New York, has come up with an excellent solution for plugging the exhaust restrictor holes on the exhaust stack when installing a muffler. The first step is to remove the exhaust restrictor and replace with the assembly of blind nuts, washers and machine screws as shown in the drawing. This makes for a nice flat, neat unit that will not be in the way of the muffler straps, etc. Harry has been using this on his Veco .45 and Du-Bro muffler combination.



The following sketch reprinted from the Newsletter of the Dallas R/C Club of Dallas, Texas, showed the method of servo linkage when you have a problem with proper throttle throw and/or a throttle servo in an awkward position for connecting to the throttle linkage.

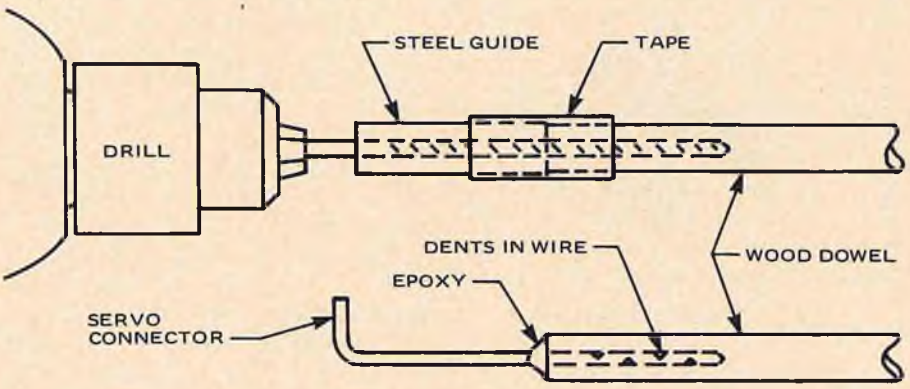


Most of us utilize those plastic, multiple-drawer cabinets and have sworn at the small parts that drift and creep from section to section (pins, small resistor leads, nuts & bolts, etc.). The simple solution, once the proper section position has been determined, is to take your drafting ink "nibs" and load them with MEK. Now simply draw the nibs around the divider and allow MEK to wick between the plastic and you will find the problem is cured once and for all. This suggestion was submitted by Joel Lavine, Dunwoody, Georgia.

Bill Thomas of Canton, Connecticut, uses a Hi-Start for his sailplanes and always found it a nuisance to carry a heavy stake and hammer in order to anchor the surgical tubing. About two years ago Bill came across a neat substitute. At almost any hardware or pet shop it is possible to buy a heavy wire anchor of the type used to leash a pet outdoors. These are about 18" long and have a corkscrew shape at one end and a handle at the other end as per the sketch. They generally come with a swivel attachment which, in normal use, would fasten the leash. For a Hi-Start, two of these units are ideal. One is screwed into the ground to anchor the surgical rubber tubing while the other is used at the para-

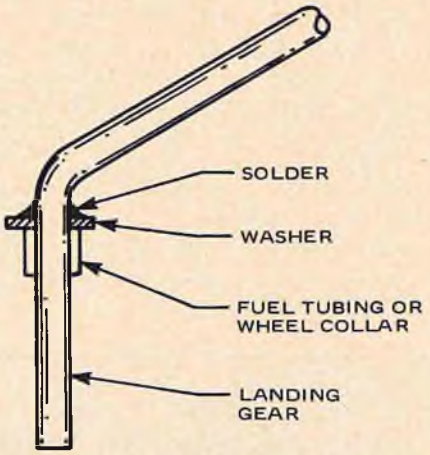
FOR WHAT IT'S WORTH

chute end of the Hi-Start as a convenient method of holding the line until ready for launch. The cost is only a dollar or so per each. Bill has never had one pull loose even under 12 to 16 pounds of tension. A couple of leash swivel connectors makes a handy method of attachment at both ends of the Hi-Start. There is no need for a hammer either, as the anchors easily screw in and out of the ground with several twists of the handle.

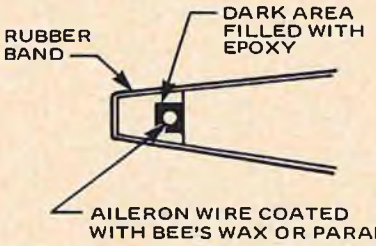


Bryce Peterson of South Charleston, West Virginia, writes that, for those who have discovered the value of drilling pushrods in the center and epoxying the servo connector wire for a straight connection, will find a steel guide taped to the end of the dowel will make straight holes a snap.

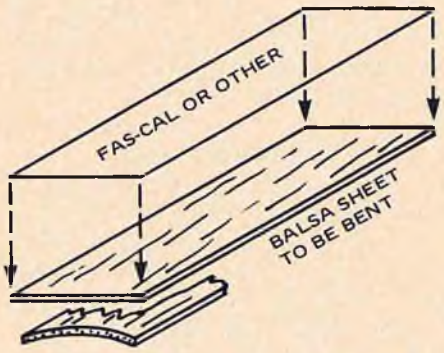
W.C. Collette of Knoxville, Tennessee suggests this method for locating a washer and holding the latter square while soldering to any wire or landing gear. Be sure to remove the tubing, or collar, after soldering.



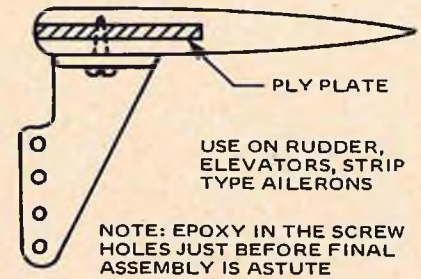
A very simple, yet effective, method of attaching the grooved hardwood block which support the aileron fittings on many kit designs without gluing the wire in solid was suggested by Harvey Mitchell of Lubbock, Texas. Prior to inserting the aileron wires into the hardwood support blocks, use a soldering iron to melt and flow on a thin coating of bees-wax or paraffin on the aileron wires. Now insert the aileron wires into the hardwood blocks, smear on the five minute epoxy, flowing it into the slot. Then, slip a rubber band over the wing, install the aileron wire block assembly into the correct position using the rubber band to hold it in place. The result is a very strong installation of the aileron blocks and a perfect epoxy bearing for the wires, thus eliminating the undesirable "slop" inherent with this type of installation.



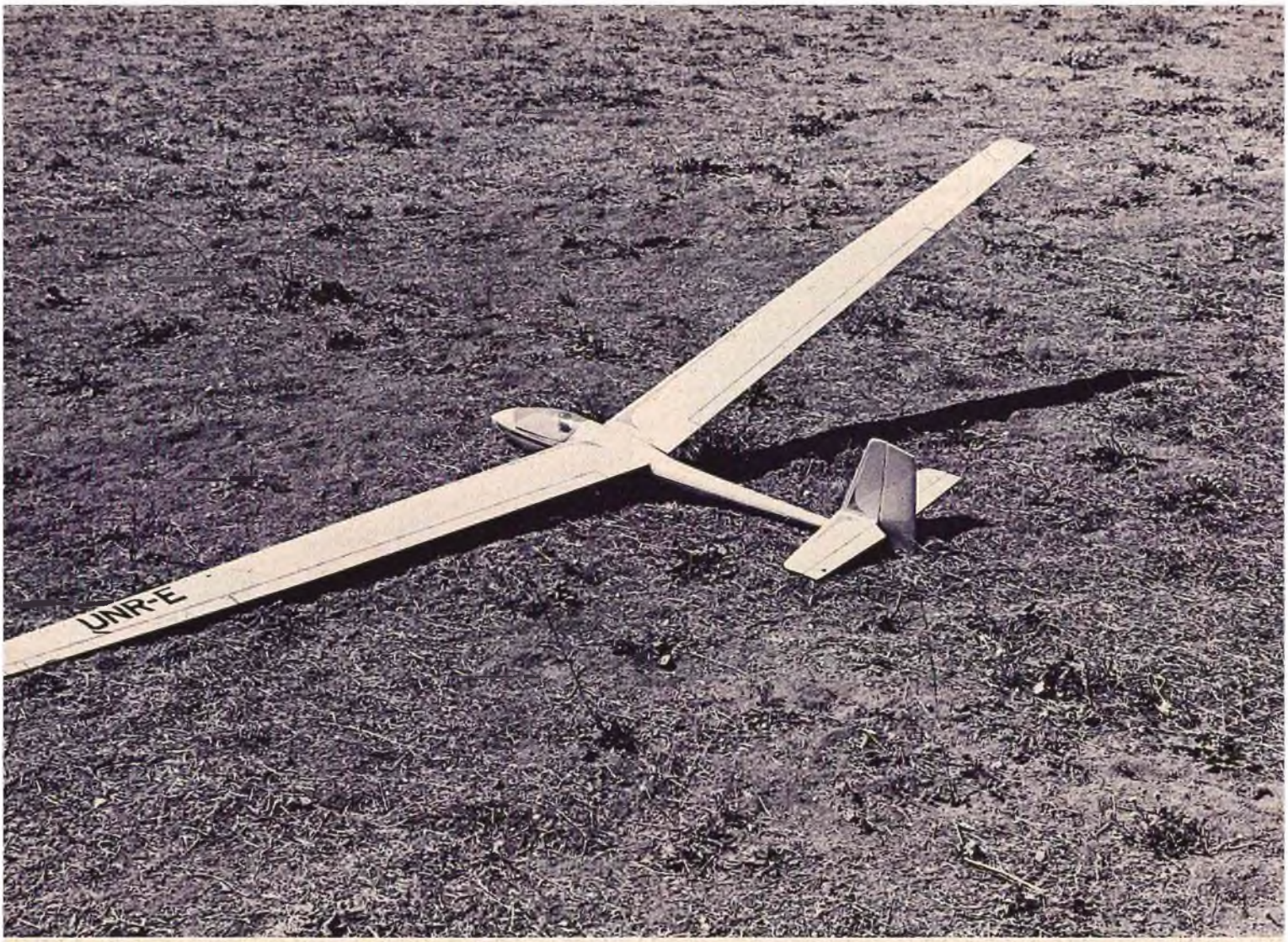
If you have been wetting balsa to bend it around leading edges and have been dissatisfied with the sometimes warped results, try this suggestion from John Vasey of Austin, Minnesota. Use AA grain balsa, cut a strip of Fas-Cal or other sticky plastic sheet, and cover the surface of the balsa that you intend to have on the outside. You will find that you can bend the balsa around the shortest radius without splitting and, no warps. After your glue is dried, remove the plastic sheet.



If you're tired of seeing those nut plates on top of the flying surfaces when installing control horns, here's a suggestion from G.N. Burkhardt of Los Angeles, California. Using Carl Goldberg, or equivalent horns, sand the base dimension down about 50% thinner. Cut a slot, as is done for a hinge, then a second slot is cut in the exposed surface at right angles to the hinge line which allows the fulcrum part of the horn to slide into the previously cut slot. After being satisfied with a proper fit, load with epoxy, slide in place, and insert toothpicks through the normal mounting screw hole. A second method is to cut a slot at the intended location of the horn just like you do when preparing a hinge installation. Now, insert 1/16" or 1/8" plywood plate using epoxy. When set, use number two sheet metal screws to attach the horn.



Edward Guzick of Glen Ellyn, Illinois, suggests using two X-Acto saw blades side-by-side in a large handle for making hinge slots. The first step is to make a guide cut in the control surface edge using a number eleven X-Acto blade, then switching to the double saw blades to enlarge the cut. You'll find the resulting slot will allow the hinges to be inserted without the wood bulge caused by a too-narrow slot. □



RCM TESTS THE ASTRO FLIGHT

ASW-17

BY BILL O'BRIEN

Photos by Don Dewey

● During the past months we have had the pleasure of building a production sample of the ASW-17 sailplane as produced by Astro Flight, Inc., 13377 Beach Avenue, Venice, California. This magnificent semi-scale kit features a fiberglass fuselage with built-up wing and all sheet tail surfaces and sports a total wing and stab area of 1050 square inches. The wing span is 132 inches in two 64 inch panels. The ASW-17 wing is constructed with a tapered D-spar supporting bending loads for most of the span, and a transition to a fully seated wing at the center section to take out launch and landing axial loads. The transition in the center section was designed to keep skin stress at a maximum of 80% of the bulking limit at a wing loading of 48 pounds (12G aerodynamic loads). The method of fuselage attachment is by a single 0.250 inches mark diameter steel rod at 25% of the cord with a 3/32" diameter aft pin to provide incidence alignment. To optimize aerodynamic performance at the 2" to the foot scale span of 132", a total wing area of 950 square inches, was chosen by the manufacturers and a stabilizer area of 100 square inches. The wing aspect ratio is 19:1. The planform was achieved by widening the scale wing by an approximate constant 40%. This widening permits the wing to operate at a Reynolds number of approximately 70,000 at the tip and 120,000 at the root, considerably above the critical minimum value. The airfoil utilized on Astro Flights ASW-17 is a flat bottom Eppler 387.

The fiberglass fuselage contained in the kit comes with a beautiful white finish which can be left without any additional finishing, or can be lightly sanded, primed, and painted. The fuselage is not only an excellent fiber-

glass job, but is also extremely light with reinforcements for maximum strength in the critical areas. The plans for the ASW-17 are quite complete with both wing panels shown and even the radio installation and pushrods drawn in detail.

The tail surfaces are quite easy and are of all sheet balsa construction. The wings are constructed on the bottom seating and when the panels are lifted, they are complete, ready for sanding. The total length of time necessary to build the wings, would be one evening with a little dedication.

Our ASW-17 prototype was covered with Solarfilm on the wings and stabilizer and the fuselage was lightly sanded and covered with one coat of acrylic lacquer primer followed by a finish coat of white acrylic. As previously mentioned, finishing the fuselage is a nicety but certainly unnecessary.

The total all up weight of our prototype was 57 ounces for an approximate 8 ounce wing loading. Several hundred flights have been put on this ship to date, and the only difficulty we have experienced is the cracking of the fuselage where the wing rods are installed. We would suggest a method of plywood bracing reinforcements inside the fuselage in this area to prevent the fiberglass from cracking. Insofar as the flight characteristics are concerned, the ASW-17 is a beautiful performer and one which can be handled by the sport flyer, but which will provide the competition flyer with a top contender. While we have made no scientific test as to the sink rate or glide ratio, we would be inclined to agree with the manufacturers specification of a sink rate of one foot per second at a glide ratio of approximately 25:1. One prototype with less dihedral and turning spoilers turned in performance that was nothing less than amazing.

In summation, we would have to compliment Astro Flight, Inc. on an outstanding model of the world famous high performance ASW-17. The kit is excellent from the beautiful fiberglass fuselage through the hand selected balsa used in the wing and stabilizer. The plans are detailed and leave little to the imagination. Even a full styrofoam base for the radio platform is included. If you want a beautiful machine, and have anything from a two channel system on up, take our suggestion and try Astro Flight's ASW-17. Tested, Approved, and Recommended by RCM. ●

SHOWCASE '74

from page 59

parts. Also included is the all new Shadow body in clear Lexan (this body is also available separately for $7.95, stock No. 306). All Jerobee cars now come with 60 day guarantee. As with all Jerobee kits, complete assembly instructions are included. No. 806 at $145.00. Available through your favorite hobby dealer.

SCHEMATICS AVAILABLE

Schematics are available for the Bonner 4RS System (72 MHz). Send $1.00, which will cover the cost of postage and reprint, to R/C Modeler Magazine, P.O. Box 487, Sierra Madre, California 91024.

1974 HEATHKIT CATALOG

The world's largest selection of electronic kits can be found in the 1974 Heathkit Catalog, available free from Heath Company, Benton Harbor, Michigan 49022.

Included are Heathkit Color TVs, 12 inch to 25 inch models (measured diagonally) with exclusive built-in service tools; audio equipment, featuring new 4-channel components and a Cassette Deck with Dolby circuit; Heathkit marine gear, highlighted by two new Depth Sounders and as many Fish Spotters; amateur radio equipment, including a complete new 2-Meter rig. New in the automotive test line are a solid-state ignition analyzer, voltage regulator tester; plus the addition of fully assembled, tested and calibrated versions of many Heath automotive kits. And for home and office, there are the Heathkit/Thomas Spinet Organ, a Digital Electronic Clock, Electronic Thermometer, Electronic Pocket Calculator, Air Purifier, Ultrasonic cleaner, Home Weather Station, security systems, intercoms, etc. Finally, more than a dozen pages are devoted to Heathkit test and service instruments, plus educational kits for students of all ages. Famous Heathkit assembly manual, repeatedly praised as the finest books of their kind, keep kit building simple, even for the beginner. A soldering iron and a few household hand tools are all that's needed for any Heathkit project. For further information, write Heath Company, Benton Harbor, Michigan 49022. □

HOVER

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basis of guest columnists and hope that the information presented therein will be a benefit to you. In the meantime, however, make your choice wisely and, next month we'll go into a few hints and kinks that will aid you in constructing your first helicopter.

* * * *

In Sweden, kits for helicopters have been available for approximately one year with most of them being German kits. At the present time there are approximately 100 models on the building table or currently flying, according to Jan Levenstan, our rotorcraft correspondent in Sweden. And, since they have had just one season for practicing, there are very few who can actually fly proficiently. At the end of October the Starfliers RC Club arranged the first Swedish helicopter competition which, in reality, was a casual fly-in. Thirteen competitors and more than two hundred and fifty spectators attended the events at the Starlanda Model Airfield. The Starfliers program consisted of a Vertical Take-Off, Hovering, Flying 25 meters into the wind, Turn 180 degrees and fly back, Hovering to the left and to the right, Flying in a wide left hand circle, and finally, Vertical landing. In order to make it even easier, the pilot was allowed to walk behind the model and land between the maneuvers in order to calm down and breath. However, pilots that took advantage of the latter concession received less points - - - a K factor of minus 5. In the competition there were four

Schuco Bell Huey Cobras, six Kavan Bell Jet Rangers, one Schluter DS22 (Enstrom 28A) and two original designs.

* * * *

The third All Japan Helicopter Contest was held on October 10th at Nagoya Model RC field with nearly five hundred people watching the contest. The first prize winner was Mr. Sigeo Suzuki who flew a Kalt Huey Cobra 450 helicopter to first place using a G65 Space Commander radio and Enya .45 engine.

The maneuvers consisted of a Reverse Take-Off; Straight Flight (30' altitude); Overhead Figure Eights; Hammer Head Turn; Side Slip; Hovering over 5 seconds; Landing inside field; and Spot Landing. The results for this meet were forwarded to us by Yuji Oki of Tokyo, Japan.

* * * *

If several members of your local flying club have been conspicuous by their absence from the local flying field for the past few weekends, they have probably purchased their first RC helicopter. It is axiomatic that new helicopter pilots go into a form of seclusion previously known only to a cloistered monastic order. So, before one of your flying buddies shows back up at the flying field and puts his RC helicopter through a series of intricate maneuver you have been secretly dreaming about doing, may we suggest you go down to the hobby shop and invest in your first RC helicopter - - - an investment that will pay dividends in both fun and frustration that will eventually become a complete obsession with you.

* * * *

Until next month, keep practicing.

RCM TRAINER ON FLOATS

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Now, back to that all important angle of attack. We had made provisions to alter the location of both the forward and aft gear (float) mounts. We lowered the rear of the fuselage and tried again. Beyootifull! No water spray in the prop, good taxi characteristics, planed well and looked neat skating across the water to rise majestically into the blue, etc., etc.

Interested? Let's build a couple.

The float construction starts upside down on the ¼" sheet tops. You will note that the stock is the full 36" length and 4" wide. Before cutting the tops to shape and cutting the slots, mark a centerline the full length using a square to mark off the bulkhead locations. Cut the outside shape and the slots for the ¼" ply mounts. Cut the bulkheads from 1/8" sheet balsa and mark a centerline on each one. Locate and glue the bulkheads to the top and slide the 3/8" triangle stock into the top corner. Add the ¼" square chines and aft keels. Cut the forward keels from ¼" sheet and install.

While this is drying cut out the ¼" plywood mounts and drill the 5/32" diameter holes. It is a good idea to drill the mounts in pairs and keep the pairs together once drilled. The mounts, as shown on the plan, are too long. This is done intentionally. It's easy to cut wood off but pure hell to cut it back on!

The floats should be just about ready for the sides to be installed. Lay a full length of 1/8" sheet up against the floats and mark along the chines. Cut and install. While this is setting up you can start construction on the water rudders.

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R/C MODELER MAGAZINE'S
MODEL OF THE MONTH CONTEST

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

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

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

APRIL WINNERS

1ST PLACE

Roy L. Cox
RR 4
Bremen, Indiana 46506

Royal Products P-38 kit covered with Super MonoKote. O.S. Max .40 and EK-logictrol M.M. 5 channel radio. Wing Span 73½", Length 51", 695 sq. in. Weighs 9½ pounds.

2ND PLACE

TSGT James L. Hilmes
1836 E & I Squadron
CMR P.O. Box 3628
APO New York 09332

"Maxi" kit from Robbe of West Germany. Covered with Kwik Cote and trimmed with Solarfilm and DJ's Multistripe. 58" Wing Span, Length 51", 625 sq. in. wing area. Used S.T. Bluehead .60 and Heathkit 8 channel radio. Approx. Weight 7 lbs.

3RD PLACE

Paul R. Hain
1824 Wildberry Drive — A
Glenview, Illinois 60025

Scratch-built RCM Sportster from RCM Plans. Covered with MonoKote and powered by a Veco .19. Wing span 49¾", Wing area 410 sq. in. Length 37¾". Used RS Systems 4 channel radio. Weight 2.5 lbs.

RCM TRAINER ON FLOATS

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There are more sophisticated water rudder designs, spring loaded, scale-like, and fancy, but these are simple and they work. If done properly, they will protect against major damage to the transom or worse. We do not recommend a water rudder that does not 'give' with impact.

Cut out two pieces of .030 brass stock for the angle brackets and bend 90 degrees as indicated. Drill the two holes in each one for the attachment screws. Slide the pair together on a flat surface with the undrilled sides up and together. Clamp and drill the hole for the hinge bolt through both.

Wrap the short length of 1/16" ID brass tube with .015 brass as indicated on the plan. Squeezing the brass stock in a vise with the tube just clearing the top of the vise jaws is an easy way to accomplish this bend and wrap. Sweat solder the wrapper and tube together. Trim and clean this part up.

Make a sandwich of the mounting angles and the tube/wrapper. Mark the wrapper at the hinge bolt hole and drill. Fabricate the rudder from 1/16" wire and tin can stock. Solder a small washer just above the rudder and slide the wire into the tube. Solder another washer just above the tube and carefully make a 90 degree bend. (We are describing one rudder here. Remember to make a right and a left. The just completed 90 degree bend will be in the opposite direction for the other one.)

Temporarily mount one of the angles to a scrap of wood. Insert a 4-40 bolt at the hinge point and slide the rudder unit and the other angle bracket in place. A washer and nut pretty well completes the rudder construction. Set the tension on the hinge bolt so that the rudder will tilt up with a sharp rap. Got the idea? Feel free to improve upon it, but this will do the job. The 'missing link' can wait until they are installed on the floats.

Time to get back to the floats. Use a sanding block and shape the keel and chines to a nice vee. **Do not** sand the curve out of the keel just forward of the step. That downward curve is very important to getting off the water. Remove the floats from the building board. Select a pair of ply mounts and insert at the proper location. The fitting technique is the same for all so we'll go through it once. Once the pair is temporarily inserted into the top of the float, slip a short length of 5/32" wire through the mounting holes at the top. Lay a straight-edge from chine to keel and mark the angle on the mount, front and rear. Remove and connect the end marks. Cut to this line and angle. If all went well the mount will now be flush to the inside bottom. If not, keep at it until the bottom sheeting can be put on nice and smooth. Once all of the sets are cut they can be epoxied into place making sure that they are square at all times. Leave a length of wire in the holes to aid in alignment. Install the NyRod tube. Remember, the tubes are on the inboard side of the floats. Leave the forward ends of the NyRod tubes full length for now. Sheet the bottoms with 1/8" cross-grain sheet. Install the nose block and transom. Plane the top corners round and sand the entire float down. The floats can now be covered with fiberglass and resin (we used Francis resin and ¾ oz. cloth). We do not recommend a silk or tissue finish.

Assuming you are using the RCM

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ENGINE CLINIC

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should be tighter than others, etc. The latter is due to different expansion characteristics, operating temperatures, etc. However, one thing all lapped piston/sleeve engines have in common is that the sleeve should be dead straight or, if tapered, should be slightly tighter at the top than at the bottom. The top of the sleeve, being exposed to higher temperature than the bottom, expands more, so under running conditions becomes straight, so to speak. As far as a proper fit, a completely dry piston (no oil) should just have a light drag when pushed through the sleeve when new. When broken-in it should fall through of its own weight. I am speaking now of cast iron pistons and steel sleeves, not the new ABC set-ups used in some of the racing engines. The ABC set-ups use an aluminum piston in a chrome plated brass sleeve and have to be fit quite tight. When checking a cast iron piston/steel sleeve fit, the slight drag should only be felt from the ports up, the tightest fit being at the very top of the sleeve. The piston should push through the sleeve with light pressure. If it does not, the fit is too tight. One thing you do **not** want is the piston/sleeve fit tighter at the bottom than at the top. This will result in an engine that will take forever to break in.

Now, regarding the interchangeability of pistons. When an engine manufacturer has the pistons finish ground, this is usually done so that there are pistons of several diameters varying by only a few ten thousandths. If, during the honing process to fit the piston and sleeve, the honing operator should go slightly loose in the fit, a slightly larger piston can be fit. You are dealing with millionths of an inch when fitting a piston/sleeve assembly and it is quite easy to make one too many passes on the hone, resulting in a looser-than-desired fit. In the case of the Custom .45's I sold, if I did not like the factory fit of the piston and sleeve, I would re-hone the sleeve for a slightly larger size piston. Hence, the reason for the piston from your Custom .45 not fitting the stock factory sleeve.

When an engine has an off-set con rod, the wider part of the off-set always goes forward. This is to allow the con rod to clear the counter balance on the crankshaft.

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trainer we will go through those modifications at this point. There are four items.

1. Add a ventrical fin. Obviously the model flies without a ventrical from land but we didn't want to take the chance of yaw instability. A great deal of area has been added to the front. Be safe, put it on. It does not detract from the land plane flying characteristics.
2. Front gear mount. The nose area needs some beefing up to secure the additional landing gear. Cut a piece of ¼" ply to fit the bottom of the fuel tank compartment. There is a slight curve there so cut that piece three or four times and resin or epoxy them to the floor.
3. Water seal. If water can get in it will! A good water seal at the wing saddle and hatch is critical. Use the Saran Wrap and silicone rubber technique. When flying from water, wipe the seals with Vaseline or other grease. The radio switch is mounted crossways inside the fuselage and operated via a push-pull wire that passes through a short length of plastic tubing.
4. Nose gear/water rudder actuator. A simple device, as indicated on the plan, is made up and used in place of the normal nosegear. This unit allows you to use your normal hook-up to operate the water rudders.

Before proceeding with the finishing it is well to set the model up with the floats. Get a handful of 5/32" wheel collars and some 5/32" wire. Modify the stock RCM Trainer main gear as indicated. The location of this hole may vary from model to model, so check it out before cutting blindly away. The idea is to get the nosegear push/pull cable to the nose and still have that added landing gear there. The rear axle must be under the C.G. We found that, by turning the regular main gear around, the axle location worked out just right. Slide the 5/32" wire through the mounts, collars, and aluminum landing gears. Once the aluminum gears have been attached to the floats and the rear aluminum gear attached to the fuselage the front gear can be set up.

This operation requires some cut and try. Each airplane is somewhat different so we will give you a method

to achieve the set-up. At this point you should have the floats parallel, the front and rear landing gear attached to the floats, and the rear landing gear attached to the fuselage. Shim the floats with whatever, so that the tops are parallel to a large work surface (floor, table, etc.). Now, block up the fuselage until the wing leading edge is 1/4" to 3/8" higher than the trailing edge. Got it? Now swing the front aluminum gear up against the bottom of the nose. Now you can see just how far off you were on the first try at it. Make your adjustments and try the whole drill over again until it is correct. Now, you can see why the gear mounts on the plan are long. Ours ended up with the rear wire in the bottom hole on the float mount and the front one tree up. Once you have everything ship shape the front gear can be secured to the belly. From here on out it will be a simple matter to change from one mode to the other.

Now we can finish up the floats and

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the other items necessary for water flying. Install the spray rails to the inboard sides of the floats. The inboard side has the NyRod tube. Do not omit the spray rails, they are most important to the life of your props. We painted ours with K & B Superpoxy, however, do your own thing. The water rudders can now be installed with sheet metal screws. The Missing Links and inner NyRod should be installed but leave the front end of the NyRods long for now.

Re-install the floats to the airplane and finish the water rudder set-up. Fabricate the forward NyRod mount and secure to the front gear. Tie down the NyRod ends and make the attachments to the nosegear/water rudder actuator.

If you can't stand it any longer, an RCM Trainer, sans wing, will fit in the average bathtub. However, leave the door open or people will talk. A two pound can of coffee will approximate the wings weight. Just lay it across the wing saddle. The transoms should be just awash with the bows clear of the water. Making appropriate airplane noises is allowed.

Before any flight attempt, check the C.G. with all equipment installed in the completed airplane. Correct any deviation from the normal C.G. indicated on the plans. Ours did not require any ballast for either version, land or water.

Notes On Flying And Water Handling

The model should handle in the water much like the land version. It will not turn as fast, so plan accordingly.

Taxi around a bit to get the idea then turn dead into the wind. Apply power gently and watch the speed increase while the floats climb up the steps. Once the floats are planing and you have airspeed, pull back gently, and away you go. No big deal. Watch the climb out and don't make it too steep since you have some additional weight and drag. General flying is much the same as before but, to repeat, watch the loops and the rolls. You will have to fly them rather than hack them out of the sky. One-and-a-half to two pounds added weight does make a difference!

Landings are much the same as a good trike gear landing. Nose high,

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wings level and into the wind. Set down on the steps and the transoms. The speed will drop off rapidly and the floats will drop down to a displacement speed. For a 'wet and went,' bring the power back up and relax on the up-elevator you should have been holding on the landing until you have achieved flying speed again.

It's a good idea to take a piece of old carpet to set the bird on for servicing. No sense on taking a chance on damaging the floats on hard ground.

Always put the receiver and battery pack in plastic bags and seal with rubber bands. If the water where you plan to fly is deep, have some facilities for retrieval. The lake we used, Lake Elsinore in Southern California, is very shallow so wading was enough. Three

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or four inches of water is about all you need.

One fascinating thing that came out of the first day on the water (7 flights and many 'wet and wents') was that the prop still had dust on it. No water errosion at all.

While we have not installed these floats on other designs, there is no reason why they would not work well on any model of commensurate size, power and weight. For what it's worth, how about an Ugly Stik, Sportsmaster, Sky Squire or Kaos. Low wing airplanes could use a wire leg and spreader at the rear and an aluminum gear in front. A similar nosegear/water rudder actuator can be made up for any model. Don't be shy, use your ingenuity and try water.

Wouldn't you rather know than go to your grave wondering. □

FLIGHT PACK CHECKER

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two coats of yellow Superpoxy, the second coat fifteen minutes after the first. Allow this to dry for 24 hours.

OPERATION

The tester is equipped with a potentiometer to enable you to make fine adjustments. First, though, cut a 1/32" strip of sticky yellow MonoKote and position it at the extreme right of the meter as shown in the photos. Charge your flight pack for ten hours. Plug in your tester and adjust the potentiometer until the meter needle is lined up with the left side of the MonoKote marker, as shown in the lead photo of this article. This is the meter reading you should get every time from a freshly charged flight pack.

Flight packs vary, however. Therefore, if you've adjusted your tester for flight pack A, you must readjust it for flight pack B or C or D, depending on how many flight packs you have.

When the meter needle has fallen to the point where no part of the needle is hidden by the MonoKote marker, you're down to 4.3 volts and that's it for the day. The final photograph in this article demonstrates.

Now, suppose you've charged a flight pack for ten hours, you insert a properly adjusted tester, and you get a **below normal** reading. This indicates a reversed or shorted cell in your flight pack. Either abandon that pack for flight use or isolate the bad cell with a voltmeter and replace the cell.

One more point. Before plugging the tester in for the first time, center the potentiometer. Just rock the potentiometer back and forth with a small screwdriver until you can guess about where the center is. This will protect the meter until you get it properly adjusted.

A FULL SIZE CHECKER

Using the miniature tester presumes that your eyesight is normal. If you have any difficulty at all in viewing things close up, try the full size version suggested by Figure 2. This unit is easier to read, yet is compact enough to slip into your shirt pocket. Changes in components are listed in Figure 2. Everything else is the same, except you don't have to fill anything with resin or cover with paint. The slot in the top of the box for the plug can be cut with a hot knife (Radio Shack 64-2088). Epoxy the plug in place, inside and out. □

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bottom leading edge sheeting in place. When the wing panel has dried, turn it over and complete the top side.

Trim all overhang flush with the root rib. Place the bottom of the wing down on a flat building board and block up the tip 1-¼". With a sanding block, sand square across the wing until the rib is 90 degrees to the building board. When both panels are sanded, check for proper fit. Now glue the two panels together with epoxy or Kwik Tak glue using the 1" piece of 1/4" dowel in the jig holes for alignment between the two panels.

First, drill the 1/16" diameter holes in the aileron brass extension tubes. Solder them on the 1/8" diameter aileron torque rods. See picture number 6.

Epoxy the aileron linkage into the trailing edge stock that has been grooved to accept it. Be sure to coat each end of the linkage with mold release or vaseline to assure the linkage is free to move after the epoxy has hardened. The linkage is installed correctly when the servo connection is on TOP of the wing (make one left and one right). Glue the trailing edge stock, with linkage, to wing.

STARTING THE FUSELAGE

Start the fuselage by drilling all necessary holes for the motor control, fuel tank vent and feed lines, nosegear linkage, and engine mount in bulkhead No. 1. See picture number 7. Also drill the hole for motor control and nosegear linkage in bulkhead number 2.

The fuselage is built upside down. Place the fuselage top block on the building board and draw a line down the center of it. Start the fuselage top block assembly by placing the elevator spacer's trailing edge even with the rear of the fuselage top block, but do not glue it in place. Use Kwik Tak or epoxy, glue the stabilizer in place. Be sure the trailing edge of the stabilizer is at 90 degrees to the fuselage top block center line, and that the stabilizer is centered on the fuselage.

Add the 1/4" by 1/2" stringers down the sides of the top block as shown in the plans. Hollow out the engine top block as shown in picture number 8 and glue it in place. Add the four cross braces. At this point the fuselage should look like picture number 9.

Make up the LEFT and RIGHT fuselage sides next. Start by using the

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plans to mark the fuselage sides at the point where the 1/16" ply and 3/32" balsa doubler meet. This point is at the front of the wing saddle. Then draw a line across the fuselage side so it passes through this point. The line should be at 90 degrees to the top edge of the fuselage side. Using this line, glue the 1/16" ply and 3/32" balsa doublers in place. Then glue both the 3/16" x 1/4" rear vertical brace and vertical brace at station number 3 in place. Your sides should look like picture number 10.

Make sure the elevator spacer is still in place. It should be lined up with the rear of the fuselage top block. Glue the fuselage sides to the top block. The rear of the sides should be even with the back end of the elevator spacer. But be sure not to glue the elevator spacer in as yet. With the sides in place, add bulkheads number 1 and number 2 and glue the station number 3 cross piece in place. Angle the balsa cross block which mounts behind the 1/16" ply spinner ring so it conforms to the angle of the fuselage sides. Then glue this block in place as indicated in picture number 11. Install the 5/8" triangle stock along both sides of the engine top block from the cross block to bulkhead number 1.

Add the 1/4" ply rear wing hold-down plate to the inside of the fuselage by station number 3 as indicated on the plans. Be sure not to get the wing hold-down plate too high. See picture number 12. Then add the 1/4" triangle blocking at the wing hold-down plate and at bulkhead numbers 1 and 2 as indicated on the plans.

Glue the 1/16" rear bottom sheeting in place with the grain running across the fuselage. Be sure the sides are right angles to the building board when gluing this sheeting in place.

When the glue is dry, remove the fuselage from the building board and round the top edges of the rear of the fuselage. Add the fin and dorsal fin. Make sure the fin is at a 90 degree angle to the stabilizer. See pictures number 13 and 14.

How you assemble the elevator, elevator spacer, and rudder depends on how you will finish your plane. If you are going to use MonoKote or Solarfilm, we recommend you apply a 1/2" width of the covering material along the trailing edge of the stabilizer, the leading edge of the elevator, the trailing edge of the fin, and along the leading edge of the rudder. Then hinge the elevator first. Glue the elevator spacer in place, and, hinge the rudder. If, on the other hand, you are painting your plane you can go ahead and hinge the elevator, glue the spacer in place, and hinge the rudder. Remember, the 1/16" wire that connects the elevator halves must move freely after the spacer is glued in place. See picture number 15 for the parts.

With the elevator and rudder hinged, add the 1/8" ply wing dowel plate in front of bulkhead number 2. Glue the 5/8" triangle stock along the bottom of the fuselage sides between bulkhead numbers 1 and 2.

WING HOLD-DOWN DOWELS AND SCREWS

In preparation for the installation of the wing dowels and hold-down screws, the section of the leading edge of the wing that mates with the fuselage should be rounded to contour so the wing can be brought forward to

its correct position in the wing saddle. See picture number 16. Note that the top of the wing should be complete at this time.

Hold the fuselage upside down and arrange it on your building board or a table so the stabilizer is level – front to back and side to side. Then, place the wing upside down in the wing saddle. Measure from the wing leading edge to the board or table top. Measure from the wing trailing edge to the table top. The leading edge should be the same distance from the table top as the trailing edge. Sand or shim the rear of the wing saddle as necessary. Then measure from each wing tip to the table top. They should be the same height from the surface. If they aren't, sand or shim one side of the wing saddle as necessary.

When the wing rests in the saddle as it should, you're ready to install the wing hold-down plate and dowels. First, block the wing away from the wing saddle for a distance of approximately 1/2 the thickness of the wing tape you are going to use. Then, measure from each wing tip to the fuselage side to center the wing. Measure from a straight pin inserted in the top of the rudder to each wing tip until the distance is the same on each side. Mark the wing and fuselage at the leading and trailing edge of the wing.

With the wing as far forward in the wing saddle as possible, locate the 1/16" ply bottom plate wing hold-down so it overlaps the trailing edge of the wing and closes the gap between the trailing edge and the fuselage. It should also be centered relative to the fuselage. Glue it in place. When the glue is dry, drill the holes in the bottom plate wing hold-down completely through the wing. See picture number 17.

To locate the wing hold-down dowels, first re-check to make certain the wing is properly lined up. Then, working through the bottom of the fuel tank compartment, use the holes in the 1/8" ply wing dowel plate as a guide to mark the location of the wing dowels on the leading edge of the wing. Remove the wing and drill the two 1/4" holes through the leading edge of the wing. Glue the 1/4" dowels and false ribs in place. Glue the 1/16" ply main spar brace in place to support the 1/4" dowels at the spar.

Complete the bottom of the wing by gluing the leading edge center section sheeting and capstrips in place. Then, with the wing installed in the saddle and carefully aligned, drill and tap the rear wing hold-down plate in the fuselage for the size hold-down screws you'll use. Refer to the plans for completing the reinforcement of the center section.

COMPLETING THE FUSELAGE

Cut a hole in the top of the fuselage for the motor according to the hole outlined in the engine top block. Add the 5/8" triangle stock along the bottom of the fuselage sides between the balsa cross block and bulkhead number 1. Install the engine mount, using blind nuts. Note that there is no side thrust or down thrust. Mount the engine in place on the engine mount. As you handle the fuselage to install the engine you'll note that the front section is somewhat flexible. This characteristic is used to align the front end. Once the chin block is glued in place, however, the nose section becomes rigid.

Glue the 1/16" ply spinner ring in place as indicated on the plans using Kwik Tak. Install a 2¼" spinner on the engine. Then, with the front end of

the fuselage lined up with the spinner, glue the chin block in place. Remove the engine and drill the hole for the nose wheel and spring as in picture number 18. Then shape the nose as shown in picture number 19. Remove balsa wood from the 5/8" triangle stock as necessary to clear the movement of the steering arm. See picture number 20. Note that the steering arm supplied in the kit will be too long. It should be cut off at the outer hole to clear the fuselage side.

The fuselage, rudder, and stabilizer should now be completed.

COMPLETING THE WING

Glue the wing fairing bulkhead and sides together, but don't glue the fairing bottom onto the fairing sides yet. See picture number 21. Install a 1/2" long section of your wing seating tape at the rear of both sides of the wing saddle. File or sand the bottom of the wing fairing sides so they conform to the shape of the bottom of the wing. Install the bottom of the fairing onto the fairing sides. Then, cut and sand the fairing bottom so it will fit the wing airfoil and fairing sides. See picture number 22. When the fairing is complete, install it on the wing and sand it to mate with the chin block on the fuselage.

The bottom of the wing should now look like picture number 23 at the center section. Picture number 24 shows the completed tip and the cut-off at the aileron tip. Finally, completely finish the airplane and install all of the equipment; engine, tank, wheels, pushrods, etc., except the servos which are mounted in the fuselage.

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BALANCE

With the airplane complete and the engine installed, place the battery pack at the rear of the fuel tank compartment. Then lay the servos on top of the fuselage. Move them fore and aft until the desired balance point is found. (See the plans for the recommended CG.) Then mount the servos inside the fuselage at this position. Then, if a change in CG is found necessary after flying, the battery can be moved or weight can be added to the nose or tail.

FINAL CHECK-OUT

With the plane standing on the ground, measure the distance of each wing tip to the ground. Bend the main gear so they're level. Check to see if the stabilizer is level. Adjust the nose wheel to get it as level as possible.

Check the control surfaces to make sure they operate freely. Make sure the surfaces operate in the direction they should. The elevator travel should be 3/8" up and 3/8" down. The aileron travel should be 1/4" up and 1/4" down. The rudder travel is optional.

Finally, check the roll of the plane to make sure it rolls straight.

We have, in the Super Kaos, Jr., tried to bring you the latest in building techniques and design with easy construction. The Super Kaos Jr. is capable of all F.A.I. and A.M.A. maneuvers with ease, yet it's docile enough for the beginner. □

LET'S SCRATCH-BUILD

from page 25

For a tapered wing, the same method is used except a root rib and tip rib are used as templates.

Still another method of producing ribs is to band saw a block of balsa to the shape of the rib and then slice the block into individual ribs. This is the method employed in many of the better kits, however, it does require a band saw.

Now assuming you are using an RCM plan which, thanks to Dick Kidd, I feel are the easiest of any to follow, plus the inclusion of the usual RCM comprehensive instructions, you are on your way to low cost RC modeling.

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LET'S SCRATCH-BUILD

from page 98

In addition you can now build that ship in RCM that might never be kitted.

I would also suggest you read the ramblings of RCM's chief skinflint, Chuck Cunningham, every month for real money saving tips. In the future, the Fearless Leader should consider publishing the "best of Chuck" for the benefit of the newcomers who have not had the benefit of learning such goodies as how to apply a $2.00, ten foot finish, etc.

One other side benefit of scratch-building is that it might help your local hobby shop survive. Since the large discount houses have attracted so many budget minded RC'ers, his existence has been jeopardized in many communities. Balsa wood, on the other hand, has the greatest profit margin of any item in his shop. Consequently, an active scratch-builder is usually the most welcome customer in his store! □

S*M*A*S*H

from page 16

That's how I found out that Mono-Kote really is easy to repair.

The following morning, off we went to the local flying field – which later that day was closed to RC'ers forever (what an omen) and fired up. Fortunately, no one was there. Grinning confidently at my wife, the tail holder, I waved at her to let go. She did, and my grin vanished. The engine

roared, the bird gained speed, and took off. Straight and level. Nice. For three feet.

Then a slight bank to the right. Then a not so slight bank to the right. Then a screaming knife edge turn to the right, heading, of course, for the open rear window (forty inches) of the station wagon. Now, this is a fifty-two inch wing, which presented some immediate logistical problems.

Also, I had thoughtfully put the kids in the car for safety.

Fortunately I panicked, and when all cooperation between brain and fingers vanished, the beast suddenly lifted. Actually, it looked more like a hiccup, but it cleared the wagon. It also lacked any further flying speed, and promptly dumped into the waist high reeds bordering the field. I considered this a successful landing, since it was still intact.

I now keep a supply of reeds in the back of my car just in case. I figure I can probably scatter them in front of the plane in case it ever gets into trouble again. Which, of course, is highly unlikely, now that I was an experienced flyer.

After all, I did miss the car.

This experience convinced me that help was needed. So, after minor repairs, I decided to ASK somebody for some, and a week later started to load the wagon again. Heavy stuff in first, then the plane. Notice, I said "started to load." Things almost got out of hand again. When a simple thing like putting your stuff in the back of a station wagon becomes a traumatic event, pal, you've got trouble.

Come to think of it, that's what my Grandma often used to say to my Ma, looking my way and wrinkling her

nose, sort of.

"You got trouble."

But I digress. What I really found out while loading is a basic truth that will stay with me forever, as a tenet to live by. Briefly stated, (with a modicum of embarrassed exasperation) it is this:

Never, under any circumstances, ever place a wheeled vehicle on that nice flat roof of a station wagon. While you put the heavy stuff in first. 'Cause what happens when you do that is that you gotta put your knee on the tailgate, and kind of climb inside. And when you weigh in the vicinity of . . . well, when you do that, your weight pushes the back of the car DOWN, chum, and you know what happens next.

I didn't see it go, but I sure heard it. Naturally, it had to bounce off the tailgate on the way past. I think that's where the prop broke.

With all due modesty, I must admit that I did manage to miss stepping on the fuselage as I scrambled back out of the wagon. Even though I klanged my skull on the roof I kept my cool. (Yes, I said "klanged." Most folks' skulls clunk. Mine klangs.) I even managed not to fall on it when I hooked my right heel in the left pants cuff as I jumped off the tailgate.

The plane was better off than I was. All it suffered was the prop and a few minor dents. My dents didn't feel too minor.

My wife was able, without a single comment, to get us both (me and the plane) loaded into the wagon. I suspect she thought I already was . . .

We finally arrived at the new field, and sure enough, it was busy with flyers. Since I didn't know a single solitary soul, I figured the best approach was no approach at all. I would keep my mouth shut and watch from the sidelines with my wife.

"Chicken," was the way she succintly put it.

My reticence didn't last long. Somebody strolled by, looked in the car, smiled, and said, "Flyin' today?"

"Uh, don't think so."

"Howcome?"

"Well, um ah, I think I still need a little help."

"Oh. Ever fly before?"

At this point I became very circumspect in my answers. I really didn't see any point in bringing up my own "flight" statistics, which included three broken props without what you could really say was a successful flight.

to page 104

S*M*A*S*H

from page 102

Interesting, yes. Successful, no. I thought of them more as "sorties."

"No." This from my wife, Cindy. She does have a way of getting to the root of things. But then, so did Tokyo Rose.

"Hey," said Friendly, "There's a few guys here who'd be glad to give ya a hand. I haven't flown too much myself; I'll point ya at the guys to see."

Cindy put her foot in the middle of my back and pushed me out the door. "Swell," I gasped, and followed him across the field.

It didn't take long to discover — even for me — that these people weren't interested in ridiculing anybody. They were interested in planes and radios, and flying. They almost all had had a lot of help starting, and they remembered it. The result was that they were more than willing to give their time to teach a novice flyer.

"Let's see it," said Brian, upon being informed by Friendly of my problem. "Ummm, looks okay. Start her up and we'll see how she flies."

After the initial checkout — range, control movement, engine, and general pre-flight stalling around, he had my ship airborne, climbing at what seemed to me to be a fantastic rate. Suddenly it flashed sunlight from the wings, and appeared to act in an altogether strange manner.

"Snap rolls," murmured my new instructor. A few loops, some minor trimming, and he uttered, from the pinnacle of his vast flying experience some of the sweetest, most electrifying words spoken to me since somebody a long time ago said, "Here it is. Would you care to re-up?"

"Flies good."

I glowed.

After a nice touchdown to refuel and richen up the engine a bit, off it went again. This time it was really wrung out, and performed flawlessly.

"Okay," said Brian, after landing again. "Now I'll take it up — real high — and give it to you. You know how the control surfaces work?"

I nodded, and we got about the

business of start up and take-off. Once airborne, he banked left into a pretty spiral climb. At altitude, he made a few final trim adjustments (up), handed me the box, and said, hopefully, "Just try to fly back this way, straight and level."

This was hopeful, alright. My hands were shaking so badly that the antenna sounded like a cat-o-nine tails whistling through the air. I was certain that my pants were wearing rapidly through from the inside where they were touching my knees.

Rallying my emotions, I clamped the death grip on the box. Fortunately, the Orbit was strongly built and resisted my efforts to push the sticks through the rear of the case. The plane began a lazy bank and turn which I took immediate steps to correct. Unfortunately, they were the wrong steps, for it continued its turn, and I suddenly discovered that it wasn't doing at all what I thought it should be doing.

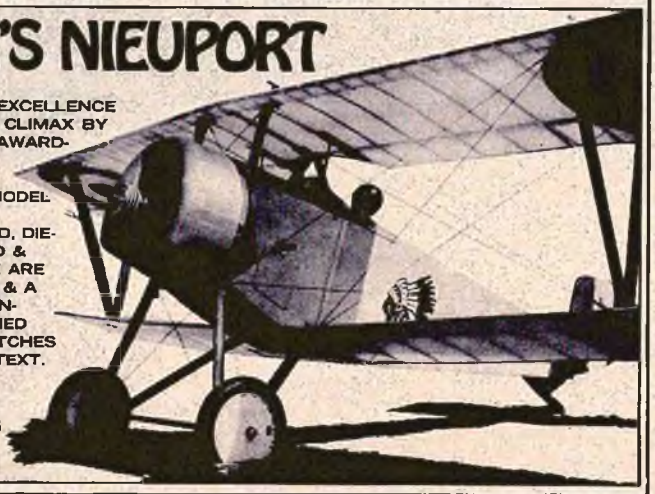
I said nothing, of course, being fundamentally sneaky, hoping that my new instructor would think that I made that nice turn on purpose. That was when I found that crime doesn't pay. The ship began a slow descent – about ninety degrees – full throttle – and I vaguely heard Brian courteously yelling in my ear, "Gimme it."

At this point, dear reader, things become somewhat painful for me. I recall hearing a loud snap, a sort of a pop, and the wing, accompanied by a single swelling "Ooooh" from the assembled observers, parted company from the fuselage.

Now, we all know that planes do not fly without wings. Not even a little bit. But I wanna tell you, friends, I hoped like crazy. For about eight hundred feet I hoped. I watched that full powered missile in its fastest flight ever, and boy, did I hope.

Didn't help at all. It sounded like Ole 99 hitting the bottom of the canyon after the bad guys blew up the trestle bridge.

There followed a very pronounced silence. After all, what could you say? Certain very definite adjectives imprinted themselves vividly on my brain, but, since there were a few ladies present, I managed to restrain



them. The adjectives, that is.

Brian eventually filled the gap magnificently with his "Well, um, well, . . .um, . . . "

Cindy, since known hereabouts as "Ironsole" took off running across the field and through the briars, beating everyone to the scene. In bare feet. I think she even beat the wing. She said later that she wanted to somehow spare me the sight of my beloved kit rekitted. A nice gal. That's why I married her.

But there it was. Intact, sort of. True, the innards were cleaned out to the firewall, but the ship was still basically the same airplane that I saw leave. Fantastic.

At that point, I faced West and offered up a silent prayer to Andrews, "May your balsa long remain unbent, but not your landing gear wire."

A couple of weeks later I really began to get some stick time in with my christened beagle – I mean eagle – with Brian giving up lots of his own flying time to get me started. Baron Von (Dick) Lux, so named for his predilection for bipes of the Fokker class, also contributed much flight time to my own personal scene. Dick, for instance, once flew my Ray magically out from behind some trees where it had disappeared – without power – for a perfect landing at the edge of the field. Even he looked a little bewildered at that one. I subsequently tried the same trick, with power, without success.

Friends, STAY AWAY FROM THE TREES. If you are interested in a most spectacular form of manufacturing an old kit, that's the way. The A-Ray was badly bent that time, but it still lives today, though somewhat heavier.

The point I was trying to make before I got carried away was simply this: It didn't take more than a visit or two to the field to find more friendly help than I could possibly use,,and a genuine interest in leading a new guy down the paths of rightness for plane's sake.

If you are thinking of finding help learning to fly, and you'd better – it's lots cheaper – you gotta get outta the car, Jack, and let people know you're alive. Try it. Walk up to someone at the local field and open with some smart conversational gambit like, "Whatcha got there, Boobie?" as you tread lightly on the horizontal stabilizer of his newest thing. He'll be the first to offer to help you.

Your education will commence immediately. □

TOWER 5

from page 44

particular system. To most RC'ers, other than the technician, these figures are really abstractions. What is important is the commitment we previously mentioned - - - caring enough to attempt to provide quality at an economical price combined with attention to little details, excellent service, and dedication to customer satisfaction. And that is exactly what the people at Tower have done.

And our Tested, Approved, and Recommended by RCM is for that service as well as the Tower/Control 5 proportional system. □

The Hamilton Radio Control Club is holding their 4th Annual Flying Tigers' May Exhibition.

Nelson Recreation Centre
4235 New Street
Burlington, Ontario, Canada

May 4 – 10:00 a.m. to 10:00 p.m.
May 5 – 11:00 a.m. to 6:00 p.m.

There will be 1st, 2nd, and 3rd place trophies in the following classes.

Best Military Scale
Best Non-Military Scale
Best Stand-Off Scale
Best Finish
Best Model Built by a Junior (16 years or under)
Best Sport Plane
Best Original Design
Best R/C Sailplane
Best R/C Boat

SUNDAY FLIER

from page 12

adiabatic convection. So let's stick with "dry" air.

On the average, the earth's atmosphere shows a temperature drop of about 6 degrees Centigrade for every 1000 meters. Naturally, it varies all over the place, or we'd never have any thermals, but you can readily see why most air tends to stay pretty close, over the long run, at one level. Here's why.

Take a "bubble" of air from the ground level. Let's say it has a temperature of 20 degrees Centigrade. Lift it 1000 meters, without gain or loss of heat, and it's going to drop to 10 degrees Centigrade in temperature. But if the air through which you lifted it had the normal rate of temperature drop with altitude (called the "atmospheric lapse rate") then the temperature of the air surrounding the bubble you lifted would be 14 degrees Centigrade.

Now you have a bubble of air at 10 degrees Centigrade surrounded by air at 14 degrees. What happens? The bubble is colder, so it's heavier, so it will sink back to the level from which it came. So, under "normal" conditions, air is stable – and that means no thermals.

But there seldom is that "normal" condition – sometimes the air temperature actually increases with altitude up to a point. You have all heard of the term "inversion." No sense in trying to hook a thermal then. It's a good time to check the true sink rate of your sailplane. The conditions for that usually are prevalent early in the morning, before the sun's rays have penetrated the air and started to heat up the earth's surface. Then, as the ray's heat up the earth (they've passed through the air without transmitting very much heat to the air) the earth heats up the air right next to it. First thing you know, little risers of that warm air start to go up to seek the level where they hit the same temperature and pressure as the surrounding atmosphere. At first they may only go up a few feet – the air is quiet, there's no wind, and they pick up the temperature equally.

Then a little wind comes up. This moves some cool air in over warm spots, changing the "normal" lapse rate into a steeper one – steeper than the rate of 10 degrees C per 1000 meters. Then the warm air at the surface starts rising rapidly, and continues on up to higher altitudes until it reaches a level where the atmospheric lapse rate becomes more "normal." It is in this process that rising air can frequently get into successively cooler layers of air due to the change in wind currents. And that's when you get those "boomers." They also have been called "killer thermals" because they not only go up rapidly, but they are very turbulent and throw a sailplane around pretty violently. An inexperienced pilot can break his plane up trying to recover from some of the rapid banks, stalls, and dives that occur.

If the wind comes up too strong, it can upset all the foregoing; even though thermals form, they get dispersed by the wind into fragmentary currents which are too small to circle in.

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SUNDAY FLIER

from page 108

In giving you this little discussion of the characteristics of the earth's atmosphere which yields the thermals we're looking for, I've purposely kept it as simple as possible. Maybe it'll help you find thermals if you understand a little about what causes them; maybe not. It's hard to find what you can't see, but it may help if you know what they are, and where to look for them. Meteorology is both a fascinating and frustrating science, of which thermals are a small, but equally fascinating and frustrating part.

Ask any weatherman. Or sailplane enthusiast. Either one will agree. But they also agree that it can be very rewarding to engage in a battle of wits and skill with old Mother Nature, and occasionally win.

* * * * *

In the February issue of RCM I had an article on the Western Front WW I Jamboree, with some of the best color photos I've ever seen. Inadvertently I forgot to give credit to the photographers.

Fred Keep, a relative newcomer to the sport of RC, took all those beautiful shots on the full color page, and Floyd Carter took the picture of his own Packard Le Pere. Incidentally, you may think there's a flaw in it – the propeller tip looks a little funny. Nope. Floyd tells me the unusual shape duplicates the original. All in the interest of true scale, one of the most demanding fields in modeling, if not the most. It certainly takes a lot of courage to put the first test flight on a model that you could have spent the better part of a year in researching, building, and detailing. Guess that's why Stand-Off Scale is becoming so popular; you can get the same thrill of realistic appearance from over ten feet away, and if you should clobber it, at least you haven't destroyed a year's work.

But maybe that's part of the challenge of true scale.

We modelers get our kicks in a lot of different ways. □

ENGINE CLINIC

from page 70

Dear Sir:

I have an Enya .09 which I purchased new. I put 6 minutes total (2 runs) "ala Lee" break-in. I used a 8/4 prop and Clean-X fuel (8% I believe).

My problem is this. The 3 minute run each time was allowed to cool before the next run. The engine turned over excellent – it sat for about 2 hours and I tried to turn it over and it locked tight on dead top center. I returned it to the factory and they replaced the piston cylinder and con rod. Yesterday I ran the end as before (rich) for a number of runs during the day. After several hours I checked the engine for being free. When it was turned below dead top center all was free but as it neared dead top center it began to stick so I backed off with several slight movements and was able to free up the sticking. (1) What is my problem? (2) How do I remedy it?

Sincerely,
T.L. Wardlaw, Jr.
Kansas City, Mo.

Any time an engine gets tighter after running than when it was new, it can only be caused by one thing (assuming that no scoring of parts occured during the run in) and that is varnish build-up. This is particularly noticeable in small bore engines. A slight build-up of varnish that would make a .60 seem a little sticky could really tighten up an .09. You are probably running the engine on the rich side or even at partial throttle. After two hours of running, the

varnish build-up is causing the engine to tighten up. I would suggest that you try one of the fuels on the market that use a synthetic oil for lubrication. The synthetics will not varnish as badly as castor based fuels. As for getting rid of the varnish build-up you have now, crocus cloth is not going to do much good. Steel wool would be better, and if this does not cut the glaze use some 600 grit emory paper with light oil. But be very careful when using the emory paper as you can easily remove too much. Just remove the brown glaze which is the varnish build up. I am almost reluctant to mention the use of the 600 emory paper as I know that there are those out there who will be cleaning the varnish out of their sleeves including a few thousandths of the metal as well!

Dear Mr. Lee,

I have read some time back where you said that some engines are made to run without nitro mixed in the fuel. You fail to mention the make of engine. I would like to know what engines are best to buy when you can't get nitro?

We, here in the Philippines, can only buy methanol and castor oil.

Looking forward to hearing from you. Thanks so much. I do enjoy your Engine Clinic. There are only a few of us here flying RC and we don't know too much except through trial and error. So anything that we can read to help us is a real help. My wife and I are missionaries here in the Philippines.

Yours truly,
Rev. Joseph Watkins
Cebu City, Philippines

Generally speaking, almost any engine will run on the straight alcohol mix. However, some do run better than others. This is usually a function of the compression ratio and port timing. Engines with smaller exhaust and bypass ports and retarded exhaust and bypass timing will run better on straight alcohol fuel than those with big ports and more advanced timing. I am speaking of sport engines intended to have a good idle, etc., not racing engines. Almost any engine can be made to run fairly well on alcohol by simply raising the compression ratio. Most sport engines have a compression ratio in the seven or eight-to-one range. Raising this to nine or ten-to-one will make a big difference. However, most fellows do not have the facilities for modifying the head to raise the compression ratio. Generally most any of the engines manufactured in Europe where nitro fuels are very difficult to obtain will run well on straight alcohol fuels. The Merco line of engines made in England and the H.P. line made in Austria both work very well on straight alcohol fuels.

In the December issue I commented on how to properly install the piston and rings in a ringed engine. I have received quite a few suggestions from others as to how they are doing this. The following letter seems to have come up with the best suggestion that some of you may find easier.

Dear Mr. Lee:

In the December Engine Clinic column and in answer to Alex Johnson's question about installing the ring without breaking it, your way of using your fingernail or X-Acto knife might be simple for you. I've tried these methods and sometimes they work and sometimes they break the ring if the proper pressure is not applied to the piston while compressing the ring with the objects you stated.

I solved this problem by using string, such as Dacron used for model boat rigging — something thin and tough. I drop the piston, with the ring on it, into the sleeve to where the ring rests on the top of the sleeve; then loop the string around the ring one loop forming an , X , . Pulling both ends of the string, I press the piston with a thumb lightly and, bingo, it works every time. I've never ringed an H.P. and thanks for the tip about it being pinned as I might have encountered some difficulty myself. I follow your column very closely and enjoy reading it very much.

I belong to the Levittown Aerobugs

Flying Club and mentioned this method to a few of the members, with good results. I thought maybe some other fellow modelers were encountering the same problems.

Thanks,
Steve Charlton
Levittown, Penn.

Dear Mr. Lee:

After disassembling my OS .35, I noted that there were two score marks up and down the forward side of the sleeve. It was then I noticed that there was a difference in machining on the lower end of the con rod. I logically assumed that I reassembled it wrong the last time causing the piston to cant forward in the cylinder. The engine had only one gallon of Supersonic 100 through it then. I replaced the con rod, piston and sleeve with new parts, assembling it with the slight beveled portion of the con rod forward. Now, after only 5 flights, I check and see those familiar score marks, as if the wrist pin was scraping the forward part of the sleeve. Did I put it together wrong? Furthermore, I plan to use this powerplant in my Sig J-3. Would an 11/5 be better than my usual 10/6?

A Faithful Reader,
Hank Schutzbier
Kaneohe, Hawaii

As mentioned earlier in the column, Hank, the part of the con rod with the greater off-set goes forward. However, if the con rod is installed backwards it will usually hit the counter balance of the crankshaft and is easily detected. If there were no signs of the con rod having done this, then I doubt it would be the cause of the wrist pin score. Now, first of all, are you sure this is a score and not just a polish mark? It is quite common for the wrist pin to make a polish mark, however, there should not be a definite groove. If the sleeve is grooved then you have another problem. Did you check to make sure that there is a brass or aluminum pad on the end of the wrist pin? If this is missing you will have a scored sleeve. If the wrist pin does have a pad, then about the only other cause would be something badly out of alignment causing the wrist pin to be driven forward during running. If the wrist pin holes in the piston were reamed on an angle this could happen. As you replaced these parts, it sort of rules out this possibility. The only thing left is a crankcase with the cylinder bore not square with the crankshaft. And, about the only thing you can do here is to replace the crankcase. It would be best to return the engine to World Engines with a note explaining the situation.

The 10/6 or 11/5 will work about equally well on a .35. On a small lighter ship the 10/6 will be faster. With a larger heavier ship the 11/5 will pull a little better and not be quite as fast. The 11/5 would be the better choice for your J-3 Cub. □

from page 6

tion techniques are as good as you can make them. You can't expect to be a master craftsman on the first attempt. You can, however, be as careful as you can to build everything as straight as possible. To begin with, a good building surface is a must. You will need to build the fuselage so that a center line drawn along the top view would pass exactly down the middle, from the tail post to the tip of the nose. If you build a crooked fuselage, with the rudder canted off to the side, you cannot expect the aircraft to ever fly well. Make sure, when gluing the sides together, that everything is exactly centered. Do this work over the top view of the plans - - - it is very important. Next, make sure that both the wing and horizontal stab saddles are constructed exactly as shown on the plans. Be sure that the finished stab saddle doesn't cause the stabilizer to tilt one way or the other. A tilted stab can and will cause a turn. At the same time make sure that each saddle has the same incidence as is shown on the plans. The aircraft was designed to fly with the horizontal stabilizer positioned with a certain reference to the plane of the wing saddle. If you destroy this relationship with sloppy building practice, then you will also destroy the flyability of the aircraft. This is not to say that an experienced pilot will not change the relative position of the wing and stabilizer but, for the beginner, stick to the plans for a while.

The next thing to watch out for in your building is to make **good glue joints.** This is as important as anything else, since a poorly constructed model, with glue joints that keep popping loose all of the time, will not allow you to do very much flying between repair projects! Use the strongest glue and adhesives that you can find, and use them properly. In the February 1974 issue of RCM, Don Dewey presented perhaps the very best analysis of glues and adhesives that has ever been published in any magazine. It is sure worth clipping out and saving. The use of the proper glue in the proper place cannot be stressed strongly enough. Just because you're building a **model** airplane, don't think that model airplane cement is the thing to use. It isn't! It simply isn't strong enough in most cases. It was strong enough to stick together an old time

10 cent Comet kit, but not our big fast fire breathing monsters of today. Not only do you need to make good glue joints, but the workmanship of the joint that you are gluing should be as good as you can make it. If you are butt gluing two sheets of balsa together, they should meet, not just faintly contact in an unfriendly fashion. Take the time to cut the pieces with care.

Warped wings, horizontal and vertical stabilizers, and control surfaces will also cause you more misery than you can tolerate. Again, a **good building surface** is necessary for good construction. You must keep the balsa parts firmly attached to the building board when you are gluing at any time. If you are building the horizontal stabilizer, be sure that each piece is pinned to the board with enough pins to keep everything in place. You can buy pins at any dime store, but the ones that you buy are pretty small and bend easily. Go to an office supply house and buy a box of No. 17 pins. You will get enough pins for a long time, but they will be good ones. Make your joints well, and you will have a good structure.

I covered the subject of covering your aircraft in an issue a couple of months back, so flip through the back issues and check this article. Your completed bird should be as near as possible to the designers. It should have the wing and stabilizer in the same relative location; the balance point at the same location; the same size engine in the nose as the designer intended; and it should have about the same weight as the original. In other words, to get that aircraft ready for flight, it should be **as close as possible to the original.**

Another place of a chance for a screw-up is in the hinging of the control surfaces. You must make your hinges as good as you can. Be sure that each hinge is installed similar to its brothers so that there is no binding of the hinges when the surface is moved. Control surfaces that are hard to move can really shorten the life of a servo. Check that your pushrods are installed correctly with no slop in the linkage, and be sure that you do not have any binding in the control rods.

How about the control surfaces, themselves? How about the elevator? Is one half of the elevator at a different angle to the stabilizer than the other half, or are they parallel? You will never be able to make a good loop if the elevators are not parallel. How

about your sanding job on the surfaces - - - are there dips and high places on the trailing edge? Have you even sanded the surfaces? I looked at an aircraft in the collections of airplanes for sale at Joe's Aero Shop the other day and discovered one that appeared to have completely escaped the abrasion of sandpaper. All of the control surfaces were completely square; had never been rounded, or tapered. Sure, you can do this, but the control response will be much more rapid than it would be if the surfaces have been rounded or tapered. Even the leading edge of the fin and stabilizer were completely square. Are all of the surfaces installed correctly on your aircraft?

If all of the above listed items have been constructed to the best of your ability, and you have taken care to make your model as near to the original as you can, then you have taken a giant step to making your new aircraft really FLY.

If your aircraft will really fly, then you will have a good chance to be a good FLYER.

•

It's time now to fold up the typewriter and take the family up into the wilds of Colorado for our annual Winter week of skiing. I hope that the next noise you hear will not be the thump of my rump crashing into the snow on a long slide to the bottom. Until next month, Good Luck, and Good Building.

Or Flying, if it's warmer in your world . . . . □

FROM THE SHOP

from page 2

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-Articles
(3) RCM Product Reports
(4) Technical Type Articles
(5) Electronic Construction Articles
(6) RCM Visits Features
(7) Club and Contest News
(8) Helicopter Articles
(9) Boat Construction Articles

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) American Aircraft Modeler
(4) Flying Models

to page 116

TRACK 180°

In 1969 Ron Chidgey and Don Coleman established Southern R/C Products to produce FLEX-ALL, a plasticizer. The company grew and began producing other quality model products, first SORGUM contact cement, then LIFELINE fuel tubing and SKYLOFT covering material.

The company expanded again when Ron Chidgey, a research and development engineer and winner of the '71 and '72 NATS, designed the Tiger Tail model and Southern R/C began producing them in kit form.

Now Southern R/C makes three more exceptionally fine R/C model kits. . . Bobcat, Sweetater, the new Mustang-X designed by Jim Kirkland. . . and a rotary pump, the SIX-SHOOTER II.

Don and Ron are both experts in the R/C model field. They and their airplanes are consistant winners. In the future they will fill this column with model building tips, flying pointers, and information about Southern R/C's line of model kits and supplies.

Southern R/C Products, inc.
THE WINNER'S CIRCLE
8685 N. Palafox Hwy.
Pensacola, Florida

from page 115

Publication Influence on Total Consumer Consumption:
In response to the question as to how much of what each reader purchased in the way of radio systems, kits, accessories, engines, etc., is influenced by editorial or advertising copy which appears in R/C Modeler Magazine, the following is the percentile breakdown:

Influence	Percentage of Readers
100%	13%
50-95%	58%
26-49%	15%
0-25%	14%

The following is the total percentage of influence on consumer purchases from all sources:
Influenced by R/C Modeler Magazine:
65%
Influenced by all other magazines combined:
10%
Other influences:
25%

Model Magazines Received Regularly:
In response to the question as to what model magazines the reader received, the following was the order listed:

(1)	R/C Modeler Magazine	93%
(2)	American Aircraft Modeler	64%
(3)	Model Airplane News	62%
(4)	Flying Models	30%
(5)	Other	25%

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 breakdown:

Mail Subscription	63%
Hobby Shop	27%
Newsstand	10%

Individual Advertising Impact:
In response to the question, "What is your favorite ad in this issue," the following was the order of preference:

(1) Model Rectifier Corporation
(2) Hobby Lobby International
(3) Hobby Shack
(4) World Engines
(5) Tower Hobbies
(6) Carl Goldberg Models

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For those of you who found that the canopy was unobtainable for Slingsby T-53D, RCM plan number 497, arrangements have been made for such a canopy from Hi Johnson Model Products, Inc., 11015 Glenoaks Blvd., Number 18, Pacoima, California 91331. This is formed out of .040 clear butyrate and is priced at $3.95 postpaid. Also available from the same firm is a 11¼" canopy for a P-51D priced at $1.60.

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The following news item was received, just at press time, from Irv Stafford of San Diego, California.

The Torrey Pines Gulls will host a world speed record assault for multi channel radio controlled sailplanes on April 6-7, 13-14, 20-21, at the Torrey Pines Glider Port, La Jolla, California. Trophies will be given to the top 3 speeds of the meet and up to $1000.00 in merchandise prizes will be

awarded to the fastest RECORD BREAKER. All AMA and FAI rules will apply. AMA and FCC cards are required as well as FAI stamps.

Breaking the world record (which is now 113.24 mph and held by the U.S.S.R.) will require the ultimate in aircraft design and pilot skill, advanced speed measuring equipment, special safety considerations, proper documentation, and special terrain and weather conditions.

If our contestants provide the 1st two requirements, we think we can provide the last. The speed equipment will include a television camera at each end of the 50 meter trap which will automatically start and stop an electronic timer. This system will be backed up by the Williams Brothers electrical speed trap.

Most sailplane pylon racers equate speed and weight. The maximum allowable weight is 11 pounds! 11 pounds of anything moving at 100+ mph can be dangerous. Therefore special safety rules NOT part of the AMA or FAI regulations will be enforced. All aircraft will be safety inspected before each launch. Pilots may be required to demonstrate their ability to properly fly the profile before an actual attempt is allowed. Crowd control will be strictly enforced.

All documentation will be in accordance with AMA and FAI regulations. Those wishing to enter should be prepared to supply all information required. Accuracy of this information will be verified on site by the contest director. Filing fees to AMA and the FAI for record breaking flights (up to three) will be paid for by our sponsors.

A record flight must consist of the mean speed of 2 passes through the trap from opposite directions. It can be assumed that most planes will be highly loaded, low drag, low lift machines. In order to get these "lead sled's" high enough to gain the necessary speed, a very high lift condition is required. The 300 foot cliffs at Torrey Pines and the prevailing west winds offer lift conditions which support RC and full scale gliders alike. These normal conditions may not be enough to support a record breaking flight. That is why we have scheduled the trials for the 1st 3 weekends in April. During the late Winter and early Spring, low pressure weather fronts move down from the Canadian border, through the San Diego area. These fronts are usually preceeded and followed by high velocity west winds. It's those high wind conditions we will be after. A special phone number will be supplied to all registered pilots so up to date weather information can be available.

The prizes, which consist of merchandise and gift certificates from the nation's top manufacturers, will be awarded ONLY to record breaking flights. If the record is not broken all merchandise will be returned. Trophies will still be awarded to the top 3 flights. Awards will be based on indicated times and calculations made at the site.

The sponsors to date are:

Airtronics, Astro-Flight, Dumas, Kraft, Hobby Shack, Mark's Models, Model Builder, RCM, R.S. Systems, Soarcraft, Windspiel, and Williams Brothers.

We think we will offer the best possible chance for a record breaking flight. We invite inquiries and comments. You may write or call the individuals involved as follows: Meet Manager, Irv Stafford, (714) 463-0176; Flight Director/Safety Officer, Kelly Price, 755-7545; Speed Trap Manager, Jim Haldy, 271-8733; Publicity Director, Ed Hoppe, 452-8996; Registrar, Linda Hoppe, 452-8996; C.D., Paul Denson, 469-8595; Asst. C.D., George Loundsbury, 747-8732; or write to: Torrey Pines Gulls, P.O. Box 1564, La Jolla, California 92119.

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See you at the field. □