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R/C MODELER

This Month's Cover

Presents a wide variety of aircraft types and sizes. These samples include the Doppeldecker displayed by Gwen Reese, the Curtis P-6E, and the Corsair F4U, all of which are featured in this issue. The Hughes H4 Hercules was featured in our March, 1981 issue. See page 4, this issue, for additional comments. Color photos by Fred Reese, Bob Rich, and Dick Tichenor.

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FROM THE SHOP

Don Dewey

This month's cover is an exemplification of the variety and range of powered aircraft in which we are involved. The .09 powered Doppeldecker by Fred Reese is a small fun-filled sport job that is quick and easy to build. The .40 size Curtiss P-6E Hawk by Bob Rich is a medium size sport scale which is slightly more complex but is designed to make it as easy as possible for the builder. Both the Doppeldecker and the P-6E construction articles are presented in this issue.

The Spruce Goose was a feature article in our March, 1981 issue and is one of the most sophisticated model projects that we have ever seen. At 1/20th Scale it has a 16 ft. wingspan, weighs 83 pounds (with 1 gallon of fuel on board), and is powered by eight K & B .61 engines equipped with Perry pumps and carburetors.

The Vought F4U Corsair is Cliff Weirick's 1/2 Scale labor of love (pun intended). A feature article on Cliffie's project is presented in this issue. While man-carrying home-built airplanes aren't really included in R/C, we stretched our guidelines a bit because Cliff modified Kraft KPS-9 servos and uses them to actuate the trim tabs on control surfaces. Besides, Cliff has many, many friends in R/C who will be interested in seeing what he has been doing lately.

The biggest personal joy that we derive from publishing this magazine is becoming acquainted with so many imaginative people and learning of the many superb projects created by them. Believe me, it is inspirational.

★

Time marches on; progress; nothing lasts forever; and all that sort of stuff. It is with a great deal of personal regret to announce that with this issue we are discontinuing our Model of the Month Contest. The contest was initiated in our November 1971 issue with the desire to promote creativity and craftsmanship within our readership. Due to the diminishing number of entries over the past year and, mainly, the low popularity rating for that department in our recent reader survey, our space and efforts will be devoted to other subject matter as voted more desirable.

★

Our country and the AMA now have new presidents. To each we wish the best of luck in performing the miracles necessary to straighten out the problems of their respective offices.

Last year it was obvious that RCM avoided the AMA election fiasco other than to urge the membership to vote. We were criticized numerous times for not selecting and endorsing a candidate or editorializing on the many controversial issues, charges and counter-charges.

Just to set the record straight, RCM is seriously concerned over the welfare of aeromodeling. We have to be, all of our staff members are long time dedicated modelers and RCM is a privately owned commercial business. Our future existence and growth is directly related to the well being of R/C modeling.

As for our not being involved in AMA politics, we learned several years ago that the vast majority of the membership not only did not want to be bothered with the subject but resented our using the space to present it in print. This situation apparently still exists as our best information indicates that approximately only 21% of the AMA membership bothered to vote in the 1980 election. The resultant run-off ballot and tabulation cost in the neighborhood of $20,000. That is a lot of bucks.

The following paragraph appeared in the March, 1981 issue of Model Aviation on page 70:

AMA now owns 1.6 acres of prime property in that area, about 17 miles west northwest of downtown DC and about five miles east of Dulles International Airport. The property was purchased outright on December 10, for cash. The money came from surplus funds accumulated over the past two years of operation.

Hmmm . . .

★

Attention RCM Subscribers:

As many of you are aware of, our subscription department encountered many problems in entering new subscriptions last year. Our sincere apologies for any inconvenience these problems may have caused you. In January, 1981, we began installing a new computer in our office to handle our subscriptions more efficiently. If you encounter any problems with your subscription, please do not hesitate to write to me, or phone, and we will correct your problem as expeditiously as possible. Thank you for your understanding and patience in this matter.

Pat Crews

Advertising model built by "Doc" Fellhauer, Toledo, Ohio, is an attention grabber. See text for details.

We were advised of an interesting project in the following letter from Richard W. "Doc" Fellhauer, Toledo, Ohio:

Dear Pat,

Here is the material that I promised you at last year's Toledo conference, I hope you can use it.

When Classic Hobbies opened its doors in South Toledo, I just had to be there to help get it started off. I knew I would be spending considerable time there in the future.

After looking at all the goodies, I entered into a discussion with the owners, Paul Storer and Jim Baird, about advertising. Why not put an airplane on the roof, after all it's flat and large enough? It was just a matter of buying a used airplane, taking it apart, hoisting it up in pieces and reassembling it. "Instant Advertising." After all, how many people have an airplane on their roof other than the neighbors around our flying field, who have a vast assortment of model parts on theirs. The idea was good, but after a few phone calls we found that a second mortgage would be required to pay for the cheapest airplane we could find.

Wanting to help, I had to suggest that since we are model

to page 200

CUNNINGHAM ON R/C

Chuck Cunningham

The great hobby/sport of radio controlled aircraft building and flying is really a pretty vast one. It includes many different forms, and offers a wide variety of fun, excitement, relaxation, and pure enjoyment. Just look at the many different columns within each copy of RCM and you begin to get some idea of the scope. This month I would like to try to acquaint you with some of the many forms of RC because there are some that you might enjoy --- and never really gave much thought to.

We were all beginners at some time in this hobby/sport. Some of us have long since passed the beginner stage, and some of us are still in it, or thinking about beginning. Most newcomers to RC get started in one of two ways. The first is the person who is lucky enough to stumble upon the local flying site, gets hooked, gets the word on where to go to purchase items and gets help in getting started correctly. The second method of entry is the person who wanders into the local toy store, sees a minimal display of RC equipment, and purchases something to get started. This unfortunate person generally does not know where a flying site is located, or that there is help for him. Many of these beginners drop by the way shortly after beginning. Quite often the first type of person also fails to gain more than beginner status. But if he, or she, persists and sticks with the program, they often become hooked and begin to investigate new forms of RC. The interesting thing is that many old and new RC'ers never stray out of the path of the most common type of model existing in their area. This is really a shame, because RC has so much to offer. Let's take a look.

First, we have two broad categories, powered and non-powered aircraft. But even here the categories overlap, so stick with me a bit and let's see if we can investigate a type of flying that might be of interest to you.

Powered Aircraft: Boy, now this really is a broad category. Power ranges all the way from electric motors, to .049 glow engines, to gas powered converted chainsaw engines. Included along the way are ducted fan type aircraft and racing aircraft. Where to start?

Let's begin with electrics. This relatively new phase of the hobby provides a simple, quiet, and clean entry into powered flight. Generally the electric type of aircraft have been mostly limited in the past to powered soaring aircraft, but the latest generation have become more general sport flying types. It is a small segment of the hobby, but one which is growing very rapidly.

Next, 1/2A powered aircraft. This is quite often in the trainer class, but there is also a racing category for this size engine --- with a little 1/2A combat plane thrown in for good measure. It is often surprising to see how much good flying can be done by models with this small amount of power. There are a number of kits on the market created especially for the 1/2A engine.

Moving past the small engines, we have a full range of powered models to choose from. Those with engines of .10 to the standard .60 size are the most popular. Within this engine size are trainer type aircraft, in any size; pattern type aircraft, generally ranging in engine use from .40 to .61; fun fly and sport type aircraft with a full range of engine sizes; racing aircraft using 1/2A to Quarter Midget (.15 engines) to Quickie 500 (.40 engines) to Formula I (.40 racing engines).

In some areas racing events are held with specialized machines and, sometimes, races are held for any type of aircraft. Racing is a highly competitive aspect of the hobby and one that provides its participants with a high adrenalin flow. If you enjoy competition, give racing aircraft a try. There is nothing quite like it in any other phase of the hobby.

The newest phase of the hobby/sport is larger models. Those RC'ers who have given them a try are really hooked on this new form of modeling. This type of model can be a large model powered by a standard .61 engine, or an even larger model powered with the new .90 engine sizes, or the really large models powered with either a prop drive unit or a large gas engine swinging a 18" to 24" prop. The larger models range in size up to 100 lbs. and present many, many engineering problems not encountered with the smaller, more normal sized aircraft. This is the challenge that really seems to interest most modelers of this type aircraft --- most of whom have grey hair and many years of experience as model builders and fliers. It is not really a good place for a beginner to start, but a super, super place for an RC'er who has tried everything else, and now wants a new world to conquer.

Another phase of powered models that is one heck of a lot of fun is the building and flying of Old Time, or Antique type, powered models. Many super relaxing afternoons can be had with a model of this type. These are radio controlled aircraft patterned after free-flight models of the late 1930 and early 1940 era. Sizes range from 48" wing spans to 8' and larger wing spans. Unfortunately, in the past couple of years the competition in this class has become an engine event rather than a pilot's event, and interest in this type of model has declined. But, for general relaxing sport flying, it's hard to beat an old Powerhouse or Quaker. There are almost no kits available for this type of aircraft but a fantastic wealth of plans are available from John Pond Old Time Plan Service, P.O. Box 3215, San Jose, California 95156. Another excellent source of supplies for Old Time models is the Hobby Horn, P.O. Box 3004, Seal Beach, California 90740. Tel. (714) 894-6223.

Pattern flying has been the mainstay of competition in RC modeling since the development of the radio control system. Early pattern meets were won if the pilot could get his aircraft up and back down in one piece. Later meets were won if one flier could loop his aircraft. Today, pattern meets and aircraft are highly sophisticated with men and machines both capable of fantastic precision flying. If you like the beauty and preciseness of a figure skater then give pattern flying a try. It takes long hours of practice and a cool hand on the stick but the rewards of a beautiful flight are a joy to the flier. Every RC pilot should practice some parts of the pattern simply to make his overall flying better and more polished.

Sport and fun fly type aircraft dominate the entire spectrum of RC building and flying. Almost every club has some form of fun fly competition throughout the year. This type of competition can range from the simple spot landing to the more complex ribbon cutting, bomb dropping, limbo, or loops, roll, and spins. The general feeling behind this type of competitive flying is that it really isn't too difficult to enter, it makes you a much better pilot in the long run — and it is fun. The type of aircraft that can be flown in these events is limited only to what you have available. Anything will work.

Of course, the broad category of sport flying includes all types of aircraft --- low wings, shoulder wings, two wings, delta wings, plank wings --- just about any type. I've been a bipe lover forever, and feel that every modeler should build a bipe once in his modeling life, just to turn back the pages of time to the golden age of aviation. In fact, bipes are really a lot of fun just for themselves, and always draw admiring looks at the flight line.

Also included in the category of sport flying are aircraft that take to the air from either water or snow. Many modelers don't have vast open flying fields but do have lots of lakes, and have developed rise off water flying in to a great sport. Many snow locked fliers have said to heck with winter and have equipped their aircraft with skiis, and have gone out and done their thing every chance

to page 195

BIG IS BEAUTIFUL

Dick Phillips

Have you noticed lately that coverage of any **big** fun fly, rally or contest, brings out a large number of some models? Fleet bipes, Pitts Specials, Jungmeisters, PT-19's, Rearwin Speedsters and a few others all show up in quantity. The reason for that is, of course, that they are readily available in kit form or plans are available for them.

Fortunately, for those of us who like to build from plans, more and more good plans are coming onto the market, and the more we get, the better the variety of models will be.

Don't get me wrong, there are always some really well done models that show up but they are usually a 'one of a kind' that has been truly 'scratch-built' with the builder doing his own plans. These are great and are usually well-done, but the builder wanted a 'one of a kind' bird, and so there are no plans available. For those of us who do not have the time or the skills to 'roll our own' we have to rely on the plans which are available. This month, a few more have come to my attention and I'd like to pass them along to you.

Anyone who is a regular reader will know that I have been shilling for an AT-6 for some time now. Well, I am happy to report that there is one available, and it's a dandy, and large!

The plan consists of three sheets, well drawn and good prints. Scale is 2.4 inches to the foot for a span of 102". Construction is quite conventional, with a framed fuselage and formers, then sheeting. And there is lots of sheeting; it might be a good idea to start your own balsa forest before jumping into this one as both wings and fuselage are sheeted and that's a gang of balsa in a model this big!

Quadra installation is shown, but I think I would be inclined to go with a bit more power for better aerobatic performance. The Quadra would probably fly this model, but I think it would be a bit marginal. A Kawasaki or a Kioritz would be my choice.

The rudder and elevator are built on sheeting with half ribs, a-la Dave Platt, and this is good construction as it resists warping if you choose good stock for the center sheet material. The wing is one piece, but could readily be adapted to three sections with a center section and two outboard panels. I would place the servos in the inboard section of the outboard panel and use long leads to make the connection to the receiver. No flaps or retracts are shown — you're on your own there. The wing ribs are shown with extensions to permit building on a flat surface, then the extensions can be amputated following assembly.

Photos illustrate excellent treatment of common subject. Model is 1/3 Scale rendering of ubiquitous J-3 Cub by Canada's Bob Nelitz, who produced Scale Internats' Champion Chipmunk a few years back.

Full scale or model? It should be this hard to tell even from a few feet.

Note Sensenich trademark on prop, safety wired hub bolts and even scale clamps on hoses and scale spark plug.

Simple panel is well done, instruments appear to be constructed as full scale, rather than photos of instrument faces under glass.

The cowl is built-up (no commercial cowl available as this is written) and the canopy would have to be fabricated from plastic sheeting. Since only the front and rear of the canopy have compound curves, this should not be too great a problem.

Cub trademark, access panel for elevator horn and adjustable stab, along with scale tail wheel all contribute to the realism of this project, which flies as well as it looks.

No instruction booklet is provided, but the plans provide enough information to build this model, providing you have had some experience building from plans. It is a big bird but should be a stable flyer and a very impressive sight on the ground or in the air.

The plan is available from Don Smith, formerly Aero Plan (2260 N.E. First Ave., Boca Raton, Florida 33431) and the current price is $24.00 P.P. for the three sheets.

Don has a couple more offerings which are a little more exotic than the T-6 and should appeal to those of you who, like me, get bored with seeing the same model everywhere you go.

The first of these is a Heinkel He 51A. For those not familiar with the original, it is a biplane fighter used by the German Luftwaffe in Spain prior to WW II and pretty well phased out by the time WW II came along. The model is at 2.5 inch to the foot and the plan is three sheets. Span is 90". Power is anywhere from .90 to 2.0 c.i. and the Evra is shown on the plan, installed upright due to the high cowl which covered the original in-line engine. The top cowl is removable for access to the engine room. All wing panels are shown and the wings are one piece. The fuselage is built on a crutch with half-formers and then the other side is added after removal from the building board. Aileron construction is shown on the bottom wing and the outline shown for ailerons in the upper wing. Again, no instruction booklet, but sufficient detail is shown on the plan to permit construction by the experienced builder.

The second of the exotics will appeal to those interested in the era between the wars. It is a Curtiss R3C-2 Racer and, as I recall, a contender for the Schneider Cup. The plan is three sheets and at Quarter Scale; span is 66" and the area is 1357 sq. inches. In

appearance the model looks a lot like the Supermarine racers which won the Schneider for Great Britain, but since the Curtiss is a bipe, there is no danger of making that mistake. Power required is .90 to 2.0 and the Evra is shown, again upright and the top cowl is removable in this one as well. Wings are one piece and the fuselage is built on a crutch and sheeted.

The plan shows the model on wheels, but a set of plans is available showing floats for this speedy little bird and the conversion is easily made. The floats are 52" long, 9¼" wide and 6¼" deep. They could easily be used on other large models as well as the R3C-2. Both the Heinkel and Curtiss plans are $24.00 and the float sheet is $12.00 from Don at the above address.

All three of these plans should provide no difficulty to the builder with moderate experience. If you are a first time 'scratch' builder (from plans) be prepared to take your time and check everything as you go so as not to build yourself into a corner.

Many of us postpone that "first building from a plan" experience as we are concerned that our abilities are not up to the task. It's like the old story, "I can't get experience 'cause I don't have the job and I can't get the job 'cause I don't have the experience." A kind of Catch 22 situation. The best advice you can get is to obtain a plan of a model you like and have a try at building from a plan. The only real complication is making the shaped parts required and that can be simplicity itself.

Patterns can be traced from the plan onto cardboard patterns or right onto the building material itself through the use of tracing paper between the plan and the pattern or building material, but there are other ways as well. I have a source of developed, un-exposed X-Ray film which I really like. It has a slight blue color to it which makes it easier to find on the bench than clear material. I tape it over the plan and use drafting instruments to trace the outline on the film, then using either scissors or a modeling knife, cut the patterns out of the film. This method does not mar the plan (or cut it up) and it works. The film is thick enough so that when held against the material to be made into the part, a pencil will trace around the edge of the pattern quite easily and there's your pattern, marked onto the building material.

After the parts are cut, it's no different than building a kit as the rest of the material needed is strip and flat stock from the hobby shop. Some parts are made of hardwood and it's handy to have a table or radial arm saw to cut them, but there are few clubs in the country who don't have someone with such equipment and, properly approached, another club member or flying buddy will probably do such cutting for you.

So, if you have been wanting to build something for which there is no kit, have a go at one of the currently available plans, you won't learn to do it any younger than you are right now! Plans range in difficulty from easy through extremely tough, so if you are worried about what to do, remember the KISS principle and start with something simple! Once you have made a start, you'll have opened up a wide world of available models and more coming along all the time.

I had a letter from Jim Cottle of Bakersfield, California, recently and Jim had a few questions which have been covered here before, but a little review from time to time won't do any harm; here's Jim's letter:

Hi Dick,

I am starting in Quarter Scale. I'm scratch-building six Stinson Voyager's for friends and myself. Hopefully you can answer some questions for me.

On mounting the engine to the firewall should you use rubber behind the motor mount?

On the Stinson Voyager they show mounting the servo in the rear of the fuselage. I'll have to use three extensions for the two servos and I would like to know if that's too much length for battery drain on a Futaba radio? Should I use the ball bearing servos or use pushrods instead of putting servos in rear of fuselage?

Should I put sheet metal on the firewall? Will it cause interference?

On the gas tanks, should you have three outlets: one for the motor, one for the fuel, one for the vent?

I am having trouble balancing my props. I balance them on a High Point balancer and I get one balanced and turn the prop completely over and it's out of balance again --- that's on a Top Flite and a Zinger. I have found out the holes on both props are not centered. Have you had this much trouble with them?

I started building from scratch off the old Voyager kit then found out they changed the incidence on the wing and stabilizer. Do you have any idea why they did this?

Yours truly,
Jim Cottle
President of the B.A.R.K.S.

Jim's enthusiasm in building six models all the same is rare. Most of us have repeated a model we have built at one time or another, and it has always seemed to me that the first one brings all the construction, trimming and flying problems to light and we correct them as best we can. The second one we build, we correct those problems and end up with a better model, usually completing it in less time than it took to build the first one. Then, when we build a third one, we do all that 'fine tuning' that makes a truly great flying model. In Jim's case, I suggested that he keep the sixth one for himself, by that time, he should be building to perfection!

Jim did not mention which Stinson he was building so it is hard to be specific in some of the answers, but what follows is about what I told him in my letter of reply.

I prefer not to mount servos too far from the receiver. There have been a few problems with long leads radiating a signal which can give the receiver fits and who needs that kind of hassle? The problem is curable with chokes added to the long leads, but there are no chokes available for some radios so what do you do then?

My solution is to use wire connections from the servo arm (both sides) to double horns mounted on the control surface to be moved. In this way, we can eliminate (or at least greatly reduce) the possibility of loss of control in the air. I have used piano wire (1/16" works okay) soft wire, and stranded cable. I am currently trying a plastic covered stranded cable which is actually wire fishing leader which has been used by others for the same purpose and for rigging wires.

In making up and adjusting these push/pull wires, keep them as snug as you possibly can without creating excessive strain on the servo output shaft. Too tight and you'll get excessive wear, too loose and you'll get too much slop. With ball bearing servos, this wear is negligible as the output shaft has a good bearing to work in. If you are using non-bearing servos, check them from time to time to assure that excessive play has not developed, If it has, then replace that section of the case through which the output shaft passes.

I have used a sheet of metal on the firewall in order to shield against any ignition noise getting to the radio, but this has not proven necessary (at least with my EK radios) and I have abandoned the practice. In one case I know of, ignition noise did get to the radio, oddly enough to only one servo, and the problem was eliminated by shielding the high tension lead from the coil to the spark plug. This was done at the field by using a short wire lead with alligator clips on each end of the wire. We clipped one end to the metal of the engine, wrapped the wire around the high tension lead and grounded the other end back to the engine again. It eliminated the problem and was a quick field repair which allowed flying right away.

I use the conventional method of hooking up fuel tanks, a hose from the clunk connection to the carburetor, a hose from the top of the tank (inside) leading out the bottom of the model and a hose from the bottom of the tank (again, inside) leading out the top of the fuselage. This permits easy fueling and allows inverted flight without loss of fuel --- pretty straightforward.

Jim's problem with props is a new one on me. I have not found a Zinger yet that needed any balancing, they all come out of the package ready to fly. Top Flite's have required a touch of sanding for good balance, but I have not had a problem getting a good balance from them. I use a balancer that was pictured here some time ago and is a high stand with four precision ball bearings mounted so as to support the short shaft which passes through the center of the prop. The bearings are knife edged and they impart only a very minor friction to the shaft, if any. Non-centered holes are also new to me, I have not had any props with any detectable flaw at the hole.

Incidentally don't neglect 'tracking' your props. With the prop mounted on the engine and the model held stationary, place a piece of card stock so it contacts the tip of the

to page 180

SUNDAY FLIER

Ken Willard

This last month (January) has really been a busy and interesting period. Now it is not my intent to rub it in to you easterners for whom the winter months are largely thought of as a building period for your new dream ships; it's just that we're lucky, here in California, to be able to both build and fly all year 'round.

It so happens that I finished two airplanes in the past month, and had the opportunity to test fly them. Naturally, in the course of that testing, I once again proved that I am your old Chief Dum-Dum. By the way, where are you all? Next month I plan to give out the award for best dum-dum letter, and the competition, although good, is not in the same volume as it has been in past years. Guess you're all getting to be experts, or, as the typist writes, "I never make mistrakes!"

Back to the flight tests. The first was with a six foot slope soaring canard --- sort of an enlarged version of the three footer that I told you about a couple of issues ago. The first attempted flights were at Ed Holder's place, Finley Ridge, where "the wind always blows." Yeah. Two, mebbe three miles per hour. Then a little drizzle of rain, and the wind shifted to the opposite direction, blowing in over a very gently sloping meadow at one to two mph. Frustrated, I decided to hand launch the canard and see what kind of a glide it had. So I did --- and the model glided over the meadow --- and over, and over and hey! It's gonna hit the trees on the other side! Turn, and the model disappeared behind a hump. Oh well; pick up the pieces and start over. But no; when I got to it, the model was on its back, with only minor damage. And that's how I found out it has an excellent glide angle. Dum-dum.

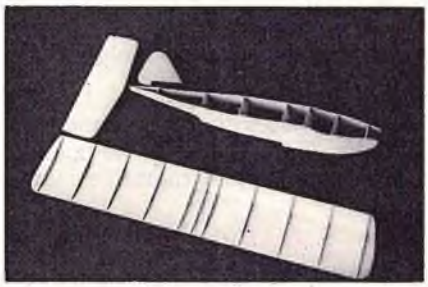
Next time up to Thornton Beach. Good slope site, but tough landing area. The model went better than I expected in a fairly strong wind.

Third test --- time to ballast it in flight. So, load it in the car, with tool box, accessories, etc. Read check list --- okay, let's go. Forty miles to Thornton Beach. Take the model out of the car and put it together. Oops --- Dum-dum time. Yes, I **read** the check list, but I didn't really check. Left the hatch for the ballast compartment (which is out of sight on the belly of the fuselage) on my work bench. Fortunately, there were some workmen at the site who had some packaging tape which I could use to close the hatch and keep the ballast in. But I felt pretty dumb --- especially with my friends Jim Wade and Dave Bridges looking at me somewhat quizzically.

The second airplane that I had just finished is an amphibious flying boat. Here's a photo of it just before covering with MonoKote.

Note the engine installation, with the servo buried in the pod behind the engine. The engine is one of the G-Mark .030s which are marketed in the U.S. by Cannon Electronics. The flying boat was designed specifically for the engine. The wingspan is 25", and all-up weight is 10 ounces, with a Cannon Super-Micro receiver and servos and 100ma battery pack.

Looks pretty nice, doesn't it. Did to me, too. Too nice. I got lazy and impatient, and when I covered the wing --- which is designed for single surface airfoil, as shown in the next photo, I decided to just stretch some MonoKote across the bottom and make it a flat bottomed, two surface airfoil. Dum-dum!



Jim Wade and I went out to the pond where we fly, got everything ready, fired up the engine, and then I put the model in the water, with the engine throttled back. Great; taxied nicely out, headed into the wind, and pushed full throttle. The model came up on the step, rose about a foot, and snap rolled over on its back! Hm-m-m.

Twice more we tried, with the same result. Okay, let's try a hand launch. The model left my hand roughly at flying speed, and promptly snapped over into the drink again. Why? I knew why, but didn't like to admit it. Let's make a change, and one more flight. I cut off all the MonoKote stretched across the bottom, and the airfoil was returned to the way it was designed to be --- single surface. Since the balsa under the MonoKote hadn't been waterproofed, we could only make one more try, and it would have to be hand-launched so water wouldn't touch the bare balsa until after landing.

Hand launch it I did, and fly it I did. If I hadn't been in such a hurry, or too lazy to cover the underside in the curved shape, all those failures could have been avoided. Here's the reason. As a double surfaced wing, the airfoil had a very sharp leading edge, which caused an uncontrollable stall. As a single surface curved plate, that characteristic was eliminated. Moral: don't be hasty, don't be lazy. Do it right, and you won't have to do it over.

Incidentally, I am very well pleased by the performance of the G-Mark .030. It turns a Cox 4½" diameter 2" pitch prop at around 18,500, and throttles down to about 6000 rpm. It takes a bit of getting used to before you can start it easily, since the muffler prevents direct prime in the exhaust, but you soon learn how to handle it. If necessary, you can resort to priming by removing the glow head and dropping some fuel directly on the cylinder head. Alternatively, you can remove the rear half of the muffler and prime through the exhaust. These are extreme conditions which occur when the engine has been dunked in the water and needs to be cleaned out. It really is a fine little engine for the small plane enthusiasts. Take a closer look.

You will also find that if you do remove the rear half of the muffler, two things happen. First, the top rpms will go over 20,000 (mine went to 21,000) but the reliable idle speed also increases to around 7000 rpm. Too bad they couldn't figure out a way to couple an exhaust baffle with the throttle; then there's a good chance that the top rpms could be kept up, and the exhaust baffle, when rotated, would keep the back pressure at a level where the glow head would remain hot enough to throttle down as low as with the muffler installed --- maybe even a bit lower. Yes, the noise level at full throttle would be higher --- but even so, not as high as an unmuffled .049. Hope they give it a try.

to page 173

GIVE IT A WHIRL

John Gorham

This is the time of year when those of us involved in the hobby business have a very busy time. The reason is, of course, the trade shows — and by the time you read this column we will have already had our four major U.S. shows of the year with a couple of international ones thrown in. Preparation for these shows really takes a lot of effort and time so that the booths of all the manufacturers and exhibitors can be made as attractive as possible for you while presenting as many of the new products as we can.

We are continuing to receive letters from helicopter enthusiasts in other countries. We welcome these letters since they give an idea of not only what's going on in other parts of the world but what are the 'pet' likes and dislikes concerning R/C helicopters. We will try to pass on as many of these views as we can through the medium of this column so that we can all learn from each other. So far as the 'state of the art' is concerned there doesn't seem to be much difference between R/C helicopter flyers in Greece or South Africa or Australia or Switzerland. One language remains the same: communicating those fancy movements of the R/C helicopter into a brain signal and then a hand movement and, finally, a correcting force to keep the darn thing in one place or going where you want it to. What does seem to vary somewhat is the particular types of helicopters and flying styles in different countries. England always has been in the forefront of modeling activities and English modelers are now tending much more towards the scale helicopter, and more scale-like flying for the semi-scale types. Seems as though the challenge of flying upside down or doing three consecutive rolls still exists but, like everything else, once a few people have achieved in any one location we all either decide it's not for us or we look for something different and new. There are many people of course (that includes this columnist), who believe that the most skillful and graceful flight of any model aircraft is when it emulates its full-size counterpart as much as possible. Well, different strokes for different folks. There is nothing wrong with advanced aerobatics at all, especially as a competitive test of skill but, since this form of flying requires a lot of practice, dedication, skill and a large bank balance, we will continue to concentrate this column on the average guy who has just average amounts of all these ingredients. The guy who wants to go out and have fun and just fly the darn thing to the amazement of his wife and neighbors. Let me know your views on this.

Well, the specific letters I received this month include a few more offers of help and one particularly poignant letter from a beginner who asks whether we could cover the problems he is encountering which he believes are general ones. Having read his letter thoroughly I tend to agree with him. It's hard, if you know a subject reasonably well, to put yourself in the position again of not knowing a darn thing about it. Since the basic idea of this column is to try and help people to learn to fly R/C helicopters we will have a go at covering his points.

The letter was from Steve Halvorson of Doraville, Georgia. Steve is brand new to the world of R/C helicopters but has done quite a bit of fixed wing flying. Steve, in fact, wrote the article in the December issue of RCM on learning to fly R/C airplanes. (You know those things which have the rotor blades fixed sideways and a small rotor system up front to pull the whole contraption forward — what a complicated way to do it!) The main point that Steve makes in his letter is that, although he has found the answer to a number of questions which I will list shortly, he states that "he and all the other novices could have saved months of time and many rotor blades and main shafts if there was an article covering some of the **very basic** problems --- basic to an experienced helicopter pilot but extremely complicated to a novice. Why not make this one of your next articles in RCM?" Some of Steve's questions are as follows:

(1) What will happen if the swashplate is out of adjustment, i.e., too much forward trim, etc.?

(2) What will happen if the flybar is out of adjustment; what is a good trim position?

(3) Why does the helicopter lift off in a decisive nose down attitude; is this normal?

(4) What are the symptoms if the main blades are not parallel with the seesaw?

(5) How do you balance tail rotor blades?

(6) What happens if you have too much pitch in the main rotor blades? Or not enough?

(7) How to best balance main rotor blades?

Okay, Steve, from other letters I have received it would seem that many of your questions are those which apply to so many other modelers who are learning to fly the R/C helicopter and I've looked back on my previous articles and scratched my head somewhat and realized that perhaps one of the basic subjects that I haven't covered fully enough is that of 'trim' of the helicopter.

The first question we should answer, I guess is "what is trim?" If we could understand thoroughly what it means maybe many of the questions such as Steve has posed would be answered faster. So, this month let's see if we can at least start on the subject of trim.

Trim:

First, let me define what I believe is meant by 'trim.' The trim of a helicopter, or any other flying machine for that matter, is the small adjustments which will produce a final balance or equilibrium of all the forces that act on the aircraft relevant to a particular flight mode or condition. These forces basically include aerodynamic forces, propulsion forces, and the forces created by the weight and lift of the machine. Now let's look at the forces which are acting on a helicopter and which can be modified by trimming. As we have discussed earlier, the primary lifting force of the helicopter is exerted by the main rotor blade system. There are other smaller aerodynamic forces involved in fast forward or sideways flight but, for the hover and slow forward or sideways flight, the main rotor system provides the lift. The counter force to lift is weight. Now there will be one point in the helicopter upon which the rotor lift effectively operates and this will be (over-simplifying a little) on the vertical center line of the main shaft of the helicopter (Figure 1). As we can see, if the Center of Gravity of the helicopter is **ahead** of the main mast, then the weight of the helicopter will react on **this** point.

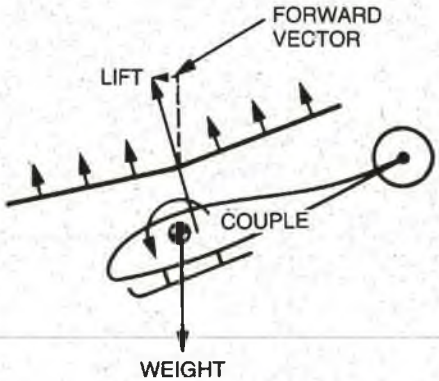


FIGURE 1
FORWARD C.G. PRODUCES NOSE DOWN COUPLE (AND HENCE, FORWARD FLIGHT LIFT VECTOR)

The result will be a 'couple' or rotational force on the helicopter which tends to swing the nose downward. The only forces we have available to counteract this are from the main rotor system and, if we tilt the main rotor system (or its lift vector) backward, we

to page 154

HERE'S HOW

By Jerry Smith

AILERON SERVO STEERING

MANY THANKS TO –
RAY HINDMAN
TUCSON, ARIZ.

Have you ever experienced the difficulty of trying to steer an airplane (taxi) with a non-steerable nosegear? It is all but impossible and downright frustrating. Especially when you have to walk across the field to retrieve the little fella. Most of the small trike gear airplanes available today are two and three channel. With three channel it is generally elevator, rudder and throttle, while the two channel are aileron and elevator only. The use of a rudder is not mandatory in flight unless you intend to do a number of aerobatics. Of course, it does help for ground steering. In the case of a trike gear it will allow you to hook up a steerable nosegear in combination. This has been the traditional hook-up for many years, however, there is another way. Yes, it is possible to hook up a steerable nosegear to an aileron servo. But what about removing the wing? We'll show you how that's done also.

I consider the following impression one of the better to cross my drawing board. Ray Hindman of Tucson, Arizona, sent me this idea of his way of aileron servo steering. Ray has the following aileron servo steering system installed in a scratch-built, .20 size, shoulder wing plane with a three channel radio. It has worked perfectly since the initial test flight. His idea gives positive steering control, with very little weight penalty and needs little room in the fuselage. It can be installed in almost any fuselage configuration, with standard available hardware. When using Ray's suggestion in a low wing airplane, the fuselage "swing arm" should pivot in the center to give proper steering direction.

Basically, the hook-up is: The nosegear steering arm pushrod is connected to a "swing arm" (bellcrank) which, in turn, is mounted on the fuselage side at the wing forward edge of the wing opening. The "swing arm" could also be mounted to the rear edge of the opening, however, the steering arm pushrod would be considerably longer. Depending on installation problems you might consider this location.

Another pushrod with Du-Bro ball links, attached to each end, is fastened to the "swing arm" and aileron servo. This pushrod can be swung out of the fuselage while attached to the wing. At this time one can easily disengage the ball link fitting from the wing servo. Conversely, it is just as easy to install the wing on the fuselage. Don't forget to plug in the aileron servo!

If Ray's idea looks good to you, and you want to give it a fling, here are some helpful construction hints.

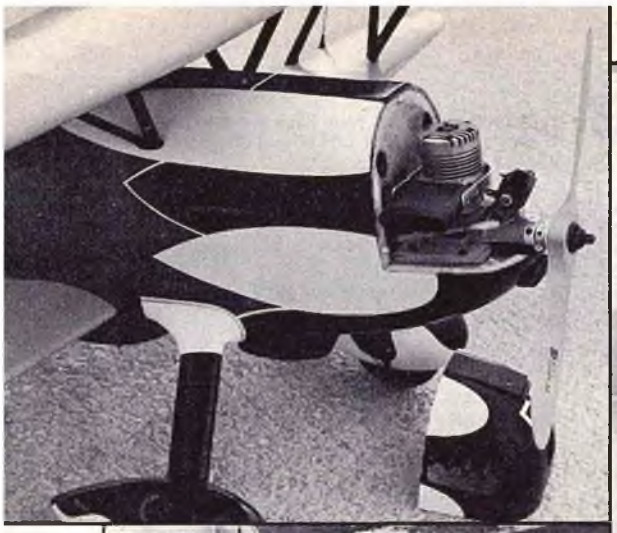
(1) Plan and lay out the aileron servo steering system as you build the fuselage. This will assure freedom of interference from fuselage formers, fuel tank, and radio equipment.

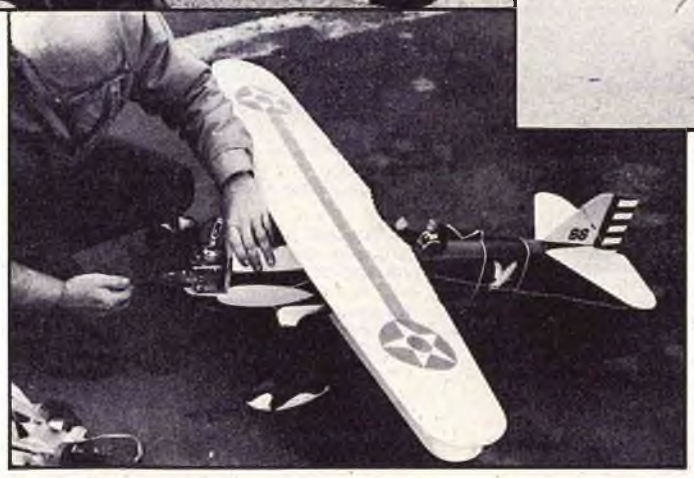
(2) To make the "swing arm," cut the arm off a nosegear steering arm.

(3) Use a straight offset output arm on the aileron servo. The outermost hole will be used for the ball joint fitting and the inner holes will be used for aileron linkage.

(4) After control throws have been set to your liking, put a dab of "Hot Stuff" on the ball link nuts for security.

(5) With the transmitter aileron stick centered, and the aileron trim centered, conduct taxi tests to be sure the nosegear is tracking true and straight. □





CURTISS P-6E HAWK

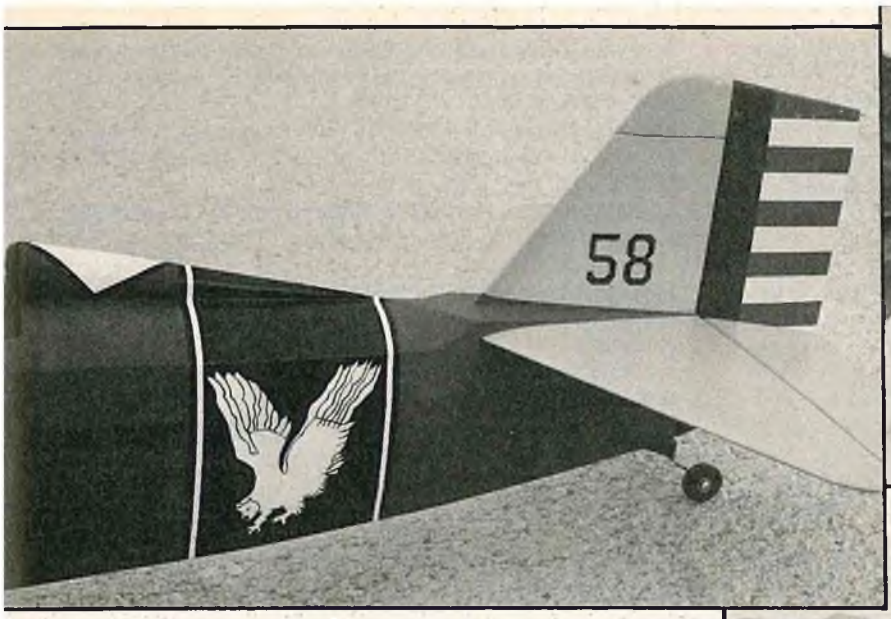
I guess I just have a thing going for P-6E's, but I know I'm not alone. There is a very large group of us who think it epitomizes everything an airplane should be. Two wings, open cockpit, wind whistling through the wires, and all that good stuff. Top that off with a very colorful paint job and what more could you ask for?

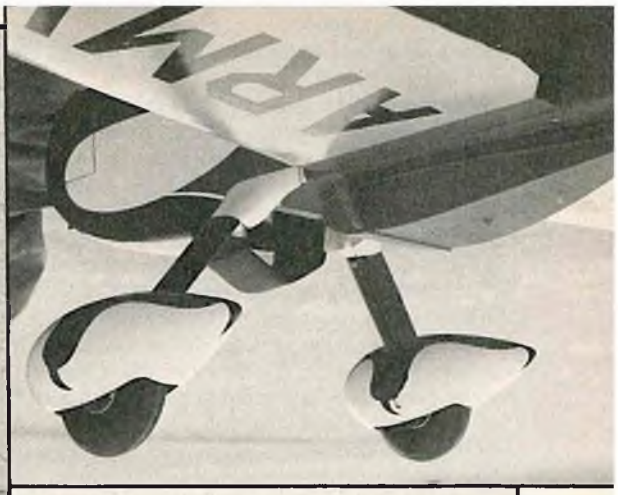
How about a model of that classic that is a very good flyer and is easy to build?

Two models were made from this design, just to check everything out. I would like to say the first one flew right off the drawing board. I would like to, but I can't. There were some changes made to make it better. While the first one flew very well, almost like a trainer at half throttle and very maneuverable at full power, it could be improved upon and it was.

These drawings reflect all of the changes that were made for the second plane to improve ground handling, flying and to get more scale accuracy.

The model is designed for a .40 size engine, but engines from .35 to .45 will work well. A word of caution though, don't over-power





Designed for a "forty," this classic P-6E offers the modeler everything an airplane should be

By Bob Rich

Photos by Bob & Doris Rich

the model. It just doesn't need brute force to fly, even at higher altitudes.

Our small P-6E, RC Modeler August 1976, and currently a Carl Goldberg kit, flew best with a .19 to .30 engine. A .25 is a very good size. It could be a real fun flying machine but, when over-powered is a real handful with the fun removed. This plane could be the same way so keep the power reasonable and enjoy it.

This model is not for the novice, either in construction or flying. But if you have several kits under your belt and can do a fair job of flying you will have no problems. That is if you follow the instructions.

After years of extensive research I have reached the conclusion that the old saying, "If all else fails, read the instructions," is absolutely false.

You can read the instructions all day long, but if you don't follow them they won't do one bit of good.

While the model is an excellent fun and sport flyer, you won't have to take a back seat to anyone in Sport Scale competition. Only a few liberties were taken for ease of construction and flying ability,

and it does look good.

If you are as sold on the plane as I am, let's get down to the nitty gritty and get started.

While the model is quick and easy to build there are several areas in which the construction differs from the general building techniques. The plans are self-explanatory in most areas so these instructions will not be a "glue stick 'A' to stick 'B' procedure."

Areas will be covered in some detail where it will make the construction easier or a special mention is required.

I like to start by making a kit, that is making all of the tracings of the parts and cutting them out before I start. I don't like to slow the building process by stopping every few minutes to cut out a part. I don't like to cut out the parts anyway so it's easier to get it out of the way beforehand, while you are in the mood. Look at the plans and pictures every once in a while to keep up your enthusiasm.

A light model flies better than a heavy one so use some care in selecting the wood.

The model is strong so medium and light balsa can be used. Just plan ahead a little and choose your wood according to its use.

The wing spars should be straight and strong.

Where 3/8" sheet balsa is called for, two layers of 3/16" glued together will work fine. The 3/16" sheet balsa is easier to find, and more reasonable.

Goldberg Super Jet was used throughout on both models and the results were excellent. If you haven't tried Super Jet, you are in for a real surprise. It isn't like any other instant glue, thick or thin. Try it, you'll like it.

Parts all cut out? Okay let's get started.

With Super Jet or a good contact cement, glue the 1/16" plywood doublers to the fuselage sides.

Most instructions emphasize the importance of making a right side and a left side so we won't dwell on that.

After making a right side and a left side, add the 1/4" x 1/8" upright braces. Mark where the formers and motor mounts are located.

Now we are ready to put the sides together, right? **Wrong!**

We do something smart for a change and build the wire cabane struts first. It's a lot easier to do it now.

Make a simple jig for the cabane wires. When everything is square and the measurements are correct, tack the cabane diagonal braces to the uprights with Super Jet. Now it's an easy job to bind the joints with soft wire and solder them.

Now we put the fuselage sides together, but we do it right so everything comes out square.

Using the plans and a couple of good right angles, glue the sides together with the cabane mount blocks and the 1/8" ply lower wing mount (that's the piece at the leading edge of the lower wing). It looks a lot better if the fuselage is nice and square, and the wings fit better too.

Now join the aft end (that's the tail) of the fuselage with the 1/8" square balsa piece. Did you get that square?

Install the cross pieces, formers, tank support, firewall, and motor mounts.

It's beginning to look like something already.

Now we will make another smart move and mark the landing gear wire locations on the inside of the fuselage. Remember they aren't the same on both sides.

Install the cabane struts --- aren't you glad they are already made?

After the cabane struts are securely in place, install the 1/8" x 1" balsa turtledeck top piece.

The turtledeck is now ready for planking with 3/32" sheet balsa, but leave the piece from Former 9 to the tail off until the stab and fin are glued in place.

Drill the holes in the motor mounts for the engine plate bolts and put in the blind nuts. Do it now, you can't do it very well after the chin block is in place. Also fuelproof the area — it's easier now. Super Jet does the fuelproofing fast and easy.

With a good wire bender, the 3/16" steel wire can be bent to the landing gear shape with a little care and effort. It could be done with a vise, but if you have a friend who is good with wire, that's a lot easier.

Don't try to skimp or take the easy way out, the heavy wire is necessary.

And while you're at it, a little toe-in on the wheels helps the ground handling quite a bit.

Drill the 3/16" holes for the landing gear wires in the landing gear mount block and mount the gear with the 1/4" ply landing gear braces.

It's time to put the side formers on the fuselage so draw a line 3/8" down from the top of the fuselage side. That's where the top of the side formers go. When gluing them in place make sure the top of the formers is up. You should have marked them when you traced them, but if you didn't, make sure they are correct before gluing them in place.

The side sheeting is a fairly easy job. On the 1/8" sheet balsa you have selected for the side, draw a line 3/8" down from the top, parallel with the top. Now bevel the balsa from the line to the top edge. A piece of masking tape along the line will help keep your sanding line straight.

When the side sheeting fits at the top, don't glue it. Hold it in place, curved over the formers, and cut it off to fit the bottom of the fuselage.

Mark the bottom of the side sheet and bevel it the same way you did at the top, straight across because it doesn't bevel at the firewall or over the top of the wing. Keep the bevel line straight 3/8" up from the bottom of the sheet.

Now glue the side sheeting in place. Wasn't that easy?

Fit the pieces of 3/8" sheet balsa to the outside of the fuselage side in front of the firewall.

If you are going to add the gun troughs, mark the fuselage for the balsa block insert and cut out the side sheeting. Install the blocks and make the groove.

Add the chin block pieces and tack glue the cowl block in place. Shape the nose area according to the plans.

The cowl can be shaped from block balsa and hollowed or make

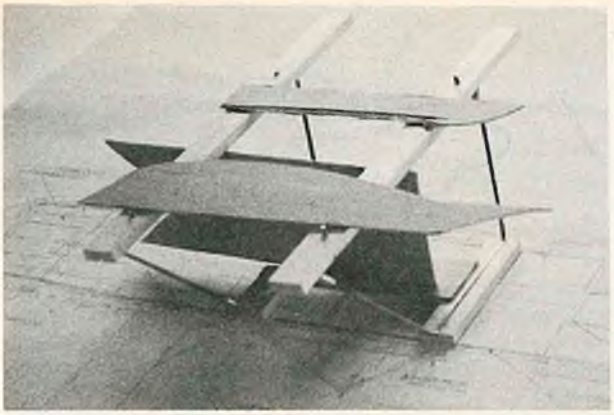
CURTISS P-6E HAWK
Designed By: Bob Rich

TYPE AIRCRAFT
Sport Scale
WINGSPAN
Top 50½ Inches
Bottom 41⅜ Inches
WING CHORD
Top 8 Inches (Avg.)
Bottom 6½ Inches (Avg.)
TOTAL WING AREA
635 Sq. In.
WING LOCATION
Biplane
AIRFOIL
Flat Bottom
WING PLANFORM
Double Taper

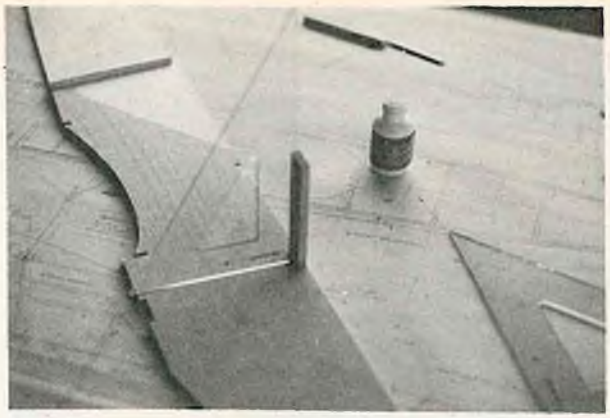
DIHEDRAL EACH TIP
Top — Flat
Bottom — 3/4" Each Tip
O.A. FUSELAGE LENGTH
37½ Inches
RADIO COMPARTMENT AREA
(L)7½" x (W)3⅜" x (H)3½"
STABILIZER SPAN
17-3/16 Inches
STABILIZER CHORD
6 Inches (Avg.)
STABILIZER AREA
100 Sq. In.
STAB. AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
8¼ Inches

VERTICAL FIN WIDTH (incl. rud.)
8¼ Max
REC. ENGINE SIZE
.35-.45 cu. in.
FUEL TANK SIZE
8 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail. & Throt.

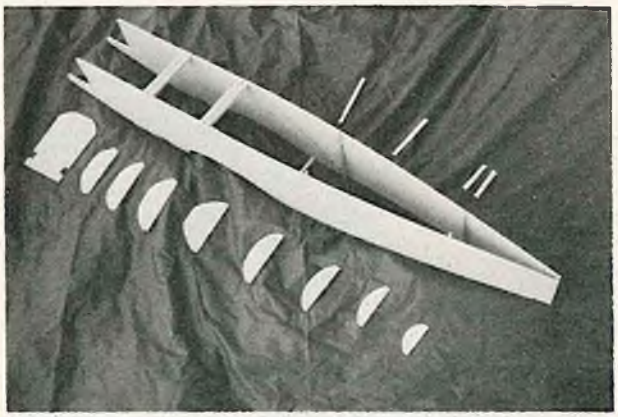
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply
Wing ..... Balsa, Ply
Empennage ..... Balsa
Wt. Ready To Fly ..... 72 Oz.
Wing Loading ..... 16.3 Oz./Sq. Ft.



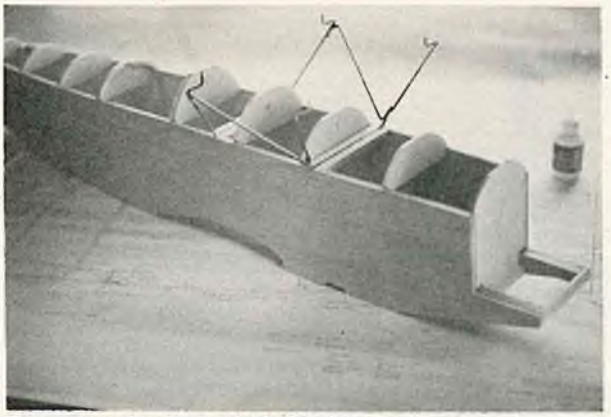
Jig for cabane struts using the cabane mounting blocks and scrap.



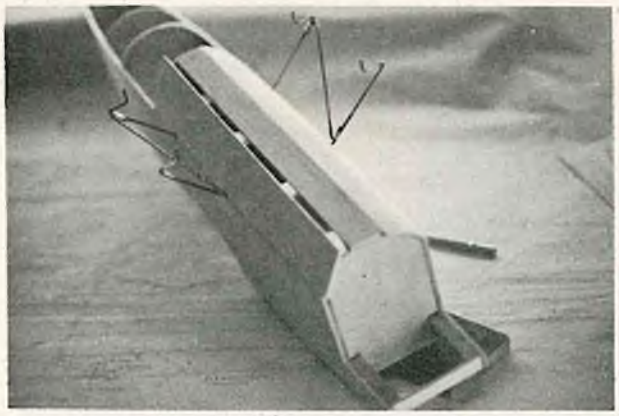
Use right angles to get cabane mount blocks square.



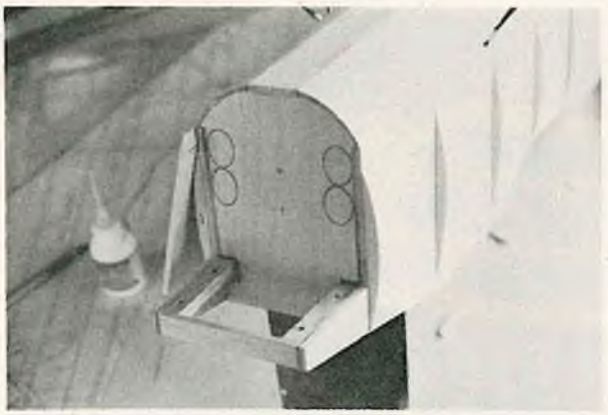
Firewall and formers ready to be glued in place.



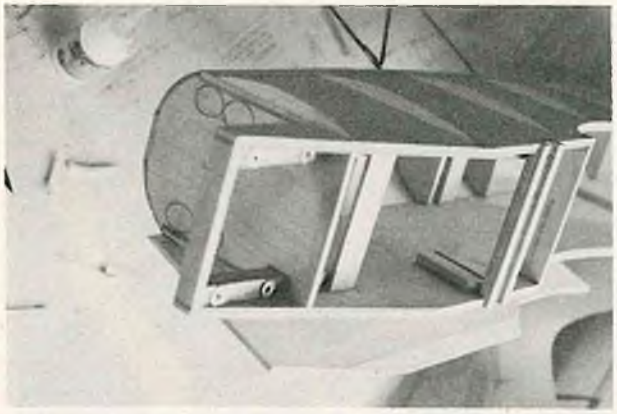
Formers and cabane struts in place.



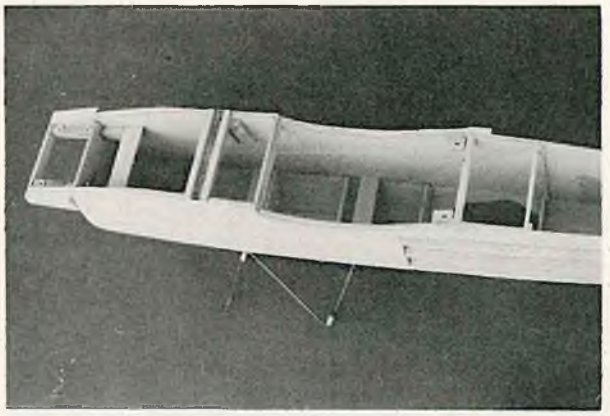
Front turtledeck top piece in place after cabane struts are secured.



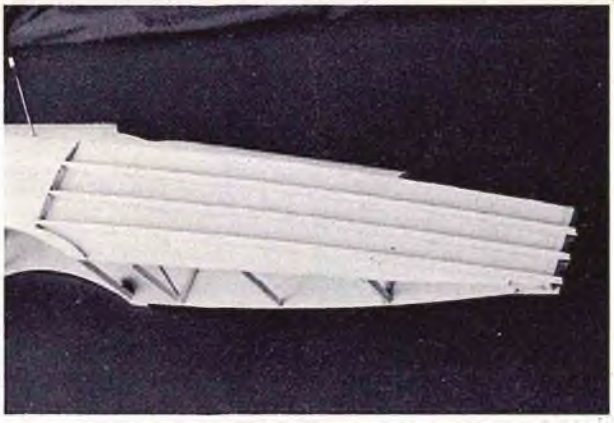
Side formers in place, note line 3/8" from top of fuselage side.



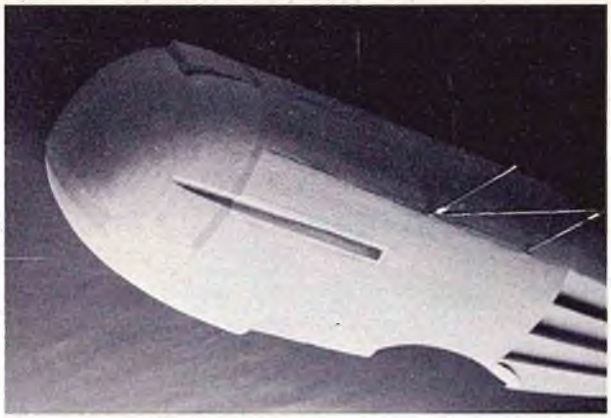
Side sheeting ready for gluing. Note bevel on bottom of side sheeting.



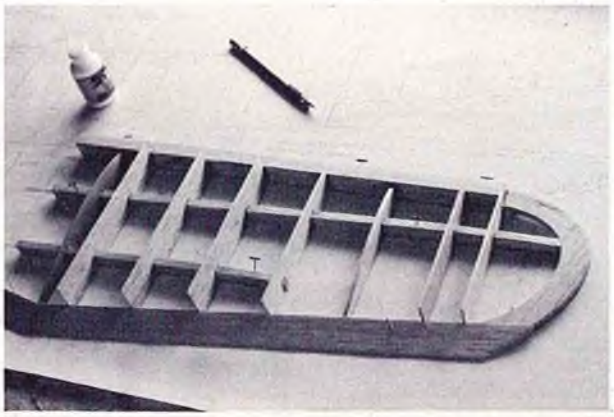
Fuselage without bottom sheeting, lower wing mounting blocks in place.



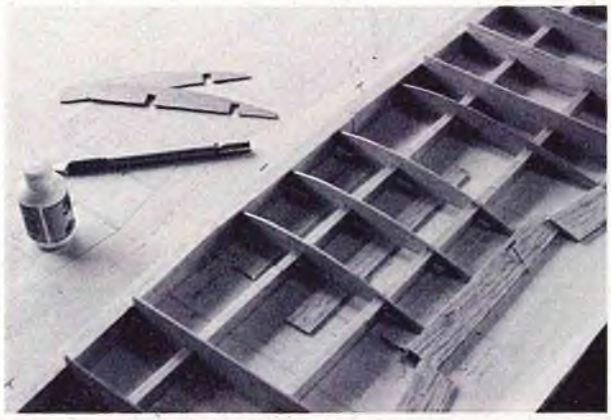
Rear of fuselage with side stringers before shaping.



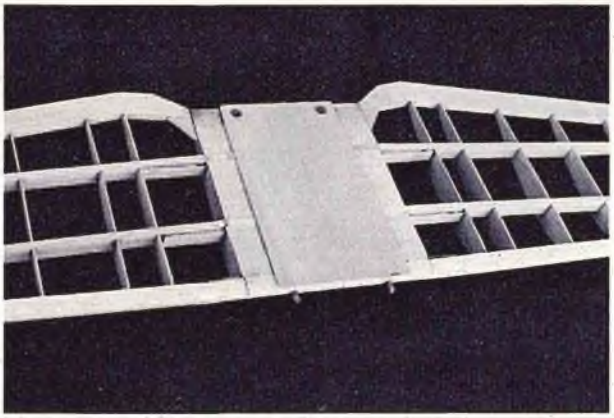
Fuselage nose after shaping, note insert for gun trough.



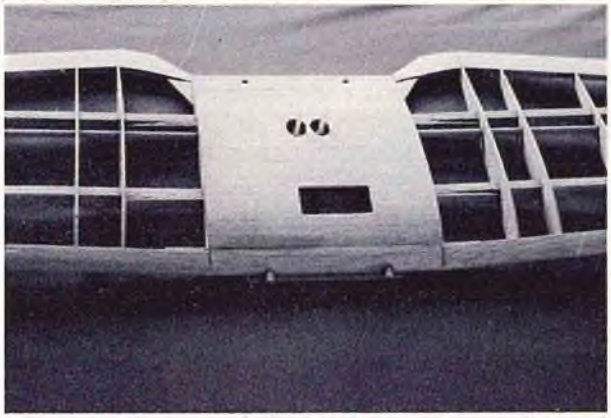
Lower wing panel under const. Shaped guide ribs and oversize rib pieces.



Center section ribs raised 1/16" to allow for bottom planking.



Lower wing center section planked and bottom piece added.



Finished lower wing, control rods and servo hole in place.

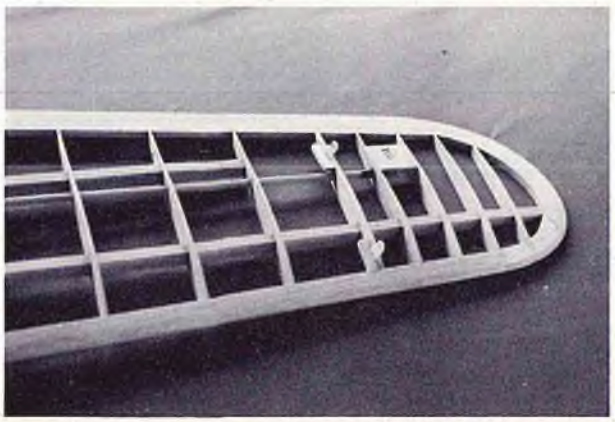
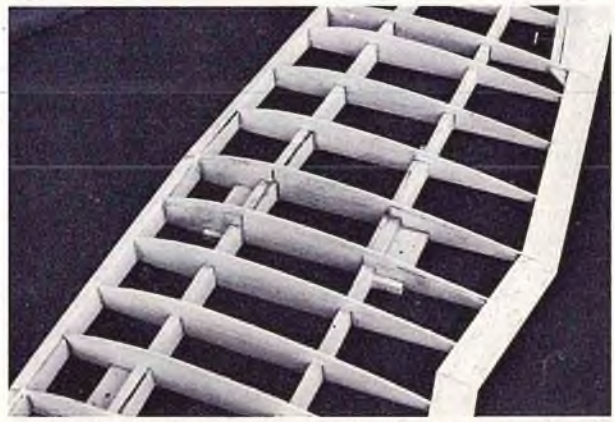
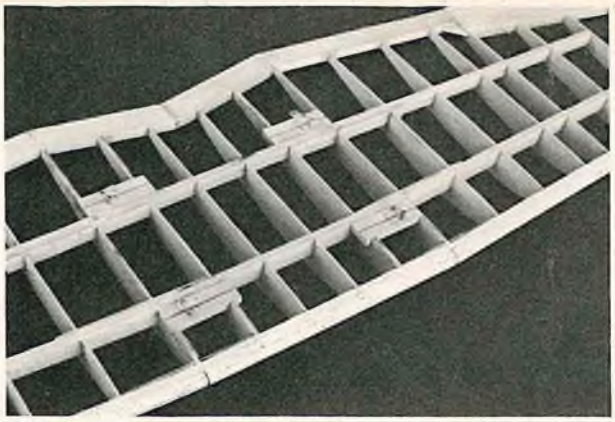


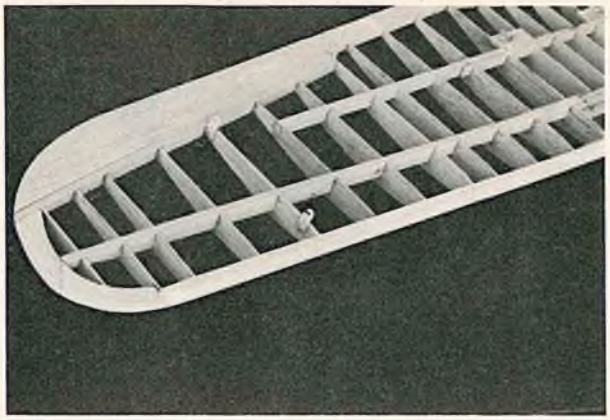
Photo shows aileron controls and strut hold-downs.



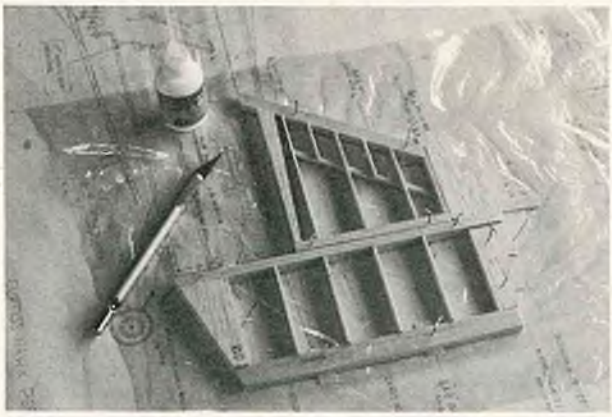
Top view of upper wing center section with cabane mounting blocks and reinforcements.



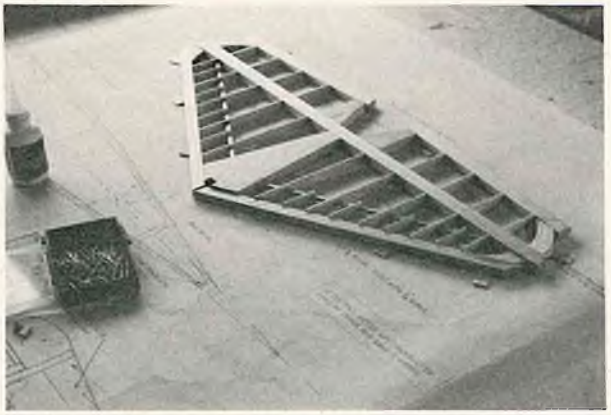
Underneath view of top wing.



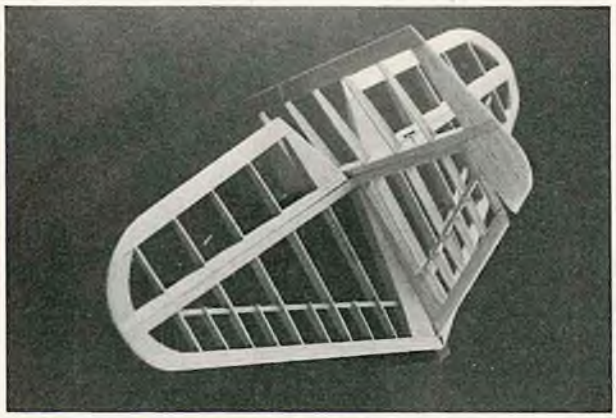
Top wing tip details before covering supports added around hold-downs.



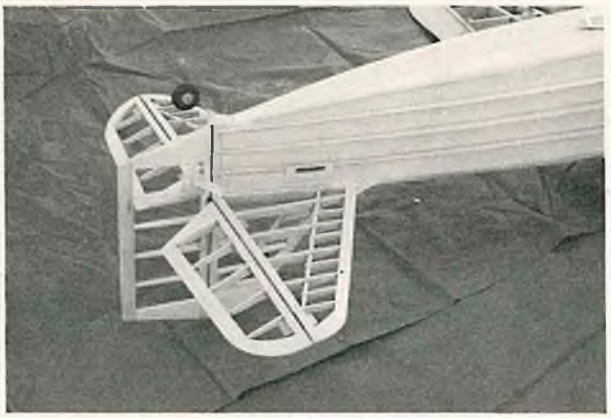
Rudder and fin, note pieces raised with 1/16" scrap balsa.



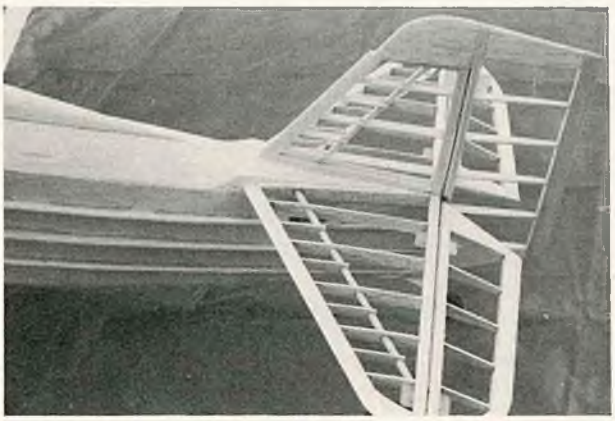
Stab and elevators, note pieces raised with 1/16" scrap balsa.



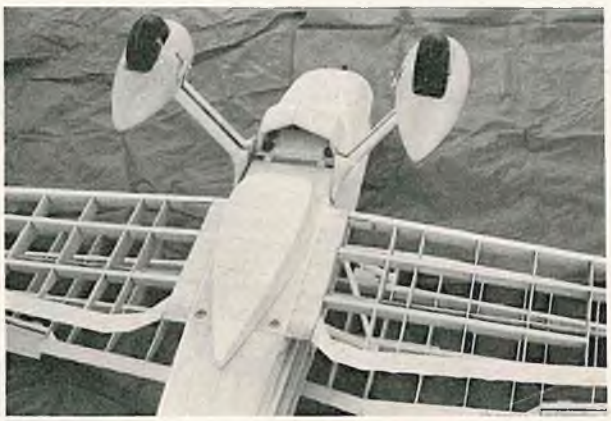
Tail tapered and sanded to airfoil.



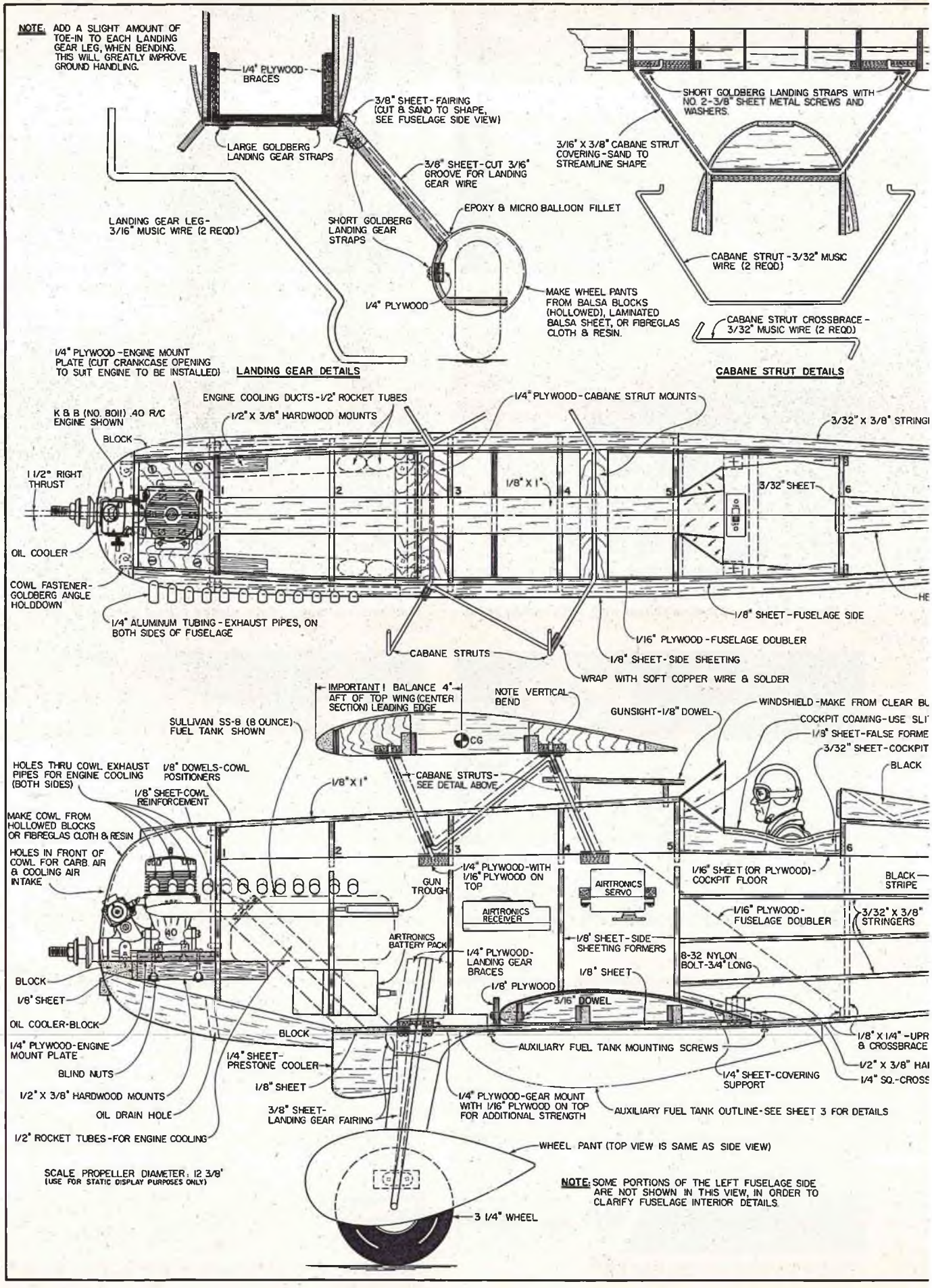
Finished tail section viewed from bottom.

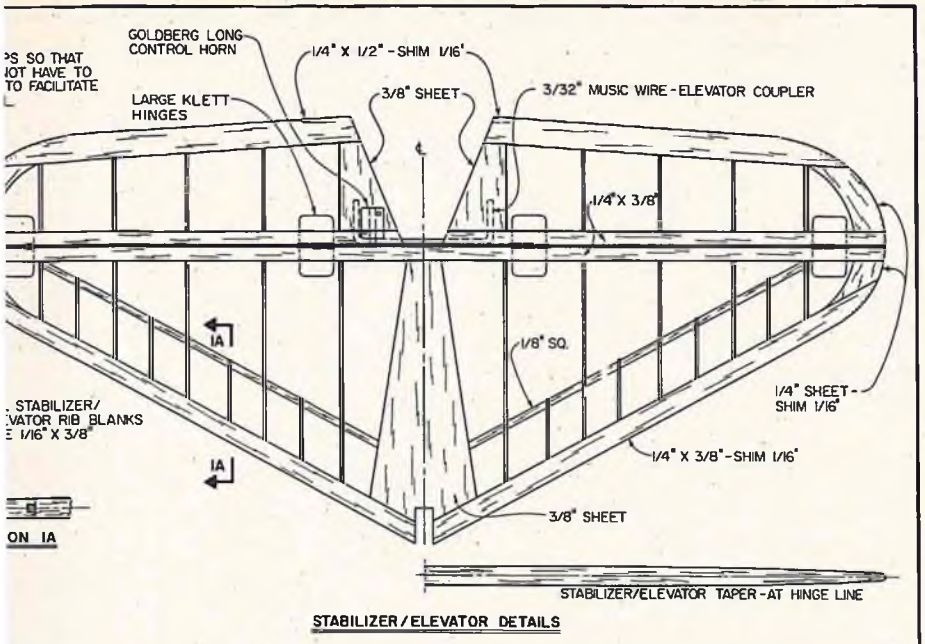


Finished tail section viewed from top.

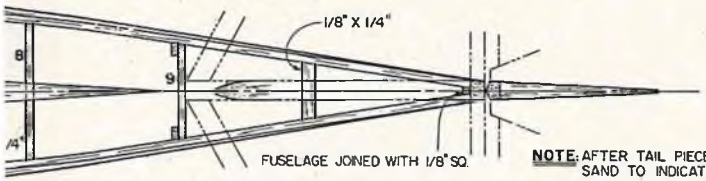


Framed aircraft viewed from bottom showing L.G. detail and aux. fuel tank.

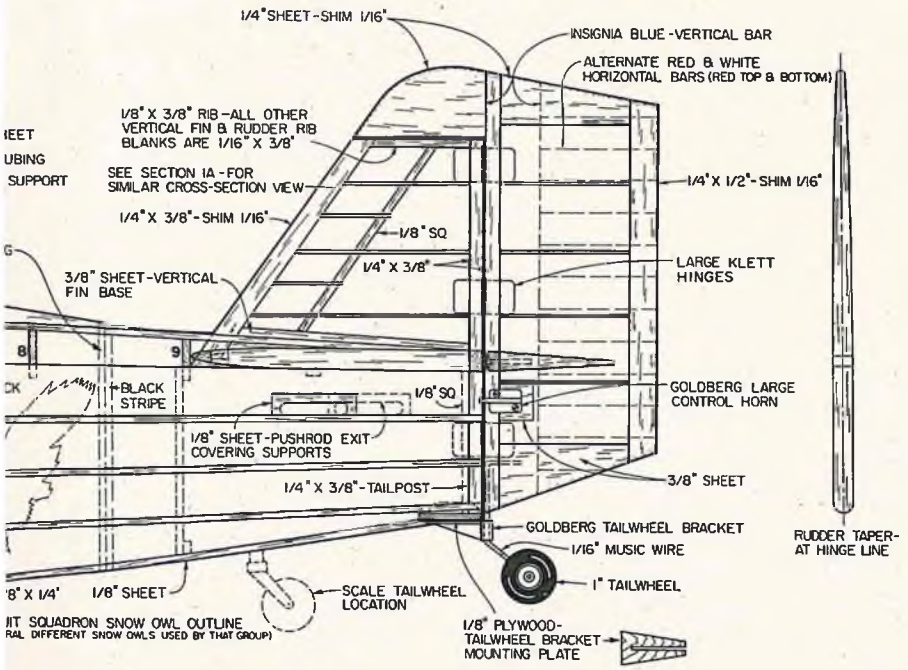

NOTE: ADD A SLIGHT AMOUNT OF TOE-IN TO EACH LANDING GEAR LEG, WHEN BENDING. THIS WILL GREATLY IMPROVE GROUND HANDLING.
1/4" PLYWOOD-BRACES
3/8" SHEET-FAIRING (CUT & SAND TO SHAPE, SEE FUSELAGE SIDE VIEW)
LARGE GOLDBERG LANDING GEAR STRAPS
3/8" SHEET-CUT 3/16" GROOVE FOR LANDING GEAR WIRE
LANDING GEAR LEG-3/16" MUSIC WIRE (2 REQD.)
SHORT GOLDBERG LANDING GEAR STRAPS
EPOXY & MICRO BALLOON FILLET
1/4" PLYWOOD
MAKE WHEEL PANTS FROM BALSA BLOCKS (HOLLOWED), LAMINATED BALSA SHEET, OR FIBREGLAS CLOTH & RESIN.
LANDING GEAR DETAILS
SHORT GOLDBERG LANDING STRAPS WITH NO. 2-3/8" SHEET METAL SCREWS AND WASHERS.
3/16" X 3/8" CABANE STRUT COVERING-SAND TO STREAMLINE SHAPE
CABANE STRUT-3/32" MUSIC WIRE (2 REQD)
CABANE STRUT CROSSBRACE-3/32" MUSIC WIRE (2 REQD)
CABANE STRUT DETAILS
1/4" PLYWOOD-ENGINE MOUNT PLATE (CUT CRANKCASE OPENING TO SUIT ENGINE TO BE INSTALLED)
ENGINE COOLING DUCTS-1/2" ROCKET TUBES
1/2" X 3/8" HARDWOOD MOUNTS
1/4" PLYWOOD-CABANE STRUT MOUNTS
3/32" X 3/8" STRINGI
K & B (NO. 8011) .40 R/C ENGINE SHOWN
BLOCK
1 1/2° RIGHT THRUST
1/8" X 1"
3/32" SHEET
OIL COOLER
COWL FASTENER-GOLDBERG ANGLE HOLDDOWN
1/4" ALUMINUM TUBING-EXHAUST PIPES, ON BOTH SIDES OF FUSELAGE
1/8" SHEET-FUSELAGE SIDE
1/16" PLYWOOD-FUSELAGE DOUBLER
CABANE STRUTS
1/8" SHEET-SIDE SHEETING
WRAP WITH SOFT COPPER WIRE & SOLDER
IMPORTANT! BALANCE 4" AFT OF TOP WING (CENTER SECTION) LEADING EDGE
NOTE VERTICAL BEND
GUNSIGHT-1/8" DOWEL
WINDSHIELD-MAKE FROM CLEAR BL
COCKPIT COAMING-USE SLI
1/8" SHEET-FALSE FORME
3/32" SHEET-COCKPIT
BLACK
SULLIVAN SS-8 (8 OUNCE) FUEL TANK SHOWN
CG
HOLES THRU COWL EXHAUST PIPES FOR ENGINE COOLING (BOTH SIDES)
1/8" DOWELS-COWL POSITIONERS
1/8" SHEET-COWL REINFORCEMENT
CABANE STRUTS-SEE DETAIL ABOVE
MAKE COWL FROM HOLLOWED BLOCKS OR FIBREGLAS CLOTH & RESIN
HOLES IN FRONT OF COWL FOR CARB. AIR & COOLING AIR INTAKE
GUN TROUGH
1/4" PLYWOOD-WITH 1/16" PLYWOOD ON TOP
AIRTRONICS SERVO
AIRTRONICS RECEIVER
1/16" SHEET (OR PLYWOOD)-COCKPIT FLOOR
BLACK STRIPE
1/16" PLYWOOD-FUSELAGE DOUBLER
3/32" X 3/8" STRINGERS
AIRTRONICS BATTERY PACK
1/8" SHEET-SIDE SHEETING FORMERS
1/4" PLYWOOD-LANDING GEAR BRACES
8-32 NYLON BOLT-3/4" LONG
BLOCK
1/8" SHEET
1/8" PLYWOOD
3/16" DOWEL
1/8" SHEET
OIL COOLER-BLOCK
BLOCK
1/8" X 1/4"-UPR & CROSSBRACE
AUXILIARY FUEL TANK MOUNTING SCREWS
1/4" PLYWOOD-ENGINE MOUNT PLATE
1/4" SHEET-PRESTONE COOLER
1/2" X 3/8" HAI
1/4" SQ.-CROSS
BLIND NUTS
1/8" SHEET
1/4" SHEET-COVERING SUPPORT
1/2" X 3/8" HARDWOOD MOUNTS
OIL DRAIN HOLE
3/8" SHEET-LANDING GEAR FAIRING
1/4" PLYWOOD-GEAR MOUNT WITH 1/16" PLYWOOD ON TOP FOR ADDITIONAL STRENGTH
AUXILIARY FUEL TANK OUTLINE-SEE SHEET 3 FOR DETAILS
1/2" ROCKET TUBES-FOR ENGINE COOLING
WHEEL PANT (TOP VIEW IS SAME AS SIDE VIEW)
SCALE PROPELLER DIAMETER: 12 3/8" (USE FOR STATIC DISPLAY PURPOSES ONLY)
NOTE: SOME PORTIONS OF THE LEFT FUSELAGE SIDE ARE NOT SHOWN IN THIS VIEW, IN ORDER TO CLARIFY FUSELAGE INTERIOR DETAILS.
3 1/4" WHEEL



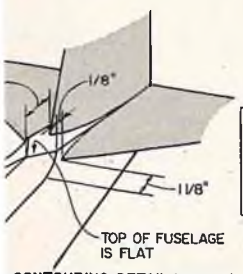
STABILIZER / ELEVATOR DETAILS



NOTE: AFTER TAIL PIECES ARE CONSTRUCTED, SAND TO INDICATED TAPER AND AIRFOIL



NOTE: ALL WOOD IS BALSA UNLESS NOTED OTHERWISE



CONTOURING DETAIL (NO SCALE)

INCIDENCE DATA	
STABILIZER	- 0° (REFERENCE)
TOP WING	- 2° NEGATIVE
BOTTOM WING	- 2° NEGATIVE
ENGINE	- 1° NEGATIVE

ADDITIONAL SCALE REFERENCES
(1) PETER WESTBURG-(DRAWINGS), W. WYLAM
(2) PROFILE PUBLICATIONS - BOOKLET NO. 45

SCALE: 1.6" = 1'-0"

CURTISS P-6E HAWK

A .35-45 CU. IN. POWERED SPORT SCALE DESIGN

DESIGNED & DRAWN BY BOB RICH

PLANS BY Bob Richie

0 1 2 3 4 5 6

SHEET 1 OF 3

PLAN NO. 836 ③

the cowl of fiberglass by using the block to make a female mold. By making the cowl blocks slightly undersize, the Hobbypoxy Easy Does It method will work well.

I prefer having the mold so if I make a goof I haven't lost anything but the fiberglass cowl and I can replace that easily. Besides if a friend is making the model too, you can share the mold or you can sell him a cowl.

Don't add the fuselage bottom sheeting until the lower wing has been fit into place and mounted.

Wings:

The wing construction is not the usual run of the mill method --- it's a lot easier.

I don't like to plot a lot of airfoils and cut all of the ribs so if you follow the same procedure it will be as easy for you as it was for me. Following the instructions here will help.

Now you have a momentous decision to make.

The rib location on the plan are for sport flying and loose sport scale. For more scale appearance the extra ribs can be added at the locations marked for the scallops on the trailing edges and in-between the wide spaced ribs on the upper wing where the ailerons are.

On the second plane the extra ribs were added after the construction photos were taken and it definitely adds to the scale appearance.

Don't get all shook up because your construction doesn't look exactly like some of the photos. Some improvements were made in the drawings after the photos were taken. You know the old saying, "**Plan ahead.**"

For the lower wing, trace and cut out the 1/8" balsa ribs and the base ribs. It's better if you use plywood for the base rib pattern as it doesn't sand as easy as balsa.

Lay out the leading edges, trailing edges, and spars on the plans. Don't forget to trim the spar ends as shown on the plans. Do not glue the pieces together at the dihedral break.

Glue the 1/8" balsa ribs in place. Tack glue the base ribs in place if you used plywood, they will be removed later and be replaced with balsa ribs.

Glue the balsa tip pieces together and glue them to the leading edges, trailing edges, and spar. Raise the front of the tip piece 1/8" so it will be in the center of the finished leading edge.

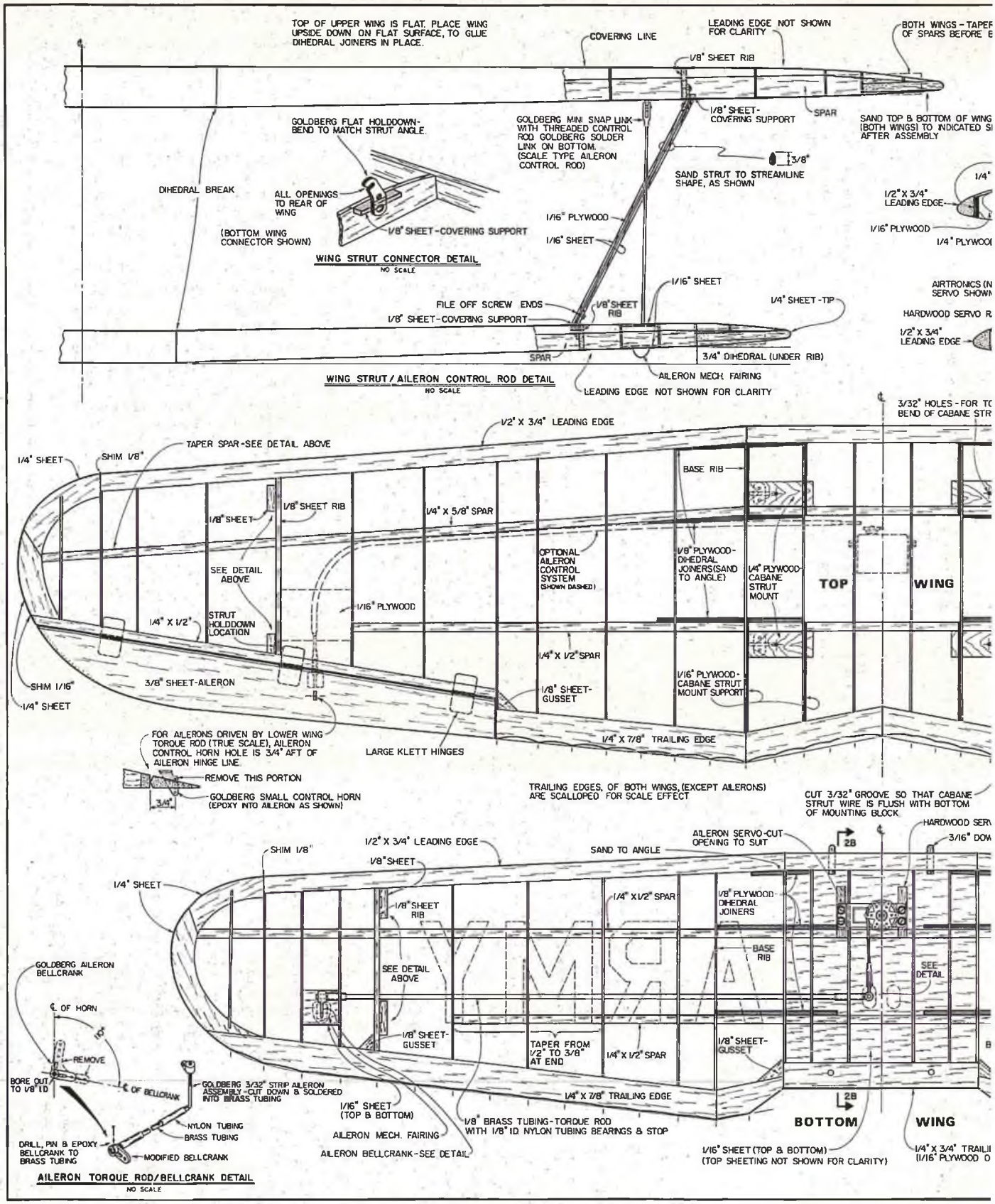
For the outer panels, cut pieces of 1/16" sheet balsa to each rib length, oversize to the rib depth. Notch the rib pieces for the spars and glue in place.

For the lower wing center section, use the rib pattern on the fuselage side view.

Don't forget to raise the center section ribs 1/16" off the plans with scrap. That's to allow for the bottom planking.

Do not put the ribs in at the dihedral break. They go in after the wing sections are joined.

By using the 1/8" balsa rib and the plywood base rib as a guide, carefully sand



the outer panel rib pieces to the proper airfoil. Use a sanding bar or make a long flat sanding block. Don't sand the guide ribs as that would change the airfoil. A piece of Color Stripe striping tape over the guide ribs will make it easier to keep from sanding too far.

Remove the plywood base ribs and replace them with balsa rib pieces.

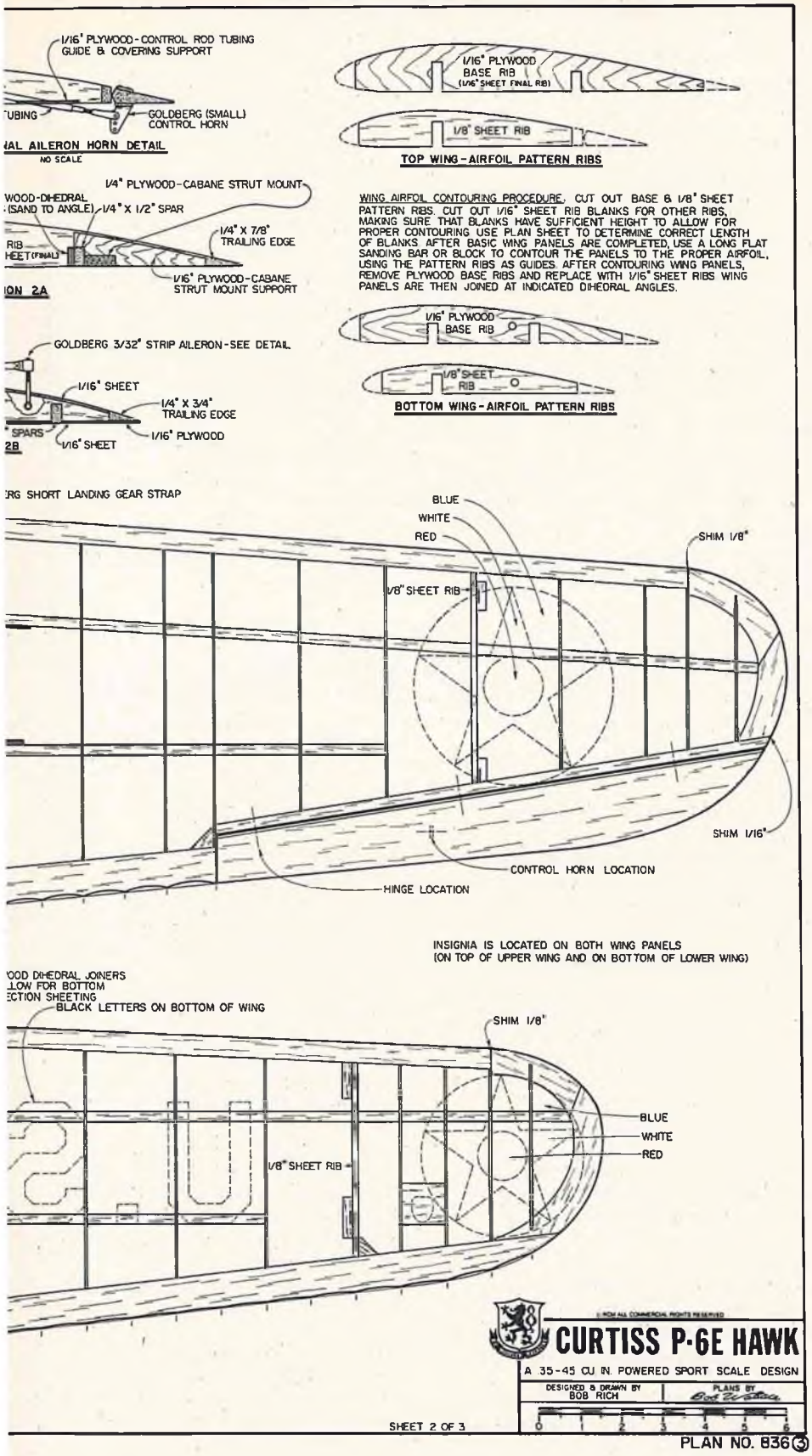
Cut the holes in the ribs of the outer panels and the center section and put the aileron torque rods in place before joining the center section and outer panels.

Don't forget the dihedral angle when cutting the torque rod holes in the center section ribs.

Join the outer panels to the center section at the proper dihedral angle and glue the 1/8" ply wing joiners in place.

Install the rib at the dihedral break and plank the top of the center section with

FULL SIZE PLANS AVAILABLE — SEE PAGE 191



1/16" sheet balsa.

Fit the wing to the fuselage.

Install the wing dowels and hardwood mounting blocks.

Plank the bottom of the wing center section.

Now wasn't that simple?

The top wing is made using the same technique, but with a change in setting the dihedral.

When the center section and the outer panels have been sanded to the proper airfoil, lay the sections upside down on a flat surface.

Glue the sections together and install the plywood joiners.

The top of the upper wing is flat when the wing is right side up.

Install the wing cabane mounting blocks and reinforcements in the center section area.

Carefully bend the Goldberg flat hold-downs as shown on the plans to the strut angle. With Super Jet and screws, install them on the bottom of the top wing and on the top of the bottom wing at the exact locations shown.

All of the hold-down openings are toward the trailing edges.

Add the 1/8" balsa covering supports around the hold-downs.

Tail:

Lay out the leading edges, trailing edges, fin and rudder posts and tip pieces on the plans. Don't forget to raise the leading edges, trailing edges and tips with 1/16" scrap balsa.

Cut the 1/16" x 3/8" rib pieces to length.

The fin ribs have a slot for the 1/8" square balsa which is put in before the ribs are glued in place.

Add the false ribs.

The elevator and stab are made the same way as the fin and rudder.

Join the elevator pieces with the 3/32" wire.

When everything is set up, tack glue or pin the fin to the rudder and the elevators to the stab.

Carefully sand them to the correct taper, then sand the ribs to the airfoil.

Glue the stab and fin to the fuselage.

If you are going to make the tail detail scale, build it up from scrap balsa, filler and sand to shape. See the perspective drawing on the plan for scale detail.

If you aren't going that far into scale, add the balsa pieces to conform to the rear turtledeck shape.

The wheel pants may be made from balsa blocks and hollowed, or laminated sheet balsa.

If you have access to a lathe, or fix up your Moto Tool as a lathe, it's easy to turn them out. The shape of the pants is the same on the top and side views.

Again, I prefer to make a mold and lay them up out of fiberglass.

I made the engine cooling tubes from 1/2" rocket body tubes. You could use aluminum tubing or wrap your own with paper.

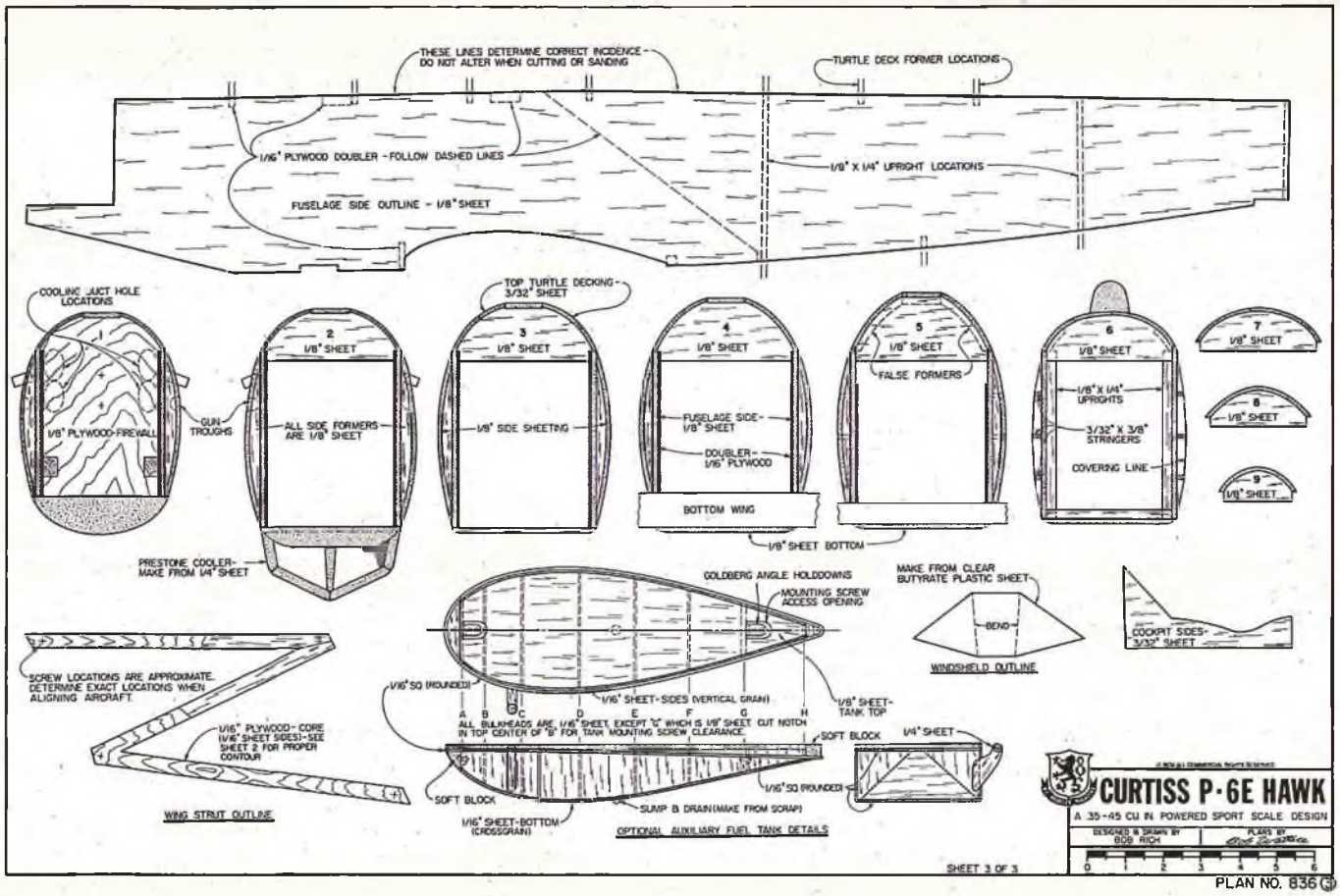
The rocket tubes are light, easy to use and reasonably priced so I took the easy way out.

Be sure to fuelproof the inside of the tubes.

Finishing:

Use some care here also, don't go overboard on the paint and finishing and end up with a very heavy airplane. Remember a feather flys better than a brick.

The first model was covered entirely with MonoKote and the results were very good.



The second one was covered with Permagloss Coverite to get the fabric effect on the surfaces. The Coverite is easy to use and gives a good scale appearance but, because it is necessary to paint the model to get the scale colors, I would recommend using Silkspun or Super Coverite instead of Permagloss if you go that way. It would be a weight savings. Top Flite's new FabriKote would also be a good choice. The second model was sprayed with Aerogloss dope to get the desired colors.

This was my first attempt at using Coverite. The only problem I had was overcome when I followed the instructions. Doesn't that sound familiar?

The P-6E's were finished in a variety of color schemes, but I think the Snow Owl trim is the most attractive.

When choosing your colors match your presentation if you are going to enter Sport Scale competition. There are several variations of olive drab by the paint manufacturers so choose the correct one or mix your own.

Also match the Snow Owl to your presentation as there were several different Snow Owls used by the same squadron.

Add the details to your model as you see fit. The inspection panels, shell ejection chutes, gun cover, wires, etc., do add scale points.

The MonoKote covered plane weighs 4½ pounds. With the changes in the second model and the painted finish, your plane should be just about 5 pounds. If you have used a little care in choosing your wood, building and finishing, anything under 5 lbs. is a plus.

Both planes use a Du-Bro muffler, cut off. On the second plane the muffler was filed so it sloped down to exit the cowl in the gun trough. With the variety of mufflers available, you have a wide choice and it could be completely hidden.

By making the muffler hole in the cowl oversize, you allow more air to exit giving better engine cooling. Every little bit helps.

There is no need to go into detail on the radio installation, you probably have your favorite method anyway. Just use the radio installation to get the balance as marked on the plans.

Putting the switch and charging jack in the cockpit floor keeps them out of the way and they don't spoil the fuselage lines.

Flying:

If your ailerons are controlled by torque rods in the lower wing, the wing struts must be in place when flying. It's a good idea to use them anyway as they add to the strength of the wings.

The model had no bad characteristics at all, it was a real pleasure to fly after the minor changes were made.

But like all tail-draggers it does require a little technique for good take-offs and landings. A recent RCM had a good article on tail-draggers and it is recommended reading if this is your first one.

The ailerons are effective and I would recommend not more than 1/4" up and down at the inboard end of the ailerons on your first flights.

Important: Don't fudge on the balance point and make it tail heavy. It's easy to move the balance point back to suit your flying. If it's too far back to start, you may never get the chance to move it forward without some major repairs.

The Goldberg Precision Balancer is a worthwhile tool to get the balance in the correct position.

When flying with the cowl in place, you will need some wire extensions for the glow plug. A little ingenuity here can make them inconspicuous.

On your first flights leave the cowl off. You don't want to worry about engine overheating while getting it trimmed out.

Keep your first flights fairly high so if any quirks show up you have plenty of altitude to get out of trouble.

Our first flights held no surprises except for how well it flew when trimmed correctly.

A little Scuff Guard judiciously placed on the front of the wheel pants and under the cowl will help just in case it should nose-over accidentally. Most flyers don't do that on purpose.

After it's trimmed out, put the cowl on and check for engine overheating. Enlarge the cooling holes if necessary. Remember you need quite a bit more area for the air to escape than to enter for good cooling.

I hope you get as much pleasure out of building and flying your P-6E as I have mine. □

FLYING LOWE

Don Lowe

For those of you who have been following my ramblings, you know that last time we talked about trimming your pride and joy for super tracking loops. I hope I didn't confuse you more than I helped. Basically, if we trim the aircraft for good loops and good rolls then we've got the problem solved. Most of our maneuvers are combinations of loops and rolls. Some special maneuvers such as wing-overs, spins, and snap rolls will require special treatment.

Let me emphasize again, that the total package is important, i.e., you can't properly trim without an airplane that's straight and without warps and a radio system that is **first class** in performance. Let's amplify a little on the latter. If you have a drifting, noisy, or large dead band servo on rudder or aileron — forget it. And the problem may not be the servo — it could be the control box and the control pot on the stick. The servos must track the stick absolutely with almost zero dead band and without jittery operation. They should be quick and strong. Use the highest torque, fastest, tightest servos that you can squeeze into the beast on the three axes, i.e., aileron, elevator and rudder. The servos **cannot be too fast** as long as they track and damp well. A quick servo will give you a **much better** control feel, and **will not** feel sensitive. Essentially, the servo should be much quicker than the natural roll, pitch and yaw rates of the aircraft. A slow servo will give you a "wandering" feeling especially on the roll axis (aileron). The roll axis is by far the most sensitive to servo speed since the aircraft is capable of rolling much faster than it pitches or yaws. It's also important that the wing be kept fairly light so that the reduced roll moment of inertia, coupled with a quick, tight servo, will permit better damping and more precise response in roll.

It's important that you keep the control system in first class shape. You must insure that the servos, especially, have not developed noisy operation due to feedback pot wear. Your biggest maintenance challenge will involve keeping the servos working properly. A wandering servo will drive you crazy trying to keep the ship in trim. It takes an almost imperceptible servo drift to completely destroy your wonderful trimming job. If you intend to become a serious pattern competitor, you must learn how to care for and maintain your servos or have an inexhaustable supply of new good ones.

Okay, let's talk a bit about roll trimming. First of all, the ship will roll best with an **aft** C.G. This is primarily true since the least pitch trim change while rolling is required to keep it level. Let me explain. Longitudinal stability is accomplished by balancing the ship so that the center of lift is behind the C.G. This being true, the stab is trimmed to lift **down** to counter the wing down pitching moment. Moving the C.G. closer to the center of lift reduces the stab trim required to maintain level flight. It also makes the elevator control more sensitive and reduces elevator travel required to trim. Moving the C.G. even further back would create an unstable condition in which the ship would trim hands-off in any pitch attitude commanded and might even diverge; i.e., continue to pitch in the direction commanded after return of the elevator to neutral. This is **no good** and is a very uncomfortable and dangerous trim condition. So a compromise is struck between stability and maneuverability. In any event, you don't want to have to pump the stick all over the box while rolling, and you want a trim condition in which the aircraft will not rapidly pitch up or down on its own as it is rolled. To explain a little further --- with the C.G. and center of lift very close, the ship is almost neutrally stable and will tend to stay in the attitude or trim condition commanded when the stick is neutralized. This means that the ship will tend to pitch very slowly on its own as it is rolled. This further improves the roll axiality and lessens the elevator trim required. I know this sounds complicated (and it is); just accept the fact that you will be able to perform much better rolls easier with the **aft** C.G.

Okay, make **sure** that the wings are absolutely symmetrical, the ailerons are exactly the same size and shape (including trailing edge), have equal throw **and** have an airtight seal to the wing. Also be sure that the ship does not fly in a yaw and that wing incidence, thrust alignment, and stab are all per specs. With all of the above pre-established, the ship will probably roll like its on a string with minimal up and down elevator to keep it level. The ship will roll most axially if rolled fast, so select an aileron deflection that gives three rolls in about five seconds. Use fairly quick rolls at the top of an Immelman turn and, of course fairly high rates are used for point rolls. Of course point rolls and the slow roll is another story and all the controls must be mixed with great precision to perform these maneuvers.

A little added design requirements: in order to roll properly the ship **must** be set-up with minimal and preferably zero control coupling. I'll hasten to explain. As you apply aileron with symmetrical deflection, a bit of adverse yaw (yaw opposite the roll) is generated. Every airplane has this but it is minimal in an aircraft with the right lateral stability, i.e., when you yaw the airplane and it doesn't roll, then you have it! Also when you bank the ship, it should stay in that banked attitude without increasing or decreasing the bank. Also when you yaw the aircraft, it should not pitch. If it does, then you must fight this with elevator in a slow roll, or point roll. We'll say more about this when we describe how to perform these maneuvers.

The best rolling ships also have the thrust line, wing and tail fairly closely aligned, have high directional stability and sufficient forward lateral (fuselage) area to suport the ship in knife edge flight. So, as you can see, the roll character is largely built in. I normally use no aileron differential deflection. Sometimes it will help to add a bit of differential usually a few degrees more of up aileron than down aileron to straighten out any adverse yaw encountered with your particular ship. If the ship seems to roll about an axis offset from the centerline, a little more total aileron throw on one aileron may help. If the ship doesn't have completely symmetrical wings and aileron set-up, as previously described, you might encounter this sympton; unsealed ailerons will also cause this. So, step by step the process is roughly this:

(A) Start with an **aft** C.G. and sealed ailerons.

(B) Adjust the throw on low aileron rate for three rolls in five seconds.

(C) If the ship appears to corkscrew through the air, try a little differential (more up than down).

(D) If it appears to rotate about an offset axis, make sure the ailerons are sealed and try a difference in aileron throw. You will have to try increasing throw on one side and then the other.

Try a vertical pull and neutralize controls. If the ship pitches up or down, first of all check to be certain that the elevator servo isn't trimming or isn't centering; also be certain that you enter the maneuver trimmed straight and level. If it pitches up or down, try trimming the thrust line up or down to compensate. If the ship pitches up when you remove power for a wing-over, you may be carrying down thrust without realizing it. Essentially, what's happening is the down thrust is holding the nose down and when it's removed the ship will pitch up.

Let's look at special trimming requirements for point and slow rolls. As you perform these maneuvers you will feed in top or opposite rudder to hold the nose up. In the process you don't want the commanded yaw to cross-couple and cause the aircraft to roll or pitch from this command. This makes performance of these maneuvers much more difficult since you

to page 150

ENGINE CLINIC

Clarence Lee

During the twelve years plus that I have been writing the Engine Clinic column I have many times made comments or expressed points of view that I was sure would bring in a large number of letters with different opinions. Strangely enough this very seldom happens. Often when suggesting that the carburetor or design of brand "X" engine leaves a lot to be desired, I anticipate a letter of protest from the manufacturer or importer. I have yet to have a manufacturer or importer take me to task for something I may have said detrimental to their product. Occasionally an individual will be come irate and let me know if he thinks I am degrading his pride and joy even though my answer is in reply to another individual who has been having problems.

However, occasionally I will give what I believe to be a straightforward answer to a modeler's problem --- an answer I do not give a second thought to at the time of writing and I will receive a barrage of letters over some technical point in the answer. The most memorable being the article I did some year's back regarding torque and how we measure the horsepower of our model engines. I mentioned in the text that torque was the culprit that causes our airplanes to go left on take-off. The letters came in for three months following this as to it not being torque at all but spiral slipstream, gyroscopic precession, "P" effect, etc., etc. But that was buried long ago guys so please any of you new readers to the column who missed the original go around, don't start firing in the letters again on this topic.

What this is all building up to this time is my answer to a modeler's series of questions in the January '81 Engine Clinic. I made the statement that with "light dry" air you could raise the compression ratio of an engine and with "heavy damp" air, lower compression is required. That statement brought in a large number of letters. The following is typical of many that I received.

Dear Mr. Lee,

The following is in reference to your reply to a letter from John Montgomery in the January '81 issue of RCM. You made reference to "light dry air" and "heavy moist air." This is a common misconception, moist air is less dense than dry air ("moist" referring to high relative humidity, not "mist" or suspended liquid water).

As far as your actual advice is concerned, you would increase the compression ratio in any situation where the air is less dense than normal. This corresponds to increases in altitude, temperature and higher humidity. I do not know anything about tuned pipes, except what I read in your column, so I don't know which way you would adjust the pipe for moist air.

In closing, I would like to say that, although I fly only R/C sailplanes, I regularly read and enjoy your column for my own information.

Sincerely,
Scott Suhr
U.S. Air Force Academy, Colorado

When I made my statement, I wasn't really thinking in terms of actual weight of the air but just using decriptive terms with which I am sure the majority of modelers could associate. After all, the term "heavy" can have meanings other than directly related to weight. Here in Southern California we have "heavy" smog attacks. People who drink or smoke excessively are "heavy" drinkers or smokers, etc. Maybe these are incorrect adjectives but ones that are in common usage. In the case of heavy moist and light dry air, I was only trying to differentiate between the two types that most modelers are familiar with by body feel. The southwestern part of the U.S., particularly Florida, Louisiana, and other gulf coast states, have high temperature/humidity conditions that make the air feel heavy enough to cut with a knife. Those who live there and those who attended the L. Charles Nats. know what I am referring to. The direct opposite is the type of weather found in the less humid and drier western states — particularly Arizona and Nevada. However, you fellows living there in the southeastern part of the U.S. will be glad to know the next time that the temperature hits 100° and the humidity is close to 100% you are actually experiencing "light" (by weight) low density air conditions. And you guys in Arizona actually have "heavy" dense air.

This all comes about due to the fact that a molecule of water has a molecular weight of 18. A molecule of oxygen, 32; and a molecule if nitrogen, 28. The average molecular weight of dry air is 29. So as part of the air is displaced by water (humidity) the average molecular weight of the air becomes less.

Now this is all fine and dandy when it comes to textbook theory, but as far as your "body feel" and model engines are concerned the interpretation is a bit different. I am sure most of the fellows who read my descriptive terms understood what I was saying.

Several fellows who wrote letters were a bit puzzled as to how this does actually affect the performance of model engines. One fellow in particular suggested the addition of water injection in our model engines due to the fact that automobiles run better on rainy days, water injection having been used in fighter type aircraft, and also now being used in automobiles to reduce detonation caused by lower octane gasoline.

Automobile and aircraft type engines benefit from water injection due to the water lowering combustion chamber temperature. Lowering of the combustion chamber temperature helps stop detonation and, in turn, will allow more spark advance. Advancing the timing, in turn, results in more power and better fuel economy.

However, with our model glow ignition engines we run into an entirely different situation. Our glow engines are compression/ignition engines. Actually semi-diesel. Compression pressure, in conjuction with the heat from the glow plug, fires the mixture which is an uncontrolled situation to say the least. The only control over firing of the fuel/air mixture is governed by compression ratio/pressure and fuel additives such as nitro methane. If compression ratio is too high, the fuel mixture fires too soon (pre-ignition) and the engine overheats, loses power, etc. Pre-ignition in a model engine is the "frying egg" sound you have heard — especially if the engine is run too lean.

High humidity affects the performance of our model engines more than any other factor. This is due to the fact that air being a gas is compressible. However, as the water content is increased (higher humidity) the water is not compressible. The engine sees this as increased compression pressure — the same as higher compression. So, as I stated in my original answer in the January issue, if you experience hot, muggy conditions (high humidity) and think of this as "heavy" air although technically it is not, you would lower the compression ratio of the engine. On the other hand, if you are flying in Arizona-type weather conditions, with low humidity, you can raise the compression ratio. Actually with a sport or pattern engine there is little need to do this. When you run high performance engines such as Formula I aircraft and racing boats you can improve engine performance by raising or lowering the compression ratio. This is most generally done by adding or removing head shims.

Although humidity is the most important factor affecting a glow engine operation, temperature, air density, and barometric pressure, all play a part. Hot air will hold more moisture than cold air so if the relative humidity is 60% on a hot day, the air contains considerably more water than a 60% reading on a cooler day. The

percentage reading is the amount of water in the air versus what it can actually hold.

Air density at sea level also affects the performance, but not to the extent that high humidity does. Naturally with high humidity you do have lower air density. Air density seems to affect aircraft lift and propeller bite more than actual engine performance. As you increase elevation, the air becomes less dense so you would increase the compression ratio. However, you are also experiencing a loss of oxygen affecting engine power and there is no way to compensate for this. At higher elevation you have to use larger engines and lighter aircraft.

I think that pretty well covers this heavy/light, moist/dry air bit so let's get on with some letters.

Dear Mr. Lee:

I am experiencing an engine/fuel system quirk that I and my local friendly neighborhood experts have not witnessed heretofore and that is the following:

I am running a Super Tigre .46 with Robart pump and Auto-Mix in a twenty-eight year old, highly modified Sterling Piper Tri-Pacer (which flies just great). However, when each flight is terminated, the fuel is seen to boil and spray out of the carburetor and fill the crankcase as if the fuel tank is pressurized. The tank, by the way, is an oval Sullivan and sits directly behind the engine, well within the tolerance limits of the carburetor. The fuel system also includes a Robart Ultra-Fueler which (when after the flight) is turned to the fueling position, spits fuel which would also indicate that the tank is pressurized.

Although this condition has not affected the aircraft in flight, it sure is curious. We have, by the way, tried every and anything to stop it, but as yet to no avail.

Your help on this will be greatly appreciated.

Yours sincerely,
John H. Trought
Clute, Texas

John, assuming that you have the pressure line from the engine connected to the pressure fitting on the Robart pump, there is only one other way the fuel tank could become pressurized --- there is a pin hole or leak in the pump diaphragm that is allowing engine crankcase pressure to pass through the pump into the tank. Send the unit to Robart for service.

Dear Mr. Lee,

My son and I have a Webra Speed .20 which we flew in a "Miss Dara" built for just fun flying and burning up the sky.

A few tanks of fuel were bench run through this engine to get the feel of it. Installed in the plane, the result was a real groovy screamer — but it didn't last long. She stopped dead throwing the prop and an $8.00 "Slim Jim" Fox spinner. My son landed okay.

Inspection revealed a chunk of aluminum in the engine jamming the rotating parts. The engine was shipped back to MRC for repairs. The problem turned out to be that half of the bottom end of the con rod broke off. As you know the oiling provisions for the rod is a saw slot halfway through the bearing surface.

This is the first engine I've ever seen with that set-up. It seems a hole or two would suffice without weakening the rod so much. We were using a 15% nitro fuel (8/6 prop).

The above info is to give you a little history of the engine leading to my real question, which is this: What can I do to the carb to come up with a reliable mid-range run? If the carb is adjusted for proper high speed and idle, she seems to be over-rich in mid-range and quickly dies. I've tried all kinds of carb adjustments — but always the same thing. I suppose a Perry carb would solve that problem but I still can't imagine an expensive engine like the Webra not having a well-engineered fuel system.

Any information on this engine and carb would be very much appreciated.

Sincerely,
Robert M. Knight
Bristol, Indiana

The carburetor on the Webra .20 is pretty basic in operation and does leave something to be desired in the way of idle and acceleration. However, I think your main problem comes from using an 8/6 prop. An 8/6 just does not have enough flywheel action. You would achieve a much better idle with a 9/4 or 9/5. Of course you will not move quite as fast but would probably experience better overall performance in climbing maneuvers, etc.

You did not say what you are using for fuel as far as brand name. When fellows omit the name I usually guess it is home brew or a club mix. Oftentimes this can be the source of idle and acceleration problems. Try a good name brand fuel. K & B, Duke's, Cool Power, etc. Also be sure to use an idle bar glow plug.

If after a fuel and plug change, and the use of a larger propeller, you still have trouble then I would recommend installing a Perry carburetor.

Dear Mr. Lee,

My adventures in building and flying model airplanes goes back to the time of the adventures of Phineas Pinkham in Flying Aces magazine. I've read a lot of modeling magazines over the years and I've enjoyed your excellent column in R/C Modeler. But somewhere along the way I've missed the articles that mentioned fuel line sizes. Before I retired and moved away from the urban areas, I simply went to my local hobby shop and said, "Joe, I need two feet of fuel tubing for a .50 I'm putting in my Groundhog." And Joe cut off a piece of tubing from the proper spool . . at least I'm assuming Joe cut from the proper spool.

Now that I live a bunch of miles from a hobby shop and send to a mail-order house for my supplies, I have to assume that where the choice is simply small, medium and large, I would use large tubing for my new Webra Blackhead .61, but one manufacturer gives us a choice of I.D.'s and I believe the largest I.D. would be too big for the .61. How critical is tubing size to keeping an engine running well and happy? Is there a rule-of-thumb for tubing size to engine displacement?

Thank you for your courtesy and patience.

Very truly yours,
Ken Young
Morresville, North Carolina

Most fuel line manufacturers still offer their fuel line in small, medium, and large. The small being intended for the 1/2A engines, medium for anything from a .15 through .60, and large for the really big engines. You do not want the fuel line I.D. to be any larger than necessary. If you can get the engine to run rich at top speed with the needle valve backed out three or four turns, then the fuel line I.D. is okay. If you can't get the engine to richen up then you may need larger line.

If you were to fill a soda straw and a larger piece of tubing with water, then hold them vertically with your finger over the ends, the water would remain in the straw and run out of the larger diameter tubing. The same thing happens with fuel line. If too large a diameter is used for the amount of fuel draw the engine has, the fuel can run back to the tank during any vertical maneuvers.

99% of the time you should use medium size fuel line for a .60 size engine. Exceptions here would be U-control speed, and boats used for racing where large volume fuel flow is required.

Dear Mr. Lee:

I am hoping to become involved in model boat competition soon and have a couple of questions for you.

I have seen many pictures of boats and I have noticed that most do not have any cowling for the engine compartment. It is my feeling that the addition of a full cowl (removable of course) would streamline a boat and add a bit of speed. Would the cowling cause the engine to overheat even with the water jacket or is the jacket a secondary cooling system. Could the heat problem be helped by adding ducts to the cowl or is the cowl impractical?

Secondly, being an avid racing fan, I realize the importance of an ample supply of fresh air to an engine's performance. Would a 'forced air system,' similar in practice to Pontiac's old 'ram air,' be a help to the breathing capability of a boat engine due to the cooler air supply and the slight supercharging effect provided?

If it is of any help, I hope to run in the Mono class with a .40-.60 size engine. Any advice would be greatly appreciated and well-taken.

Yours truly.
Kevin Freeman
Ontario, Canada

The majority of the cooling for boat engines comes from the water cooled head or, in some cases, a water jacket. Usually the water cooled head is all the cooling that is required. Many fellows do use water

to page 146

RADIO SPECTRUM

Jim Oddino

Many of our readers have expressed a desire to see circuits presented in this column that they can build themselves. Therefore, I'm continually on the lookout for simple circuits that I think might be of interest. I don't think it is practical to print schematics for complete R/C systems because I don't think there are many guys who want to build their own system from scratch. It just isn't economically the way to go unless you have unlimited time and can steal a lot of parts. However, you can save a lot of money by adding your own roll buttons and dual rate circuits, etc., so I have tried to print my ideas on how to go about some of these "do it yourself" projects. This month I've got one that can be used for at least three applications that I can think of, so I'm having a little trouble putting a name on it. If someone can think of a better name and/or some other uses, let us know.

Automatic Rate Changer

There has been a lot of talk about exponential control response over the last couple of years and in most cases the conclusions reached indicate that it aids flying in almost all R/C applications. George Myers recently did a fairly in-depth report in Model Aviation, and everyone he worked with was quite enthused about Expo. Yet I haven't seen any of the top pattern flyers using it and to tell the truth I'm still not sure why. Perhaps it is a case of the circuits not being good enough, or there is some drawback that makes them feel the overall results are not worth it. For instance, I think we can have too many modes and switches as to cause goofs at critical times in a contest. Quite often the "kiss" theory (keep it simple, stupid) is the way to go. If you decide you need low rate, high rate and expo, or various combinations such as high-linear, high-expo, low-linear, and low-expo, then I predict sooner or later you will screw up and be in the wrong mode at the wrong time. Therefore, my idea has been to minimize the number of modes and if at all possible have only one mode so you never have to worry about switch positions.

The various exponential circuits I have tried didn't really give the results I wanted. They were great in Cuban eights and top hats, but screwed up low rate maneuvers such as point rolls. The logical solution was to have low rate linear and high rate exponential. The next problem was one of coming up with a circuit that was stable and symmetrical on both sides of neutral, so it has the same response day after day. Most of the circuits published use diodes whose characteristics change with temperature and I was never completely satisfied. There probably is a solution but I don't think it will be simple. Isotronics has a very stable (and

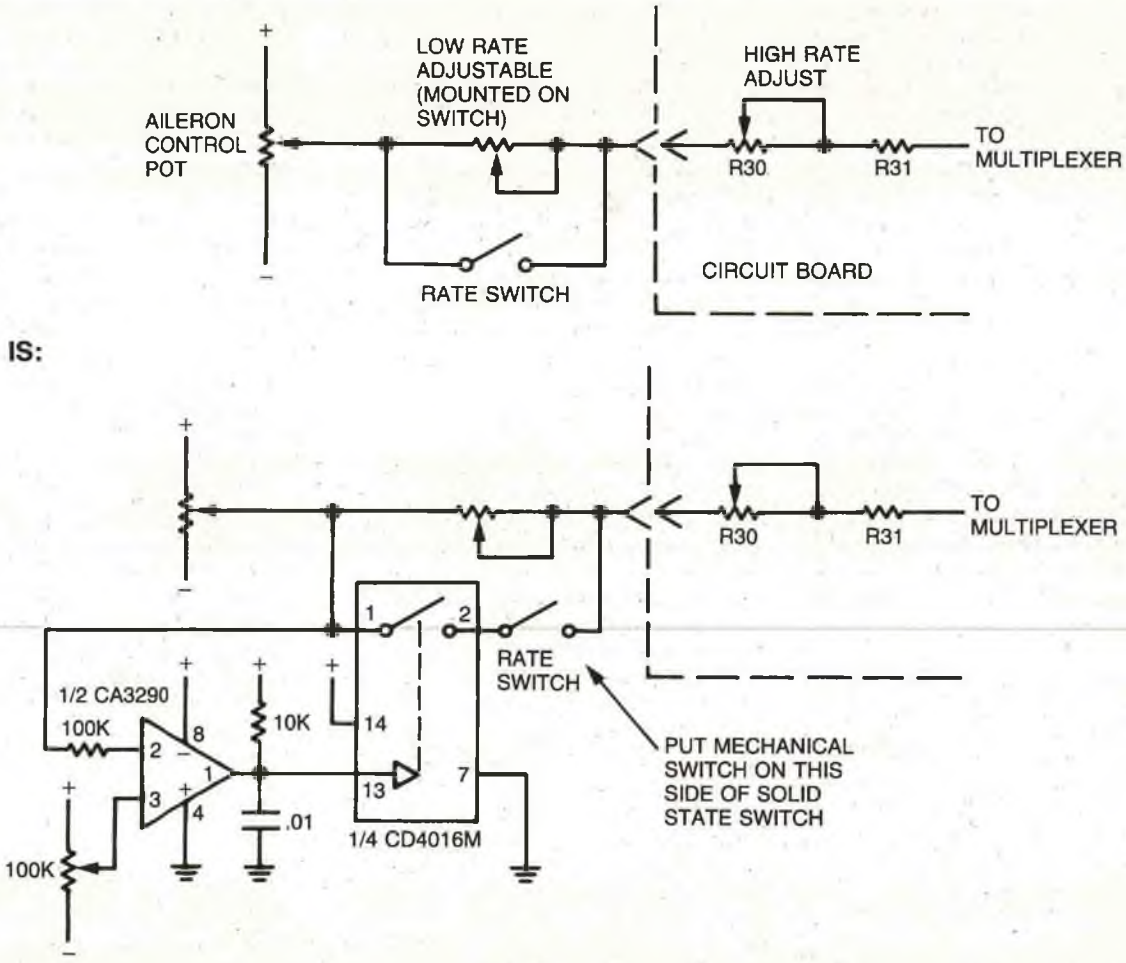


FIGURE 1

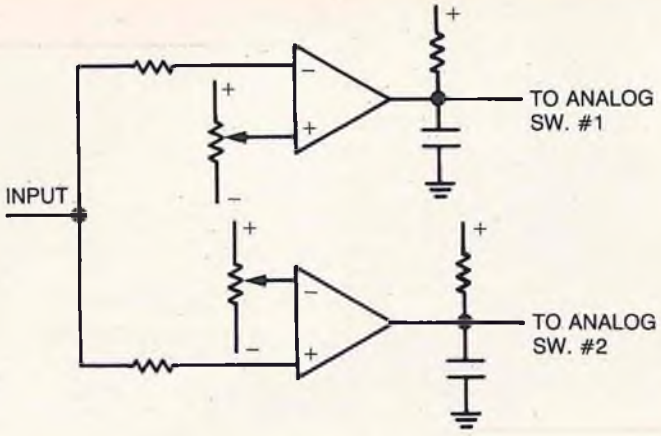


FIGURE 2

complicated) circuit but I wasn't completely satisfied with the shape of the curve. I reviewed the maneuvers in which I use high rate (top hats, vertical rolls, etc.) and decided I really wanted the slope around neutral to be just the same as my low rate and the end point the same as my high rate. The more I thought about it the more I realized that the **only** time I wanted high rate was when I pushed the stick hard over.

After establishing this, the rest was easy. Two integrated circuits and a few discrete parts and I had what I wanted. I haven't been to a contest with it yet but, I'm convinced it is going to help. Not only is it easier to enter a maneuver with the wings level and to keep them level during square corners but the system (including airplane and pilot) seems better damped and the stopping of the rolls is more controllable.

The mechanization I'm going to show is for the Kraft KPS 7C, but it can be used on any system in which you have a pure DC signal coming off the control pot such as those that use the NE 5044 encoder (Ace S/S, Airtronics, etc.). The before and after schematics are shown in Figure 1. The circuit is made up of a comparator and a solid state analog switch. I used 1/2 of a CA 3290 comparator which is probably too expensive. A 1458 or LM 339 ought to do fine.

As shown, when the rate switch is open, the system will be in the conventional low rate mode. If the rate switch is thrown to high (closed) you will still be in low rate until the analog switch closes. This will happen when the comparator changes state. This can be adjusted by means of the 100 K trimmer. I set mine so that it triggers at 95% of the stick travel. As shown, the circuit only functions on right rolls (voltage on control pot goes negative). One could use the other half of the comparator and another switch in the 4016 for left rolls. You must pay attention to the polarities on the comparator. The comparator circuit would look like Figure 2 and of course the analog switches would be wired in parallel.

The chracteristic of this function is shown in Figure 3. It is not very pleasing to see the ailerons jump at the end of the travel but believe me it really works. One could sum in a DC bias at the switch point and change the high rate gain in order to have a more elegant characteristic curve as shown by the dotted line but I don't think you would be able to tell the difference when flying.

I think one could possibly do away with the rate switch completely and fly in this mode all the time. My only worry is that I might hit the stop in a four point and switch to high rate. I don't think I normally do this but to be safe I've got the mechanical rate switch in series with the solid state analog switch just in case. By the way, this circuit will work in transmitters with mechanical trim because the rate circuit has no effect on the neutral trim.

There has been a lot of talk about having the rudder rate switched automatically with the throttle position. In case you haven't noticed, this circuit will do that very nicely. Just connect the input of the comparator to the throttle pot wiper and put the analog switch on the rudder rate citcuit. The other application is to set different rates for up and down or left and right. This would be accomplished by setting the comparator to switch exactly at neutral. (For the newcomer, when we talk about different rates, we really mean different servo throw which results in a different pitch or roll rate.) As I said before, maybe you guys can think of other applications. If so, let us know.

to page 130

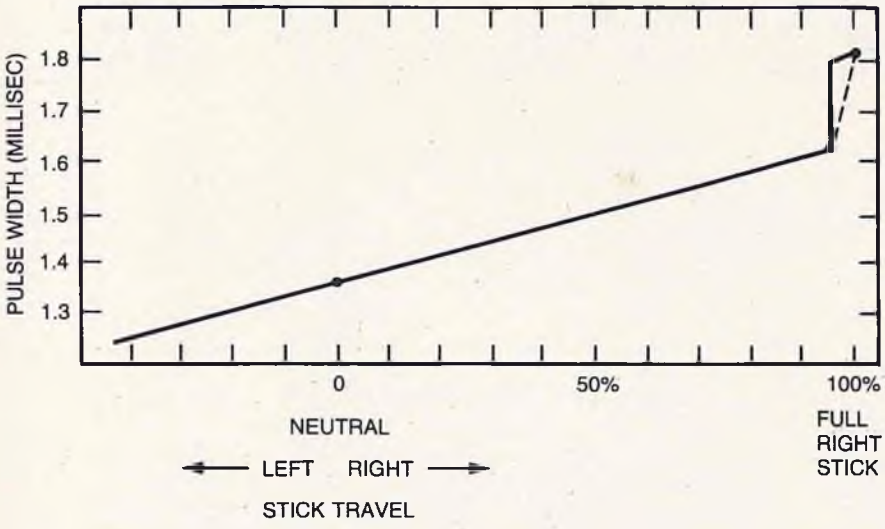


FIGURE 3

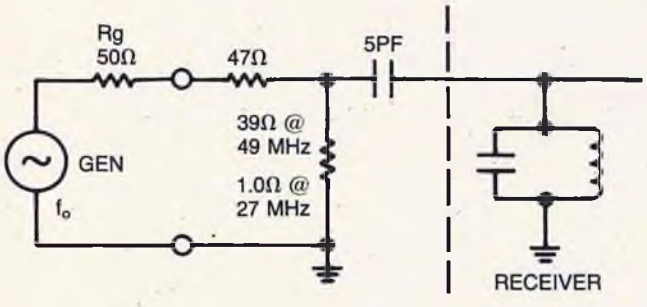


FIGURE 4

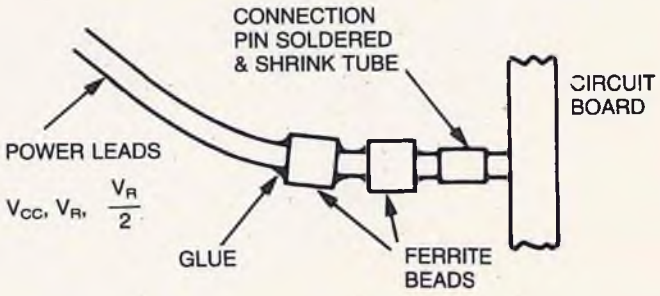
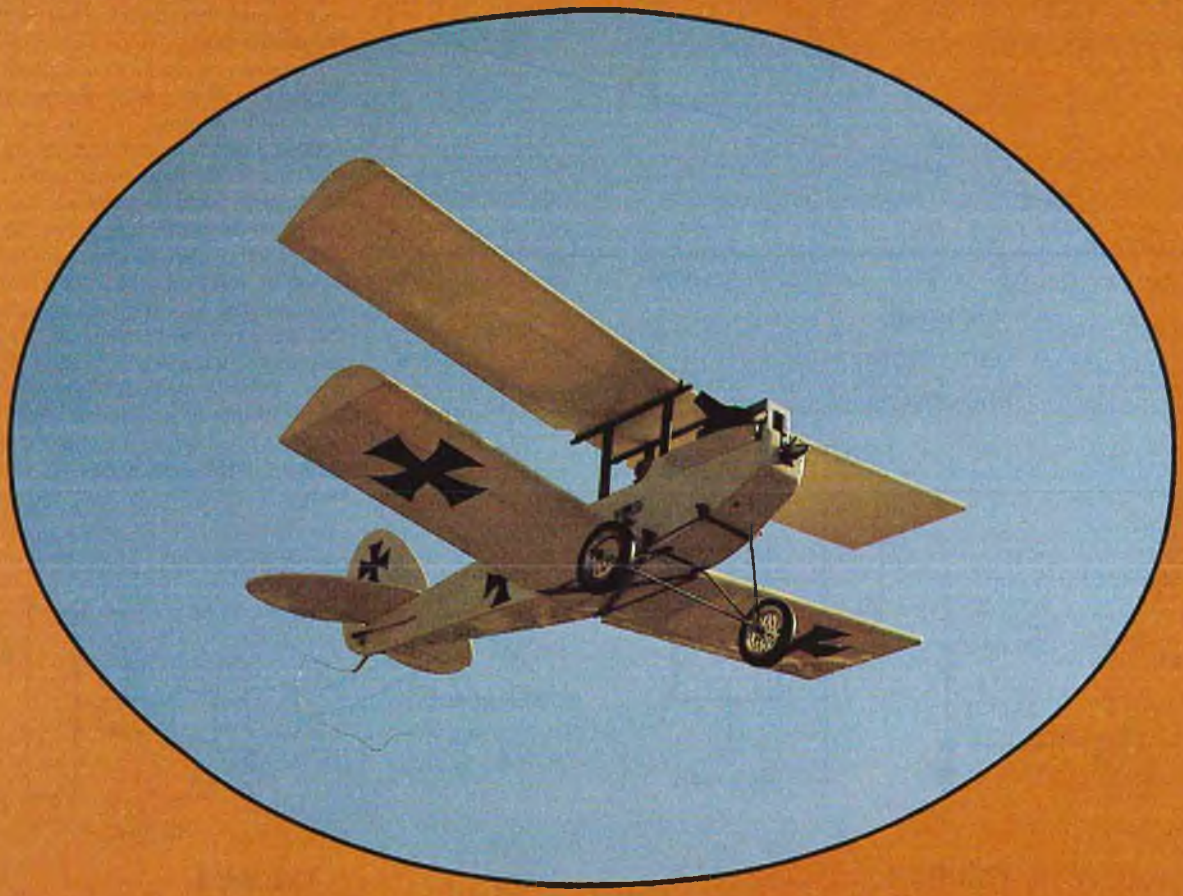


FIGURE 5

DOPPELDECKER



Yes, there is life in Wyoming. From Jackson Hole comes this inexpensive, easy to build little biplane for two or three channels and a .10 size engine.

DOPPELDECKER

Designed By: Fred Reese

TYPE AIRCRAFT
Sport Biplane
WINGSPAN
Top 32 Inches
Bottom 28 Inches
WING CHORD
6"
TOTAL WING AREA
350 Sq. In.
WING LOCATION
Biplane
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
Top 1⅞ Inches
Bottom 1⅝ Inches
O.A. FUSELAGE LENGTH
27 Inches
RADIO COMPARTMENT AREA
(L)6" x (W)2¼" x (H)2¼"
STABILIZER SPAN
11 Inches
STABILIZER CHORD (Incl. elev.)
5 Inches (Avg.)
STABILIZER AREA
55 Sq. In.
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
4¼ Inches
VERTICAL FIN WIDTH (Incl. rudder)
5 Inches (Avg.)
REC. ENGINE SIZE
.09-.10 Cu. In.
FUEL TANK SIZE
2 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
2 Or 3
CONTROL FUNCTIONS
Rud., Elev., Throt, (Opt.)
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply
Wing ..... Balsa, Ply
Empennage ..... Balsa
Wt. Ready To Fly ..... 30 Oz.
Wing Loading ..... 12½ Oz/Sq. Ft.

There are times when one needs a new airplane quickly, like yesterday, or so it seems. Last spring I was faced with this problem. I needed a knockabout airplane for summer flying from a rough site, but only had a couple of weeks to complete the project. I quickly decided on a small two channel biplane for my trusty Cox TD .09 and thought of the old German word for biplane, "doppeldecker." Doppeldecker or double decker sounded fitting and I looked at all of the old German biplanes from WW I. However, I really didn't want to bother with a scale design so I closed the books and made the simplest biplane I could. Only the dummy engine and crosses give a hint that I actually did look at the books. So much for the design philosophy. The head honchos, Don and Dick at RCM, say we designers are supposed to dazzle you with our footwork. So much for dazzle.

But it does fly. In fact, it flys pretty well --- that is, if you like little "buzz around" biplanes. It will loop and roll and spin and keep you amused for quite a while provided you don't try to fly it through trees or fences.

CONSTRUCTION

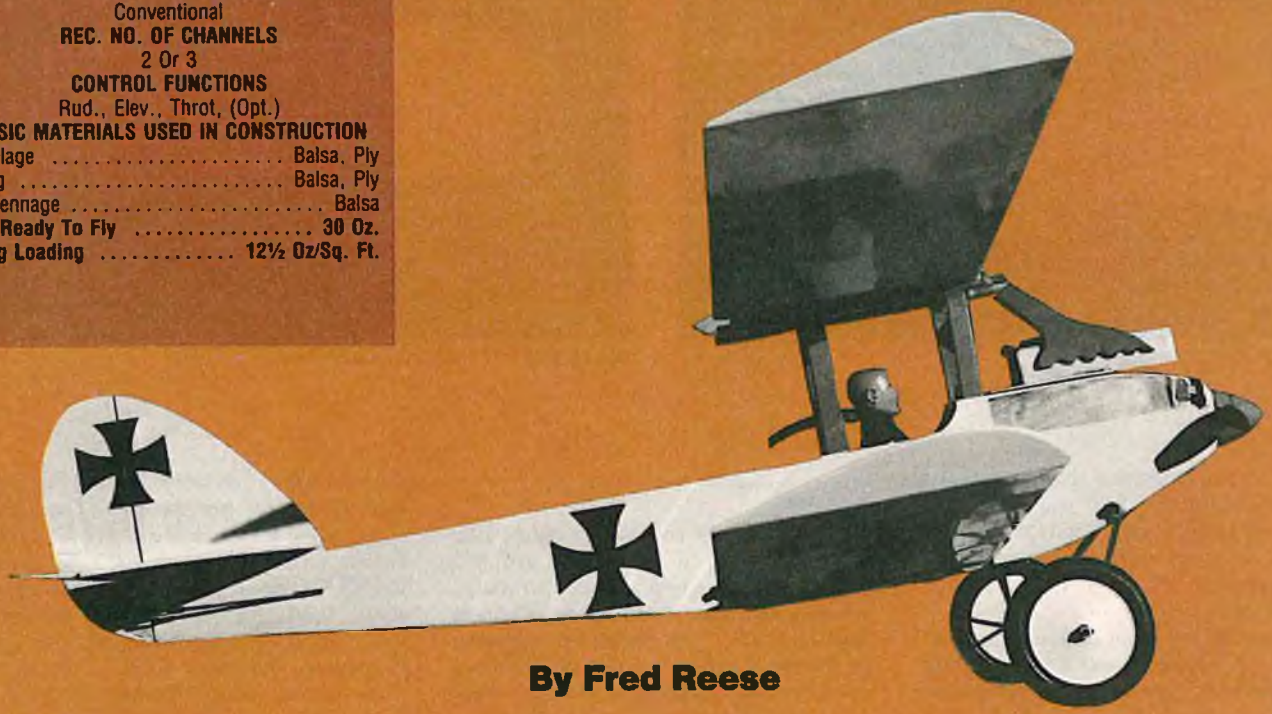
Fuselage:

Make the two fuselage sides F-1 from 3/32" medium balsa and add the vertical grain balsa doublers, shown by the dotted lines on the F-1 part drawing. I used Super Jet for all construction except where I specify epoxy. The fuselage top, F-2, fits between the sides and on top of the doublers. Glue bulkhead F-8 and the forward, straight part of the top, F-2, to one of the fuselage sides. Glue on the other side, pull the tail together and glue. Bend the tail skid wire and laminate it between F-17, F-18, and F-19 (using epoxy), and glue the assembly into the fuselage. Add the bottom, rear 3/32" balsa sheeting. Glue bulkhead F-7 into the fuselage. Glue the firewall, F-5, and the firewall doubler, F-6, together. Bolt the motor mount to the firewall with a 1/16" plywood shim behind left side of motor mount to give the engine 2° right thrust. Epoxy the firewall and the tank floor, F-3, into the fuselage. Add the noseblock, F-4. Glue in the landing gear mount doubler, F-8, and then the 1/16" plywood forward fuselage bottom, F-11. Sand the fuselage for covering and apply a coat of Balsarite to seal the wood and make the covering stick better.

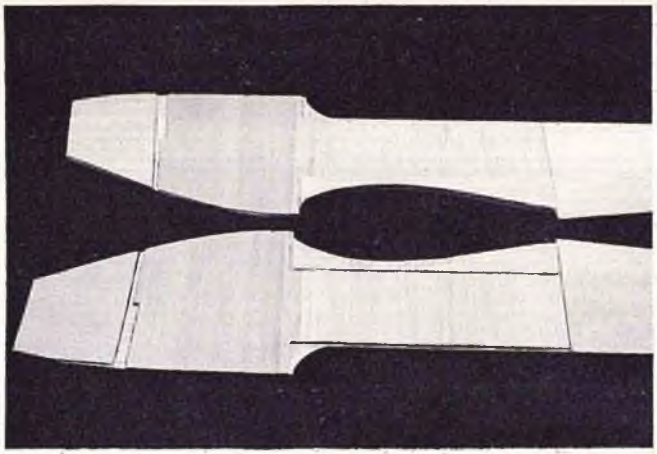
Wings:

Construction of the two wings is the same, except the lower wing is one rib shorter on each side. Lay waxpaper over the plan. Glue the 1/8" x 1/2" spar doubler to the spar and pin it down to the plan. Also pin down the 1" trailing edge and glue in the 1/16" bottom sheeting. Glue all of the ribs in place, angling the center rib for the dihedral joint. Add the 1/4" sq. leading edge and the rest of the bottom center 1/16" sheeting.

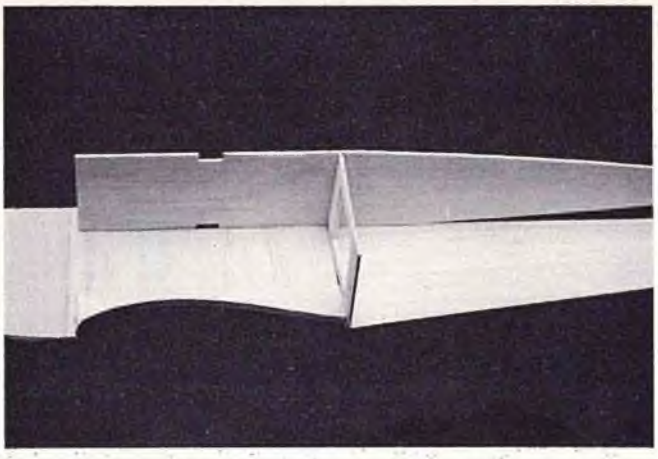
Glue on the wing tips, W-6, using W-5's to get the correct angle. To one side of each wing, glue the plywood spar joiners, W-4, to the wing spar. Add the top 1/16" sheeting to that panel and trim the center. Glue the



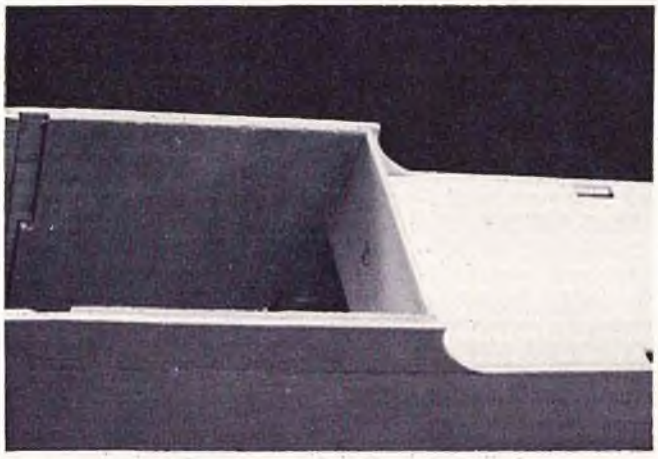
By Fred Reese



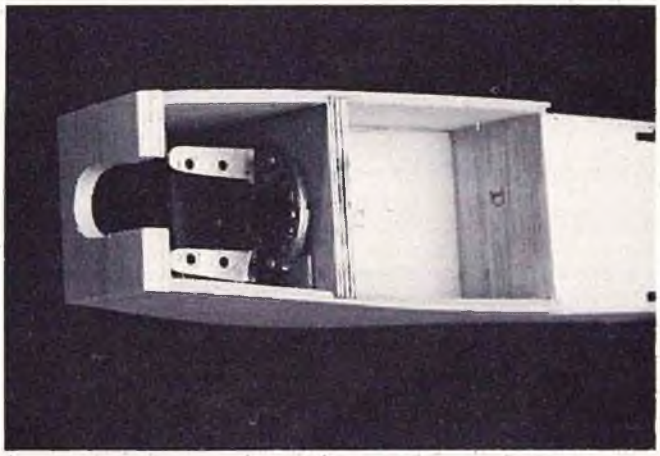
Make the left and right hand fuselage sides with the balsa doublers.



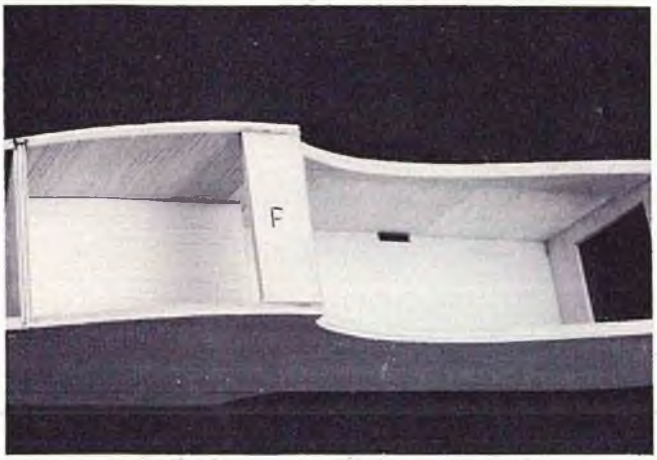
Glue bulkhead F-8 to the right hand side F-1. Glue the top, F-2, to F-1 and the bulkhead.



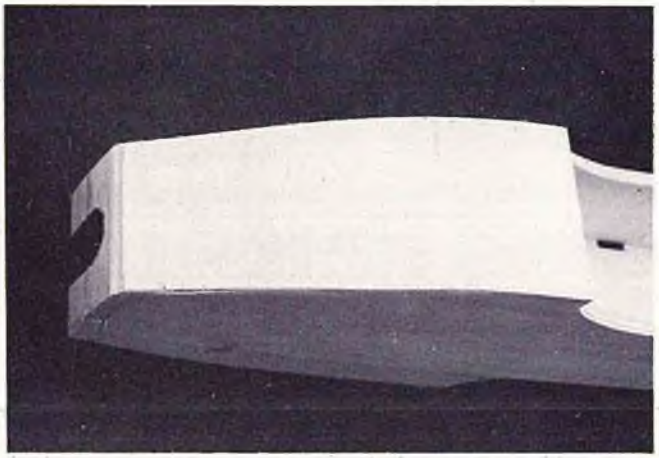
Glue in bulkhead F-7 (marked as D in photo).



Glue firewall F-5, and firewall doubler F-6 together and bolt on the motor mount. Epoxy the firewall and tank floor, F-3, into the fuselage. Add the noseblock, F-4.



Glue in the landing doubler, F-8.



Attach the 1/16" plywood bottom front, F-11.

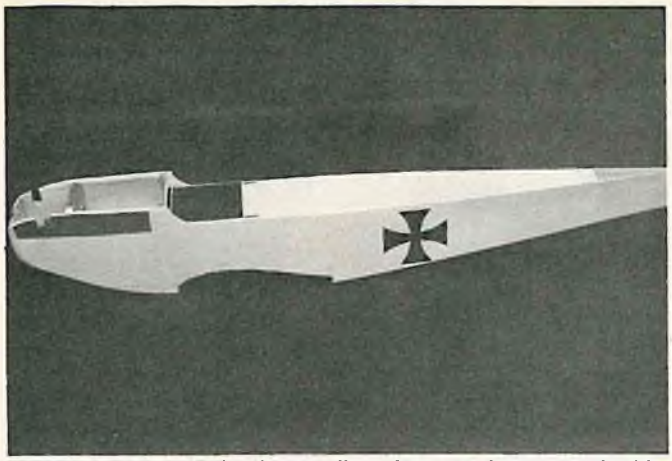
two wing panels together, blocking up each tip of the lower wing 1⅝" and the top wing 1⅞". Add the remaining top 1/16" sheeting and notch the trailing edge for the rubberbands.

Tail Group:

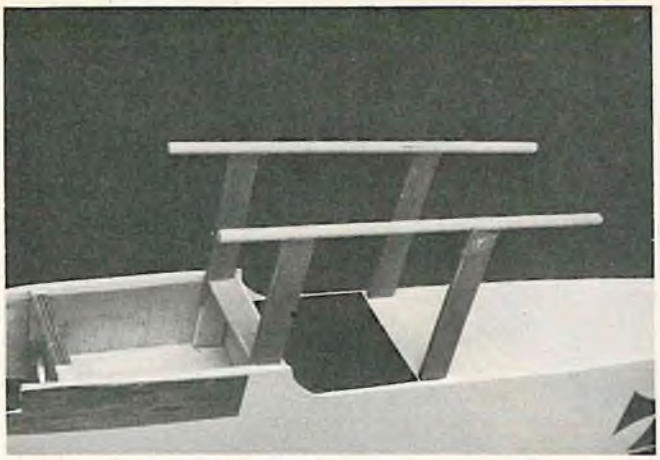
Cut out all of the tail surfaces from 1/8" medium-light sheet. Epoxy the 3/16" dowel to connect the elevator halves. Brush on a coat of Balsarite.

Finishing:

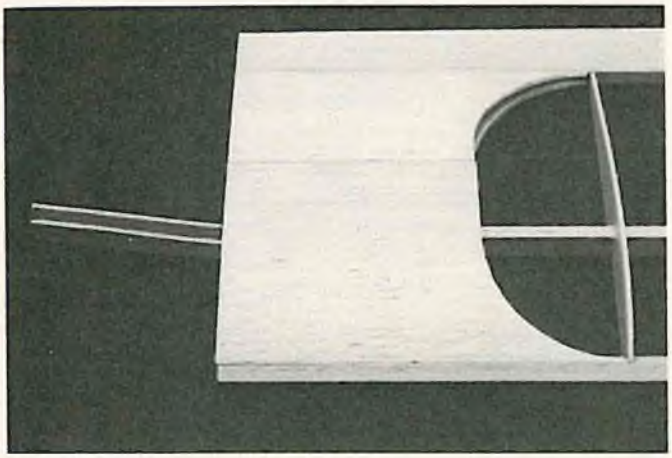
Cover all of the parts with a plastic film covering. I used the cream colored Econokote. A good source for color schemes and other details is the Kenneth Munson series, "The Pocket Encyclopedia of World Aircraft in Color, Fighters 1914-19" and "Bombers 1914-19," from the MacMillan Company. Cut out the trim from MonoKote trim sheets and seal the edges of the trim with Hot Stuff. Glue the cabane struts, F-20 and F-21, into the fuselage. Glue in F-12 between the front struts. Epoxy the 3/16" dowels onto the tops of the struts using Goldberg nylon tape to reinforce the joints. Glue in the other 3/16" dowels through the fuselage for the



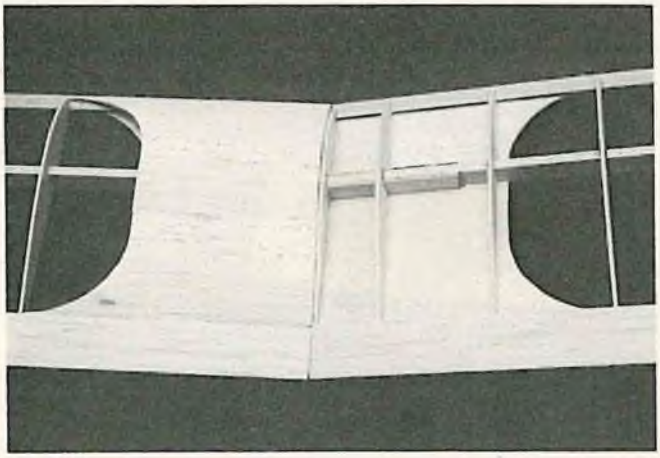
Apply a coat of Balsarite to all surfaces to be covered with iron-on film, then cover before further assembly. Add trim cut from MonoKote trim sheets.



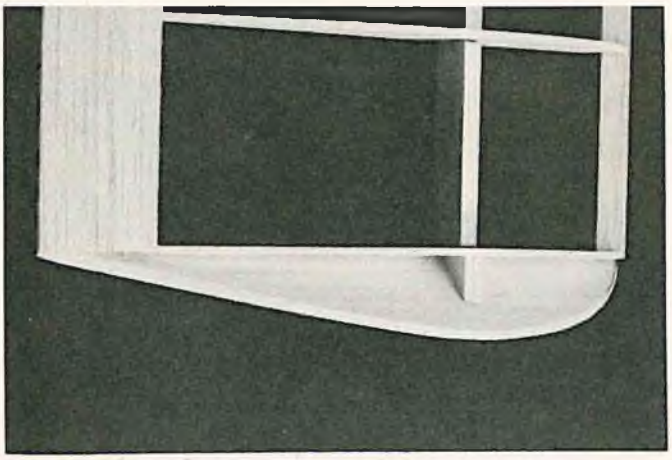
Epoxy the cabane struts, F-20 and F-21, into the fuselage, then epoxy the 3/16" dowels onto the tops of the struts using Goldberg nylon tape to reinforce.



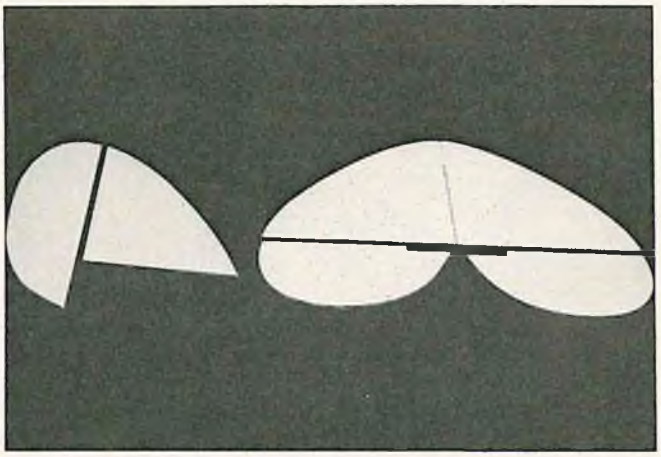
Glue the two spar joiners, W-4, to the wing spar and add the top 1/16" sheeting.



Build the other wing panel except for the top sheeting and epoxy the wing panels together.



Glue on the angle guides, W-5, and the wing tips, W-6.



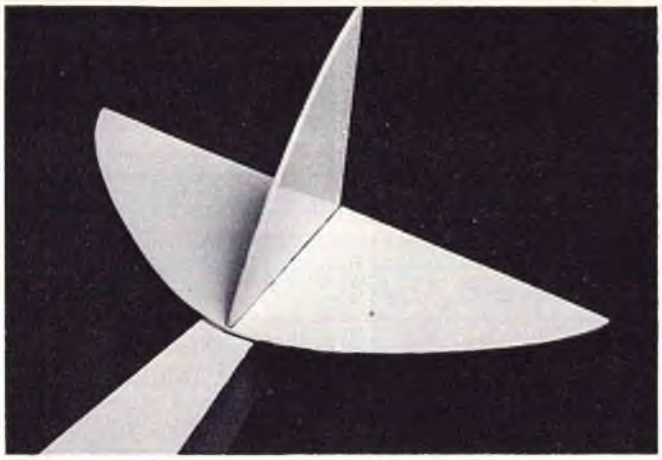
Tail surfaces are made of 1/8 sheet.

bottom wing and the landing gear.

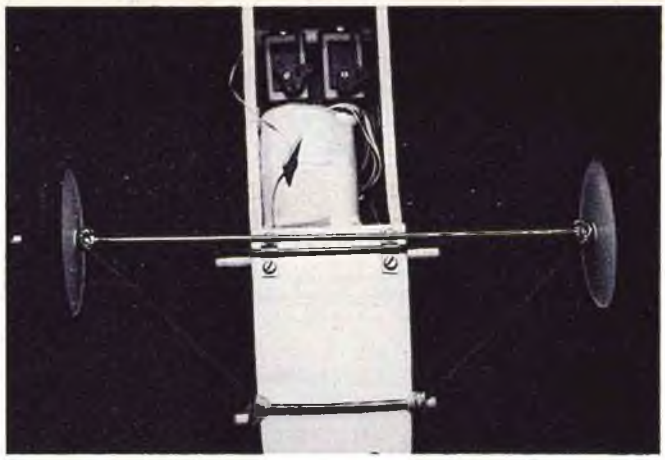
Cut away the covering on the stabilizer so it can be glued to the fuselage, and cut away a 1/8" wide strip on the top for the rudder. Glue the stabilizer to the fuselage, and the rudder to the stabilizer. Hinge the elevator to the stabilizer. Notch the rudder to clear the elevator dowel, then hinge the rudder.

Make the landing gear from 3/32" piano wire. Bind the joints with copper wire and solder. Attach the landing gear to the fuselage with two metal landing gear clips and #4 x 1/2" SM screws in the rear. The front of the landing gear is held to the fuselage with a rubberband around the forward dowel to absorb the landing shocks. Install the radio as shown. There should be room for three servos in the location shown in the plan, but check your servos for width. If you plan to use three servos and they are wider than mine, you will have to make the fuselage wider.

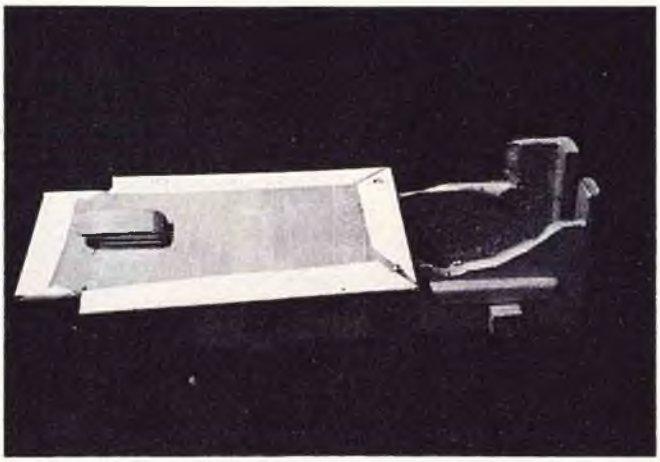
Seal the engine and tank area with epoxy and brush on a coat of fuel proofer in the radio area. Install the engine and the fuel tank. Fit the tank compartment cover and epoxy on the rear catch, F-15 and F-16. This



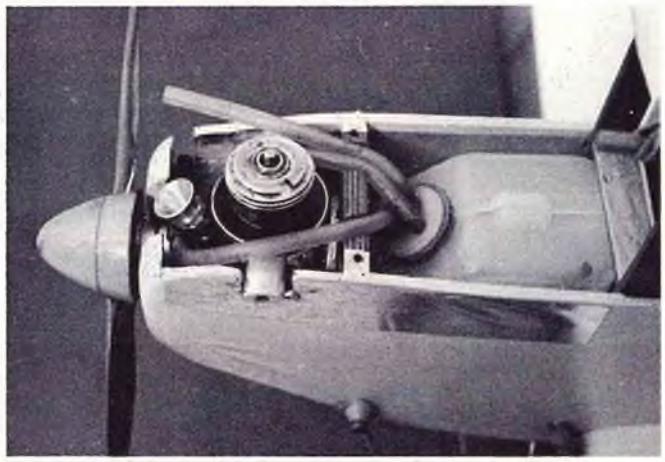
Cut away the covering on the stab for the fin and where the fuselage is to be glued, then glue the stab to the fuselage. Glue the fin in place.



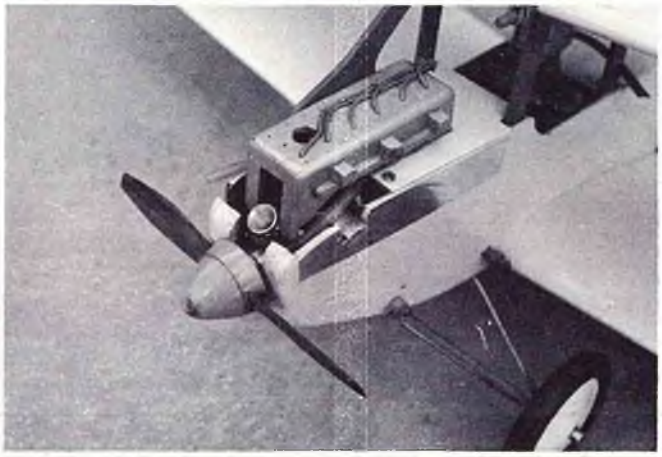
This photo shows landing gear and radio installation.



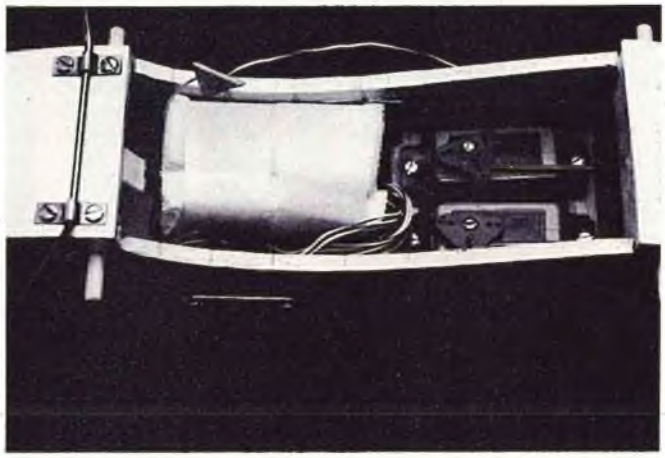
On dummy engine, both ends are open for engine air cooling. To retain hatch, glue rear catch, F-15 and F-16 which hooks under F-12. Front of cover held down with two #4 x 1/2" SM screws.



Install the engine and fuel tank and muffler.



Cox TD .09 is almost completely hidden under the dummy engine. Only the venturi and the pipe from the Cox muffler are visible. The Williams Brothers Vintage wheels, pilot and spinner really dress up the model.



Mount the servos on 3/8" sq. pine cross rails and wrap the receiver and battery in soft foam.

catch holds the rear of the cover down to the crosspiece F-12. The front of the cover is held down with two #4 x 1/2" SM screws into the firewall.

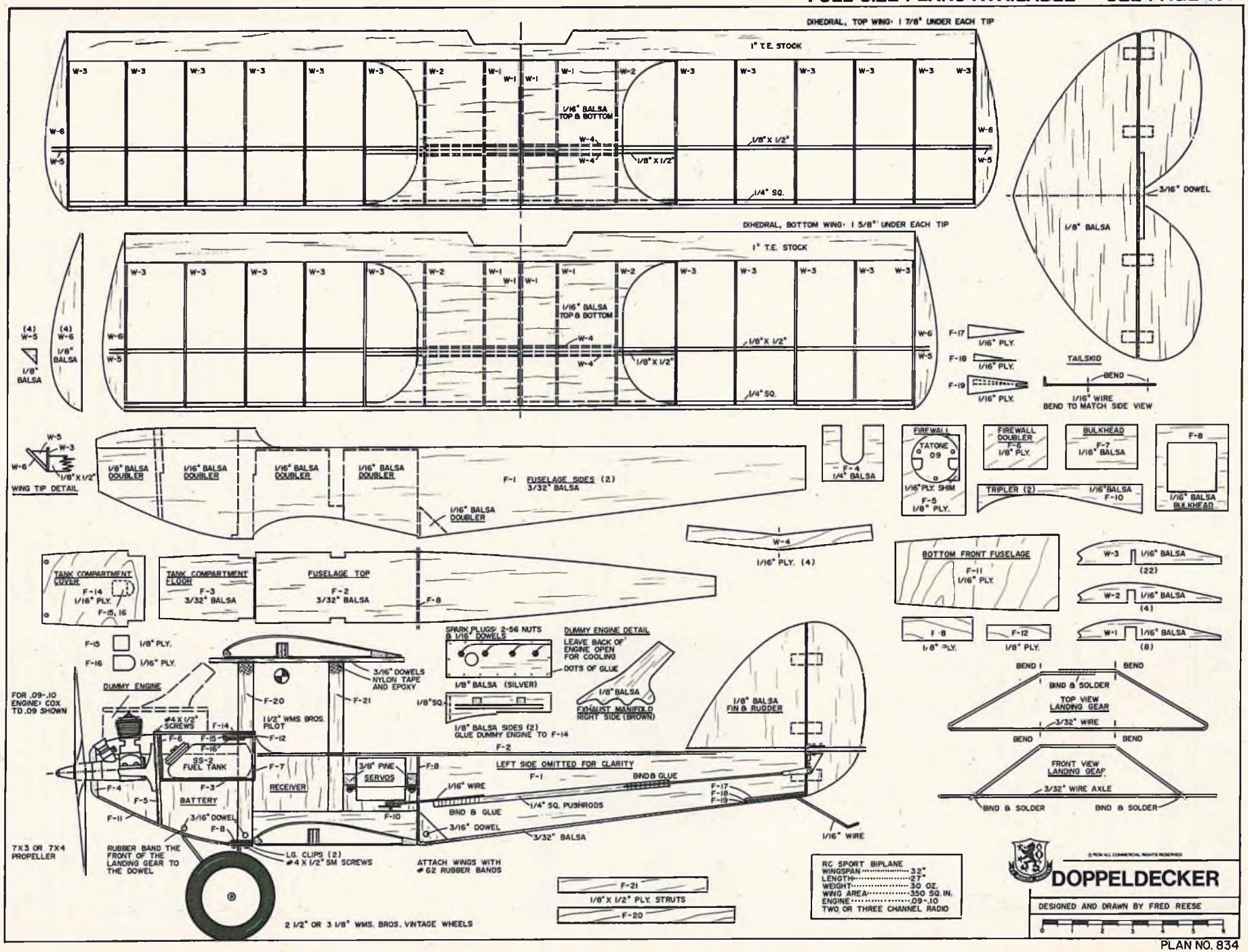
Dummy Engine:

The dummy engine is just a 1/8" balsa box open at each end that hides the real engine. The Cox TD muffler fits neatly under the dummy engine and exits with a little pipe straight out the side. The dummy engine is dressed up with carburetors made from scrap balsa. Engine bolts are drops of epoxy and the spark plugs are 1/4" lengths of 1/16" dowels stuck into 2-56 hex nuts. The spark plug wires are fine radio hook-up wire glued in place. Paint the engine sliver and the exhaust stack brown. Cut away two 1/8" wide strips from the covering on the tank cover and glue the dummy engine to the cover. Access to the glow plug is through a hole in the top of the dummy engine. Use a third fuel line to the tank to fill it without having to remove the cover and dummy engine.

Flying:

Use a 7/3 or 7/4 prop, whichever one your

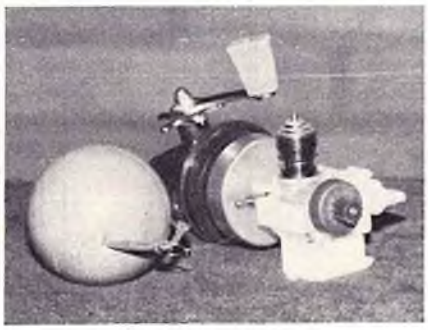
to page 130


DIHEDRAL, TOP WING- 1 7/8" UNDER EACH TIP
1" T.E. STOCK
1/16" BALSA TOP & BOTTOM
1/8" X 1/2"
1/4" SQ.
DIHEDRAL, BOTTOM WING- 1 5/8" UNDER EACH TIP
3/16" DOWEL
1/8" BALSA
TAILSKID
BEND
1/16" WIRE BEND TO MATCH SIDE VIEW
F-17 1/16" PLY.
F-18 1/16" PLY.
F-19 1/16" PLY.
WING TIP DETAIL
1/8" BALSA DOUBLER
1/16" BALSA DOUBLER
F-1 FUSELAGE SIDES (2) 3/32" BALSA
F-4 1/4" BALSA
FIREWALL
TATONE 09
1/16" PLY. SHIM
F-5 1/8" PLY.
FIREWALL DOUBLER F-6 1/8" PLY.
BULKHEAD F-7 1/16" BALSA
F-8
1/16" BALSA BULKHEAD
TRIPLER (2) 1/16" BALSA F-10
W-4 1/16" PLY. (4)
TANK COMPARTMENT COVER F-14 1/16" PLY. F-15, 16
TANK COMPARTMENT FLOOR F-3 3/32" BALSA
FUSELAGE TOP F-2 3/32" BALSA
BOTTOM FRONT FUSELAGE F-11 1/16" PLY.
W-3 1/16" BALSA (22)
W-2 1/16" BALSA (4)
W-1 1/16" BALSA (8)
F-15 1/8" PLY.
F-16 1/16" PLY.
F-12 1/8" PLY.
SPARK PLUGS- 2-56 NUTS & 1/16" DOWELS
1/8" BALSA (SILVER)
DUMMY ENGINE DETAIL
LEAVE BACK OF ENGINE OPEN FOR COOLING
DOTS OF GLUE
1/8" BALSA EXHAUST MANIFOLD RIGHT SIDE (BROWN)
1/8" BALSA SIDES (2) GLUE DUMMY ENGINE TO F-14
1/8" BALSA FIN & RUDDER
BEND
BIND & SOLDER
TOP VIEW LANDING GEAR
3/32" WIRE
FRONT VIEW LANDING GEAR
3/32" WIRE AXLE
BIND & SOLDER
FOR .09-.10 ENGINE: COX TD .09 SHOWN
DUMMY ENGINE
#4 X 1/2" SCREWS
1 1/2" WMS BROS. PILOT
3/16" DOWELS NYLON TAPE AND EPOXY
F-20
F-21
F-14
F-6
F-15
F-16
F-12
F-7
F-8
F-2
3/8" PINE SERVOS
RECEIVER
BATTERY
F-3
F-4
F-5
F-11
F-10
3/16" DOWEL
LEFT SIDE OMITTED FOR CLARITY
F-1
BIND & GLUE
1/16" WIRE
1/4" SQ. PUSHRODS
3/32" BALSA
F-17
F-18
F-19
1/16" WIRE
7X3 OR 7X4 PROPELLER
RUBBER BAND THE FRONT OF THE LANDING GEAR TO THE DOWEL
LG. CLIPS (2) #4 X 1/2" SM SCREWS
ATTACH WINGS WITH #62 RUBBER BANDS
2 1/2" OR 3 1/8" WMS. BROS. VINTAGE WHEELS
F-21
1/8" X 1/2" PLY. STRUTS
F-20
RC SPORT BIPLANE
WINGSPAN ..... 32"
LENGTH ..... 27"
WEIGHT ..... 30 OZ.
WING AREA ..... 350 SQ. IN.
ENGINE ..... .09-.10
TWO OR THREE CHANNEL RADIO
DOPPELDECKER
DESIGNED AND DRAWN BY FRED REESE
PLAN NO. 834

POWER BOATING

Howard Power

I have just been made aware of a great new product that all boaters will be interested in. The use of a spin-fishing reel and a sponge rubber ball for retrieving dead boats has been in common use for a long time. Up to now the ball had to be thrown by a strong armed boater so that the line fell across the boat to be retrieved. Then the line and boat were slowly brought in by cranking. But now due to the application of space age technology the Fly By Night Boat Works has taken a giant step forward by announcing its first product — the motorized retrieve ball. I won't go into a full blown product report here since the promotional photo they have sent tells the whole story. I bet you boaters out there wish you had thought of this idea first.



I also received the following letters which I would like to answer.

Dear Mr. Power,

I have been involved in R/C boating for the past three years and have been plagued by a lack of technical information. Now, thanks to you and RCM, my prayers have been answered. If your future articles are as well written and as in-depth as your article on tuned pipes, then you may add my name to your list of admirers. For me there are two areas of R/C boating that have many knowledge gaps. Perhaps you can help to fill these gaps. The first area is in the field of propellers.

(1) What are the advantages / disadvantages of de-lifting a prop?

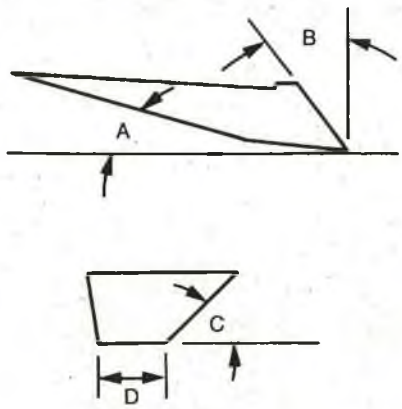
(2) Why increase or decrease the cup of a prop blade?

The second area is in the field of sponson design. Having one scratch-built outrigger under my belt, I would like your opinion on the following:

(1) What are the ideal angles at: A, B, C?

(2) What is the ideal width of D?

To aid your answers, here is additional information. I have two boats, a Lil Lightning tunnel and a scratch-built outrigger. The tunnel runs a "hot" 3.5 outboard with the rear sponson edge at the prop shaft centerline. The scratch-built is a toy/test bed powered by an O.S. Max .10 FSR. The prop depth is the same as the outboard. I intend to use any knowledge and experience gained from this outrigger to design and race an A class outrigger.



Both boats run stock JG and/or Octura props. The only work done to the props is sharpening and balancing. With some luck and the proper technical information, I hope to increase the performance of both boats.

Any help that you may be able to give concerning my two problem areas will be greatly appreciated.

Sincerely,
Larry F. Rumbley
Dover, Delaware

De-lifting or reducing the lift of a propeller is not always an advantage. Most boaters who run monoplane hulls (hulls with a single planing surface) find that propellers with low lift seem to work best. The lift of a propeller increases as rpm's increase. For this reason, propellers with low lift do not change the riding trim of the boat as much as those that develop high lift. An increase in lift when accelerating is beneficial because as rpm and speed increase, the added propeller lift tends to keep the bow down. However, when you shut the engine down to turn a corner, the prop lift suddenly decreases. Without prop lift, the hull angle of attack increases and you may blow off the water since the hull is still traveling fast. A monoplane hull, therefore, usually requires the use of low lift propellers to keep boat trim changes small.

Low lift may be a disadvantage for propellers used on hydroplanes. Lift is used to support the rear of a conventional hydro. This lift is developed by prop lift and by the vertical component of the prop thrust if the drive shaft is at an angle with respect to the water. Low lift propellers require a higher shaft angle to trim the boat than propellers with high lift. The increased shaft angle results in less thrust in the direction of motion and will, therefore, slow down the boat.

Cupping propellers will be discussed in greater detail later in this series of articles. By cupping different areas of the blade, we can adjust a given propeller's torque, lift and pitch. In this way we can "create" a propeller with characteristics that more closely match a boat's requirements than the stock propeller.

As far as sponson design is concerned I am afraid that there are probably no ideal angles and widths for sponsons. The planing angle of attack A and sponson width D are related because they determine the sponson hydrodynamic lift which must support the weight of the boat along with prop lift forces. If you measure the angle of attack A used by successful hydro designs you will find that five degrees is a good place to start. The angle B is not critical but the edge formed by the planing surface and the sponson back surface should be sharp so that water cannot run up the back sponson surface. The sponson non-trip angle C determines how much the sponson slides in the turns. The steeper the angle, the higher the side force developed during turns. If this angle is too high the boat may hook or turn over. Low non-trip angles give the boat more forgiving turn characteristics but increase sponson aerodynamic lift. Increased sponson lift can produce high speed blow-offs. Only by experimenting can you find the proper characteristics for your particular design.

Dear Sir,

Being a beginner to model engine powered boats after many years in electrics, I have purchased the following equipment: Dumas DV .40 CF, Dumas 2321 flex outdrive, HB .40 PDP with Perry pressure pump and an HB pipe, and a Futaba three channel radio. Since I haven't been able to find a single boater in my area, perhaps you can answer some of my problems.

(1) Which servo is better suited for the rudder — an S-7 or an S-24?

(2) With the HB adapter on my pipe angled downward, how do I get my pipe above the deck?

(3) How do I solve cavitation in the turns?

(4) How does one go about breaking in a marine engine?

(5) Am I over-propped with a 1460 and 5% nitro? How much can I safely use? (Nitro.)

(6) Do I require a turn fin? If so, where do I put it?

(7) What do you recommend for an

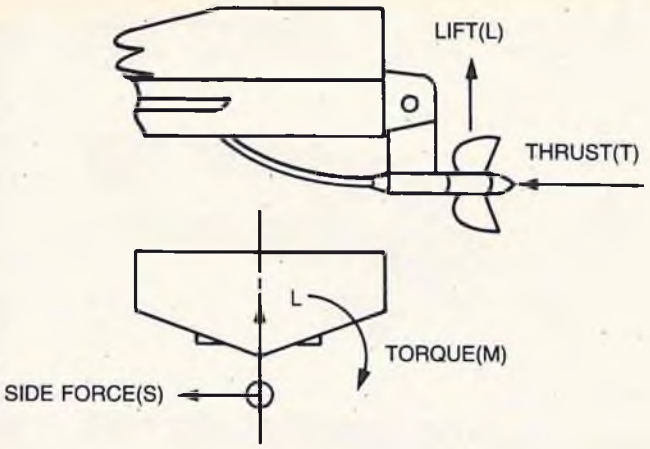


FIGURE 1
PROPELLER FORCE SYSTEM

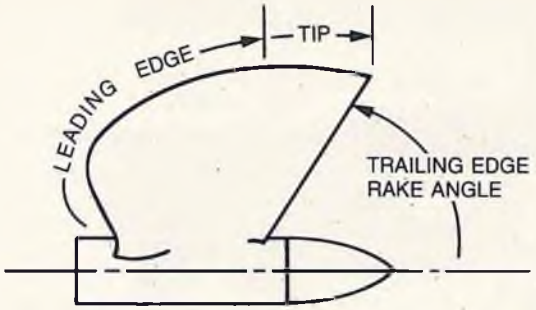


FIGURE 3
PROPELLER NOMENCLATURE

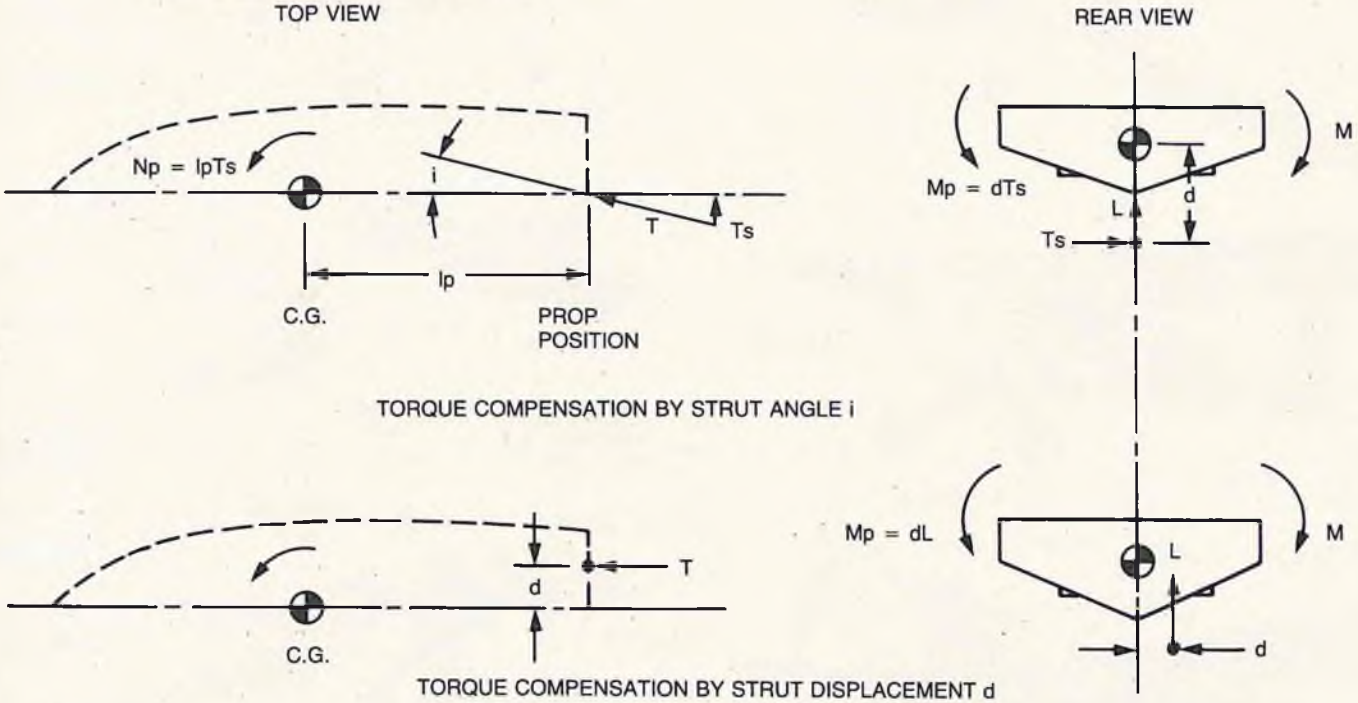


FIGURE 2

antenna? I am interested in high performance, but I am not yet ready for competition. Thank you very much for your help.

Mike Wettengal
Green Bay, Wisconsin

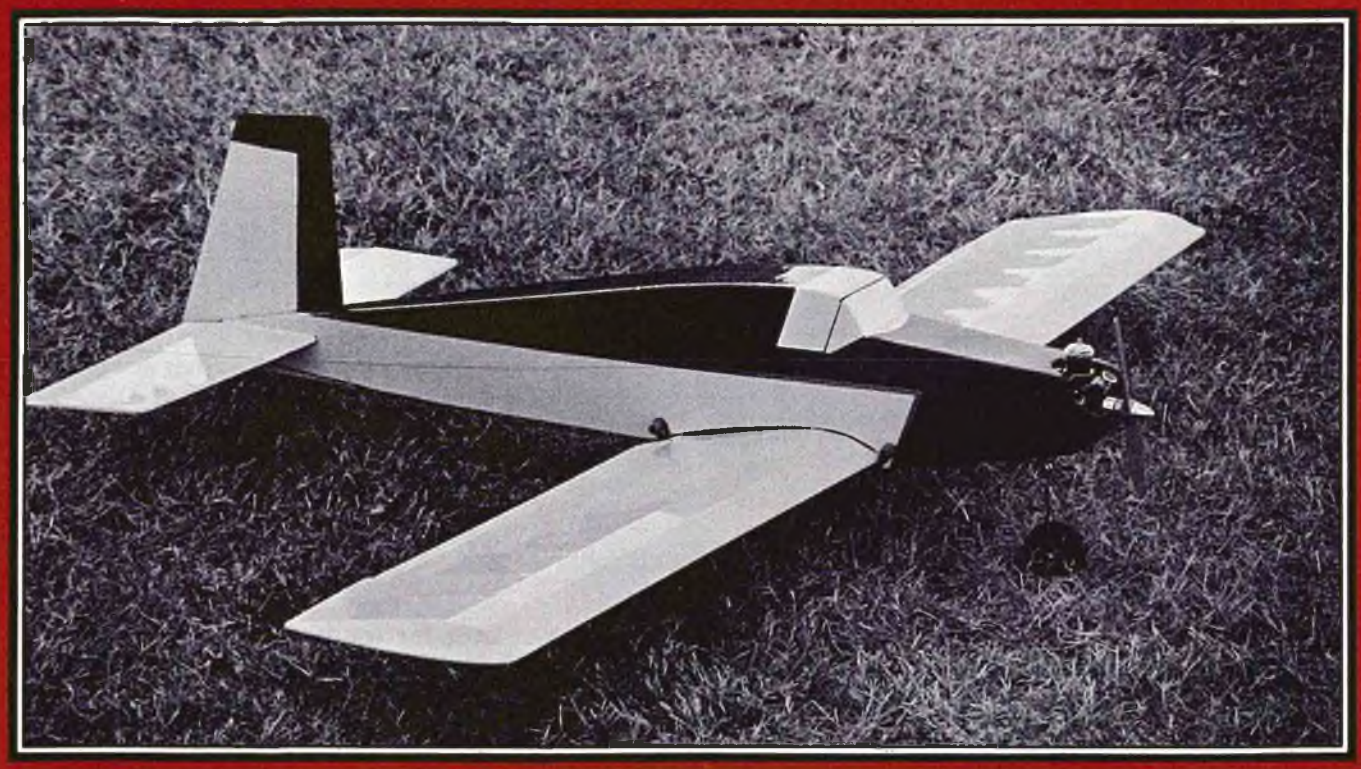
Most boaters in my area use the Futaba S-7 servo because it is as waterproof as any servo can be, has a good strong gear train, and has a high output torque (42 in.-oz.). The electronics also seem to be able to take an occasional water bath without major damage. You just need to dry the electronics out and most of the time it will come back to life.

The HB 40 is a side exhaust engine so the pipe should be mounted in the area alongside of the left motor rail. If the engine is mounted at a high angle the manifold will be angled downward. Your only choices are to mount the engine with its crankshaft parallel to the keel or you will have to modify the manifold. If you mount the engine parallel your flex drive line should be S shaped to line up accurately at the engine and at the strut. The manifold tubing can be bent in an upward curvature by filling it with sand, plugging the ends, and bending with the application of heat. Electricians also have tubing benders so you might get someone to help. The pipe outlet should be brought out the transom. If the pipe is not long enough to extend past the transom, a length of hose can be attached to the stinger and mounted at the transom. I have not been able to notice any loss in pipe performance with this type of stinger extension.

Assuming you have carefully streamlined all underwater parts, cavitation in the turns is usually caused by the rudder lifting the stern of the boat. The rudder rolls the boat over and propeller depth decreases. With less load the prop speeds up and cavitates. Try tilting the rudder blade so that the tip moves forward. This brings the nose up and the stern down in the turns. It may take 5 to 10 degrees of forward tilt to help. You don't say how deep you are running the prop but your question No. 5 indicates that you must be running it on the surface. If you mount the prop deeper you can sometimes reduce a cavitation problem. I would recommend that you consider mounting the drive shaft centerline parallel to the keel and at a depth of 1'' to 1¼'' below the keel. You should then be able to use a J.G. H-25 or I-25X propeller. This set-up should not cavitate and should give you good performance. If you don't want to move the strut you will have to try various propellers until the cavitation problem disappears.

Marine engines are broken-in using the same methods as used for aircraft engines except you can do it by running the boat. Lapped piston, steel sleeved engines should be run rich until they run at a clean two cycle without stopping due to heat build-up. This may take up a gallon of fuel. Ringed piston

to page 125



MAROONEY

Kind of a look alike to its big brother, this 1/2A, 3 channel has proven to be pure fun for the Sunday flier.

By Randy Randolph

My first experience with a throttled .049 was with a Keo Willard Showmaster — great airplane — but the throttle was more or less a "slower-downer" rather than a throttle. Better yet, it acted as an exhaust port cover in case of a nose down landing in the dirt. Since then I have had a lot of throttled 1/2A's, all of which had to be flown-on and run into the tall grass to stop. The Ace throttle sleeve is different. With it, touch-and-go's are not only practical but easy and, for the first time — a 1/2A that will taxi. The mid-range on this throttle is almost nonexistent but it is enough to make slow and easy cruising fun.

Marooney was built to take advantage of the Ace throttle. It is an easy to fly airplane, smooth and groovy stable. It is not a bomb but it will perform loops, Cuban eights, rolls, etc., and do them outside as well as inside. Snaps and spins are possible if the fourth channel for rudder is added, and that can be done with very little trouble. A 1 oz. tank will fly Marooney for nearly 10 minutes (the original had a snuff can tank of nearly 2 oz.) so there is plenty of time for T & G's. The tail skid is necessary to keep from grinding the tail down, since landings are made at rather high angles of attack. Incidentally, I fly a rather low nitro fuel and, although performance is not as good as with hotter juice, the climb angle is still 25-30 degrees and I have flown in 18-20 mph wind with little difficulty. The airplane is strong enough for a .10 without modifications or, if you prefer more pep, one of the new .061's with full house might be fun.

CONSTRUCTION

First this is an airplane not a bridge . . . build it like an airplane. Although this design is not an ultra-light one it must be kept within reason as far as weight is concerned. Any additional weight manifests itself as higher flying speeds and results in much more damage to the ground in hard landings.

Wing:

The wing is a good place to start; this one is a tried and true design that is quite strong for the weight. Make a template of the rib from thin, hard paper such as a file folder or notebook cover and trace around it on to a piece of 1/16" x 3" x 36" medium soft balsa. With care, all 22 ribs can be cut from the single sheet with some left over. The trailing edge is sliced from 1/16" sheet balsa and a 36" sheet 3" wide will provide all four pieces with enough left over for the center section sheeting. The leading edge and spars can be stripped from 3/16" sheet or purchased. The spars should be medium hard and the leading edge, medium soft. While you are stripping 3/16", cut a few extra medium soft ones for the stab. The webs between the spars and at the trailing edge are important, don't leave them out. They are cut from soft 1/16" sheet with the grain running vertical. Cut the five dihedral braces and the four gear mount braces from 1/16" plywood and strip a couple of 1/16" x 1/8" balsa pieces for the trailing edge cap.

Select four ribs and cut 1/16" from the top and bottom of each for the center section sheeting; designate these as R-1. Select four more and glue the gear mounting braces on them noting that two ribs have the braces on one side and two have them on the other side. Cut the notch for the gear mount in these ribs and designate them R-2. Cut, glue up and drill the 1/8" plywood gear mount.

Cover the plans with waxpaper and pin the bottom trailing edge sheet and the bottom main spar in place over them. Beginning at the center, glue the first spar web and the first R-1 in position. Add the webs at the spar and trailing edge, then glue in the first R-2 with the plywood gear mount brace facing inboard, followed by more webs and the next R-2 with the brace facing outboard. Continue this sequence of ribs and webs out to the tip. When all ribs are

installed, glue the top front spar and leading edge in place then add the top main spar; bond it to the webs as well as to the ribs. Do not add the top trailing edge sheet at this time. Build the other wing half in the same sequence.

Before the wing halves can be joined, the center spars, and leading and trailing edges must be beveled to match at the dihedral angle. The easiest way to do this job is with a sanding block and the side of the workbench. Block up the wing tip of each half 1" and use the side of the workbench as a guide to sand in the bevel. Trim the notches in the R-1's and R-2's near the center section to accept the dihedral braces and join the 2 wing halves. Use clothespins to hold spars & braces in alignment. Check for any built-in warps and correct them. Add T.E. dihedral brace & top T.E. sheet, followed by 1/16" x 1/8" T.E. cap.

Cut the two remaining R-1's at the main spar notch and trim them to fit from the main spar to the leading edge and from the main spar to the trailing edge. If the airplane is to be flown three channel, glue these ribs together and install them at the center of the wing. If full house is anticipated, glue the leading edge ribs together and install at the center in front of the spar; the aft sections of these ribs are separated, as shown in dotted lines on the plans, to form a nest for the aileron servo. Complete the center section sheeting.

Slip two pieces of 1/8" brass tube 2" long over two pieces of 3/32" music wire 8" long and bend the aileron torque rods. Glue the tubing in place at the trailing edge and notch the trailing edge for free movement of the torque rods. Hollow a piece of 1/4" sq. hard balsa to fit over the tubing and form the fairings on each side of the center. Cut the ailerons from soft 1/8" sheet and sand them to a streamlined section. Cut the tip pieces from the ailerons and glue them to the trailing edge of the wing at the tip. The ailerons will be installed later when covering the wing. Make the wing tips from the saddle cut outs in the fuselage sides and glue them in place. The gussets at the spar locations hold them secure against the stretch of the covering. Sand the completed wing with 150 grit sandpaper followed by 400.

Fuselage:

The fuselage sides are cut from one piece of 1/16" balsa 6" wide which is made by edge gluing two sheets of 3" x 36" medium stock together. Cut the firewall doublers from 1/16" scrap balsa and strip some 3/32" sq. for the longerons and uprights. The wing saddle doubler and servo mounting rails are 3/32" sheet. Glue the doublers, uprights and longerons in place on the inside of the fuselage sides, one left, one right. When both sides are complete, pin them both together with the doublers and longerons on the outside and sand them to the same outline with a sanding block. While they are still pinned together cut the stab slot and the wing saddle (use the saddle cut-out for the wing tips) as well as drill the 1/4" holes for the wing hold-down dowels.

MAROONEY
Designed By: L.F. (Randy) Randolph

TYPE AIRCRAFT
Sport
WINGSPAN
41½ Inches
WING CHORD
6½ Inches
TOTAL WING AREA
265 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
1 Inch
O.A. FUSELAGE LENGTH
27¼ Inches
RADIO COMPARTMENT AREA
(L) 8½" x (W) 2¼" x (H) 3"
STABILIZER SPAN
16 Inches
STABILIZER CHORD (incl. elev.)
3¾ Inches (Avg.)
STABILIZER AREA
60 Sq. In.
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
5½ Inches (Avg.)
VERTICAL FIN WIDTH (incl. rudder)
4" (Avg.)
REC. ENGINE SIZE
.049-.10 Cu. In.
FUEL TANK SIZE
1-2 Oz.
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
3-4
CONTROL FUNCTIONS
Elev. Ail. & Throt. (Rud.)

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Balsa and Ply
Empennage	Balsa and Ply
Wt. Ready To Fly	**23½ Oz.**
Wing Loading	**13 Oz./Sq. Ft.**

Cut the firewall from 1/8" plywood and build up the other two bulkheads from 3/32" balsa.

Glue the two cabin bulkheads to the inside of one fuselage side; use a square to properly align them. Glue the other side to these bulkheads and again use a square to position the second side exactly over the first. Bring the tail together, bevel the insides to fit and glue the two sides together. Drill the firewall for the engine mount and the fuel and throttle lines, install the blind nuts for the engine mount and glue it in position on the fuselage sides. Hold the sides together with masking tape until the glue has set.

Before sheeting, install the outer NyRod to the elevator (and rudder) and the inner NyRod for the throttle. Glue a 1" wide piece of 1/16" plywood on the fuselage bottom where the nose gear steering exits the airplane and install the inner Nyrod from this plywood to the aileron (or rudder) servo location. Install the fuel tank and fuel lines, then sheet the fuselage top and bottom with soft 1/16" balsa. Trim the sheeting around the nose to fit the engine and sand the completed fuselage with 150 then 400 grit sandpaper.

Tail Group:

The stabilizer is built from soft 3/16" sq. balsa with a 1/32" x 3/16" plywood doubler at the trailing edge. The elevator is cut from soft 1/8" sheet balsa. Hold the stab and elevator together with masking tape and sand the tips to match; sand the leading and trailing edges round. Bend the elevator carry-through from 1/16" music wire and epoxy it to the leading edge of the elevator before the rudder clearance cut-out is made — this keeps the elevator in alignment. The surfaces will be hinged when they are covered. Make the rudder from soft 1/8" sheet balsa. If four channel operation is contemplated, make the cut-out for the movable surface.

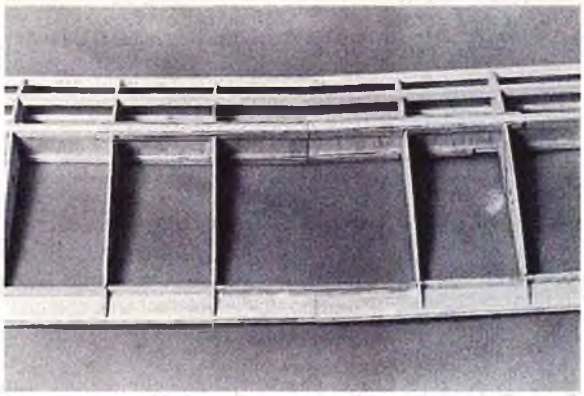
Finishing:

Before covering, notch and drill the leading edges of the ailerons to receive the torque rods; and if MonoKote type hinges are used, cover all surfaces before hinging. Follow the instructions packed with the film you choose for covering. Join the ailerons to the wing by epoxying the torque rods in place then covering them with a separate piece of film ironed over the wire and to both sides of the aileron as they are hinged.

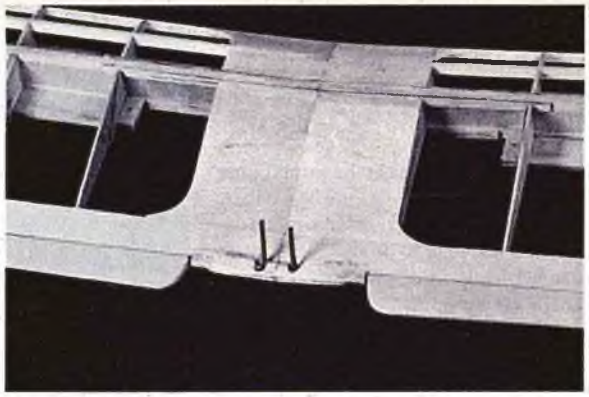
After the fuselage has been covered, paint a coat of epoxy on the firewall and cowl area and overlap the seams in the covering in these areas. Cut the covering away from the stab cut-out and cut a notch in the fuselage top covering to accept the rudder. Epoxy the stab and rudder in place.

Bend the main gear from 3/32" music wire and, if a coil bender is available, bend the nose gear from the same wire, otherwise it can be purchased. Attach the main gear to the gear mounts in the wing with mounting straps and small wood screws. Drill the engine mount to accept the nose gear, and bolt it to the firewall. Drill a hole in the bottom of the cowl to clear the nose gear.

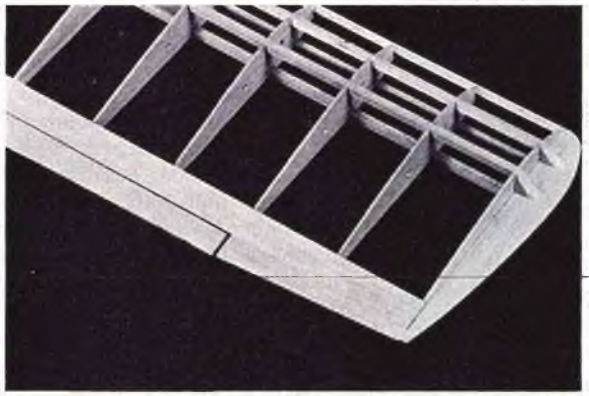
text to page 54



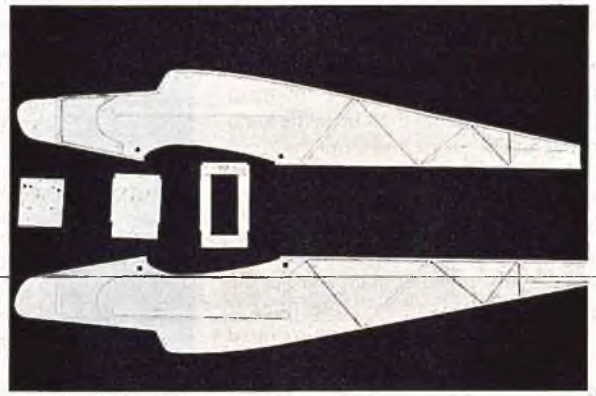
The four center ribs are trimmed at the spar notch to receive the dihedral braces.



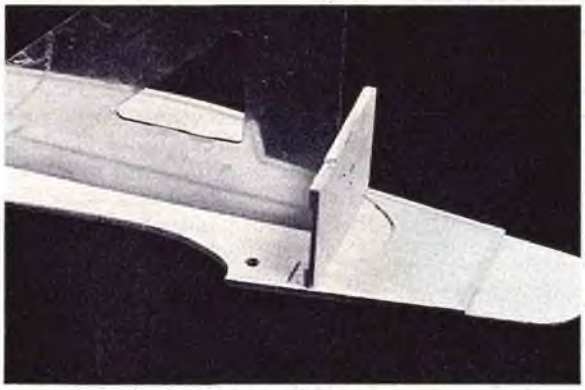
Balsa fairings added to torque rod bearings, don't attach ailerons until all surfaces are covered.



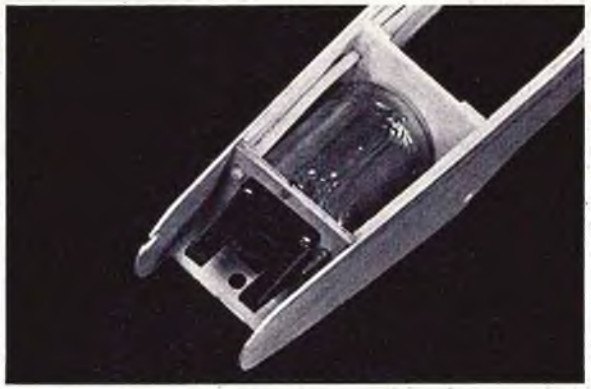
Wing tip is made from cut-out in fuselage sides. Aileron tip is glued to trailing edge to complete wing.



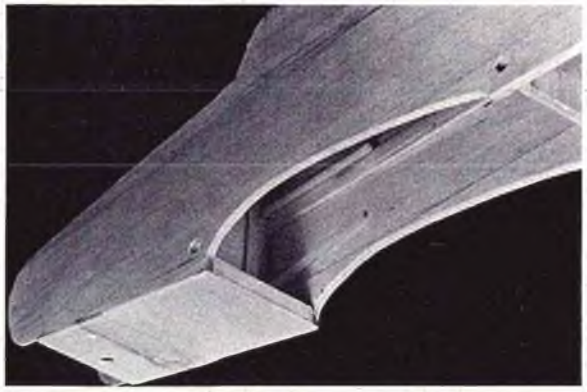
Fuselage sides with doublers, longerons and uprights ready for assembly.



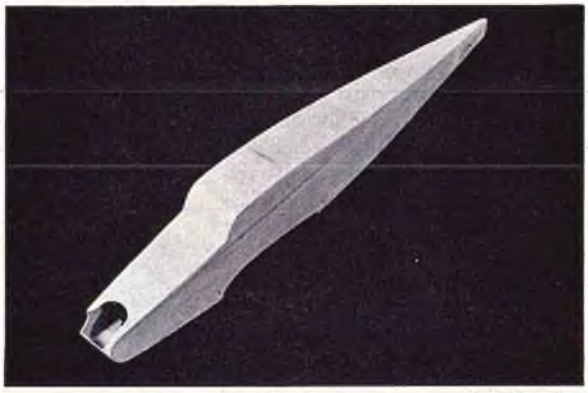
A builder's square assures vertical alignment of formers on fuselage side. Use the square to assure alignment when putting fuselage sides together.



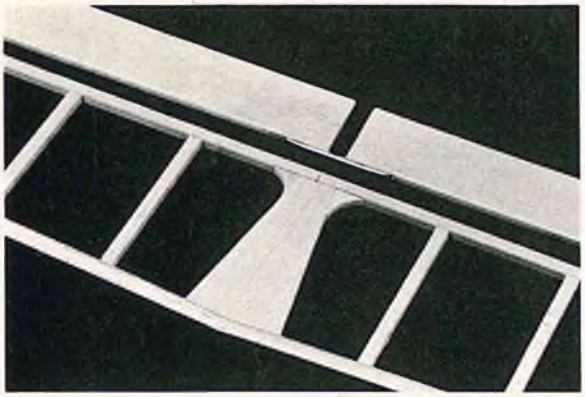
Firewall, engine mount, tank, fuel line and throttle line installed. Snuff can used as tank in original.



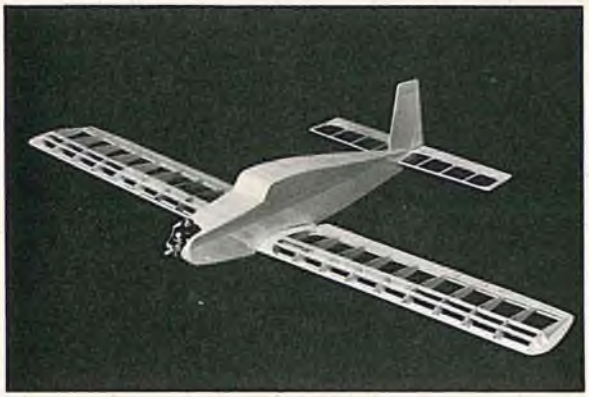
Nyrod used for throttle line and nosegear steering, installed.



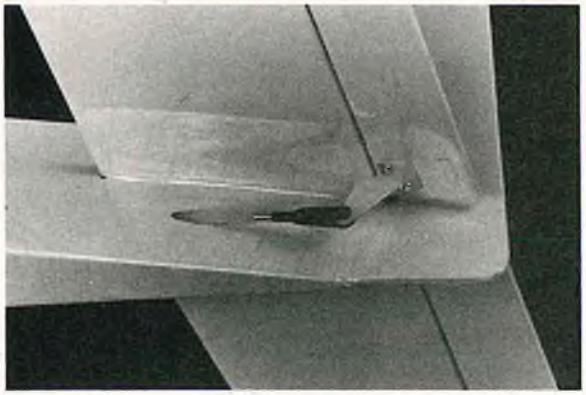
Completed fuselage with engine cut-out and final sanding finished.



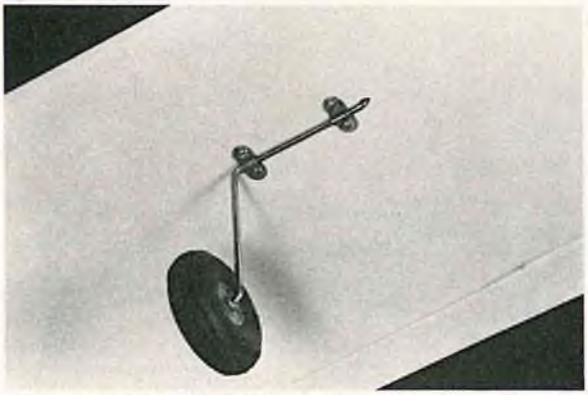
Music wire used as elevator joiner is installed prior to cutting rudder notch in elevator. This view shows completed elevator and stab assembly.



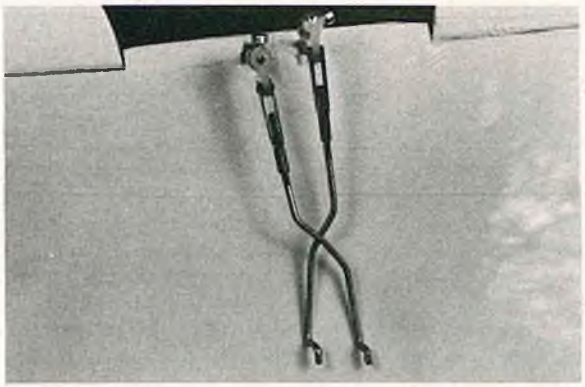
Bare bones Marooney ready to be covered.



Elevator NyRod and horn installation.



Main gear mounting detail.

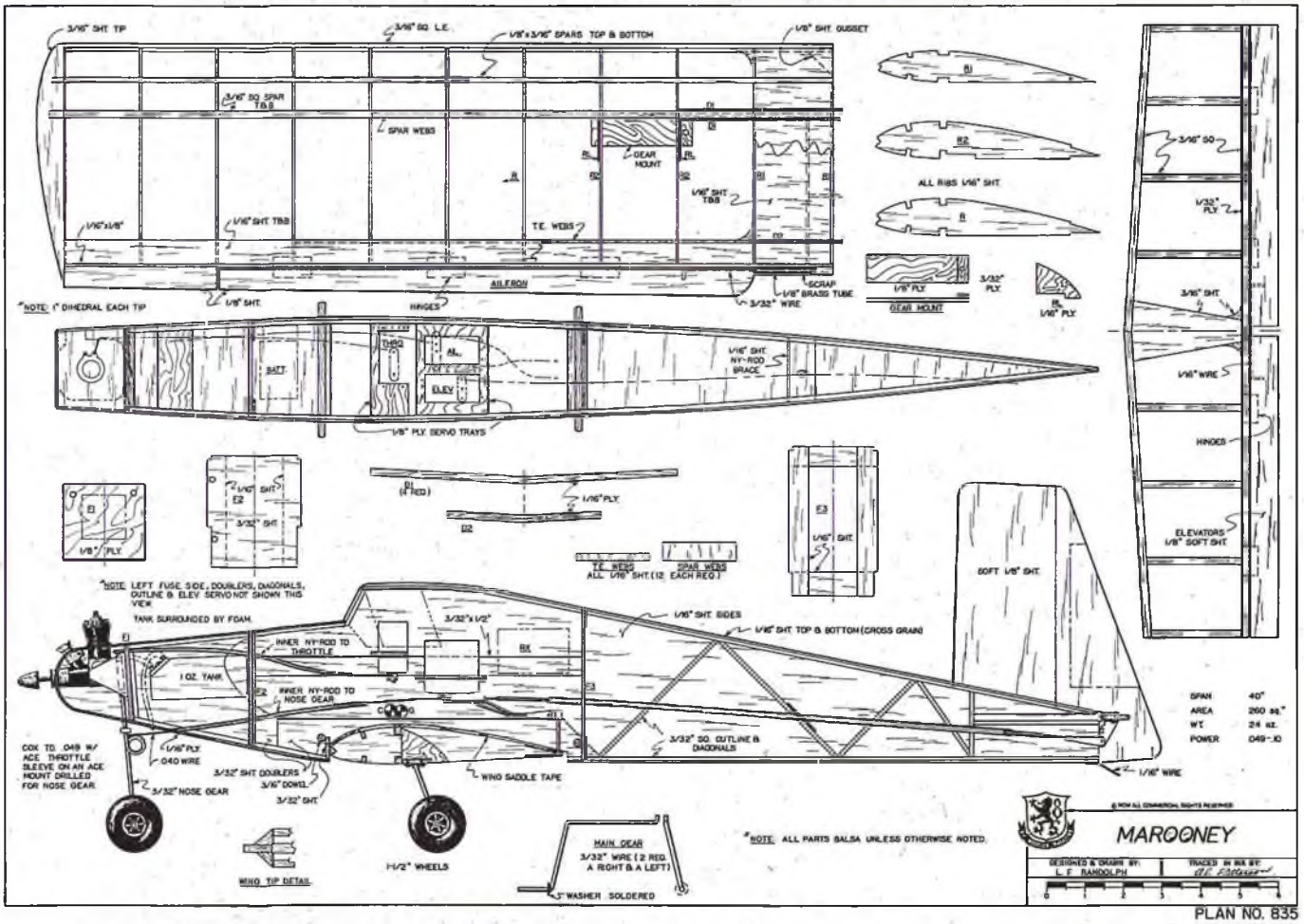


Alleron pushrods and hardware. Rods are crossed to accommodate standard rotation servo and nosewheel steering.

Radio installation, batteries are in front of throttle servo and receiver is aft of aileron and elevator servos.

Marooney makes a slow fly-by. Look at the fun you can have.

Marooney settles in for a touch-down.



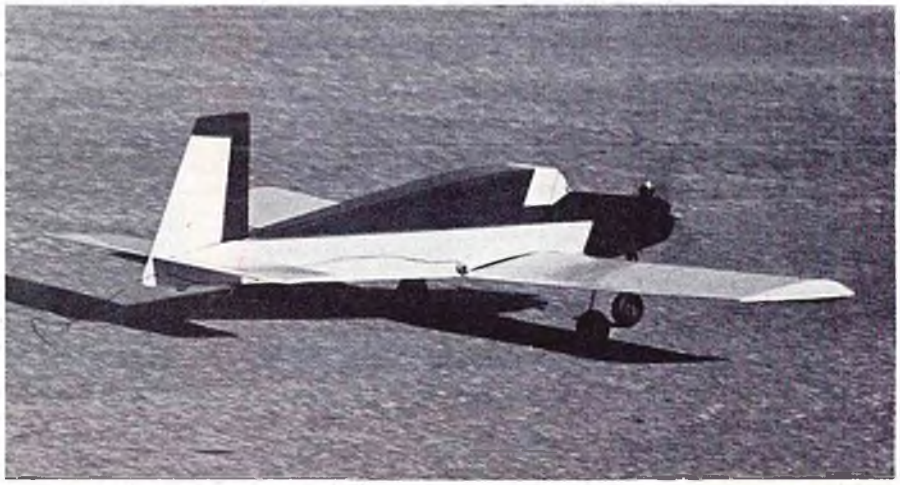
Slip a steering arm on the gear along with a wheel collar and slide it into the holes in the engine mount; anchor it with another wheel collar above the mount. Position the two wheel collars as shown and mount the engine and wheels.

The radio is mounted on 1/8" plywood trays with the batteries in front of the wing and the receiver aft of the servos. Install the inner NyRod from the elevator servo to the elevator and mount a horn on the elevator in the proper location. Use a clevis to link the elevator to the NyRod. Insert a piece of florist wire (soft iron wire) into the throttle NyRod. Attach it to the servo with a Z bend and, where it exits the firewall, bend it up and into the hole in the throttle sleeve. Retard the throttle and anchor the ring on the sleeve with a pair of pliers and turn the sleeve until it just closes the exhaust ports on the engine. When the throttle is advanced the sleeve should open the ports to maximum. Attach a fuel line.

Install wing saddle tape to the wing saddle in the fuselage. Bend the aileron pushrods as shown on the plans. Use standard hardware from the torque rods through the clevises to the pushrods. **The pushrods must be crossed for proper aileron action with standard servos.** Insert the Z bends into the servo arm and place the wing in its saddle; adjust the clevises until the ailerons are neutral when the servo is centered. Make sure the ailerons move in the right direction upon command. Mount an E-Z Connector in the inside hole of the aileron servo arm and run a piece of .040 steel wire from the nose gear steering arm through the NyRod and into the connector. Center the nosewheel and tighten the connector. Epoxy the tail skid in place, check the C.G. location, and the airplane is ready to fly.

Flying:

Run the engine and check the idle. It should be slow enough for the airplane to remain still, and go easily to full speed when the throttle is advanced. Now for something different with a 1/2A --- **taxi** out to the take-off spot, advance the throttle and take-off. Marooney will not fly off by itself, it will require back stick, and remember this is not a hot-shot's airplane so climb out at a nice steady angle. The ailerons are effective but not quick and the airplane is a delight to fly. Landings are a cinch, throttle back all the way and come on in, you will be surprised at how you have to slow the airplane down and at the high angle of attack at touch-down. It's just like they do it downtown. Use forward stick to get good steering on the ground and remember with three channels the ailerons steer the airplane on the ground as well as in the air. □



Cliff Welrick allows RCM's Dick Tichenor to stand beside and to touch (very carefully) his 1/2 Scale bent wing U Bird.

CLIFFIE'S CORSAIR

PHOTO STORY BY DICK TICHENOR

● "Cliff, what is the bottom line?"

"It has been a labor of love spread out over four years and it is worth every hour of my effort. It flys like a dream even with both feet on the floor."

That very pointed exchange followed an aerial photo session to record Cliff Wierick's Corsair in flight.

Cliff has been a prominent competition modeler since he started building and flying models back in 1933. He was deeply involved with the development of proportional radio control equipment following WW II, was National R/C Champion in 1964 and 1965, a member of the U.S. World Championship Teams in 1965 and 1967, and National Pylon Racing Champion for several years.

As a highly respected member of the R/C model industry, Cliff was Chief Lab Technician with Bonner Specialities, Inc., General Manager of Proportional Control Systems (PCS), and Executive Vice President of Kraft Systems.

He is a past president of the Academy of Model Aeronautics and is a member of the Model Aviation Hall of Fame Committee. He obtained his pilots' license in 1941, has logged over 6000 hours of flying time, and holds a single/multi engine land plane, instrument rated ticket.

Now, about the Corsair. A little over four years ago Cliff was fascinated by a 1/2 size Corsair kit being marketed by War Aircraft Replicas, Santa Paula, California. After obtaining one of the early kits, he, like most modelers, decided to make a bunch of modifications to meet his own standards of performance.

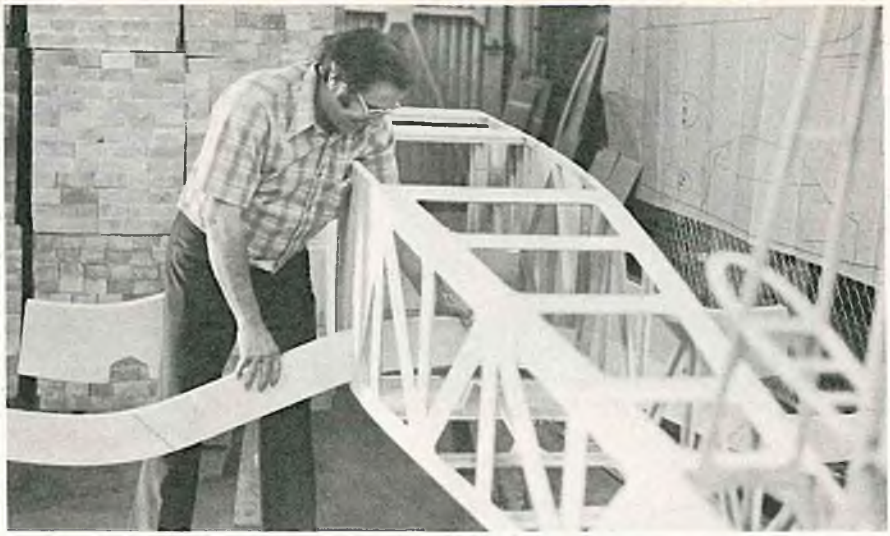
The first change was to replace the recommended Volkswagon engine with a Lycoming O-235, 115 hp, engine to which a 70" dia. 3 blade Warnke propeller was fitted. The landing gear design was modified for electric retractable operation with a manual emergency override. Cliff even learned to perform heli-arc welding in order to build the landing gear.

Additional fuel tanks were designed and installed in the outer wing panels to increase the flying time from two hours to four hours. The original design did not include trim tabs on the flight control surfaces so our model-oriented friend modified Kraft KPS 9 servos to make trim tabs operable from a slide switch on the control stick hand grip.

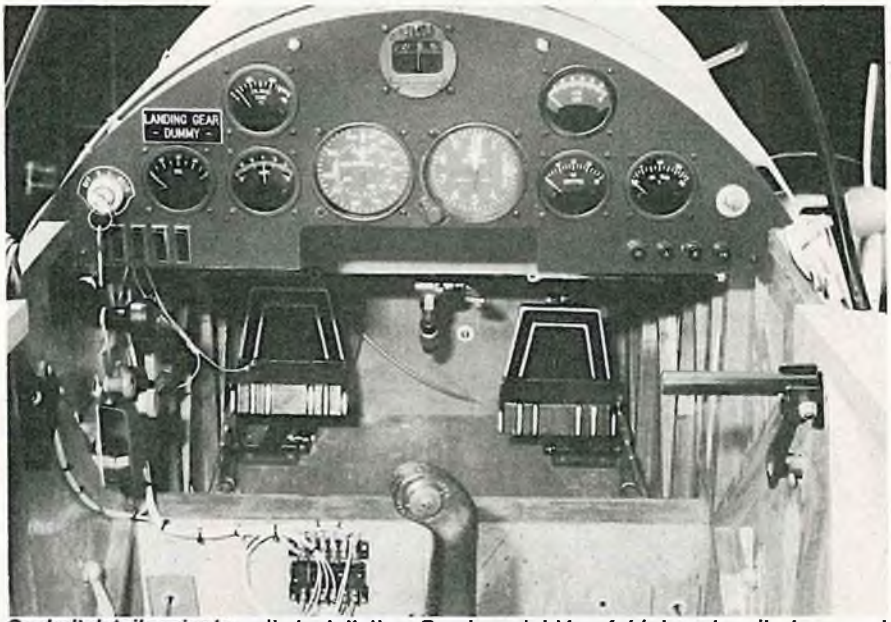
The construction of the Corsair is basically a few wooden load carrying members surrounded by blocks of polyurethane foam. After carving and sanding the foam to the proper contours, a fiberglass cloth covering was epoxied to the foam. Most of us know what an aggravating chore the sanding and finish preparations for an R/C model can be. You better believe that Cliff applied more than his share of elbow grease on this project. The final coats of DuPont DuLux sparkles like a jewel to justify his efforts.

The finished bird has a dry weight of 867 lbs. including pilot. This gives a wing

text to page 125

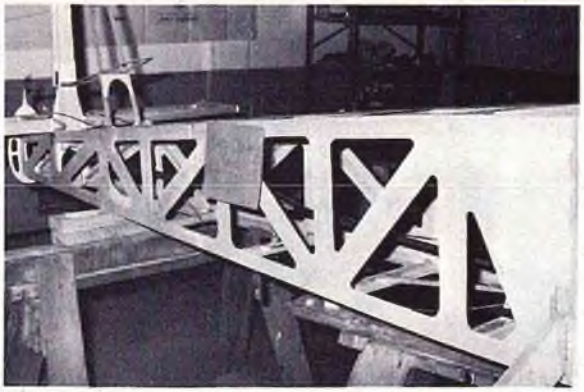


The heart of the Corsair structure is a thin plywood reinforced strip spruce frame. Cliff is checking the wing spar fit to fuselage.



Cockpit details prior to radio installation. Crank on right has fold-down handle, is manual override for electric retracts. Button on control stick operates trim tab servos. L.G. placard courtesy Paul White.

Cliff's 150 mph fly-by was exciting from Piper J-3 photo aircraft. It revived WWII memories for photographer.

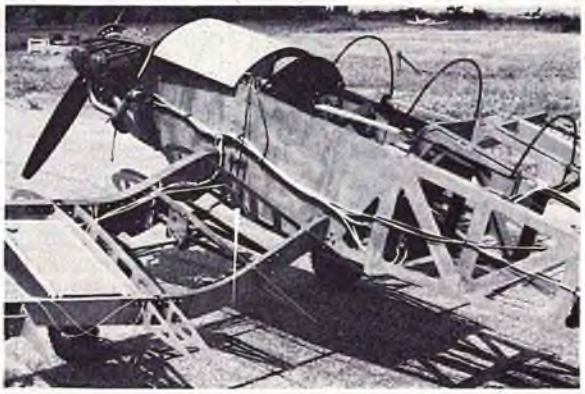


Anyway you look at it, it is built like a large model.

Cliff cut and welded all of the steel struts and fittings himself.

Additional tanks were installed in outer wing panels to double the F4U-s range.

The Corsair starts to resemble its big brother at this stage.



Top forward cowling is also top of main fuel tank. Foam blocks will cover and secure wire harness.

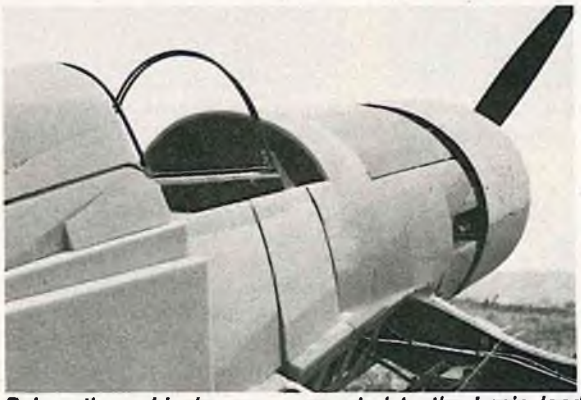
Sandbags were used to counter-balance engine weight at this point.

Landing gear details are visible in this photo. Note gears to rotate strut as gear retracts.

Tail wheel has leaf spring and is retractable.

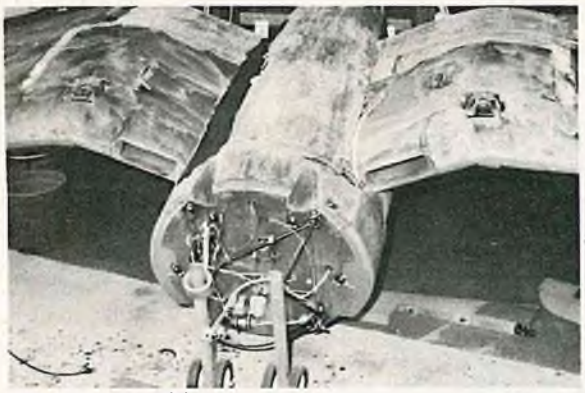
Landing gear nestles snuggly into the wing when retracted.

Fitting the fiberglass engine cowling was the same as with an R/C scale model except it was a bit larger.



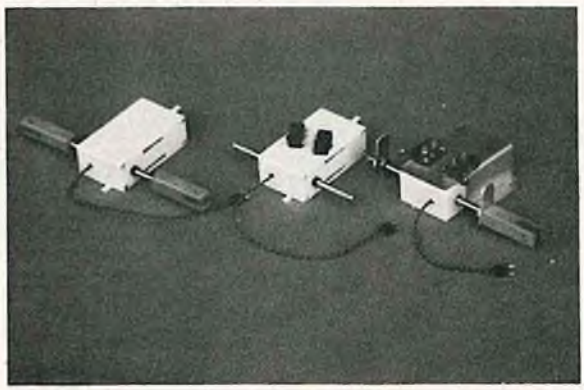
Polyurethane blocks were cemented to the basic load carrying structure to form final shape.

Cliff assumed the role of sculptor with his electric carving knife to make his bird look like a Corsair.



We accused Cliff of getting mixed up on landing gear installation. The rig is actually a holding fixture for sanding the bottom side.

The polyurethane blocks have the glass cloth/epoxy covering and has final sanding. White streaks were replaced with sheet aluminum for wing attach access.



We can justify running this spread on a home-built because it was built by an RC'er who used modified Kraft KPS-9 servos to operate trim tabs.

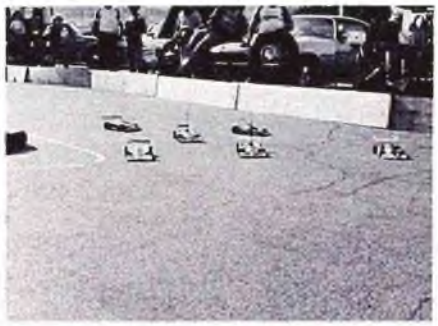
Cliff has close to 200 hours of flying time on his pride and joy.

PIT STOP

Gene Husting

The First Annual Futaba/Flying Models Gran Prix was held in Los Angeles at the Crenshaw R/C Car Club's track.

The number 1 Denim Formula 1 car by Mike Quarterman won Concours against this tough opposition.



Formula 1 cars typify racing cars at their best, adding super realism to model car racing.

Futaba/Flying Models Gran Prix

As you've noticed by the names, this 1/12 scale electric Gran Prix race was jointly sponsored by Futaba Radios and Flying Models Magazine. This all came about because of Chris Chan. Chris does Futaba's advertising layouts and now Chris will be doing a column for Flying Models Magazine. So it all ties in. Chris has been an avid R/C car racer for about 8 years, and was a USA ROAR National Road Race Champion, so I'm sure he'll be a great asset to R/C cars, as this race indicates, and we wish him the best of luck.

Chris is also what we affectionately call a "Scale Nut," thank goodness. "Scale Nuts" really love car racing and strive for utmost realism in their cars. They also help to counteract the "Speed Freaks," who believe speed is the only thing and to heck with what the car looks like. This will always be an ongoing battle, but with Chris's help, and others like him, our model cars will continue to look like model cars. Incidentally, Chris has won many concours awards for his scale appearing cars.

Chris also loves Formula cars, so if you're going to sponsor your own race, then naturally it will be a Formula race. This race was run by the Crenshaw R/C Car Club in Los Angeles. The track is located on a shopping center parking lot and is only available on Sundays, so there was no Saturday practice.

Mike Lavacot did it all. Mike was Top Qualifier, won the Trophy Dash and then won the Modified "A" Main.

Two ROAR classes were run, Stock and Modified and for the first time a Tamiya class was run. Normally Tamiya cars are not run because they are not ROAR legal. They are 1/10 scale, instead of 1/12 and they only run 5 minutes, instead of 8 minutes. So there was something for everybody.

With over 100 entries, there would be only 1 practice round, then 2 qualifying rounds, a Trophy Dash then the A & B Mains. Concours judging came first, and it was a beautiful sight to see all these Formula cars lined up for judging. The racers really knocked themselves out doing some super paint jobs. Don't ever volunteer to be a concours judge. With this many beautiful cars, it makes picking just one, an impossible task. But Mike Quarterman from Northern California won Concours honors with his scale Denim F1 car.

Al Chuck, from Northern California, was a close 2nd in the Modified "A" Main.

I don't think there's any kind of race car that more typifies what a race car should

to page 117

Butch Berney, also from Northern California, took 3rd in the Modified "A" Main.

Randy Tentschert won the very competitive Stock "A" Main.

Futaba's newest R/C car radio has everything we've been waiting for. You name it — it's got it.

SCALE VIEWS

Claude McCullough

Scale Spotlight

These days, when the state of the art requires a staggering investment of time and effort, a new precision-quality scale model is news. When it has such ingenuity and craftsmanship incorporated as does the Bell RP-63G, built by veteran modeler Weldon Smith (Barrington, Illinois), it deserves headline treatment. The RP-63G was an unusual aircraft to start with. A piloted target plane, it was specially armored to protect the pilot. Despite the fact that the bullets shot at it were made from frangible plastic, designed to shatter into bits when they struck the target, it still must have taken a cool customer to sit in the hot seat and fly it. A red light on the wing tip blinked in pin-ball machine fashion every time a hit was registered!

Weldon went to Lackland Air Force Base and photographed what probably is the last remaining RP-63 of the some 332 examples built. He has spent 3 years on the model, much of this time in engineering and making the scale operating retract gear mechanisms and the special extension shaft and geared prop drive unit. The landing gears are complete right down to air actuated brakes using the scale hydraulic lines. The prop drive unit duplicates a main feature of the Bell fighter series, the engine behind the pilot. The span is 84" with 1,200 sq. inches. Unfortunately the weight went over 15 lbs., moving it into the Giant Scale class.

The photos speak for themselves but I'd like to call your attention to two areas. Notice the cabin door. Building it so realistically that it is difficult to say it is not the actual airplane is a considerable feat of workmanship. Having tried to fit and keep unwarped so thin a structure I can say that the real test is when the door is closed. As you can see, the seam almost disappears; there is a flush surface and the concealed hinges fit perfectly. Likewise consider the break line to open up the fuselage for access to the drive unit. This seam looks like all the other scale panel lines. We don't have room for more photos but the quality shows in every other area. A real beauty!

Hostetler's Hawk

The popular line of Giant Scale plans from Wendell Hostetler (1041 Heatherwood Lane, Orrville, Ohio 44667) has a new design, the handsome Curtiss Hawk P-6E being presented in the photo by his wife Phyllis at 8°F. It uses the symmetrical wing section and 4-aileron set-up that worked out so well on the other bipes he developed --- Skybolt, Liberty Sport and Jungmeister. The 84" span has 1700 sq. inches of wing area to carry 24-28 pounds of all-up weight. His prototype is powered by a 2.4 Kioritz engine, but any big mill from 2 to 3.7 cu. in. will do the job. While the basic design of the Hawk is not itself a complex construction problem, that flowing cowl, streamlined landing gear and pants, would be a handful for the average scratch-builder to manage. So Wendell made that a non-problem by joining forces with Tom Keeling of T & D Fiberglass, who will produce and market an epoxy glass one-piece cowl, wheel pants, gear fairings and, for that final scale touch, the belly tank. The three large plan sheets and instruction book are still in preparation at press time and the price is not established. By the time you read this, all will be ready. For further information, send Wendell a self-addressed stamped envelope and he'll let you know the prices for the drawings and formed parts. The model will be on display at the Toledo show and will probably be causing traffic jams in the aisle. Those classic lines and color scheme should draw model builders like moths to a flame.

A Horse Of A Different Color

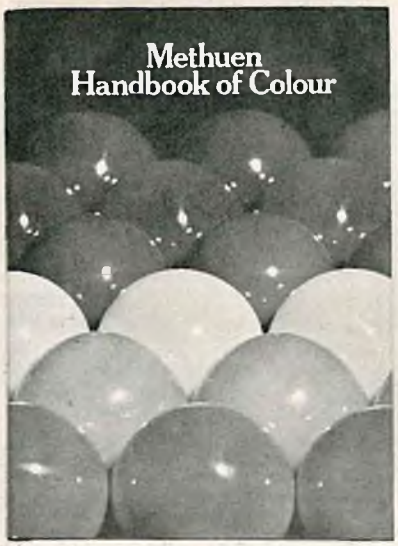
In the September 1980 RCM, we presented the Scalemaster's Color Guide and information about the Federal Standard FS-595a color book and color chips. One of those commenting on this column was Lenox Carruth, Jr. (Dallas, Texas), who got a copy of FS-595a and used it in color research study. He found that U.S. and R.A.F. colors were relatively uniform when reference sources were compared. In the case of German aircraft colors, he found some noticeable variations. For example, though both the Scalemasters and Dave Platt had original German color charts for matching, the shades for RLM 27 Yellow are not the same. Dave tells me that he hand mixed and compared the paint shades for his color chips to the chart. Only one batch of paint was prepared and all of his chips were made from the single batch. The Scalemasters picked a chip from FS-595a that most closely approached the German shade. A new book, "German Aircraft of World War 2 In Color" (reviewed in Scale Views in January 1981) has a different FS-595a number from the number listed in the Scalemasters Color Guide for RLM-27, with a notation indicating that it is only an approximate match. The question Lenox asks is which reference is the most accurate.

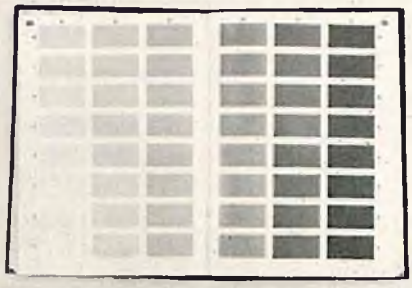
I think the three examples are careful research efforts and are probably perfectly accurate to their own particular base data. But it is possible for authentic source material to show variation. Perhaps the color charts were different editions and lacking in stability. Ken Merrick, author of "Luftwaffe Colors — Vol. I" has said that he had seen several actual LDV 521/2 WW II official German Color chip charts and none of them perfectly matched the others. Aging and environment can affect the charts. Then there is the problem of using FS-595a as a color matching device when it is not really intended for that. It is a catalog of particular U.S. colors, not a graduated shade and hue guide.

It is a fact of life in the historical color game that in many areas there are no absolutes. About all that a modeler can do in research is to look at all the sources possible and pick what seems to be the best one. The bottom line is that the AMA rule book does not require a scale contestant to furnish evidence in the scale presentation that the reference he has included is "**the**" definitive proof of color, only asks that it come from a published and/or authoritative source. Purists object to this policy from time to time as being too permissive, but experience and practicality show this is the only reasonable way this complex matter can be handled.

The Methuen Color System

Since FS-595a is not really suitable for





accurate judging of shades other than those used by the U.S. government, it is clear that scale modeling needs a more useful standard of color reference. Commercial companies whose work requires control of subtle color shades often use the Munsell color guides. They are considered the last word on the subject but are expensive, so much so they cannot be considered a viable proposition for model builders. However, there is another color guide that seems to me to be the answer for colors not covered adequately in FS-595a. It is already seeing use in the plastic display modeling field and in aviation history books, such as the aforementioned "German Aircraft Of World War 2 In Color." Titled "Methuen Handbook of Colour," it has 1,266 color chips, indexed with numbers and letters. They are very finely graduated in tones and a good match should be possible with most any color you may find on an aircraft. If nothing else you could locate a shade between two chips if your color vision is that acute.

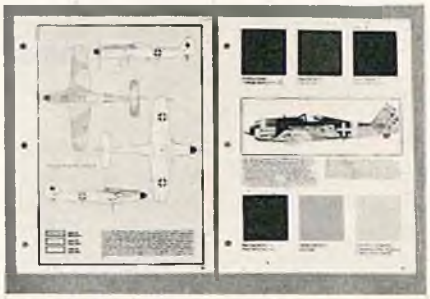
Consider how handy this book would be on a trip to photograph a full-sized aircraft for scale purposes. As we all know, color photographs are notoriously unreliable color reference sources. With the Methuen book in hand a color number can be arrived at by holding the book up to the subject. If possible, hold it under an edge so the aircraft color is directly comparable to the chip. Then, no matter what your local drug store's photo processor does to your color prints, you'll have a lock on the exact shade. I'd even take a closeup of the book being compared to the aircraft for the benefit of any skeptical judge who might want to stick to the photo hues only.

I got my copy from Sweet and Maxwell, Ltd., North Way, Andover, Hampshire SP10 5BE, United Kingdom. The cost of the book is 8.50 pounds and postage is an additional 1.25 pounds. I sent them a blank personal check which they filled out for $23.40. A pound is worth about $2.42 currently, varying a few cents now and then, so it might now take $23.60 to cover. It comes by surface mail and will take about 2 months, though you probably could have it sent airmail by paying extra.

We will see more books using Methuen numbers and if all serious scale modelers had a copy, the subject of color shades would be much easier to manage and standardize.

Scale Bookshelf

The Official Monogram Painting Guide to German Aircraft 1935-1945. By Kenneth Merrick and Thomas Hitchcock. 144 pages, 10" x 11½" in a vinyl binder. Available from aviation book dealers or Monogram Aviation Publications, 625 Edgebrook Drive, Boylston, Massachusetts 01505. $39.95 plus $2.25 shipping.



This late arrival is particularly appropriate because it fits right into the preceding discussion. Monogram's now out-of-print 3 volume series called "Luftwaffe Colors" has been a well-regarded reference source for German aircraft. "Painting Guide" is a most impressive addition to color and markings data. Printed on coated cardboard stock, illustrated with 3-views, color and black and white photos, the text is brief but informative. There is even a section devoted to the scale effect of applying colors to a model with sample altered color ships. I like the loose leaf format. A page can be removed without damage and inserted in a clear plastic cover for inclusion in a scale judging presentation. But the 116 large 2" x 2" color chips are the stars of the book. They are not printed reproductions but are lacquer painted chips, individually glued into the book (which is a major reason for the price). No cross-reference to FS-595a or any color system is listed under the chips, just the German number and name. The publisher states the chips were professionally matched to actual aircraft, aircraft parts, original German color card samples and independent comparisons.

In view of the questions raised by Lenox Carruth about RLM 27 Yellow, the first thing I did was compare the "Painting Guide" chip to the FS-595a chip numbers listed by the Scalemasters and GAOWW2IC. It is more yellow than either the Scalemasters 30257 (which is so un-yellow that it is in the "Predominately Brown" section of FS-595a) or the 23481 given in GAOWW2IC. The matter of just what color RLM 27 is has come up before, most recently in the English plastic and display modeling magazine "Scale Models." In a letter to the editor last year, Thomas Hitchcock, one of the authors of "Painting Guide," stated that the forthcoming book would set the record straight and give Munsell matt color number 5Y 7/10 as the correct shade for RLM 27. Considering the previous comment of his co-author about German color cards and the recognition accorded in "Painting Guide" to "variations," I'm not sure I would want to go out on a limb and say that the controversy on this particular shade and on others is over and finally settled. Sometimes it seems the more we find out, the more we need to know. But I would say that the considerable and additional research resulting in this book, qualifies it as the best generally available source material for painting German aircraft. It is a tour-de-force by dedicated specialists and I unreservedly recommend the publication to every builder of scale models.

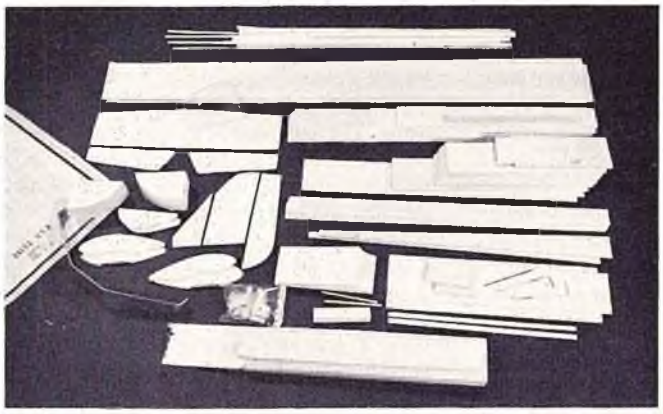
Hobbypoxy's Pointers

Hobbypoxy has recently sent out to their dealers copies of a 4 page brochure titled "Hobbypoxy Painting Pointers" and a color chart of their epoxy model finishes. The booklet gives all the information

to page 113

RCM PRODUCT REVIEW

Balsa USA SMOOTHIE



SPECIFICATIONS

Name	SMOOTHIE
Aircraft Type	Sport Pattern
Manufactured By	Balsa USA
	P.O. Box 164
	Marinette, Wisconsin 54143
Mfg. Suggested Retail Price	$21.99 (delivered)
Available From	Direct from Mfg.
Wing Span	52½ Inches
Wing Chord	10½ Inches
Total Wing Area	520 Square Inches
Fuselage Length	44 Inches
Stabilizer Span	20 Inches
Total Stab Area	102 Square Inches
Mfg. Rec. Engine Range	.35-.45
Recommended Fuel Tank Size	8 Ounce
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa, Ply and Hardwood
Wing	Balsa and Ply
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (2 pages)
Construction Photos	No

RCM PROTOTYPE

Radio Used	Westport International Variant
Engine Make & Displacement	K & B .40 R/C
Tank Size Used	8 Ounce
Weight, Ready to Fly	68 Ounces
Wing Loading	18.8 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Ease of assembly, flight characteristics, price of kit.

WE DIDN'T LIKE THE:

Idle reliability due to inverted engine.

The Smoothie is a sport pattern aircraft, designed for engines of .35 to .45 cubic inches of displacement. It is kitted by Balsa U.S.A. (P.O. Box 164, Marinette, Wisconsin), "The plain brown wrapper folks." The Smoothie is available direct from the manufacturer only.

The price is an unbelievably low $21.99 and Balsa U.S.A. even pays the UPS shipping charges!

In this age of inflated prices and declining quality, we were more than a little skeptical of any .40 engine size kit, which included a formed aluminum landing gear, ABS plastic wheel pants, formed canopy, hardware package, die-cut and shaped parts and sold for under twenty-two dollars delivered to your door.

The Smoothie is truly a modeler's kit. By that we mean that Balsa U.S.A. has produced a sound, well engineered, no nonsense R/C design, that is easy to build and flys very well.

The Smoothie comes in a sturdy, plain brown corregated box with no label or even printing on it, to indicate what is inside. Upon opening the box and inspecting the kit, our skeptical attitude vanished. We were truly impressed. While there is no superfluous, colorful label on the box, there is an abundance of quality within.

Construction

The plan sheet, while drawn well, is very basic, as is the accompanying two page written instruction sheet. If you are accustomed to step-by-step assembly instruction, complete with multiple pictorial details, you won't find them in the Smoothie kit. If the Smoothie were a beginner's kit, which it is not, we would be critical of the plan and instruction sheets for this reason. However, the Smoothie is easy to assemble and any R/C'er, who has built a few kits, should have no difficulty in constructing one.

Wood quality is good and the die cutting of both the balsa and plywood parts is crisp and precise. Balsa U.S.A. informs us that they will replace, free of charge, any kit part that does not satisfy the builder. Just send them the part you're not happy with and a replacement part will be sent to you at no charge.

The wing, which is symmetrical, has strip ailerons, and is of conventional balsa rib and spar construction with the leading and trailing edges sheeted with 3/32" balsa. The tail surfaces are all pre-cut sheet balsa. The fuselage is also conventional with sheet balsa sides and plywood doublers in the nose portion. The plans call for the fuselage top block, which extends from the spinner to the cockpit, to be removable. We elected to install it permanently for greater strength, and simply cut an opening in the plywood bulkhead in front of the wing to facilitate fuel tank removal. We also added a deepened cockpit interior (strictly for looks) as the fuselage radio compartment area is sufficiently large to allow a portion of it to be used for this purpose. Our Smoothie went together rapidly and no problems were encountered during assembly.

Covering:

The wing was covered with red Econokote and the fuselage and tail surfaces were finished with K & B Superpoxy primer and yellow and red gloss enamel.

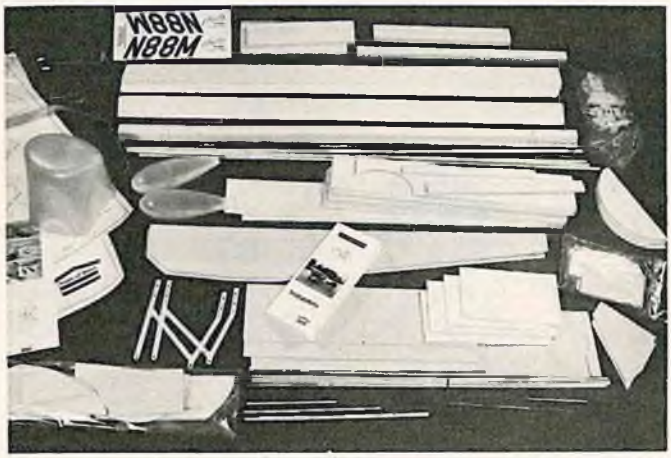
Engine:

A K & B .40 R/C engine was installed in our test aircraft for power. A Du-Bro Mufflair II was used for noise suppression and we used an 8 oz. Sullivan slant tank.

to page 112

RCM PRODUCT REVIEW

House of Balsa
PITTS S2A



SPECIFICATIONS

Name	PITTS S2A
Aircraft Type	Sport, Stand-Off Scale Bipe
Manufactured By	House of Balsa 20134 State Road Cerritos, California 90701
Mfg. Suggested Retail Price	$109.95
Available From	Both Mfg. and Retail
Wing Span	41" Top — 39" Bottom
Wing Chord	7-5/16" (both)
Total Wing Area	580 Square Inches
Fuselage Length	34½ Inches
Stabilizer Span	17 Inches
Total Stab Area	120 Square Inches
Mfg. Rec. Engine Range	.29-.40
Recommended Fuel Tank Size	8 Ounce
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa, Ply, Fiberglass, Nylon
Wing	Balsa and Ply
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (42 pages)
Construction Photos	Yes

RCM PROTOTYPE

Radio Used	Heath Tx, Royal Rx
Engine Make & Displacement	K & B Front Rotor .40
Tank Size Used	8 Ounce
Weight, Ready to Fly	84 Ounces
Wing Loading	20.9 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Ease of assembly, fiberglass parts, flying characteristics, instruction manual.

WE DIDN'T LIKE THE:

Lack of hardware and pushrod/nylon material.

Everybody seems to have suddenly "discovered" the Pitts . . . yet Curtis Pitts had the first of these aerobatic bipes flying way back in 1945.

Our introduction to this airplane came in 1947, when we saw Betty Skelton and her red and white "Little Stinker" do a number on the competition; and this dynamic duo continued to steal the show, and win the Women's Aerobatic Championship, until Betty retired from competition in 1951.

The latest version of this show stopper is House of Balsa's .40 size Pitts S2A. And, although we may seem to be up to our ears in Pitts kits, HOB's Don Dombrowski has once again filled a void by giving bipe lovers what they really want . . . a Pitts designed for the myriad of .40's that everyone seems to have at least one of.

Considering the diminutive size of the completed airplane, the 37¾" x 6" x 6½" box it comes in is unusually deep. The revelation comes when you peek inside at the size of the beautiful fiberglass cowl, wheel pants, and canopy that are crammed in with all the rest of the goodies.

Having built and flown a number of other HOB designs, we pre-supposed that we would find the same quality inside this kit, and we weren't disappointed. The famous HOB instruction manual is right there to lure the builder and spur him on. The clean die-cutting, along with the uncluttered easy-to-read rolled plans, the pre-formed landing gear, the hardware package, the molded cabane struts, all sorts of nylon fittings, and the neatly bandsawn and bagged parts tell the story: HOB has another best seller.

Building any of their kits is simply a matter of starting at the beginning of the manual and going by the numbers. Each step along the way has one or more good photos to supplement the clearly written instructions (would you believe that this Pitts instruction manual contains 229 photos). Page one even includes a list of materials needed to complete the model.

Construction:

You just unroll whichever of the two 25" x 38" plan sheets you'll be working on, correlate it to the instructions, and start cutting, assembling, and gluing; in this case, the wings are tackled first. And to make things easier, Mr. Dombrowski has included an HOB "upright," so for the very first time all your wing ribs will be installed the way they're supposed to be . . . upright.

Both wings went together with ease, partly because we used only the new Hot Stuff Super-T (it's outstanding for planking and sheeting), and partly because eveything fits so well. The top wing is built upside down over the plans which, according to Don D., allows you to build in washout. All four ailerons are cut from trailing edge stock and fitted; the bottom ailerons, driven via torque rods, are externally coupled to the upper ailerons.

The fuselage also went together with no problems. With the exception of the firewall and the cabanes, where we used Gas Model Products 10 Minute Half-Fast Epoxy, the rest of the fuselge was put together with Super T (also great for laminating doublers). The aluminum landing gear uses 3/32" music wire that does double duty as the axles and the shock absorber. Nylon blocks and fittings allow the epoxy glass wheelpants to be simply, but solidly, attached to the aluminun gear.

In order to achieve the shape and look of the full size Pitts, the bottom and lower rear sides are covered with clear MonoKote. we used black because we had no clear and had already planned on

to page 98

SOARING

Al Doig

Two Meter World Cup — This annual shin-dig seems to be generating steam. The latest edition, held in January, had 61 flyers record scores. For the past 2 years the event has been sponsored by the San Fernando Valley Flyers and the Antelope Valley Soaring Association. The site has been the high desert, near Palmdale, California. In 1980 the weather was very windy and very cold. This year the weather wasn't quite so nice. While Saturday was sunny and warm, Sunday featured a freezing rain. Fortunately I chose Sunday to attend, which permitted me to share in the misery experienced by the flyers. Who, by the way, came from England, Canada, Nevada, Washington, Virginia, New Hampshire, Oregon, and of course, California.

The thing that draws my interest to this contest is the numbers of unique aircraft entered. There were almost no stock gliders entered this year. Most everyone flew ships especially designed for the event. The predominant craft was aileron controlled, with wing loading exceeding 10 oz. Despite this, the contest was won using a rudder/elevator controlled 100" Sagitta, with the wings clipped to 2 meters. The winner, however, was Don Edberg, U.S. FAI team member, a man of considerable skill and experience. Two ships rotated the entire wing in the place of ailerons (wingerons). These were flown by Californians Steve Manganelli (9th place), and Blaine Rawdon (20th place). One ship was a low wing slope airplane flown by Dave Katagiri of Seattle (19th place). Jerry Krainock of the Valley Flyers was 2nd flying a much modified prototype Gemini, to be kitted by the Pierce Arrow Co. (Paragon). 3rd place went to Dave Johnson from Portland, Oregon, flying what I think was a 2 meter Camano. Another interesting ship was a pylon wing, aileron job flown to 18th place by Bob Champine.

The tasks were very similiar to the International FAI tasks. That is, speed, distance, and duration. These tasks have not been too popular with most flyers around the country; yet they attracted quite a number of flyers, some coming great distances to attend. In November, last year, another strictly 2 meter, 2 day contest was held in the Los Angeles area. This one was totally a thermal event affair. It did not have the publicity of the World Cup, nevertheless, only 16 flyers entered. I've concluded that the World Cup multi-task events attract the innovative flyers who likes the challenge of design. Trying to design a better 2 meter thermal airplane too often leads to the design of another Drifter II or Gentle Lady, or something.

RCM's Soaring Editor Does It Again!

Reprinted from the newsletter of the S. African Assoc. of Radio Flyers

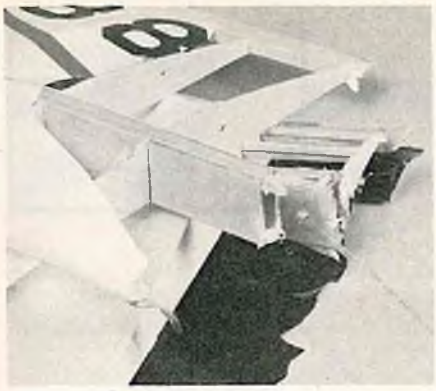
Dave Johnson, Portland, Oregon launches Seattle's Dave Katagiri's Low Winger.

Everyone stayed under cover Sunday.

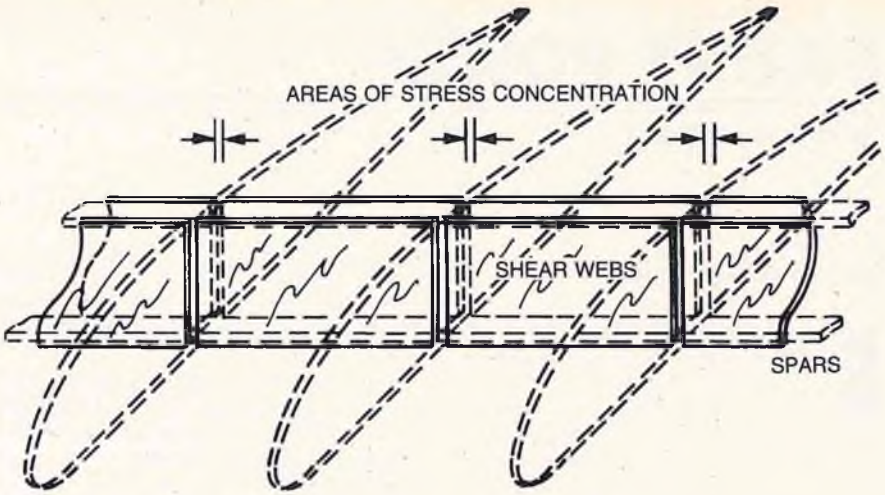
Last year's winner, Bob Torres of San Diego, broke a towhook on launch and slid to 15th place this year. Bob had some interesting comments. He observed that while there were a lot of good airplanes, few of the pilots really knew their ships. He included himself in this observation. Much time goes into designing, building and testing, and not so much in practice. As an example of what practice and preparation will do, Bob Worley of Encinitas,

The English contingent was completely instrumented to brew tea.

Contest Director, Doug Ford, followed by a sullen lynch mob.



Spar failure in #1 Paragon.



STRESS CONCENTRATION BETWEEN SHEAR WEBS IN PARAGON WING

California, decided he was going to do well in the World Cup. He built his ship early and engaged in weeks of intensive practice of the World Cup tasks. As a result, Bob, who is a relatively new flyer, won 4th place in some pretty heavy competition.

Anyway — it is a very interesting sort of contest and brings out some interesting airplanes. Scoring was done again by Dave Peltz on his Compucorp computer. Contest directors Doug Ford and Sam Brown are hoping that the World Cup will move around to other locations from year to year as interest develops. Next year there is a possibility of it's moving to Las Vegas with some rather strong cooperation of one of the hotels.

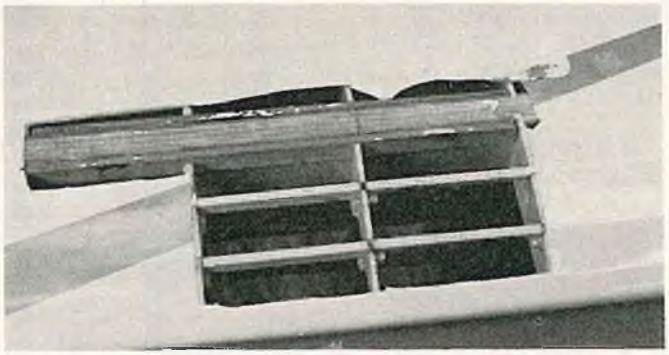
♦

The Anatomy of a Crash — My poor old number one Paragon bit the dust. It was at the very top of a tow when, with a loud **crack**, the right hand wing folded and parted company. There is no feeling so helpless as watching a sailplane with half a wing. The radio, servos, and Thermic Sniffler were shock mounted and survived. The airframe was a total loss.

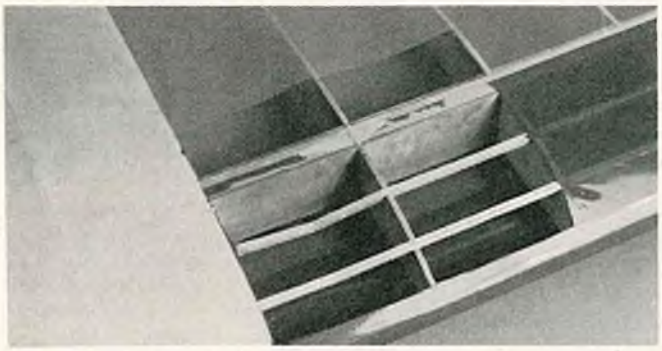
The crash had started some time previous to the day it actually happened. During a contest late in 1980, I noticed a softness in the left wing, one rib out from the center section sheeting. After much flexing the conclusion was that it was okay to fly. The incident was forgotten for a couple of weeks until the weakness progressed to a point that could not be ignored. At that point there were tell-tale wrinkles in the MonoKote over the top spar and the turbulator spars were broken just inboard from this spot. Investigation revealed a crack in the upper spar right at a rib, and **between** two sets of plywood shear webs. There was another crack in the upper spar at the next rib inboard, at the edge of the center section sheeting, **between** the sets of plywood shear webs. Repair was made by epoxying two 1/8" x 3/8" spruce members to the shear webs, through the damaged area and into the center section, as seen in the photo. Unfortunately I did not inspect the right hand spar at the time of repair. The ultimate failure of the right wing occurred at the same spot, namely between the sets of plywood shear webs, one bay out from the sheeted section (see Photo #1).

The demise of numero uno Paragon prompted a careful look at my back-up Paragon wing. Sure enough there were the tell-tale wrinkles in the same place on both

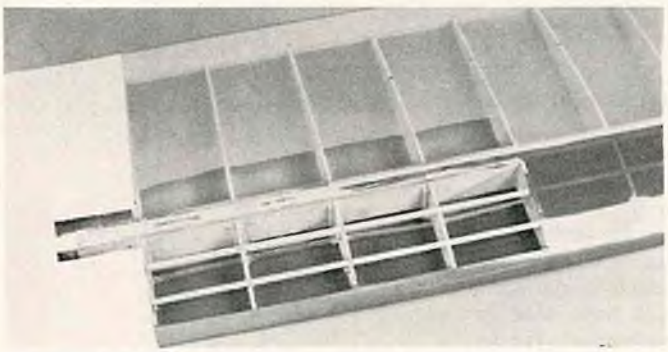
to page 96



Original repair L.H. wing #1 Paragon. Note 2 spar cracks.



Compression failures in L.H. wing #2 Paragon.



Final repair #2 Paragon wing using continuous shear web.

Compression failures in R.H. wing #2 Paragon.

SILENT POWER

Jim Zarembski

More On Folding Props

In the November 1980 Silent Power column, I wrote about the use of folding propellers on electric powered sailplanes. At the time this column was written both Estes and Astro Flight planned to introduce their own lines of folding props in the Fall of 1980. This just never materialized. Estes, as far as we know, has delayed their electric powered R/C program because of production problems. Astro Flight, with a bevy of new products and a move to a larger building, has not completed their research and development program for folding props and it now appears that they will not produce these items till later this year. Thus, after the build-up in November 1980 the demand for a folding propeller in the United States has gone unanswered. And, believe me, more letters were written to this column about folders than any other item in the last year and a half.

Jim Martin of Hobby Lobby International has addressed this desire for folding props and has announced that his firm will import selected items by the West German Carrera Company. Included will be all three Carrera folding propellers, three different gear drives, and motors, as well as several sailplane kits which are quite popular in Europe. He also has a small quantity of Carrera "Passat" electric sport models which are reported to be super sport flyers.

Carrera Passat

Carrera folding prop of approximately 15" diameter with gear drive and .15 size motor now available from Hobby Lobby International.

The smaller Carrera folding prop is approximately 9/6 size and works well with an Astro 075 direct drive utilizing the 8 cell Astro 05 pack.

A special Carrera catalog is available for 50¢ from: Hobby Lobby International, #1 Franklin Pike Circle, P.O. Box 285, Brentwood, Tennessee 37027.

New 05 System

Leisure Electronics has annnounced their first entry into the electric powered model aircraft field. R/C electric car enthusiasts have been familiar with their quality line of custom wound electric car motors and a wide variety of battery packs and chargers for these systems for a number of years. Now, Roland Boucher, President of Lesiure Electronics, intends to use the knowledge gained producing "hot" car motors to develop a "new generation" of electric flight systems.

The premier outgrowth of this development program is the new Lesiure Electronics' "Black Label" 05 which should be available at press time. This motor features two ball bearings, a special hand wound and epoxy balanced armature and is similar in size to other 05 motors.

The flight battery consists of six Sanya 1.2 AH cells. The motor battery combination was designed specifically for the Cox gray 6/4 prop. Using the 6/4, the Black Label 05 tachs at 13,500 rpm. However, the real breakthrough is in flight duration which is said to be in the 8 to 10 minute range when flying acrobatics. The flight system weight is 16 oz. and comes pre-wired.

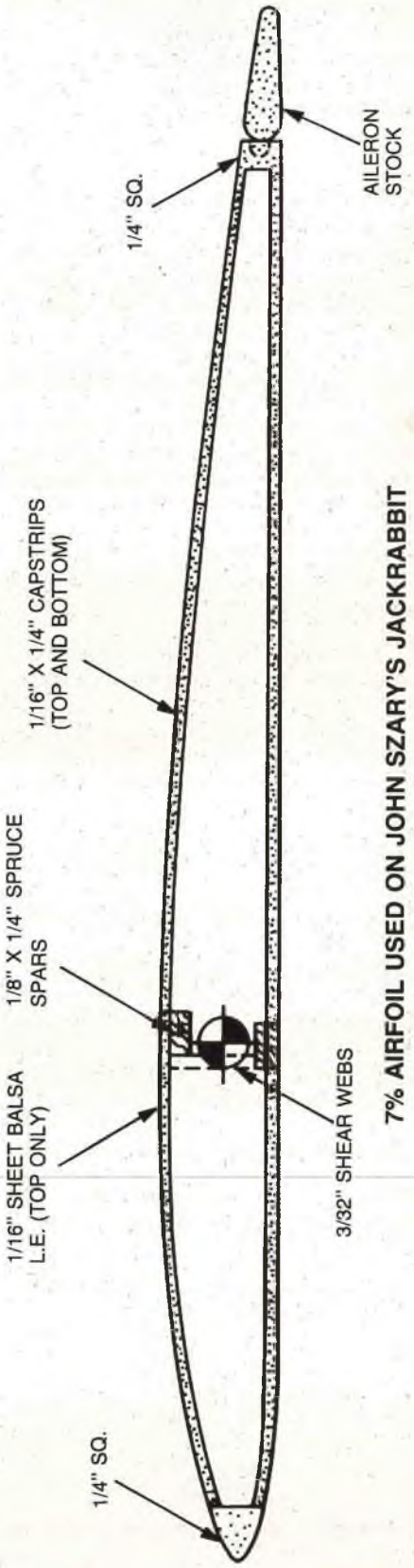
This flight system will work best in models in the 250-300 sq. in. range. According to Roland, a Kraft Cessna Cardinal using the Black Label flew inverted, did "round" loops from level flight, and had duration of over 11 minutes while acting as a test bed for the new system.

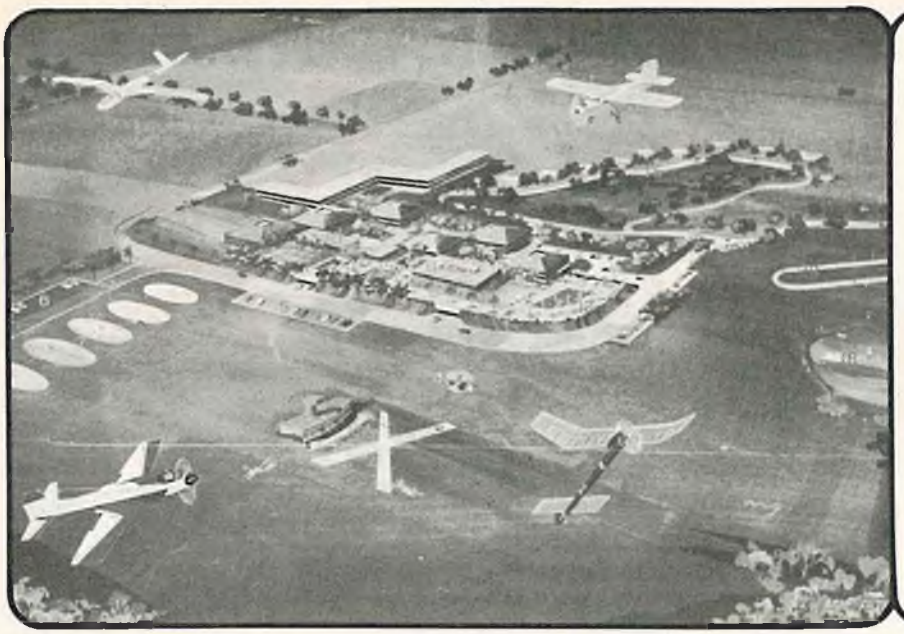
The motor sells separately for $39.95 and the entire system, including switch harness and flight pack, is listed at $75.00. For information write to: Leisure Electronics, 11 Deer Spring, Irvine, California 92714.

Electric Sport Model Evolution — Reduce Drag

In the mid-1970's, when electric power was in its formative stage, the trend was to use high lift relatively thick airfoils. I, personally, used airfoils in the 10% to 12% range until 1979. Then in California a number of small 05 powered pylon racers began to appear which have lead to exceedingly improved performance. For the 05 size motor the trend is to design models

to page 91





R/C WORLD

An Ideal Community For Modelers

By Drew Alexander

A new idea in modeling, sponsored by leaders of the industry, will soon result in the creation of a year round paradise for hobbyists. It is a fascinating concept named R/C World of Florida, Inc., a multi-million dollar planned community for modelers. R/C World will offer over two hundred acres of the finest model airplane and boating facilities imaginable, luxurious condominiums and individual homesites, and the near perfect weather of Orlando, Florida. R/C World will make it possible for modelers to enjoy their sport whenever they wish and in a style that is unsurpassed. It will eliminate from modeling the problems of bad weather and loss of flying fields to encroaching commerce.

The founders of R/C World are Lee Painter and Bill Sharpe of Richmond, Virginia. Mr. Painter has an eight year background in real estate and raising real estate venture capital, and has run the entire model gauntlet from plastic kits to R/C Stand-Off Scale. Mr. Sharpe, a modeler for over twenty-five years, is an engineer and former general sales manager of an eighteen million dollar real estate investment trust. "Fifty percent of all modelers in the United States live in the northeast quadrant of the country," says Mr. Painter. "Because of the weather, they enjoy their outside activity for only four or five months per year. Even those modelers who live in a milder climate face the growing problem of losing scarce flying fields to expanding business." Mr. Painter and Mr. Sharpe offer an imaginative solution to these problems.

They have recently organized Hobby Associates Limited, a Florida limited partnership comprised of thirty leaders in the model industry. Hobby Associates sponsors R/C World of Florida, Inc., and nine of its members serve as R/C World's board of directors. Limited partners include Sid Axelrod, President of Top Flite Models, and Frank Garcher, President of Midwest Models. Sig Manufacturing is a limited partner, as are two popular hobby magazines, RCM and Model Airplane News. Ed Mate, the architect who designed the Chicago Hyatt Regency Hotel, and Harold Parenti, a designer for Top Flite Models and prominent scale competitor, contribute their expertise. Also involved in R/C World are Ed Izzo, inventor of the foam wing, and Dave Brown, an international pattern flyer. Both Bob and Doris Rich, the couple who made the first transcontinental radio control flight, furnish their support.

An equally impressive group of modelers serve on R/C World's nine member Board of Directors. Included are Dr. Walt Good, who is a pioneer in radio control, and Warren Hitchcox, President of the Model Aeronautic Association of Canada. Corporate attorney Bill Mathews and communications company President Chuck Foreman are AMA District Vice-Presidents, and Jim Greer, a respected pattern flyer, is the owner of one of the most successful grinding wheel and abrasive companies in the country. Two board members, Dixie Cutrone and Mario Yederlinic, are commercial developers experienced in building condominiums, apartment complexes, and shopping centers. These people, with their successful business backgrounds and knowledge of modeling, will play an integral role in making R/C World the largest project modeling has ever known.

But it is the incredibly vast array of hobby facilities to be enjoyed in R/C World that makes it exciting. Radio control pilots will practice touch and go's on paved directional runways twice as long as a football field. Multi-engine Quarter Scale planes will discover plenty of room to spread their wings and soar, while below, their transmitting frequencies will be monitored by an elaborate and functional control tower. Taxi-ways will lead to spacious pit areas housing underground terminals that signal to modelers which frequency is being used at any given moment. A short distance away, an avenue of control line circles will buzz with stunt flying and dog-fighting. Free-flighters will have their own domain where they can launch their planes into open skies, and boating enthusiasts will zip their crafts atop smooth water in a scenic lake. For sportsmen requiring supplies or refreshments, the grounds will have a hobby shop with food and beverage bar, and for the brief shuttle between the recreational and residential areas, a comfortable golf tram will be provided. These are only a few amenities modelers will enjoy in R/C World, and the residential section is equally enticing.

Energy efficient condominiums and individual homesites will provide a wide selection of housing to residents who will live in R/C World. Several different floor plans will be offered, and each includes a hobby room equipped with special screening, enabling a modeler to fine tune transmitter adjustments on his craft without interfering with frequencies on the field. Other standard features will include central air conditioning, cozy eat-in kitchens, and an abundance of closet space.

Modelers will enjoy an olympic size swimming pool, asphalt tennis courts, and an elegant clubhouse complete with restaurant and cocktail bar. A social director will organize dances, plan barbeques, and supervise the banquets that will follow national and international competitions hosted by R/C World. A discreet distance from the residential section, ample camping facilities will accommodate vacationing modelers.

Every comfort necessary to cater to the modeler's slightest whim will be found in R/C World, and through the public placement of preferred stock, it is conceivable that this wonderland will be owned and managed entirely by hobbyists.

to page 91

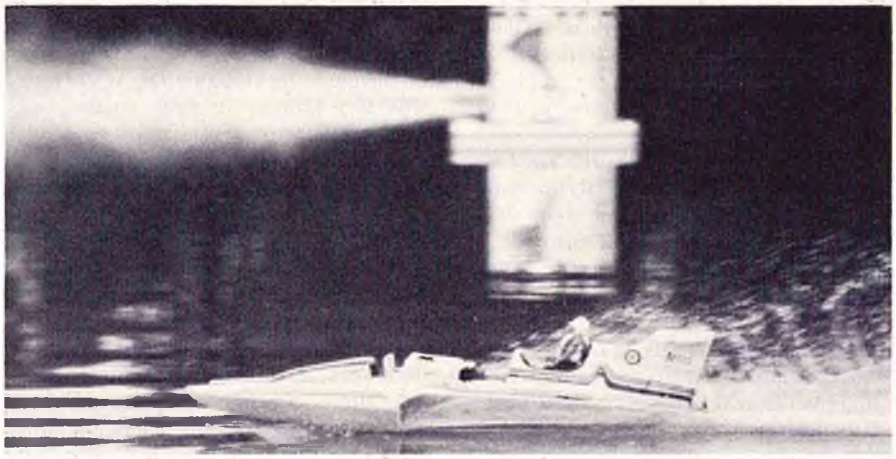
Trophy winners: In front, David Preusse, 1st place and winner of Concourse Trophy donated by RCM. Left to right back row: Bob Preusse, 2nd place; Doug Riha, winner of Consolation Race; Gary Preusse, 3rd place.

1980 SILVER CUP TROPHY RACE

By Bob Preusse

Some of the boats line up for Concourse judging.

Gary Preusse and Miss Budweiser, U-12, controlled by Kraft radio.



Atlas Van Lines getting up on step with the starting clock in the background.

On September 28, the Minute Breakers Model Power Boat Club of Elmhurst, Illinois, hosted the 7th Annual "Silver Cup Trophy Race" for 1/8th Scale unlimited hydros. This event is the oldest scale boat race in the Midwest and has become a popular race for the scale boat drivers vying for the prestigious perpetual "Silver Cup." Spectators seem to appreciate the scale Unlimited Class because the boats look like the race boats they've seen in person or on T.V. The realism factor is important for the drivers and spectators. All boats are complete with drivers, cockpit instrumentation, dummy engines, prototype paint schemes and markings.

The past six "Silver Cup" trophy races have been won by Miss Budweiser, U-12, driven by Gary Preusse of Oakbrook Terrace, Illinois. The Budweiser is capable of 60 mph plus. It is very fast on the course as it also corners very smoothly with little loss of straightaway speed. Without question, the Bud was the race favorite on Sunday morning. Like a good book though, I won't divulge the winner now.

This year's event was held at Tollway Lake near Aurora, Illinois. With the elevated shoreline, this lake is ideal for racing as the drivers have a good angle to view the course. Considering the time spent on building these boats, we wanted a safe race so that was another factor used in selecting this site. Our course simulated the one used by the big thunder boats on the Detroit River. It has one

Fred Goodman and his Miss Timex.

The new Circus Circus, U-31, owned by Ed Ojenus.

wide-sweeping five buoy turn (about 200 foot diameter) and a standard size turn used on the I.M.P.B.A. 1/3 mile oval. Thus, the drivers competed on an egg-shaped oval which seems to be fair for all the boats whether they run fast and turn a little wider in the corners or slow down a little quicker at the end of the straightaway to run tight on the buoys. As shown in the photo, our new clock was positioned in the center of the course on the start/finish line.

During the driver's meeting, the drivers were asked to select the three boats which were the best looking at the meet. Usually the Concourse Trophy winner is selected by an independent judge at the scale contests; however, this year we thought we would let the drivers do the selecting. After all, it would be an honor to receive an award in competition judged by your peers. Each unlimited was judged for quality of construction (0-10 points); detail, paint scheme, finish (0-10 points); and overall appearance (0-10 points). The judging took about 1/2 hour and the drivers had a good time selecting a winner. The 1980 Concourse winner was Miss Madison, U-6, owned by David Preusse. This is David's rookie year on the unlimited circuit, even though he has been R/C boating for ten years. Congratulations, David, on a beautiful entry. All the drivers wish to thank R/C Modeler Magazine for sponsoring the Concourse Award which was a beautiful engraved plaque.

All of the unlimiteds this year seem improved in speed and handling characteristics over previous years. One gets the feeling that more and more boaters are interested in the scale unlimited class and are making an effort to promote the class and improve their boats, which is good for the hobby. Doug Riha's Natural Light is a good example. This is Doug's third scale boat and is the best handling. It is complete with a gear box which, if nothing else, makes it sound great winding up. Although the Miss U.S. built by Doug was very nice looking, I think the Natural Light is the best he has built.

In heat 1A, the Hawaii Kai III, driven by Gerald Urban, led the four boat heat which included Atlas Van Lines, owned by Shon Casey from Indianapolis, currently second in District IV points, Miss Exide, a beautiful round nose from years gone by, driven by Harold Root, and the Natural Light with its silver and blue paint

to page 89

FINAL STANDINGS 1980 SILVER CUP

Place	Unlimited	Owner/Driver
1	Miss Madison U-6	David Preusse
2	Sunny Jim U-22	Bob Preusse
3	Budweiser U-12	Gary Preusse
4	Hawaii Kai III U-8	Gerald Urban
5	Oly Beer U-74	Bill Pistello
6	Miss Exide U-75	Harold Root

CONSOLATION RACE

Place	Unlimited	Owner/Driver
1	Natural Light U-13	Doug Riha
2	Circus Circus U-31	Ed Ojenus
3	Atlas Van Lines U-71	Shon Casey
4	Miss Timex U-44	Fred Goodman
5	Miss Technicolor U-76	Phil Thomas
6	Circus Circus U-31	Roger Miller

We wish to thank all those who contributed to our prize and trophy list.

Atlas Van Lines owned by Shon Casey. Shon finished second this year in District IV points.

Miss Madison owned by David Preusse won the Racing and Concourse events.

HOROSCOPES ANYONE?

See how destiny affects your flying

By Ernest M. Olsen

Aquarius (Jan. 20-Feb. 18) — You have an inventive mind, are inclined to be aggressive. You dive on the runway just when someone else is taking off. You lie a great deal. On the other hand you are inclined to be careless and impractical. Stop nailing your models together and start using glue like everyone else does.

Pisces (Feb. 19-Mar. 20) — You have a vivid imagination and often think you are being followed by the CIA or FBI. Maybe its because you are flying on 53 MHz with a 72 MHz ticket. You lack confidence and are generally a coward. You get air sick the minute your plane leaves the ground.

Aries (Mar. 21-Apr. 19) — You are the pioneer type and hold most people in contempt. You are quick tempered, impatient and scornful of advice. You never ground check your radio. You are not a very nice person. You fly your plane at full speed over the pit area.

Taurus (Apr. 20-May 20) — You are practical and persistent. You have a dogged determination and work like hell. You insist on flying in 20 mph winds when your talent stops at 10 mph. Most people think that you are stubborn and bull headed. You have a closet full of broken planes.

Gemini (May 21-June. 20) — You are a quick and intelligent thinker but your fellow flyers don't like you because you borrow frequency pins. Also, you are inclined to expect too much for too little. This means you are cheap. Your wings are held on by scavenged rubberbands.

Cancer (June 21-Jul.22) — You are sympathetic and understanding to other people's problems. You are always lending your tools and fuels. They think you are a sucker. You will never make anything of yourself. Cancer people are afraid of taking their planes off the ground.

Leo (Jul. 23-Aug. 22) — You consider yourself a born leader, others think you are pushy. You hog the whole sky. Most Leo people are bullies. You are vain and dislike honest criticism. You crash more planes in a year than any other flyer.

Virgo (Aug. 23-Sep. 22) — You'er the logical type and hate disorder. This nit-picking is sickening to your friends. You slow down flying club meetings and delay the coffee break. You are cold and unemotional and sometimes fall asleep while making love. Your bedroom is so full of planes you haven't noticed that your wife has left you.

Libra (Sept. 23-Oct. 22) — You are the artistic type and have a difficult time with quality. If paint jobs could fly, you would be the best. Chances for monetary gains are excellent . . . you'd sell your own sister. Your planes are the only ones that fall apart on the way up.

Scorpio (Oct. 23-Nov. 21) — You are shrewd in business and cannot be trusted. Any engine you trade will not rev up above 8000 rpm. You will achieve the pinnacle of success because of your total lack of consideration for others. Never buy a used plane from a Scorpio.

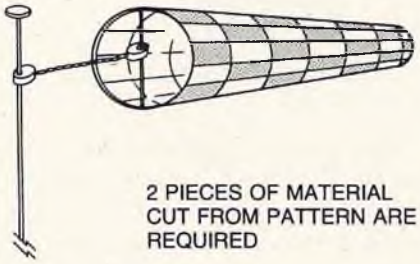
Sagitarius (Nov. 22-Dec. 21) — You are optomistic and enthusiastic. You have a reckless tendency to rely on luck since you lack talent. None of your maneuvers can be found in any flying manual. The majority of Sagitarians are drunks or dope fiends. People laugh at you a great deal, except when you fly into their planes.

Capricorn (Dec. 22-Jan.19) — You are conservative and afraid of taking risks. You are still using a buddy box after five years of flying. You don't do much of anything and are lazy. There has never been a Capricorn of any importance. A Capricorn glues himself to his plane whenever he uses instant epoxy. □

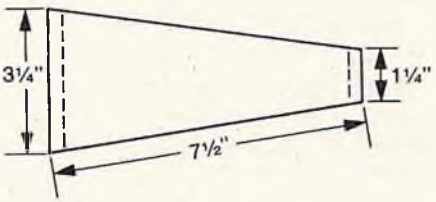
FOR WHAT IT'S WORTH

Have you ever tried to drill an aluminum motor mount and burned up your drills and taps? Your troubles are over if you use ordinary candle wax on the drill and tap for lubrication. Don't heat the wax as this loses the wax lubrication qualities. Just rub wax on the drills and taps and do your thing. This idea was submitted by Richard Lynn of Clifton, Colorado.

A unique frequency flag is used by Mark Lindgren of Northridge, California. It is made of checkered material in the appropriate colors,and is shaped like a miniature wind sock. The sketch shows the pattern. Two pieces are required, which are first sewn together lengthwise, hemmed at the back, and then hemmed at the front, around a wire hoop, as shown in the accompanying sketches. The wire hoop has a center brace, to which a short piece of string or nylon cord is attached. It is then attached to the top of the antenna.

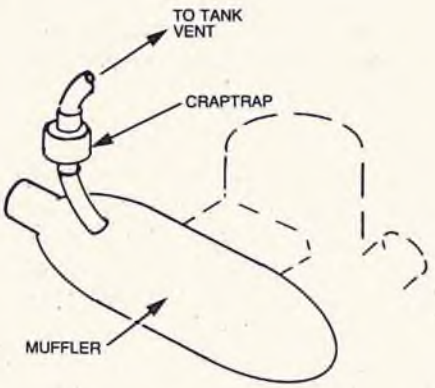


2 PIECES OF MATERIAL CUT FROM PATTERN ARE REQUIRED

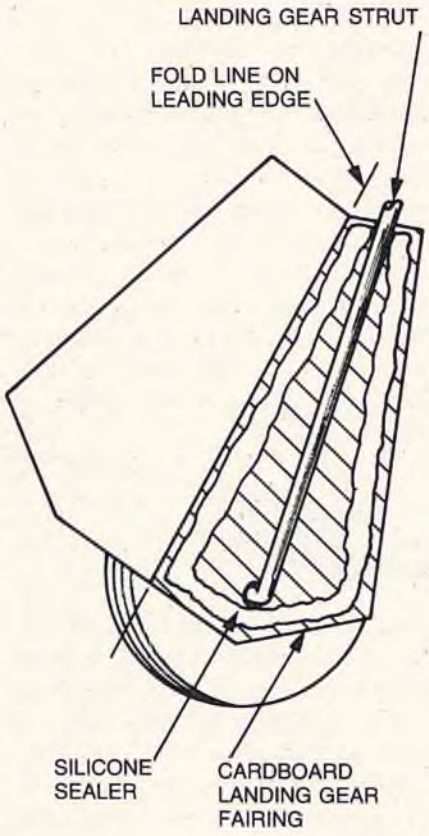


RING WITH CENTER BRACE MADE TO FIT LARGE CIRCLE

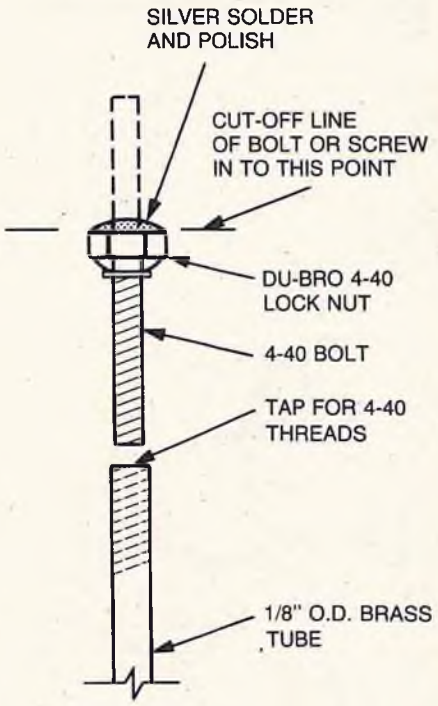
Everybody knows that an inline filter should be used between the fuel tank outlet and the carburetor inlet. But . . . how about installing a filter between the pressure tap on your muffler and the fuel tank vent as shown in the sketch? Why? Well a high efficiency filter such as the Sullivan "Crap Trap" will do the following: Keep most of the engine break-in residue from recycling into the engine during the first hours of operation; keep most of the carbon and varnish-like products from recycling into the engine during all operation. This idea was sent in by Dave Kovensky, reprinted from the Carrier Wave newsletter of the McDonnell Douglas Radio Control Model Airplane Club.



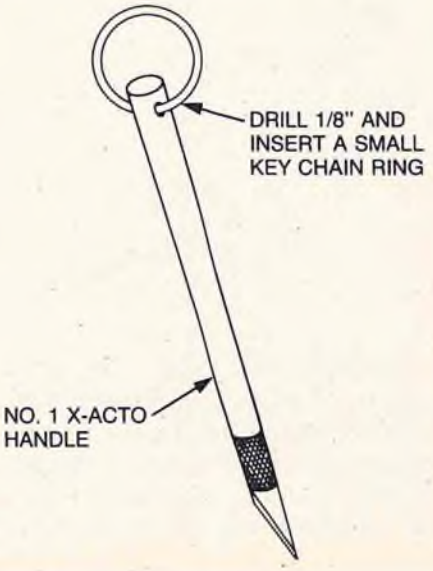
An inexpensive method of making landing gear fairings is used by John G. Chapis of Seaford, Delaware. The drawing is self-explanatory. Besides adding a touch of class to his models, it is flexible and is easy to construct.



For a functional gas cap for scale models, take a look at the sketch of one in use by Bob Ferber of St. Peters, Missouri. It is made of common hardware normally found on or around any workbench. The sketch is self-explanatory. Note that this, or any cap, can only be used on systems which utilize another line as a breather, or are pressurized and thus completely sealed.

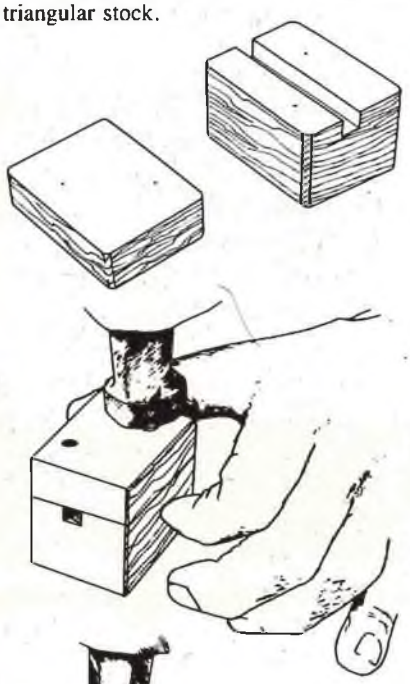


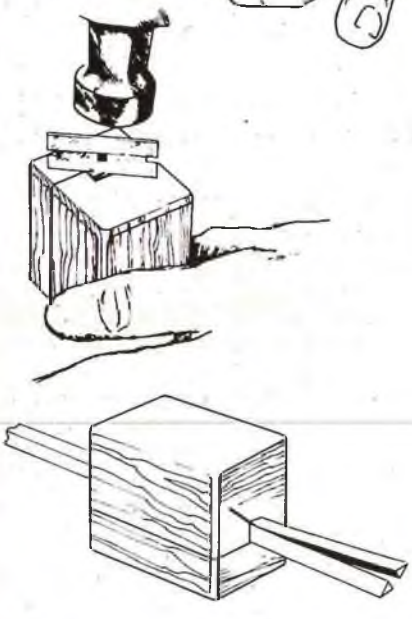
The old problem of the X-Acto knife rolling off the work bench and sticking in a foot is solved by Allan W. Wehman, Ladson, South Carolina. See sketch. The ring also makes it easily stored on a peg board.



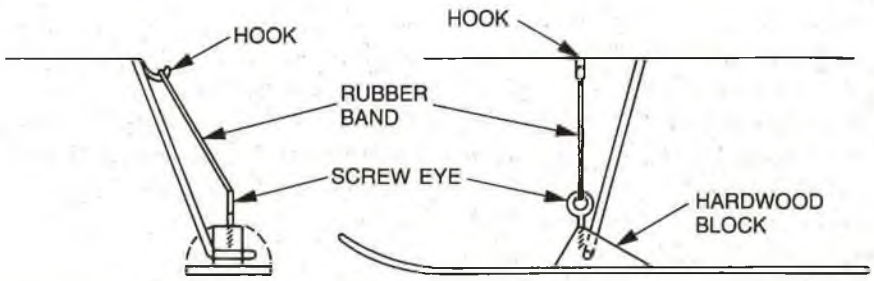
FOR WHAT IT'S WORTH

A handy gadget for cutting triangular strips from 1/4" sq. balsa is submitted by Bob Evens of Mayfield, Kentucky. Use a piece of soft wood (Bob used cedar) about 1½" sq. and 2½" long. Cut in two pieces, with the grain, a little off center. Cut a 1/4" sq. groove in the thick piece. Tack the "lid" back on. Tap a single-edge razor blade diagonally across the hole and break off the thick back with pliers. Push a 1/4" sq. balsa strip through the hole and out comes perfect triangular stock.

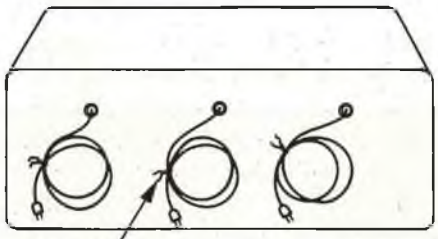




John Breitenbach of Silver Bay, New York, would like to pass along a method of attaching skiis that he uses that is very simple and fast. Keep the screw eye directly above the hole for the landing gear wire and the rubberband will hold the ski in a horizontal position. The amount of spring can be governed by the strength of the rubberband.

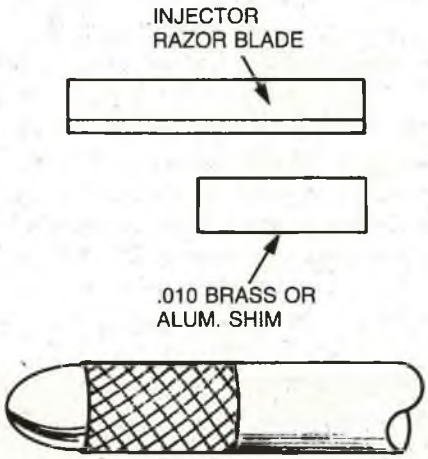


Andrew Gall of Portage, Pennsylvania, does not care for the dangling power cords and wire leads that often clutter the average R/C modeler's workbench. The sketch shows his solution; he simply rolls the wires up into small diameter coils and secures them with those little ties that come with plastic trash bags.

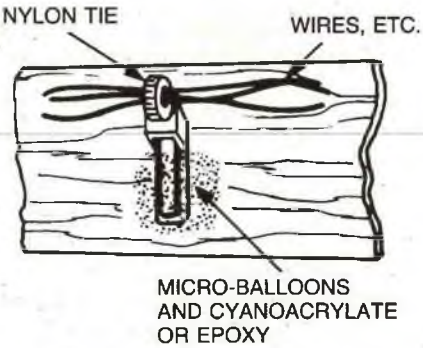


Don't throw away those throw-away razors — the blades become great tools for making grooves for strip aileron horns, and also work very well for hollowing out soft balsa wingtip blocks, cowls, etc. Half of a stainless steel double-edge razor blade will work, too. Bend the blade around a piece of wire or tubing of the desired size and insert **both** ends into a medium size X-Acto knife handle. Plan on breaking a few before you get the bending technique perfected. This idea was submitted by Darrel Stebbins of Olympia, Washington.

R.J. Barbosa of Miami Lakes, Florida, discovered that when injector razor blades are no longer sharp enough to shave with, they are still good for many modeling chores. He found that with the addition of a .010 brass or aluminum shim, they can be chucked quite securely in the medium, No. 2, X-Acto knife handle. See sketch. They are especially handy forjobs where a sharp point is not needed, such as trimming plastic covering, silk, etc.



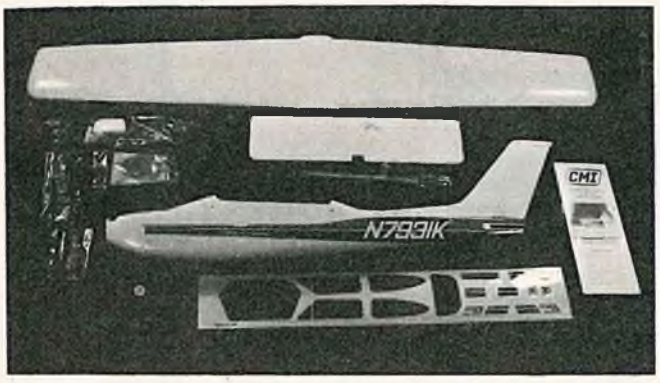
Dangling servo leads, loose retract air lines, etc., can sometimes be dangerous, or at least a nuisance. Ken Perluke of Bel Air, Maryland, tells us how he controls them in his models. Ken uses small readily available nylon tie traps, held in place with a mixture of micro-balloons and epoxy, or cyanoacrylate. They are easy to install, sturdy yet easily removable, inexpensive, and neat as shown in the sketch.



Send your hints & kinks to RC Modeler, P.O. Box 487, Sierra Madre, Ca. 91024 & win a free book from RCM's Anthology Library Series if your idea is used.

RCM PRODUCT REVIEW

Kyosho Co. Ltd.
CESSNA 177 CARDINAL



SPECIFICATIONS

Name	CESSNA 177 CARDINAL
Aircraft Type	Sport Trainer
Manufactured By	Kyosho Co. LTD.
Distributed By	Calif. Model Imports P.O. Box 1695 Garden Grove, California 92642
Mfg. Suggested Retail Price	$99.95
Available From	Both Mfg. & Retail
Wing Span	45 Inches
Wing Chord	6.4" Average
Total Wing Area	287 Square Inches
Fuselage Length	32½ Inches
Stabilizer Span	16 Inches
Total Stab Area	64 Square Inches
Mfg. Rec. Engine Range	.09 to .10
Recommended Fuel Tank Size	Pre-installed
Recommended No. of Channels	2-4
Rec. Control Functions	Rud., Elev., Throt., Ail. (optional)
Basic Materials Used In Construction:	
Fuselage	Foam and Ply
Wing	Foam and Spruce Spar
Tail Surfaces	Foam
Building Instructions on Plan Sheets	No (no plans)
Instruction Manual	Yes (11 pages)
Construction Photos	Yes

RCM PROTOTYPE

Radio Used	Cannon Sport "5"
Engine Make & Displacement	O.S. Max .10 FSR
Tank Size Used	As installed, about 2.5 oz.
Weight, Ready to Fly	31¼ Ounces
Wing Loading	15.7 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Sleek appearance, nice colors, good packaging, ease of assembly. and motor mount. Slick battery/receiver hold down.

WE DIDN'T LIKE THE:

See text for details.

The C.M.I. Cessna 177 Cardinal is a .10 size all-foam R.T.F. 3 or 4 channel sport/trainer. It is being imported by California Model Imports, From Kyosho, and will be available at your local hobby retailer. All the buyer need do to ready his or her model for flight is install an engine and radio. Opening the 6" x 8.5" x 45.5" box revealed all the foam parts packed in bubble plastic to prevent damage. The hardware provided is complete and packed in plastic bags which are grouped as to usage, i.e., wing dowels with rubberbands, etc. The quality and finish of the foam parts is excellent.

Construction:

No plans are provided or necessary. An 11 page instruction manual is included to assist the builder. One or two paragraphs and a photo are devoted to each phase of assembly. Someone with no prior experience would benefit from more detailed instructions. As an example, the motor is bolted to a pair of tapped and machined plates which are then bolted to the glass filled nylon motor mount. When done properly the necessary right thrust is built in. It is possible to reverse the plates and get left thrust! No mention whatsoever is made of this in the instructions. When C.M.I. was called regarding this problem, we were informed the production models are being set-up with the motor mount installed. Great!

Total assembly time was around four hours. If a Futaba radio is used where the servos just have to be screwed in, the time can be cut considerably.

Covering:

No covering or painting is necessary. The plywood firewall looked as if it could use some type of additonal sealer. The finish in that area was sparse, however, we were informed the entire model including the firewall has been sprayed with a clear fuel-proof material.

Engine:

C.M.I. recommends an O.S. Max .10 FSR for this aircraft. Since we had one on hand, it was installed with the standard muffler. Extra mounting plates are provided for the Enya .09 as well. The only thing we found in this area that might possibly be a problem is a thumb size hole in the firewall through which the fuel lines are routed at the factory. We felt this should be plugged to prevent fuel and fumes from entering the fuselage. Some white silicone did the job.

The pre-installed fuel tank appears to hold about 2.5 ounces. A short rubber tube is provided to help deflect exhaust glop away from the model.

Radio:

A Cannon Sport 5 radio was installed in the model. A plywood servo tray is provided for three standard servos controlling rudder, elevator and throttle. This tray is set up for most of the Futaba servos. Ailerons can be added by the buyer as an option and the conversion is shown in the instructions. All necessary hardware for this is included. The receiver and battery pack is wrapped in foam rubber which is provided. They are held in place by rubberbands cleverly installed in the roomy fuselage. Not only is the completed radio installation neat, but when the wing was strapped on, the model balanced properly.

Flying:

The model weighed 31.25 ounces ready to fly. No control throws are given so we started with 1/4" elevator travel and 1/2" on the

to page 89

CESSNA 177 CARDINAL

from page 77

. . . rudder. Test flights indicated the need for more rudder. Increasing the throw to 3/4" improved the flight performance. Due to the lack of dihedral, roll maneuvers are slow. Turns, however, are smooth and positive. If ailerons are installed, the aircraft becomes very responsive in the roll rate. It makes a world of difference in the performance.

A beginner would have to try pretty hard to get into trouble. The .10 size engine is more than enough power. We could maintain level flight on one half throttle. Ground handling is excellent and the model glides well too. After several flights we found the main gear mount loose, however, some epoxy cured this problem. It would be wise to epoxy this before flying.

We felt the wing was a bit on the weak side. Again, a call to C.M.I. brought results. This has been taken care of on the production models. A spruce spar has been molded into the wing. We were also informed that spruce spars have been molded into the tail group. That came as a very pleasant surprise.

Conclusion:

The Cessna 177 Cardinal is a great looking, good flying R.T.F. sport trainer. A beginner could assemble it, but a more detailed set of instructions would be helpful. Strengthening the landing gear and plugging up the hole in the firewall would add considerably to the longevity of the model. For looks, ease of assembly, and flyability, the C.M.I. Cardinal is hard to beat. □

1980 SILVER CUP TROPHY RACE

from page 73/72

. . . . scheme owned by Doug Riha of Darien, Illinois. Unfortunately, Natural Light received a bad launch and could not get restarted in time, so the battle developed between Hawaii Kai, Exide,and Atlas. After two laps, Atlas rolled over in the turn and from there on Hawaii Kai held a half lap lead for the final four laps over Exide. Harold Root should be congratulated for the fine race preparation on Miss Exide as he amassed 825 points in his first race driving this boat. Also, I think Jerry Urban has really been doing some work on his OPS as the Hawaii Kai never looked better.

In heat 1C the field of four boats included Miss Madison, driven by David Preusse, the Oly Beer, U-74, built by Bill Pistello, the colorful Miss Technicolor by Phil Thomas, and a very fast Miss Timex, built and driven by Fred Goodman. The race developed between Miss Madison, Timex,and Ole Beer for the first three laps, then Madison

started to open up its lead and took a clean 400 points, while Timex took second and Oly took third.

Heat 2C featured an unfortunate accident. After one lap Circus Circus owned by Ed Ojenus, with its beautiful paint job, was really smoking down the back stretch hotly pursued by Miss Budweiser, U-12. The Bud boat hooked in the turn and spun-out. Gary was bringing the boat back up on step turning the Bud around right next to the #5 point bouy. At the same time Atlas Van Lines was running a tight course coming into the turn and the result was a head on collision. Needles to say, both boats needed repairs to complete the day of racing. Boy, that duct tape, or should I say speed tape, works great for replacing sponson sides, right Bud! By the way, Circus Circus, U-31, won the heat.

Another exciting preliminary heat was 3A. Natural Light had the best start and dominated the heat with a fast 400 points. The excitement developed between the Oly Beer and the author's Sunny Jim, U-22, which is an old style round nose. The Sunny Jim had some catching up to do to reach the Oly Beer — on the last lap only a few feet separated the two boats! Through the final turn Sunny Jim took the inside lane as the two sprinted for the finish line. Oly Beer held on to second place in the near photo finish. Sunny Jim took third and Circus Circus did not finish the heat.

Going into the Main Event the Miss Madison had a perfect 1200 points followed by the Sunny Jim with 875 points; also in the big race were Miss Exide, Budweiser, Oly Beer, and Hawaii Kai. Now you forget all previous points scored in the preliminary heats. All six boats in the Main Event have a shot at the prestigious "Silver Cup." This winner-take-all concept follows the same format of the big thunderboats.

All six boats got into the water quickly and the drivers began to jocky for position as they gauged the starting clock. The Miss Exide died during the mill laps. She was parked in a precarious position about 60 feet past the start line in the number four lane. All drivers were alerted and no mishaps occurred. As the boats roared down to the start line 5 . . . 4 . . . 3 . . . 2 . . . 1, the gun went off. Four boats hit the start line almost simultaniously. In lane one was Budweiser, lane two — Miss Madison, lane three — Hawaii Kai, and lane four — Sunny Jim. The first three boats drove to the right of Miss Exide into the first turn. Meanwhile, I took the Sunny Jim to the left of Exide and drove back quickly to the course. The Oly Beer was slightly behind the pack in the first turn staying out of trouble. Hawaii Kai spun out in the first turn and the Sunny Jim moved into third place. The Madison and Budweiser were really smoking for the lead. The Madison passed the Bud boat on the third lap as my memory serves me. Remember, I'm driving the Sunny Jim while trying to draw mental notes on the progress of the race. The Bud drove hard trying to catch Madison but, in the attempt, cut two bouys losing 100 points.

Meanwhile, the Sunny Jim, Hawaii Kai, and Oly Beer were trying to take third place or second place, the way Budweiser was cutting the bouys. Coming around to the finish were Madison, Budweiser, Sunny Jim, Hawaii Kai, and Oly Beer. Sunny Jim was awarded second place and Budweiser third place due to the bouy cuts. Congratulations rookie driver, David Preusse, for winning the 1980 "Silver Cup" Trophy Race. This is the first time in our District that the most beautiful boat (Concourse Winner) also won the race!

The Natural Light was very impressive in winning the Consolation Race. Doug Riha really wanted to get in the Main Event, so I guess he decided to just smoke five other boats. No problem! □

R/C WORLD

from page 71

"Instead of borrowing money from banks and paying their high interest rates," explains Mr. Painter, "why not offer shares of ownership in R/C World to modelers and pay them the interest? It's an investment in something they are familiar with, it is backed by real estate, and run by modelers who want to do something positive for the industry." Ownership of stock will be spread throughout the fifty states and Canada in order to develop a broad base of support, for once R/C World is established, Mr. Painter and Mr. Sharpe envision building similar projects in the mid and far west regions of the United States. Stockholders in R/C World will automatically own a portion in subsequent enterprises. Dividends will be based on profits received from the sale or rental of condominiums and individual homesites, fees from campground facilites, and income generated by hobby shops, restaurants and boutiques.

R/C World of Florida, Inc., is a practical concept designed with imagination. It is supported by leaders in the hobby industry, and is fast becoming a reality. Offering the finest in facilites, housing and weather, R/C World may be the future of modeling.

To receive additional information concerning R/C World, modelers are invited to contact: R/C World of Florida, Inc., 216 East Jackson Street, Orlando, Florida 32801, or R/C World of Florida, Inc., c/o Mr. C. Lee Painter, 2307 Leighton Court, Richmond, Virginia 23233. □

SILENT POWER

from page 70

.with 7% to 10% thick airfoils, flat, semi-symmetrical, or symmetrical with 200 to 300 sq. inches of wing area. Driven by the new miniature servos these models weigh 28 to 30 oz. RTF and generally do not use landing gear. I have flown three aircraft of this type and have truly enjoyed rolls, loops,

inverted flight, etc., that were not possible with most of the earlier electric models that have been flown. In addition a well broken-in battery on a mild summer day would yield flights in the 5½ minute range with a Cox gray 6/4 prop. Why? The answer is apparently that at the higher flying speeds 55-60 mph of these models the prop is more efficient and it pulls less current. The chart below was originally seen in the Keller Motor Catalogue and shows the relationship of powered duration and current draw of a flight system for .55, 1.2 AH cells. Thus it appears that reducing current by reducing drag will increase flight time. Again, streamlining, thinning of airfoils, and reduction of wing area all have an impact.

Any comments on this are welcome. I feel, along with others, that increased acrobatic ability along with increased duration will have a great deal of influence on how fast electric power grows in this country.

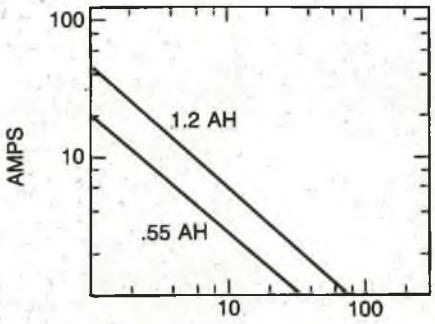
Jackrabbit uses 7% thick flat bottom airfoil.

Craig Christensen and Crash Evanson with some electric beauties in Apple Valley, Minnesota.

Jim Zarembski with Astro 05 powered Super Malibu.

to page 94

from page 92/70



RELATIONSHIP BETWEEN MOTOR LOAD IN AMPS AND MOTOR DURATION FOR ELECTRIC FLIGHT SYSTEMS

Winter Flying

Craig Christensen and H. "Crash" Evanson sent a nice letter and photographs of electric flying in the middle of winter in Minnesota. The picture was shot in 10°F temperature with 10-15 mph wind with 6" of snow. The Buzzard Bombshell powered by an Astro 15 geared and the Bird Of Time powered by a direct drive Astro 15 made their first flights this day. Crash goes on to say that they flew each of the models a half a dozen times until they ran out of coffee.

The Buzzard flying behind a 13/8 prop flys beautifully with electric power to about 500' and has a nice flat glide. The flight times this day were 3-5 minutes.

The Astro 15 powered Bird of Time has to be seen to be appreciated. Using an 8/5 prop the B.O.T. achieves winch height in less than a minute and its floating glide is the same as the sailplane version.

The electric powered "Piece Of Cake" is a perfect combination of the Astro 05 and a glider for the novice who is interested in powered soaring.

East Coast Electra Fly

Date set: September 20, 1981. The Keystone R/C Club has set the date of September 20, 1981 for their 2nd Annual "Electra Fly." In addition to several flying events, this year's "Electra Fly" will feature a clinic on the "care and feeding of

Bob Kopski's Astro 15 gear powered J-3 at the 1980 Keystone R/C Electra Fly.

to page 96

SILENT POWER

from page 94/70

electric motors." Certainly if you are in the vicinity of Lansdale Pennsylvania, make a point of reserving this day for what should be an excellent event. Further details will appear in Silent Power when available. You may contact the Contest Director if you have any questions or suggestions: Bob Kopski, 25 West End Drive, Lansdale, Pennsylvania 19446.

Until later, good flying. □

SOARING

from page 69/68

wing panels. Also, the turbulators spars were collapsed on the inboard bay. Removal of the MonoKote revealed compression fractures in the same places as the number 1 wing (see photos).

Looking at the sketch we can see why the wings all broke in the same place. The shear webs transfer the bending load down the wing and dump it into the spar at the discontinuity between webs. The stress is concentrated at these points, with the spar taking essentially the entire load. The upper spar is in compression and the lower spar is in tension. The crushing strength of spruce is from 3000 to 5000 pounds per sq. inch. With a spar cross section area of .047 sq. in., the fibers will fail in compression at 140 to 230 pounds. A rough calculation shows that this can occur at 30 or 40 pounds tow line load. This sounds like a lot but with a 12 volt winch, in the wind; or a thermal or wind shear at the top, a large sailplane can develop a big bunch of lift.

As can be seen in the photo, the fix on the number 2 Paragon wing was to make a 1/16" full-depth slot in the ribs and install a continuous shear web from the second bay through the fourth bay. This is made from 1/16" birch plywood and epoxied over the existing shear webs. I didn't carry the shear web clear to the root as the Paragon has an unbelievably strong spruce wing joiner that carries out to the third bay. The outboard end of the web is tapered in the last bay to prevent another discontinuity.

I certainly wouldn't advise everyone with Paragons to start surgery. I'm pretty heavy footed on the winch, and these Paragons are 4 years old. I would caution you to watch for any signs of softness at the first rib outboard of the sheeting. If you are building a new Paragon, or any other sailplane with short inboard shear webs, I would advise changing to continuous ones. You will have to cut the ribs and butt them to the web, but this is no particular problem. It would be overkill to run this web outboard more than 5 or 6 bays. The bending moment is proportional to the square of the distance

to page 98

SOARING

from page 96/68

from the tip so falls off rapidly. The dangerous sections are near the wing root.

It is not intended that this critique take anything away fron the Paragon's excellent reputation. I like a sailplane that doesn't do anything faster than I do. It's nice to be able to take your eyes off the ship for a minute and know, when you look again, it will be right where you left it. Anyway — I'm still flying #2 and have ordered a kit to replace #1.

Howzat! □

PITTS S-2A

from page 67

. . . making the bird black with white trim. The molded cabane struts fit into slots in the ply doublers and were held in place by epoxy rivets, capped by plywood.

The tail section is made from 1/4" sheet balsa; a little rounding and shaping here and there, and the tail feathers are done.

One of the very few things we did not like were the hinges. A good many kit manufacturers must be procurring theirs from the same source because this type of flat, webbed, polypropylene hinge has been showing up (still attached to its "tree") just about every time a kit is opened. They are thick and much too stiff, so we opted for the large Klett Flex Point hinges instead.

The only other bone we have to pick is also in regards to the contents of the hardware package . . . or to be more precise, the lack of contents. Much of the hardware we've come to expect in quality kits was not standard equipment here. Not present nor accounted for were 6-32 Allen head bolts and blind mounting nuts, horns for the aileron torque rods, pushrod/nyrod material, threaded rods and Kwik Links. Considering the price of the kit, and

to page 100

PITTS S-2A

from page 98/67

especially the buyer's expectations, the hardware package could have been more complete.

Covering:

The wings, ailerons, rudder and elevator were covered with black MonoKote, whereas the fuselage, cowl, wheelpants, gear fairings, fin and horizontal stab were first primed with Ohio Superstar Softglas, sanded, and then brushed with black K & B Superpoxy. The white checkerboard trim on the bottom of the wings and stab, and the white sunburst pattern on the topside were cut from a roll of MonoKote and ironed in place (ironing over the Superpoxy presented no problems that a few pin-pricks couldn't cure).

For years we've been using Rit Dye to custom tint our canopies and color coordinate nylon and plastic parts, and stayed with this establishment procedure. Using black dye, we let the canopy soak for an hour and were rewarded with a nice smokey tint. The nylon parts pretty well matched the basic black after soaking overnight.

Engine:

Power for this bird came from a '72 vintage K & B front rotor .40 that is still going strong. Since we had trouble finding a Pitts Junior Muffler to fit, we decided to use a Du-Bro Mufflaire II that had worked well with pressure on this same engine. A Kraft mount gave us something to hang the engine on and a Sullivan slant 8-ounce tank mounted close to the firewall served as the fuel reservoir.

Radio:

Radio installation proved to be a bit of a problem only because there was too much room, and because this time we tried to mount the servos like everybody else does --- using the grommets and mounting lugs.

to page 110

PITTS S-2A

from page 100/67

After fiddling around a while, we finally ended all that frustration by reaching for our trusty roll of servo mounting tape. In no time at all we had my Royal Titan servos in place on the fuselage sides and a Bantam Midget taped on its side to drive the aileron torque rods. (We did not cut into the bottom wing center section for the aileron servo installation.)

Flying:

By installing the 6 channel Royal receiver and 5 ounce battery pack against the firewall, the plane balanced at a comfortable 33 percent, just a tad behind the C.G. shown on the plans. And all control surface throws were set to HOB's recommendations.

This bird did not fly well her first time out; in fact, her first flight almost became her last flight. In our haste to get the plane airborne (we were running behind on this project), we didn't do **all** our homework. Using a Robart Incidence Meter, we carefully measured incidence angles, but foolishly neglected to check the engine's thrust setting. And these settings would have been correct had we not used an engine mount we "operated" on some time ago to give two and a half degrees of right and downthrust.

Since we side mounted the engine this time, we ended up with left and downthrust, which almost did us in. Because the plane is relatively short coupled, these thrust settings required full opposite control to compensate. (we almost bent the sticks on our Heath transmitter during take-off.)

However, a new mount got the engine aimed in the right direction and we finally started to enjoy the Pitts. Ground handling was mighty good (we cranked in three degrees of toe-in during construction) and take-offs were now straight and true. Once

to page 112

PITTS S-2A

from page 110/67

in the air this bird did what the Pitts is supposed to do --- everything. The small amount of differential we had put into the ailerons made the rolls look truly axial, with minimum elevator needed when she was on her back. Entry into, and exit from, all high speed and violent maneuvers, such as snaps and spins, was crisp, clean and predictable; she was a real crowd-pleaser.

Low speed characteristics were just plain nice, no bad surprises here. That washout built into the top wing made her a veritable pussycat at lower speeds and dragging her in over the end of the runway was mere child's play.

Conclusion:

This Pitts could easily be built by anyone with minimum experience, but because she's quick, very responsive and **small,** this particular model would not be a good choice for the novice. Any neophyte would feel hopelessly helpless once this perky little package broke ground and started to accelerate.

The S2A deserves the care and attention an experienced sport flyer can give her and should find an exceptionally happy home with anyone who loves bipes and taildraggers. □

SMOOTHIE

from page 66

The Smoothie design incorporates an inverted engine installation, which is somewhat unusual for a sport aircraft. We installed our engine in the inverted fashion, and did not experience any problems, providing the engine was "peaked out," and not run on the rich side. If you are in the habit of setting your engine rich, this will probably make the idle reliability rather poor. Side mounting the engine would eliminate this problem but certainly would detract from the Smoothie's clean, sleek lines. Another solution to this problem would be to install an on-board nicad battery, connected to the glo plug and energized via a micro switch on the throttle servo when low throttle is applied.

Radio:

A Westport International Variant radio system was installed in our Smoothie which, ready to fly (less fuel), weighed in at 68 ounces.

Flying:

Test flying the Smoothie proved to be equally as impressive as the kit itself, in that it is a fine flying sport aircraft. Take-offs are easier than one would expect from a "tail dragger" due to the Smoothie's unusually wide landing gear. Just hold a bit of right rudder and the Smoothie will track like a pattern ship. Our Smoothie was a delight to fly and did not display any bad traits or nasty

tendencies. The initial aileron roll rate was rather high but with the in-flight adjustable aileron travel rate feature of the Variant radio system, we were able to dial in just the right amount of aileron movement that we needed during the first test flight. Landings are also easy and predictable as the Smoothie's slow speed characteristics are very good. Conventional "tail dragger" three point landings are easily accomplished.

Conclusion:

Balsa U.S.A's Smoothie kit is a "winner," and at $21.99 (delivered) it's definitely a "best buy"or a "can't go wrong" choice for the sport flyer. It is not presented as a beginner's project but should present no problem to the modeler who has learned the basic building and flying skills. As stated, there is no fancy box with a multi-color label, but an abundance of quality in the box where it counts. □

SCALE VIEWS

from page 65/64

needed for best results with the popular finishing product line. The color chip chart shows the 12 standard Hobbypoxy colors (there is also clear) as well as the attractive results produced by adding H-99 Part C Custom Metalizer to them. I was especially interested in the samples of colors that were achieved by mixing various standard colors together. The formulas emphasize that getting the right shade sometimes takes a lot more than just one or two colors added to a basic color. For example, the recipe for Olive Drab is 6 parts Bright Red, 2 parts Black, 2 parts White, 2 parts Stinson Green, 2 parts Cub Yellow and 1 part International Orange. So you can see that successful matching of odd color shades requires a full line of colors on hand for experimentation. If your dealer does not have these items, send a business sized self-addressed stamped envelope to Hobbypoxy, 36 Pine St., Rockaway, New Jersey 07866, and ask for them.

K & B's Cups

Since we're sort of on the theme of paint mixing and matching this month, it occurred to me that some of you out there may not have come across a product that is seldom advertised. It's one of those little

to page 116

from page 113/64

unspectacular items that doesn't get in the headlines, but is as handy as sliced bread. These small clear plastic cups from K & B are graduated by ounce and gram and come 24 to the box. A real bargain at $1.50. They are intended for mixing small batches of epoxy or measuring out larger batches. I've used them for all kinds of finishes and, being Scotch, have even managed to re-use them by prompt cleaning with thinner. These are a must for developing formulas for shades of paint. Trying to arrive at a mix by adding drops to a very small amount just isn't accurate enough. And while we're on (or back on!) the subject, mix enough of the final formula to do not only the model but also to save for repair jobs in the future. When it comes to hand mixed colors, you can never get exactly the same results twice.

Upper left — 03, upper right — 05, lower left — 02, lower right — 04.

Get All Lit Up

RAM (4736 Milwaukee Ave., Chicago, Illinois 60630) has introduced a line of lighting systems for scale models. They are powered by the common 9 volt alkaline transistor battery which weighs approximately 1½ oz. and snaps into the circuits. They come completely assembled as shown in the accompanying photo. The 02 Strobe Light ($19.95) has a flashing unit, a high intensity bulb and a clear dome lens, and weighs .6 ounce. The 03 ($39.95) set of Landing Lights has a positive pulse electronic switch (which is adaptable to the majority of radio sets) and 2 high intensity bulbs with sockets, weighing 1 ounce. It can be wired to work from the retract system or can be controlled directly from a separate channel. A Mars Rotating Beacon is simulated by the flasher unit in the 04 set ($19.95), which includes red and amber dome lenses, a high intensity bulb and weighs .5 ounce. The 05 Marine Navigation Light system ($10.95) has clear, red and green bulbs with 24'' long leads, and weighs .5 ounce. Another unit, not shown in the picture, is the 01 Flashing Navigation Light outfit ($24.95). It looks like the 05 except that a flasher unit is not included and it weighs .6 ounce. There should be an outfit here to meet just about any scale lighting requirement. □

from page 62

look like than Formula 1 cars and it really was an inspiring sight to see all these scale appearing cars racing on the track. But Formula car racing takes an entirely different technique than Can Am type racing. Can Am car racing is a much faster, closer, aggressive type racing, whereas the Formula cars require less aggressiveness and more defensive strategies. With Can Am cars, you can race door handle to door handle, or fender to fender, if you prefer, with no problems. But with Formula cars, you cannot touch another car because if the open wheels came into contact with anything other than the pavement, the car or cars go somersaulting through the air. The "Scale Nut" in me says Formula cars are great, but the "Speed Freak" in me says Can Am is the only way to race. Everybody who knows me, knows this is how I feel. Of course I'm not alone, as 80% of the racers feel the same way. It very well might be over 95%, and if you need proof, stage races as we do, and allow any type body to be run, Can Am, Formula or G.T. and you'll see what I mean.

Now, having said all this, guess what happened during qualifying? After the first round, I had Fast Time!! Can you even begin to understand the amount of razzing I got from these racers? They really enjoyed putting the needle in me. How can you even possibly think such thoughts when you run like that? Oh well. Mike Lavacot came to my rescue and got Top Qualifier spot after the second round, dropping me to 2nd place. Thanks for rescuing me, Mike.

The most surprising event from qualifying was the Tamiya cars. Not having raced with them before, we had no idea how fast they were. So the results were quite surprising. The Top Qualifier in the Tamiya class, William Ormond, turned 12 laps in 5 minutes. Mike Lavacot, the Top Qualifier in the Modified Class turned 32 laps in 8 minutes, or the equivalent of 20 laps in 5 minutes. That's almost twice as many laps in 5 minutes. This was quite a surprise to everyone.

There was also another surprise to come in the Trophy Dash. This consisted of the 5 fastest cars running in a 4 lap race. I've raced in many Trophy Dash races in the 1/8 gas cars, but never in the 1/12 electric cars. I was about to find out why we don't have Trophy Dash's in the electric cars. The 5 of us in the Trophy Dash, or at least I was led to believe the 5 of us in the Trophy Dash, agreed to not make any special changes to our cars for this race. Anyone who has raced in a Trophy Dash knows the winner is generally the one who can get through the first corner first. This happened to be Tim Neja, who got a great start and had a 20 foot lead starting down the straightaway. I'm sure Tim believed right then he had the race won. But Lavacot made up the 20 feet and went right on by and easily won the race.

to page 122

PIT STOP

from page 117/62

Mike then told us he put in a super fast motor that was only good for 5 minutes and geared it super tall. Exactly what you should do for a 4 lap race, except he neglected to tell anyone. We'll have to change that old saying "Everything's fair in love and war" to "Everything's fair in love and racing." Live and learn.

In the "B" Stock Main, Joe Tentschert, who runs hot or cold, was certainly running hot today, as Joe took the checkered flag with Andy Jacobson 2nd and Midge Husting 3rd. My wife Midge, got the nickname "Killer" for her obvious racing liabilities in the beginning. But that nickname no longer applies as Midge is now a very accomplished driver. She's not ready to replace Debbie Preston, but Midge is the top woman driver in Southern California among the 25 or more woman drivers, so I think that's outstanding.

Kent Clausen had problems getting his car sorted out, but by the start of the "B" Modified Main, he was ready. Kent took the checkered flag, but not without a tough race with Frank Killam in 2nd and Charlie Vehle in 3rd.

The Tamiya Main was next and in a very close race, William Ormond just beat Jeff Abrams in 2nd with Brian Tobin in 3rd.

In the Stock "A" Main, which requires the use of stock motors, Rene Cortez jumped out in the lead, but had problems on the first lap. Bruce Hickman then lead the race for 5 laps, until he too had problems. Doug Kott then took the lead with Randy Tentschert and Chris Chan in close pursuit. It stayed this way until the last lap, when Doug's batteries took a dump, which is quite unusual in the stock motor class. Randy Tentschert then grabbed the lead and the checkered flag, with Chris Chan in 2nd and Doug Kott following in 3rd.

Now, Mike Lavacot has the ability to come from last place and win the race. I've

seen him do it many times. And when he gets a good start — look out. He got a fairly good start in the modified "A" Main, and it wasn't long before he had the lead and everyone else was playing catch-up. But it wasn't as easy as it might sound, because Al Chuck and Butch Berney were close behind, swapping positions in a close race with each other, while also trying to keep up with Lavacot. Lavacot took the checkered flag, about 1/2 a lap ahead of Al Chuck in 2nd with Butch Berney right behind in 3rd. I worked my way up from 8th to 4th, with Mike Reedy about 25 feet back in 5th and John Thorp in 6th, all on the same lap with super close exciting racing.

Try it — You'll like it! □

FUTABA/FLYING MODELS RESULTS

Modified "A" Main

1 Mike Lavacot	Assoc.
2 Al Chuck	Assoc.
3 Butch Berney	Assoc.
4 Gene Husting	Assoc.
5 Mike Reedy	Assoc.
6 John Thorp	Thorp
7 Mike Hickman	Leisure
8 Neal McCurdy	MRP
9 Tim Neja	Assoc.

Stock "A" Main

1 Randy Tentschert	Assoc.
2 Chris Chan	Assoc.
3 Doug Kott	Leisure
4 Larry Harrison	MRP
5 Darryl Empey	Assoc.
6 Bob Oliver	Assoc.
7 Robert Kavasos	Thorp
8 Bruce Hickman	Leisure
9 Rene Cortez	MRP

Tamiya Main

1 William Ormond
2 Jeff Abrams
3 Brian Tobin

CLIFFIE'S CORSAIR

from page 59

loading of approximately 18 lbs./sq. ft. The resulting performance number is a true airspeed of 150 mph.

One of the most heartwarming sights that we have ever seen was the proud smile on Cliffie's face as he climbed from the cockpit, especially after landing and taxiing to a parking area at an airport away from his home base at Oceanside, Calif. He and his Corsair are really the star attraction.

Many happy landings to our friend, Cliff Weirick. □

POWER BOATING

from page 47/46

engines should be run rich for a few tanks of fuel to seat the ring. Then they can be gradually leaned out. If excessive heat is noticed, run the engine rich for a few more tanks and try to lean the engine again. ABC piston and sleeve set-ups require very little break-in. The first tankful should be burned at a slightly rich needle setting. The engine should be run for short periods of time at high throttle with periods of part throttle operation between. The second tank can be leaned down fully. Use the full throttle, part throttle technique for this tankful and most ABC engines will require no further break-in.

My experience with the Dumas 40CF indicates that you are over-propped using a 1460 and 5% nitro fuel even if you run the prop on the surface. Try 1450 or 1455 props and you will have better luck. The HB .40 without modifications can probably safely be operated at no more than 20,000 rpm. You can use high nitro fuel but you will have to reduce the compression ratio of the engine as you increase the nitro percentage. It is best to increase combustion chamber volume as nitro percentage increases but you can increase the deck clearance between the piston and the head squish band by adding head shims between the liner and head to accomplish a lower compression ratio. As you increase the nitro, be sure to prop the engine below the recommended rpm.

The Dumas deep vee boats should not be run with turn fins. The hull vee angle is large enough so that a turn fin will usually cause instability and poor handling. If your boat doesn't turn well enough, increase rudder blade size or use a rudder blade that is counter balanced.

Boat antenna systems are little different than those used on other R/C craft. The water environment invites corrosion anywhere plugs and sockets are used in the antenna circuit. For this reason I don't use plug-in antennas. The simplest antenna system you can use consists of a brass square strip soldered to an 18" length of thin piano wire. This strip has two holes drilled in it for sheet metal screw attachment to a convenient place on the hull or on the radio

to page 128

from page 125/46

box. The receiver antenna wire is cut off 18" and soldered to the piano wire whip antenna. Kraft Systems also markets a great little removable 12" whip antenna that works very well. The part of the antenna that is in the radio box should be carefully wrapped around a square piece of balsa so that the wire does not cross itself.

★

Last month we discussed what to do to prepare commercially available propellers for use on your boat. Once you have your boat and props ready, it is time to go to the lake and try various propellers. The first thing that you will notice is that different props affect the way the boat rides. This change in trim is due to the fact that propellers do more than just produce thrust. Propellers produce a torque reaction M, lift L, and, if used in a surface piercing mode, will produce a side force S. Figure 1 shows the propeller force system.

Propeller torque reaction M tends to roll the hull opposite the direction of propeller rotation. At any given boat speed, the propeller torque required is equal to the torque generated by the engine. Since all our racing engines have decreasing torque available as rpm increases, propeller torque reaction M decreases with increased rpm at maximum speed. This explains observations that large diameter propellers are associated with high torque. A large propeller will impose a bigger load on the engine which results in lower rpm and larger torque reaction. If you want to reduce the torque reaction you must prop your engine so that its operating rpm is as high as possible. Torque tends to roll the hull into a right hand turn. Each hull design will react differently to torque. Torque can be compensated by lowering the right ride plate and raising the left ride plate on mono hulls. Slightly turning the rudder to the left also produces a balancing torque and a left turning tendency but this increases rudder drag. Both these adjustments produce a balancing torque that increases with boat speed so it is possible to cancel out M at only one operating speed. The propeller shaft may also be mounted at an angle with respect to the hull centerline as shown in Figure 2.

If we mount the shaft so that the prop tail nut is to the left of center, the resulting component of the thrust in the side direction (Ts) acting at a distance (d) below the Center of Gravity will help balance M. The deeper the propeller is running the more powerful this effect is. We may also compensate for torque by offsetting the strut to the right of the Center of Gravity of the hull. In this case propeller lift force (L) acting at the strut displacement distance (d) produces a balancing propeller torque Mp. Since Mp is a function of prop lift in this case we would expect this method

of torque compensation to be of little use for monoplanes since lift is low. Both of these torque compensation adjustments by the strut position not only produce a balancing torque Mp but also produce a left turn inducing moment Np as shown in the figure.

Another useful torque compensation technique is to weight the left side of the boat so that the Center of Gravity is moved to the left of the hull centerline. In this way a torque balancing moment equal to the weight of the boat multiplied by the C.G. displacement distance is produced at the boat centerline. Unlike the techniques previously described, this moment does not depend upon boat speed. Any combination of the above torque compensation techniques may also be used to balance propeller torque.

Marine propeller forces are different than those produced by air propellers because the medium in which they operate (water) is a dense fluid. The high weight of the fluid creates a noticeable increase in fluid pressure with depth. Even a fully submerged propeller, therefore, has one blade operating at a higher pressure than the other blade most of the time. This helps produce a propeller lift force (L). Propeller lift depends upon a variety of properties. Usually the higher the pitch, the more the prop will lift. Low trailing edge rake angles usually reduce lift. If the leading edge of the prop enters the water at an angle close to 90 degrees with respect to the water surface the lift also may be reduced. If the blades enter the water at lower angles the lift will increase. Therefore, cupping the leading edge and tips of a prop decreases the lift. J.G. and Octura 1200 and 1400 series propellers are low lift propellers. As the pitch to diameter ratio of Octura props increase, so does the propeller lift. Low lift propellers should be used on monoplane hulls. Prop lift increases with rpm and produces a nose down pitch axis moment. Since monoplanes usually are balanced on a single small area of the hull, any change in prop lift will create large changes in pitch trim. Low lift props minimize this effect and the result is a better handling boat.

Side force is developed when a propeller is used in a surface piercing mode (when the propeller blades operate both above and below the water surface). This side force is often described in terms of its main effect: prop walking to the left. Each time the downward going blade enters the water it tends to pull the rear of the boat to the left. At the same time the upward moving blade is losing its "grip" on the water as it approaches and penetrates the air above the water surface. The net result is side force development by the propeller.

As a result of these force development properties, every time we change the propeller on a boat it may be necessary to make adjustments to bring it back into trim. Try various propellers until you have determined the one that gives you not only the top speed you desire but also produces the best handling you can get at that speed. Carefully keep track of the pitch and rpm

realized for each prop you test. By using the Hughey speed chart, a 20% slip figure, and these test results you can accurately estimate your top speed. Many times you may have to sacrifice speed to insure adequate turning and acceleration performance.

Next month we will talk about modifying propellers for better performance. Until then send all questions, comments, and photos to the address at the end of the column. Remember that if you want a written answer to your letter, you must enclose a stamped, self-addressed envelope with your inquiry to, Howard Power, Hobbies Unlimited, 766 Broadway, Seaside, California 93955, (408) 394-1200. □

DOPPELDECKER

from page 44/41

engine can turn easily without overheating. If the 7/4 is too much prop for your engine and you cannot find a 7/3, trim the prop down to 6½".

The Doppeldecker is a very docile and stable flyer. It is not difficult to fly and is a fun intermediate design especially for schoolyard type flying. □

RADIO SPECTRUM

from page 39/38

National Transmitter and Receiver Integrated Circuits

I believe I have mentioned the LM 1871 and LM 1872 IC's before. I never really paid much attention to them because they appeared to be designed for the R/C toy market. Even when a reader sent in the data sheets I didn't give it much thought. Then one of the guys at work asked me about R/C for his daughter's robot. He said they wanted to build it themselves and it didn't need much range. I dragged out the national data sheets and the more I read the more intrigued I became. It looks to me that you could probably build a first class receiver with the LM 1872. If anyone has pursued this, please share your results with our readers. I know at least one manufacturer has, and he speaks highly of

to page 144

RADIO SPECTRUM

from page 130/38

the performance. Even if you don't build anything you might find the data sheets very interesting. For instance, they present some information on receiver antennas and methods of coupling a signal generator to a receiver. The suggested antenna simulation network is shown in Figure 4.

Another reader mentioned that Toko has a single chip receiver circuit for R/C. I haven't got any dope on these yet, but I keep hoping that someone will come up with a real winner. Maybe one of these will be the answer.

Frequency Re-use

A modeler from the St. Louis area called Dick Tichenor the other day and described a situation where they had obtained a new flying field but it was only three miles away from another R/C site. The obvious question is whether they would have problems. Dick asked me what I thought, and I suggested passing on the info that the AMA sent to the FCC on this subject. I believe it originated with Mike Gilbertson of Kraft Systems. Mike made certain assumptions about the transmitters and receiver and concluded the following:

"Given the above assumptions, the received signal at a slant range of 750 meters is in the range of 1000-2000 microvolts per meter. This signal level represents 30-35 db of gain reduction in AM receivers. Translated to an interfering source on the same frequency, with the assumed signal plus noise to noise ratio requirements (about 10 db), an interfering source producing approximately 100μv/m at the receiving antenna would begin to cause noticeable interference in a linear modulation (AM) system. Where the co-channel interferer is a similar transmitter at another site and over flat terrain, interference would be seen at 5 to 6 mile ranges."

He went on to say that if you assumed some degradation in your equipment vs. the specifications, you better allow seven miles. A word to the wise is usually sufficient but I'm sure someone will go out and try it anyway. Let us all know the results and please use an old airplane.

Fix For Proline Custom Competition Transmitters

Apparently there has been some problem with RF getting into the encoders in the Proline Custom Comp. Transmitters. Charley Reed sent in a suggested fix that he gives credit to Bob Redmon for developing. The problem is due to lack of bypassing or filtering on the regulated voltages coupled with lots of long leads which pick up RF. The solution is the addition of ferrite beads on all power leads coming off the encoder board. It is also good to minimize the lead length and to keep it away from the RF board. The beads used were 1/8" dia. x 1/8" long and two were used per lead as shown in Figure 5.

The beads which are standard practice in Ham radio can be purchased from Amidon Associates, 12033 Otsego Street, No. Hollywood, California 91607. Radio Shack may be another source.

to page 146

RADIO SPECTRUM

from page 144/38

Next Month

After recommending the Kraft KPS20H servos and being very evasive concerning the feedback pot/pot wiper combination that is now being used, I decided I better get some first-hand results. The people at Kraft were nice enough to send up a servo so we'll run some tests and try to report next month if the time permits. We'll also throw out some unconventional ideas about R/C system design and see what kind of reaction we get. Till then keep smiling. □

ENGINE CLINIC

from page 37/36

cooled exhausts when using tuned pipes as the pipes can transfer heat back to the engine.

Boat engines are usually fired up on the beach before any water cooling can come into effect. For this reason you want all the air you can get to the engine. Cowling it would not be too good of an idea. Baffling, ducting, etc., would be of no value with the boat motionless and no propeller to circulate the air.

You want to get as much air to the area around the carburetor intake as possible but do not want a direct ram feed tube. This causes mixture changes with changes in speed and you will have a difficult time getting a constant needle setting.

Dear Mr. Lee:

Recently I purchased a Max .90 engine and was surprised to observe that World Engines had assigned their stock .60 size muffler to it. I am interested in your comment regarding this decision by World. My concern is threefold, to wit:

(a) Is this not an illogical marriage? How can a muffler that was designed to accommodate the needs of a .60 size unit be reasonably extended to the volume of a .90,

which is theoretically greater by one third in its requirements for optimum performance?

(b) Will this muffler not result in excesive restriction, noticeably impairing the potential of this engine?

(c) I cannot understand the attitude of World Engines or O.S. Max to cut such a big corner here. The .90 is in a class by itself and, as a matter of design integrity, should demand its own muffler component, built to its own specification, to complement the rest of the design package.

World seems to have borrowed a page from General Motors handbook on cost cutting philosophy. The cars may look different on the outside but under the hood its another story.

Perhaps I am over-reacting, but I am disappointed in what I consider to be an unwise decision by an otherwise fine manufacturer of reputable, quality products.

Your comment please.

Sincerely,
Raymond R. Cummings
King of Prussia, Pennsylvania

I have received several letters since the O.S. Max .90 came out, asking this same question. I do not believe World Engines is at fault here — the .90 comes from O.S. with the .60 size muffler. I can only assume it is a matter of economics. Dies for casting a new muffler are expensive so if one that is already in stock can be used satisfactorily a manufacturer is going to put it to use. The O.S. .60 muffler does have fairly large capacity and I guess O.S. figured it would be okay on the .90. The muffler is pretty restrictive but I guess O.S. figures the .90 has ample power and some can be sacrificed by using the .60 size muffler. There is also the size and weight to be taken into consideration --- the .60 size making for a more compact size.

Actually any time a muffler causes more than a 300-400 rpm drop in the operating range of an engine it is causing excessive back pressure. For some reason O.S. has always gone with very restrictive mufflers — some causing as much as a 1000-1200

to page 150

ENGINE CLINIC

from page 147/36

rpm drop in power. Of course this is probably done for the sake of lower noise level. O.S. mufflers have always been considerably quieter than many of the less restrictive types. □

FLYING LOWE

from page 35

would compensate with elevator and aileron. To test for control cross-coupling, put the ship into knife edge flight with just enough top rudder to hold level. The ship should not pitch up or down or roll with neutral elevator and aileron. If it does, you must learn to live with it by adding a bit of elevator and/or aileron to correct. To correct by trimming, proceed as follows:

(A) If it rolls you must change the dihedral to correct; sounds bad but is not really so difficult. If it rolls proversely; i.e., in the direction of applied rudder, reduce dihedral. If it rolls adversely; i.e, opposite direction of applied rudder, you must increase the dihedral. How much you ask? It's cut and try but amounts required are usually very small unless the couple if very strong. As an example, I increased the dihedral on the P-8 from 3/4" under each wing tip to 15/16" to eliminate a slight adverse roll problem. The technique is to cut the wing through the top skin only down to the chord line and through any dihedral braces. Do not cut the bottom skin or belly pan. You will then be able to block the wing to a new dihedral angle and re-glass the center section. I've done this several times and it requires only about an hour of your time.

(B) Once any rolling problem is corrected, work on pitching in the following way: If it pitches up; i.e., as if up elevator was applied, trim the trailing edge of the wing down or trim the ailerons down a bit. If it pitches down, trim the wing leading edge down or ailerons up. Sometimes trimming the thrust line up or down will help. I have, at times, used a combination of wing, aileron, and thrust trim. Some ships can't be trimmed to eliminate pitching due to faulty design or construction. We have found that improper incidence in the stab is a killer. Also a stab that is placed excessively high is untrimmable. A good design, as previously stated, should have the thrust line, wing and stab fairly close to alignment. The stab seems to work best right on the thrust line and very close to an extension of the wing chordline. You may have read some of my previous stuff about this control coupling problem. Suffice it to say in a given design you can correct the pitching by moving the stab up or down in relation to the wing/thrust line. Moving it up causes pitch down. Placing it sufficiently low will cause it to pitch up! Bending the tail ala "Curare" effectively lowers the stab.

to page 154

FLYING LOWE

from page 150/35

We've run out of space for this time. Next we'll discuss some special trim requirements and then, hopefully, launch into a discussion of maneuvers. □

GIVE IT A WHIRL

from page 16

can produce a small rearward component of the upward lift force to counteract the 'couple' produced by the offset Center of Gravity (Figure 2). Because the rotor blade

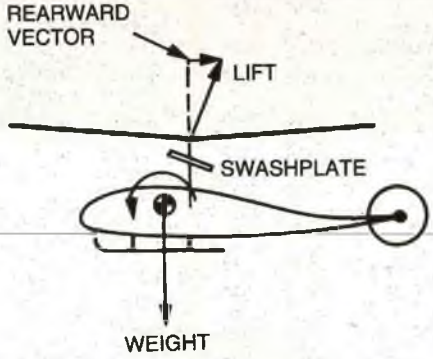


FIGURE 2
FORWARD CCOUNTERED BY REARWARD LIFT VECTOR

system must be tilted back (or produce a rearward lift vector) to do this, the swashplate must also be tilted back and, therefore, the servo will not be operating around its neutral position. If all the controls have been set up correctly in the first place, this now means that either the trim lever on the transmitter must be moved to the 'nose-up' position and/or the pitch stick of the helicopter must be held back against its centering spring continuously to maintain this rearward force to balance the forward C.G. Obviously when the forward force caused by the forward C.G. is greater than the correcting force resulting from the forward trim, there will be a tendency for

to page 157

from page 154/16

the helicopter to "take-off" in a forward direction and this can only be countered by holding the main control stick back. Even if the trim lever alone could counter the forward motion, we would not have any trim adjustment left for other out-of-trim conditions, such as wind.

Now let's look at the helicopter from a sideways force point of view (Figure 3). Again, the main lifting force is acting down the main shaft and, providing the Center of Gravity lies directly on the line of the main shaft, the only lateral force that we have to put the helicopter 'out of trim' is the force provided by the tail rotor system. As we have discussed in earlier articles, countering this force means tilting the main rotor plane system to the right to produce a sideways force so that the two forces exactly cancel each other out and the helicopter will then be laterally 'trimmed' for a stationary hover. Again, to produce this sideways force from the main rotor system, the swashplate must be tilted and, to do this, we would have to hold the transmitter stick over to one side or we must off-set the control linkages so that we eliminate this need.

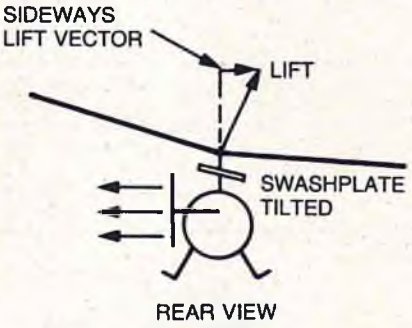


FIGURE 3
SIDE FORCE OF TAIL ROTOR COUNTERED BY SIDE LIFT VECTOR OF MAIN ROTORS

Now there is one difference between these two 'trim' situations. In the first case it is usually best to have the C.G. on the main shaft of the helicopter so that the swashplate can be exactly level for stationary hover. Remember though, if you are hovering into a wind, then the wind itself will create a rearward force on the helicopter which must be countered by tilting the rotor blade system in this case, therefore, the swashplate must be tilted forward.

This is usually done by adding some forward trim to counter the wind. That's one of the main reasons for having a trim lever for all the axes of our radio control units so that you can adjust that trim lever to suit the particular wind conditions that you are flying in. A very slight tilt forward is usually all that is needed for a light breeze. For a

to page 172

Warren G. Hitchcox, age 56, succumbed to a heart attack on February 15, 1981.

Warren was a highly respected world-renowned aeromodeler who had been the President of the Model Aeronautical Association of Canada for the past nine years.

Warren had an avid interest in all phases of aeromodeling throughout his lifetime and his personal participation during the latter years was concentrated on FAI R/C pattern competition. Warren has been the catalyst to unify and inspire aeromodeling in Canada. Unquestionably, it was through his efforts that Canadian modelers have become very highly rated in world class competitions.

We, at RCM, were privileged to know Warren, a friendship which developed into the greatest admiration and affection for one of the finest gentlemen we have ever known. Our deepest sympathies are extended to his wife, Shirley Hitchcox.

We will indeed miss Warren G. Hitchcox.

from page 157/16

very heavy wind you may have to re-trim the helicopter and tilt the swashplate even more forward. We should hasten to add here, before you experts write in, that some flyers prefer to have their helicopters trimmed for forward flight and to hold a little back stick for the hover. Take your choice, but I believe that the beginner is best flying with a neutral pitch trim for the hover.

Now, as far as the lateral conditions are concerned, this is a natural phenomenom as we have discussed earlier and the swashplate should, indeed, be tilted slightly to the right (viewed from the back of the helicopter) to 'permanently' offset the left sideways force produced by the tail rotor system. There are other problems associated with this being a variable force before and during lift-off and we covered this in one of our earlier articles. However, since we are talking only of basic trim in this discussion, there should be a definite right hand tilt of the swashplate when your transmitter trim lever and your main stick are in their neutral position.

The final major axis of control we have to concern ourselves with is the 'yaw' axis (Fig. 4). We can see that the force produced by the tail rotor, in order to counter the torque of the main rotor, will depend upon the speed of the tail rotor system and the pitch angle of the rotor blades. Since the tail rotor blade pitch angle is changed by the rudder control stick on the transmitter, here is another trim situation where we should adjust the linkages and, hence, tail rotor blade pitch angle so that the helicopter will stay pointing in one position without us having to hold the stick of the transmitter either one way or the other. Again, before I get some letters on this topic, we will explore more pros and cons of tail rotor trim next time.

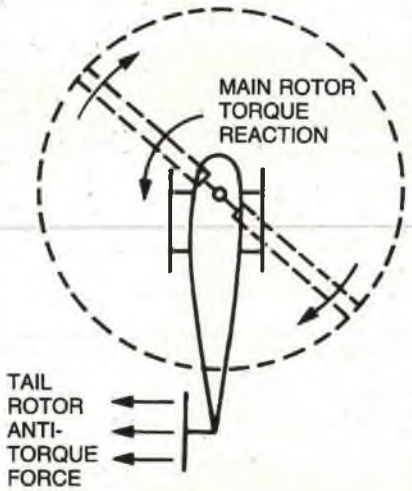


FIGURE 4
TAIL ROTOR TORQUE VARIES WITH BLADE ANGLE SETTING AND ROTOR SPEED

Remember, the helicopter can be readily flown when it is out of trim, but even for an expert it is more difficult to fly this way and he will always have his helicopter very much in trim in order to ease the flying task. For the beginner it is particularly important that he should be in trim. We will continue to cover 'trim' and also some of Steve's other questions next month. Meanwhile, enjoy yourselves and the trade shows and remember "to fly is divine, but to hover is heavenly." □

SUNDAY FLIER

from page 14

★

Here's another item that seems to be coming up regularly with modelers. My friend Mike Valco asked me the question, "What should the thrust to weight ratio be to give you a good flying model?"

As is almost always the case when it comes to airplanes, either models or full scale, there is no single answer to that question. Nearly everything about airplanes is a compromise between one requirement or another. The best example might be the case where you design a model so strong that it will withstand almost any crash --- but then it becomes so heavy that it won't fly for sour apples. The opposite extreme is a lightly loaded model that flies up a storm, but busts up everytime you land it. You have to stay somewhere in-between.

The same is true when you talk about thrust to weight. If the model is heavy, and with a correspondingly heavy wing loading, you'll need more thrust than is required with the lighter model with the lighter wing loading. Most models are comparatively highly overpowered relative to the full scale jobs. Not always; the Air Force F-15 weighs 43,000 pounds, but the engine puts out 48,000 pounds of thrust! The only model I've ever seen which had a similar thrust/weight ratio is Dean Copeland's Pitts Special. It weighs around 16 pounds, and his geared .91 puts out around 19 pounds of thrust. Thus, he can point it up vertically, throttle back very slightly until the thrust equals the weight, and hang the Pitts on the prop while doing a slow "torque roll." As you watch in amazement, he then increases the thrust to full power, and climbs vertically from the stationary hanging attitude. You gotta see it to believe it.

At the other extreme, look at the "ultralight" designs, or, going to the very extreme case, the Gossamer Albatross. Thrust to weight is less than one to ten. But similarly, the wing loading is very low.

Mike is putting a new engine in his 1/4 Scale Rearwin Speedster. The model weighs around twenty pounds; his new engine puts out about seven or eight pounds of thrust. Will it work? Yes --- but he won't get pattern performance; he'll get fairly good scale performance, and that's what he wants.

to page 176

from page 173/14

For good sport flying, a thrust to weight ratio of two thirds --- that is, if the model weighs six pounds, the static thrust is four pounds --- will give very lively performance, with power to spare. Pattern jobs like a thrust to weight ratio of close to one --- weight nine pounds, thrust nine pounds. Not all of them get it.

My personal preference is for a model with a wing loading around one pound per square foot, and thrust/weight ratio around one to two, or maybe a two thirds ratio. I like the way they fly.

As I said, it's a compromise for which there is no single answer. If you want a real hot rock, put in a real powerhouse of an engine. If you want gentle, realistic-type flying, use less power. Finally, of course, there are many modelers who say, "Put in a powerhouse. You can always throttle back." Okay. Somehow I consider that a bit of a cop-out; if you can't fly it on the wing, then firewall the engine and point the model up. More often than not, things happen so fast that by the time you've remembered to hit the throttle, the model has already hit the ground. But as they say, "I'd rather do it my way."

★

One other thing that happened this month, and it was perhaps the most fun of all. It didn't start out that way; we had a leaky faucet, and I had to call a plumber. Well, he came over and fixed the faucet, and we got to talking. His name is Frank Oberti and, as you can tell, is of Italian extraction. He's also seventy years old. Seems that many years ago he built free-flight models, and when he saw my garage workshop with models hanging from every available space, he was intrigued. I asked him if he'd be interested in trying to build one. He jumped at the chance, and I gave him a Headmaster Sport 40 kit. What better way to find out if a relative beginner could build one? He never even heard of MonoKote. But he is a craftsman; take a look at this shot of Frank with the model he built.

That picture was taken on the day we test flew it. I wish all of you could have been there. As I said, Frank is 70 years old, but when his creation took off, he was like a 7 year old boy. He jumped up and down, clapped his hands, and kept saying, "Look at it fly!"

to page 180

SUNDAY FLIER

from page 176/14

And that, my friends, is what Sunday flying is all about. The joy of creation, the thrill of flying, and the friendship with your fellow modelers.

Let's keep in touch. □

BIG IS BEAUTIFUL

from page 12/11

prop, mark the point of contact carefully, and swing the prop so the other tip comes round to the card stock. The points of contact of the two tips should be identical. Any deviation here indicates that the prop is wobbling on the shaft and it will create a severe vibration, and you don't need that! Correct by facing the rear of the prop where it contacts the hub to eliminate the wobble. With multi-bolt hubs, you can usually tighten the hub bolts in a way that will eliminate the wobble.

If you are using a multi-bolt hub, be sure to carry some spare hub bolts in your field box, a slight touch of the prop on the ground can partially sheer the bolts and could lead to problems in the air. Also, if you do touch **anything** with a prop, inspect both the prop and the multi-bolt hub before flying again. This applies to the prop on a single bolt hub as well. A cracked prop can kill or maim you (or someone else) and that's another thing we don't need.

As for the alteration to the incidence angles, not knowing which plan Jim is using, it's a bit hard to comment, but I would guess that whoever designed the kit or plan, found that it flew better with the change and it was incorporated after some production had been shipped. It happens all the time and I would use the latter of the two versions. I doubt the change was made for the sake of making a change; there was likely a good reason for doing so.

Something else about props. Don't use the same prop on the same engine in

to page 184

from page 180/11

different models. I don't know why, and I would bet there is a complex mathematical formula to explain it, but different models fly differently on the same engine with different props. Try a few on your favorite model and you may well be pleasantly surprised at the change in flight characteristics.

I noticed at Las Vegas last October that there were people who did not know what 'Density Altitude' was. Moist, cool air is more dense than air that has been heated and has a low humidity. Therefore, the cooler, moister air will create more lift at a given speed, than will dry, hot air. Basically, density altitude means that you are, in effect, flying at a higher altitude than actual height above sea level when you are flying in dry, hot air. At Las Vegas last year, many found their models requiring much longer take-off runs than usual. Some did not realize this and initiated rotation at too low a speed, finding that they had a handful of trouble trying to keep things flying properly. Some of the crashes I saw there may well have been caused by the modeler not realizing the difference and trying maneuvers that would have been quite successful at sea level on a cool day, and they just didn't work at higher altitude coupled with the density altitude problem. Tuck the information away in the back of your mind and think about it if you have occasion to fly where it is hot and dry, especially if it is a higher altitude than you normally fly. It's another place where a coarser pitch prop just might make the difference between flight and disaster!

So much for the soap-box this month, see you all next time out.

(Editor's note: Dario Brisighella provided us with the following information regarding his "overbalancing.")

There is a near-dear subject I would like to get corrected and put-to-rest. It concerns the balances, overbalanced, and "Average Factory Balanced Flywheels" for the popular, fine, Quadra engine.

Ma Bell or A.T. & T. have made a lot of money on the phone calls that this subject has generated over the past few years. Since I do not own any A. T. & T. stock, and collect no dividends, I hope to help RC'ers out by saving them some expenses on long distance calls in an attempt to get the story straight.

It is not my intention to make this into any sort of long commercial (you get enough of them on TV); I would like, instead, to give you all the facts concerning my "Overbalancing" modification for the Quadra engine's flywheel.

Contrary to whatever you may have read in any trade magazine, or anything that you have been told (by no matter who, nor however reliable you may consider the

source), at the present time the factory, TML of Canada, is shipping all Quadra engines with what they call an "Average Factory Balanced Flywheel." These **are not my "Overbalancing."** "Overbalancing" flywheels for the Quadra is something I alone do. I designed and engineered this modification, and I claim the rights to this modification.

Fact: Overbalancing of a flywheel, any flywheel, is highly technical in nature requiring a lot of time, concentration and some specialized equipment. It is not the sort of work that you might ask someone to perform for eight hours a day. Quality-control is truly critical and not well-suited to high production line methods.

If TML were to attempt this type of operation within their production facilities, the cost of the finished flywheel would be more than double the price of what I charge. These costs would have to be passed along as they would need inspectors to check inspectors four times over, to insure the quality --- and there is more to it. I would not like to, nor would I even attempt to try, to keep abreast of the production requirements of the TML plant. I can insure good quality-control, only because I don't have to do too many on any single day. The work requires high level concentration and there are days when I just can't even think of doing a flywheel, so I just don't try to fudge-it. This could be dangerous. The unbalanced state of a poorly done modified flywheel turning at, say 10,000 rpm, could explode with the force of a hand grenade!

On days when I'm in a good frame of mind, I do a few extra flywheels and these are then back-up stock for my exchange service. This allows me to insure a same-day delivery service, and avoid the RCer's wrath for making him wait a few extra days. I take this work very seriously, and so do the TML people. A good Overbalanced flywheel may be "worth its weight in gold," but a bad one could cause some very serious injuries!

Now, what's it all about anyway? I'll attempt to put it as simply as possible without giving you a course in Physics . . . the Quadra engine needs more counterweight on its crankshaft. Due to the design of the crankshaft and connecting rod, etc., this is not possible. So, in my modification, I make-up for this lack of counterweight by adding the additional weight to the flywheel. The specific weight and location is critical.

Next, I take care of what ever unbalance there may be in the die-cast flywheel itself. In producing the flywheel (not a TML product), there are areas where the density of the metal is greater than other areas. There are other factors too, including one (I love the term) called "Monday Morning Parts . . . " I also eliminate this unbalance so the bottom line reads . . . "I unbalance the flywheel in one stage of my process and I balance it in another." The finished product is anything but "symmetrical in balance" when I ship it out. Let's just call it lopsided.

to page 190

BIG IS BEAUTIFUL

from page 185/11

More lopsided than when I began. In any event, it does just what it was intended to do, make the engine run smoother and changes one form of energy called vibration, into another form of energy, better understood as "horsepower" . . . for after all it's horsepower that turns the propeller which, in turn, hauls our models around the sky.

The engineers at TML do not have their heads buried in the sand either. They never designed this engine with our use in mind. They know about balance, unbalance, and even overbalance, though they may use another term for it. One does not re-engineer, re-design and produce a whole new engine overnight. It takes time and costs hundreds of thousands of dollars to do so as well. So to keep the RC'ers happy and keep the cost down as well, the TML engineers have added some additional weight, in the form of two rivets, to the newer flywheels to get the vibration level down a bit and the power up a bit. Keep a few things in mind here. First, this modification improves the engine's performance over the orginal version's and, second, the price didn't go up. That's about as close as you can get to "having your cake and eating it too . . . "

What are the merits of one flywheel versus another you may well ask. Well, as most of you may have been into glow-engines at one time or another, it's like running a stock K & B engine versus running one that Clarence Lee has reworked. But, this additional smoothness and performance does not come free, power comes from cubic-inches or cubic-dollars. As the cubic-inches of the Quadra can't be increased, about all that's left is increased dollars . . . One other small item --- I only need the flywheel and the exchange is made the same day, unless I get swamped or take a little vacation break. You see I will not allow anyone to help me with the actual modification as I can't afford to lose control of the quality.

I have considered working on other engines and I have made up my mind that I just can't do more than I'm doing now, no matter how hard I try. You may as well also know that some engines **cannot** stand up to the severe centrifugal-loads an Overbalanced Flywheel generates at operational speed. I'll give you an example: For another brand of engine it takes about a half ounce of weight installed in the flywheel rim to overbalance it properly. At its normal operating speed, this half ounce weight generates a centrifugal force of just over 145 pounds. I've had engines come apart from the forces. I hope this word-to-the-wise is sufficient. Centrifugal force can be awesome, even deadly!

to page 195

When writing to RCM or an advertiser, be sure to include your zip code.

BIG IS BEAUTIFUL

from page 190/11

The engineers at TML have provided us with a very powerful, stout, little engine which has become the mainstay of our giant-sized models. All I have actually done in my modification is "Gild-a-Lilly . . ." This must be possible, as I receive many favorable reports back from RC'ers, around the world, who are using my "Overbalanced Flywheels. □

CUNNINGHAM ON R/C

from page 6

that they had.

Scale models have really become popular in the past several years. Today, everyone would like to have at least one realistic looking model in his stable of aircraft. Just a few years ago radio reliability was such that not too many modelers would put in long hours constructing a scale machine, but the general radio available today has such great reliability that scale is really the in thing. Not many can devote the time and patience required to construct an AMA scale type aircraft, but a scale looking bird is a source of real pride to its builder and flier.

Ducted fan models are gaining a foothold now with the modeling public. This type of aircraft provides the ability to build a simulated jet type aircraft with the engine turning a fan enclosed within the confines of the aircraft fuselage or jet pod. Very realistic looking aircraft are possible with this form of power. More and more of this type will be available in the future.

Non-Powered Aircraft: Soaring aircraft, or non-powered flight, is the other broad range of modeling available to the average RC'er. The pure form of soaring is accomplished by putting the aircraft into the air with the aid of a high start or a tow winch, or pitching the aircraft off of the face of a slope into a rising current of air. All very quiet, and beautiful. Interest in silent flight is soaring today due to the increasing cost of glow fuel, as well as the loss of flying fields due to the noise factor.

Many, many fine kits are available for soaring type aircraft. Kits are also available for high start equipment, and many clubs have constructed electric winch launches. Two other methods to get the glider up into the air are also available. Either to be towed aloft by an RC tow plane, or to be pulled aloft by the use of an electric or glow engine. Soaring purists will argue that the only way to have a real soaring flight is a silent launch, but other fliers who are just out to enjoy the sport of flying will put a power pod on top of their glider, find a suitable field and put the bird up into the air quickly and easily. It really doesn't take much of an engine to lift a large glider into the air.

to page 197

from page 195/6

Slope soaring is an art unto itself but, contrary to popular opinion, you really don't need a cliff facing into an ocean breeze to have a slope soaring site. Just about any reasonable hill, facing into the wind will do the job. Of course, you must have a breeze to create an updraft, but there are many many sites around the country that can provide this type of flying. Generally slope soaring machines are quite different in design from thermal type aircraft. Most thermal machines can be flown from the average slope site, unless it is a site that is known for its really high winds.

All in all, the wide realm of RC offers tremendous opportunities for the individual to have a great time. Just because everyone at your flying field, or in your club, flies a Sig Kadet, or a Goldberg Falcon is no reason why you shouldn't tackle another phase of the hobby. Fun is where you find it. Who knows, by experimenting, you might start the next phase of active RC flying.

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This month's tip is one that may save you some money in the long run, or prevent some problems at the field. Whenever you have engine problems, by that I mean that the needle valve setting will not stay constant, or the engine goes from rich to lean and back again, investigate the fuel tank and the plumbing lines first. Sure, you may have some real engine problems, but chances are that the tank and lines may be giving your engine a hard time drawing the correct amount of fuel.

Whenever you install a fuel tank in a new bird, use all new fuel lines, both inside and leading from the tank to the engine. Small pin holes and cracks in a fuel line can cause more problems than you can sort out. If you suddenly develop engine problems in an existing aircraft, take out the fuel tank and replace all of the fuel lines, again, both inside the tank, and leading from the tank to the engine. Always filter the fuel going into the tank from your fuel can, then forget about filtering the fuel going from the tank to the engine. These filters can become clogged, causing a lean engine run, with the possibility of ruining an engine at the same time. Use muffler pressure to stabilize the fuel flow to the engine. Make sure that the fuel tank is padded with foam rubber so that it doesn't rub against the aircraft fuselage, causing two problems, foaming fuel, and the possibility of rubbing a hole through the fuel tank and allowing the fuel to drain into the innards of your aircraft.

Speaking of this, a friend of mine had this problem the other day and didn't realize it until it caused a major problem. His fuel tank sprang a small leak, allowing fuel to seep into the aircraft. Normally he provides a small drain hole in the bottom of the fuel compartment, but this was an aircraft he had

to page 200

CUNNINGHAM ON R/C

from page 197/6

purchased so a drain hole had not been provided. The fuel soaked the foam wrapping around the battery pack but was discovered before it had a chance to melt the pack box. He realized that there was a fuel leak when suddenly the aileron servo started to go ape in the air. On examining it on the ground he found that the servo had ingested some of the leaking fuel, getting the pot and pot wipers all screwed up. He was lucky not to have had any more damage, such as a crunched aircraft. The fuel tank and fuel system is much more important than most of us realize. Take care of it and you will have long and successful flights.

Again, let me remind you that the Fourth Annual Southwestern Jumbo RC Fly-In, open to large models of any type, will be held at Thunderbird Field, just west of Fort Worth, Texas, July 18 and 19. This two day Fly-In will again be the focal point in the Southwest for large models from all over so make your plans now to attend. There will be trophies for the Most Impressive Aircraft, the Best Scale Aircraft, Best Non-Scale Aircraft, and the entrant from the farthest distance. For trophy consideration the aircraft **must** be flown at the Fly-In. There will also be a special prize to be awarded in a drawing held among all entrants, as well as some special prizes for those spectators who have come to see the goings-on at the Jumbo. Bring your suntan lotion and big hat and join in on the fun July 18 and 19. □

FROM THE SHOP

from page 4

. . . . builders, all we need to do is built one on a larger scale. At that instant I knew that I was embarking upon the largest model project I had ever undertaken, even surpassing the eighteen foot "Hindenburg" hanging in my garage.

Nine months later a new knd of model was born, a sort of World War I vintage, complete with machine gun. Although it was intended to be a biplane, I just became weary of building wings.

The structure is steel tubing with wood bulkheads and ribs. The machine gun and cowling are made of sheet metal. The engine has the valve assembly from a junked auto engine and the exhaust pipes are steel pipe. The propeller is made from styrofoam insulation board with canvas tips. The wheels are from a motorcycle found at a garage sale.

There were no plans for construction, I just started bending and welding until it took the shape of an airplane. The fabric used to cover it was muslin, machine sewn and hand stitched to the structure. It was then doped with seven coats of clear and green.

to page 202

DID YOU KNOW...

that a simple way of extending a needle valve, and changing the direction of adjustment, is by the use of a short length of silicone fuel tube? Use a one to one and a half inch length of tube fitted over the needle valve knob at one end, and over a length of 1/16″ wire at the other to make a flexible "universal" joint. The wire will need a small loop bent in the end that's to fit into the tube, and both fittings should be secured in place with a silicone seal, such as the GE type, being sure that the metal parts are *clean*. Those building quarter scale might try this one to get needle valve adjustments away from that big nasty prop. And *please*, take a buddy along when going out to fly a ¼ scale. They are too big for any one man to hold safely.

And did you know that Devel-Hide is great for things other than covering foam wings? This chemically bonded wood fibre product has all the strength of 1/64″ ply, but is far easier to finish than either ply or balsa. Great for covering built-up surfaces such as the vertical or horizontal stab, turtle-decks, etc., and best of all, it costs less than ply or balsa. $4.00 for a 26″ x 32″ sheet, .010″ or .015″. (Min. order, 4 sheets). Postpaid in the U.S., or at your dealers. Idea Development, P.O. Box 7399, Newark, Delaware 19711

FROM THE SHOP

from page 200/4

The total cost of materials was $360.00. I managed to expend about two hundred hours of building time, loving every minute of it.

Due to lack of backyard space, I assembled the aircraft at the Air National Guard Base where I work. Then dismantled it, hauled it to Classic Hobbies where it was hoisted to the roof and was reassembled in June 1980.

When you come to the Toledo Conference this year I hope you make it to Classic Hobbies and see it. It's just Plane Big and I believe RCM advocates "Big Is Beautiful."

R.W. "Doc" Fellhauer
Toledo, Ohio

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Randy Wrisley is working up a construction article on a 1/4 Scale Pou de Ceil (French Flying Flea) that we will feature later this year. Flight tests have been interesting.

In the S.I.M. Pulse, newsletter of the Staten Island Modeleers, Dan Speranzo Editor, we found the following bit of confusion:

While standing around at the S.I.M.E.X show, shooting the bull with a few of our members, a curious man came over to us and inquired as to the name of our club. "We're the Modeleers," answered one of our members. "Modeleers?" the man replied. "Yes, we fly models." After a moment, the man reached for his earlobe and asked, "How do you guys fly model ears?" At that point I intervened and explained we're the Modeleers, you know sort of like the Mouseketeers. We build and fly radio control model airplanes. "Oh now I understand," said the gent and walked away happy. I turned to Artie Hoke who was standing beside "Mouseketeers?" he said.

With that strange note we depart until next month. □