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RCM MODELER

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THIS MONTH'S COVER

features Miss Angela Otting showing off a clipped wing version of Executive Design's Monocoupe, built by Thomas P. Jacomini. The 1/4 Scale Monocoupe is powered by a .60 engine and utilizes a Royal Classic radio. Photograph by The Local Photographer II/John Bintliff.

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FROM THE SHOP

Don Dewey

It is with deep sorrow that we must report the loss of a great member of the R/C industry and a dear friend, Lee Renaud. While Lee departed this world on January 14, 1983, his contributions to our hobby and sport will continue to soar and the memories of this man will live on in our hearts and minds. We felt it would be appropriate to ask Lee's wife, Barbara, to express a few words in memory of her husband.

Lee Renaud
1930-1983

My purpose in writing this is a hope that some of my own memories from the past twenty or more years will evoke some of your own thoughts about Lee. Because it is apparent to me that over the years Lee has won a unique place in the awareness and affections of the modeling world, I would like to share the following thoughts with all of you.

Memory is like a distant landscape; there is a haze that enhances, yet hides the less attractive features. To many Lee was a distant landscape.

He lived in a world of his heroes. History meant people to him, Carl, Sid, Frank, Bill, Walt, Cliff, John; they were all involved with model airplanes, and models were a way of life for Lee. He was a philosophical man, and in his case a profound and delicate heart was joined by an intellect which never ceased to search for the ultimate meanings of life and flight.

He was a man for beginnings, his model designs were always an attempt to advance the state of the art of modeling. He made his own rules because he knew he was right. Because he was a man who found his happiness through full use of his powers along lines of excellence; performance as well as beauty were found in his designs. A Lee Renaud design, be it an Aquila, a Sagitta, an Esprit, or an Olympic will live on even though he will be making no more additions to the stable.

He was a private man who let few people know him well. But there were a few . . . Bill, Dan, Gordon, Gary, Skip, Dick . . . Lee considered these men his riches. He was wealthy in his friends.

He was the only child of Leo and Ann, he was their pride and joy.

He was a family man who has left a great legacy to his children — Shelly, Tom, Tim and Bob — himself.

And now at last my husband has found his ultimate thermal.

Good lift, Lee!

A memorial fund for Lee Renaud has been established at A.M.A. Headquarters in Washington.

★ ★ ★

Tichenor's article on the Lockheed Little Dipper (RCM, December 1982) has brought in a considerable amount of correspondence regarding this rather obscure aircraft. As is often the case, the passing of time seems to glamorize many incidents that may have been rather mundane when they occurred. Regardless, these stories can be most interesting to those of us who are air-minded.

Our Chief Sunday Flier, Ken Willard, called to tell us that he and Jim Wade, both of whom are retired Lockheed employees, were reminiscing about the Little Dipper and felt that we should mention the following incident.

In the hands of Prentice Cleaves, a Lockheed pilot, the Little Dipper buzzed around Washington performing for any and all civilian and military officials who showed the slightest interest. Finally the Army ordered several pre-production Airtroopers for evaluation.

At about this time, Cleaves hopped over to show the airplane to some War Department people, landing on the then unlandscaped inner grounds of the mighty Pentagon. It is said that Air Force General Hoyt S. Vandenberg witnessed the spectacular arrival from his office window. Apparently the General was not favorably inclined toward the idea of a flying cavalry and the Little Dipper's unceremonious arrival did nothing to improve his disposition in that regard. On the following day the purchase order was cancelled. Thus ended all hopes for further consideration by the military.

Now, if we can just get Tichenor to stop crying about how much time it takes to make the plugs for the canopy, cowling, and head rest, and to finish up the Little Dipper project, maybe we can get the construction article into print during this century.

★ ★ ★

Pursuant to the editorial in the March issue concerning "consumer protection," we received the following:

Dear Mr. Dewey:

If you have a column that the following experience can be printed, I would like to share it with your readers:

"Good as Gold"

In late summer of 1982, I joined the ranks of R/C modeling of airplanes. After finally admitting I was deeply infected by the "flying bug," I set out to get all the fancy equipment I had seen at the flying field and in RCM. Being a down to earth country boy, I was amazed at the fact that almost everything I wanted came from California. Being quite leery of ordering anything through the mail sight unseen (except for pictures), I hesitantly placed a call to Custom Woodcraft. That call and order generated the finest flight box at the field --- boy was I proud.

A short two months later I was the proud owner of a broken flight box, a result of an apparent manufacturing defect. Frantically I searched for a warranty somewhere in the papers that came with the order — no such luck. Feeling totally frustrated and somewhat angry, I placed another call to Custom Woodcraft (way off in California). Expecting to get the typical, "We're sorry — you own it," type of response to my problem, I was delightfully surprised. Speaking directly to Mr. Morris Gerow I received sympathy for my situation and a reminder of his statement when I placed my order regarding Custom Woodcraft's quality craftsmanship, and concern for its customers. ***Mr. Gerow has taken care of my misfortune cheerfully and with the pride and sincerity of a company that really cares about its customers.*** *This was indeed a welcome change from what I believed to be the standard in this time of economic problems.*

What a treat to find a man and company whose word is as good as "all the gold in California."

A satisfied customer of Custom Woodcraft . . .
Tom Johnson
Beavercreek, Ohio

★ ★ ★

Here is an amusing tidbit to which a lot of us can relate that was picked up in the Glitch, newsletter of the Albuquerque R/C Club, Jim Windeck, Editor.

An airline pilot coming into Kennedy International

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CUNNINGHAM ON R/C

Chuck Cunningham

Some of you long-time readers know that each Fall my wife, Jan, and I take a vacation some place in Europe, and while there we visit modelers wherever we happen to stop. This year, due to the economy, we didn't make the trip and, therefore, don't have any interesting information to bring to you from modelers on the other side of the Atlantic. I have received lots of letters from modelers on each side of the ocean; from this side, asking for more information; and from the other side, asking us to stop by their area the next time that we head that way. So, perhaps, if things get a bit back to normal around the world, one day the Cunningham's may be knocking on your door. Don't think that you guys on the other side of the Pacific are really safe from a Texas invasion, because Jan's already informed me that we're going to investigate Australia and New Zealand some time in the future. But for this year, nothing interesting to report from abroad. Which means that you modelers who read this magazine in other parts of the world sure can feel free to send some black and white photos and some information about what's happening where you live.

I know that the larger than normal aircraft, those designed for .90 engines, are being built around the world because I've shipped lots of .90 Turbulent plans to destinations outside of the US. If you're interested in this size aircraft or the Turbulent plans, check the Sky Master Industries (that's me) ad in the back of this magazine. Now we've added a Quadra size Turbulent (8' span) and a Turbi-Bipe with an 84" wingspan for Quadra, and up, engines.

The interest in scratch building seems to be on the rise, so if you're a newcomer to this hobby, you may want to give more thought as you construct the next kit to see just how you can "kit" the next aircraft that you build from magazine plans, or purchased plans. The simple reason that plans are making an impact in the modeling world is that it's a very expensive proposition to bring out a new kit, especially for the very large kit companies. The smaller companies can bring out a new kit easier, but the relative cost per sale is very high.

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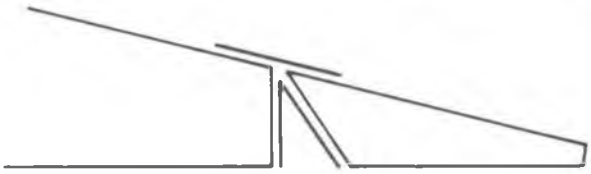
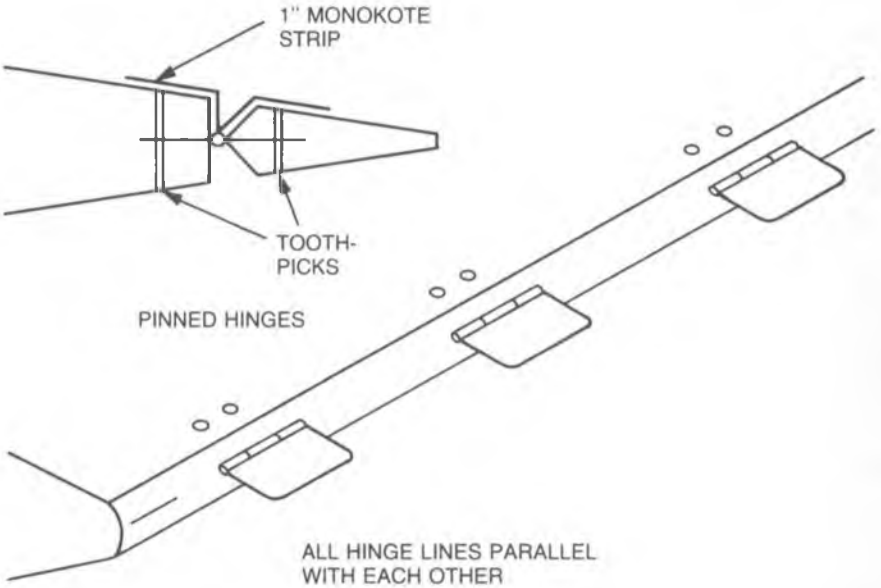


MONOKOTE HINGE AS USED ON THE LAZY ACE

SIMPLE MONOKOTE HINGES



Beautiful scratch-built Lazy Ace from RCM plan No. 706 by Bud Lockwood of Portland, Oregon.

SUNDAY FLIER

Ken Willard

I knew you all were out there all the time. It just took a couple of pictures or so to prime the pump. The November issue of RCM had some interesting items and, as a result, I've got quite a stack of letters --- just the way I asked you to do. Except for one thing. Most of you didn't really ask for a reply, but a lot of you did. However, you did not include a stamped, self addressed envelope for me to send you a personal reply. I'd like to do it, but the fact is that, with the number of letters that are coming in, I can't afford it. "Twenty cents?" you ask. "Yup," I reply, "and one hundred letters is twenty bucks!" It adds up. Over three hundred bucks a year!

Keep the letters coming --- just send along an SASE if you want a personal reply.

Okay, enough about that. Let's get to the material. As usual, I've got another piece of evidence to prove that I'm still Chief Dum-Dum. In the November issue I told how to find the C.G. of a Delta. Almost, anyway. This letter from George R. Smith of Huntsville, Alabama, tells the rest:

Dear Ken,

I feel like I know you personally, having read your stuff for so long. A chance to pass on a tip gives me this opportunity to say, "Hi!" and to introduce myself.

You may be familiar with some of my work. The Double Eagle series comprises my most well-known designs. (Original .60 size, RCM May '79; .40 size sport version, RCM March '82.)

I've just read your article in the November RCM and took interest in your discussion of determining mean aerodynamic chord. The locating of the accurate chord line that correctly halves the ***area*** *of a wing half-span may be beyond the capability of even some of our advanced builder/fliers who have no familiarity with the mathematical side of our airplanes geometry. It is difficult enough for a Delta but taken further to a swept wing (with both L.E. and T.E. swept) and they do have a problem and have to resort to considerable trial and error in some cases.*

I offer the following graphical solution which works for ***any*** *shape wing with straight L.E. and T.E. (elliptical wings, for example would have to be approximated with straight lines).*

1. Draw the half-span plan.

2. Extend the lines of the root and tip chords both fore and aft.

3. Measure the root chord and lay it off both fore and aft of the tip chord.

4. Measure the tip chord and lay it off both fore and aft of the root chord.

5. Diagonally connect the extreme points.

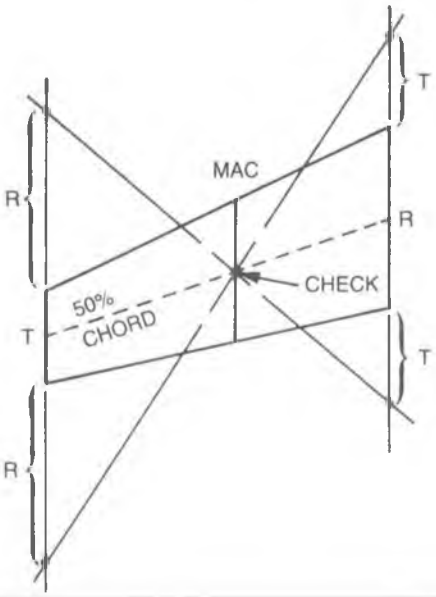
6. The crossing point lies on the MAC.

Check: Connect the 50% chord points of root and tip chords to verify crossing point. If it doesn't meet, something has been mismeasured.

You may have seen this graphical method before; it is standard in area-moment relationships.

I would like to have the opportunity to talk to you some time and swap airplane tales. I am an Aero Engineer and have several years in the design end of our sport. If I could ever be of any assistance, I would be honored to hear from you.

Sincerely,
George R. Smith



George, I wish I could get together with all of you Sunday Fliers and swap lies --- mebbe even tell the truth occasionally. Everyone has a tall tale to tell; that's what makes sport R/C flying so much fun and so rewarding. And as for your being of assistance --- you just were, by completing the formula for locating the C.G. There are a lot of modelers who have never seen the graphic solution you submitted. They thank you too.

★

Speaking of the 1983 Dum-Dum contest, I have enlisted help. At a recent clinic on helicopters, held at King's R/C Distributors in Redwood City, I was very much impressed with the need for accurately setting up an R/C helicopter for flight. The clinic was conducted by Walt Schoonard, President of Miniature Aircraft Supply, 2594 North Orange Blossom Trail, Orlando, Florida 32804. Walt opined during his discussion that one of the reasons beginners have trouble learning to fly helicopters is that they try to do two things at once --- fly the machine and trim it at the same time. He says that if you get the machine properly trimmed out to begin with, it'll be a helluva lot easier to fly during the learning stages. Well, that applies to fixed wing aircraft also, but it was apparent to me that a helicopter out of trim is far more difficult to control than a fixed wing model. Within some limits, naturally.

Anyway, since I don't fly helicopters, I'm not really qualified to judge the biggest Dum-Dum of the year in that phase of R/C. Walt, on hearing this, said he definitely was qualified --- he'd made every mistake in the book at one time or another (just like I have with fixed wing models) and even made some mistakes that aren't in the book! So I appointed Walt to be Chief Helicopter Dum-Dum for 1983. All of you helicopter enthusiasts who would like to enter that part of the contest, submit your entries direct to Walt at the address given above. Then Walt and I will get together at the end of the year and decide the winners in each category. What'll the prizes be? Don't know just yet --- but you can join in the "tall tale" fun, enjoy reading what some others have done, and we'll come up with something well-worth going after. Let you know as soon as we get it firmed up --- mebbe something like "An all expense paid trip to your nearest hobby shop --- as long as it isn't over five miles." Just kidding --- we'll do right by you.

Now, back to some unusual models. Let's start off with this one submitted by Peter R. DaBa of Middle Hope, NewYork.

Mr. Willard,

I have been a fan of your Sunday Flier column for many years. I am a Sunday Flier and scratch-builder with a flair for non conventional model's. After reading your November '82 Sunday Flier column I thought I'd drop you a line and a couple pictures.

Now about the model. The original design goes back to 1969-1970 when my brother and I built several smaller planes of this type which used model rocket engines and a single channel Ace pulse radio. These models used the rocket power to reach altitude, then the single channel radio to glide them back. In 1977 I saw a duct fan model fly and was so impressed I wanted to build one, however, the choice at that time was slim and weight and ducted design were very important. I started to think of those single channel planes and how light and stable they were — so all I had to do was scale up one of the old model's! But by the time construction had started I had a completely new airplane.

The airplane was now quite large and I wanted to keep the weight down as low as possible, so the entire fuselage is of 1/16" balsa (rib and stringer type). But what makes the difference is the entire outside of the fuselage is covered with 1/100" aluminum, similar to that of 16 oz. Coke cans. It was fitted by first cutting stiff paper patterns, then cutting the aluminum skin (which cuts easily with a ruler and razor). The result was a model 44" long with a 36" span and a 5½" fuselage diameter at the wing and comes in at 26 oz. ready to fly less fuel.

The model in the pictures uses a rear mounted Cox T.D. .049. The wing uses a triangle type airfoil of all balsa and covered with Solarfilm. Control is 4 channels using elevons on the tail combined with underwing spoilers and flaps, throttle and steerable nose wheel.

I was afraid that scaling up and changing things would make this a hard to fly airplane, but with the light wing loading and the high lift wing and light weight its biggest fault is on landing — it wants to float down the runway forever.

I was so impressed with the performance and how really strong it was that I never did build the ducted fan version — instead I have been working with aluminum and have built several other types.

Thank you for your time, and if you need more information please do not hesitate to call or write. I would be willing to give you whatever assistance is needed.

Yours truly,
Peter R. DaBa

Peter, you certainly do have an interesting story to tell and, needless to say, a very impressive model --- both the flying one and the female one.

Next, here's a letter from 'way up there in Canada. Bill Gillespie of Edmonton, Alberta, Canada, comes up with this "Sunday Flier" ducted fan information:

Dear Ken:

In response to your request in the November issue of RCM for original models, I am enclosing photos of my sport fan jet. This project was undertaken as a result of my experiences in building and flying the Byron Originals MIG 15 and A-4 fan jets (both of which are excellent models).

The primary objective for my design was to achieve a true "Sunday Flier" sport plane — "bolt on the wing, fill it up and fly" — with an absolute minimum of complications. In order to produce a fan jet with these characteristics the following criteria were used:

Upright engine — Avoids hassle of inverting plane to start.

Air intake — On the top of the fuselage in order to avoid the mess and clean up problems.

Landing gear — Fixed tricycle (although one version has been built with retracts).

Power unit — Byron Originals fan and tuned pipe, powered by an OPS .65 ABC rear rotor, rear exhaust motor, using FAI fuel. These components provide a very reliable and ***powerful*** *unit.*

Exhaust system — Byron tuned pipe modified to exhaust out the bottom of the fuselage.

General specifications — Wingspan, 73"; total wing area, 871 sq. inches; overall length, 64.0"; weight (dry), 12.5 pounds; wing loading, 33 oz./sq. foot.

I have found this model to be absolutely thrilling to fly — it is fast, has good vertical performance, and is capable of most aerobatics. Rolls are very axial, and the model grooves well, going exactly where it is pointed. Like all fan jets, however, full flying speed must be maintained for control. The swept back wing no doubt contributes to its stability. The model is flown from grass fields and gets off with no difficulty, providing that the grass is reasonably well cut. Dick Phillips (Big Is Beautiful) lives in the Edmonton area, has seen it fly, and can vouch for the foregoing statements.

Knowing of your addiction to seaplanes, I have enclosed photos of a couple of my favorites — an Evolution

1/2 with a styrofoam main float, and a scratch-built Veco .61 powered flying boat. The flying boat has been going strong since 1973!

Also enclosed is a photo of my Tiger Moth which took first place in Stand-Off Scale in the Canadian Nationals which were held in Edmonton this year. The model has a

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see when looking in the exhaust opening and directly opposite the exhaust. In the case of the Fox, these are quite large and one would think they would contribute greatly to the power of the engine. Evidently not. You will also get a slight gain in fuel economy. By blocking the two boost ports the engine is then of true Schnuerle configuration. The addition of a boost port/ports was a later modification to the original Schnuerle porting. I would also recommend that you fellows having the earlier Fox Twins with the vane-type MK-X carburetor exchange them for the new venturi type. I do not know what Duke's exchange policy is on this but I am sure he will give you a good deal. Duke is just as interested in seeing his engines perform properly as anybody, and particularly the twin which has been known for this problem.

Incidentally, only the one production run of Fox Twins was made and Duke is not contemplating making another run. If you have any expectations of purchasing a Fox Twin, don't put it off. As soon as the present stock is gone there will be no more. It is a real powerhouse of an engine — the most powerful 1.2 cu. in. engine you can buy. I should point out, however, that the Fox Twin is intended to be run in the 11,000-12,000 rpm range. It is not intended to be lugged down with larger size props. To lug any glow engine much below 10,000 is to ask for heating problems. If you want to swing a larger prop at lower rpm, then go with one of the four strokes or chain saw/leaf blower type engines.

Clarence,

I wish to remark, and invite your comments, on a couple of items mentioned in your column in December RCM.

First Item. *You state that "castor oil carries off heat better than the synthetics." What properties does castor oil have which allows it to do this? I can believe it may be a better lubricant during a lean-hot run, mainly because it probably breaks down into a varnish and other junk, rather than vaporize — but anything which vaporizes removes heat better than something which does not vaporize, so why wouldn't the synthetics carry heat away better?*

Second Item. *You have mentioned many times that castor has better "film strength" than the synthetics. I have carefully searched through the ASTM testing volumes, and nowhere can I find a test for "film strength" of a lubricating oil. It seems to me that if the ASTM testing volumes do not have the test, there is no such thing! Is there such a test? If not, what do you base your statement on?*

I have performed viscosity measurements on numerous oils, including castor and Klotz. It turns out that while castor is more viscous at room temperature, it loses viscosity rapidly with increasing temperature, and at 200°F., Klotz has a higher viscosity. Since viscosity is one of the indices of a lubricant (per ASTM lube oil volume), I would have guessed that Klotz is a better engine lubricant at operating temperatures of the piston-cylinder; perhaps not so for the crankcase since the incoming fuel air cools the crankcase area below room temperature. Do you have any comment on this viscosity business? I am very interested in your reply.

Yours truly,
Cal Malinka
Rialto, California

I cannot really tell you what properties castor oil contains that allows it to carry off heat better. It is just one of those things that has been proven through actual application. Castor oil does form a glaze on the cylinder wall that helps keep an engine from scoring or sticking up on a lean run. However, it is doubtful that this aids in heat reduction. Castor oil also has a higher flash point than the majority of synthetics which means it is less likely to burn which, in turn, provides better lubrication at higher operating temperatures. There is also a term known as cylinder wall burn-off that is different than flash point. Castor has a higher burn-off temperature than the synthetics. Although lubricating oils do vaporize, the temperature is also reached where they turn to smoke and no longer aid in the lubrication. A lot of your synthetics go up in smoke at a much lower temperature than castor oil, but again this is related to the flash point.

Every time a new synthetic comes along I test it by running an engine and checking the cylinder head and exhaust temperatures. Some of the synthetics will about equal castor oil with a normal mixture setting. However, as you begin to run the engine on the lean side, the cylinder head temperature and exhaust temperature begin to skyrocket. Far more with any of the synthetics than with castor oil. Hence, the logic that castor oil carries away heat better.

Again, I cannot tell you how the film strength of a lubricating oil is measured. I do not profess to be a petroleum engineer. This is a term in common usage among those involved with lubrication. The function of any lubricant is to keep moving surfaces from touching. This is referred to as the lubricating film. The lubricating films ability to do this is, in turn, the film strength. There are many things involved here including molecular structure, molecule size, etc. There is more involved than just viscosity. A good example being the synthetic lubricating oils used in jet engines (turbine oils). These have high film strength to keep metal surfaces from touching at higher than normal operating temperatures but are of low viscosity to provide lubrication when cold. This is similar to your multi-viscosity motor oils. Maybe one of the engineering types out there involved with lubrication can write in and let us know how the strength of an oil film can be determined.

Incidentally, Klotz 2-Cycle Racing Oil (KL-100) intended for all out racing competition contains 25% castor oil. This should tell you something!

Dear Mr. Lee,

I have worked myself into a corner which I hope you can help me out of. My problem is the installation of a K & B 7.5 Duct Fan Motor and Midwest RK 40 Fan. Since the engine has a tuned pipe it is obviously pipe-timed but, due to the limited size of my exhaust duct, I cannot use the pipe in my model. I am building a control line model F9F Panther which has a small jet exhaust to begin with and the bulk of the pipe would choke it down to nothing. Running the 7.5 with an open exhaust will, most likely, degrade its performance below the point of usefulness and changing the timing is something I'd rather not get involved with.

The only solution I can see is to use a mini-pipe similar to the 6.5, but what length pipe is best for the 7.5? How much of the power (rpm) that I lose by not using the tuned pipe can I expect to salvage with the mini pipe? Does the mini pipe do any good at all (other than get the messy exhaust out of the fan area)?

If you can see any alternatives I would appreciate suggestions. Duct fans are relatively new and many modelers must be experiencing similar installation difficulties, especially with scale aircraft.

I thank you in advance for any help you may be able to give me and also thank you for writing the Engine Clinic column which to me is the highlight of every RCM issue.

Truly yours,
Dieter E.R. Rosenau
Kew Gardens, New York

It is really strange how guys will create problems and then expect miracle solutions. The K & B 7.5 Ducted Fan engine was designed to be run with a full length tuned pipe. It relies on the tuned pipe for a good percentage of its power. There is no

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SCALE VIEWS

Col. John deVries

Unless you're a rank beginner in the scale R/C model building business, I'll bet there are some constructional techniques **you** use that are totally **yours.** Many of the construction techniques you've learned probably have come from friends, the magazines, or the kit construction manuals. But, experience being the best teacher, you soon start doing things **your** way! For instance --- when you start forming rectangular balsa blocks into smooth, streamlined wing tips. Some people start hacking wildly with a razor blade; others may use a modeling knife; while a third group may be addicted to the use of razor planes. Yours truly reaches for a long-bladed X-Acto, just to remove the square corners. Then I grab a coarse sandpaper block and "take" the balsa almost to its finished form. Finally, I'll finish the wing tip with very fine glass paper, held in my fingers. Over the years, I've developed a "touch" that tells me when to stop sanding. The point is this: There are a bunch of ways of doing essentially the same thing when it comes to building scale models --- and that we all do them in the way that is either more comfortable or easier for us. The gist of this column is to describe some building techniques that I've heard about, or tried, that might help **you** make a better scale R/C model. I'm presenting them in no particular order, so read on, because you may find something that's just right for you!

Canopy Framing: There's nothing more difficult to "mask" when it comes to painting a model than the framing of a canopy or windshield. On a bubble canopy, there are usually compound curves that defeat the most skillful application of masking tape. And, the "paint on trim off" masking liquids require a deft hand with a No. 11 blade to just cut through the mask and not the underlying clear plastic. Of course, if you can find the right color striping tape, windshield framing can be stuck-on --- but it usually looks like it's just stuck-on!

Probably the best solution to this vexing problem is one I've seen friend George Fischer use. Taking either a canopy he's molded or vacu-formed, George will overlay it with a **thin** sheet of molding plastic. He'll then use the original canopy as a **mold,** and pull the thinner sheet right down over it. When things have cooled, he'll trim away all of the thinner molding except for the canopy framing. He then paints the frame --- and lays it atop the canopy when both are glued to the model's fuselage. Admittedly, it takes a bit of time, cutting and filing the framework. But --- the final appearance of the framed canopy is truly prototypical, and the color line is crisp and clean. If you give this technique a try and your original canopy is large or floppy, it should be filled and supported before "pulling" the framing plastic. Polyurethane foam, balsa blocks carved to fit or even modeling clay can be used to fill the canopy. George's masterpiece, using this twice-molded technique, was the flight station cover for an R/C B-36 (intended for six .19's). It looked like a checkerboard of square cut-outs --- but it also looked just like the canopy on a "Peacemaker."

More on Canopies: The really new Zap for **Plastics** and the other cyanoacrylates are just the ticket to stick the transparent parts of a scale model to the more opaque parts. They flow into the crack between plastic and balsa and hold things together very well. **Except** --- on those days when ol' debbil static electricity is hanging about. On those days, it's 99 and 44/100ths percent sure that your canopy's gonna look like the leftovers from a spiders' convention! Glue all over everything, no matter how careful you are, and no matter how tiny the glue bottle nozzle. Curses! But, there **is** a way to rectify this problem (otherwise we wouldn't be writing this!) although it's a long, drawn-out process.

First, make sure that the canopy is well and truly glued in place, because you're going to apply a bit of pressure, fixing up the glue spider webs. If you got some "globs," trim them as flush as you can to the plastic surface with a razor blade or X-Acto knife. Then, sand the webs with 400 or 600 grit paper, used wet if possible. This'll get rid of the glue and leave you with a partially translucent canopy. Attack the plastic with some **white** automobile rubbing compound,

Bill Strohman's Taube Albatros No. 4 was designed from drawings presented in Taube, Dove of War, a book by Col. John A. deVries.

Close-up of Bill's engine detail on his Taube. Bill is an excellent craftsman.

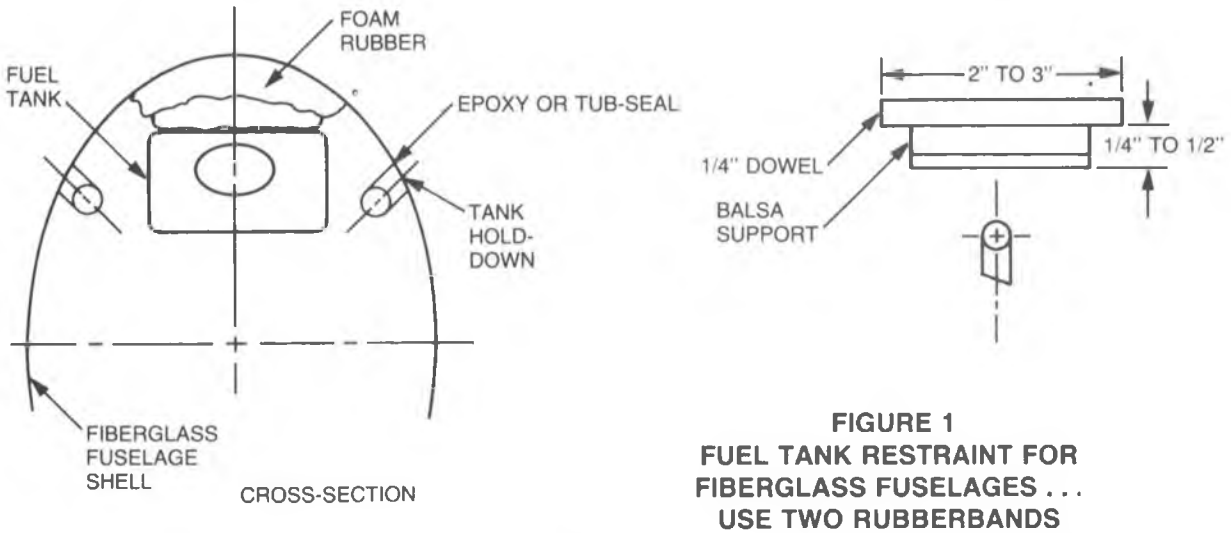

FIGURE 1
FUEL TANK RESTRAINT FOR FIBERGLASS FUSELAGES . . . USE TWO RUBBERBANDS

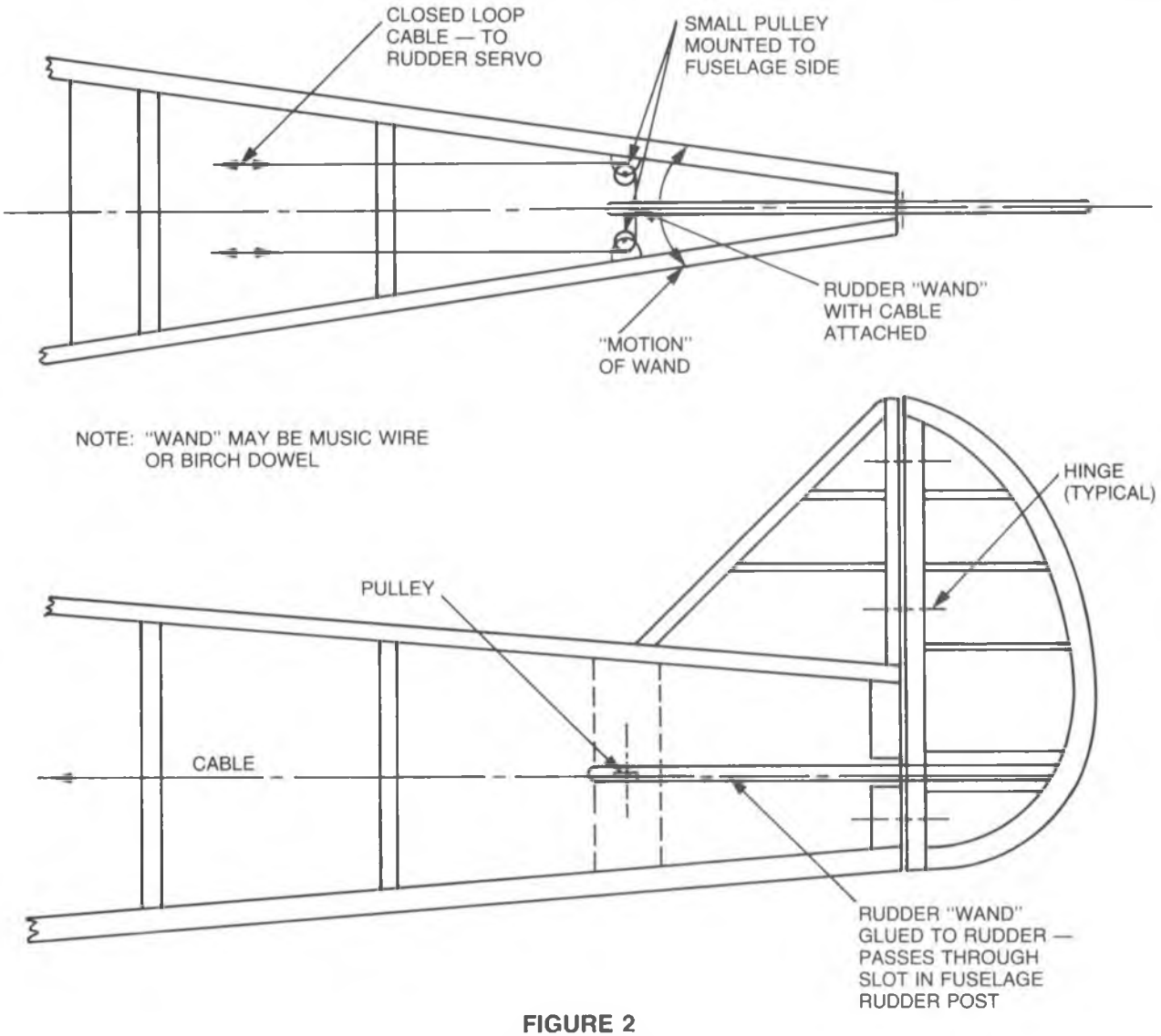

FIGURE 2
METHOD FOR "HIDING" RUDDER ACTUATION — USING A CLOSED-LOOP CABLE SYSTEM

following the instructions on the can (some brands of rubbing compound are to be applied with a wet rag). White rubbing compound is about as fine as is usually available so the job **will** take time and patience. It'll leave a "haze" of fine scratches so the next effort will be the application of "Brasso" --- a brass cleaner and polisher. It's mildly abrasive so it'll clean up the scratches left by the rubbing compound. Finally, if you can get some jewelers' rouge, have at the plastic one more time. Although this technique **won't** restore the plastic to its original smooth luster and transparency, it'll come darn close if you take your time in the later polishing stages. Don't you envy those turkeys who can stick a canopy in place and it comes out looking just as it did when the kit box was opened! No trapped balsa dust, no glue webs --- the little plastic pilot has a clear view of the world! Geez, I wish I could do it!

Landing Gear Wire: As scale R/C models have become larger and larger, the usual hobby shop sizes of music wire just aren't hacking it as far as strength is concerned. Some people are doubling or tripling hunks of music wire and binding them together with copper wire and solder. And, forming any music wire into landing gear struts of a diameter of 5/32" or thicker is akin to challenging the Pittsburgh Steelers to a wrestling match! If you've joined the "lets heat it up" school of wire-benders, you may have found that your big gear wire sheared at a bend on your model's first landing because you were unable to re-establish the wire's temper. But --- Paul Weigand and Charley Kelley, both of the Rochester, New York R/C Club, to the rescue! Paul and Charley found automobile trunk-lid torque rods! The beauty of the rods is that they come in a zillion different lengths, thicknesses and tempers. It's a lot cheaper than the big sizes of music wire, too. We all know that there are some .60 powered scale models that are heavy enough for trunk-lid rod landing gears, and most Quarter Scalers certainly are. So, if you have a heavyweight model, take a trip to your local automobile wrecking yard and check the rods that twist to hold the trunk lid open and slam it shut. Pick up a couple of pairs that seem to be of the right thickness and give 'em a try. Even heated bends seem to hold up very well and re-tempering the rods is relatively easy. Bend away!

Knocking Off The Fuzz: Not the cops --- we're talking about the fuzz that even the highest quality sheet balsa seems to have. When you're ready for the final sanding prior to covering or painting the balsa sheeted areas on your scale model, grab some 600 grit wet-or-dry sandpaper. Before you start rubbing it back and forth, use Jim Workman's technique. Take a folded and **slightly damp** paper towel and rub the sheeting you're going to sand. Lightly does it! And **then,** have at it with the sandpaper. The slight moisture brings up the almost microscopic fuzz and the "glass paper" shears it off, nicely. Jim often uses the damp towel number right after he's finished shaping a sheeted area --- and his results are as smooth as the proverbial baby's bottom!

Fiberglass Installations: Course the work's all done for you when you buy a fiberglass and foam kit. To which I add, "Baloney!" Although most commercial fiberglass fuselages give you a beautiful starting point for a scale R/C model, they pose some interesting problems when it comes to mounting radios, servos, and fuel tanks. Since the fiberglass casting is hollow, there isn't anything to glue to, except the interior fuselage walls. A couple of home grown techniques that might help:

For radios and servos, the first step in mounting them should be epoxying a pair of hardwood rails, one on each side of the fuselage interior. The only tricks here are to make sure that the rails are parallel and equally "deep" in the fuselage. Then, even if you're using servo trays, epoxy a couple of hardwood cross pieces atop the side rails. Make sure that the cross pieces don't bulge the fuselage sides because they're too long --- and it's a good idea to pre-assemble the rails and cross pieces and drill them **before** installing 'em. If your fiberglass fuselage is **not** epoxy fiberglass, use some clear or white silicone tub seal to affix the hardwood in place. I've had epoxied servo rails literally fall out of a polyester-resin fiberglass fuselage! *(Editor's Note: Hobby Lobby has an epoxy glue that really sticks to epoxy. It is called Epoxy Epoxy. Check Hobby Lobby's ad. We have tried it and it works great.)*

How do we fix the fuel tank in the middle of a fiberglass fuselage? Easy! Make a "bed" of rectangular pieces of foam rubber, up from the "floor" or down from the "roof" of the fuselage. Use several layers to get the tank located properly with regard to your engine's needle valve. Tub seal will hold the layers together and also hold the "pack" to the fuselage interior. Then, using some medium large **dress hooks** arranged to hold the tank in position and epoxied (tub sealed) to the fiberglass, hold the tank in place with rubberbands. I usually use four hooks and two bands for tanks up to eight ounces; six and three for 12-ouncers. If you have difficulty getting the right size of dress hooks, all is not lost! Check our drawing (Fig. 1) for a rubberband bracket. It's made from strip balsa and a short length of dowel. A couple of these beauties, epoxied in place, plus a couple of rubberbands hold most any shape fuel tank in place. And, if your throttle pushrod has to penetrate the fuel tank foam pack, just push it through **inside** a bit of Nyrod tubing. The "pack" will act as a flexible "guide" for the pushrod!

Foam-wrapped receivers and battery packs can be treated in the same way --- using dress hooks and rubberbands. Just don't bind things too tightly to the fuselage structure, thus over-compressing the foam.

Internal Control Connections: Nothing is uglier than a sleek, beautiful scale R/C model with external pushrods and nylon control horns! Makes you want to specialize in World War I models, where **all** of the control system is, naturally, hung out in the breeze. Even Golden Age models are a help in this respect --- a lot of 'em use cable controls which are easy to duplicate. But a "Jug" (P-47) or a Mustang (P-51) with exposed control horns --- ugh! No sweat with ailerons and flaps --- we can hide control actuation with torque rods on the newer aircraft types. But, when it comes to rudders and elevators, we have a big problem keeping everything inside our R/C scale model.

Elevators can be pushed and pulled internally --- by using a music wire elevator-half connector with a "soldered in place" internal control horn. It may require a bit of judicious trimming inside the rear of the fuselage for horn clearance. And, if you have the space, the use of a ball connector at the control horn. The connector should be placed in a hole in the horn at approximately the proper distance from the hinge line (determined by checking the model drawing or the instruction book). More or less elevator action can be obtained, depending on which holes you use **on the servo arm or wheel.** Use an adjustable clevis at the servo end of the elevator pushrod --- for trim purposes **and** to adjust elevator travel.

Internal rudder horns are a different kettle of fish. You're in luck if the rudder isn't hinged at the extreme rear of the fuselage. A rudder horn (again, brass) can be soldered to the end of a hooked bit of music wire. The wire is embedded in the rudder, on the hinge line, and projects down into the rear fuselage (usually above the stabilizer). Again, a ball connector is used and adjustment and rudder trim set at the servo end of the rudder

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RCM PRODUCT REVIEW

R and R Models STINGER

SPECIFICATIONS

Name	STINGER
Aircraft Type	Giant Sport
Manufactured By	R and R Models 1611 Red Bud Drive Northwood, Ohio 43619
Mfg. Suggested Retail Price	$149.95
Available From	Direct from Mfg.
Wingspan	86 Inches
Wing Chord	15 Inches
Total Wing Area	1290 Sq. In.
Fuselage Length	55 Inches
Stabilizer Span:	30.5 Inches
Total Stab Area:	187 Sq. In.
Recommended Engine Range	Quadra
Recommend Fuel Tank Size	12-16 Oz.
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa, Ply & Spruce
Wing	Balsa, Ply & Spruce
Tail Surfaces	Balsa
Building Instructions	No
Instruction Manual	Yes (3 pages)
Construction Photos	No

RCM PROTOTYPE

Radio Used	Futaba
Engine Make & Displacement	Quadra
Tank Size Used	12 Oz.
Weight, Ready to Fly:	17 Lbs.
Wing Loading:	30.4 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Easy construction, good wood selection, rugged design performance.

WE DIDN'T LIKE THE:

No problems.

R and R Models have released another giant model kit aimed at the modeler who desires an easy and quick building plane suitable for weekly flying. This entry is called the "Stinger" and has similarities to the earlier released "Snapper," presented as a kit review in the March 1982 R/C Modeler.

The box, 48½" x 13½" x 5½", contains a large collection of wood, smaller parts in individual bags, heavy duty aileron torque rods, beefy dural landing gear, and a very well-drawn 21" long canopy. All items were well-packed and arrived in excellent condition.

Construction

Plans were one page measuring 86" x 42". The instructions are 3 pages and quite sufficient to make building the Stinger an easy task. All wood was of top quality as was the hardware.

The tail surfaces are built from 36" long stock. After the framework is together, sheeting is applied. The horizontal stabilizer uses 1/8" sheeting and the vertical stabilizer and rudder take 1/16" sheeting. The elevators are shaped balsa and need only to be tapered. Building the framework is very quick and easy and, once the sheeting is in place, the finished pieces are strong and light.

We built the wing by first pinning down the 1/2" x 5/8" spruce spars. Use 1/2" x 3/4" material under the rear of the ribs (fully symmetrical airfoil) and glue ribs and 1/8" ply shear webs to the spar. Start with the outermost rib and glue it in place. Then install a shear web, a rib, a web, a rib, etc. This spaces the ribs automatically and is quick to do. You will probably need to cut a little off of one web so the center two ribs are right on location. Center ribs are 3/16" ply with a 3/16" ply doubler where the 1/2" dowel is inserted that pins the front of the wing to the fuselage.

Next install the spruce top spar, leading and trailing edges, and the 1/8" sheeting. Use the harder pieces for sheeting the trailing edges, leaving the more easily bent wood for the leading edge. Wing tip blocks are provided but we used the wing cutout from the fuselage to build up the tips.

Ailerons are the strip type and require heavy duty hinges (as do rudder and elevator). Dihedral braces are 3/16" ply and create 2¼" of dihedral. Fiberglassing is needed for the center joint.

The fuselage is made from 1/4" balsa sides, 3/8" top block, 1/2" bottom blocks in front of the wing, and 1/8" bottom sheeting from wing to tail. The fuselage is a basic box with 1/8" ply doublers from firewall to rear of wing, four formers, 1/8" spruce longerons, and lots of 3/4" triangle reinforcement. The firewall is 1/2" ply and we glassed the joint it makes with the 1/4" sides. The landing gear is screwed to a 1/2" ply base, which we also glassed to a former and 1/2" bottom block. Topping off the package is the huge canopy which really dresses up the model.

We used Super Jet throughout with GMP 6-minute epoxy in higher stress areas. Hinges were a combination of Robart (gray with the steel pin) and Du-Bro Quarter Scale flat hinges. Pushrods were 5/16" and 1/4" wooden dowel, with the ends being 4-40 threaded rods and Du-Bro Quarter Scale ball links.

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SILENT POWER

Jim Zarembski

Guillermo Villa Novoa in Ohio, summer 1982

Guillermo Villa Novoa's Leisure Playboy cabin version in Mexico City. Powered by a Leisure 05 with a 2½ to 1 gear reduction and 6 cells, 1.2 AH. See text for details.

As always, Silent Power receives a lot of mail from beginners interested in electric power. I was sent two particularly interesting letters regarding flying with electric power in high altitudes. These were from Al Fabor of Boulder, Colorado, and Guillermo Villa Novoa from Mexico City, Mexico. Al is an old time RC'er who has been dabbling with sailplanes and electrics with only marginal success.

Guillermo is a relatively newcomer to the hobby with about three years of flying under his belt. Disgusted with glow engines, Guillermo considered Silent Power and was able to visit me in Ohio last summer to discuss the ins and outs of Electric Powered R/C. We spent a day going over the basics and flew a prototype of the 05 powered WASP in rather windy conditions.

(See page 56 of this issue for full size construction article on the WASP.)

Impressed by what he had seen, Guilermo went to work on a WASP and a Leisure Playboy. More on that later; let's hear from Al Fabor.

Dear Jim,

Several years back I sold all my power planes, equipment, etc. I decided to go with gliders and, due to your beginning articles --- electric power.

"Weird" configurations (the Mrs. description) seem to intrigue me, so while building a couple of gliders, Charlie Parker's Sorcerer caught my eye.

This came in under the maximum weight Charlie gave, but trying to fly it at 6,000 ft. was no go. It appears to be way under powered.

The wife and I are now building a Mini Bird of Time and Mark Pohling's Electric Brigadier. I just read the article on converting the Mini Bird of Time to electric. I'm glad to see your other article and tables in RCM also --- this has helped me immensely --- but I still have the following questions:

(1) Are batteries used in these tests Sub C?

(2) Do you make up your own battery packs? If so --- what components and where are they available?

(3) How do I charge 6-cell pack on an Astro 4/8 cell charger?

(4) Would one of the new Astro or Leisure motors do a job at this altitude on both the Sorcerer and Brigadier? If so --- what combination of components --- batteries, props, etc.?

***Note:** I have been using Futaba gear and Royal Mini Titan servos with micro switches for on/off.*

(5) Suggestions for mounting new motors with "ears" (brushes) to

Guillermo's son with the Cabin Playboy back in Mexico City.

At 8500 ft. the Playboy is launched in grassy knoll.

The Wasp at 8500 ft.

facilitate removal.

(6) In your opinion --- best component(s) and source(s) for fusing system.

Jim, I have been trying to put an intelligent package together for two years that would work at this altitude and I'm glad to hear that RCM is adding to your coverage. Writing this letter and hoping to pick your brain and save myself time, money and frustration. In my opinion, the basic and complete information to start in electric power has not been put together in one package.

We all are looking for more information. Thanks in advance for your time and consideration.

Sincerely,
Al Fabor

Dear Jim:

I built the WASP per the plans you mailed me, and equipped it with the Astro-Cobalt 05 engine. My youngest son helped me, building a modified cabin version of the Playboy which was equipped with the Leisure 05 engine and gear reduction.

I made the first trial flights in the Mexico City area at 6,000 ft. altitude and the results were ***great,*** *especially with your WASP, so I decided to go a step forward and went to the mountains where I have property located at about 8,500 ft. of altitude and* ***surprise!*** *I can state that altitude does not affect at all the performance of our electric R/C planes. You just have to fly a little faster to compensate for lower air density, but that is something anyone can handle without problems. The important fact is the efficiency of the motor is not altered. The propeller turns faster as a matter of fact, and everything is compensated for.*

The following table of my own experiences clearly shows that with glow engines, the power decreases with altitude, but with electric motors, the rpm's actually go up with altitude. Of course, this does not mean more power because the propeller moves in a less dense air, but at least it keeps a small variation of power at different altitudes. (I actually went to the coast this weekend for fun with the family, but I took the electric engines and accessory equipment just to complete the table.) The experiences with the glow engines had been done previously by me.

First flight of Guillermo's Wasp. Fast climbing with an Astro Cobalt 05.

and when I have dared to fly them, it was with a very critical performance as compared to performance in Mexico City at 6,000 ft. and, of course, to performance in Acapulco at sea level.

Please pass on a note to your readers, that I firmly state that flying electric at high altitudes is the perfect solution to having fun instead of problems.

I am enclosing some photos taken at that place in the mountains. I hope you enjoy seeing your WASP giving me a great deal of flying fun. I have to congratulate you for the design of the WASP, its performance is excellent in

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		RPM's at		
		Sea Level	6000 ft. (Mexico City)	8500 ft. (Mountain Ranch)
Engine	**Prop**			
GLOW ENGINES				
K & B 0.61 (C. Lee)	11/7	13,000	12,100	11,400
Veco 0.19	8/6	12,800	11,800	10,900
ELECTRIC ENGINES				
Astro Cobalt 05	7/6	12,300	13,000	13,300
Leisure 05 Geared 3:1	11/7	4,600	5,300	5,500

I have to tell you that at 8,500 ft. altitude, I have never had anything near to good performance in the past with my glow R/C planes. I experienced disappointments and frustrations trying to start and carburet engines,

SR flight packs for electric powered R/C. You select the cell size and configuration. These packs are shown without the popular Molex connectors which are available from SR.

Jim Zarembski's Porterfield with SR 16 cell 900 mA battery pack. Flight duration up to 8 minutes with little increase in weight.

BIG IS BEAUTIFUL

Dick Phillips

How many of you out there keep a log on your radios? . . . that's funny, I don't see many hands up! How many of you put your radios away in the fall and leave them setting on the shelf all winter? . . . ah, there are a goodly group who make that mistake, judging by the hands raised!

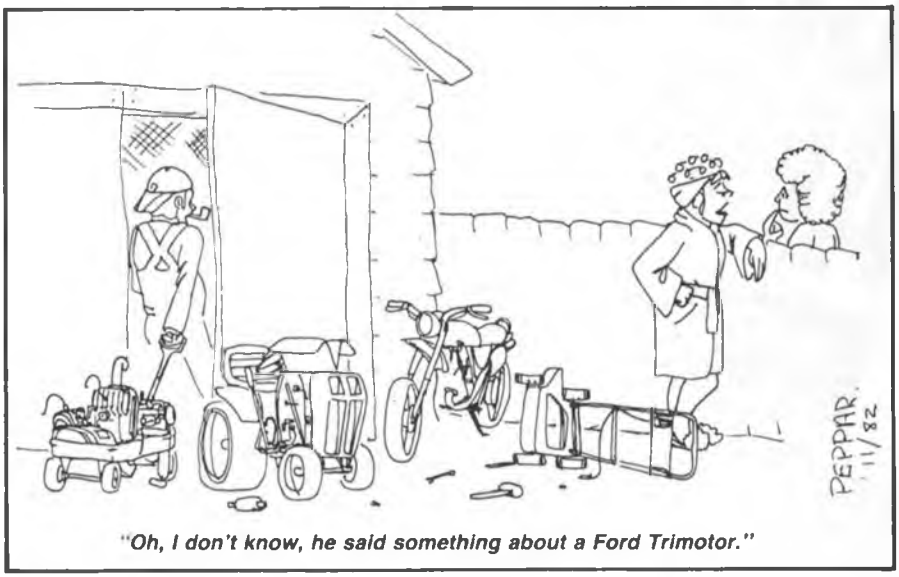
Most of us are like that. We intend to do the right thing, we just don't get around to doing it until it's too late and we've smashed a model up as a penance for neglecting our equipment.

I'm no exception; as with many of you, I too didn't keep a log on my radios and didn't take care of them during the winter building season when they aren't used that much. Oh, sure, I might put a charge in a set of batteries if I was going to be mounting a radio in a new model and needed to know for sure which way a servo operated or some such. But, like most of us, I didn't bother with really taking good care of my radios.

Mine are getting a little old, they still work well, but one of them cost me a model earlier in the year and I sent all four of them off to have a check-up. It was about a $300 bill which isn't bad, considering their age and the use they have had. However, I could have saved a model had I been looking after them a little better.

Our radios are pretty darn good gear, especially the better quality ones, and the only weak link in that chain are the batteries we use. They are basically very reliable, but they have a limited lifespan and that period is shortened if we don't take care of them. Considering that battery failure accounts for almost a third of the radio caused crashes, we can make life a lot easier for ourselves if we make sure the batteries get the best care we can give them.

Nicads do not require any real 'service' at all, all they need is a regular regimen of charging and they'll serve us well. One the easiest ways to take care of this important aspect of battery management is to use a timed discharge accessory and **log the results.** I use a Super Cycle which I don't think is still available and that's the only way I ever charge my radios. While so-called 'memory' is not the problem we once thought it was, it can limit battery performance and so the timed discharge/charge cycle is a good idea. It lets us know how our batteries are doing, what condition they are in, how long they'll hold a charge and can also point to the occasional bad cell.



"Oh, I don't know, he said something about a Ford Trimotor."

I'll bet most of us have done as I have from time to time. Especially after a crash . . . made a record of battery charge/discharge performance on a scrap of paper which is soon lost or misplaced and the effort is wasted. I've recently made up a sheet of paper and use it religiously. It's pretty simple and straightforward, listing the date, whether it was an RX or TX charge, which radio or battery, the discharge time, charge time, and the voltage read after an hour or so following completion of the charge after the voltage has settled back from the charging peak, and a remarks column.

A glance at the chart will be self-explanatory. I identify the TX by its frequency and, since going to Ace's redundant battery system, have numbered the batteries I use so they are readily identifiable. Discharge indicates the time in minutes that I read off the Super Cycle. (The large RX batteries don't work too well on the Super Cycle so I don't worry too much about them. They do have plenty of capacity so it's not a big deal.) The Charge Column indicates in hours the charge time on the battery and the last column is the voltage reading on them after the charge has been over for at least one hour. The **remarks** column I use for any pertinent information that comes to mind as to that battery or radio, or whatever.

During the off-season, I cycle once every six weeks and that seems to be a good interval. I'm not forever managing battery charges and yet it's often enough to keep the batteries in good shape and it creates a record of battery performance that is important to the health of my airplanes. If you aren't doing something like this now, you probably should be and it will, undoubtedly, eventually save you an airplane. The record doesn't have to be

PAGE NO. 1

CHARGE/DISCHARGE RECORD

DATE	TYPE	NO.	DISCH	CHGE	VOLTS	REMARKS
10/16	TX	72.240	125	12	—	CYCLE
10/17	RX	1A	—	24	7.02	INITIAL CHGE
10/17	RX	1B	—	24	7.02	INITIAL CHGE
10/22	TX	72.460	130	12	—	CYCLE
10/23	RX	2A	—	24	7.04	INITIAL CHGE
10/23	RX	2B	—	24	7.08	INITIAL CHGE
11/3	TX	75.40	120	12	—	CYCLE

Doug McBrien's OS2U Kingfisher 'on the step' and just about ready for lift-off. Plan available, see text.

Joerg Vogelsang's manned V-1 model. At Quarter Scale, model was noisy, fast, and impressive. Was clocked at 262 mph and flew very well.

Starting the V-1 was a challenge, toasted marshmallows anyone? Joerg Vogelsang (left) and crew prepare for noisy flight.

like mine, just so you keep one and can track your battery performance over a period of time.

★

Some months ago, I inherited a tool chest from a relative who had retired from the gun making game. It was a real bonanza to a modeler and included a lot of very fine and useful tools and some I probably wouldn't have bought for myself due to their high cost or to my belief that they would not have been much use to me.

Among the items in the tool chest was a very complete set of taps and dies. I thought they were pretty great when I received them but had no idea just how useful they were going to be to me. If you don't have a few good quality taps and dies in your workshop, you'll be amazed at how you got along without them once you own a set.

While a full set of taps and dies is useful, you don't need many. I find I frequently use just a few of them and the cost of adding them to your array of tools is not that great. A 2-56, 4-40, 6-32, 8-32, and maybe a 10-32 are really quite enough and you'll be surprised how often you use them.

Incidentally, with a small assortment like this, you can afford to buy good ones and, if you do, you won't be disappointed in them. Don't however, try to thread piano wire unless you intend to anneal it and then retemper afterwards. You can get away with doing a little threading of such hard wire if you only do a bit of it and use a good cutting oil. Not just any oil, a cutting oil. Your taps and dies won't last too long if you make a habit of threading really hard material, however.

As most of you know, I have been using bicycle, motorcycle, and, recently, sulky spokes as pushrods and pushrod ends. The latter are smaller than motorcycle spokes and bigger than bike spokes and, if you can find them, work very well in our uses. If you choose carefully, you'll find

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Full scale or model? Hard to tell in this photo. Model was capably flown by German modelers. C-5A equipped with operating flaps and spoilers. Note flaps partially deployed.

German C-5A Galaxy rotates for one of many spectacular flights at QSAA Rally in Las Vegas. Large and well-engineered model impressed all who saw it fly.

Chuck Fuller's AT-6 at QSAA Las Vegas Fly-In.

George Harlan's Monocoupe 90-A was completely detailed as was the passenger. Best of Show award winner at QSAA Las Vegas Fly-In.

B.D.8

From one of England's top scale designers, Dennis Tapsfield, comes this 68" span, 3½" scale model of Jim Bede's little jewel. A .90 4-stroke will handle it nicely. By Dennis Tapsfield

For me, one of the most difficult decisions to make is on which full size aircraft to base my next model. I probably have the documentation for several aircraft, all of which I consider to have the right attributes for an R/C model. However, the B.D.8 saga, for me, began when I was in Oshkosh in 1980. If you aren't familiar with Oshkosh, it is an airfield about 100 miles north of Milwaukee, Wisconsin, and, during a week in August each year, it is the venue for the most outstanding full sized aircraft convention in the world. In 1980, 9000, yes, nine thousand! aircraft arrived there, mainly privately owned, and falling into several different categories including veteran, vintage, WW II, replica, etc., etc. A lot of these are parked in fields surrounding the airfield if they are not going to be flown during the

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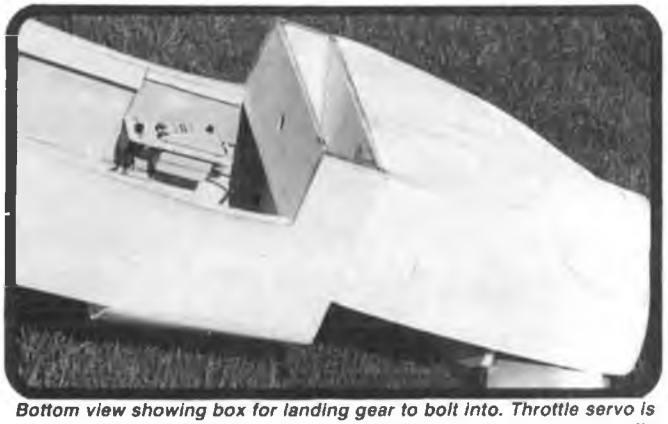
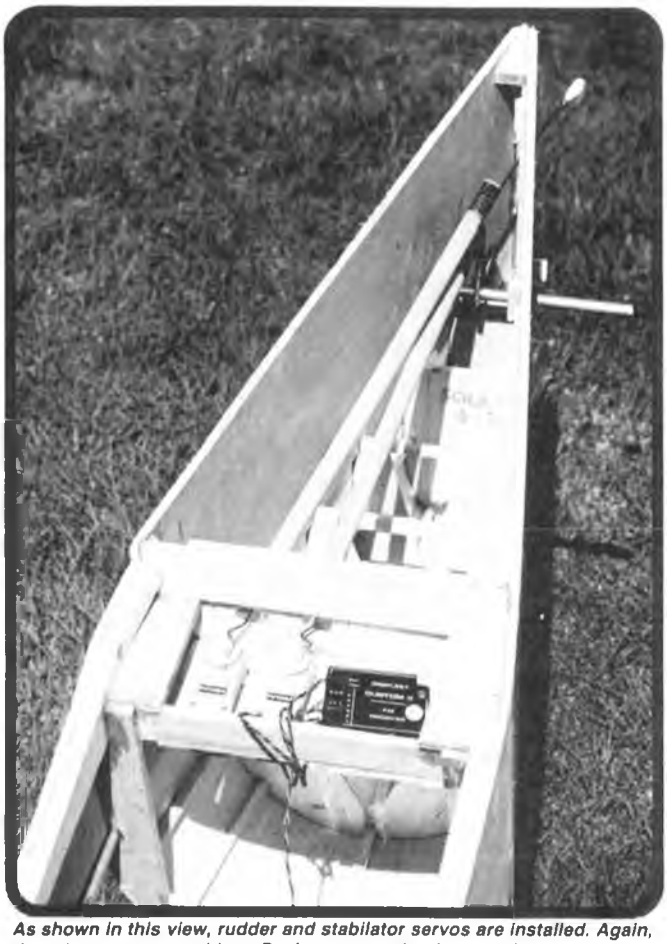


Bottom view showing box for landing gear to bolt into. Throttle servo is mounted along with radio switch. No problem with where to put radio equipment.

Close-up of Magnum .91 4-stroke installed in Dennis' prototype. There is a good deal of room under that cowling to hide most any engine used.

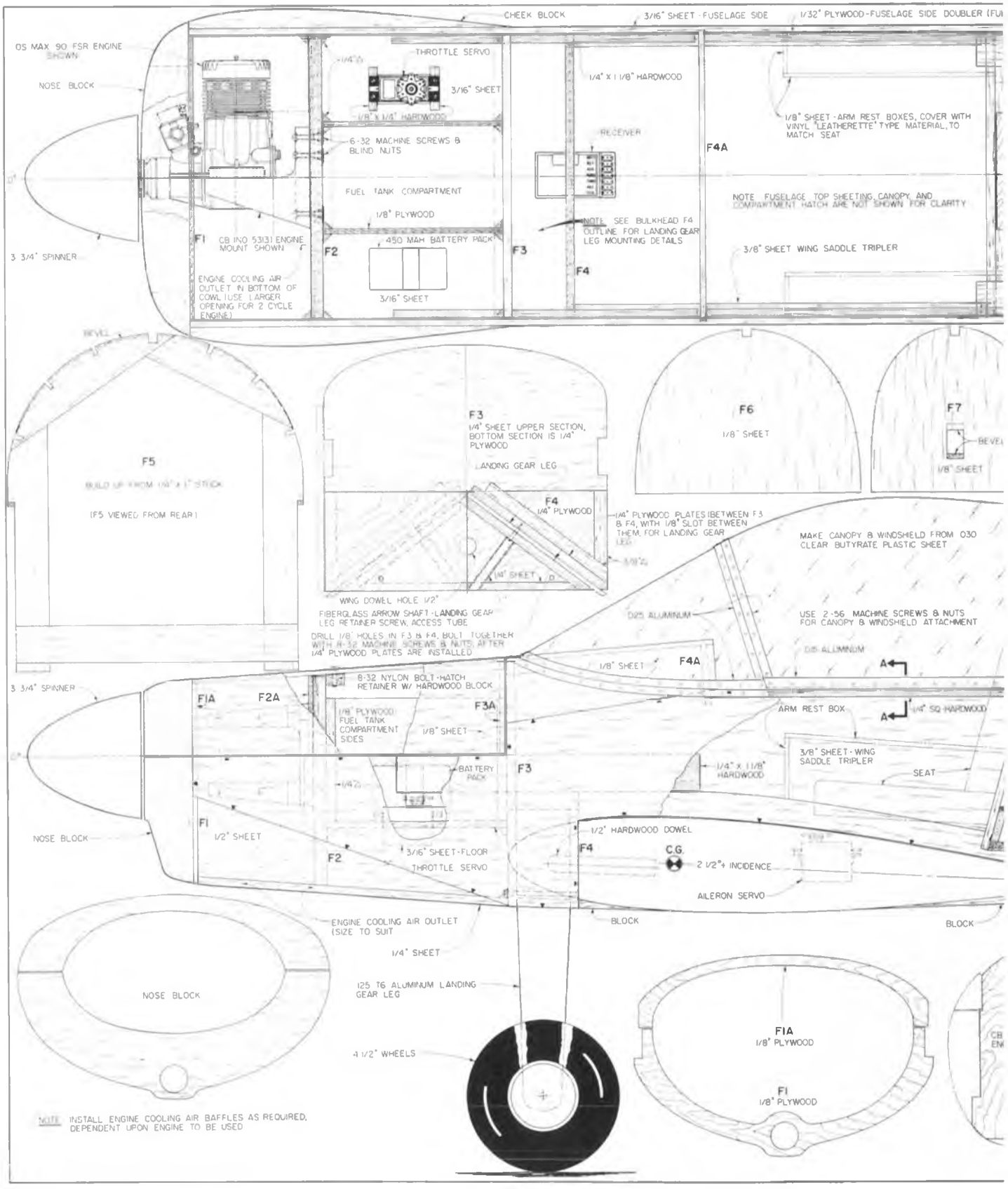
Three photos of the full size aircraft.



As shown in this view, rudder and stabilator servos are installed. Again, there is no space problem. Basic construction is very simple.

Looking through the canopy at the cockpit interior. The use of vinyl leather to cover various parts can really add to the looks.

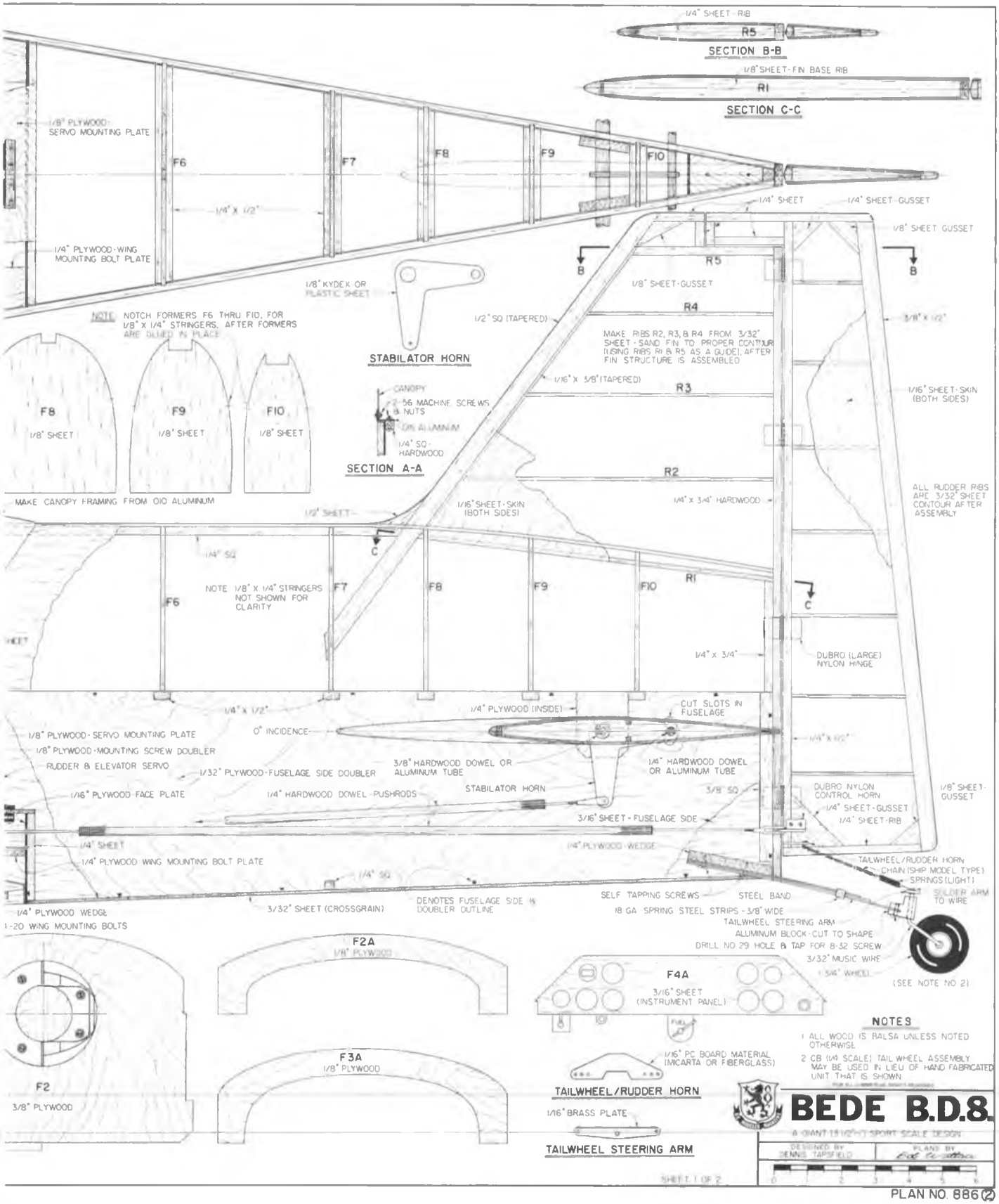
Author prepares for another flight as he is about to take-off.



convention, and the owners either camp under the wings, or even inside the aircraft! To be able to walk around, talk to the owners and look at and touch the planes was really something.

Anyway, during the flying on Thursday afternoon, out of the blue, in came this unusual little plane; pretty, with an outstanding trim design, and it really looked like a model. I took a couple of color slides of it, and was determined to try to acquire a 3-view drawing from somewhere so that I could build a model of it! It was to be several months before the drawings appeared in the April 1981 Aeromodeller, and set me on the road

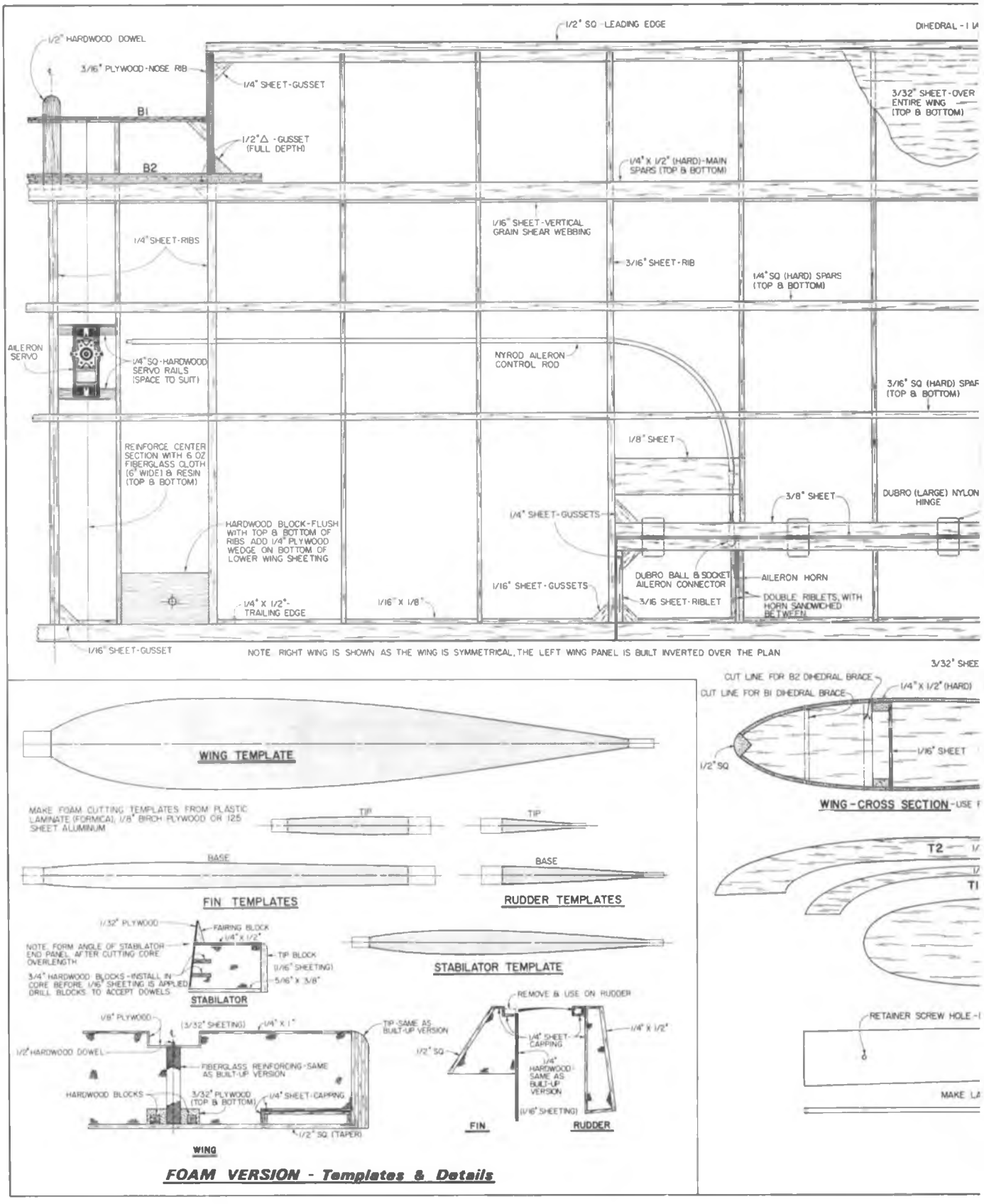
FULL SIZE PLANS AVAILABLE — SEE PAGE 203



to building it.

After some thought, I decided that a scale of 3½" to 1' would be about right, since I could buy wheels the right size, 4½", and the cowl would completely hide the engine and silencer. The right size spinner was available and, most important of all, it would fit in the car! The last remaining thing was that the canopy that Howard Blackwell makes for his Robin adapted almost perfectly, so I was all set.

If you are interested in the prospect of building this rather unique airplane, then read on. Note that the prototype had foam wings, fin, rudder, and stabilizer. You can cut your own cores using the templates that are



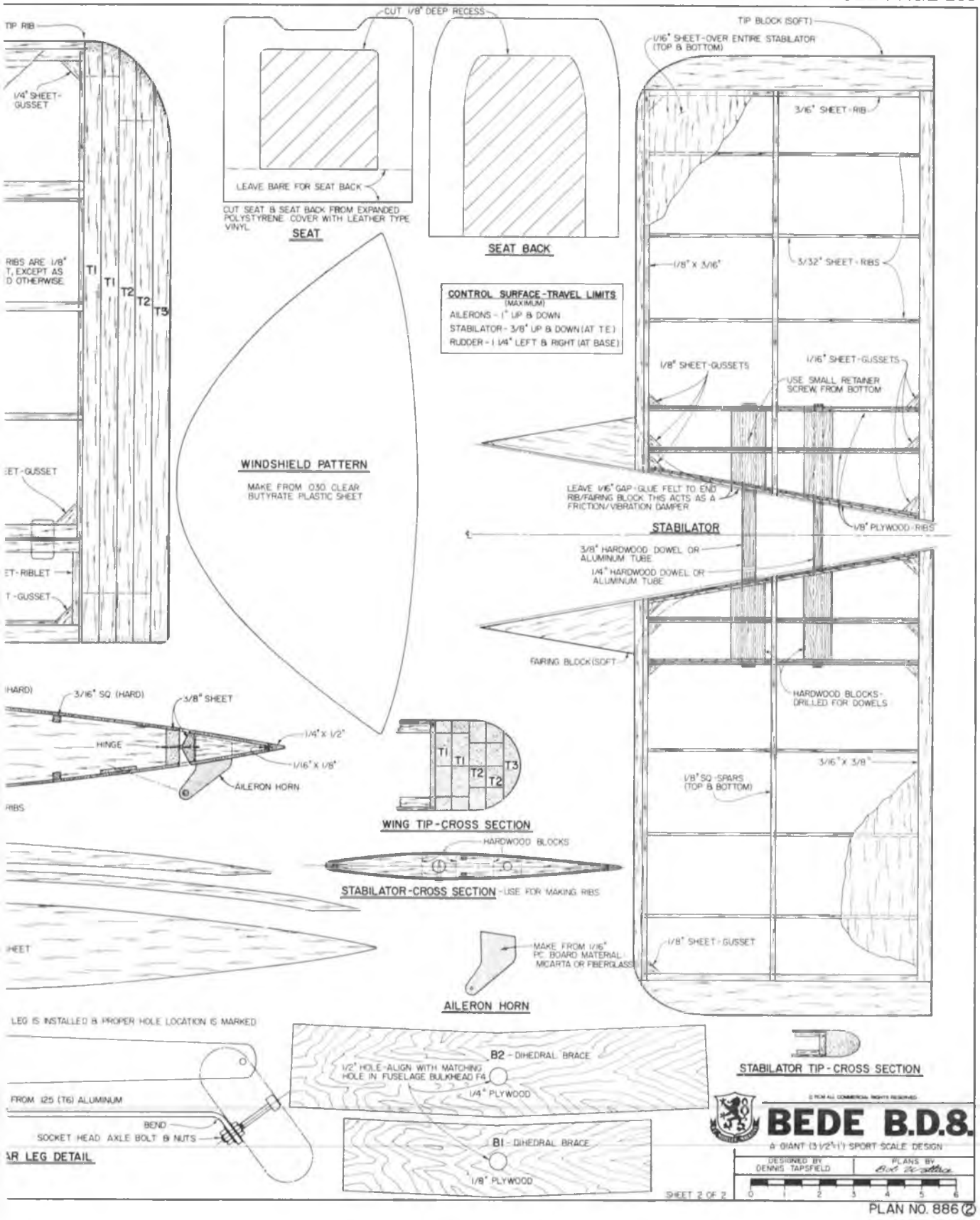
shown on the drawing, or if you can raise a mortgage for the balsa, you can build them up in the traditional way as shown.

CONSTRUCTION

Built-Up Wing:

This has been designed as a simple structure and, being of very low aspect ratio, is not highly stressed. Select your wood with care. Cut out all the ribs, and assemble one wing at a time, by pinning the 1/2" x 1/4" spar on the plan, and setting the ribs on it. Use some packing under the trailing edge to support the ribs, add the leading edge, and the top spars. When this is set, remove it from the plan. Pin down a piece of 3/32" sheet, leaving room for

FULL SIZE PLANS AVAILABLE — SEE PAGE 203



the trailing edge and, using a piece of packing near the main spar, glue the wing to the piece of sheet. Allow this to dry, and continue to build the wings to the drawing, by joining them together before sheeting. Don't forget the aileron snakes (or linkage if you prefer) the hardwood blocks, gussets, etc. Before closing the whole thing up, add the trailing edge, and the wing tips, then carefully cut the ailerons away. Fit the hinges and the horns, and clean up all over. Glue on the 2" bandage in the center, and that should be it.

Try to keep the tail end as light as possible!

Fuselage:

Cut out the sides from 1/32" ply, and make up the balsa outsides from 3/16" sheet. Mark the position on both the ply and the balsa where the bend occurs just forward of the wing T.E. Wet the area involved, allow to soak, then bend the sides to the angle shown in the plan view (believe me this is the only way to produce the desired result). Clamp the sides in this position, and allow to dry. Now glue the balsa sides to the plywood sides using an impact adhesive. I use Dunlop Thixofix with great success. Drill the holes for the stab pivots and clearance slots at the rear. Join the sides together with slow setting epoxy

resin, using the formers up to the rear of the cockpit; allow to set. Draw the tail together and sandwich the post between them; it is best to set the fuselage on the building board, and use a square against the fuselage side at the tail end. When this is quite dry, add the deck formers and build up the fin as shown on the plan, and cover with 1/16" sheet. At this stage it is a good idea to fit the stab pivot bearings using the 1/4" ply reinforcing plates inside the fuselage. Make sure that they are in line and square by putting the 3/8" tube or dowel through and taking measurements. Fair in the stringers and the deck formers, fit the fin and plank the rear deck. Next, add the hardwood stiffeners, build the tank box, adding all the gussets as shown. Block in the nose area as shown. Tack glue the cowl formers in position and plank. Add the side cheek blocks, and the nose block and sand to shape. Ease the cowl off and fill in with

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JIM BEDE'S B.D. 8

Designed By:
Dennis Tapsfield
TYPE AIRCRAFT
Stand-Off Scale
WINGSPAN
68 Inches
WING CHORD
17½ Inches
TOTAL WING AREA
1190 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Symmetrical
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
1¼ Inches
O.A. FUSELAGE LENGTH
58¾ Inches
RADIO COMPARTMENT SIZE
Ample
STABILATOR SPAN
28 Inches
STABILATOR CHORD (incl. elev.)
8¾" (Avg.)
STABILATOR AREA
234 Sq. In.
STAB. AIRFOIL SECTION
Symmetrical
STABILATOR LOCATION
Mid Fuselage
VERTICAL FIN HEIGHT
10½ Inches
VERTICAL FIN WIDTH (incl. rud.)
10½" (Avg.)
REC. ENGINE SIZE
.90
FUEL TANK SIZE
16 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rudder, Stabilator, Ailerons & Throttle
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa & Ply
Empennage	Balsa, Ply & Hardwood
Wt. Ready To Fly	**232 Oz.**
Wing Loading	**28 Oz./Sq. Ft.**

AIRFOILS . . .

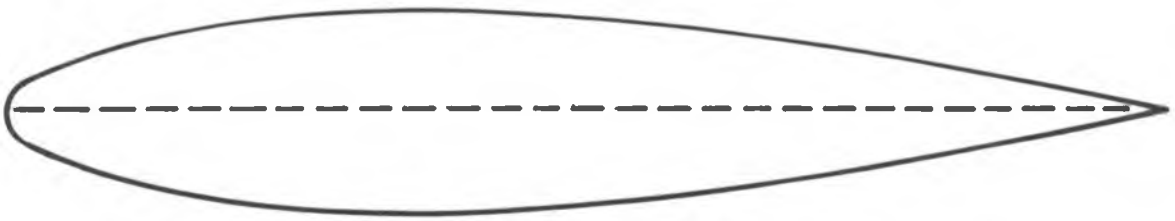
AND HOW THEY AFFECT THE PERFORMANCE OF YOUR MODEL

By Fred Reese

It is not my intention to write a lengthy technical article but rather present information that you can use to adjust the performance of a wing to better suit your model. Whether you choose a symmetrical, semi-symmetrical, or flat bottom airfoil depends on the weight, speed and performance of your model.

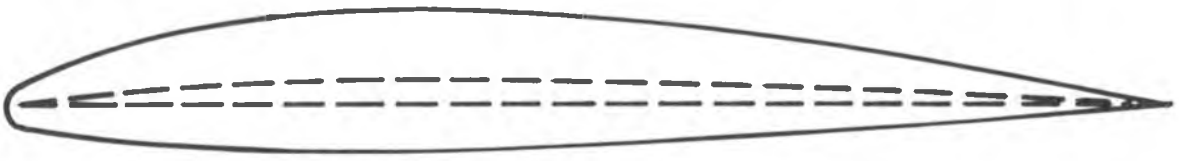
For aerobatic models, a symmetrical airfoil is best (Figure 1) because it requires a minimum of down elevator to sustain inverted flight, inside and outside looping maneuvers will be the same, and there is no natural tendency for the airplane to pull up as speed increases. The angle of incidence is the angle between the line of flight and the chord line of the wing, a straight line between the center of the leading edge radius and the point of the trailing edge. Symmetrical airfoils do not produce lift at zero degrees incidence, but require some positive angle of attack to develop the lift to carry the weight of the model. This angle on a properly balanced pattern ship would be less than one degree. As the Center of Gravity is moved forward, more incidence is required, indicated by "up" trim in the elevator. Symmetrical airfoils can be used on trainers that require some natural stability by setting the wing at about two degrees positive incidence. To

FIGURE 1



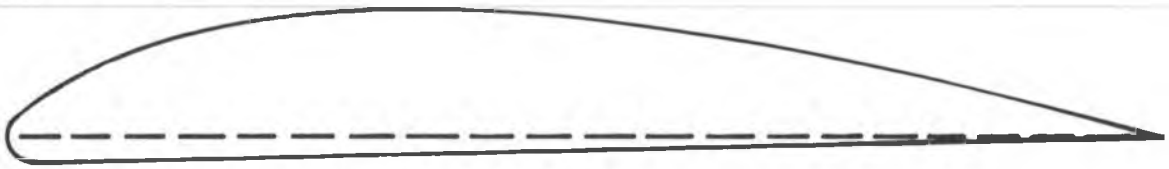
15% SYMMETRICAL

FIGURE 2



NACA 2312

FIGURE 3



FLAT BOTTOM

trim the trainer will require a more forward C.G. and about 2° of downthrust in the engine to eliminate any climbing tendency.

Semi-symetrical airfoils are usually chosen for scale models or other models with higher wing loadings, sport-trainers and trainers. A semi-symmetrical wing produces lift at 0° and, thereby, has less drag than a symmetrical airfoil forced into a higher angle of attack to carry the same weight. The lifting airfoil produces some natural stability as lift increases with speed. A model put into a dive will tend to pull up on its own.

Semi-symmetrical is a vague term that means, for us, an airfoil somewhere between symmetrical and flat bottomed. The upper surface is cambered more than the bottom. For models, the four digit NACA (National Advisory Committee for Aeronautics) airfoils provide a wide range of effective airfoils. A good example is the NACA 2312 (Figure 2). The four digits describe the airfoil. The first digit identifies the degree of being non-symmetrical. It is defined as the maximum percentage difference, relative to the chord, between the straight chord line and the curved mean chord line. Thus a 3312 airfoil will have more camber on the top and less on the bottom than a 2312. The 3312 will produce more lift than a 2312 but will have more drag. The second digit indicates the high point of the top camber as a percentage times ten of the chord. In this case the 3 indicates the higher point is 30 percent of the chord back from the leading edge. The last two numbers are the percent thickness of the airfoil relative to the chord, in this case 12%. Using a 10" wide wing as an example, the high point of the airfoil is 3" behind the leading edge and the wing is about 1¼" thick.

This type of airfoil gives good overall performance at both high and low speed, gentle stall and even good inverted flight performance, although more down elevator will be needed. Outside loops will be much larger in diameter than inside loops. As lift increases with speed, a model with a semi-symmetrical airfoil will tend to pull up if put in a dive.

Flat bottomed airfoils (Figure 3) are the easiest to build and are well-suited to gliders and trainers and other lower speed models. In most cases, the bottom of a flat bottomed airfoil is at 0° relative to the line of flight which is actually 2 or 3 degrees of positive incidence to the airfoil. This airfoil provides a lot of lift, especially at low speeds. A flat bottomed airfoil will fly inverted but will require almost full down elevator and it is almost impossible to do outside loops.

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POWER BOATING

Howard Power

In the month of December 1982, the FCC officially granted the R/C fraternity new frequencies. I'm sure that by now you all know about this development so I thought I would summarize which of these new frequencies will be available for boating activities. The old 27 MHz frequencies are still usable as well as the old shared 72 MHz frequencies (72.160, 72.320, 72.960). These 72 MHz frequencies will only, however, be usable for boating for the next five years, at which time they will be for aircraft use only. Boaters have been given new frequencies in the 75 MHz band shown in Table 1. Also shown in this table is the new colored two flag system applicable to these new frequencies.

The present 75.640 frequency will be replaced in five years by Channel 72 on 75.630 MHz. We now have a total of twenty frequencies to use with our boats. We all should thank the AMA for the great job they have accomplished for all modelers.

★

The first two photos are items sent to me by Speedmaster Model Products (1325 Carol Drive, Memphis, Tennessee 38116). The first item is a neat all metal hydro launch handle. This handle is mounted on the transom of your outrigger hydro. In this way the boat may be held safely without fear of getting fingers into the prop while launching the boat. The sample is very well-made and will list for ten dollars. The second item is hardware to mount your tuned

Table 1. New Frequencies Available To Boaters.

Channel	Frequency (MHz)	Top Ribbon	Bottom Ribbon
62	75.430	Blue	Red
64	75.470	Blue	Yellow
66	75.510	Blue	Blue
68	75.550	Blue	Grey
70	75.590	Purple	Black
	75.640	Green	White
74	75.670	Purple	Yellow
76	75.710	Purple	Blue
78	75.750	Purple	Grey
80	75.790	Grey	Black
82	75.830	Grey	Red
84	75.870	Grey	Yellow

Hydro Launch handle.

Tuned pipe mounting hardware.

MRP Hydro kit parts.

Hydro internal arrangement.

MRP Hydro external appearance. Builds into a beautiful boat.

MRP Hydro on plane.

exhaust pipe. An aluminum T-bracket and pipe clamp is constructed so that the accompanying O-ring holds the pipe stinger firmly when the bolts are tightened. This unit will also list for ten bucks. These items are very useful and fill a void in the market for items of this type.

Last year MRP (Model Racing Products, 12702-D N.E. 124th St., Kirkland, Washington 98033) introduced their electric powered vee bottomed boat. Many people have "cut their teeth" on this great little boat. Their success with that boat convinced the folks at MRP to develop a faster, more exciting hull for racing. The result is their Hydro Sport High Performance Electric Scale Hydroplane. The boat is constructed of lightweight plastic with styrofoam flotation. The boat is available in ready to run, ready to install your radio, or in kit form. We started with the 971 assembled kit. Opening the box (which has some of the best art work done on any boat kit we have seen) reveals the parts shown in Photo 3. Mylar stickers and two types of cowls are included so that the modeler can make a replica of any of the following full size unlimited hydroplanes: Miss Bud, The Squire Shop, Pay-N-Pak, Circus Circus, and Atlas Van Lines. The model is powered by an 05 electric motor and a seven cell rechargeable nicad pack is included. The charging cord and rheostat speed control are also provided so that the modeler only has to supply the radio to get this model to the water.

Included in the kit is a very good instruction book. I had no trouble following it but a beginner with no experience might have minor troubles. You will need a soldering iron, drill, screwdrivers, pliers, and wire cutters to complete the job. All the photos are clear and numbered but somehow the figures were not numbered. The rudder linkage wires should slip out of the rudder arm when installed as shown in the instructions. We solved this problem by rebending the wire so that it had a Z bend at this end. The fit of the rudder and the bracket was very tight but by using a 3/16" chain saw file the fit was opened up without problem. The instructions refer to an enclosed paint chart but we found none. I assume that the paint schemes on the box lid replaced the mentioned color chart. If you have ever tried to write instructions for beginners you will appreciate the great job the people at MRP have done on these.

Photo 4 shows the internal arrangement of the finished boat. The speed control and its servo are mounted forward of the electric propulsion motor. The battery pack and the steering servo are mounted aft. Be sure to use watertight servos or your voyages will be short since any water that gets inside modern I.C. servos will cause them to malfunction.

Photo 5 shows the size of the boat and its Pay-N-Pak scheme (not to mention my wife, Beverly).

We encountered no problems when we ran the boat but found that the running time was very much shorter than expected when charged for twenty minutes as suggested in the instructions. By measuring the charge current we found that the stock charge cord only charged the batteries at less than 2 amps. At this rate it would take approximately 30 minutes to fully charge a dead pack. Since I can't run anything stock, and since I wouldn't wait a half hour between runs, I modified the charge cord. By shortening it to a total length of 15" I achieved a 3½ amp initial charge rate that successfully charged the battery in 15 minutes. Now the boat ran as expected. The stock propeller is plastic and works okay, but I also found that by replacing it with a brass 1.1 propeller made by JG Products (8030 Fordham Rd., Los Angeles, California 90045), the Hydro Sport really picked up both speed and endurance. I also used "mix and pour" expendable urethane foam to fill the rear compartment of the boat. This gave it more flotation and helped hold the rudder servo in place.

Photo 6 shows the boat "on the step" and running. Overall, I would highly recommend the boat to anyone interested in high speed electric boats.

★

Dear Sir:

I have built a Dumas Atlas Van Lines U-1 powered by a K & B Sport 40 Marine engine and an Octura 1445 plastic prop. I am using K & B 500 fuel.

Except for the color scheme and the prop, the boat was set up as per the plans.

The problem I have encountered is that the boat plows through the water. It will not plane and it sounds like the prop is cavitating.

My father has a Dumas Atlas Van Lines U-76 with a K & B 40 Marine and it literally skims across the water.

I have talked to the local hobby shop owner and a member of a local boat club and they both say that the only way this hull will plane is if I cut it in half and add 2" to the beam. I find it hard to believe that Dumas would market a product that would require such a drastic modification to make it operate properly.

This is my first attempt at R/C boating and I would appreciate any help you can give me in getting this boat to operate properly.

Thank you,
Jerry Daily
Chewelah, Washington

You do not have to modify your Dumas U-1 hull, Jerry. The secret to your problem is contained in the third sentence of your letter. You are using the wrong prop on your boat. You are using a propeller that is too small and it is not developing enough thrust to push your boat up on plane. Many

fellows in this area are having excellent luck with this hull using an Octura 1450 or an X447 propeller when using low nitro fuel. If you feed the engine high nitro fuel you should use an Octura 1455 or an Octura X450 prop. These props will get that slug of yours going. You are right in assuming the guys at Dumas know what they are doing when they release a boat kit. Their kits are well-engineered and are good designs for sport 40 racing.

Dear Mr. Power:

I am running a Streaker 39" with an O.S. .46. I chose to build this boat from what I have read in your article in the July 1981 RCM. I have set it up the way you mentioned, prop, strut depth, etc. The thing is that since I've first used it I've always had a problem which I don't know what I am going to do, so I turned to you.

My problem is that, when I start the boat it starts really good. I place it in the water but it doesn't matter how much throttle I use, the boat won't accelerate. It just runs at idle. Then I will have to either wait for a wave to lift the boat up or I have to pick it up myself and throw it in the water at high rpm. Then when she starts going, she goes! You might think that it seems too rich, but I assure you that I have tried all kinds of needle settings. It's the same. The fuel we use in Malta is no-nitro fuel because it is illegal to use nitro. I mix 3 to 1. I can't complain about the boat because she really runs good when she wants. Sometimes she wants to fly out of the water. The next minute she loses 3,000 rpm. For glow plugs I tried K & B and even O.S. I am using a 1650 prop. The pipe is set at 9". The trim plates are set so that I can hardly keep it in the water. Otherwise if I try to set them just a touch lower, the boat runs too wet and 1/3 of the original rpm and speed are lost.

I hope I have explained my problem well enough and I hope that you can help me solve my problem, because it's a pain. Hope to hear from you soon.

Thank you,
Joseph Borg
Sliema, Malta

Joseph, you are describing a classic case of too much propeller (or load) for a piped engine. Your no-nitro fuel cannot supply enough power to spin the 1650 propeller fast enough to "get on the pipe." The torque required to spin a propeller goes up as the rpm increases. A piped motor usually exhibits a torque curve that peaks at a rpm well below the rpm for maximum horsepower. As a result, a piped motor actually has decreasing torque available as rpm is increased in the area of best horsepower. If the prop is too big the motor will run out of torque and the benefits of the pipe will not be achieved. If the prop is too big the pipe length has to be increased so that the "on the pipe" rpm is low enough to supply the needed torque. Your first move to increase performance in an over proped condition is to lengthen the pipe. If this doesn't help, you must change the prop to one with less torque load. I suggested the 1650 propeller and a 9" pipe length when using high nitro fuel (40% to 60%). This prop is much too big when using low nitro fuel even if you pull the pipe out past 10". I would, therefore, suggest that you try a JG 3121 or an Octura X445 prop with the pipe at about 9½" to 10" measured from the liner exhaust port to the maximum diameter of the pipe. The boat should then run very good with excellent acceleration and about 45 mph top speed.

The fuel mixture you use also probably has too much oil in it. I would suggest that you use no more than 20% oil or a one part oil and four parts alcohol mix.

★

I recently received a long letter from Glen Dye whose Performance Model Parts, Inc. (12233 South 1565 East, Draper, Utah 84020) manufactures the TWA racing engines and a line of ABC sleeves and pistons along with other specialized parts for racing engines. He has so many comments concerning racing motors that I decided to deviate from my normal "print the letter and then answer it" format. Glen's letter is presented in italics and my comments are interspersed along with it so that our discussion maintains some continuity. Please remember that his comments (and mine for that matter) are **opinions** that may or may not be based on fact. All engine builders have their own pet theories and techniques that work for him. It's a discussion like this that I hope can possibly open up a dialogue between those interested in developing more than stock performance from their engines.

Dear Howard:

First I'd like to thank you for the very fine column you've been writing in RCM each month. Hopefully RCM will soon have enough to publish another book in their fine series on R/C models!

I disagree with several things you said on the Rossi engines and Picco engines in the August issue. As you can see from the enclosed power curves none of the ***stock*** *timing 60's or 65's develop peak hp at 21,000 or 23,000. Eighteen to 19.5 is more like it.*

Glen submitted horsepower curves for the Rossi 65 ABC Marine and the OPS 65 RCB Marine engines, running on 15% fuel. His curves show a peak horsepower of 3.2 at 19,000 rpm for the OPS 65 when operated on a steel pipe of unspecified design when operated at what I believe is a fixed length. His horsepower curve for the Rossi 65 engine peaks at 3.0 horsepower at an rpm of 19,250 when operated with a tuned muffler pipe of unknown origin at an unspecified constant pipe length. I'm sure that these curves are accurate for the conditions stated. The big question is, however, do the conditions tested closely represent the actual operating conditions we experience in racing? Dyno tests can only help the engine modifier if they duplicate actual operating conditions.

Motor output is dependent on atmospheric conditions, fuel burned, intake tuning and exhaust tuning if we assume given motor port timing and areas, and combustion chamber design configuration. Atmospheric conditions can be easily taken care of by well-known horsepower adjustment formuli. By specifying a given test fuel we can then turn our attention to intake and exhaust systems and their effect on power output. In my opinion, the biggest of these effects is exhaust system tuning. The type of tuned pipe can greatly change the output characteristics of any pipe timed engine. In fact, I suspect that the pipe dominates the engine to an extent greater than most believe is possible. I wonder what Glen's curves would look like if he had used, for example, 60% fuel and an International Products 11cc pipe whose length was adjusted to achieve peak rpm for each propeller load tested, while simultaneously adjusting for the optimum fuel mixture at each pipe length. The point is that a fixed pipe length may have driven the motor to a peak horsepower at 19,000 rpm just because its length synchronized best at this rpm. By shortening the pipe, this max power rpm might be adjusted to a higher rpm. Before one can claim to know an engine's peak horsepower rpm you must, in my opinion, perform tests that show how exhaust system tuning affects the results. Different pipes will distort the shape and peak of the power curves.

In my own experience I have found that my boat's speed maximizes every time I prop its stock timed Rossi 65 to run in the 21,000 to 23,000 rpm range using the IP pipe. I don't use a dyno but the proof is in the performance of the boat. Maybe this discrepancy is due to propeller diameters and pitches that are currently available or due to prop efficiencies that force the motor into operating at higher than its peak horsepower rpm. Will someone out there with a dyno perform the suggested tests and give us the

results?

There is also a question as to what is **stock.** Most racing engine manufacturers frequently change their motors to keep up with developments. Any dyno tests should include a complete description of port timing and areas as well as head shape and deck clearance of the motor in question. It is a well-known fact that, for example, the exhaust timing tends to dictate the rpm for max horsepower in a piped engine. The higher the timing, the higher the peak power rpm. In later columns I hope to be able to discuss why I feel that operating an engine at the highest possible rpm is beneficial. Along with this theory will be suggestions on how to modify the motor to achieve higher than stock rpm performance.

Also none of the carbs I've tried (Rossi 10.5, Perry Pump, Webra 10.5 mm, O.S. 7F, are big enough to develop maximum hp above the 18 to 19.5 range. I have not been able to run Rossi 65 or 80 drum valve. C. Duran and others have been running these in tether cars for about 3-4 years with good results.

I feel that the size and adequacy of any carb has to be judged very similarly to those procedures outlined in the pipe discussion. Simply stated, the intake system has to be able to supply the same amount of fuel and air flow required by the motor when "on the pipe." In general, we have found that by increasing carb size, the operating rpm is increased up to a point determined again by the type and length of the pipe and by the applied load. To test these effects takes a very long time because of the many combinations possible. Racers definitely need larger bore carbs than are currently being manufactured. Manufacturers, however, must be conservative in their carb selections because they want the motor to work for everyone's set up. Most manufacturers do an excellent job of carb selection but they know, as well as we do, that the stock set-up is a safe conbination for the masses; not the ultimate set-up for your race boat.

The TWA .67 I build (first are available this summer) will use an O.S. 7F carb which works fine, but is too small a throat bore and starts to hurt the power above 19,000. Even with this carb we have run above 20,000 on 15% with a Wardcraft DV hull and X450 and X455 props (this at 4500 feet above sea level and also at 7,000 feet elevation). I haven't run the Picco .45 yet but have one on order. The Picco .65 Marine I have doesn't make any more hp ***stock*** *on 15% than a good O.S. 46 or K & B 7.5, even though everything checks out okay.*

The fact that a good O.S. 46 or K & B 7.5 puts out as much horsepower as the Picco 65 (or, for that matter, the other 65's available to racers) doesn't surprise me too much. This is, I feel, a good example of the beneficial aspects of high rpm operation. If the 65's are running at 19,000 at peak horsepower, and the 45's are running at significantly higher rpm, they may (and, in fact, do) put out similar horsepower figures. Horsepower is (in simple everyday terms) the rate of doing work. It is calculated by multiplying rpm by the torque produced at that rpm and divided by a constant number that depends upon the units of torque measurement. We can see, therefore, that you can make the same horsepower by high rpm and low torque that you can make by a lower rpm but at a higher torque figure. A good example of this phenomenon is a chain saw type motor running at about 7000 revs putting out the same power as a good 60 which turns at 16,000 revs. A good 45 puts out almost as much horsepower as a good 65 motor does. Just look up the records and you will see very small differences in speed between these two classes.

Other problem areas in the Rossi 65, 80, 90 are:

(1) You should glass bead ringed pistons and check the ring end gap especially above ports (90's bad on this). Also some 90's sleeves are soft. They should be chromed with less taper. The stock .004 taper is too much for a ringed engine. Center punch around the ring pin on top of the piston (notch piston for boost port optional).

I personally had a lot of trouble with the ringed 65 Rossi engine. If I got it really running well the whole top of the piston would come off above the ring! I don't know anything about ringed engine set-ups (obviously) so am glad to get comments from those of you out there who like ringed racing motors. I seem to have much better luck with the ABC set-up in my boats.

(2) Use 12mm long screws in front plates! 10mm screws are okay for the back plate. Use heavier gaskets on both sides of the case. Bill McGraw (Rossi Sales) has them or I do (I made his for him) at 10¢ each for 60, 65, 80, or 90. I don't understand why Rossi insists on putting just one thin gasket, and that on the back plate. This causes fretting between front plate and case.

The use of longer screws in the front plates helps keep the front plate in position since they won't strip out as quick as shorter screws do. If you try to increase engine operating rpm above 21,000 you will find that one of the weakest links of our racing motors is the front housing fit to the crankcase. At high revs the front plate works on the case and causes the fretting Glen mentions. I have tried thicker gaskets and have not had any luck with these. They just allow the motor to work longitudinally and quickly wear out and the front plate gets loose. Maybe it's okay at the lower rpm range. The only way I have been able to partially solve this problem is to glue the front housing to the case using an epoxy filled glue such as JB weld. I use **no** gaskets on the front housing. The clearance between rotor drive pin and rotor is then set by adding one or more thick gaskets to the back plate assembly. By the way, Super Tigre 60 gaskets fit the Rossi perfectly and are thicker than stock. The real fix is to have the manufacturers supply a one piece case instead of the more normal bolt together two piece cases.

(3) Some crank front end assemblies have the front bearing pocket too deep allowing crank pin to press against rotor. This is a disaster or reverse thrust with hydros using straight drive or on a ducted fan engine.

(4) Some crankpins are ground as much as .001 to .005 out of round. More than .0003 out of round or .003 rod to pin clearance is junk. OPS is terrible on clearance and you spin the bottom rod bushings.

(5) Check the case for rod and cylinder to crank squareness. Again OPS (early especially) are frequently .005 or more off and tipped as much as .003 in the length of the bore.

(6) Early Black finned Rossi head with groove would crack radially from button (insert) to screw holes. This happens to the ringed motors or those used for aircraft especially when run hot (later thick heads are okay on this).

I have also had trouble with the blue water cooled heads cracking. This occurred only after a hot run (too lean or the cooling hose came off). You can easily tell if your head is a candidate for future cracking. If you have changed the blue color to a much darker shade, the head will crack soon! I have been using the black 80 water cooled head on my 65's and these don't crack even if I abuse the motor.

(7) I also wish you'd say something about too tight cylinder piston fits (K & B!!), and con rod (bottom bushing) life. The best way to go is with needle bearings in a titanium (mine) or steel rod or else like Dooling or OPS set-up with a steel race pressed in an aluminum rod. This needle bearing set-up ***must*** *be kept dry for storage. No water or fuel tolerance — they rust. Some of the 3.5 and 6.5-7.5 K & B's only get one to two hours of con rod life before the bottom rod bushing is shot. Please tell the modelers to fix this* ***before*** *running the engine. It is*

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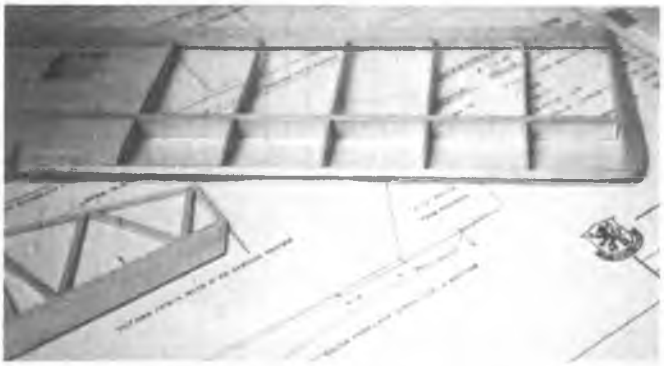
Leading edge cemented to top spar with cyanoacrylate. Clothespins used to secure during cure time.

Wing skin cemented to ribs and leading edge. Held in position by pins while upside down on building surface.

Wing and stab framed. This takes less than one hour using Super Jet.



Bottom of wing shows 3/32" shear webs with vertical grain.

Fuselage formers F-4 and F-7 epoxied in place. Make sure they are perpendicular.

Completed fuselage with battery in place.

the batteries in your model, lunch time and those short evening hours could be fully utilized for electric flying.

With the idea of a fast, efficient, aerobatic model in mind, I sat down at the drawing board trying to figure out how to design a quick change battery feature into a sport aerobatic R/C model. A lot of ideas were analyzed, but the use of a simple ventilated plywood hatch on the bottom of the fuselage proved to be the best approach. This is certainly not a new approach. I recall seeing this type of hatch on several of Mr. Mabuchi's electric models in the modeling press back in the mid-seventies.

It occurred to me that I'd probably break off the fin sooner or later if I tried to turn the model upside down in the grass to change the battery pack. Just about this time, I thumbed through a general aviation periodical and saw a picture of a Short Skyvan, and I immediately began to think in terms of twin rudders.

With a pair of twin rudders, the model could be turned upside down in the grass for battery changing. Since the top of the rudders don't touch the ground, they won't get broken. They are also very striking in the air and lend a certain distinction to the Wasp.

I personally feel that a high wing planform is best suited for electronic models. A model should look like an airplane. There should be a windshield, windows, etc. Of course, it also has to be as drag-free as possible and should weigh as little as possible.

The Wasp meets these design criteria, and can be quickly built with "ready to fly" aircraft weight of 8 ounces, not including the radio and electric flight system. It uses the NACA 2410 airfoil which is a 10% version of the well-known 2412. The wing loading is 15 to 16 oz. per square foot, which results in excellent gliding ability.

Prototypes have been flown with both Leisure's pattern and racing motors, the Astro XL 05, and Astro Flight's Samarium Cobalt Challenger 05. The number of cells was varied from six to eight Sanyos of the 1.2 AH size. As with all electrics, the compromise is duration versus speed. I personally feel that seven cells is the

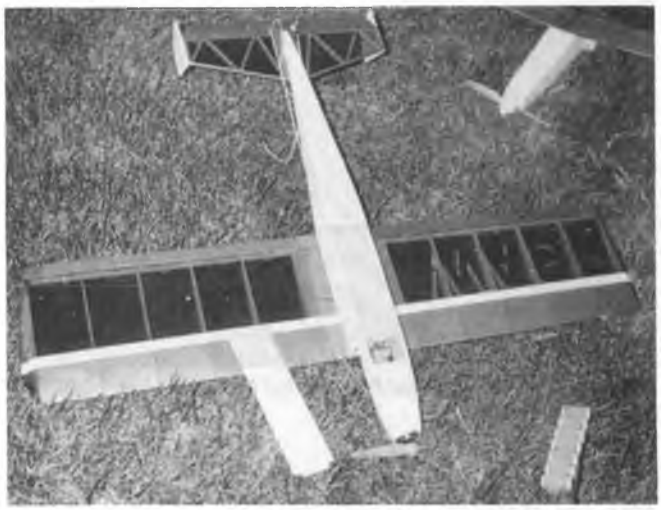
Wing and stab ready to cover. Wing requires fiberglass reinforcement around wing hold-down dowel and nylon hold-down bolt area.

Bench flying with Leisure 05.

The finished Wasp with a framed-up twin. Motor shown is Astro Cobalt 05 with 7 cell pack.

The Wasp is designed for use with any of the 05 sized motors available today using 6, 7, or 8 cells of 1.2 AH capacity for long pleasing sport flying.

Changing battery packs at the field takes about 1 minute.



7 cell battery pack removed to show nice arrangement for quick removal for charging.

best compromise for either the Cobalt 05 with a 7/6 prop or the Leisure 05 with a 6/4 prop.

What can you expect in the air? With the Astro Cobalt Challenger 05, the Wasp jumps away from your hand after you toss it into the wind. It'll climb at 40 degrees and can fly out of sight in a few minutes if you continue to climb. However, if you keep the Wasp trimmed neutrally on the elevator, she'll go where you point her. Snap rolls or long smooth rolls are easily mastered. The Wasp flies inverted just as well as it does right side up. It'll do inside loops of 100 ft. diameter or more with ease. Outside loops are also possible if you build up the airspeed. It'll fly for five or six minutes before the power noticeably drops.

That's the real advantage of the 1.2 AH cells. The power stays there until the end of the flight when the rpm's finally diminish quickly. With some of the older systems using .55 AH cells, power continually dropped off after only a couple of minutes. With the Wasp, you can do the same aerobatics the last minute of the flight as you did when you launched.

Once the power is off, the Wasp has a surprisingly flat glide. It doesn't have a tendency to stall, so you can pull back on the elevator to slow her down for a smooth landing.

This ship is relatively clean. It penetrates very well. In fact, I'll fly it in winds up to 25 mph. The first flights with the Challenger 05 were made in California in May of 1982 in high winds. The Wasp handled these winds with ease.

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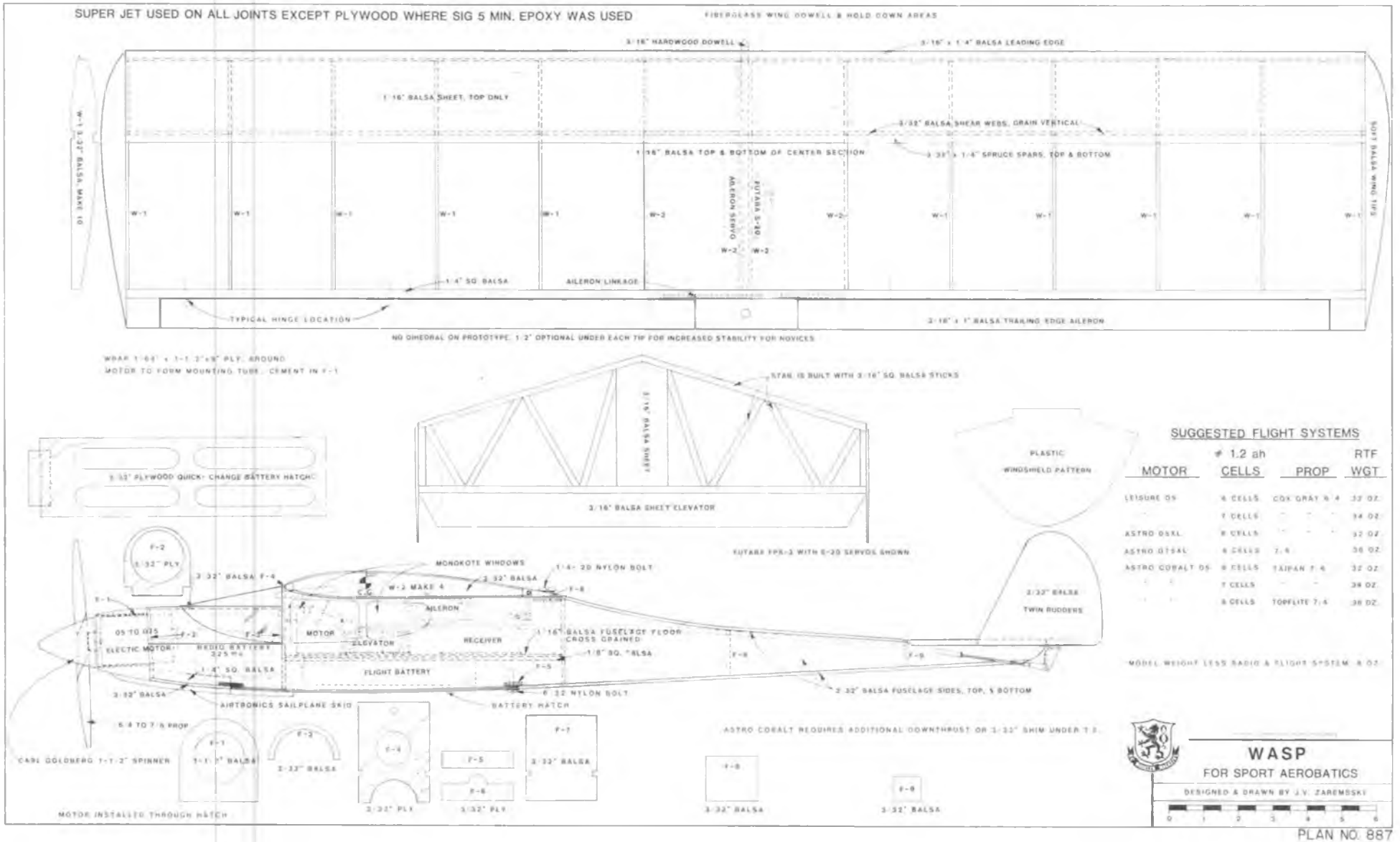
FULL SIZE PLANS AVAILABLE — SEE PAGE 203



SUGGESTED FLIGHT SYSTEMS

MOTOR	# 1.2 ah CELLS	PROP	RTF WGT
LEISURE 05	6 CELLS	COX GRAY 6-4	32 OZ.
"	7 CELLS	" "	34 OZ.
ASTRO 05XL	8 CELLS	" "	32 OZ.
ASTRO 075XL	6 CELLS	7-6	36 OZ.
ASTRO COBALT 05	6 CELLS	TAIPAN 7-6	32 OZ.
" "	7 CELLS	" "	34 OZ.
" "	8 CELLS	TOPFLITE 7-6	36 OZ.

MODEL WEIGHT LESS RADIO & FLIGHT SYSTEM 8 OZ.

WASP

FOR SPORT AEROBATICS

DESIGNED & DRAWN BY J.V. ZAREMSKI

0 1 2 3 4 5 6

PLAN NO. 887

FLYING LOWE

Don Lowe

The Big Ones

In December, my wife Clara and I decided to journey down to Homestead, Florida, to witness an aerobatic competition staged by the International Aerobatic Club (I.A.C.). It's something I promised myself to do prior to the Vegas Tournament of Champions (T.O.C.) but never got around to doing for many reasons. As you undoubtedly know, the I.A.C. competitions use the Aresti or

Don tells about flying the Hobby Shack Pilot EZ Super Star. See text for details.

Gordon and Sandy Price with their offspring, a much modified Pitts. Gordon has been Canadian Aerobatic Champion several times. Performs an unbelieveable 4 minute routine, and was also a judge at the Circus Circus Tournament of Champions.

Note the "Q" tip on Clint McHenry's prop. Tip is intentionally formed back to reduce noise.

No, not Laudenslager's Laser, it's Don Lowe's TOC Laser. Powered by a Tartan Twin engine, weighs 17.5 pounds, and is a joy to fly.

Gordon Price's aileron set-up on his Pitts provides a roll rate of 360° per second. How can he stand the physical stress?

"Spade," aerodynamic booster on aileron of Clint McHenry's Pitts. Everyone used them.

Kermit Week's "Solution" has a thrust to weight ratio of close to 1:1. A fantastic flying machine.

turnaround style of aerobatic flying such as we have been copying in the Vegas T.O.C. and the International Miniature Aerobatic Club (I.M.A.C.) styles. As one might think, since we are modeling the aircraft, why not model the style of flying?

It would be interesting to reflect on how we got to where we are in model and full scale aerobatics. Obviously, it all developed slowly in models; as we gained technology in equipment and aircraft design, we gradually have increased the level of difficulty in performance. We started with simple sequence escapement mechanisms and single channel radios which could barely stay aloft without crashing and gradually transitioned to the sleek fast pattern ships of today. In the process, our demands for flight performance have gradually increased until now we can completely simulate everything the full scale ships are capable of — and more.

Full scale aerobatics have developed also as new aircraft designs and techniques became available. Starting with underpowered modified light aircraft and bipes of all sorts, with ever increasing sophistication in design and increases in horsepower, we now have ships that do everything any model is capable of — almost. The advent of the little Pitts biplane and the ever increasing horsepower has been the real boon to full scale aerobatics. Witnessing today's I.A.C. aerobatic competitions is a real eye opener — since one would conclude --- gee, they fly just like models! Conversely — witnessing an IMAC or Vegas competition, one could draw the same analogy for models.

The move of the F.A.I. to adopt a "turnaround" pattern for 1985 international competition is the latest step in what to me is a logical progression in the order of things. I know that a lot of pattern fliers are upset these days about the prospect of what they feel could be a radical change in pattern flying and aircraft requirements as we now have it. In this regard, I would like to offer the following thoughts. Flying a turnaround pattern of a simplified form is not difficult. It simply means that instead of flying out a half mile and turning around without judging, we simply close it in a bit and judge it. Some think that today's ships will be obsolete — nothing could be further from the truth. Admittedly, it would be best to have a slower tighter turning, lower wing loaded aircraft, however, you can accomplish that with current designs; how? Shave off about one pound of weight from the average pattern ship. How? You again may ask. Simply use a fixed two wheel gear instead of retracts and lighten up on the paint job. A case in point: we held an event at the Orlando "Tangerine" contest this year which we called "TangerVegas." I was lucky to win it with my large Laser Vegas T.O.C. aircraft. Second place, however, was taken by a **standard** pattern aircraft, "Hippo-Tippo" flown very capably by Dean Pappas. He won over other Lasers. Additional evidence; we held a "Vegas East" contest in Dayton for several years in which we had a "turnaround" event for any kind of aircraft — standard pattern aircraft always won!

I am not proposing that we rush helter skelter into a complete change in pattern flying overnight. I certainly feel that we need to keep things simple for the beginners. However, I really feel that there has been a lot of over-reaction to something that simply isn't that different, but represents what I feel is a natural progression of things.

The competition in Homestead was fascinating to me. I was privileged to spend a lot of time with Clint McHenry, Chief Judge, and listen to him score many competitors in the different categories. Clint talks all the way through a maneuver and you can really be sure of what was right and what was wrong with the maneuver. Generally, the full scale ships score higher than their model counterparts. I feel this is due in some measure to the average higher skill level of the

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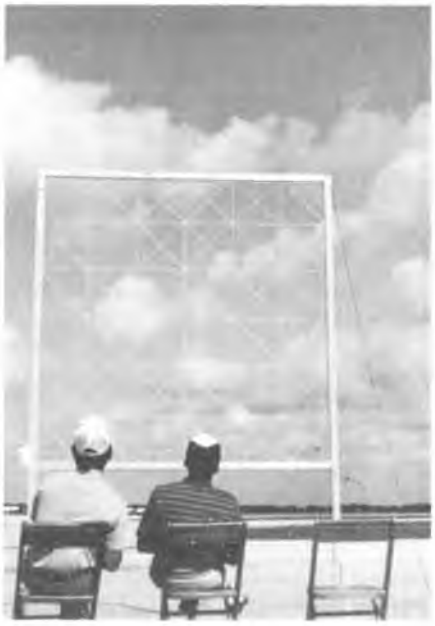

Clint McHenry takes a look through the sighting frame.

Sighting frame is used to judge vertical and horizontal maneuvers. A reference that really works.

A gorgeous example of the Christen Eagle.

A partial line-up of the aerobatic aircraft at Homestead, Florida. Gordon Price's Pitts at left.

HERE'S HOW

By Jerry Smith

Installing radio gear is a real pain. To me, it is the least glamourous part of model building. For the most part, plans do cover where to mount the servos and where to run the pushrods but, when it comes time to actually do it, there are many hang-ups. I simply haven't found a way to make it a fun part of building. However, the fact remains, without radio gear we could not control flight. So, give a man a job he doesn't like and sooner or later, hopefully, he will find an easier way of doing it. I keep telling myself this is true and sometimes it works.

Getting down to the business at hand, Photo #1: Many of you big bird lovers are using a servo on each aileron. There are a couple of good benefits in this concept. First, a smaller servo can be used because it has a more reasonable size control surface to contend with. It is not necessary to use one of those big battery drainers. Secondly, by having two servos, if one quits you have a good chance of getting the airplane down safely. And, finally, the best part, the servos are much easier to hook-up.

My sketch shows an ultra simple aileron installation. You will notice that it is very utilitarian. Easy to remove for servicing. Easy to adjust the pushrod. And above all, easy to install. Now we're talking! Some of you scale purist might take exception to this concept. Rightly so! However, we Sunday fliers are not interested in exact scale. Just lots of flying. The more the better. Oh yes, when your airplane is sitting on the flight line, who looks at the bottom of the wing? And, when it's way up in the sky, how much detail can you see on the bottom of the wing?

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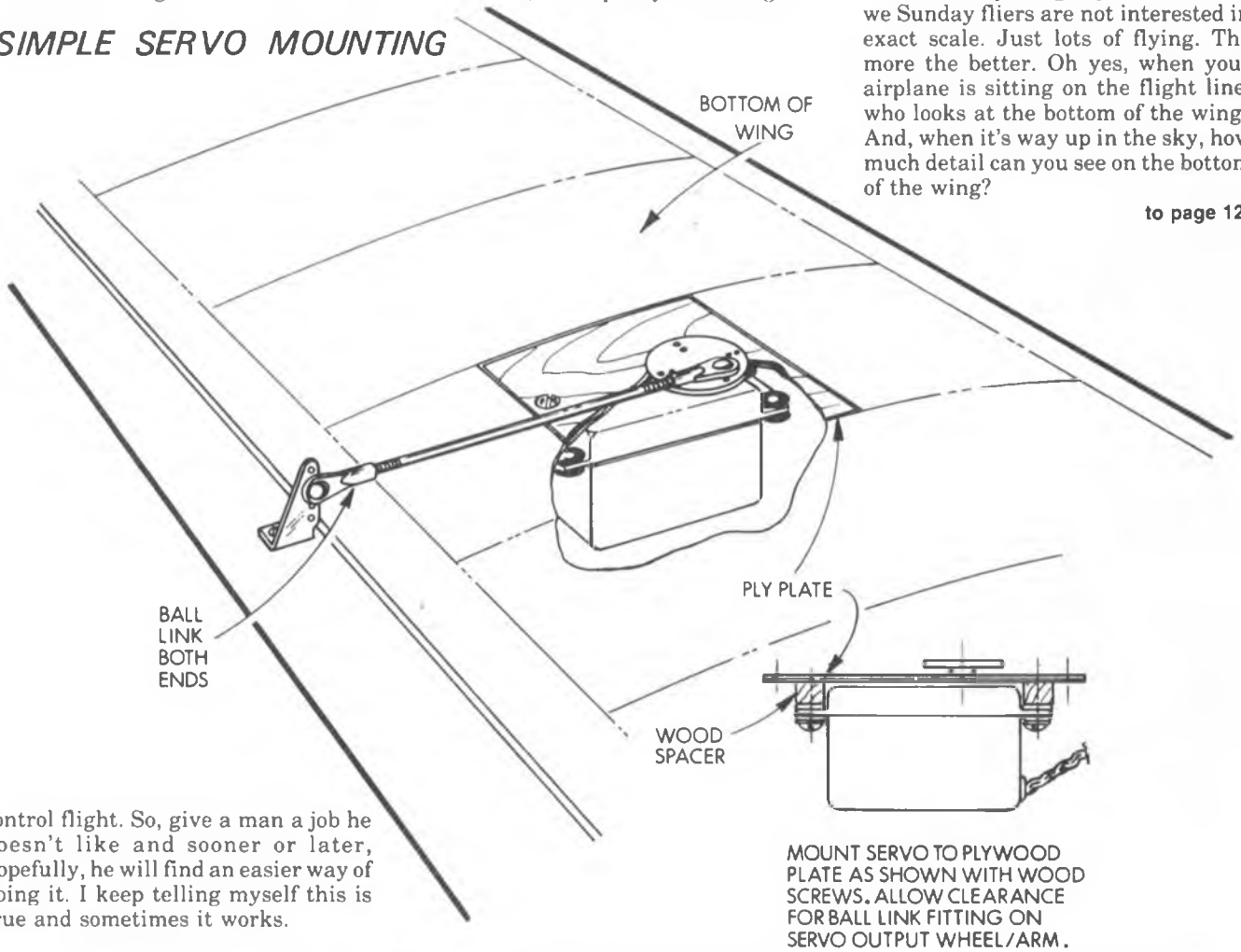
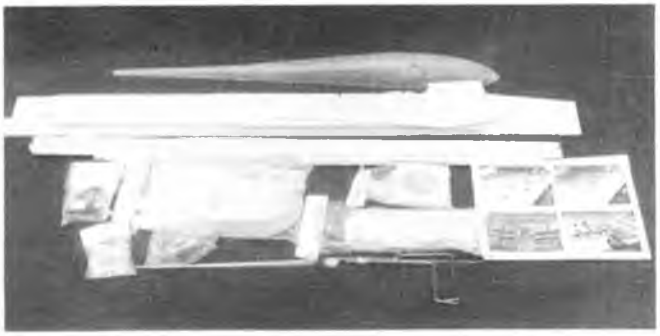
SIMPLE SERVO MOUNTING



MOUNT SERVO TO PLYWOOD PLATE AS SHOWN WITH WOOD SCREWS. ALLOW CLEARANCE FOR BALL LINK FITTING ON SERVO OUTPUT WHEEL/ARM.

RCM PRODUCT REVIEW

Rick's Kits JET TRON



SPECIFICATIONS

Name	JET TRON
Aircraft Type	Sport
Manufactured By	Rick's Kits
	P.O. Box 1106
	Santee, California 92071
Mfg. Suggested Retail Price	$69.95
Available From	Both Mfg. & Retail
Wingspan	50 Inches
Wing Chord	12 Inches
Total Wing Area	600 Sq. In.
Fuselage Length	45 Inches
Stabilizer Span:	19 Inches
Total Stab Area:	114 Sq. In.
Recommended Engine Range	.40-.45
Recommend Fuel Tank Size	10 Ounce
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa, Spruce, Ply, Fiberglass
Wing	Balsa & Spruce
Tail Surfaces	Balsa
Building Instructions	Yes
Instruction Manual	Yes (10 pages)
Construction Photos	Yes (40 photos)

RCM PROTOTYPE

Radio Used	Kraft KP6A w/4 KPS 24 servos
Engine Make & Displacement	O.S. .40 FSR
Tank Size Used	10 oz. Sullivan Round
Weight, Ready to Fly:	5.25 lb.
Wing Loading:	20 oz./sq. ft.

SUMMARY

WE LIKED THE:
Construction manual and flying capabilities.
WE DIDN'T LIKE THE:
Plans difficult to read — not enough detail.

The Jet Tron was designed for the novice as well as the Sunday sport flier. It has good slow flying stability and is capable of most of the pattern maneuvers.

We concur, in fact, we feel the designer is a bit reluctant to reveal the full possibilities of the Jet Tron. It is an excellent pattern trainer or pattern plane. We were amazed at the ease with which it performed any maneuver we asked, then became absolutely docile when slowed down and floated to a perfect landing.

Something new is beginning to pop up with the kit manufacturers, and this kit is no exception. They are beginning to staple the hardware, and other heavy parts packaged in plastic, to the sides of the box. We think this is an excellent idea as it prevents these heavy parts from shifting when the kit is enroute to the dealer and destroying the softer balsa wood parts.

The balsa parts, including wing ribs, stab, and rudder parts, were sawed and then sanded; it is a relief not to have to push the parts from die-cut sheets then have to sand the ragged edges. All kit parts were packaged very neatly in the 4" x 8" x 43½" box.

Surprisingly, the hardware was a little more complete than usual. It was not necessary to purchase any hardware, not only was a Kraft engine mount included, but so were the bolts and blind mounting nuts.

Construction:

The ten pages of construction photos (40 pictures) are a real help in building the plane and they are directly involved in the excellent quality ten page step by step instruction manual. We felt the plans, 5' x 3½', could be upgraded a little more. They were hand lettered which was difficult to read and many more details could have been added to make them easier to understand. Since we would not recommend this plane for the beginner, we would expect the builder to have quite a bit of building experience before attempting this kit. Therefore, we found the construction rather straightforward. When you see the picture of this plane on the box cover, or in the advertisements, you will notice quite a change up front. We decided, for our own convenience only, to mount the engine upright necessitating movement of the canopy toward the rear of the plane. This caused no particular difficulties except to constrict the nose around the engine mount. Where the canopy faired into the fin, it was necessary to remove a small bit of the canopy and shorten the fin.

We felt there was a chance of crushing the trailing edge of the wing with the wing bolts so we drilled matching holes in a 4" x 2½" sheet of 1/16" ply which overlays the wing and about 1" of the fuselage behind the wing. The wing hold-down bolts pass through this ply then through the wing and into the fuselage.

Covering:

The RCM prototype was covered with metallic brown Super MonoKote. The diamond checkerboard was accomplished with pieces of orange and tan Super MonoKote.

Engine:

As mentioned before, it was our choice to mount our O.S. .40 FSR upright in the fuselage. Directly behind the firewall we mounted a Sullivan SS8 fuel tank.

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GIVE IT A WHIRL

John Gorham

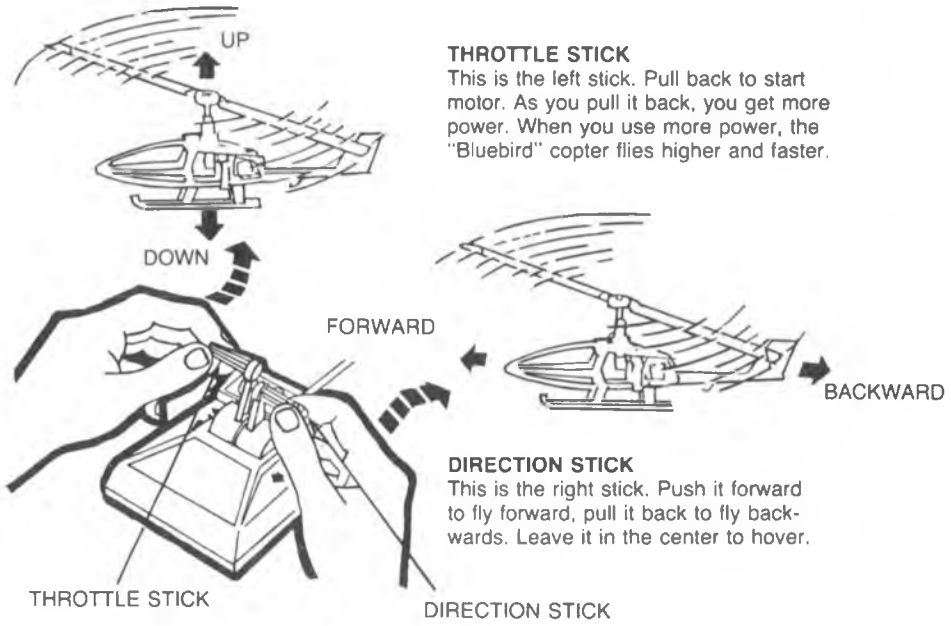
Last month I left you with a promise that I would provide instruction notes for a new version of George Smith's table top trainer. You may remember we discussed that the addition of yaw control could help considerably in learning head-in hover and also control while the model is rotating in front of you and that's what my version of George's Smith's trainer provides. In case you have not been able to obtain the April issue of RCM which contained the original instruction notes of George Smith's trainer, I have made some reprints which I will send you if you will (for sure) enclose a stamped, self addressed legal size envelope with your request. So far as the general topic of simulators is concerned I plan to keep looking at all the different types that may become available, especially those that the readers might cook up as a result of this column. I'd be very glad if you let me know your finds and also any variations that you may plan on the simulator that we are going to describe here.

By the way there is a "toy" on the market called the "Blue Bird Air Police Copter." I don't even know who the manufacturer is because his name doesn't appear on any of the literature. However, we include a reprint of part of his literature so you can see how the controls work and also a photograph of a guy trying it out. Even a simple device like this can give you an idea of the kind of activity your fingers (or thumbs) need to perform to fly an R/C chopper. So, for the $20 that this toy costs it's well worth playing with it for a while then passing it on to your kids or the ones next door. This particular device, by the way, includes a small plastic helicopter about 4" long with real live blades which rotate and provide the lift. Admittedly, it's restricted to fore and aft cyclic and up and down, but playing with it can give you some idea what it's like when you try to get all four axis going at the same time.

Now to get on to the description of my yaw axis table top trainer. You will find a parts list at the end of the article and I've tried to provide the best sketches I can to back up the photographs of my original prototype. If you'll look at the photograph, you'll see the completed trainer and you'll notice that it is composed of two discs, one mounted above the other. These discs, believe it or not, you buy from the local hardware or food store and they are made by "Rubbermaid" and are 12" Lazy Susans, so the first thing to do is to get two of these. Now if you look at the sectional sketch you'll see that the two Lazy Susans are connected together by means of a 2½" long piece of thick rubber hose (about 5/8" diameter) and this hose is popped into the holes in two plastic or ceramic bulb holders which I found in the electrical section of the local hardware store. Never mind what bulbs they are supposed to hold as long as the holes in them are the same diameter as the rubber tubing. These two bulb holders are fixed onto the center of the Lazy Susans. In the case of the bottom Lazy Susan you'll notice which way up it's mounted by looking at the sketch. The upper one is mounted the same way up but the ball bearings and bottom plastic piece have been removed. You can just epoxy the two bulb holders to the top and bottom Lazy Susans, although if you look at the photographs you'll see that in my original prototype a piece of plastic sheet is tilted under the track of the top Lazy Susan and we screwed the bulb holder onto this piece of plastic. A simpler way, however, would be just to epoxy it onto the bottom of the Lazy Susan and have the track removed altogether. Now that we have connected the two Lazy Susans together you will notice that the whole unit consisting of top and bottom tables can now rotate on the ball track of the base. But just to be sure that the top table stays 'in-phase' with the bottom we used a swashplate locator bracket such as the GMP "Cricket" and the "Heliboy" uses.

Now, how can we make the top rotate in the same manner as a helicopter does in yaw? Well, the way you do this is to mount the yaw servo as shown in the sectional view by cutting a hole in the Lazy Susan and popping the servo output shaft

BLUEBIRD AIR POLICE COPTER FLYING LESSON!

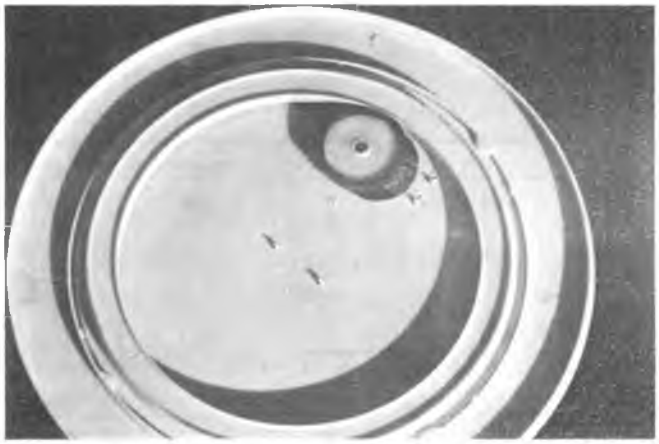


THROTTLE STICK
This is the left stick. Pull back to start motor. As you pull it back, you get more power. When you use more power, the "Bluebird" copter flies higher and faster.

DIRECTION STICK
This is the right stick. Push it forward to fly forward, pull it back to fly backwards. Leave it in the center to hover.

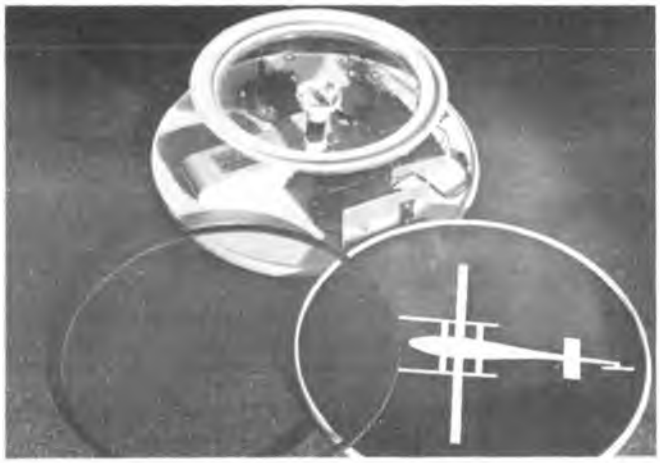
Experiment and see what happens each time you change position of the sticks. For example: To hover, use both sticks at the same time you have to find the right position for both of them to work together to keep the "Bluebird" Air Police copter in one place.

Bluebird Air Police copter over landing target.

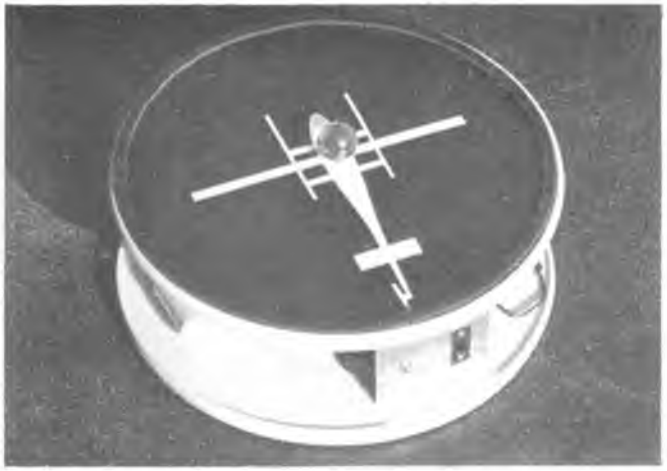


Bottom view of training table showing yaw servo wheel.

Completed training table minus top plates. Prototype used track portion which is not necessary.



Top piece and cut glass complete the table.



Completely assembled with 3/4" glass marble.

All systems are go!

through the hole. You can double sticktape mount the servo onto the Lazy Susan surface. Now take the biggest servo output wheel you can find and make a "tire" around it, either with fuel tubing or with 1/8" thick wing mounting tape. Adjust the position of the servo until the "tire" that you have created is pressed firmly against the inside diameter of the Lazy Susan base so that when the servo rotates, the whole top portion will rotate also. (Because the wheel is walking around the inside track of the bottom Lazy Susan — get it?) Now, as you all know when you move the yaw control of a helicopter a certain **amount** it doesn't just move a certain **amount** in yaw it moves or rotates at a certain **speed** and that is where the next trick comes in. We open up our servo and we take our feedback potentiometer out of the servo. I know with the Airtronics servo this is easier to do and I'm sure there are many other servos where you can remove the complete pot quite easily. You should still leave the wiring connected to the potentiometer and, if necessary, you can extend these wires. Whichever way you achieve the wiring, mount the complete servo potentiometer on a bracket together with a switch for the radio and be prepared to adjust it.

Now, if you have the whole system connected up to a radio, you will find that your servo becomes a 'rate' servo rather than a 'position' servo. That is to say, when you move the yaw stick of

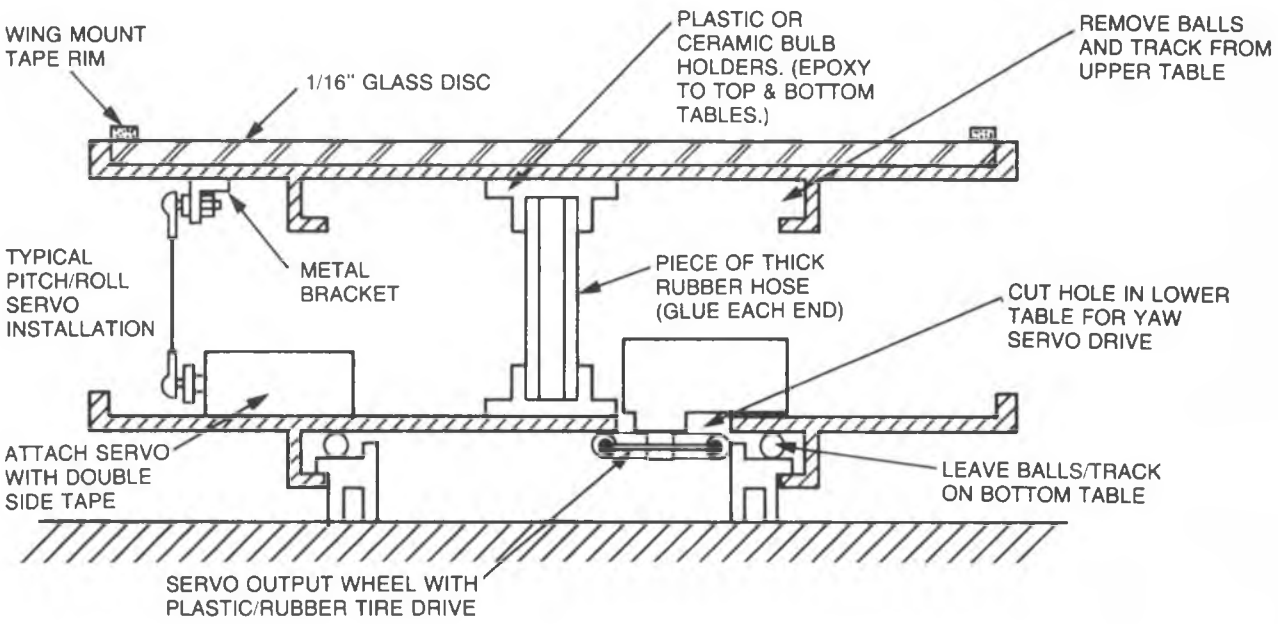


FIGURE 1
SECTION VIEW SHOWING METHOD OF USING RUBBERMAID "LAZY SUSAN" FOR TOP AND BOTTOM OF TRAINER TABLE

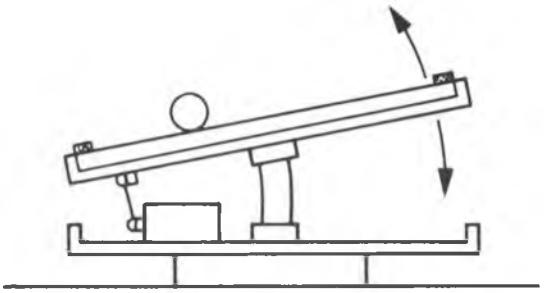


FIGURE 2
TABLE TILTS BY BENDING RUBBER HOSE

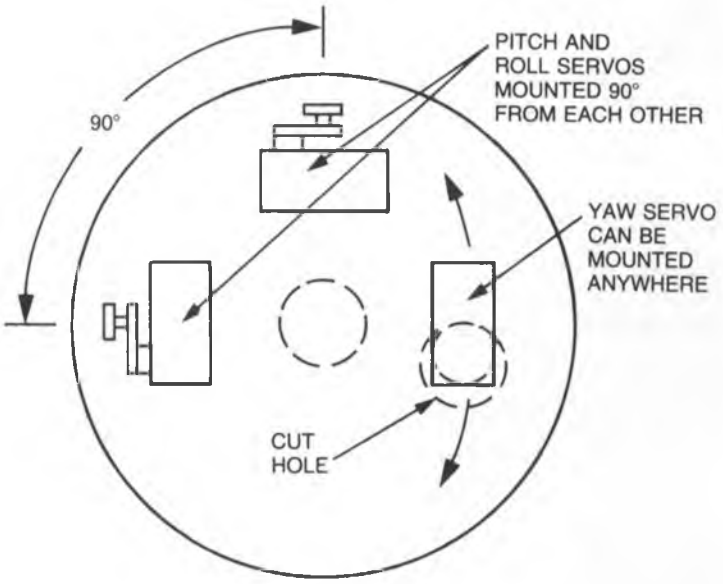


FIGURE 3
SERVO ARRANGEMENT

your transmitter the servo will start 'zipping' around trying to find out where the feedback potentiometer signal went to. Well, the feedback potentiometer is standing still, not knowing that it should move because it isn't connected mechanically anymore. So the servo will keep revolving as long as you keep the transmitter stick over one way and, if you reverse the position of the stick, it will slow down, stop, and start revolving in the other direction. Now you have a 'rate' servo, see? It moves at a **rate** proportinal to the stick **position.** You can center the servo by adjusting the wiper arm of the potentiometer and, if you do this carefully, you'll be able to make the servo stand still when your stick and rudder trim are both centered. Moving the trim slightly one way or the other will cause the servo to creep away, and moving the stick even more will cause it to race away. Now you have a table top which will rotate one way or the other depending on how you move the yaw stick of your transmitter. The way which it does it is quite similar to the way a helicopter does it in yaw. Now we fit two more servos to the base and connect them to brackets mounted underneath the top Lazy Susan table. We fit servo arm and links so that the servos will pitch and roll the top table (about ±1/2" at the outer edge for starters). Naturally they must be mounted at 90° to properly represent pitch and roll.

Now connect a radio receiver and a switch to the servos (and a battery, of course) until you have the equivalent to a three servo flight pack set-up between your Lazy Susans. Then adjust your servo feedback pot for the yaw axis until the table top stands still when the trim and stick are at neutral.

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SOARING

Al Doig

My AMA number is 20888. Decal sheets never contain three eights and the thickness of some stick-on numbers drove me to make my own numbers for wing identification. The back of trim MonoKote sheets are printed with a number of things including a set of numbers. I bought a small sheet of 1/8" plastic at the hobby shop, trimmed the numbers 208 from the MonoKote, stuck them to the plastic for patterns; then the plastic was sawed and filed to shape. Now I had permanent patterns. Just lay them on the trim MonoKote sheet and zip around them with an X-Acto knife and voila, AMA numbers. Like most of my explanations, I have gone through ten typewritten lines and have yet to get to the point I was going to make. Anyway, when the numbers are stuck on the wing they grab hold and won't let go. Every once in a while I sell a sailplane. Consequently, a large number of sailplanes are floating around the sky with 20888 on the wing. I finally wrote to Top Flite and asked if there was any way to remove the numbers short of recovering the wing. Their suggestion was to put K & B Thinner on a Q-Tip and carefully moisten the adhesive while slowly pulling the number back, using tweezers. Be sure to do this in a well ventilated place, like outside and away from any flame. Acetone will also work. I haven't tried it yet, but I will soon.

★

Where there's a will, there's a way. Tom Brown, of Oceanside, California, has a physical problem that makes it difficult to grip things. As a consequence, he needed someone to launch his sailplane when using a hi-start and, as a result, he could never go out and fly by himself. So, Tom built a launcher, using a luggage rack on his car as a platform. An aluminum channel guides the plane. A pin angles back through the channel and into a tube in the bottom of the sailplane. A lanyard pulls the pin and it's up, up and away. Works quite well and solves Toms launching problems.

★

Judge John Menard of San Diego has retired from the Judicial bench to the workbench. This gives him time to do all sorts of neat things like designing sailplanes. His latest is called the Prowler. This is a super light 2-Metre piece of machinery. The all-up weight is 28 oz. giving a 6.5 oz./sq. ft. wing loading. The airfoil is John's own but looks like a 10% Eppler 205 — kinda. On its 2nd, 3rd, and 4th flight, the Prowler took first place in 2-Metre Class at a Torrey Pines Gulls club contest.

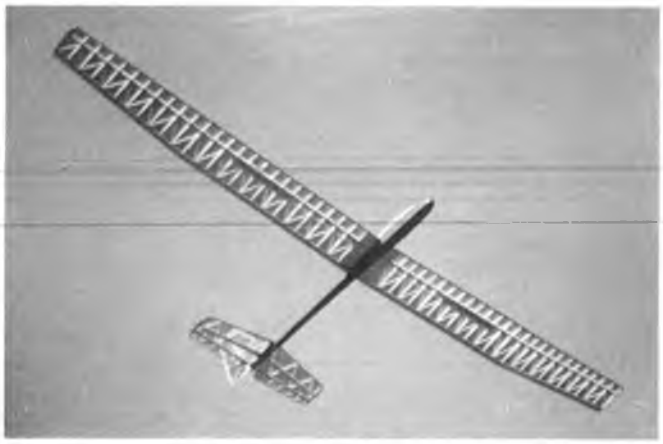
★

From Down Under: In the September 1982 issue I showed a

Tom Brown, Oceanside, California, and his Rocket Launcher.

John Menard, San Diego, California, and "Prowler."

From Sydney, Australia, pretty Meryl Wiessner holds hubby's Wiess I.



Steve Wiessner's Wiess I flies majestically — Sydney, Australia.

picture of a large sailplane by Steve Weisner called the Weis 1. I promised more data. Well, in the first place I spelled Steve's name wrong and as a consequence got the ship's name wrong. It's Steve Wiessner and the sailplane is called the "Wiess 1." Steve is from Baulkham Hills, NSW, Australia, near Sydney. The Wiess 1 has a 140" wing with an aspect ratio of about 19. The airfoil is from Tom Williams' Drifter II. The all-up weight is 54 oz. and it flies at a wing loading of 7 oz./sq.ft. The wing area is 1107 sq. in. In his first year of open competition, Steve has won: 1st Warringah RCAS Open Thermal; 4th Overall Heathcote Cup; and 2nd Overall in N.S.W. State Pointscore (RCAS). Anyone wanting more information can write Steve at 6 Dunkeld Ave., Baulkham Hills, NSW Australia 2153.

★

I've talked from time to time about flaps as an aid to landings. Several questions have been raised regarding the type of flap and general operation. Jack Cash, of Walkersville, Maryland, also said he had heard that flaperons lose aileron effectiveness when drooped excessively. Let's dispose of this question first. I've had no personal experience with flaperons, so I'll have to rely on the books. Figure 1 shows the change in lift of a trailing edge flap as a function of flap angle with a constant angle of attack of the main wing of 10 degrees. You will notice that for each 10 degrees of flap deflection, an increase in lift coefficient of 0.2 is obtained, up to a deflection angle of 30 degrees. The change in lift then starts to fall off until the flap angle is changed from 50 to 60 degrees; where almost no lift change is noted. We can conclude that it would be unwise to deflect flaperons more than 45 degrees and that control would probably be very marginal above 30 degrees or so. Also, from a pure flat plate drag standpoint, flaps increase their projected area 70 percent the first 45 degrees and only 30 percent more up to 90 degrees. So, again we can conclude that 45 degrees is enough flap deflection.

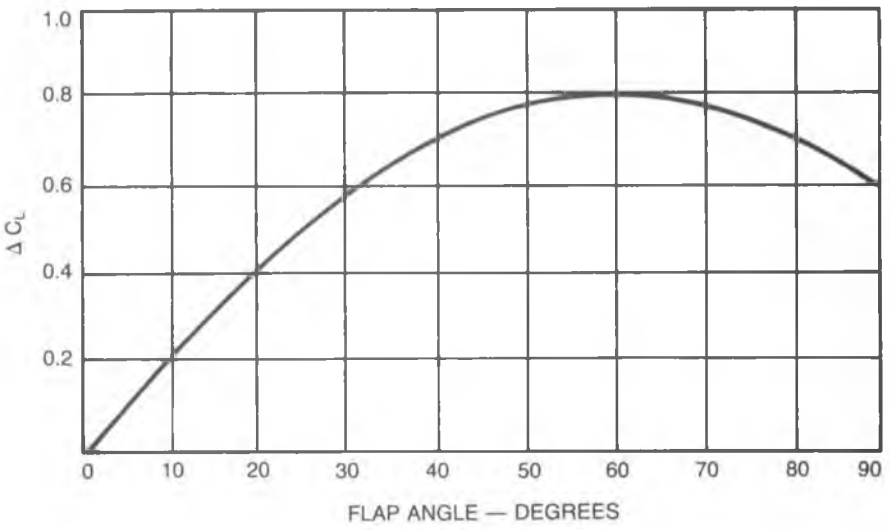


FIGURE 1
LIFT INCREASE DUE TO TRAILING EDGE FLAP

From a configuration standpoint, there are three common types of flaps used on model sailplanes; the split flap, the trailing edge flap, and the drag flap. These are shown in Figure 2. The split flap is not seen too often for a couple of reasons. While it yields a

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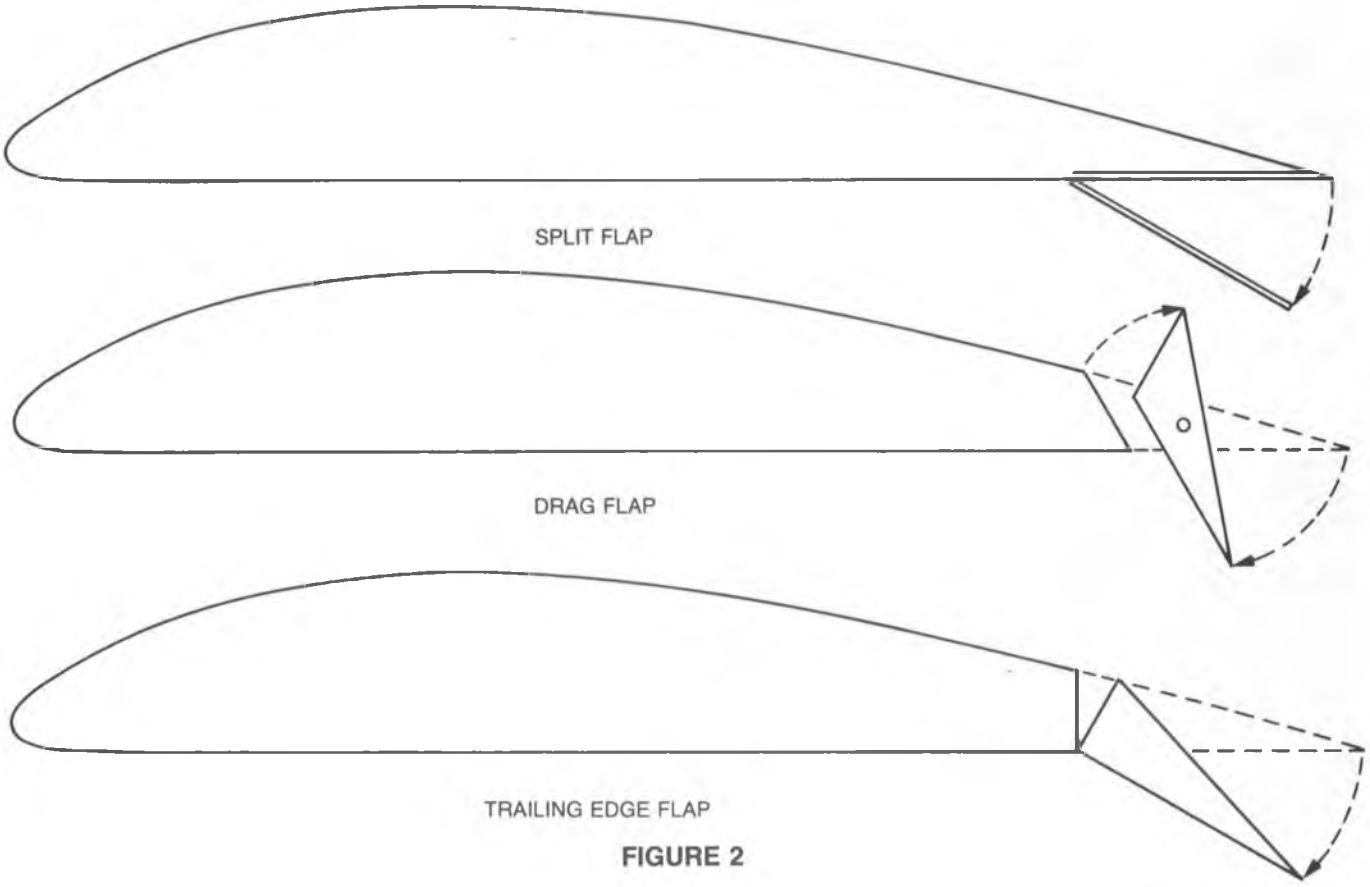

FIGURE 2

RCM PRODUCT REVIEW

Circus Hobbies ACRO KNIGHT 45

SPECIFICATIONS

Name	ACRO KNIGHT 45
Aircraft Type	Pattern/Sport
Manufactured By	IM Products, Inc. (Japan)
Distributed By	Circus Hobbies, Inc. 3132 S. Highland Dr. Las Vegas, Nevada 89109
Mfg. Suggested Retail Price	$124.95 — Circus Hobbies, $79.95
Available From	Circus Hobbies
Wingspan	60 Inches
Wing Chord	10¼" (Avg.)
Total Wing Area	604 Square Inches
Fuselage Length	51½ Inches
Stabilizer Span	26 Inches
Total Stab Area	160 Sq. In.
Mfg. Rec. Engine Range	.40-.50
Recommended Fuel Tank Size	11¼ Oz. (provided)
Recommended No. of Channels	6
Rec. Control Functions	Rud., Elev., Throt., Ail. Flaps, Retract Gear
Basic Materials Used In Construction:	
Fuselage	Fiberglass & Ply
Wing	Balsa, Ply, & Hardwood
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	O.S. .40 (Sch.) (K & B .61)
Tank Size Used	11¼ Oz.
Weight, Ready to Fly:	104 Oz.
Wing Loading:	24.7 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

High quality of materials, neat packaging, machine cut parts & fit, numerous accessories, overall appearance, and flying.

WE DIDN'T LIKE THE:

Wing jig assembly box fit, minimal instruction sheet.

Imported by Circus Hobbies, Inc., of Las Vegas, Nevada, the Acro Knight-45 is a high performance pattern aircraft that may be used for competition and/or sport flying purposes. Manufactured in Japan by IM Products, Inc., and designed by I. Matsui, the Acro Knight-45 is intended as its name suggests, for use with engines of .40 to .50 cubic inches of displacement.

The Acro Knight-45 is packaged in a sturdy 6½" x 9½" x 48" corregated cardboard box, which is adorned with an attractive full color label that shows an example of the finished aircraft. All parts and component pieces are neatly and carefully packaged and each wood part is clearly marked with an identifying number which corresponds with the plans sheet. All wood parts are machine cut and sanded. The quality of both the wood and cutting is excellent. The fuselage is a molded fiberglass unit with all bulkheads, stiffeners, and engine mounting plate installed by the manufacturer. The fuselage quality is equally outstanding, and the accessories that are included by the manufacturer make it easily one of the most complete kits that is available at this time. For example, items such as the spinner, wheels, pre-drilled engine mount plates, all necessary horns, clevises, combination flap/aileron torque rod assemblies, pushrods, fuel tank, fiberglass reinforcing cloth, and virtually all necessary nuts, bolts, brackets, and screws, are provided.

This reviewer has had the good fortune to evaluate more than a few kits in the past and is not given to "sugar coating" or, as the saying goes, "to gilding the lily," with regard to any kit review. "To tell it like it is" has always been the goal. With this in mind, it is not an exaggeration to state that the Acro Knight-45 is one of the finest, most complete, well-fabricated kits that this reviewer has ever assessed. It has a few minor shortcomings (which will be mentioned) to be sure, but, all in all, it is a kit that most modelers may order from Circus Hobbies sight unseen, and not be disappointed.

It should be stressed that the Acro Knight-45, being a high performance aircraft, is not intended for the beginning RC'er, but is designed with the proficient flier in mind.

It should also be noted that the Acro Knight-45 is intended for use with retractable landing gear and flaps. IM Products retractable landing gear units were also provided to us, for this review. This landing gear system, which is mechanically operated, is well-made of high quality materials and functions very smoothly. These gear units fit perfectly into the pre-assembled nose gear fuselage well mount and pre-cut wing mounting block assemblies. While the Acro Knight-45 could be modified into a conventional 4-channel aircraft with fixed landing gear and no flaps; the 6-channel mode is a far more pleasing choice. In this reviewer's opinion, the 4-channel

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THE COMPUTER

By James V. Reiss, M.D.

Flight control is a computer function. The brain is the computer, visual stimuli the input and the control of the transmitter the output. The learning process is analogous to programming a computer. The more input stimuli that are recorded with the correct response, the smoother the flight path will be. The correct response or output 90% of the time is no movement or change on the sticks of the transmitter.

Mastery of aerobatic flying is a complex function loaded with many variables. To elaborate on a few: the learning curve of each individual is different, a few people are natural fliers, the rest of us have to be taught the appropriate responses. Every aircraft is a new task requiring different degrees of movement of the control sticks. The direction and velocity of the wind has to be dealt with. Density altitude, humidity, and temperature are other factors.

The secret of success for your flight control computer is to reduce the number of corrections that are needed.

1. You should trim your aircraft to the ultimate of your ability.
2. Get the most consistent, reliable performance from your engine.
3. Use a control system that is first class; transmitter, receiver, and servos that are accurate in response to your command.
4. You should use sunglasses, and corrective glasses, if needed; also get adequate rest. Why handicap your computer? Also, you can reduce the number of functions the computer has to do to complete the task. This will speed up the correct response rate.
   a. Learned reflexes only come with practice.
   b. Use of learned visual clues to give correct response.

All pattern fliers go through a logical progression of flight skills, whether they realize it or not. For discussion purposes, let's separate all fliers into five different stages.

Stage I — The Beginner

The number of goals are small but extremely important. He learns visual recognition: which way is the plane going, what attitude is it in. He has to learn to give the correct control. He learns to place himself mentally in the cockpit, or he cheats and points the antenna in the direction the plane is going. Left is then left, right is right on the control stick. Only a small amount of up elevator should be in his computer. The throttle will do the rest. He does accomplish take-offs, landings, loops, and learns how to control a basic flight path.

Stage II — Discovery of the Left Hand Transmitters — Mode II

This stage flier is capable of loops, rolls, inverted flight and stall turns. He has limited use of the rudder. Uses all or none response for stall turns, and does use proportional control of the plane on the ground for taxi.

The most important function he learns is that linear power is available for flying loops and Cuban 8's. He also learns the value of throttle control for spot landings. The major goal achieved is for constant speed in the maneuvers; this decreases the variables for in-flight controls.

Stage III — Mastery of the Rudder

In precision aerobatics the rudder is incorporated into all maneuvers, for correction of loops, Cuban 8's, correction of vertical flight segments, and is also needed for point and slow rolls.

1. Stall turn and taxi control — place yourself in the cockpit, easy to visualize.
2. Correction of inside loops, also square loops, square horizontal 8's, regular outside loops; if they drift away from you or come in toward you, due to cross wind. The solution is as follows. Point the antenna in the direction of loop entry. If you move the rudder stick left the loop will move in or out from you to the left, the same applies to right movement of the stick. The same technique will work for Cuban 8's if you switch the directions of the antenna, and get mentally into the cockpit at the loop entry.
3. The correct rudder control, when plane is inverted or when the wheels of the aircraft are facing you is difficult at best. A solution is to bypass a step in your computer by using the following analogy. We can all relate to riding in a child's wagon; remember when you went left, the tongue was pushed to the right and when you went right, the tongue was pushed left. That is assuming you had the same red wagon as I did. Now all you have to do is believe that the tail of your aircraft is the tongue of the wagon. Suddenly you have the correct control without the mental gymnastics of placing yourself in the cockpit.
   a. Using the above system you can correct reverse outside loops in a similar manner as you did inside loops, this time pushing the tail of the aircraft.
   b. The correct direction of the rudder for top hats, half rolling square loops, and figure m's become obvious.
   c. The correction of inverted flight path heading by rudder is now a snap.
   d. The same system will work for point rolls, when the wheels are toward you.

Stage IV — Master Fliers

Fliers who have reached this stage are able to blend elevator, ailerons, and throttle so smoothly that their maneuvers flow in a continuous manner. They have thought out each maneuver and are anticipating the correct response.

Stage V — World Competition Flier

Only a handful of people can obtain this level of excellence. It requires considerable dedication of each individual involved. Many hours of practice, competition with the best is mandatory at this stage. They also demand and require the best equipment available.

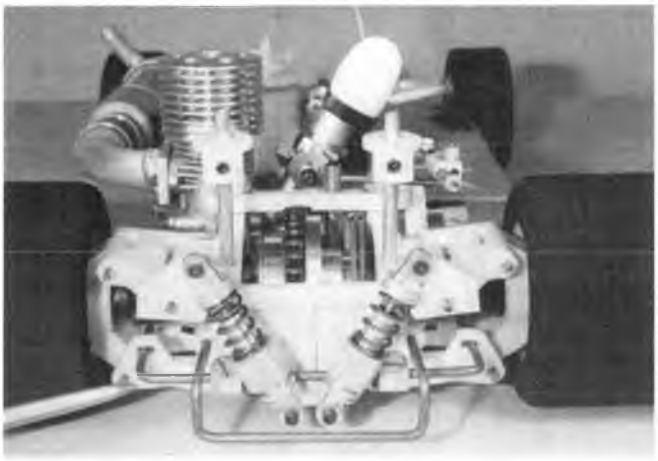
All five stages on final approach, throttle back, last minute flare, contact, **computer flight complete.** □

HAS LANDED

PIT STOP

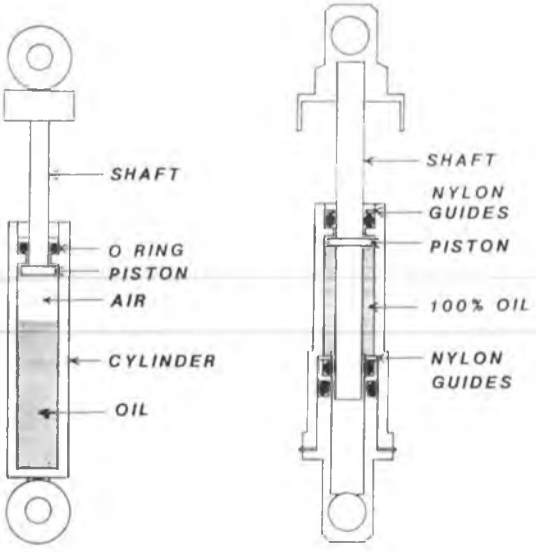
Gene Husting

Associated Custom Racing Shock



With all the new 1/8 gas independent suspension cars out now, as well as all the 1/10 off-road cars, it was important to develop a whole new type shock absorber. Associated has been working on this problem for over a year now and has finally released their new Associated Custom Racing Shock for 1/8 gas cars, 1/10 off-road cars and 1/12 electric cars. The basic shock is the same for these three different applications, the only difference being the springs and oils suitable for each car's requirements.

Bill Campbell wrote an excellent article on shocks in the November 1982 issue of RCM, showing very clearly the problems with current shocks. Bill also showed the new Delta Pressurized Shock Absorber which was a definite improvement over the conventional shock absorber. If you still have that article I'd suggest you read it again. I do not want to duplicate all Bill's fine work here. But it is necessary to duplicate one drawing, because there is one other important point that Bill left out.



CONVENTIONAL SHOCK

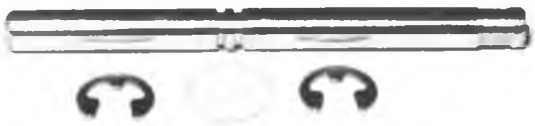
ASSOCIATED CUSTOM RACING SHOCKS

In the drawing of the conventional shock, as Bill pointed out, when the shock is compressed, the shaft enters into the cylinder. If the cylinder is filled 100% with oil, then the shaft cannot enter the cylinder because it is already filled with oil and the oil will not compress. In order to make this type of shock work, the cylinder can only be filled approximately 85% full with oil, leaving 15% air inside. Then when the shaft enters the cylinder the air will compress allowing the shaft to enter. The problem with this system is that if you have air mixed with oil you will have a very eratic shock action. The shock action will be jerky instead of smooth.

The other big problem which Bill didn't point out, is the fact that as the piston enters the cylinder it is unsupported in its sideways movement, and it ends up scraping up and down against the inside of the cylinder. This constant scraping wears away the aluminum cylinder, thus mixing these scraped aluminum particles into the oil. These aluminum particles then end up on the shaft and the shaft gets worn out when these aluminum particles get imbedded in the "O" ring. When the oil is removed from one of these shocks it is always silvery in color from the aluminum particles.

Roger Curtis, from Associated, attacked these two problems in a different manner. As you'll notice in the drawing the shaft extends on both sides of the piston. With this solution the shaft is already in the cylinder whether the shaft is extended or collapsed. This means the cylinder can be filled 100% with oil, and the shaft will move up and down very precisely without any air bubbles or other springs to affect its travel.

And Roger also eliminated the other big problem of having the piston scraping against the inside of the cylinder, as you'll notice in the drawing, right next to the two "O" rings, are two nylon guides. These nylon guides center the shaft in the cylinder so the piston cannot touch the inside of the cylinder. This eliminates the aluminum particles in the oil. I think you'll agree that this is a truly advanced shock design. Its performance and long life has been proven by winning two 6 hour Enduros with an RC500 car built by Rich Lee and driven by Rich, Chuck Phelps and Gene Husting.

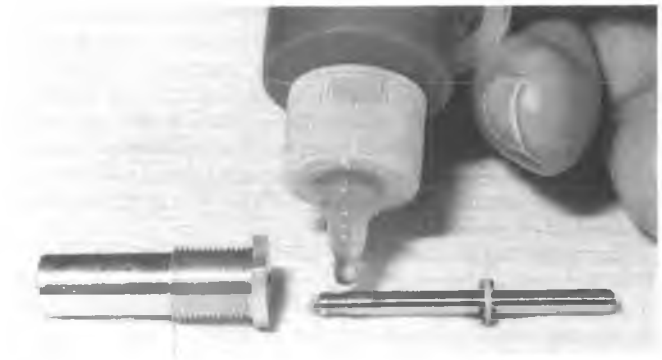


I'd like to give you some assembly tips on the Associated Custom Racing Shock. The assembly instructions that come with the shocks are very clear and easy to understand including 15 step by step assembly photos. But there are a few very important steps that I'd like to help you with here.

Photo #4 shows the shock shaft. This is a very high quality shaft made out of drill blank material, the same steel as drill blanks. It has a very fine ground finish. But we'll want it better because this shaft will be covered with oil when it's inside the cylinder and, when it comes out of the cylinder the rubber "O" ring must wipe **all** the oil off the shaft. The "O" ring can only clean all the oil off, if the shaft

is as smooth as a mirror. This is quite easy to do. You can get some crocus cloth in a hardware store. This is **not** sandpaper, but a fine polishing cloth, and it will be near the sandpaper in the store.

Chuck the shaft up in a drill press, hand drill, or even a Dremel tool and polish the shaft until it shines like a mirror. This will only take a few minutes to do. Polish the end of the shaft that has the groove in it also. Polish the edges of this groove very good so that when this shaft is installed through the "O" rings it will not cut or scratch the rubber "O" rings. **Clean** the shaft **very good** and install the "C" clips and nylon washer, as the instructions show.



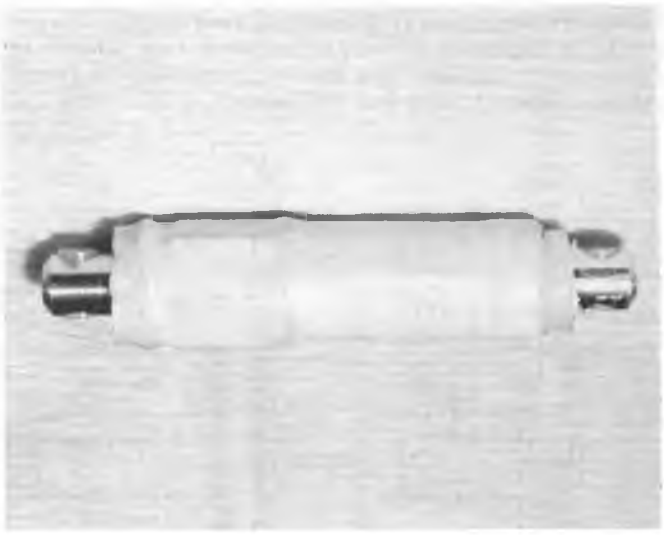
Oil the shaft from the notched end all the way to the piston washer before installing. The shaft will be installed in the cylinder body in the direction shown in Photo #5. Install it very gently through the rubber "O" ring so you don't scratch or cut the "O" ring.

Fill the cylinder body with oil as the instructions show and then wipe out any excess oil with the corner of a paper towel as shown above.

All the oil must be wiped off the white nylon washer, which will now look dark because of the oil underneath it.

Install the cylinder body end cap, which is aluminum. On some other shocks these caps are plastic which strip out and fall off.

Install the nylon adjusting nut, spring and shaft cap per instructions. Associated has an assortment of springs and oils for all cars.



Finally install the balloon dust cover over the shock. This dust cover is very important. **Never** run the car without this dust cover on the shocks. Otherwise you will wear out the shafts and your shocks will be useless.

The shock kit to fit the Associated RC500 car is part #5136. The shock kit for the off-road cars is part #6150. These are available from your dealer or from Associated.□

By Robert Richter

A TREE GROWS IN MY FLIGHT PATH

Being an inexperienced radio control pilot and flying at a field surrounded by dense woods, I have become an expert in the art of finding lost aircraft.

As most radio control pilots know, woods exert a strange magnetic force on model aircraft. The denser the woods, the stronger the force (Murphy's Thirteenth Law Of Mangnetism).

Once down in the woods, trees have been known to twist, turn and in some instances up-root in an attempt to surround and hide the aircraft.

It's not really necessary to wait 'til fall for the woods to give up their captives. With a little planning and a systematic search procedure, the woods will yield your bird in a matter of hours instead of months.

The best defense against airplane eating woods is a good offense and the best place to begin planning your offense is right on the building board. If you have the room, the money, and can afford the extra weight, install one of the many audible signaling devices presently available on the market today. Their operation is quite simple. With your transmitter and receiver both on, the device doesn't make a peep. Leave the receiver on and turn the transmitter off; the device will sound off with a loud beep.

This device alone will cut your search time down so much, the woods may not even bother to grab your aircraft (Murphy's Fourteenth Law of Magnetism).

Once off the building board, your newest creation is ready for paint. You can't imagine the weeks of pleasure you will have romping through the twigs and bushes searching for a solid green aircraft. With a camouflage paint job on a scale Fokker D XXI, you won't have to buy any more fuel that summer.

When possible, a brightly colored airplane with red, white, and blue stripes is fairly easy to spot against a green and brown background. Solid white is difficult to spot atop a tree especially with a cloudy sky. Likewise, a black airplane will look like a branch 40' up. When scale requires a camouflage paint scheme, the audible signaling device may be your only hope of ever seeing your bird again.

It's a bright, sunny Saturday morning and up goes your pride and joy on its thirteenth flight (Friday the thirteenth was yesterday, when you "charged your battery"). Out over the woods you fly, getting ready to make an approach to the runway. Just as you begin your turn, Bloop, down she goes.

Step One — **Don't panic** or go running blindly in the woods. Curse, scream, cry if you must, but don't move from the spot you are standing. Wipe the tears from your eyes and take a good look at the tree line. Get a fix on the exact spot on the tree line the plane was last seen. Now, mark the place you are standing in some way, such as, sticking a prop into the ground. (Some pilots have been known to kick a hole in the ground after the loss of a plane.) Having these two points will enable you to draw an imaginary straight line right to your plane.

Step Two — Pack up all your flying gear except for your transmitter. If you are flying at a crowded field, inform the flight director of your problem, and have him hold your frequency open (remember, if you have an alarm in your plane it will sound only with your frequency off). Above all, make sure someone knows you are going into the woods and about where in the woods you will be.

It's a good idea to put on some coveralls, boots and gloves before starting into the woods. Wet shoes and poison ivy aren't much fun. It doesn't hurt to stick a couple of band-aids and a knife in your pocket.

Now it's back to your starting point with your transmitter antenna collapsed.

Step Three — Take a sighting on the exact point you had before and walk straight to that spot.

Once at the edge of the woods, stop, and sight a tree or other land mark

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LOU ROSS IS BACK!

Back in the late 1960's and early 1970's a lot of us were fascinated by a line of multi-cylinder model engines known as the Ross Twin, Ross Four, and Ross Six. Lou Ross was the genius behind the design and production of these little jewels. Lou earned an enviable reputation for the quality and performance of his engines but, unfortunately, adverse business management problems brought on the demise of his company.

For engine collectors who might be interested in past manufacturing records, less than 50, six cylinder engines were manufactured; 92, four cylinder engines; 195 inline twins; and 1300 opposed twins were produced since 1968.

In late 1974, Lou moved to Tucson, Arizona, and became involved with developing engines for RPV's and APU's. The research and development work involved engines ranging from 10cc to well over 1000cc displacement.

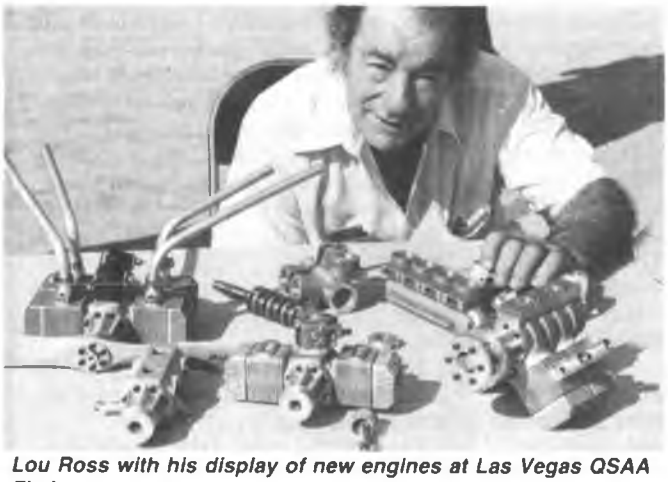
This activity has been carried out in a well-equipped, modern building and machine shop which Lou's company owns free and clear. Recently, Lou Ross and affiliates finished the last of the old Rosspower engines and spare parts. All of the castings and parts left over from the old Rosspower Corporation were finished and all tools retired forever. Never again will these engines be manufactured. Incidentally, these engines and spare parts can be purchased either through Jimmy Robertson of St. Joseph, Missouri, or through Ross. Ross will, however, repair and update any and all of the older Ross engines at a reasonable price. Ross can be contacted directly for this service.

We had the opportunity to chat with Lou at the 1982 Las Vegas QSAA Fly In and to see a variety of his new engines. The quality of the engines is typical of Lou Ross, excellent. He tells us that he is presently assembling and delivering this new line of engines to numerous giant scale modelers.

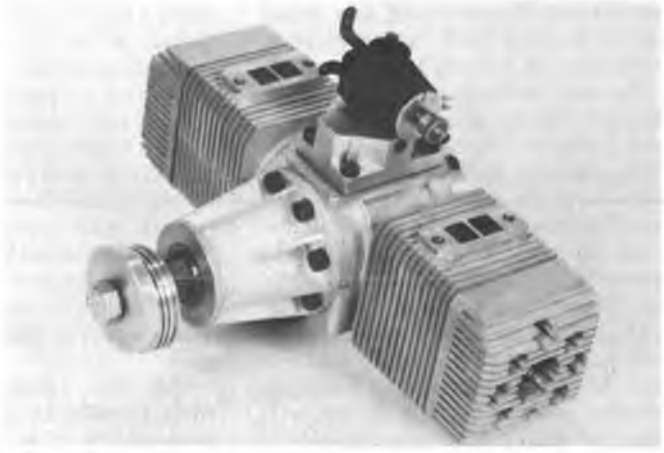
Engines currently available for delivery are: 2 cylinder opposed 1.2 cu. in., 4 cylinder opposed 2.4 cu.in., 6 cylinder opposed 3.6 cu. in., and 90° V 4 cylinder 2.66 cu. in.. Each is available with direct drive or reduction geared and may be obtained in larger displacements. The specifications and options are most impressive and quite numerous, too

The famous Ross Twin of yesteryear. Lou Ross' best known engine had a displacement of .60 cubic inch.

The Ross Twin was used by Jan Sakert and Dick Riggs in a 1/2 size version of the first RPV project to use off-shelf model hardware.



Lou Ross with his display of new engines at Las Vegas QSAA Fly-In.



The horizontally opposed twin fitted with a Perry carburetor and reed valve induction.

LOVABLE LOU IS PRODUCING A LINE OF LARGE ENGINES

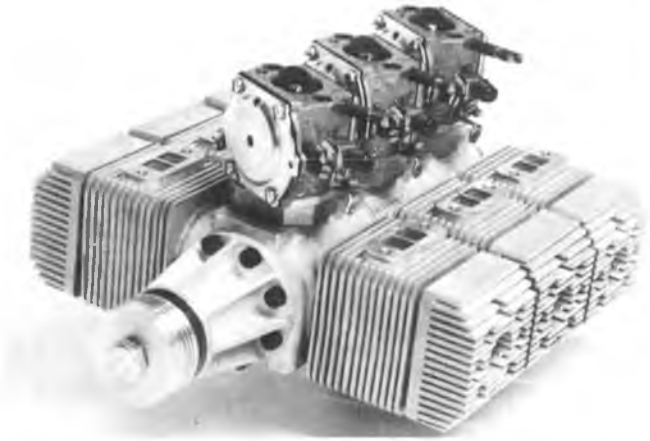
By RCM Staff

lengthy to list here. Those seriously interested may contact Lou Ross, Ross Engine Development and Manufacturing Company, 1010 South Plumer, Tucson, Arizona 85719 (phone 602-884-0610).

Lou's present engine business needs a bit of explanation. He is not set up for high volume mass production. For instance, Trail Manufacturing will probably produce more engines in a week than Lou will produce in the rest of his lifetime. Each of Lou's engines is assembled on an individual basis to special orders. This means that one can not expect production line prices, Lou's engines are not cheap but neither are Rolls Royce automobiles.

If there is a need for an engine for a special project or application, you can be assured that Lou Ross can deliver that engine with the required performance and built to the highest quality standards. □

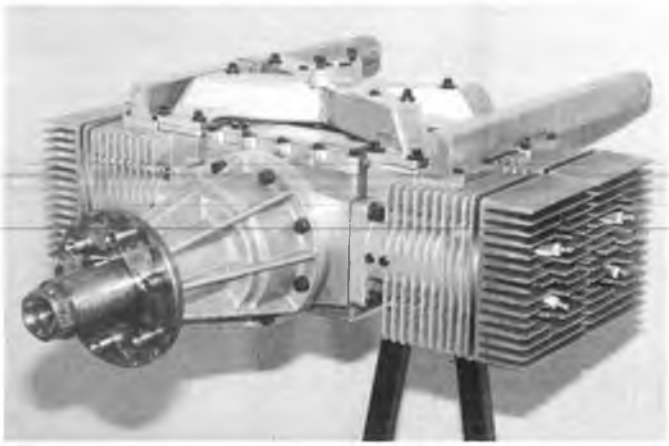
The horizontally opposed four is shown with twin Walbro carbs.



The horizontally opposed six set-up with three Tillotson carbs.

The horizontal four with black anodized parts, exhaust headers, Perry carbs and 2.055:1 reduction gear drive.

The 90° V four has displacement of 2.66 cu. in. (3.972 cu. in. to be available soon) and comes with either a direct drive or with 2.055:1 reduction gear drive as shown here.



The model R-1 is a four cylinder, two cycle, horizontally opposed engine of 1000cc (61 cu. in.) displacement. Weight is 127 lbs. and delivers from 75 to 95 horsepower.

The model R-1 on test stand can be operated on diesel fuel, gasoline or natural gas.

TOP-FLIGHT FLYING COMPLEX

Took money, unwanted land, Goodwill.

By Neal Ricker

The site is monotonously flat, mercilessly arid. It is starkly open to the region's nortoriously hot summers and foggy, bleak winters. But to the 50 members of the Merced County R/C Club and visiting enthusiasts, it's almost Paradise.

These 10 acres in California's San Joaquin Valley hold one of the best complexes anywhere for radio control model aircraft: A paved runway 400 feet long and 50 feet wide. Two paved taxiways. Parking area. Shaded areas, seats and a building. A fence to keep unauthorized people off the runway. Even the isolated setting is a blessing. Here it is impossible for errant planes to plow into pools, pets or picture windows.

The club's president is confident his members aren't about to be kicked off the land, leased from the City of Atwater six miles away. Before the runway came along, the site was a former garbage dump. The club was able to get the land for flying because it wasn't good for much else.

"By law they can't use it for another 10 or 15 years, so there's no problem," says President Garrison Paul. "They can't build on it, they can't farm on it, they can't do anything on it except for what we're doing."

Most model aircraft pilots make do with whatever runways they can find: cramped parking lots, parks, bumpy and dusty dirt roads. That means sharing the space with other users. It also means engines choked with dust and expensive equipment jarred by bouncy, chancy landings.

The Merced County fliers used a dirt strip at first. But six years ago, they decided that wasn't good enough, club members designed a new runway to their own specifications. It started out 200 feet long and 40 feet wide. In the late 1970's it was expanded to 50 feet wide and 400 feet long.

The advantages of such a first class complex did not come free. "There was an original assessment to the original members of $70 to get the runway going," says Paul. Now, new members pay a $30 one-time fee for their share of runway use, on top of other charges. Local contests and a $3-per-month fee support club activities.

So, while Atwater provided the land, the club is paying the bill for its luxurious facility. "All the improvements have been done by the club's membership," says Paul. The club takes out bank loans to pay for the work and then pays them back, he explains. It cost $14,000 to pave the runway and taxiways. Another $2,000 was spent in 1980 to seal the pavement for 10 years more.

The club president gives concrete advice to other groups who want to build their own runways. "The basis of the whole thing is you have to find a piece of land that can be yours for a period of time so that you can amortize your costs for a period of time," he says.

The Merced County club leases its site from Atwater for what Paul calls a nominal, reasonable fee. The lease is for five years at a time he says, "but the written agreement doesn't mean a thing because the city can break it anytime on 30 days notice."

"What really keeps the agreement working," he says, "is not the legal wording. We have a tremendous amount of goodwill with the City of Atwater, and that's worth a lot more." In lauding city officials for cooperation, Paul states, "The City of Atwater, who owns that property, loves our activity and they don't want to upset us."

Paul goes on to explain that, in fact, Atwater hopes to develop its old dumpsite even further for recreational use. A motocross track already is next to the runway property, but the two don't conflict. Improvements might include a paved road to the runway, water and rest rooms, and grass on the infield which would keep down dust, cool the 100 degree plus summers, and make the site more scenic.

"Scenery and official rest rooms are about the only things missing at the club's complex. It takes trees or lakes to make a better model airstrip than this one," says Paul.

"Talking to the guys in the military who go all over the country, most of them say it's the best facility they've ever seen," he says. "The long paved runway helps draw fliers from a wide radius. Hobbyists from other areas are welcome to fly for free here as long as they're carrying their Academy of Model Aeronautics licenses."

Isn't $70 to $30 a lot for a member to pay for the privilege of using a few hundred feet of asphalt? It might sound like too much. But with hundreds of dollars in metal, plastic and fabric skimming the ground at up to 60 feet a second, a member easily saves many times his fee the first time the paved runway helps avoid damage which might have occurred at a less sophisticated strip.

Paul explains that even such a generously sized runway isn't enough, when the ground based pilot is inexperienced or the plane develops mechanical difficulties. If the pilot doesn't touch down his craft at the very start of the runway, some planes will zip down the length of the pavement and off the other end before they can be stopped.

Merced club members do their share of calmly walking to downed planes, cursing mildly if at all. Sometimes their crippled machines drift into the neighboring cornfield, sometimes they plummet to harder earth closer to the runway.

Many model airstrips are closer to civilization. But Paul says the biggest advantage of his site is its remoteness: "We're far away from human beings so we have no complaint." The nearest house is about 700 yards away, safely out of crash range so far.

The distance from town doesn't discourage enthusiasts from driving out on weekends, and sometimes on weekdays, to enjoy their runway. Several members work at nearby Castle Air Force Base, flying or maintaining B-52 bombers, tankers or fighters.

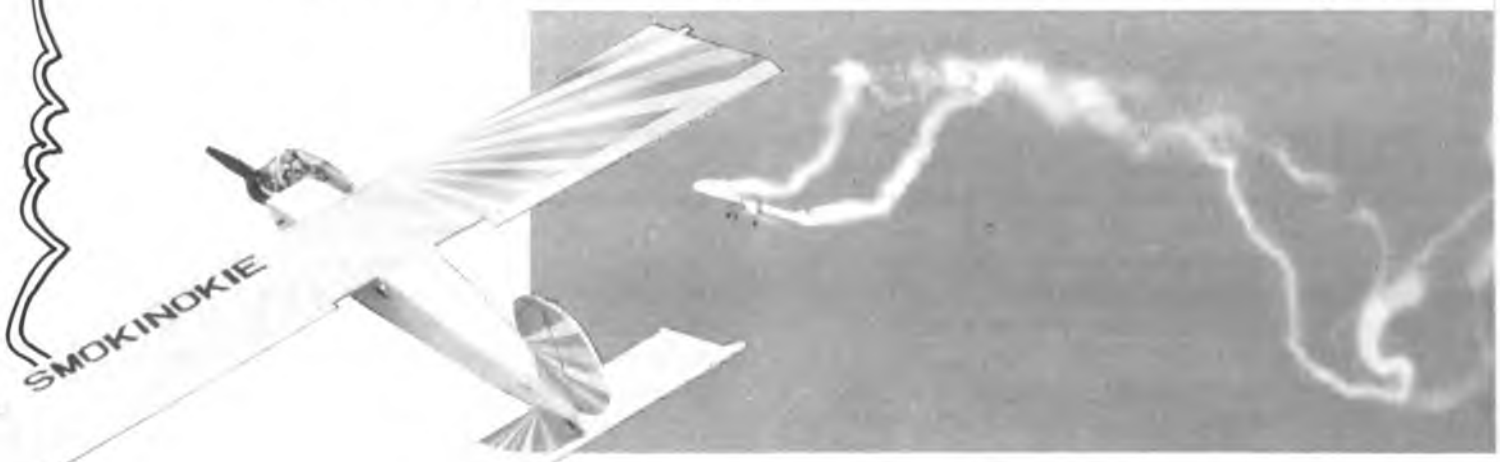
"We get a lot of people out here to watch," says Paul. "There's a lot of spectator interest."

Even more spectators and pilots will appreciate the top-flight Merced County site starting in spring 1981, when the club hosts an AMA sanctioned pattern contest. Other national events are expected to follow.

In the meantime, club officials hope their accomplishment isn't so impressive that it accidentally attracts full-size aircraft. From the air, say passengers in full-size planes, the bizarre layout of taxiways and building in the middle of nowhere looks like a landing base built by visitors from outer space.

No UFO's reported here yet. "But," says Paul, "it's long enough for some real airplanes. That's why we put Xs on the end."

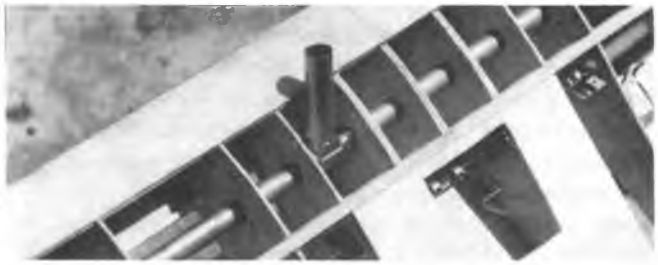
□



SMOKINOKIE

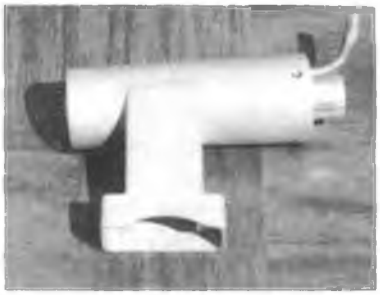
I like most RC'ers, am continually searching for some new thrill in radio control. Recently RCM has published several articles on smoking airplanes, and they immediately caught my attention.

A quick run to the hobby shop for a smoking valve, a stop at the gas station for some diesel, and a couple of modifications to my airplane, promptly got me a greasy plane. It was then I realized that getting a chain saw motor to smoke was somewhat easier than getting smoke from a .40 size glow engine.



Underside of wing before sheeting; showing tubes fitted into "T".

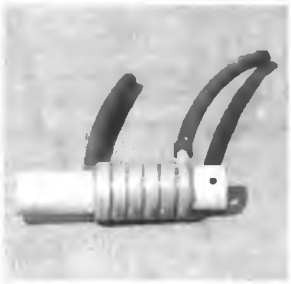
Exploded view of Fox muffler with an internal preheater. Note screen around aluminum core and one of the four or five holes drilled in the end of the copper tube.



Fox muffler with internal preheater.

K & B 40 outfitted with boat type preheater and screen in the muffler (probably the best of all the smoking 40's).

Exploded Fox muffler showing the different modification explained in text. (Top): Standard Fox core. (Middle): Core wrapped with screen and tube for internal preheater. (Bottom): Core cut to allow muffler to accept more screen, an external preheater must be used with this type of modification.



External preheater made to slip over the end of the stinger on the muffler. (Note hole to screw preheater to stinger.)

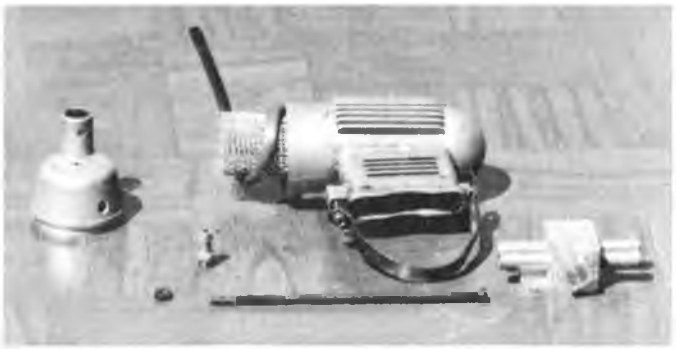
To be perfectly honest the plane did smoke a little, but it was a big letdown from what I had expected. So for the past three months I have been working on modifications to different planes and mufflers to achieve a denser smoke.

Even though I would still like to get a thicker smoke, these changes have made a real improvement to the looks of the plane in the air, and clean-up after flying.

The start of any smoking system of course, is getting the valve, servo, and extra tank in the plane. To do this and still be somewhat aerobatic, the plane and engine should be .35 size or larger. For this reason I have not tried to make an engine smaller than a .35 smoke, although that's not to say a smaller engine couldn't work proportionally as well.

Before talking about wing and muffler modification, a word about the engines. A Fox .45 is the engine used in the flying pictures of this article. The plane is a Sweet Stik and the radio

By Richard Harrigill



Exploded view of O.S. muffler showing preheater tube and screen along with a home-made high volume smoking valve. (Note tube exits muffler through hole drilled in edge of stinger housing.)

The underside of the first set of wing used with K & B twin exhaust. (Note: No "T" is necessary with the twin exhaust.)

is a Championship Airtronics 5 channel.

I figured a Sweet Stik and a Fox .45 would be a time tested combination, with few problems to work out.

This allowed me to concentrate on my smoking system without the problems of an unproven plane and engine. The Airtronics radio with dual-rate, servo reversing, and total throw adjustments on the transmitter made that shaky first flight a breeze.

Later the total throw adjustment on the smoke valve servo enables the diesel to exhaust mixture to be changed in flight for different weather conditions.

A mixture that is too lean doesn't smoke well and one that is too rich soaks the plane with raw wasted diesel. This saturation point varies from day to day with the changing temperature of the air.

A Championship radio will let you adjust any servo in this way in flight, if necessary. So even though Fox, Midwest and Airtronics were my choices for dependability and service, several other engines were tried before writing this article. A rear exhaust K & B .40, an HP .40 and an O.S. Max .35 all worked very well. The easiest to set up, however, was the K & B rear exhaust because the muffler is manufactured with twin

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Preflight check-out.

Complete installation using the external preheater.

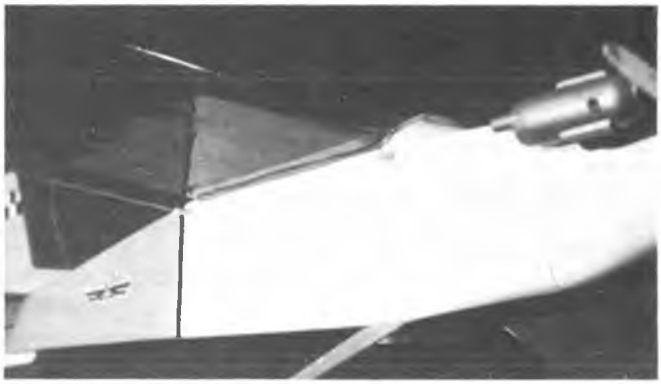
A BETTER WING SADDLE

The airplane should be finished including paint and covering, before setting up the wing saddle. Note that no effort was made to contour the leading edge area of the saddle, as the sealer will do that for you.

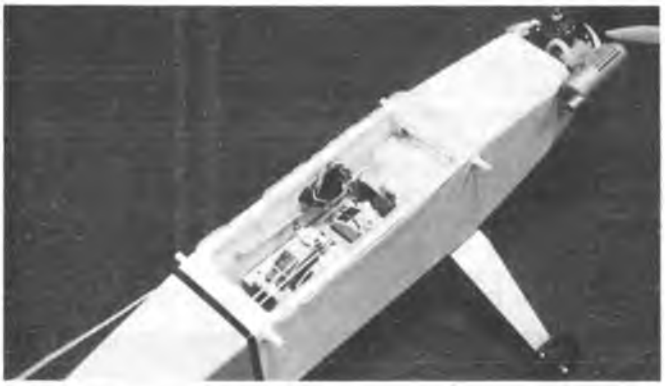
Cover the portion of the wing that will be in contact with the fuselage, with clear plastic wrap or waxpaper.

Apply the silicone sealer the width of the wing saddle, about 1/4" thick. Note that additional sealer was used along the leading edge.

Carefully place the wing in the wing saddle. Note that masking tape was used to secure the ends of the plastic wrap.



Gently press the wing down until the sealer emerges from the sides.



After the sealer hardens, remove the wing and trim the excess material with a sharp X-Acto knife.

Notice that the sealer has taken the shape of both the wing and fuselage with a tailored fit.

The finished product — neat, efficient, inexpensive, and tough!

By Dave Liscia

How would you like to have a wing saddle cushion on your next bird that is inexpensive, completely fuelproof, and is easy to set up? The material used can be found in almost any store, in the hardware department, and has a multitude of uses in addition to forming the best wing saddle cushion that I have seen. It is silicone tub and tile sealer, which may be purchased in clear, white, or aluminum. One tube will supply you with enough material to do several wing saddles, hatches, or compartment covers.

You will need only a few basic items to be able to form the wing saddle cushion. A tube of silicone sealer — I have used several different types — and all seem to work just fine, either waxpaper or clear plastic wrap, masking tape, and an X-Acto knife.

The cushion will be formed on the fuselage, in the same place that you would normally use saddle tape. Before the material is applied the surface should be in its finished form, i.e., painted or covered. It is possible to form a cushion on an airplane that has been in use as long as the surface is clean, and free from any oils or dirt.

The airplane in the photographs is a Sig Super Sport and the saddle cushion was formed as one of the finishing touches. This airplane was built as a pylon racer that will be used in races at Corvallis, Oregon. The Super Sport with a non-Schnuerle .15 engine is the only plane that the Benton County RC Club will allow in its races, and at this point it was finished with the exception of the wing saddle cushion.

Cover the portion of the wing that will be in contact with the fuselage using either clear plastic wrap or waxpaper. I prefer the use of a clear plastic wrap to waxpaper because it does a better job of taking on the wing's shape. Simply cut the material to size, lay it in place, and smooth out all of the wrinkles. If you have trouble holding the material in place, use masking tape to tack down the unruly parts. On this particular airplane I used three pieces of clear plastic wrap, one on either side of the wing's centerline, and another across the compound curves at the center of the leading edge.

A clear GE brand sealer was used to form the cushion. The silicone sealer should be applied on top of the edge that you wish to serve as a cushion. On most airplanes I apply the sealer completely around the wing saddle,

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THE STUDENT SIDE OF THE BUDDY BOX

By Larry Johnson

Many articles have been written on the subject of instructing newcomers in the art of flying R/C. All of these articles, I suspect, were written by people who have been flying and instructing for so long they have forgotten what it feels like to make those first few flights (in my case quite a few), on the student side of the buddy box.

Those who teach anything are a special breed and are deserving of all the praise we can give them. It is not my intention to exonerate the student, while making the instructor out to be the bad guy. We all learn at a different pace; a fact overlooked by many of my (twelve) instructors during the first three months of my training. Watching others much younger than yourself, start after you, solo, and go on to bigger and better things, can bruise a well-developed fifty year old ego.

My first trainer (the operative word is first) was a Bridi T-20. The plane flew fine after a couple of flights and some trim adjustments. In fact, my instructor had so much fun with it, he flew through three tanks of gas **after** it was trimmed out before I was finally hooked up to the buddy box for the first time.

On one occasion I traveled the ten miles from my home to our club flying field, per arrangment with my instructor for the day, only to wait in the broiling hot California sun for three hours without getting in a flight. Turns out he forgot we had an appointment, so I got to work on my tan.

One of my instructors ground checked my plane prior to our first flight of the day, only to discover (to the horror of both of us) the aileron

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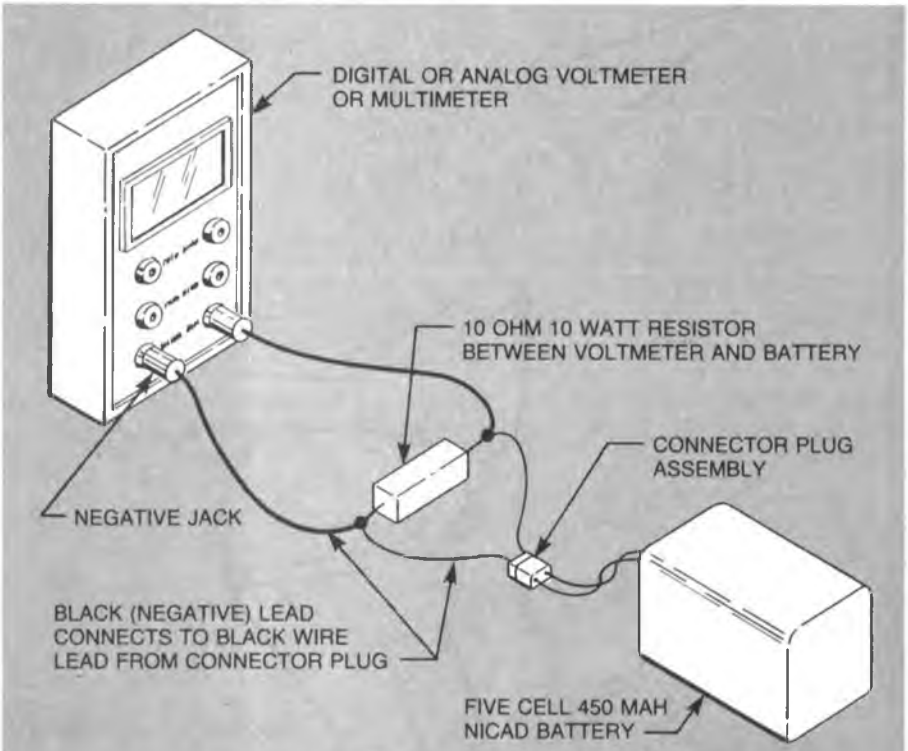
TESTING THAT SILENT MEMBER OF RACING SUCCESS



SET-UP FOR BATTERY DISCHARGE TEST

By Dean Brown

Of all the items found on my 1/8 Scale race car, the one I have trouble relating to is the battery. I can really get excited about the engine, although I'll never fully understand how it can turn close to 30 grand and not warp off to another galaxy. I can appreciate the receiver — well, a little — and the servos. Especially the servos because they move and obviously do something.

The engine, servos, brake system, differential, clutch --- all of these items seem to make sense. They move or make noise. They help to make the car go or stop. And each one can be improved or adjusted to make the car go faster or stop better.

But the battery is something else. For one thing, it's not much to look at. I like to see a good finish on parts. The battery looks terrible. Besides that, it doesn't move and it doesn't make any noise. What's the damn thing doing, anyhow? How can you tell? Is it really important?

You bet it is important. It might look terrible, not move, and remain silent but without it being in tip top condition and full of life everything else on the car can become useless.

The problem many of us have is knowing how to tell if the battery is in good condition. No, make that the problem many of us have is not to even wonder about its condition. Charge it and forget it is the typical treatment. But if I can learn to have better thoughts about the battery and regularly check its condition, anyone can. What remains is learning how and possibly finding something wrong before it can cause a race to be lost.

Good news. It's very easy to check the condition of the battery. It requires the use of a voltmeter and involves connecting the battery to a load — to an electrical resistance — so that its capacity to deliver the required voltage to operate the receiver and the servos can be determined. It turns out that you can't tell by simply hooking a voltmeter to the battery and seeing if it reads 1.2 volt for each cell in the battery, or 6 volts total for a five cell battery. Actually, the voltmeter can read more than 6 volts, like 6½ volts, and not mean a thing because there's no load on the battery. The apparent voltage can fall drastically the instant it faces a load.

With thanks to the Deltagram Newsletter for the data, here's how to perform a discharge test of a five cell, 450 milliampere hour, nickel cadmium battery.

(1) Solder the red and black leads from an extra male battery connector to the wires extending from a ten ohm ten watt resistor (available for a buck or so from a place like Radio Shack).

(2) Fully charge the battery which, depending on its initial condition and the type of charger used, can take up to sixteen hours.

(3) Let the battery sit for 24 hours and then check the voltage. If it's below 6 volts, the battery is self-discharging because of an internal short in at least one cell. Refer to Step 8.

(4) Assuming the battery tests at least 6 volts, connect the resistor/plug assembly to the battery and immediately connect the voltmeter leads across the resistor, as shown in the figure. Connect the black lead from the voltmeter (negative) to the resistor lead which is soldered to the black wire from the plug. Connect the other voltmeter lead to other side of resistor.

(5) From an initial reading of 6 to 6½ volts, the measured voltage should drop slowly to no less than 5½ volts during the first fifteen minutes of discharge.

(6) During the next five minutes the measured voltage should not fall below 5 volts. That is, a five cell, 450 mAh battery should have the capacity to discharge into a ten ohm resistor for 20 minutes and still be supplying at least 5 volts.

(7) Disconnect the battery immediately after the 20 minute period. Five volts is considered the discharged state and to draw the voltage further down can result in damage to the cells.

(8) If any of the foregoing conditions are not met, open the pack and connect the voltmeter leads across each cell, one at a time, to identify the cell or cells that have significantly lower voltage than the rest. Replace such cells using new cells which have solder tabs.

If the battery does not meet the 20

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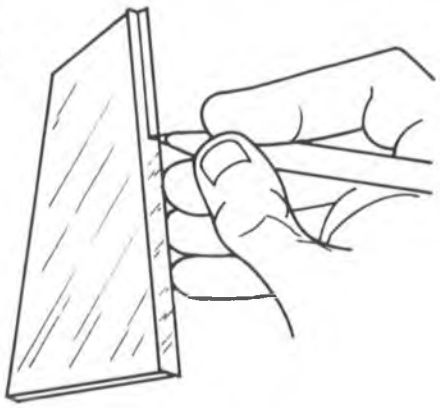
FOR WHAT IT'S WORTH



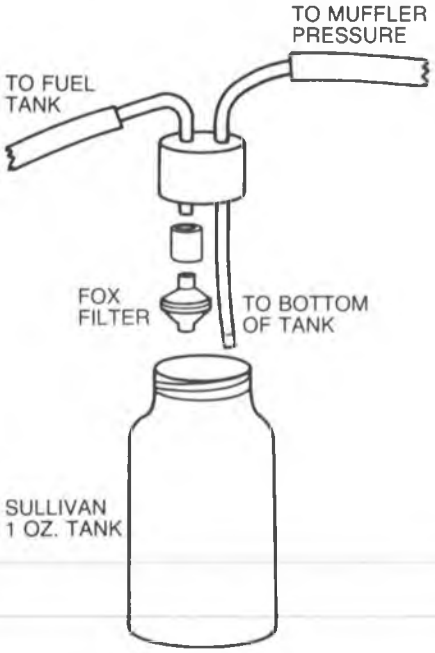
Joseph Beckner, D.D.S. of Loveland, Colorado, shares this building technique. Before shaping the edges of fins, elevators, rudders, ailerons, leading and trailing edges of wings, Joe likes to draw a guide line down the middle of these edges with a ballpoint pen. By using this mark as a guide, as shown in the sketch (and being careful not to cut it off) he gets a balanced shaping of the airfoil without taking off too much material on one side or the other. These marks help center hinges too.

Here is a handy hint from Gail Kapusnick of Lehighton, Pennsylvania. Instead of using messy paint stirrers and wasting paint, simply put a few marbles in the can of paint and shake vigorously for a minute or so. This is much better than dripping paint all over from the stirrers. The marbles can be left in the can until the next time you use it.

George Chrystal of Wilmington, Deleware, sent in this handy shop hint. George has found that mixing Aero Gloss Dope in 1 oz. bottles is easier if an electric portable reciprocating sander is used. Making sure the lid is tight, invert the bottle and attach it to the sandpaper side using a heavy rubberband. Turn it on and watch the white pigment on the bottom turn the necessary color indicating the dope is being thoroughly mixed. Having sandpaper in place will keep the bottle from slipping.

L. W. Standley of Del Mar, California, sent in a method to control that unmanageable fuel fill line --- he coils it. He obtains a 3 foot length of vinyl tubing, the kind used in hospitals. He then wraps the tubing around an empty can approximately 2½" in diameter and secures the ends with a piece of thin wire. The can is placed in an oven at 250° for 1/2 hour, remove from oven, allow to air cool, until the wire and the tubing remains coiled. Install it on your fuel pump and it works better than the coiled cord on your telephone.

Roy Propst of Chapel Hill, North Carolina, has a Zero Crud Pressurization system. Muffler pressure is piped into a 1 oz. round Sullivan tank, exits through a Fox filter, and is piped into the fuel tank. The 1 oz. tank and filter are removed and cleaned of the accumulated goop as necessary. It is still recommended to install a filter between the fuel tank and carburetor. The sketch shows how it is done.



EXHAUST GOOP GOES FROM MUFFLER INTO 1 OZ. TANK

Mark Kincer of Roanoke, Virginia, found a bargain at the flea market. The next time you go to a flea market

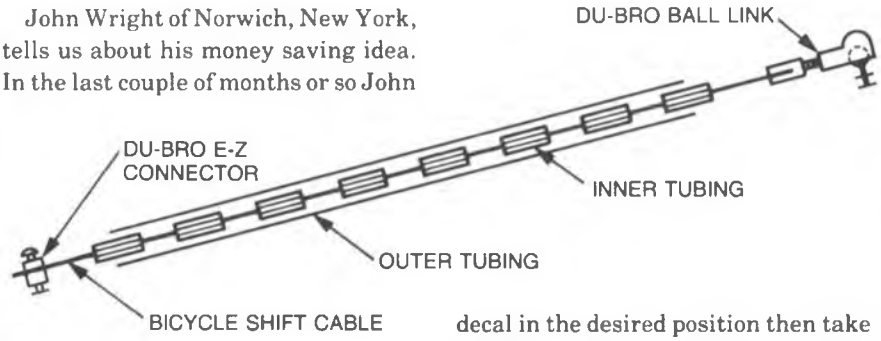
or yard sale, you may want to ask the price of those lowly looking grass shears, because inside, there lies a bargain. Most sell for $1.00 to $3.00. As shown in the photos, all you have to do is to remove a few screws and look inside and you will find one hi torque motor, three to four "C" size nicads, and some gears. This motor, nicad, and charger make an excellent way to move R/C boats, cars, tanks, and with a little know-how and the right gears may even be used as an on board starter.

David Laville of Metairie, Louisiana, submitted the following. Using micro-balloons and epoxy as a filler can be a problem when it comes to sanding its translucent color. David has found that adding a few drops of food coloring of your desired shade makes the filler easier to see while sanding.

Here is an oldie but goodie discovered jointly by Douglas MacKenzie and Don Bannick, both from Litchfield, Michigan. When you find yourself at the flying field, and notice your wing is warped, a quick way to fix it, without a heat gun, is to start your car and twisting the wing, put it under the exhaust pipe. The heat from the exhaust will shrink the MonoKote.

FOR WHAT IT'S WORTH

John Wright of Norwich, New York, tells us about his money saving idea. In the last couple of months or so John has been working on his latest model (which by the way is an RCM Big Bird Too). During the process of this he discovered a real neat trick. While installing the throttle linkage, he noticed that he had quite a few scraps of Gold'N-Rod and Ny-Rod. As it always ends up, the scraps are short pieces of the inner tubing and longer, more suitable, pieces of the outer tubing. Now when you hook up a pushrod you need the inner tubing longer, right?



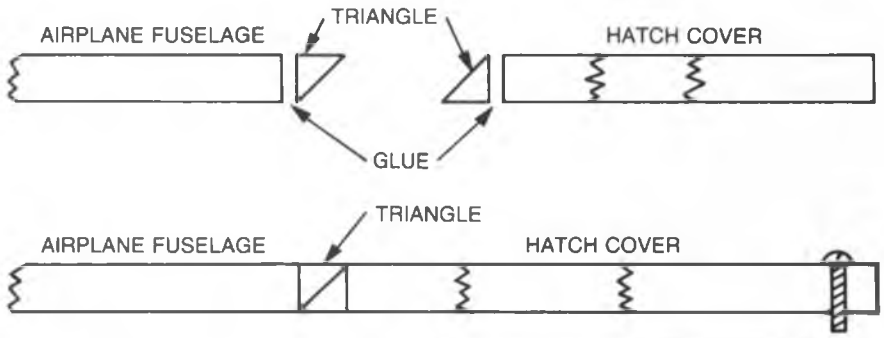
So to solve this problem, he installed the outer tubing in place as normal. Then cut the inner tubing scraps into about 1" pieces. Go to the local bike shop (that's right) and buy a 6 ft. section of shift cable for 95¢ (this is just the inner cable without the outer housing). Approximate the length needed then cut the cable, slide the 1" piece of tube over the cable and space them apart about an inch or so, then Hot Stuff in place. John then used a Du-Bro 1/16 threaded ball link with solder on the coupler on the carb end and one of their E-Z connectors on the servo, as shown in the sketch.

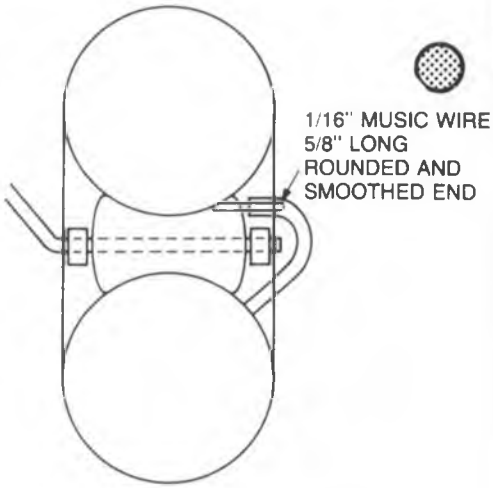
The following suggestion was submitted by Harold Clary, Greenville, South Calolina. His suggestion is in regards to decals, specifically the plastic adhesive backed type. Harold has found that with the larger decals the best way to apply them is to first take the paper backing off of the decals, clean the area where it is to be applied, then take a spray bottle of window cleaner (Glass Plus, Windex, etc.) and spray both the back of the decal and the area where it is to be applied. Place the decal in the desired position then take a flexible plastic squeeze (he uses the type available at auto parts houses used to apply plastic auto body filler) and proceed to squeeze all of the cleaner from under the decal. Harold has found this method to be extremely helpful as it will let you align the decal perfectly and remove all air bubbles. This method also works well with plastic film covering material when used for trim.

Bill Sandifer of Raleigh, North Carolina, describes an economical building aid. A handy way to deliver small doses of baking soda to those hard to reach areas is with a plastic coffee stir stick from McDonald's. The small, flat end works great as is, or can be heated and bent to suit your needs. Can't beat the price, also.

Roy Taylor, Sr., of Forrest City, Arkansas, tells us how he solved a well-known problem.

Roy has always had trouble getting a good fit on a wedge locking hatch cover when he tried sanding or cutting the lock angle. He now uses triangular strip stock. It is much easier and it works much better. See accompanying sketch.





TREXLER BALLOON WHEEL

Here is an idea from Bob Kelley of Dayton, Ohio. The guys using Trexler balloon wheels blow up the tire, twist the stem, wrap it around the spool and tuck it under the tire to retain pressure.

Cut a 5/8" length of 1/16" or .070 wire, round and smooth one end. Drill a 1/16" hole in the wood spool opposite the stem. Push in 1/4" of the wire leaving about 3/8" sticking out. Make sure there is clearance for the collar set screw. Blow up the tire and stick the stem on the protruding wire. No need to deflate after each flying session. The stem will stay open and a rough landing will not pull the stem off. This system will work on any size Trexler wheel. The sketch will help clarify.

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

from page 96/94

affairs, has filled this thorough reference guide with the weights and dimensions, engine specs, production figures and individual histories of 100 principal types of aircraft used by U.S. and allied forces from the time of Pearl Harbor to the "Enola Gay" and the jet.

Here are America's fighter planes --- including the Lockheed Lightning, the Republic P-47 Thunderbolt and the Grumman Tigercat that approached a then incredible 500 mph --- in all their true colors and insignia (just check the color keyed chart on page 17). Here, too, are the rarely seen variants and flops, along with bombers, helicopters and transport glider, plus previously unpublished interior shots and closeups of turret guns, nose cannons and other on-board equipment.

Specifications are placed in convenient "data boxes" and an appendix, along with six more appendices that include a detailed map of principal U.S. and Canadian aircraft production centers --- something that would have delighted enemy spies! Bibliography and full index also included.

THE AMERICAN BOY

Frank Zaic has completed work on his book entitled "Model Airplanes And The American Boy 1927-1934."

This is a complete 160 page collection of model airplane articles, hints and AMLA News which was published in the American Boy magazine from September 1927 to August 1934. Included are samples of advertisements and regular features which appeared during that period. The model airplane ads are indexed but are not in chronological order.

The formation of the Airplane Model League of America and the publication of the model articles could not have been timed better. The newspapers were headlining flights Charles Lindbergh was making across the country after his trans-Atlantic flight on May 20, 1927. It was an era during which the whole world became aviation conscious. So, it was no wonder that youngsters flocked to join the AMLA and fly model aircraft while their older brothers were just aching to get into the cockpit of full size aircraft.

The list price is $9.50 postage paid and would make a very worthwhile addition to any modeler's collection of books.

Available from retail outlets or order direct from Model Aeronautic Publications, P.O. Box 135, Northridge, California 91328.

TESTING THAT SILENT MEMBER

from page 90

minutes/5 volts test, and all cells check close to the same voltage, all cells have deteriorated the same from long usage and a great number of recharges. The pack is probably okay for use on practice day but shouldn't be depended on for reliability on race day.

If you think this is an easy way to check battery condition, there's even an easier way. Of course, it costs more. Be prepared to spend $60.00 or more for a piece of equipment called "Power Pacer" (formerly called "Super Cycle") at your local hobby store. The unit allows you to simultaneously charge or discharge (under fail-safe conditions) receiver and transmitter batteries. After charging both batteries fully, a discharge test is performed by zeroing a pair of timer knobs and pushing a button. The unit switches to the discharge operating mode in which a resistance load is imposed on each battery. Special circuits monitor the discharge and cut off the load when each battery reaches the normally discharged state. The separate timers read the discharge time for each battery and the unit automatically switches to the charging mode of operation and returns each battery to fully charged condition after about fourteen hours. A typical five cell, 450 mAh battery when new, typically will show 90 minutes discharge time from being fully charged. Any time the reading becomes much less, there's cause to look for a bad cell.

So, the battery really does perform a role just as important to racing success as those magical engines. And, I'll have to admit that something which can be brought repeatedly back to life after being declared dead is pretty interesting after all. □

THE STUDENT SIDE OF THE BUDDY BOX

from page 89

servo had not been plugged in prior to putting all those rubberbands on the wing. It being one of my first take-offs, I didn't know what to do and panicked at low altitude with the throttle bent forward as far as it would go. What followed was the demise of my first trainer.

The following week I assembled an Ugly Stik, stuck it on the back of a K & B .61 and headed for the field again. The instructor I drew for the day, pre-flight tested my plane, made two flights and some trim adjustment, put me on the buddy box and almost immediately started a conversation with another pilot on the flight line. I didn't know I was in trouble until we all heard the crunch. I'm sure my instructor wasn't looking somewhere else or hadn't remembered I was a student pilot with a new plane --- right?

Many instructors and repairs later, I was labeled as non-teachable by many of my fellow club members. I was beginning to think they were right, when one of the better fliers in our club accepted the challenge. Repairs to my plane became minimal after that and my maneuvers started looking **almost** the same each time. This man has to feel a sense of pride in knowing he succeeded where others had failed. I did solo and the shirt tail (signed and dated by him) is in a frame in my building room. It's my greatest trophy.

What about my other instructors? I still call them all friend and, maybe after all, learning to fly is really just one more by-product of our great hobby. □

A BETTER WING SADDLE

from page 89/88

including the leading and trailing edges. This provides an excellent seal that will keep out fuel and, in the case of floatplanes, water as well. Be sure to apply it in a manner that will provide a bead that is the width of the saddle and about 1/4" thick. Once the bead is complete, gently place the wing in the saddle, push down on it with even, gentle pressure until the sealer emerges between the wing and fuselage. Double check for proper alignment and allow the silicone to set for 12 to 24 hours, as per the directions on the tube.

When the material sets up you may remove the wing, and take the plastic wrap off as well. The last step is to trim the excess sealer with a sharp X-Acto knife. Once the trimming is complete, you will have a wing saddle cushion-seal that is tailor-made and will provide excellent service. □

SMOKINOKIE

from page 87/86

exhaust stingers. This evenly divides the smoke going into the wings, and no choking down of one wing tube was needed to balance the smoke trails later.

Preheater Construction

In order for diesel fuel to produce enough smoke to be noticed it must enter the muffler already hot. In fact, the hotter the better. Some sort of preheater must be used, and there are several types to choose from. A boat water jacket is probably the easiest to install. An internal muffler preheater is the most inconspicuous, but an in-line with the muffler external preheater seemed to work the best for me.

The water jacket type is purchased to fit the O.D. of the cylinder. It's clamped down with a screw and does work, fairly well.

An internal muffler preheater must be installed in a muffler that comes apart. A copper tube must be coiled to fit the I.D. of the muffler case tightly. The more coils, the better it will work. The copper tube must be heated red hot and allowed to cool slowly to anneal the metal. This will allow the tube to be wrapped around something to form the coil without kinking the copper. The tube used in these preheaters was .156 O.D. copper tubing. A larger tube can be used if room allows. Where you choose to have the tube enter the muffler is not important. I chose the rear simply because it was easier. At the other end of the coil the end is crimped and 5 or 6 small holes are drilled in the tube to help distribute the diesel evenly in the muffler.

Again, the coiled tube should fit tightly in the muffler to avoid vibration noise. During final assembly, coating the tube with high temperature cylindrical part bonding Loctite® #RC/620 will keep everything tight.

In the case of the Fox muffler, the manufacturers have an internal aluminum tube that runs the length of the muffler. To work properly for smoking, more slots must be cut on both sides of the tube, again the more the better. Now 3 or 4 wraps of window screen are wrapped around this aluminum tube before finally wrapping on the copper preheating tube. This helps break the diesel into small droplets that are more easily turned to smoke.

Some window screen has a coating on it that must be burned off with a flame, and the soot brushed out of the screen before installation in the muffler. This screen will be mentioned later in the muffler modification section, but in the case of the Fox muffler it must be wrapped on the aluminum tube before wrapping on the copper tube.

An external preheater may be made by wrapping the copper tubing around a 3" long piece of brass tubing that fits

tightly on the stinger of the muffler. In final assembly use Loctite® for the copper tube to the brass tube and likewise the brass to the muffler. In fact, all joints must be sealed with Loctite® before flying to prevent leaks.

Muffler Modifications

If you have decided to go with the Fox muffler with an internal preheater, your muffler has already been modified with the possible exception of a pressure port for your engine's fuel tank. The port must be put in, or possibly moved to, the top side of the muffler housing close to the cylinder wall. This is to avoid getting diesel in the engine fuel through the fuel pressure hose during smoking.

If you're using a Fox muffler with an external preheater, it is advisable to completely do away with the aluminum tube to make room for more screen. To do this, just hacksaw both ends off the tube and discard the center section. The front piece is then installed in the muffler using Loctite® and a 6" long piece of rolled screen is installed in the muffler before the stinger end is replaced.

Now the only thing left to do is to put a diesel inlet pressure fitting in the muffler, close to, but down stream from, the fuel pressure fitting if there is one. With other mufflers which are hollow (whether they have been fitted with internal preheaters or not) must now be stuffed with clean rolled screen and pressure fittings added.

The only modification to any engine is to install a crankcase pressure fitting to power the diesel tank.

I mentioned earlier that what got me started on "smoking" in the first place were some articles in RCM. One of the articles in "For What It's Worth" suggested using a G.M. one way vacuum valve in the pressure line from the engine to the diesel tank. The logic being that below half throttle the crankcase develops vacuum, not pressure. This sometimes causes the engine to suck diesel into the crankcase, killing itself. For this reason a check valve is a must for anything but full throttle smoking. I had been using a Hi Johnson fuel filter with a BB on one side of the screen to act as a one way ball valve. Both the G.M. and the homemade valve worked well to keep the diesel out of the crankcase, but I must admit the G.M. valve built better pressure in the diesel tank and it's fairly cheap.

If you've somehow managed to follow these instructions to this point you should have all the parts to make an exceptional smoker even without the wing modifications.

Wing Modifications

Even though wing tip exhaust looks great, keeping the slime off the plane was the purpose behind the original wing. The first step is to install the tubes in the wings. Although this plane's tubes were installed before covering, the first tubes were put in an old set of wings already covered, and there was no great problem.

You will need several lengths of brass tubing that are somewhat larger than the I.D. of the stinger on the muffler you are using — this is to keep the wing from acting as an exhaust throttle. Take a Dremel tool with a cut-off wheel, and cut 10 or 15 slanted slots in the end of one of the tubes to resemble sawteeth. This will make a hole saw just right to cut through the center of the ribs. Do this by twisting and lightly pushing the tube through the ribs. On a wing that has already been covered and after the tube has cut through the wing tip rib, cut slightly into the next rib. This forces the cut out slug up into the brass tube and keeps it from falling into the wing when you pull the tube out to remove the slug. This work must be done on a flat surface so measurements can be taken to insure that the tube goes through the wing straight. Both wing tubes must match up in the center where they go into the "T." The only other cutting that must be done on a wing already covered is down on the bottom side where the "T" tube exits the wing. Part of the sheeting must be cut away to allow hook up of the "T" to the wing tubes. If you are building up a wing this can be done before sheeting the bottom.

The tubes running the length of the wing are made from 12" long sections joined together. A 2" long piece of tubing one size smaller than the 12" tubes is slipped half way into each of the 12" tubes. Use Loctite® on all joints. Any length of airtight tubing may be made in this manner. This also keeps the outside of the tubing smooth so it will slide freely through the wing ribs. The first wing tubes made were joined together with a homemade "T" silver soldered together out of brass tubing. Later I found that buying a "T" at the hardware store and drilling it out to accept the tubing was easier but somewhat heavier. After the tubes have been fitted to the "T" and wing, they are cut flush with the wing tips. Assemble all the parts together with the "T" using Loctite® and sheet the wing.

Two wing tip extensions can be made later, if need be, to choke one tip or the other to attain two even smoke trails since most of the smoke will try to exit the wing through the shortest tube.

The only thing that remains to be done now is to hook the wing to the muffler. Silicone tubing is the easiest way to go, though care should be taken to avoid kinks. Short pieces of brass tubing may have to be inserted in the silicone tube to prevent this.

Again, keep all fittings tight to prevent diesel from getting on everything.

In conclusion, I'd like to say a couple of words about diesel fuel and rubberbands. It seems that if **any** diesel get on the rubberbands it has a tendency to preserve the life of them only to the bottom of your first or second loop.

This flier became acutely aware of that fact when the first smoker developed a leak in the tube from the muffler to the wing. Two and a half flights later the fuselage fit loosely in a five gallon bucket, fortunately the wings flew down by themselves quite nicely. So, if you are not planning to use wing bolts, keep your eye on the rubberbands.

Finally, even though your plane may have a preheater, on cool days this may not be enough. Cold diesel may not be able to flow through the hose to get to the preheater fast enough for good smoke. Warming the diesel with your car heater or setting it in a pan of hot water will remedy this problem.

In conclusion, the only problem anyone might have with this system is if all the joints aren't sealed properly, so get out the Loctite® and give it a whirl. □

A TREE GROWS IN MY FLIGHT PATH

from page 81

about ten to twenty-five yards in. Walk into the woods carefully to this second spot and again stop. Now take a sighting from the point you entered the woods to the point where you are at present. Now pick out another tree or landmark ten to twenty-five yards further in along the same straight line. Continue this process as you move further and further into the woods.

For the flier not accustomed to the great outdoors, an unplanned excursion into the woods can be disastrous. Depending on how dense the woods get, it may become impossible to distinguish North from South. It's bad enough to lose a plane, but when you lose a pilot as well . . .

Use this process when entering the woods and your chances of losing yourself are nil. Your chances of getting lost become almost impossible if you mark each tree you stop at with a knife.

Now, if you had the foresight to install one of those alarms, be sure your transmitter is off and listen for the beep. If you don't hear the beep, turn your transmitter on. Since the alarm draws battery power, keeping the transmitter on will help save the batteries if the plane is within range.

If you didn't install an alarm, don't give up hope. Remember, most servos make some noise when they travel. They also move control surfaces, and a movement of any type is easier to spot than a stationary object.

If you have no luck at your first stop, proceed deeper into the woods ten to twenty-five yards at a clip, stopping each time and using your transmitter to aid in your search. Keep in mind, alarms don't work every time so try a few shots with your transmitter even with an alarm installed.

So, where do you look at each stop? A plane will snag on the very top of a tree or drill itself straight into the ground. Look both high and low, and everywhere in-between. If the wings were attached with rubberbands, chances are good the plane is up in a tree and the wing is on the ground. A glider will usually get about half way down through the trees if the wings come off. A plane with wing bolts and extended landing gear will almost always be found high up in a tree. Another good rule to follow, is, always consider the plane is in two or more pieces. So, if you lost a Quarter Scale Pitts, look for it as if it were a half a Corsair.

Continue deeper into the woods until you reach a point you honestly feel is too deep. Turn around one hundred eighty degrees and walk back out following the same path you took to get in.

Emerging from the woods without your aircraft is extremely discouraging, but it may happen. Why? It is possible you just didn't see your plane or it made a turn just before going in. All is not lost. Take a breather for a few minutes and go back to your starting point. This time enter the woods a few degrees to the right of your first entry point. Follow the same procedure you followed the first trip. If still no luck, start over again a few degrees to the left.

One word of caution, never enter the woods when it is getting dark. Always allow yourself plenty of daylight. This is no time for your first all-nighter with Mother Nature.

As a word of encouragmenet, no aircraft were lost during the last flying season using this search method. The longest search time was about 6 hours.

After several hours of searching you are rewarded with the sight of your bird. There it is, 40' up the tallest tree around, hanging by its tail way out at the very end of the longest branch. Now is definitely the time to use your brain and not your brawn. Tree climbing is something better left to the squirrels, so keep that idea as your last resort.

Probably the safest method to get your plane down is to simply lasso the offending branch with a piece of rope and shake the plane loose. This is actually easier done than said. Simply get a 100' long piece of 1/8 diameter nylon rope. At one end, tie and tape a rock about 3" in diameter. If the branch is within range, throw the rock over the branch. The rope will follow. Pull up on the rope while trying to snag the rock. Once you get the rock stuck you can tug on the rope and in turn shake the plane loose. For those branches out of range, spin the rock in the tradition of David and Goliath for the extra range. It will take several attempts with this method, but it works.

Landing gear has a nasty habit of locking into a tree, making the old rope trick useless. All the tugging in the world won't bring down the plane. Would you believe you can saw that branch off from the ground? All you have to do is get that rope over the branch with both ends on the ground. Most good hardware stores carry braided steel cable. Purchase a piece about 5' long and roughen the outside with a metal file. Pulled tight, the cable will cut through wood. Tie this cable in-between the two loose ends of your rope and pull it up and over the branch. Apply a little force and pull the cable back and forth across the branch until it cuts through. It may take a while, but it works.

As luck would have it, there will be times when reaching the branch with a rope is impossible and tree climbing is the only alternative.

First, take a short trip home and, in between beers, cut up a number of two by fours about 2' long. Make a stop back at your friendly hardware store and buy a box of long nails and some strong rope.

Back at the crash sight start building yourself a ladder right up the side of the tree. Hammer the nails into the tree at a slight down angle and use two or more nails per piece of wood. If possible, get a safety rope over a branch and hang onto it. Whenever climbing a tree, always use more caution than necessary.

When you reach the branch where your plane is, keep in mind your weight and the apparent strength of the branch. It is always better to just saw off the branch than walk out on it. No matter what situation you are in, when you are up in a tree, take your time. Think out every move before you make it. It should not be of paramount importance to bring the plane down without any more damage, just get it on the ground. Of paramount importance is to get you down in one piece.□

ACRO KNIGHT-45

from page 77

····· modification would be like wearing sneakers and a tee shirt with a tuxedo! Circus Hobbies has these retracts available with the three units retailing at $67.90 and their price of $33.96.

Construction:

The 35" x 55½" full size plan sheet is well-drawn and clearly detailed. There are no instructions on the plan sheet, however, each part is identified in both English and Japanese. Also included is a 10" x 14½" two page construction manual in English, which features many helpful illustrated assembly views. The builder who expects highly detailed sequential assembly instructions will be disappointed. In fact, some items included in the kit are not specifically explained at all. There is a piece of adhesive backed foam that we assumed is for cushioning the fuel tank, and a metal bracket with screws, that we thought might be a tuned pipe attachment bracket. These are minor deficiencies that could easily be rectified with the addition of a more detailed instruction sheet. The Number 6 wing ribs were missing from our test kit. We assume that this was a singular circumstance and not associated with every Acro Knight-45 kit. We cut substitute Number 6 wing ribs by interpolation; using the Numbers 5 and 7 ribs as guides. The only serious shortcoming that we encountered during assembly dealt with the basic wing frame assembly. The symmetrical wing panels are designed to be constructed via a pre-cut cardboard "rib jig" box that is slotted to accept each wing rib. While the parts fit of the respective wing ribs into the lightly notched leading and trailing edges is excellent, the slots cut into the "rib jig" box simply did not match. We spent a considerable amount of time re-cutting, measuring, and adjusting the rib jig slots in order to obtain "true" wing panel frames with no bowed ribs. Any Acro Knight-45 builder who has access to a rod type wing assembly jig would be well-advised to drill the kit wing ribs accordingly and use that type of wing jig. The instructions call for the bottom of each wing panel frame to be sheeted first and then items such as the landing gear blocks and wheel well liners are added. Care should be exercised during this assembly phase,

to insure that a warp or twist is not built into each wing panel, when sheeting each side of the wing panels individually.

The stabilizer and vertical fin are built-up balsa frame structures, which are fully sheeted with balsa. The elevators and rudder are pre-cut balsa.

As previously mentioned, the fiberglass fuselage unit is highly prefabricated by the manufacturer. The builder is mainly concerned with the installation of the wing, tail surfaces, engine, and other components into it. A fiberglass belly pan, which is installed on the wing center section, blends into the fuselage contour perfectly with very little cutting and fitting. The fiberglass fuselage unit as received, is more complete in many respects than many other kit fuselage units that are glowingly referred to by some manufacturers as A.R.F.'s (Almost Ready to Fly).

The IM Products molded nylon control surface hinges are the nicest molded hinge design that this reviewer has ever seen or used. Each hinge has a small molded depth stop on each side, which produces a nice close fitting, free working, uniform hinge line on all control surfaces, with minimal effort.

Carl Goldberg Super Jet glue was used for the assembly of the basic wing and tail structures and Custom Model Products' fast bond epoxy was used for the other construction phases.

Covering:

Since we intended to finish our Acro Knight-45 with epoxy enamels, the wing and tail surfaces were first covered with 3/4 ounce fiberglass cloth and K & B polyester resin. Hobbypoxy primer and epoxy enamels were then used to complete the finishing process.

Engine:

An O.S. Schnuerle .40 R/C engine was installed with a conventional muffler. The IM Products fuel tank, with its 11¼ ounce capacity (which is more than adequate for any engine that might be installed) slides neatly into its pre-installed plywood cradle formers with ease.

Radio:

A brand new Airtronics 7-channel radio system was installed except for the retract servo which was an Ace R/C unit. The new 7-channel Airtronics system, with its servo reversing, exponential and linear travel, servo travel adjustment in both directions, and rudder/aileron coupling features, makes the radio installation and flight trimming of this (or any other R/C aircraft) an absolute joy. The control surface travel limits were set up according to the plan sheet. Our ready to fly (less fuel) Acro Knight-45 weighed in at 104 ounces.

Flying:

Our initial test flight quickly established that the Acro Knight-45, in addition to being an outstanding kit, also possessed excellent in-flight characteristics. It is a smooth flying, precise aircraft that should satisfy the demands of competition and serious sport fliers alike. Landings and take-offs are equally smooth and predictable with no bad quirks or traits in evidence.

We did find our Acro Knight-45 to be under-powered for acrobatic purposes, with its .40 size engine and conventional muffler. This power deficiency was most readily apparent during any vertical maneuver. Undoubtedly, the use of a tuned pipe would be a big asset on any .40 to .45 size engine that might be installed in this aircraft. One of the newer and more powerful .45 size engines aided by the added punch of a tuned pipe would be an ideal power source for the builder to consider.

After first test flying our Acro Knight-45 with the .40 size Schnuerle engine, we decided to install a conventional (cross-flow scavenged) .60 size engine. A new K & B .61, equipped with its standard expansion chamber type muffler, was provided by K & B. The K & B .61 engine is approximately 3½ ounces heavier than the O.S. .40. We achieved the same C.G. location by relocating the battery pack to a more rearward position within the fuselage. The 11¼ ounce fuel tank, which is included in the kit, is adequate for a conventional .60 size engine. The smooth running and reliable K & B .61, with its larger prop handling capability, produced the hoped for vertical maneuver performance improvement. This was accomplished even with the engine being run on the rich side, due to its being new. If you do not happen to own one of the newer high performance .45 size engines, a conventional .60 size engine such as the K & B .61 would be an excellent alternative power choice. The pre-assembled engine mounting plate and nose cavity is large enough to easily accept a .60 size engine. (This is not meant to suggest that a high performance ABC Schnuerle type engine can or should be used.)

Conclusion:

In summary, the Acro Knight-45 is definitely a "best buy." It is a well-engineered, high quality kit that comes with many accessory items not found in most other kits. It is a delight to fly and a good looking design to boot! It is difficult to envision the modeler who would be dissatisfied with this Circus Hobbies kit offering. □

SOARING

from page 76/75

nice clean airfoil when retracted, it is difficult to achieve trailing edge structural rigidity. The real problem, however, is that while lift increases about 1½ times, the increase in drag drops the L/D by a factor of about 5. While this drag is welcome when the split flap is used to reduce the speed for landing, it prevents its use as a high-lift device for increasing launch height on tow. The split flap also may upset the sailplane pitch when landing.

As a pure drag device to slow the ship for landing, the drag flap is a very effective device. This device is hinged so that about 40 percent projects above the wing and 60 percent below. This ratio is arranged so that deflection of the flap does not cause any pitch change. It is only 6" or so long and mounted at the inboard trailing edge of each wing. It acts as a pure drag plate and really slows the sailplane for landing. Since any effect on lift is small and subtractive, the drag flap can be put in and out without the ship falling out of the air. While this is also true for spoilers, these devices change the pitch of the ship.

The most common flap is the trailing edge flap. This flap has the advantage of increasing lift, for small deflections, without destroying the L/D. Thus, it can aid significantly in launching as well as enhancing thermalling ability. With large deflection, flaps will slow the ship down to a walk for landing. Another handy feature of the trailing edge flap is its ability to modify the airfoil for a change in performance. A fairly high-lift airfoil such as the Eppler 214 can be changed to resemble the higher speed 205 by reflexing (bending up) the trailing edge flaps. This will increase the speed and, hence, the penetration ability of the sailplane.

All this good stuff is not without penalty, however. The airfoil is not as clean as a non-flapped one. The structure and construction is more complex; and it requires another servo. They also change the pitch when deployed. One characteristic of trailing edge flaps one must be on guard against is that if you change your mind; that is, you've slowed too much and won't make it to the target, the flaps must be retracted with care. When the additional lift generated by the flaps is removed, the airspeed may be too low to support the weight of the plane and, kerplunk, it falls out of the air. When flaps are retracted the nose must be pushed down to get the speed up to a flyable level. But, boy oh boy,

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SOARING

from page 119/75

they sure are nice to get the sailplane down from a booming thermal in a hurry; just throw out the flaps (and spoilers, if any) and dive straight down.

Anyway — so much for flaps, except to say that any leakage of air through the gap between the flap and wing is really detrimental. The flap hinge line should be solidly sealed with tape.

★

I was recently discussing glider kits with a hobby shop owner. My point was that, relative to the value, many kits were underpriced. He snorted, "Just try to convince the guy across the counter of that, especially when he's looking at a hundred, or two hundred dollar kit." I can certainly appreciate that; I have to lay out money for kits too. But when you look hard at the problem, the manufacturer only gets 50 to 70 percent of that hunded bucks, unless he sells direct (which doesn't always work too well). Kits are labor intensive: receiving materials, cutting, sanding, stocking, packing, and shipping take lots of man hours. Some of the quality kit manufacturers sort the incoming balsa, using only prime wood for ribs, sheeting, etc. Some kits have the ribs stacked and sanded. If you've ever been in a balsa sawing/sanding area you can appreciate the difficulty in getting help to do these jobs. Another dirty job is laying up fiberglass fuselages. It takes from 45 min to 1¼ hours per fuselage to lay up the glass. Material costs are going up daily. Kit manufacturers pay from $2.00 to $4.00 just for the boxes. Printing costs for the drawings and instruction manuals are high. Then you've got all the saws, sanders, molds, jigs, facilities, bookkeeping, and on and on. Then there is product liability to worry about these days. Some guy runs his ship through his windscreen and sues you for negligence. A lot of kits are manufactured by one-man, or family operations because when you hire your first employee, your troubles are multiplied.

Anyway — I'm glad I'm in a high paid writing job and not trying to make it building kits. However, the next time I go down to my friendly hobby shop to look at one of those expensive kits, I'll re-read this again — a spoonful of sugar makes the medicine go down.

Catch you next month, all being well. Howzat!

GIVE IT A WHIRL

from page 74/72

You can fix a plan representation of a helicopter on top of the table. I used some black vinyl sticky shelf paper to cover the top of the table first and then some white MonoKote trim to represent the helicopter. On top of all of this you put a sheet of 1/16" thick glass. This will be cut by your friendly glass cutter to just fit within the rim of your Lazy Susan. Make sure that he just smooths the edges so that you don't cut your wrists everytime you drop the simulator on the floor.

The next problem you will find is that the rim of the Lazy Susan has now disappeared because the glass is in there. Restore the rim by fitting some 1/8" wing mounting tape all around the edge to form a new rim.

Now you can try your system out. Adjust the links on your pitch and roll servos so the table is level when the trims are in the center. Take a large (3/4" diameter) glass marble, place it in the middle of the table and start "flying" the ball. As you will notice, if yaw control is not exactly centered the

whole table top will start rotating round but, just as in a real helicopter, your controls will be oriented according to the way the model is pointing. If the model is pointing towards you, then roll and pitch are reversed; to the side of you, you have a 90° orientation: pitch becomes roll and roll becomes pitch. This is exactly the situation we have when flying a real R/C helicopter. When you see the experts doing slow yaw axis pirouettes you know now, having tried the table, that this is a very hard thing to do.

Well, I don't have too much time to write the column this month since I'm actually doing this while making a trip across the country. But I did promise to describe the table for you since I think it could be an intriguing device for us to resurrect again. We would appreciate very much any inputs from you on ideas for training or any ideas that you might think of to sophisticate the trainer described in this article. I hope there is enough information here for you to get going on it. I'm sure there is for the expert modeler and if the beginner has a few doubts on how to construct this gadget then please send for the reprint of the 1974 article. By the way, one quick comment which relates this table top trainer to some of my previous columns. Remember that I stressed the need for eliminating dead space or free play in your controls. Well, why don't you try it with this trainer? Just loosen the screw on the servo holding the brass ball on the output arm so that you get some play or lost motion. Do this on pitch and roll and then see how much harder it become to keep the ball in the center of the table. This should bring home pretty forcibly the need for having a very tight control system.

One other point. Vary the size and weight of the ball and the amount of table top movement to vary the response of this device. Good luck in its construction, have fun and please give us lots of feedback.

See you next month.

Parts List For 3 Axis Table Top Trainer

2 — 'Rubbermaid' 12" diameter Lazy Susans
2 — Small Bulb holders on a plastic or ceramic base
2 — 5/8" diameter rubber hose
1 — Swashplate locator bracket (Cricket or Heli-Boy)
2 — 1½" long 2mm or 2/56 threaded rod
4 — Ball links with ball ("Rocket City")
1 — piece of 1/16" glass — 10⅝" diameter
3 — small metal brackets (1/4" x 1/4" x 1/4")
1 — piece blade or shelf vinyl (10⅝" diameter)
1 — small piece white MonoKote trim (to represent the helicopter)
1 — 4 channel R/C set with 3 servos

□

JET TRON

from page 71

Radio:

No problem was found installing the Kraft KP6A radio, battery, and four KPS 24 servos in the large radio compartment.

Flying:

The initial flight was a pleasure for two reasons. First, anything that was asked of Jet Tron, it cooperated. A real stunt plane. We feel the long moment arm and short tapered wings went a long way in accomplishing this ability. Secondly, she does float. We enjoyed the flight so much that we neglected the time and wound up flying it out of fuel. We came in rather high and hot expecting the worst, but, **surprise,** it floated; in fact, had we not had a long runway, it would have floated over the fence at the end into the weeds.

If you want a racy looking excellent flying, easy to build sport plane, look no further — this is the answer. In the second and ensuing flights we really wrung Jet Tron out and found she will do anything you ask. At least four members of our club have insisted upon their turn with Jet Tron and each one concurs highly in our opinion of the plane.

Conclusion:

Again, we do not agree with the designer, the Jet Tron is not for the novice. It is excellent for the person who has had a little more than average time on a high wing aileron plane and we do concur that it would make an excellent Sunday flier or pattern trainer. The buildng instructions, along with the excellent construction photographs, make construction a breeze for the rather experienced builder. We think you will have a good feeling for Jet Tron and greatly enjoy the manner in which it flies. □

HERE'S HOW

from page 62

Photo #2 shows you how not to mount a servo. Although it is mounted correctly with the grommets, I would suggest it is **not** a good idea. For one thing it has no protection from the environment of dirt and oil. If the receiver is mounted up front, the long servo lead running parallel with the

antenna could be a possible glich source. You must admit the modeler was thinking direct --- and how much more direct can you get. □

FLYING LOWE

from page 61/60

pilots in all categories (after all, the pilot is risking his neck), and to the much reduced aircraft susceptibility to wind gusts, etc. Maneuvers were much like the Vegas T.O.C. flying except corners were generally softer. The full scale ships have lower power loading and develop their vertical lines with a combination of thrust and inertia. It's obvious that they must manage their speed carefully to make nice clean level legs following vertical pulls. I also had a false impression concerning time between maneuvers. Flying "in the box" reduced time between manuevers to that analogous to models. Negative "G" maneuvers are very commonplace, and the higher categories must use many negative "G" maneuvers to generate the necessary total "K" factors.

We were treated to a flight demonstration by Kermit Weeks in his "Weeks Solution." This original biplane has a 300 hp engine and seems to have a thrust to weight close to one. Anyhow, he performed a vertical rolling loop (such as we used to attempt in models years ago) that was perfect. I had never seen this maneuver performed properly by model or full scale previously — fantastic. I didn't even think that it was possible to do it!

While we were there, I put on a short flying demo for the judges with my Laser. This looks like it would be a great way to train judges much less expensively than flying the full scale. One additional note — they employed a judging frame which was a great assist in judging all lines. It was not used to judge framing — only to judge vertical, horizontal and 45° lines — neat.

In Florida, we are promoting a closer liason between modelers and full scale aerobatics, principally through the I.M.A.C. organization and the work of secretary Floyd Lawrence. They have already held one combined I.M.A.C, and I.A.C. competition in Sebring, Florida, and plan another in April. Contact Floyd for details. Why not do this in other areas of the country? The other thing that helps is Floyd's reporting of I.A.C. doings in the I.M.A.C. newsletter.

Little Super Star

I had a chance to fly a friend's Hobby Shack EZ "Super Star" the other week over in Bradenton, Florida. This little

ready to fly replica of Henry Haige's aerobatic design proved to be an eye opener and a lot of fun. It performed every T.O.C. maneuver including knife edge 360° turns and rolling circles. I was really surprised by its knife edge ability. For a small airplane and minimal effort in assembly, you can have a ball with this airplane. Just be careful to restrict elevator travel since it will snap roll like crazy. Once this was trimmed down, landings were easy.□

WASP

from page 58/56

CONSTRUCTION

The Wasp is built quite traditionally. Balsa, plywood, and spruce are used as the basic raw materials. To this, add MonoKote, Super Jet, 5-Minute epoxy and a few hours of time and you'll have a Wasp.

Wing:

Let's begin with the wing. Pin down the trailing edge over the plan. Next, locate the 3/32" x 1/4" bottom spruce spar over the plan and cement the 1/16" balsa sheet at the center section. Note that the prototypes had no dihedral.

Cut out four W-2 ribs and ten W-1 ribs and cement them in position with Super Jet. Add the 3/16" x 1/4" balsa leading edge and the top spruce spar. Before removing the wing from the building board, cement the shear webs in place.

Remove the wing from the table and run a bead of Super Jet on the top spar only. Cement the 1/16" forward wing sheeting to the top spar and let it fully cure before the next step.

Hold the wing perpendicular to the table with the leading edge up and put a big bead of Super Jet at the leading edge of every wing rib. The Super Jet will flow downward toward the top spar. Next, run a bead of Super Jet across the entire leading edge. Finally, place the wing upside down over the building surface and slowly roll it into a position where the top sheeting is touching all ribs with straight pins holding the leading edge down over the top sheet.

Add the rest of the center sheeting, wing tips, aileron linkage, and reinforce the wing hold-down hole with fiberglass and you're ready for sanding. The wing mounting dowel is added in conjunction with the completion of the fuselage.

The stabilizer and fins are straightforward. Be sure you do **not** sand too much off the ends of the stab since this surface is required to support the twin fins.

Fuselage:

The fuselage is built so that the motor can be inserted from the inside. Much of this design's uniqueness revolves around the quick change battery hatch. However, if you do not desire to add this feature, the hatch cover and F-5 can be omitted with a weight savings of about an ounce.

However, to add the quick change feature, first cement two 1/8" square balsa sticks on each fuselage side between F-4 and F-7. Add the 1/4" sq. balsa stock to the front bottom of the fuselage sides. Cement F-4 and F-7 to one fuselage side, making sure they are perpendicular. Cement this to the other fuselage side and then cement F-2, F-8, F-9, and the rear fuselage sides together. When this dries, add the bottom sheeting, former F-3, and the front cowl top of 3/32" balsa.

Now install your favorite brand of elevator control rod and sheet the top rear of the fuselage. Epoxy F-5 and F-6 in place and drill and tap a hole for the wing hold-down bolt. At this point drill a hole in the wing for the hold-down dowel and use ample amount of epoxy to secure it while positioning it on the fuselage while inserted into the hole in F-4.

A piece of 1/64" ply, 1½" x 9½", is rolled around the motor to form a tube. This is cemented into the nose block F-1. The hole shown on the plan is for the largest diameter 05 motor, the Leisure 05.

You can reduce the diameter of the nose block hole to the size of the smaller diameter Astro XL05 and Challenger 05, or you can use spruce shims to hold these motors in an oversize tube.

The nose should be sanded to a round cross section. Sand right down to the plywood motor tube. The entire model should be finished with 100 grit, followed by 220 and 400, before covering. MonoKote was used on the prototypes.

Radio:

The motor is installed from the rear through the battery hatch. Next install the radio components.

Since you can charge the batteries out of the aircraft, no special charge circuit is required in the switch harness. A Radio Shack micro switch with a lever arm activator can be servo taped to the side of a servo. A large washer should be Super Jetted to the lever arm at the end so that there is a good contact area between the servo arm and the switch.

Once the radio is installed, check the balance and make any adjustments required to achieve the proper Center of Gravity. Range test your radio with the motor on and if all is well, give your Wasp a firm toss into the wind and you'll discover electric aerobatic flying at its best. □

POWER BOATING

from page 54/51

especially critical with water cooled engines as there is so much more temperature differential between piston and cylinder case (K & B is getting better).

All for now,
Glen Dye

The "proper" fit of an ABC piston and liner is a topic of much controversy. It is also probably the most important single hop-up technique. I would love to hear from any of the top engine builders about their techniques. How about sharing your expertise, John Shannon, John Ackerman, Ed Hughey, Ed Baker, Jim Whitlatch, Jim Wilson, Bill Wisneuski, Terry Prather, Jack O'Donnell, Ed Fisher, Bruce Kaiser, Frank Ward, etc., etc., etc.? My experience has been that "tight is right!" But it has to be the right tight. The motor should be tight only at the very top of its stroke. How tight depends on what you are doing. As an example, if you are running straight-away time trials with no requirement to start within two minutes, you can run a tighter motor with good results. My tests indicate that a tight motor will allow you to pull about one size bigger prop off the beach. This indicates to me that the tight fit benefits the low rpm lugging power. Tight fits don't seem to affect the top end rpm much but really help acceleration and torque production and, therefore, speed. If you are circle racing, a looser fit is usually called for. Reliability is much more important than absolute power generation.

Well, that about does it for another month. Send your questions, comments, race results, etc., to the address at the end of this column. If you desire an answer before magazine publication, enclose a stamped, self-addressed envelope so I may answer your letter by return mail. Howard Power, Hobbies Unlimited, 766 Broadway, Seaside, California 93940. (408) 394-1200. □

AIRFOILS

from page 48/47

Tip stall is a major consideration when designing a wing. If the wing tips stall before the rest of the wing, the ailerons stop working which results in a loss of control followed by the aircraft falling off to one side. A more violent reaction to tip stall is a snap roll that pitches the airplane over on its back and pointed down. If this happens during a take-off or landing, well, back to the drawing board.

If a wing has a constant chord wing, with no change of airfoil and no washout and no engine torque to complicate things, at stall, the entire wing quits flying at the same time and the nose of the model drops straight ahead in a clean stall. Control is resumed as the model picks up speed. If power is on, the left wing may drop first as the wing stalls.

The cures and airfoil modifications apply to all airfoils and produce the same characteristics. The basic wing change to prevent tip stall is to wash out the wing tips by raising the trailing edge at the tips so that the wing tips are flying at less positive incidence than the root or center of the wing. One to three degrees of washout would be the usual range or about 1/8" on a 6"-8" chord section. This is the way most modelers treat a constant chord wing and often can be done when applying the iron-on covering. Wash-in is the opposite of wash-out and is not desirable as it causes the wing tips to stall first.

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AIRFOILS

from page 130/47

Stall characteristics improve when:

(1) The leading edge radius is enlarged.

(2) The high point of the airfoil is moved forward. The range of the high point is 25% to 40%.

(3) The percentage thickness of the wing is increased. The usual range of model wing thickness is from 8% to 18%.

(4) The entire wing section is enlarged. As the wing gets larger, it becomes more efficient. This works against us but only to a slight degree and can explain some problems with a tapered wing using the same airfoil from root to tip.

You can use the above statements to help you tailor a wing to your design requirements by changing the airfoil from root to tip. When building tapered planform wings, one or more of the above principles should be used.

Keep in mind that as wing thickness increases, so does drag. This is why some sport-pattern ships use very thick airfoils to slow the model when going downhill to give a more uniform airspeed through manuevers. A thick wing with a large leading edge radius tends to have a softer stall, more of a mush, rather than a quick, sharp break. A leading edge radius of 1/4" would be about average (1/4" x 1/2" leading edge material on a 8"-10" chord airfoil). 3/8" to 1/2" radius would be about maximum even on a 12" or larger airfoil. Thick wings are also less sensitive to elevator around neutral which makes the model easier and smoother to fly.

A good solution for a sport pattern wing would be a 15% symmetrical root airfoil with a 40% high point, tapering to an 18% symmetrical airfoil with a 30% high point at the tips, with a constant radius leading edge of 3/8". This wing might require more control movement to enter a spin, but would not be critical to C.G. and would have a gentle stall and slow landing speed.

Scale models usually have higher wing loadings and should use a lifting wing as the model should fly at zero degrees incidence and no "up" trim in the elevator. A pattern type, symmetrical wing can be used at two degrees positive incidence built into the wing saddle of the fuselage, but the wing tips are too thick for scale appearance. A better solution for a medium weight, high speed model would be a 12% semi-symmetrical airfoil such as a NACA 2412 airfoil used at the root (40% high point, 12% thick) tapering to a NACA 2312 airfoil at the tips (30% high point, 12% thick), constant radius leading edge of 1/4" to

3/8" and, for that last bit of insurance, wash-out the wing tips two degrees. For most aircraft this solution will be very close to scale and the wing tips will look right. Surprisingly, the 2300 and 2400 series of airfoils have very low drag and they have very gentle stall characteristics. If the anticipated wing loading is over 30 oz. per sq. ft. of wing area, the wing thickness should be increased to 15% or even 18% and possibly increase the upper camber of the airfoil to a 3300 series. The airfoil should be thickened as weight goes up or flight speed goes down.

Flat bottomed airfoils can range in thickness from eight to fifteen percent, with most trainer types between ten and twelve percent. The same principles apply to flat bottomed wings as well as the solutions. Move the high point of the airfoil from 40% to 30% from root to tip, wash out the wing tips, keep the percentage thickness the same or increase it by 2% at the tips and use a constant radius leading edge.

The airfoil changes apply primarily to tapered wings, but can be used on constant chord wings, although the benefits don't usually outweigh the trouble. I have built several constant chord wings with changing airfoils and they flew well but I doubt that they flew any better than if I had used a constant airfoil. An exception to this is a negative stagger biplane such as the "Hot Canary" with the ailerons on the lower wing which is set at 2° positive relative to the top wing. It is normally desirable to stall the forward wing of a biplane first, as this produces a nose heavy condition at stall and the nose naturally drops, the plane gains speed and the forward wing is flying again. This stall is usually just a gentle mush or hesitation and the plane continues forward. If the stalled wing has the ailerons, control is lost momentarily and this can wreck the airplane on landing. I had this problem several years ago with a Beach Staggerwing. I solved the problem by putting the ailerons on the top wing and eventually hooked up all four ailerons. Back to the "Hot Canary." A solution would be to stall only the center portion of the forward wing which would preserve the gentle stall and still maintain aileron control through the stall. This would require about 3° of wash-out or change the airfoil and use less wash-out 1°-2°. Another part of the solution might be to sharpen the leading edge at the root to start the stall at the root earlier.

I hope this information will be helpful and if more exact data is needed, get a copy of: "Theory of Wing Sections" by Ira H. Abbott and Albert E. Doenhoff from Dover Publications, New York. □

from page 46/40

balsa where shown. Cut and fit the landing gear plywood blocks and gussets, bolt through as shown. Glue in the fiberglass arrow shaft tubes to enable the retaining screws to be fitted. Glue in the tailwheel mounting block and fit a 1/16" bore nylon tube inside the fuselage for the R.X. antenna, exiting at the tail. Do not sheet the underside until you have fitted the stabilator, rudder, pushrods, and stabilator bell crank.

Rudder and Stabilator:

Build the rudder as shown, and cover with 1/16" sheet. The stab is very simple, just be sure that the tubes/dowels are a good tight fit. Add the tips, and the block L.E. fairing after covering with 1/16" sheet. Glue on the trailing edge and the 1/32" ply root rib.

Landing Gear:

It is essential that the correct specification of material is used for this. Most of us know it as "Duralumin" or "Dural" and the commercial spec is T6 (.125). Anything softer than this will not survive a landing! If the material you propose using can be bent 60° on a 1/4" radius without cracking, you have the wrong stuff! For the axles, two 10 x 32 Allen socket cap screws can be used, or 3/16" Du-Bro steel axles. Mild steel will **not** do!

Tailwheel:

This looks complicated, but is really easy. The most difficult part is the pivot block which is cut and filed from a small block of aluminum, but the effort is well worthwhile — the result is very realistic. A standard 1¾" diameter wheel is used.

Covering:

I originally intended to cover the model with tissue and paint, but after a lot of thought and in view of the complex trim design, I decided to use heat shrink film. I was pleased that I did so — I really don't think that I could have successfully completed the trim any other way. It was a painstaking business, but the results were most rewarding.

The trims were cut as follows: First, mark out each different "hockey stick" shape on a piece of grease proof or similar paper. Cut out the pieces of film of the right color about 1/2" larger all round (not forgetting to make left and right hand) so that in the event you need four pieces of a particular shape, two pieces will have the face up, two will have the face down. Now — take one piece, tape one end to a flat

smooth wooden surface, smooth and stretch to the other end, and tape that. Now, go around the edges at about 3" intervals, with short pieces of tape to hold the piece firmly in place. Do this with all the pieces of film the same shape, one on top of the other, finishing with the piece of paper with the shape drawn on it. Using a straight-edge wherever possible, with a very sharp razor blade or X-Acto knife, cut right through the sandwich of film and paper. With care, an almost perfect job results. It sounds like a tedious business, but it's worth it in the end.

The trims on the fuselage sides were cut in two sections, the joining of the two being just in front of the stab. The 1/16" wide black trim tape is used to outline the color trim. Do be sure that the film you propose using for the trim adheres properly to the white base film on the model. If the area is well-cleaned with cellulose thinners, and the trim moistened with film solvent, then iron on at the right temperature. Pulling the trim off **must** leave most of its color pigment behind for it to be acceptable, so check this point before starting work!

Canopy:

I was fortunate in being able to buy a canopy that was intended for a Quarter Scale "Robin" which adapted almost perfectly. I'm sure a visit to your model shop will produce something suitable, as the shape is not complex. The windshield is just flat sheet, and the rear portion nothing more than a wrap-over with a bulge in the top.

On Board

Glow Plug Battery:

As a belt and braces type, I decided to mount a 2 AH nicad cell in the nose, since some extra weight was needed there anyway. It is switched in the accepted way, by a micro switch, operated by a cam cut in the periphery of the throttle servo output disc. This is cut in such a way as to switch the glow plug on when the throttle is about two-thirds closed; another benefit is that you do not need an external glo battery. I also made the battery easy to change over, so that it can be changed at the field in seconds. You will also see that there is a larger nicad for the radio, also for nose weight; I strongly object to flying with useless lumps of lead! *(Editor's Note: Great Planes Model Mfg. Co., P.O. Box 721, Urbana, Illinois 61801, has a great unit called "Switch-N-Glo." It is*

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B.D. 8

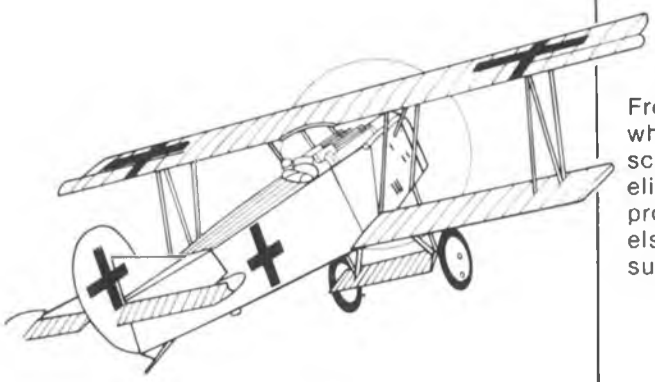
from page 139/40

an onboard ignition system that weighs only 3 ounces and is complete with a sub C nicad battery.)

General:

I had originally intended to fly this model using a standard .61 motor, but as the airframe progressed, it became increasingly evident that a larger motor would be required to fly it! It was at about this time that the "Magnum G.B. 91" four stroke engine became available and, having had such success with an O.S. .60 four stroke, a close inspection of the Magnum made it very clear --- I just had to have one! It arrived at last and I found that the model was just made for it. A tiny notch out of the longeron to clear the rockers, a slight tilt clockwise to give access to the glo plug, and I was there. I've never regretted it — in flight, the sound of four strokes is a transformation, it even sounds scale! With a 15" x 6" wooden prop, the combination is just right. The model tracks very straight, and gets airborne at what seems to be a relatively low speed. There is no real need to coordinate rudder with aileron, the turns are really neat on ailerons alone: the ground handling is good, and is liable to make you the envy of the nose-over brigade.

Contrary to common belief, the all moving stab has not caused me a moment's trouble and, providing you follow the drawing, it shouldn't cause you any either. Make sure the control movements are as shown on the drawing, and you will be rewarded with a model that is easy to fly, and a real eye catcher to boot. The color scheme is quite authentic, and is a tribute to the owner — Mike Huffman of Owasso, Oklahoma. Mike says that



Flying Near Airports? Be Careful!

Free Flight or Radio Control flying near airports, or in any situation which might involve the possibility of models being in the vicinity of full-scale aircraft operations, must be avoided—or conducted so as to eliminate any dangerous situations. Models should not be flown in the proximity of full-scale aircraft operations unless the flyer has someone else with him for the sole purpose of watching for full-scale aircraft and supervising the flying so as to prevent accident possibilities.

PROTECT YOUR RIGHT TO FLY!

Safe Flying Is No Accident!

the trim looked like nothing until he put on the black pin striping --- so don't chicken out on them.

If you choose to build this little beauty, I hope it gives as much pleasure as mine gives me. Happy landings. □

BIG IS BEAUTIFUL

from page 39/38

motorcycle spokes that have 4-40 thread and which fit into the Du-Bro 4-40 ball links; these are ideal and are not hard to find. I suspect you could use any appropriately sized spoke with almost any thread as they will thread themselves into the material Du-Bro makes the ball link ends out of. However, with a set of dies, you can cut yards of 4-40 thread any time you like and it is very convenient. I use quite a few 6-32, 8-32, and 10-32 bolts and its pretty convenient to be able to cut threads into practically any material to take the bolts, including the harder woods. Invariably, when working as we do, we run into a place where being able to drill a hole, cut some thread in the hole and put a bolt into it to hold something in place, is a real healthy advantage over having to find some other method of fastening and a few taps and dies make this sort of thing a whole lot easier. I had mine given to me, but had I known the use I was going to get out of them I'd have bought them long ago! K & S Engineering has taps and dies available through model retail outlets. Send 25¢ to: K & S, 6917 W. 59th St., Chicago, Illinois 60638, for a catalog of hobby and craft tools.

★

Doug McBrien, the fellow who developed that super little Druine Turbulent plan I have mentioned here several times in the past, has not been

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SWEEPINGS FROM THE balsa dust factory

By
Paul
Denson

Aileron servo protected by tail end of a canopy.

Protection From Fuel

When building a plane with an enclosed cockpit and large headrest, you will use the front 1/3 or 1/2 of a canopy. What do you do with what is left over? Use it to protect that wing servo. Tiny 1/2" Sig pins and silicone adhesive hold it in place. On the wing with the barn-door ailerons, the servo was mounted flat and all mechanics were inside, thus only a small portion of the servo was exposed. This and the opening were covered with the lid from a small plastic box. Three small sheet metal screws and more silicone adhesive hold it firmly in place.

For space reasons, on the same plane, it was necessary to have the nose wheel steering tiller outside the front compartment. In this particular instance, because of the upsweep of the fuselage bottom, the pushrod cable would have to exit some distance back from the nose.

Cutting a hole in the forward bottom of the fuselage is an open invitation for oil penetration. The hole is a must and a cover for the hole is also a must. If you look closely at the cover in the picture, you will see it is the top shoulder from an empty 2 oz. Titebond glue bottle. Corners of plastic bottles will make all kinds of streamlined exit covers for control rods. Cut the corners of the bottle off a little larger than needed and sand it to shape with a sanding block. To prevent oil penetration, use silicone adhesive for attachment.

Plastic box lid — 3 screws and silicone adhesive hold it firmly in place.

Fuselage exit cover for pushrod cable.

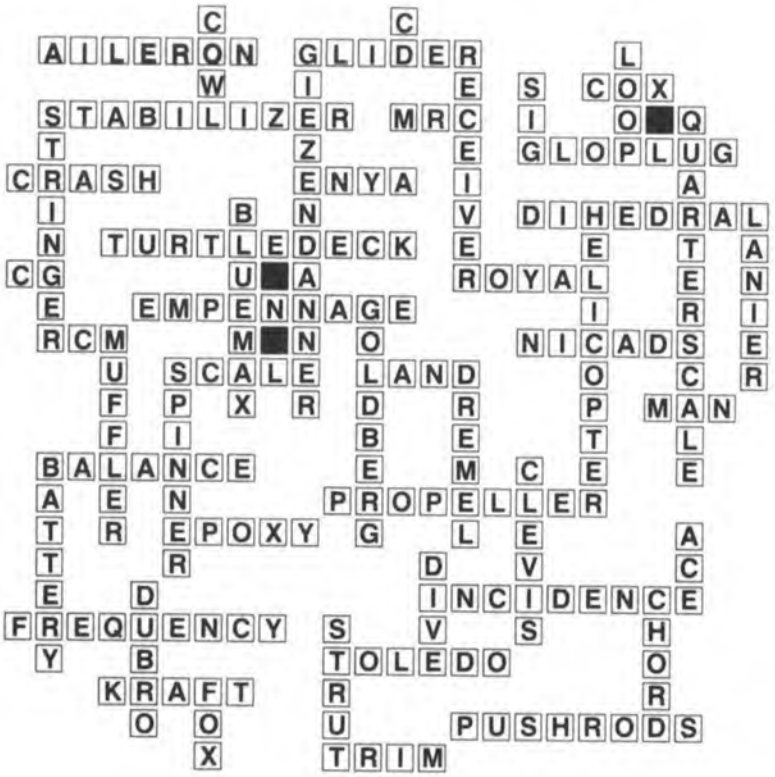
Putt 'N Paul with cable clamp holding exhaust tube.

Exhaust Extension

Shown on my cardboard Putt'n Paul is a hold-down for the engine exhaust extension. It takes a plastic cable clamp obtained at Radio Shack. You should take your exhaust extension with you for dimensions since the cable clamps come packaged in various sizes.

The clear plastic tubing may be found in the plumbing section at the hardware or building supply store; it also comes in various sizes. We have never had any of the tubing melt from the high temperatures at the exhaust outlet of the muffler. When fastened to the muffler with a single turn of wire twisted off and a cable clamp on the other end, we have never had an in-flight loss. Besides, it keeps that loathsome oil off most of the fuselage. □

SOLUTION TO RCM KRISS-KROSS
ON PAGE 93



NOTE TO SUBSCRIBERS:

Due to the increase in envelope prices and in order to hold down our prices, those subscribers who are currently receiving their magazines in envelopes will receive their magazines in a wrapper beginning with the March '83 issue.

BIG IS BEAUTIFUL

from page 143/38

idle since putting the Druine plan on the market. Doug now has a new offering ready for the market and those of you who like flying off water will probably need one of the new birds in your stable. The OS-2U Kingfisher has not been done to death in the past, so if you are a plans builder and want something a little different, the Kingfisher might just fill the bill for you.

While I have not yet seen the plan (as this is being written, the prototype has been flown and the final 'adjustments' are being made on the plan), if Doug has done as well with it as he did with his first effort, the Turbulent, it will be a dandy. Doug has included a profusely illustrated 20 page instruction manual (the one for the Turbulent is among the best I have ever seen) and has also included 'at least' four full colour pictures of the Kingfisher in the National Air and Space Museum.

Only minor modifications have been made from the full scale bird. Ailerons are slightly larger and there are no flaps shown. The main float deep "V" has been flattened slightly (which works a bit better at the size and weight). The model is 1/5 Scale, spans 86" and has a wing area of 1470 squares for a wing loading of 39 oz./sq. ft. on floats and about 32 oz./sq. ft. on wheels. Changeover from wheels to floats takes only about ten minutes and the model is as aerobatic as the original was which is considerable.

A full scale Kingfisher pilot friend of Doug's says the model performs exactly as the original did, and that's got to be about as close as you can get to the original. The prototype was flown on a 2 c.i. Quadra using a Dynathrust 20/8 prop, so the model at a dry weight of 24.5 pounds is getting close to the top of the small Quadra's weight limit . . . I wonder what it would do with the new 3 c.i. engine . . . hmmm?

Doug's plan, instruction booklet and photos will be available by the time you read this, at $50.00 for the package. Judging by what I have seen of Doug's work, it'll be worth it! Drop him a line at 24 Truby St., Branby, Massachusetts 01033, for a set or for more info.

Those of you who do not read the Art Johnson/John de Vries Scale column elsewhere in this issue should do so. John covered some rather neat tools in a recent column and, at my request,

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sent me some information on the outfit that has them. Briefly (with apologies to John) the NorthWest Short Line (NWSL) is a supplier to model railroad fans but some of their tools make sense for us. For example, a precision drill press, a press and riveter, a sheet metal brake and a couple of others are of perhaps limited interest to us. If you'd like to know more, dig out your back issues and look for John's description of the goodies or drop NWSL an SASE at Box 423, Seattle, Washington 98111.

Well, the QSAA Rally at Las Vegas is a thing of the past again. This Sixth Annual was better than last year's and was better attended as well. This year saw the event back on the dry lake bed again and, for a change, great weather throughout the three days of flying. While there was a bit of wind and (of all things) even a little rain, nothing to interfere with the event. In short, it was an excellent three days flying and some really fine models were present.

I'm not going to try to cover the whole rally in the limited space available to me, but there were some really outstanding models present and a brief description of them is warranted.

Joerg Vogelsang, who brought a radial engined Sopwith Pup from Germany last year, was once again present and knocked the socks off all who saw him fly this year. The reason was the model he brought with him, a Quarter Scale V-1 Buzz Bomb — and could he fly it! The model has been radar clocked at 262 miles per hour and it was certainly on the high side of 200 mph when it flew at Las Vegas. The model uses a pulse jet engine as did the original, this one made in Holland and used by the Dutch Speed Team on their Delta models which have also exceeded 200 mph. The engine is quite noisy and a bit finicky to get started, but once fired up, it's a performer!

The V-1's axial rolls are a delight to watch and Joerg showed them to good advantage on several occasions. The first time the model was flown, there was a small problem with fuel feed and this restricted the top speed of the model, although it was certainly still quite fast. The valve used to shut the fuel off to this non-throttled engine was malfunctioning and restricting the fuel flow on the first flight. Subsequent flights were not affected and its speed was phenomenal. If you

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have never seen a model making 200 mph, you haven't seen anything. It is most impressive and the pilot skills required to fly it are significant. Joerg has them and gave us all a real treat and received a rousing round of applause whenever he completed a flight. During one of the flights I was standing next to Dan Parsons (of the 1/8th Air Force) and Dan was beside himself watching the V-1 perform. It would be a proficient pattern pilot's dream to fly and Dan's delight with watching it perform was quite obvious!

The plan to construct the model and bring it to Las Vegas was hatched following the 1981 Rally while the group were still in Las Vegas. For Joerg to have planned, built and tested the model in the meantime, along with his normal activities, says a good deal for his engineering talent and skills. Watching the very realistic model (and hearing it!) was a"once in a lifetime" thrill.

The German modelers seem bent on astounding us each year when they appear at various fly-ins and rallies around the country. A group from Frankfurt brought a very nicely executed C-5 Galaxy with them to Las Vegas and did a very creditable job flying this monster. The model flies on propellers in place of the jet engines of the original, but this is no detriment to its performance in the air. Climb out was spectacular to say the least and in this it copied the original aircraft quite well. Working flaps and spoilers added to the realism of flight and landings. Fly pasts at low level were very realistic. The German crew are to be heartily congratulated on their building skills and on the realism they bring to the really large model. Their craftsmanship cannot be faulted and their flying skills leave nothing to be desired.

In conversation with Joerg Vogelsang, he mentioned that they all feel it would be silly to bring something relatively mundane with them to such a world renowned show at the QSAA Rally and each year they seem to outdo themselves with their creations. One wonders what they will come up with next year as an encore ---?

Chuck Fuller's Quarter Scale AT-6, now powered with a Titan engine, was a most impressive bird. The engine did not seem to me to be putting out the way the Titan can and the model

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BIG IS BEAUTIFUL

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suffered a bit from a slight lack of power for maneuvers. Once the engine is performing as it can, the model should be an outstanding flier. It is a most impressive bird and Chuck's finishing talents have not declined a bit over previous years. Good looking model in the air and on the ground.

George Harlan, another Californian whom I had not met previously, brought along a spectacularly beautiful Monocoupe 90 A in yellow and blue livery. George is a fine craftsman and took Best of Show with the Monocoupe. Well-detailed and beautifully painted, the model deserved the win and flew as well as it looked. George has added both a pilot figure and a passenger figure to the model and the painstaking work required to produce such a fine model is evidenced in the making of a pair of calf length boots for the pretty blonde passenger. There isn't room to describe them fully here, but they looked great. George is a craftsman to be watched, especially if he manages

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to produce the twin engine ship he is considering for next year.

QSAA Headquarters solicited, and got, help from several of its chapters in putting on the Rally. It showed in the way things worked. Everything ticked along quite well. The weather cooperated very well and, for those who wished to do so, the following weekend saw the Tournament of Champions, sponsored by Circus Circus, available for the amazement of those of us who are (or were) pattern fliers and who wanted to see perfection repeated endlessly.

QSSA is also planning some revamping of their operations, and, should these changes be carried through, I would bet that there will be a resurgence of interest in the organization. Anyone who thinks QSAA is dead had better take another look as Quarter Scale is alive and well in Las Vegas!

If you have not yet tried Pacer's new Zap products, do yourself a favor and give them a try. I received a sample of their good stuff from them recently and a couple of things they have added to the cyanoacrylate arsenal are pretty neat. Zip Kicker is a sprayed on, water based liquid that causes the C/A glues to get started right now! You still have the chance to position things with the slow cure C/A but when you are ready for it you give it a shot of the Kicker and it gets going immediately. When I first used it, it reminded me of the prayer you may have seen around; "Lord, give me patience . . . but hurry!"

The other neat thing they have added to the line is Z-7 Debonder and, just as the name suggests, it's a solvent for Zap and will either remove it (from your fingers, or whatever) or will ease a bond to permit re-positioning the parts you just glued together wrong. (Oh . . . you don't ever do that? Sure you don't, same as me!)

Of perhaps less interest to us, but another addition, is their Plasti-Zap which is a Zap for gluing plastic together. If you have a plastic model engine you intend to use between a model engine and its prop, Plasti-Zap will provide a bond which is liable to last a good deal longer than the usual plastic model cement. (I know there are some good plastic model glues around, but most of us can't find them readily when we need them so we use the regular stuff and our engines lose parts in the air which is a no-no!)

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BIG IS BEAUTIFUL

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There are a couple of other items included in Pacer's new line but I am already over length for this month so will cover them later. See you next month? □

SILENT POWER

from page 35/34

all regards. I could do about everything I know flying R/C and certainly much better than with glow engines. It does all kinds of aerobatics I can handle, but at the same time it is gentle, glides beautifully and lands pretty slow. Its size is just perfect to carry in a corner of the car's trunk with no problems, but it is large enough to make it visible when flying in normal conditions.

In summary, I find flying electric gives fewer troubles and better performance at high altitudes, and at all altitudes it is reliable, no cleaning is necessary, there is no staining your clothes, car, and home with oil fuel, and it is even cheaper.

I followed your system of having two sets of batteries for each plane and installed the hatch in the belly for rapid change of batteries. I logged 12 flights today with the two planes in only 2½ hours (average time was 10 minutes since I do a lot of gliding without power and with some thermal activity the flights are longer). I have never had that number of flights or number of minutes flying time before with glow engine airplanes in such a reduced time and, best of all, I packed everything back in the car in 5 minutes, when I used to spend as much as 30 to 40 minutes with glow equipment. (Just to clean my Lazy Ace 72" span biplane takes 15 minutes.)

I do thank you for your help and advice in this project for going electric, which for sure will make the hobby more enjoyable for me and for other fellows around here. I will surely take care to hook them on electric.

With best regards,
Guillermo

Thanks, Guillermo, for the information on "high altitude electric flight."

Now, back to Al's questions:

(1) Are batteries used in the test Sub C? (from December 1982 "Silent Power," page 29).

This table showed the 05 and 075 systems available from Leisure and Astro. All batteries were Sub C cells of 1.2 AH capacity with the exception of the Astro 05, which uses 8 of .55 AH capacity.

SILENT POWER

from page 162/34

(2) Do you make up your own battery packs?

I have, in the past, with some premature failures of cells. The cells should be matched for similar internal resistance so that they accept a charge and discharge at the same rate. When one or more cells are not matched, they can be overcharged or reversed upon discharge, leading to a cell failure. I now, as a rule, use only packs assembled by the manufacturers.

Therefore, I recommend that you use a Leisure or Astro Pack recommended for your motor. In addition, SR Batteries, Box 287, Bellport, New York 11713 (see ad on page 171 of this issue), is offering a virtually unlimited variety of electric power packs. You simply tell SR the number of cells you want, the Amp Hour capacity of the cells to be used, and the configuration of the pack, and they'll select the cells, double weld the pack, add the proper connector, and place the cell in a heat shrink case. I've used a 16-cell .90 AH capacity pack with my Astro 15 geared in a Porterfield. The Porterfield normally uses an Astro Flight 16-cell pack of .55 AH capacity with flight times of about five minutes. With the SR pack, my flight time jumped to about eight minutes. The weight difference of the cells was only 2 oz. — 19 oz. for the SR and 17 oz. for the Astro.

I've also flown 7-cell packs of 1.2 AH capacity cells produced by SR for use in the WASP with the Astro Cobalt 05 with good results.

Be sure to select the proper connector, the Small Molex for the Leisure Systems and the new Astro 035; Astro still uses the larger Molex connector for their Astro 5, 075, 10, 15, 25 and 40 systems.

(3) How do I charge a 6-cell pack on an Astro 4/8 cell charger?

You can charge the 6-cell pack with a 4/8 cell Astro Charger by moving the switch to 4 cells and charging for approximately 25-30 minutes. The initial charge rate will be about 2½ amps, and should level off to about 2 amps, finally dropping down to less than 1 amp near the end of the charge.

However, a conversion kit is available from Astro Flight which will convert a 4/8 cell charge to a 4, 6, 8. This conversion kit (#4005K) consists of a 3 position switch, resistors, and instructions and is available from Astro Flight for $7.95 Postpaid.

(4) Would one of the Astro or Leisure motors do the job on the Sorceres and the Brigadier?

I have not seen the Brigadier, so I can only assume that any of the 05 systems will work well with it. (See the "Silent Power" column, December 1982, for details on props, batteries, etc.)

The Socerer builds up rather "heavy." It is definitely not an 05 powered ship. I would recommend either the Astro 075 XL or the Astro Cobalt 05 with cells and an 8/4 prop for the Sorcerer.

(5) Suggestions for mounting motors with the long brush holders to facilitate removal?

These motors cannot be placed in a motor tube from the front since the brushes from end-to-end are larger than the diameter of the motor. I simply insert them in a motor tube from the inside of the model or use a standard plywood firewall mount with two screws to attach the motor. In either case, the motor must be placed in position from the rear. Therefore, you have to plan the fuselage for ease of installation.

(6) What are the best components for a fusing system?

Any in-line holder will work. I suggest you visit your local Radio

Shack. It is recommended that a 10 amp fuse be used for the Astro 020 and 035. A 20 amp fuse is recommended for the (Leisure and Astro) 05, and the Astro 075, 10, 15, and 25 systems.

Astro Flight recommends a 25 amp fuse for **all** of the Cobalt systems from 05 through 25. I definitely recommend fusing to protect your investment in Silent Power.

Keep the cards and letters coming. □

STINGER

from page 30

Covering:

The finish is maroon MonoKote over Balsarite, with white MonoKote used as trim. The striping tape is 1/4" wide black and we painted the inside of the canopy black. Scrap balsa was glued with R/C 56 to the inside base of the canopy to form a floor. This floor was glued to the fuselage.

Engine:

A Quadra provides the muscle using a Dynathrust 18/8 prop. A Slimline muffler and Kraft 12 ounce tank complete the power package. We put in all power and control parts before sheeting the top or bottom on the fuselage.

Radio:

A Futaba radio was used with an S-7 servo (41.7 oz./in.) on the ailerons and four S-16 servos (27.8 oz./in.) in the fuselage. There is one servo for the throttle, one for rudder, and one for each half of the elevator.

Flying:

The balance point came out a little nose heavy but it was left there for the first few flights. This airplane flies as if it were on rails and, at 17 pounds even, it can really do whatever the pilot calls for. Ours weighed in at 11¾" pounds for the fuselage and 5¼ pounds for the wing. We can accurately say that this airplane flies as well as any of the 40 or so models we have built. It outflies almost every other giant model we've seen or flown.

Conclusion:

The Stinger makes an excellent choice for a sport giant model and is so easy to fly that training missions could be easily handled. For a kit of the Stinger, contact R and R Models at 1611 Red Bud Drive, Northwood, Ohio 43619. □

SCALE VIEWS

from page 29/27

pushrod. Taking the worst case (where the rudder is hinged at the fuselage tail post!), there is still a way of

driving the rudder, internally. It requires a closed-loop cable system and a slot in the tail post of the fuselage plus a pair of good **pulley** assemblies. See our drawing (Fig. 2). A wire or hardwood (dowel) "wand" is glued into the rudder structure and projects through the tail post, well into the rear of the fuselage. The "wand" is attached to the cable, between the pulleys, and wobbles the rudder nicely in the closed loop. A bit of experimentation will be necessary to achieve the desired amount of rudder travel --- the point of attachment of the cable in relation to the distance to the hinge line will determine just how far the rudder moves. A full-size mock up of the model you're building will permit this experimentation outside of the model's fuselage. Although this system may be trimmed, the total amount of rudder movement will be essentially fixed when you close up the rear of the model.

At The Field: For the competition minded scale "buff," a hint for the field box. Although I advocate the "Kiss Principle" (Keep It Simple, Stupid) when it comes to the stuff we take to the field, there are some things that the avid scale competitor should take along. Scale models, by their very nature, often require specialized hardware or home-grown parts that can't readily be borrowed from a sympathetic fellow modeler. We all swap props and glow plugs but, as you build your model, you'll find that there are some bits and pieces that are unique. For example, if you've attached your cowl with scale sized brass bolts and nuts, the chances of finding some 00-80 replacements at the flying field are nil. If your bipe is dolled-up with genuine Proctor turnbuckles at the ends of the flying wires, finding replacements outside of the hobby shop may be "pie in the sky." Or, if your tail wheel is restrained by a 1/16" wheel collar, even such a common item might not be in good supply along the flight line. What to do? I call it a "goodie box" --- a small container, like a plastic cigarette box or a cardboard "cigarillo" container holding the kinds of bits and pieces that are unique to your construction. It is rather simple, when you've completed a new model, to stock a small box with the proper parts and tuck it into the old field box. Then, when you drop a bolt, nut or washer into the grass of the "pits," it won't be hair tearing time. Even something as mundane as an engine mounting bolt might be part of the "store." Be sure to identify the goodie box with the name of the model for which the parts are applicable --- to keep things organized!

Scale Forever! □

FROM THE SHOP

from page 4

..... noticed that his wristwatch had stopped, so he asked the tower what time it was. "That depends what airline you're flying for." "What possible difference could that make?" "Well," said the tower. "If you are United, it's 1:20. If you are TWA, its 1320. If you're Ozark, the big hand is on the 4, and the little hand is on 1. If you are Texas International, today is Tuesday."

★ ★ ★

Hobby Shack is announcing the 1983 4-Stroke contest co-sponsored by the Riverside R/C Club to be held June 25 and 26. Due to the response and enthusiasm shown at the 1982 4-Stroke contest, not only will it be repeated in 1983 but it will be expanded to a two day meet. More events, more prizes, and all sorts of good things. See the contest ad in this issue for complete details.

★ ★ ★

Santa brought us a Rubic's Cube that we can work, all the squares are white.

We are anxious to see the fine new crop of models from this past building season. See you at the field. □

ENGINE CLINIC

from page 24/22

way in the world you can run the engine without the tuned pipe and expect to get the same power output as you would with the pipe. The K & B 6.5 mini-pipe can be used on the 7.5 but you can expect to lose about 1,000 rpm. The engine will not work as well with the mini-pipe and full pipe timing as it would if the engine were timed for mini-pipe use (a shorter exhaust duration).

The answer here would be to replace the piston/sleeve with one from the K & B 7.5 Outboard engine. The outboard has non-pipe timing with an exhaust duration of 150°. The 7.5 ducted fan sleeve has an exhaust duration of 170°. For mini-pipe use, the exhaust duration could be increased to 160° which would mean

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ENGINE CLINIC

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raising the exhaust approximately .025". You would then get maximum performance from the mini-pipe.

If the engine has not been run you can return it to K & B and, for a charge of $5.00, they will exchange the piston/sleeve. If the engine has been run then you will have to purchase the new piston/sleeve outright.

Even with this modification do not expect to get the same power that you would have using a full length tuned pipe. However, the power should be sufficient to fly the aircraft providing you keep it light. As this is a U-control model without any radio gear you should certainly be able to do this.

And, incidentally, for the benefit of any free-flighters who might read this column — the above piston/sleeve exchange can be done with either the K & B 7.5 ducted fan engine which is of front intake design, or the K & B 7.5 inboard marine engine which is of rear intake design. With the substitution of the water cooled head and flywheel on the 7.5 marine engine for aircraft parts, either engine can be made into dandy free-flight engines. I do sell Custom versions modified and set up this way for free-flight use. See my ad in the Classified section for business address.

Dear Clarence,

A co-worker, Ed Dziombak, has under construction, a two-cylinder 4-cycle engine. It is air-cooled, opposed cylinders, and about 2.5 cu. in. displacement. It was designed by a man named Wall — probably over 30 years ago.

Ed is a toolmaker by training so he is able to interpret the rather rough drawings, but he has no operating

information. The engine has no oil pump and no obvious oil sump so it appears to require oil mixed with the gas.

The mixture does not pass through the crankcase like the Morton, so he is concerned about oil getting down to the rod bearings.

Please comment on this lubrication problem and suggest a fuel mix for this engine.

Yours truly,
Ed Gerhardt
Basking Ridge, New Jersey

This Mr. Wall designed quite a few gasoline engines. Coles Power Models, P.O. Box 788, Ventura, California 93001, sells casting kits for at least six of Wall's designs including the Wall Wizard your friend is building. Coles' sells a complete set of drawings for the Wall Wizard for $9.50. I do not know if these include operating instructions or not. You might write Coles and find out.

I do not see why the Wall Wizard would be any different than our present day opposed twin four stroke engines when it comes to lubrication. Enough oil blows past the pistons to lubricate the lower end. Quite a bit accumulates so, for this reason, it is necessary to have a vent hole as per the O.S. .60 four stroke. The vent or breather hole also keeps the crankcase at atmosphere pressure so that a positive or negative pressure is not created. Most four strokes seem to work best with about 12%-15% oil in the fuel.

Dear Mr. Lee:

After the first running of a used O.S. .35 (history unknown), I disassembled the engine to determine the cause of a "knock" during operation. I found the connecting rod bearing surface, piston end, quite elongated. The crankshaft end was all right. Compression was good. Nothing else appeared wrong so I replaced the con rod. The engine

vibrated badly at low speed, much more than I had ever seen, but ran smooth at high speed and put out adequate power on a 10/6 prop. But --- I could detect a metallic rattle while in flight. After the first flight the low speed vibration was less but inspection disclosed the beginning of the same elongation on the connecting rod.

As I have been unable to detect any engine abnormality that would contribute to this malfunction, I would be pleased to get your opinion as to the probable cause. With the price of engine parts getting outrageous ($5.00 for a plain aluminum con rod), I am reluctant to try a new crankshaft or piston unless I am sure it will cure the problem.

Sincerely,
Jack George
Brandon, Florida

Used engines are not always the bargain they might seem to be. Most fellows get rid of an engine if it is giving them problems, has been in a crash, or is worn out. Few fellows unload a good running engine in top shape unless giving up the hobby or something similar. When buying a used engine it is always best to know something of its owner and history.

Vibration at lower rpm is usually caused by a loose rod. However, all engines pass through vibration modes as they are accelerated from idle. A high vibration period will usually be noted in the 6,000-7,000 rpm range and then the engine smooths out. A flimsy mounting will accentuate the vibration so be sure you do have the engine mounted solidly.

A knocking noise during starting could be a loose rod or excessive end play in the crankshaft. However, with the engine running you cannot hear these noises with the engine at full throttle. At idle, a crankshaft with a lot of end play will make some noise. I would guess that if you are hearing a metallic rattle while in flight that something else is loose in the aircraft — pushrods, etc.

If the upper end of the con rod was elongated then chances are pretty good that the wrist pin holes in the piston must have had some wear also. The new rod without a new piston allowed the rod to wear rapidly again, probably due to misalignment of the worn wrist pin holes in the piston. Of course there is always the possibility of the crankcase being bent from a crash prior to your purchasing the engine. You would be wasting money replacing the crankshaft if this was not the cause or if the crankcase is bent. It would be best to return the engine to World Engines for service. Either this or consider a new engine. It would probably be cheaper in the long run.

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ENGINE CLINIC

from page 180/22

Dear Mr. Lee:

I would like to say how much I have enjoyed your column over the many years. At 52 I am still learning about engines and "Engine Clinic" is always the first article I read in RCM.

I have a few questions I have been saving up for some time to ask you.

(1) If a glow engine is converted to gasoline and ignition, doesn't the engine run better, and is it detrimental?

(2) Why can't a glow plug be redesigned so it will run an engine on gasoline and oil and give the proper timing?

(3) In your June issue you said a diesel converted engine will run cooler. I thought gasoline and diesel oil were very close in BTU output, and much higher than methanol. Why does it run cooler?

Thanking you in advance for your answers.

Sincerely,
George Werber
Westford, Massachusetts

Converting a glow engine to spark ignition is not detrimental in any way, however, it does not necessarily make the engine run better. It just allows you to use gasoline for fuel rather than more expensive glow fuel. If a spark ignition engine and a glow engine were run on alcohol fuel there would not be too much difference in performance. The spark ignition engine would have better low speed characteristics and the glow better high speed.

With the addition of a small percentage of nitro propane to gasoline base fuel and engine will run fine on glow plug. Fellows were doing this in U-Control team racing back in the 50's for the 50 and 100 lap races to get more laps between pit stops. Only a one ounce tank was allowed.

We do not run model diesel engines on diesel fuel. A mixture of kerosene and ether is used. The ether has a considerable cooling effect due to the latent heat of evaporation. The same thing applies to methanol and, although methanol has a lower BTU rating, it produces more power due to a richer fuel/air ratio. Gasoline burns with a mixture of 1 part gasoline to 14-15 parts air. Methanol with a mixture of 1 part methanol to 8-9 parts air. So for a given volume of fuel, there is more methanol being pumped through the engine resulting in more power. □

When writing to RCM for answers to your questions, please send a self addressed stamped envelope for a prompt reply.

SUNDAY FLIER

from page 12/11

6' wingspan, and is powered by an O.S. .90. It is detailed after a real Tiger Moth which is owned by a friend of mine.

Best regards,
Bill Gillespie
Edmonton, Alberta

Bill, as Professor Higgins might say --- "I think you've got it!" I liked it, and also like the Tiger Moth, the Evolution, and the flying boat. Thanks for writing and sharing your designs with all of the Sunday Fliers fraternity (and sorority, too!). □

CUNNINGHAM ON R/C

from page 6

Learn to build from balsa that you cut up yourself and you open up a whole new world of aircraft to build.

★

Let's take a look at an extension of last month's conversation about thrust lines, that is the angular setting of the wing and tail, both to the thrust line of the engine and to the normal or central line of the fuselage. Last month we talked about the use of down thrust, and pretty well ignored the wing and stab settings. Of course, what we were talking about was adding down thrust to existing aircraft to correct some flying problems. Now, let's take a look at the wing and stab setting along with the use of down thrust to give us an aircraft that will fly more "gently." If you're a dyed in the wool pattern flier, pushing around pattern birds, turn to another page because this discussion is for those thousands of us who are simply sport fliers, and who want an aircraft that takes off and lands "gently."

Okay, assumption time. Let's assume that the normal line, or horizontal line of the fuselage, runs from the nose to the tail of the aircraft. Everything on the fuselage is arranged around this normal line. Let's call this line "zero." Everything else will be either positive (+) or negative (−) to this line. The thrust line that we talked about last month is negative (−) to this line. In most cases the stab will be zero to this line, except when you wish to set the stab positive to this line, or when you're using my favorite, the slightly lifting stab. Most models use a flat piece of balsa as the horizontal stab. It has a rounded leading and trailing edge but, for all

intents and purposes, it is simply a flat piece of balsa, with no airfoil. We will save a discussion of the lifting airfoil for a future issue. Generally, this flat plate is placed at zero to the basic fuselage line. Lifting the leading edge of the stab slightly, say 1°, is quite often used on tail draggers. Why? Because this is the same as cranking in a little down elevator which, in turn, imparts a bit of lift to the tail. On making a take-off run, this bit of down elevator lifts up the back end of the aircraft and lets the tail dragger have a chance to track down the runway.

Naturally, a tail dragger with its tail lifted up off the ground is going to weathervane into the wind, so if the wind is blowing cross wind to your runway, the tail dragger is going to assume a takeoff direction right into the wind.

On aircraft that are designed to be trike gear configuration, the aircraft is already at the normal takeoff attitude, so a bit of positive need not be added to the stab — it's already off of the ground. How about a bit of negative for the stab. Consider. If you have the aft end of the stab lifted and the nose of the stab down, then this is the same as adding up elevator. There might be a case where this kind of a set-up would be used but, again, on a tail dragger, this action would force the tail to remain on the ground, giving the aircraft a rather squirrely takeoff run.

I have read several construction articles where the author wants you to keep the tail end of the aircraft firmly pressed to the ground during the entire takeoff run. This is contrary to normal aircraft flying. Take a trip to an airport and see how a tail dragger is flown into the air. Better yet, ask a light plane pilot how he makes his takeoff run. You will find that just as soon as he starts his takeoff run, he pushes forward on the stick just a bit to lift the tail off of the ground. The aircraft runs down the runway in a normal flying attitude and, as soon as flight speed has been reached, he lifts the nose off the runway into a 'gentle' climb. The same should apply to model aircraft.

'Nuff about the aft end of the aircraft, let's take a look at the wing. There are three basic airfoils that we use on powered model aircraft. First, the flat bottom type; second, the semi-symmetrical type; and third, the fully symmetrical type. Each airfoil is used for a specific type of aircraft and for a specific end result. Of course, we can toss in the undercambered type of airfoil found on most "Old Time" type models but, for our discussion, let's treat this airfoil in the same category as the flat bottom type.

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Model design has evolved over the years based upon radio equipment, not aircraft looks or engine power. Many models today are an outgrowth of aircraft that were designed more than twenty years ago. Then the radio had one function — it could move the rudder from center to left and return, or center to right and return. No throttle, and no elevator. The first addition to this type of radio system was a two position throttle, either high or low. The next addition was a "kick up" elevator. Not too long after this came the reed radios with the ability to control the rudder, throttle, elevator, elevator trim, and ailerons. Aircraft design took account of this and made some modifications, but not until the advent of proportional radio did model design achieve the status that it has today. With today's radio equipment, we can get away with many things that were only dreamed of way back then.

Getting back to model design, in the early days of only rudder to control the aircraft, most airplanes were designed with flat bottom wings, sitting on the fuselage several degrees positive to the normal line. Correctly set up, the engine was at many degrees negative to the normal line, and the stab at zero. This type of aircraft was pretty much in balance. It was rigged so that it would climb out under power. When rudder input was added, it made a gentle turn. If lots of rudder was held full on, then the aircraft would heel over into a spiral dive. When rudder was let off, the very positive wing setting would take over and the aircraft would right itself and pull up. If you were good, fast on the control button (you only had one, one push was for left rudder, two pushes were for right rudder) you could put your model into a spiral dive, hold it until the speed had built up, then let off rudder, watch the nose come up, hit a blip of opposite rudder and watch the aircraft come over in a loop. Then, as the nose came up again, you held rudder and, if you hit it just right, you could force your model into a roll. It was fun and, if the radio equipment had been just a bit better, a really great and interesting way to fly.

When reed radios and, later, proportional radios came upon the scene, the flat bottom airfoil gained a bad name because it was still propped up a bunch of positive to the normal line. Setting it back to zero resulted in a different aircraft, one that would fly and react much more like a full size

aircraft did. What the heck, all full size aerobatic aircraft used a flat bottom airfoil until just a few years ago.

The semi-symmetrical airfoil, with a lifting surface on the top and a rounded surface on the bottom, allows the model to do more stunts in an inverted position, and generally is set just about zero to the normal line. The symmetrical airfoil is usually set with its chord line zero or just a bit positive to the normal line. When radio equipment went from the simple bang bang rudder to a bit more sophistication the semi-symmetrical airfoil began to be widely used. In some cases it was set positive to the normal line, and used with bang bang rudder, but really became more popular when the reed radios took over.

The early type aircraft taught us something about landing. The aircraft was trimmed to land itself. You didn't have any elevator to lift up the nose at the right time, no ailerons to pick up a low wing, so the aircraft had to be pretty much self-landing. A spot landing contest in those days was really something. A good pilot could put his bird right on the spot with just gentle nudges of rudder.

To achieve a 'gentle' landing aircraft today, just a bit of the set-up of yesterday will do this. Take a look at Joe Bridi's classic Kaos design. This model has been just about as widely built as any. What kind of force set-up does it have? The symmetrical wing is sitting at 1° + to the normal line. The stab is zero to the normal line, and the engine is sitting at about 5° – to the normal line, with the thrust line passing over the top of the stab, thus forcing it down a bit, and lifting the nose. Have you ever landed a Kaos? You can slow it way down, lift the nose up, and let it settle gently in on the main gear. You can run it around the runway with the nose gear lifted just slightly off of the ground with a bit of gentle back pressure. Joe's trainer type aircraft employs this same set-up.

If you have a model that is hard to land, take a look at the plans. See just how the wing and stab are set up in relation to the normal line. Where is the engine thrust line? Now, take a really hard look at how you built that aircraft. Did you duplicate the plan set-up, or did you made a few errors? Did the stab wind up not zero? Did the wing wind up with too much positive, or is the wing negative to the stab? Did you build it this way, or was it designed this way? Nope, I'm not tossing stones at any aircraft, any kit, or any builder. Simply, I'm saying that if your model is a bear to handle, it may be calmed by lifting the wing a bit

and by adding down thrust. That is unless you really screwed everything up by creating an aircraft so much over the design weight that you have altered the entire design. I've seen this happen many times. A fledging builder and flier believes that if a little glue will make it strong, a heck of a lot will make it even stronger. If a little paint will make it pretty, a heck of a lot will make it prettier yet. Build 'em light, build 'em strong, build 'em right, and you won't go wrong. Ought to be a poem there someplace.

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Now for this month's bit of insight for the real beginner. Let's talk just a bit about hinging the control surfaces on your model. The general reason for putting some kind of hinge between the control surface and the primary surface is so that the control surface will move. When we want it to move, we don't want to go get the local weight lifting champion to grab the control surface to move it. We want the control surface to move nice and easy, imparting no load to the servo. Really not too difficult to do if you take a bit of care with what you're doing.

There are several different types of hinges to use. A simple MonoKote hinge works very well, and is really free moving. I use a MonoKote hinge on my .90 powered Lazy Ace ailerons, and have never had any trouble. The aircraft is covered with MonoKote, and the hinges are really an extension of the MonoKote covering. I haven't tried it with any other type of covering. The ailerons on the Lazy Ace are about 3" wide and about 34" long, so if this type of hinge can work on a bird of this size, they can work on most any normal model. See the drawings on how to apply this type of hinge.

Next is the molded poly-propylene hinge, which is pretty cheap, but a bit stiffer than the MonoKote hinge or the pinned type hinges. The answer here is to work the hinges for a while before installing them in the surfaces. Grab each half with a pair of pliers and work them back and forth. Break in the hinge, which really is aligning the molecules of the plastic in the direction of the hinge line. The more you work this type of hinge, the more free the movement will become.

The third type of hinge is the pinned hinge, pretty much like the hinges on your front door.

The fourth type of hinge is the barbed pointed hinge with a nylon pin.

Any of these hinges can be used successfully; the secret to proper use is in the alignment of the hinges to each other. Each hinge must be inserted in the moving surface parallel to each other. If you make a cut in the leading edge of the surface for the hinge, and one goes 'wampy-jawed' to the other,

the resulting hinge action will be destroyed and the surface will not move 'gently.'

Being a bit lazy, and always looking for the easy way to do things, I usually hinge the surfaces in, what is to me, a very simple manner. First, I take a nylon marking pen, the non-permanent ink type, and mark the location of the hinges on the movable surface. Let's say ailerons in this case. I do this after the surface is covered. I draw a mark exactly along the center line of the hinge slot location. I always use the pinned type hinges, so I make this line 5/8" long. When all of the lines have been located, I take an X-Acto knife with a broad blade (the blade is about 1/2" wide, beats me what the number is) and gently 'score' the surface of the covering along the slot line. If this line looks parallel to the edge of the surface, and all lines look parellel with each other, I stick the point of the blade into the scored slot and push the blade all the way in, until it hits the hilt of the knife. I reverse the point of the knife to the other end of the scored slot and insert it again up to the hilt. Work the blade back and forth just a bit until the slot seems pretty free. Don't auger it out; the width of the nylon hinge is just about the same as the thickness of the knife blade. Make all of the slots the same. Now, insert the hinge into this slot all of the way to the hinge point. If it is a Klett type hinge with a loose pin, make sure that the pin is also inserted in the slot. Now, lay the aileron on the wing in its correct location and again mark with the plastic pen the location of the hinges.

Repeat the operation of marking and scoring and slotting the trailing edge of the wing. Now, gently slide the hinged aileron into place, working the hinges into the trailing edge of the wing. This may take a bit of muscle and patience, but can be done. Work the aileron into position so that the gap between the aileron and the trailing edge of the wing is about 3/32". You can measure this with a piece of scrap balsa. Make sure that all of the hinges are working perfectly and that the aileron will move up and down easily.

Okay, you're half done. Take a 1/16" drill bit, chuck it into your drill or Dremel tool and drill two holes in each hinge half location, through the surface, hinge, and out the other side. Stick the spout of a bottle of Hot Stuff into this hole and squirt out a bit of Hot Stuff. The idea is to let the Hot Stuff seep around the hinge from the inside, not the outside. Next, cut a supply of round toothpicks in half and insert these toothpicks into the holes, let the point stick out the other side.

Take the razor saw blade of your X-Acto knife and gently saw off the toothpicks flush with the control surface. Try not to screw up the covering. Turn the wing over and cut off the points that are sticking through the holes. Again, take up your trusty bottle of Hot Stuff and put a couple of drops on each end of the toothpicks. This bonds the toothpicks to the trailing edge of the wing and to the control surface. The only way you're going to remove these hinges is to rip up the entire wing. But, you're still not done. Cut a strip of MonoKote the length of the aileron and about 1" wide. If you've covered with any other heat shrink plastic sheet, cut a strip of the same material. Lay this 1" wide strip of MonoKote along the hinge line, 1/2" on the wing, 1/2" on the aileron. Iron the strip to the top surface of the wing, but be sure not to iron it to the aileron. Flex the aileron to its down position, the very farthest that it will flex, hold it there, and iron the strip of MonoKote to the downward flexed aileron. Let the aileron come back to its normal or zero position and then iron the MonoKote into the slot between the control surface and the wing. Flex the surface.

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You will hear a bit of popping noise as the MonoKote adhesive works its way loose in spots.

You now have a hinged surface that moves easily to the command of the servo. You have a surface that is hinged in such a manner that the hinges won't pull loose, and you have sealed the control gap giving you a much better responding aircraft. Best of all, it really doesn't take much time to install hinges in this manner. You can use just about any hinges that you want, but seal the gap. You cannot imagine just how much better an aircraft will fly with this gap sealed. Seal the gap on both the elevator and the rudder. For the ailerons and elevator, you need seal the gap only on the top side; but for the rudder, because you're looking at both sides, seal both sides.

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Since this is now almost April, it's time to be getting out and flying. Time to brush the winter cobwebs away, and time to make your plans to attend the

Sixth Annual Southwestern Jumbo Fly-In — the Southwestern party time for all big bird fliers. This year, as in all past years, it will be held at Thunderbird Field, just west of Fort Worth, Texas, July 16 and 17. Any type of aircraft may be entered, just as long as a monoplane has a span of 84" minimum, and a bipe has a span of 60" minimum. Sure, it's going to be hot, it always is --- so what else is new, this is Texas. Bring your hat, your big bird, and your best girl, and come on down to the Sixth Annual Fly-In. If you need a map on how to get to T-Bird Field, write to me at 2440 Colonial Parkway, Fort Worth, Texas 76109.

Just in case you big bird fliers think that I've deserted you in favor of information for beginners, everything that I've been saying in the past few pages also applies to the big birds. Thrust line and wing line set-ups are critical for the big aircraft, and since so many of you are hatching your own, the same force set-up information still applies. Also sealing the hinge gap on a big aircraft is even more important — as is a good solid hinging method — than it is for the smaller models since our servos have to do a bunch more work anyhow. See you in the summer. □