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RCM radio control MODELER

THE WORLDS LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

RCM BIG BIRD TOO
Featured in this issue

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This Month's Cover

Lovely model, Miss Cindy Mawson, squints in the California sun as she suffers through a photo session with the RCM Big Bird Too. B.B. Too construction article is in this issue. Kodachrome transparency by Dick Tichenor.

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FROM THE SHOP

Don Dewey

On numerous occasions we have expounded on the importance and value of R/C clubs. Yes indeed, the R/C clubs are the backbone of R/C. We received a most interesting letter from Bruce E. Doll, President, Aero Radio Club, Inc., Flint, Michigan, that implies that they must be doing something correctly.

Dear Mr. Dewey:

The results of a recent questionnaire sent out by Mr. Geoffrey Styles, the flying site director for the AMA, indicated that the average lifespan of a club flying site is approximately 2.8 years. After having filled out the questionnaire sent to our club, I did some research and found that the Lennon field leased by the Aero R/C Club of Flint, Michigan, located near the Village Lennon, Michigan, has been used continuously since 1956 as a site for the flying of ***Radio Controlled*** *model airplanes. Club member Stanley Marmuziewicz flew at the field when he was 15 years old (he will observe his 40th birthday this year) with Bonner equipment with other fliers who he recalls were using Babcock and Citizenship equipment. This means that this year (1981) the club will be celebrating its 25th year (1/4 Century) of uninterrupted R/C flying at the Lennon field.*

As the editor of a magazine directed to R/C enthusiasts we thought possibly this might be some sort of longevity record for club R/C flying sites and thought possibly some of your readers might know of other R/C sites used for a longer period of time.

Regards
Bruce E. Doll
President, Aero Radio Club, Inc.

Our heartiest congratulations to the membership of the Aero Radio Club and our best wishes for many more successful years.

★

Hi Johnson

Dear Mr. Dewey:

I'm sure I join the rest of the modeling community in sincere appreciation of the beautiful, simple and moving tribute to Hi Johnson in the current issue of RCM.

A group of us, interested in Hi's history, and in his engines, were discussing how best to dedicate and commemorate both; we decided that no better way could be found than to form a society whose purpose would be the restoration and actual use of Johnson engines.

This club will be called ***JERS*** *— The Johnson Engine Restoration Society. We would be most appreciative if you would mention us in any section of the next possible issue where you would deem it appropriate. Any reader wishing more information on this Society can obtain a preliminary newsletter by sending a self-addressed stamped envelope to me at the address below.*

Thanks for your help and, again, for the tasteful memorial. Peter Feldman, Box 591, Times Square Station, New York, New York 10036.

Very truly,
Peter Feldman

We appreciate the kind words and are happy to pass the word concerning JERS.

★

May 16th marked the annual Vance AFB Open House, and the S.P.A.D.S. radio control club of Enid, Oklahoma, turned out to support the event with a day of flying and a large display of R/C models.

1st Lieutenant Steve Rojecki, currently a student pilot at Vance, traded the T-38 jet trainer for his "Brushfire" pattern ship and put on an amazing demonstration of aerobatics.

Jim Nelson, club Vice President, flew a crowd pleasing routine with a scale P-39. Mark Kiner, John Cantrell, and club President, James Mueller, added aerobatic flights to entertain a crowd estimated at 2,000.

Another mind blower from Bill Evans. This is his pattern aircraft. 60" span, weighs 7¼ lbs., O.S. .60 with tuned pipe and retracts. Maneuvers are unreal.

In the show hangar, the club had more than 30 aircraft of all categories and sizes on display. Several club members were on hand to spark interest in R/C flying and talk to the crowd.

The S.P.A.D.S. (Salt Plains Aeronautical Development Society) consists of about 40 fliers from the Greater Enid area including about a dozen "blue-suiters" from Vance.

★

From Aero-Shaft, Jack Pray, Editor, newsletter of the Aero Radio Club, Flint, Michigan.

The good news TAUBE, the bad new GATOR

In March I was in Kissimmee, Florida just south of Orlando. While visiting a local tourist trap I heard an R/C plane buzzing around and inquiries led me to the local club field. Two fliers were present and one was Erwin Carter of Carsonville, Michigan. He proudly assembled his new Taube three channel and proceeded to put on a flying demo. It flew great and I left him and was talking to another RC'er. When I looked Erwin was gone! A young kid said he had lost control and crashed just beyond the field in a swamp. Sure enough here came Erwin empty-handed, walking back across the flying field. He exclaimed that he had found the plane but he could not reach it from solid ground and he was not about to go wading for it because there was a big "alligator" watching that plane like it could be his lunch for that day. Erwin got hold of an 8 foot, 2 by 4 with a nail in the end and he and I and the young kid headed back for the swamp, camera in hand.

Sure enough there was the Taube. The wing and fuselage had separated and the prop had screwed its way into the swamp weeds pretty good. It was about 8' off shore in the wet stuff.

Sure enough there was the alligator about 30' from the plane and watching us like we were about to steal his lunch. He was at least 10' long and I don't think he liked us because he had a mean look in his eyes and was hissing at us.

Erwin couldn't quite reach the plane so I grabbed hold of his belt and he leaned out and hacked at the plane with the board. Meanwhile the kid was next to us and was watching the gator. "He's moving! He's in the water now! No I don't know which way he's headed because the water is black and I can't see him anymore," said the kid. I was scared to death and Erwin wanted that plane worse than I did so I hung on and he got the fuselage back.

The local flier laughed and said the gator has lived there for a long time and was a real asset because he kept the snakes away (ate them I guess) and the snakes are worse than the gators.

Year around warm flying sure looks good to me but its nice to be home.

★

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BIG IS BEAUTIFUL

Dick Phillips

Prolific Nick Ziroli and his new Grumman F8F Bearcat. Plan is available along with cowl and canopy direct from Nick. Another popular addition to Nick's line of WW II fighter plans. More in text.

RC Kits Manufacturing's new Chipmunk kit, finished in Art Scholl Colors. Kit is 1/4 Scale and can be finished as a standard Chipmunk or as the Scholl Version. Nice looking machine.

Another month and another flying season rapidly waning. It's the old question, where does the time go? It seems only a short time ago we were looking forward to a full season, and now it's almost gone and those of us in the winter belt will soon be facing frost and snow again. Oh, well, we need a building season to reconstruct what we broke during the summer and to prepare a new project for the next season.

I often wonder what it's like to live where the weather allows flying all year . . . how do you get anything built? I can see what would happen if I were to go where those conditions exist, I'd be so careful not to waste any of that precious good flying weather that I'd never get anything built. At least until I accepted the fact that it's almost **always** good flying weather!

Some more new things this month, and that's no surprise as it is getting to be a rare month indeed when there is not something new coming along.

From Balsa USA, comes the news that they at last have wheels available for the Sopwith Pup. They had some problems with their original aluminum wheels not holding up to hard landing and also a supply problem. Their new spoked wheels are much stronger, plus they are scale size of 9" diameter, hub width at axle is 2⅛". Weight is only 4 oz. more than the aluminum wheels. The price of the new wheels is $15.99.

For those of you who have already paid for your wheels, Balsa USA will be sending a refund check around the time you receive the wheels.

Another neat and much needed item that is now being produced by Balsa USA is their own 1/4 and 1/3 size engine cylinder kits just the thing for your big Cub. Again, having problems obtaining them from the supplier, they are now producing these kits in their own plant. This should eliminate any further supply problems. The kits are improved and are available in 1/4 Scale for $6.99 and the 1/3 Scale for $9.99. All of these items are available direct only from Balsa USA, P.O. Box 164, Marinette, Wisconsin 54143.

If you have been trying to find a one way valve for your smoke system, Roush Manufacturing, the new Kioritz Distributor has a dandy. It's about the slickest I have seen and is so simple it can hardly go wrong. At $3.95 from Roush at P.O. Box 251, Sandyville, Ohio 44671, it's got to be a bargain. They also have a number of goodies for the Quadra and Kioritz engine and if you ask I'm sure they'll send you material on their Kioritz Exhaust Manifold, Kioritz/Quadra Velocity Stack Kit, Quadra Six Bolt Hub, Belray Oil, and Champion spark plugs for our engines. They also can provide special length prop hubs for the Kioritz and other engines at $20.00 each.

Vincent Ranzino (104 Calhoun St., Cinnaminson, New Jersey 08077) is making available a new engine mount for the Quadra which looks good. The workmanship on the mount is very good indeed and it is certainly worth the $45.00 asking price. I am going to see if I can adapt mine to use Lord Mounts between the two plates as I suspect they will absorb most of the vibration left after a Brisighella balance job. One of the advantages of this mount is that you can have several of the front plates at $10.00 each and change engines without a major teardown. Vince will also do custom machine work and will quote from your drawings. A $5.00 estimate charge will be credited to your order when placed. Drop Vince a note at the above address for complete details.

Don Harris, a member of the Eagle Squadron, a chapter of IMAA, has come up with some original ideas for the larger engine. One of these is his dynamic damping system for the Roper engine (3.7 c.i.). Drop Don a line at 23668 Shadow Dr., Auburn, California 95603, for additional details and costs involved in doing this work. The damping system includes the flywheel and prop hub and will require sending the entire engine to Don. In addition to the damping system, he is also working on a stainless steel muffler for the Roper and Quadra engines, plus an electric injection system for producing smoke. Judging from the pictures I have seen, the smoke system is capable of obscuring your field at full bore.

One of Don's ideas passed along to me by Ken Runestrand is that to produce large quantities of smoke, you must supply exactly the correct amount of smoke producing material to the muffler. Too much and it cools the flow down to the point where little smoke is made, too little and there isn't enough material to make any appreciable quantity of smoke. It sounds good to me and if the pictures of his system producing smoke are any way to judge, he is certainly on the right track.

This Eagle Squadron are an inventive group. There are some battery saving systems in the works along with some other good things I hope to be able to tell you more about as soon as I pry the information from Ken. These guys are a going concern and they are going all the time!

If you have had a problem with finding basswood in sizes convenient for building

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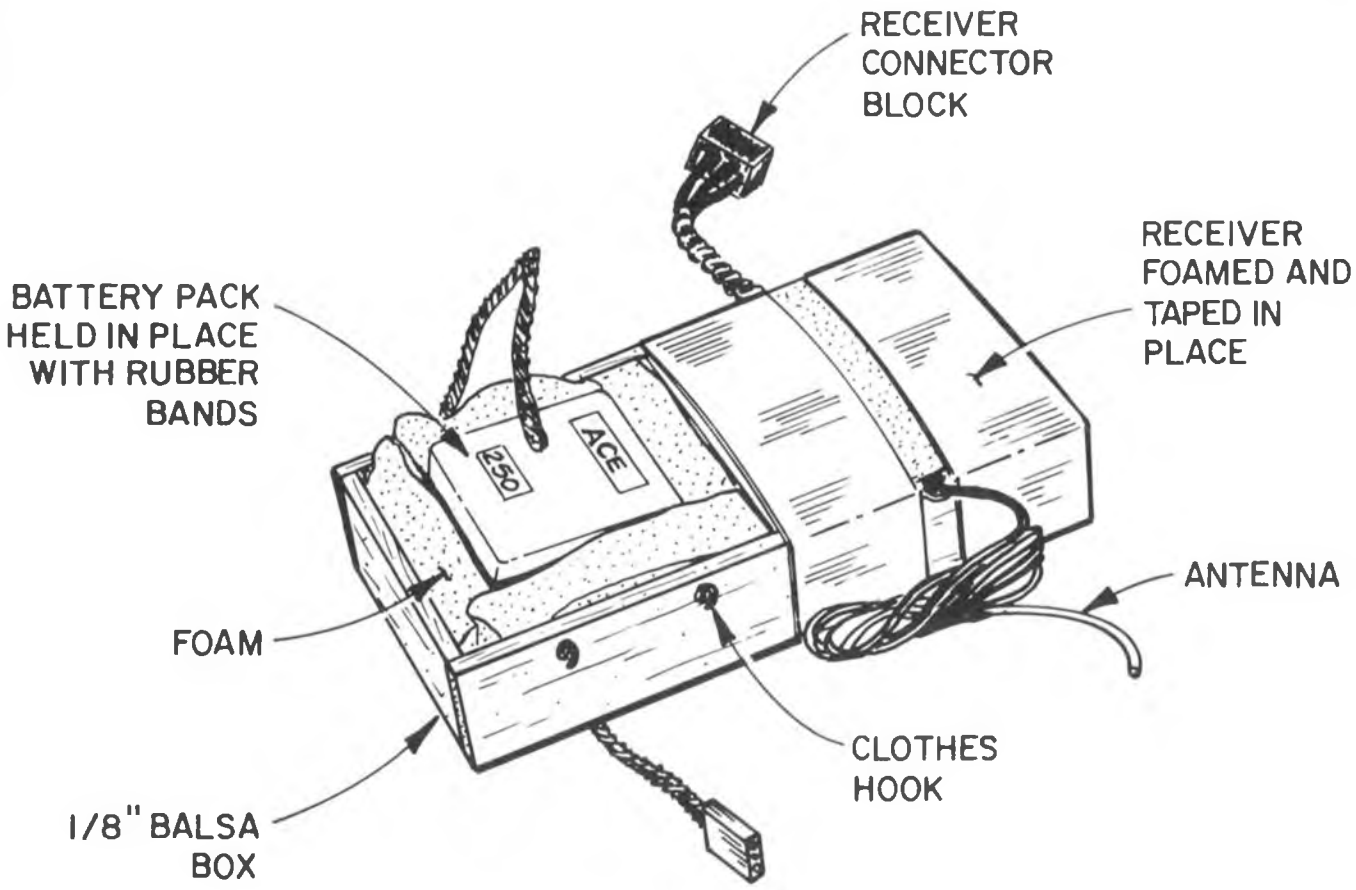
HERE'S HOW

By Jerry Smith



Installing the teeny-tiny radios, even in smallish models, often poses problems in the mounting of the receiver and battery pack. Of course, both items may be swathed in foam rubber to fill in the available volume --- but, it makes for an "ugly" installation. Wires wandering out of foam-balls ain't my idea of a particularly good way to go.

Since the servos go into trays --- why not the receiver and battery pack? So, I Hot Stuffed some 1/8" sheet balsa together, allowing enough space for lots of foam. I cut a notch in the receiver side to let the antenna and connector block(s) out. Then I foamed over the receiver (which seldom has to be removed from any airborne installation) and taped it in place.

A couple of small clothes hooks, epoxied to each side of the box at the battery position, hold the flight-pack power into its foam-lined compartment. Small rubberbands are used.

Since we're dealing with small radios/batteries, there's more than enough restraint built into the box. Strips of Velcro, epoxied to both the tray and the structure will hold the tray in place. Or, the box may be epoxied directly to the structure --- if it isn't intended to be removed. Another potential advantage of the tray system is that it can be shifted as a unit, fore and aft, to help attain the proper C.G. (little R/C models don't usually require much weight to get them in balance).

The above suggestion was sent to me by Col. John DeVries who, from time to time, submits some very clever ideas. Many thanks, John, from all of us.

I ran across something quite interesting and thought it might be of benefit to some of you. Some time ago I fired up my old Webra .91 and was having a dickens of a time getting it to run proper. Like many of you with Webra .91's it seems to starve on the high end of the throttle. Just couldn't get a good high and low run. Incidentally, my Webra sports the old carb. I was afraid of running it too lean. Finally, I thought of trying another carb and, you'll never believe it, but the O.S. .90 carb fits into the hole just like it was made for it. My Webra now performs like it should. To help get a more consistent run, I installed a Robart Super Pumper MK IV. This little jewel, even though there is nothing inside it, (Ha), combines in one package: engine demand fuel pumping operation on pulses from the crankcase and excess fuel return sensing fuel demands at the carburetor and returning the excess back to the fuel tank. It works super. The O.S. .90 carb is very simple to adjust, both high and low end, and is extremely durable. According to Circus Hobbies, distributor for Webra engines, it is advisable to run them on 5% nitro fuel (or less). They were designed to run on no nitro, however, I found mine seemed to idle better with some. So, if you are having trouble with your Webra .91 and have all but given up on adjusting the carb, try an O.S. .90 carb. I'll never take mine off again. □

FLYING LOWE

Don Lowe

"Either give up R/C as your hobby or get used to Flying Lowe."

Huntsville Masters Aerobatic Team Selection Contest:

I attended the Masters in Alabama and again I failed to make the team, but gave it a fair try --- if I could only fly to my potential when it counts! It is certainly a lot easier to tell you how to fly the pattern maneuvers than it is to accomplish it myself! After three days of heated (literally) competition the following placings emerged:

U.S.A. Team:

1. Dave Brown (who's he?) — Tipo
2. Steve Helms — Bootlegger
3. Mark Radcliff — Phoenix 8

Alternate:

4. Tony Frackowiak — Tipo
5. Dean Koger — EU-1
6. Don Lowe — Phoenix 8
7. Cliff Hiatt — Superstition
8. Tony Bonetti — Intrepid
9. Jim Kimbro — Double Vision
10. Ron Chidgey — Arrow

There were 42 competitors, which made this the largest Masters ever. Judging was accomplished by a mixture of U.S. Pattern Judges and volunteer help. I must say that I feel the judging was generally good. Judging will always be the weakest link in this sport. The set-up at the Masters, however, went a long way towards assuring fairness for all. Basically three sets of judges were used; five judges in each set. Everyone had six flights; two in front of each set of judges. Winners were determined by adding the high score from each set of judges. Additionally the high and low scores on each maneuver were thrown out and the three remaining added together. The flying was generally very good. As it turned out, the three top fliers had to average over 8.5 per maneuver to make it. Everyone knows that anything over an 8 is an excellent maneuver. Steve Helms finally made the team, after being the bridesmaid the last two Masters. Tony Frackowiak came very close --- you can believe that he will be even tougher to beat next time, since he is already a polished flier. Dean Koger had his problems with two flame-outs, but came on strong at the end to move into fifth place. Cliff Hiatt, from Florida, is a contender to watch in the future since he also has applied a lot of polish in the last year. Tony Bonetti scared them all and was in contention until his last flight. Tony is the only Masters flier who I know of who does the reverse double snap maneuver, and very well! Contest veterans, Tony, Ron and myself, are still pushing those "youngsters" pretty hard! Ron was flying what he called the "Tigre Tail 5," an Arrow with a semi-exposed pipe!

Poor Donny Weitz! He crashed his No. 1 bird after demonstrating his coupled flap/elevator set-up --- color coding might help Don! I flew a Phoenix 8 with a buried pipe and JR Radio. I must say that the JR with the coreless motor servos is the most solid system I've ever flown. Now, if I only had an auto pilot and programmer to go with it!

Mark Radcliff continues to amaze me; he probably practices less than anyone but really comes on strong under pressure. In fact, he had second place sewed up until Helm's "boomer" final round. And, what can you say about Dave Brown? He's another guy who never gets rattled, practices little and flies superbly! I'm still convinced that Sally is really doing the flying.

I feel that we have a very strong team again this year and will confidently predict a team win again --- I refuse to predict individual placings, however.

There were no surprises in aircraft and equipment. Most everyone had a strong engine, although some had flame outs for various reasons. Aircraft designs had all been seen before, and everyone flew trike gear retracts, even though take-off and landings were not scored. We will probably see some two wheel gear ships, however, if the no scored ground maneuvers continue. We can certainly save weight, complication and cost.

The hottest engine I heard there was Sal Bataglia's YS; he went like a streak! Of course, I've always contended that you can fly too fast and have too much power. There does seem to be an optimum speed for each design where the ship flies crisply and yet isn't a blur on a fly-by! My own buried pipe P-8 is very fast, however, it does roll

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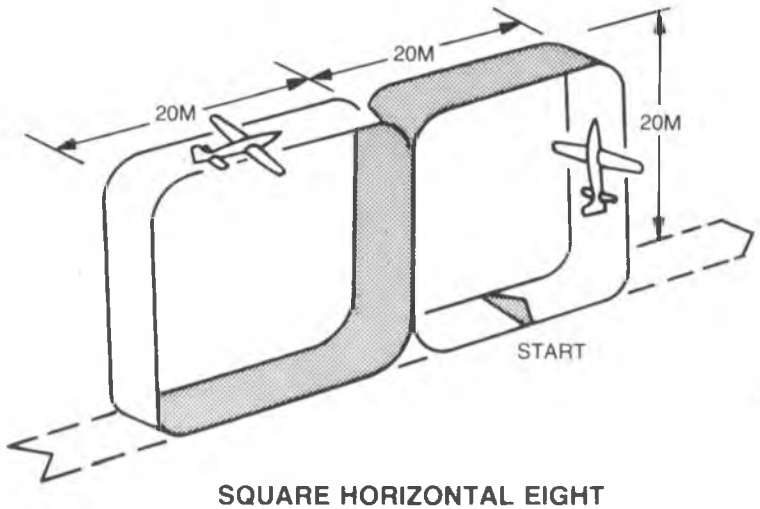
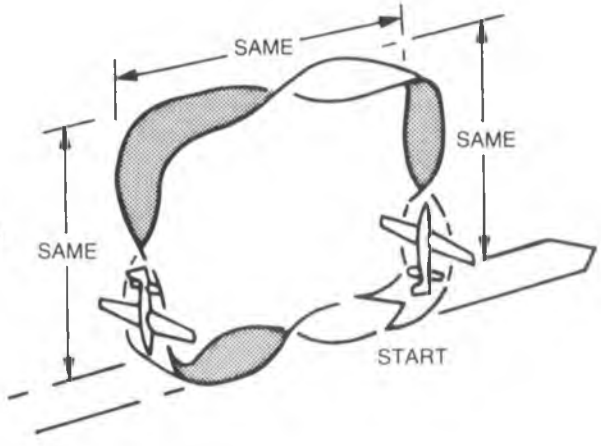


SQUARE HORIZONTAL EIGHT



SQUARE LOOP WITH 1/2 LOOP

POWER BOATING

Howard Power

Several months ago I discussed my first impressions of the newest 7.5cc marine motor from O.S. After a few months of running this motor as hard as I can, I have yet to have a problem with it in its stock conditions. I have, however, had conversations with, and have witnessed, several people who have had failures in their motors. Any racing motor, when run to the max, will break eventually. Sometimes failure occurs because of a design weakness but many times failure occurs because of poor maintenance and handling by the modeler. Did you ever notice that some guys in the club almost never have motor trouble but others are constantly breaking the very same brand motor? The difference in most cases is proper maintenance and handling.

Getting back to the O.S. 46 Marine, there seems to be problems with two areas in the motor. The first is a very common problem with racing motors: rear or large bearing failure at high rpm. The O.S. has a bearing that uses steel ball cages that are welded together. The failures I have seen involve cracks developing in the cage. The welds hold the two cage halves together but the cracks develop into breaks near the balls and the cage breaks soon after. In all these cases the broken bearings show signs of corrosion that I suspect is a factor in their deterioration and subsequent failure. If anyone out there knows of better replacement bearings please let us all know. Up to now the solution used by many of us has been to replace the stock bearing with a homemade bearing with a full complement of balls when rear bearing failure occurs in any motor. I recommend this procedure highly on any 7.5cc motor that will be propped over 21,000 rpm. I have discussed how you make these full complement bearings in an earlier column but will briefly outline the procedure for those of you who have missed that issue.

You start by taking two **new** bearings and remove the cages. Using a Dremel tungston carbide cutter or a Dremel grinding cylinder that is approximately the same size as the bearing balls, cut a notch in one side of the outside of the inner race and another notch on the inside of the outer race. These notches are made so that when you line up the notches (with half the balls in the races) a ball can be added between the races only by forcing it in with a hard push or a small tap of a hammer. I use a piece of 1/8" K & S brass tube to drive the ball home with a small hammer without damaging it. Fill the bearing with balls until no more will fit. Remove the original bearing by heating the front housing to 300 degrees in your oven. At this temperature the bearing will fall out and the new one can be inserted using the crank as a guide.

The second problem area with the O.S. 46 involves the rotor pin. I have heard of several cases of pins coming loose, moving into the path of the rod and, of course, causing all sorts of problems when contact is made! In all the cases on which I have had a chance to do the postmortem, the failures were due to a loose fit between the rotor pin and the backplate or a loose rotor pin set screw. It seems that some motors have a looser fit than most of the others and, as a result, are prone to this failure mode. If you find a loose fit, change the parts and use purple Loctite to fasten the rotor pin and the rotor set screw securely. Set the rotor clearance using a .003" U-shaped piece of brass shim stock placed between the rotor and the backplate. After tightening the set screw, remove the shim stock. If you need to take the rear assembly apart after using the Loctite, just use a high wattage soldering iron to heat the pin and it will come out only when you want it to. If you want to make absolutely sure the set screw doesn't loosen up you also can tap the backplate hole above the 8-32 set screw and install an 8-32 set screw on top of the original.

As I have said earlier, my motor has not shown any of these destructive tendencies so maybe I was just lucky enough to get a good one (for a change). We have been using the motor in a mono that is propped to run at approximately 22,000 rpm. My rear bearing has not shown any signs of failure but I intend to replace the stock bearing with a full complement one as soon as possible. After each day's running we remove the motor from the boat **at the lake.** Rinse the motor off inside and out with a squirt bottle of alcohol. The alky draws out any water that may have found its way into the motor. This alky bath is followed by WD-40 oil bath. The inside of the motor should be liberally filled with oil until oil drips from the front bearing or fly wheel area. At this time you should check for freeness. If any strange glitches are felt (as you turn over the motor by hand) the motor should be disassembled to find the cause. If you are satisfied with the motor "feel," place it in a Zip-Lock plastic sandwich bag and store it in its box. If you intend to store the motor for longer than 2 to 3 weeks, I would replace the WD-40 with 3-In-1 machine oil because the WD-40 oil evaporates quickly. About every 3 or 4 contests you should remove the backplate to inspect motor parts visually. Make sure that the rod doesn't have excessive clearance. These simple maintenance techniques will keep your motor running like new for a much longer time than you have previously thought possible. If you are very careful to never let the motor over-rev on the beach when starting, your breakage problems should definitely decrease using these techniques.

★

Dear Mr. Power,

I would appreciate any information you could give me concerning props. My project is a Deep Vee called a Grey Ghost 60. I got the plan from Flying Models Magazine and am scratch-building it. It had a flat deck throughout and I raised it from nothing to 1⅛" at the engine compartment. I then added a lid over the radio compartment. The engine I am using is a 1.9 cubic inch Remington Mighty Mite 100 from a chain saw with a 12" bar. I machined half the fins off the cylinder so I could wrap a water line around it. The motor comes out of a two piece case and is mounted inside on five rubber mounts. I added on a windshield. I made it out of stainless steel. It took eight hours to cut and file it out by hand.

I also hand-made the outdrive. I had the stuffing box made at a tech. school nearby, also the tube on my outdrive that the bearings fit into. Behind the prop I have one tube angled forward to cool the engine and another to siphon water out of the hull. The top of the deck is stained with postassium manganate. I used it because it isn't oil based and fiberglass will harden over it. The wood grain is seen through the fiberglass, wet-sanded, steel-wooled, rubbed-out and waxed. Part of the deck is painted with Pactra polyurethane spray, which is the only spray paint I have had any luck with. I am getting a rope/spool made to start the motor with and I have some thin walled copper tube ordered to cool the cylinder. I have two universals inside the hull to take the strain off of the driveshaft. The muffler is also hand-made.

There was no balance point on the plans. My boat balances 14" from the transom. The hull is 45" long, 50" overall. I have approximately 350 hours of work in this boat and am very proud of it. I have had the motor started three times and so far no radio interference. Now for some information on props. I am using a 3008 Dumas which is for electric motors. My boat weighs 12 lbs. complete. The motor turns around 8,000 rpm. I do not know of any company that puts out props for any boats with 2 cycle engines. Again, any help would be appreciated.

Thank you,
Daniel Pensell
Portsmouth, Ohio

Thanks, Dan for sharing your project with me and my readers. I have received

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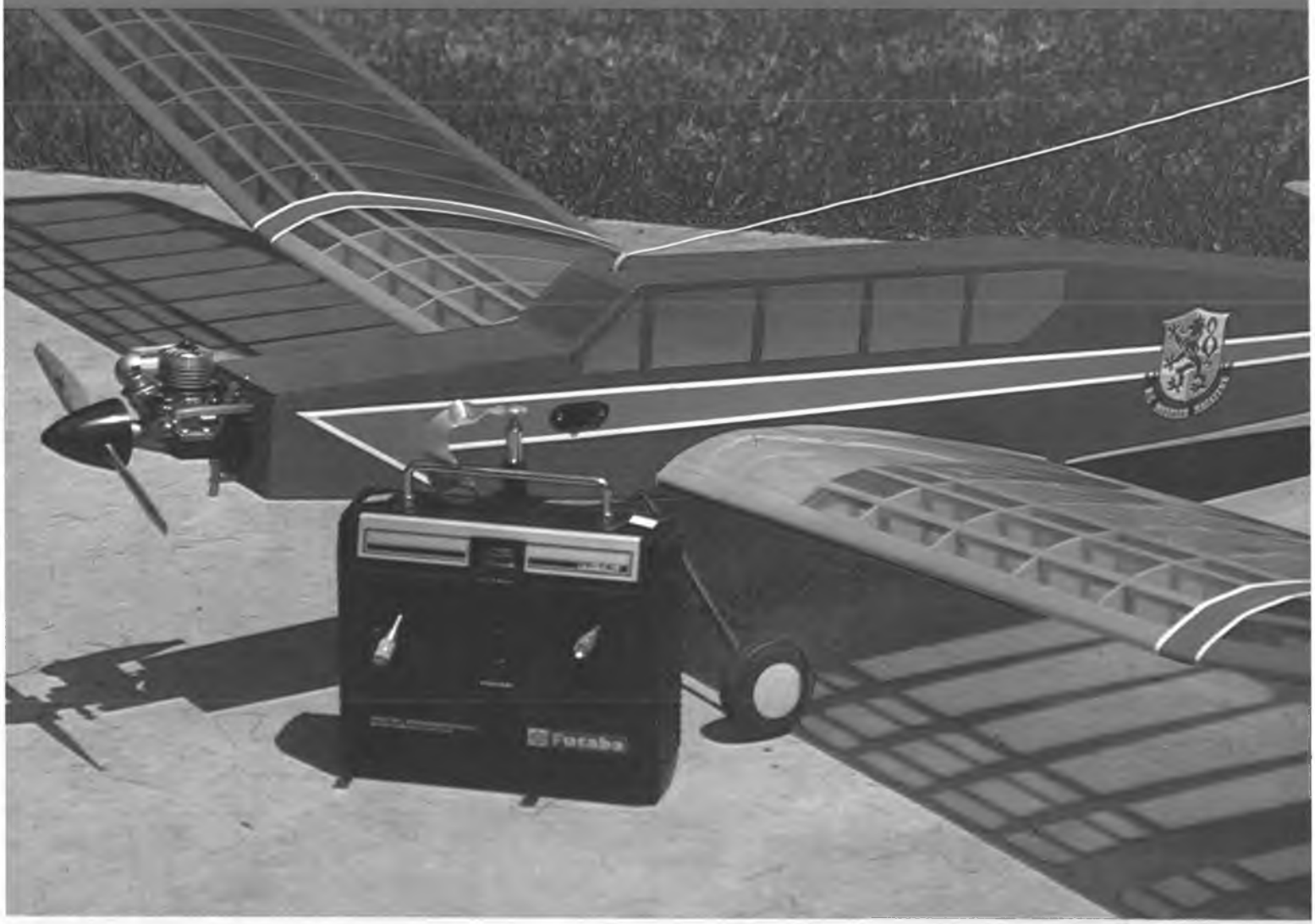
RCM BIG BIRD



The RCM Big Bird was presented in our September, 1980 issue and has been one of our all time most popular designs. Dozens of our friends have put an uncounted number of enjoyable flights on the prototype Big Bird and it is still as good as new. Some of us, however, become bored with almost anything after awhile, therefore, the Big Bird Too was conceived.

One day, while out for a flying session, the Big Bird wing was laying on the ground and for no particular reason the fuselage was placed across the top of the wing. This immediately brought a rash of smart aleck comments from good ole buddies about making a low wing fighter out of the docile Big Bird. Later, back at our office, lines were drawn on the BB plans to alter the fuselage to provide a cut-out on the bottom for the wing. A new fuselage and tail were built (too lazy to build another wing) and we were off to see how it would fly. Fantastic, we could hardly believe it, but it performs better than the orignial BB.

The Big Bird Too is even more stable than the BB. The center of lift is naturally lower than on the BB but, due to the polyhedral, it is still above the C.G. and we do not experience the pendulum effect as much as with the BB.

In the same concept as the BB, the RCM Big Bird Too is a powered aircraft that could be recommended as the first radio controlled airplane project, particularly for a person who either does not have, or does not want an experienced RC'er to assist him.

We are thoroughly aware of modelers who will assemble their first aircraft and go out alone to make their very first R/C flight. The probability of success on this first unaided attempt is very low with the majority of the "trainer" type aircraft.

Dozens of trainers are available with varying degrees of complexity of construction. The Big Bird Too is simple to assemble even though there are a goodly number of detail parts. It was designed in this manner in order to keep it light, yet strong, as weight is a key factor in the Big Bird concept.

Our approach is to combine low weight with generous wing area and a small throttle equipped engine to obtain a forgiving, slow flying aircraft. This allows the new pilot ample time to correct his mistakes before the craft smashes into the ground. In fact, with

TOO

A design follow-on to the very popular RCM Big Bird. It out-performs the Big Bird and still is a pussy cat.

By Dick Tichenor

the craft at a reasonable altitude, if the pilot has managed to get the airplane into an awkward situation, he merely has to throttle back the engine, return controls to neutral, and the ship will right itself.

There are those people who will immediately say that the RCM Big Bird Too is a powered sailplane with a landing gear.

Well, it is, in a way. The wing is a shortened version of the Bridi Big Birdy sailplane wing. The fuselage, however, is pure airplane, designed to be easy to build and rugged enough to withstand lots of abuse. The sturdy landing gear is usually found on aircraft weighing twice as much as the Big Bird Too.

The rank beginners aren't the only ones who can enjoy the Big Bird Too --- several of our experienced flying friends have had a ball with it. Unbelievably small consecutive loops, tight turns, and wallowing barrel rolls, all in slow motion, have brought on lots of giggles.

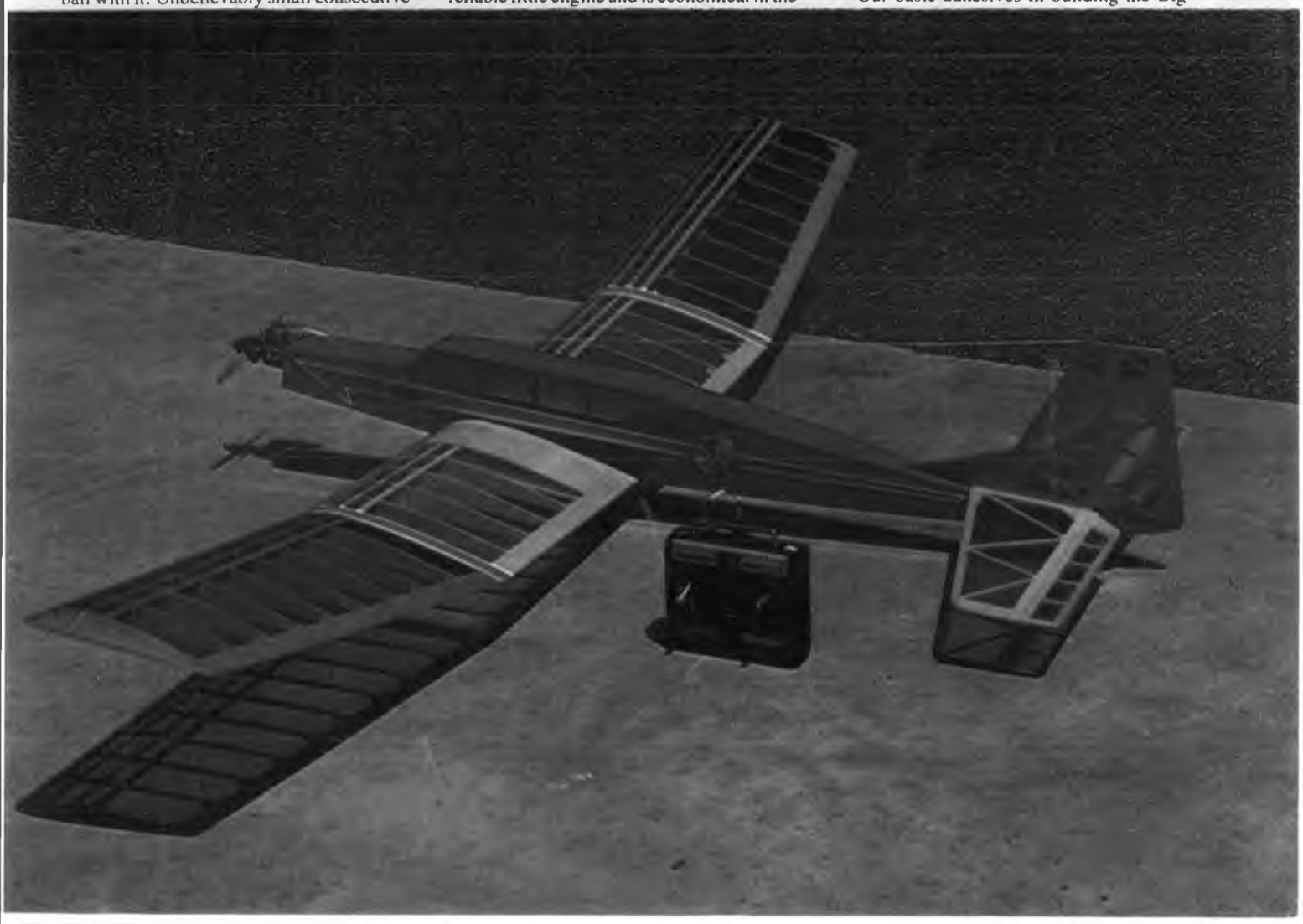
Another aspect of the RCM Big Bird Too is the low cost of both building and flying. We have been using an O.S. .10 engine with excellent results. It is an economical engine that seems to run forever on 4 ounces of low nitro fuel. There is also the Enya, Fuji, Hobby Shack Speedie, Thunder Tiger, and other suitable engines in this .10 cu. in. size, all are good just take your choice, you will get more go per gallon.

Incidentally, both of these Big Birds have been flown on .15 engines. The main benefit derived is an increase in the rate of climb. We used a Fox .15 Ball Bearing Schneurle engine, a dandy little powerhouse that somehow hasn't received the recognition it deserves. It is an easy starting, reliable little engine and is economical in the fuel consumption department.

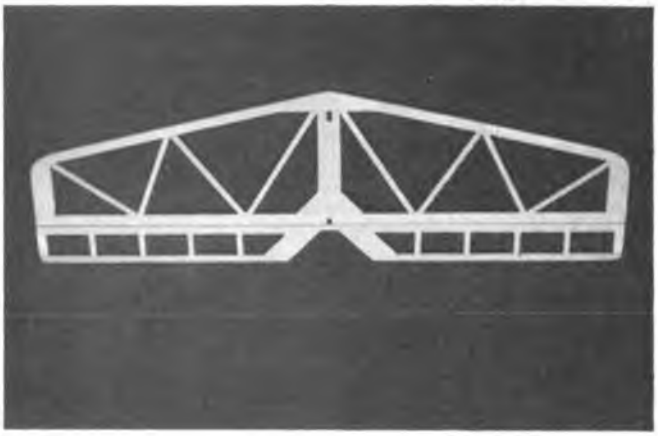
The construction details shown in our photos graphically describe the assembly of the RCM Big Bird Too. However, to assist the inexperienced beginners, we are presenting a much more comprehensive set of building instruction, than usual.

Our recommended construction sequence begins with the tail feathers. The wing panels are constructed and joined at the polyhedral joint, then the fuselage is built. The aircraft is covered and, finally, with your R/C equipment installed, you are ready to fly. Please read through the instructions before you begin work on each section so you'll know what's coming before you get there. With these few minutes of preparation you can better adapt our notes to your own ways of working.

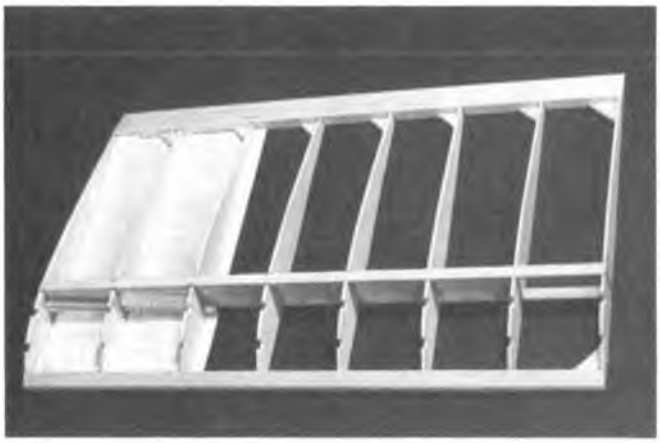
Our basic adhesives in building the Big



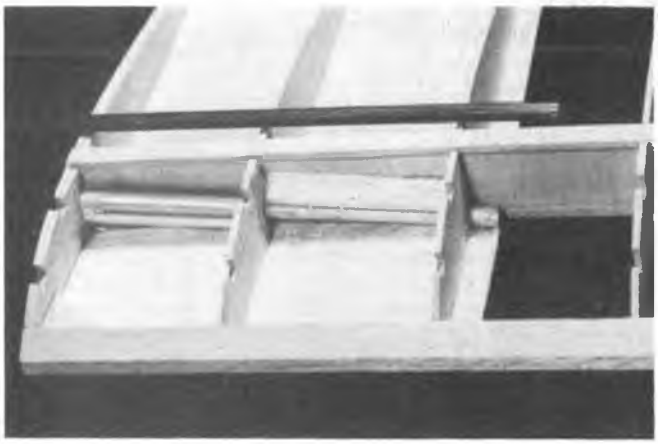
Fin and rudder ready for covering. Bill Evans' Iron-on X-Hinge used.



Stabilizer and elevators also hinged with Bill Evans' X-Hinge.

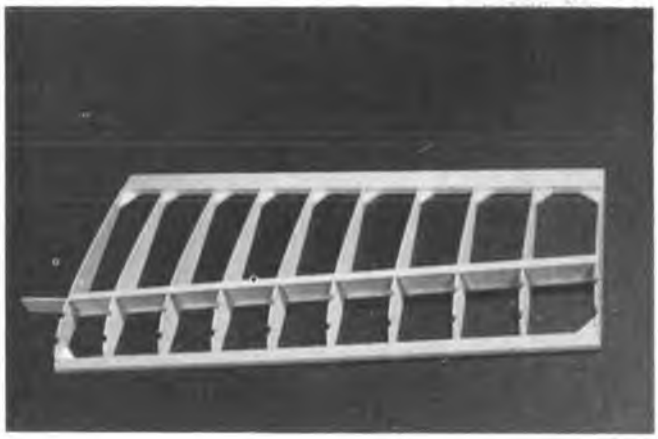


This portion of inboard wing panel is assembled directly over plans.



Details of wing joining tubes. Note 1/4 triangle stock reinforcements.

Inboard ends, leading and trailing edges.



Outboard panel structure. Note polyhedral splice plate.

Bird Too was Jet and Super Jet. We also used Wilhold white glue and 5-minute epoxy in higher stress areas.

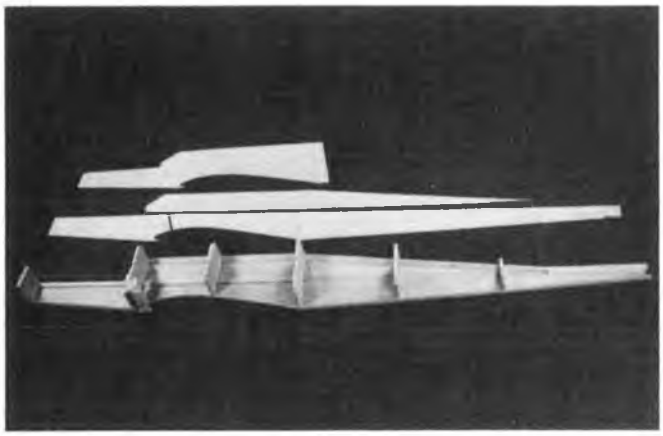
Tail Surfaces:

The fin, rudder, elevator, and stabilizer are constructed of balsa strips. We recommended that you cut the larger pieces first, using the left-overs for the smaller pieces. The plans have been designed so the fin, rudder, elevator, and stab can all be built at the same time.

Working directly over the plastic ktichen wrap covered plans, cut, glue, and pin all of the outside pieces in place for the fin, rudder, elevator, and stab. Add the triangular shaped piece, cut from 1/4" x 1" balsa to the front center of the stab and the center 1/4" x 1" piece. Also add the 3/16" x 1" piece to the bottom of the rudder. Do not add the dorsal fin to the fin at this time. Also add the 1/4" dia. dowel to the leading edge of the elevator.

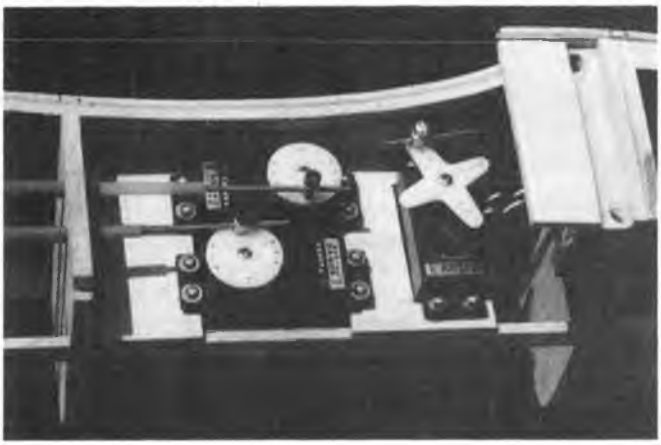
After the adhesives on the fin, rudder, elevator, and stab have set up, these pieces may be removed from your building board. With the stab resting flat on your workbench, relieve the back of the bottom of the dorsal fin as necessary for the stab. See the plans. Then, with the fin and dorsal fin resting flat on your workbench, glue the dorsal fin to the fin.

Cut the hinge slots in the stab, elevator, fin and rudder. Then sand the stab leading edge and tips and fin leading edge and tips to shape. Shape the leading edge of the rudder and elevator to a slight 'V' shape as shown on the plans. Sand the elevator tips and rudder tip to shape. Do not taper the trailing edge of the rudder and elevator. Use a sanding block to slightly round the trailing edge of these control surfaces. Finally, use a sanding block to sand the top and bottom



Side parts and first fuselage assembly details.

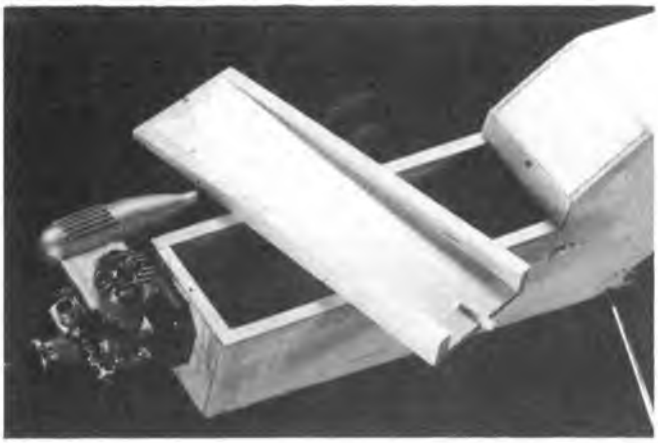
Landing gear mount and details.



Servo installation is easier accomplished prior to adding side panel.

Close up of servo hook-up. Pushrod connectors can safely handle the air loads on Big Bird Too.

Landing gear torsion bars fit in slot of L.G. mount.



Front hatch details. Note fuel proofing with K & B sanding resin.

sides of the fin, rudder, elevator, and stabilizer. Sand a notch in the leading edge of the rudder as clearance for the elevator dowel.

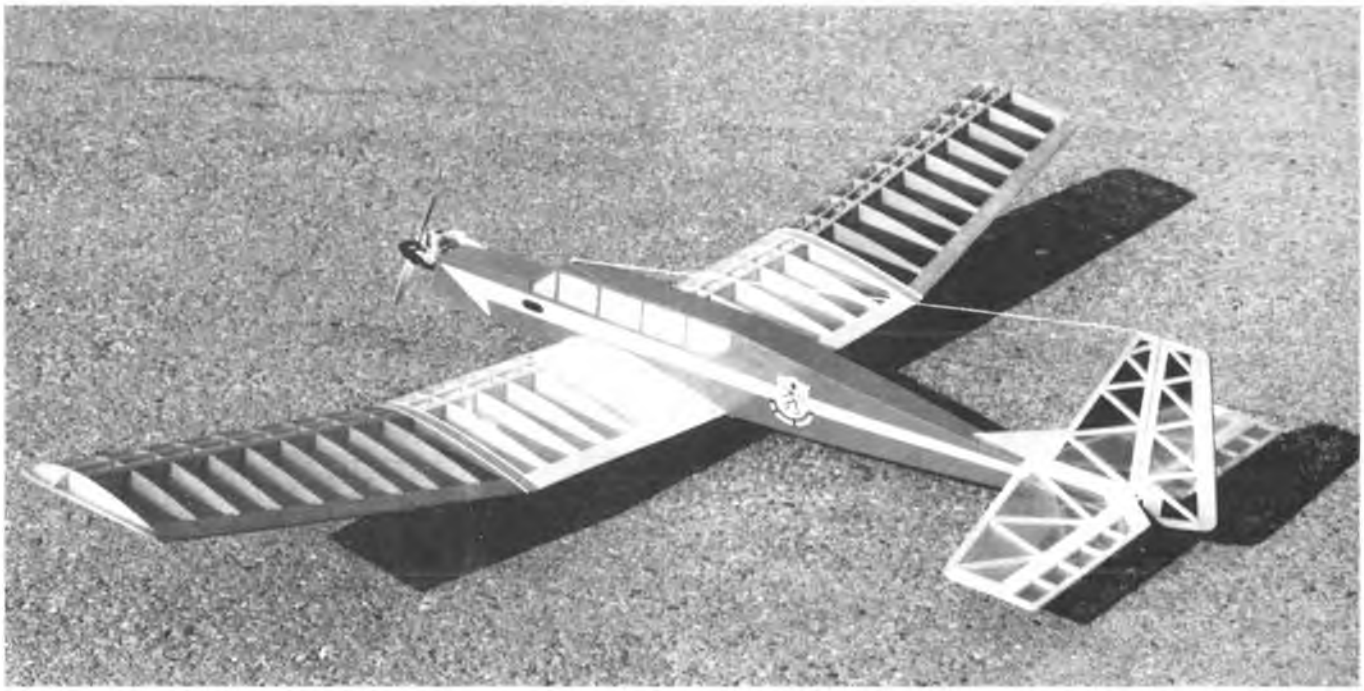
Wing:

Because the right and left wing panels have polyhedral, each wing panel is constructed of inboard and outboard section. As you study the plans we want to call your attention to some design features to keep in mind as you build. First, the first two bays of both inboard and outboard wing sections are wider than the other bays. Second, the webbing used throughout the wing bays is installed on-center between the spars to offer a sturdy "I" beam spar configuration. Note, however, that no webbing is used in the bays adjoining the polyhedral joint; a ply polyhedral brace is used in these wing bays.

To join the right and left wing panels at the center, a 1/4" dia. hardened steel rod is used. The rod slides into an aluminum tube glued in place in each wing panel. To provide a good glue surface for the aluminum tube in each wing panel, an additional piece of webbing is added in the first two bays of the inboard wing sections. These added webbing pieces are glued in place so they are flush with the front of the top and bottom spars.

As is normally done, the wing sections are built directly over the plastic kitchen wrap covered plans on a flat building board. Begin work on the inboard section of the right wing panel by preparing the spar webbing pieces. From a 3" wide sheet of 1/8" thick balsa sheet, cut 1" long pieces (the grain must run in the 1" direction). Check plans for distance between ribs and cut webbing to fit.

The webbing pieces for the root bay



should be cut to the dihedral angle at which the root rib is installed. Use the dihedral gauge ⊗ provided on the plans as a guide to cut the angle on the root rib end of the webbing pieces for the right and left inboard wing sections.

To hold the spar down until the ribs are pinned down, groups of three pins may be used. That is, two pins are used on one side of the spar with one pin located mid-way between them on the other side of the spar.

Cut and glue the bottom sheeting pieces together and to the spar. Pin them in place.

Note that the root rib and second rib are smaller from top to bottom to allow for the sheeting in the area of the root bay. Working from the balsa root rib outward (the ply rib is to be installed later), glue a rib in place, then the webbing, then the next rib, webbing, rib, and so on. Each webbing piece must be glued to the ribs on each side as well as to the center of the spar. Use the dihedral gauge cut end of the webbing for the root bay to get the desired angle of the root rib. Use the dihedral gauge as a guide when you install the rib at the polyhedral joint. The top edge of the root rib should be tipped toward the other end of the wing section. The top edge of the rib at the polyhedral joint is angled toward the root rib. As you work in this way, using the webbing to locate the ribs, you will find that some of the ribs may be off slightly from their location shown on the plans. That's okay, just as long as the rib at the polyhedral joint is at the location shown.

Glue the leading and trailing edge in place to each of the ribs. Use the dihedral gauge when gluing the root rib and the rib at the polyhedral joint to the leading and trailing edge to assure they are installed at the proper angle. Remove excess adhesive from the glue joints so it won't get in the way of the gussets to be added later.

Glue the top spar in place to the ribs and to the top edge of the webbing pieces. Again, use the dihedral gauge on the two end ribs. Install the gussets.

After the adhesive has set up, the wing section may be removed from the building board. The leading edge, sub spars, and trailing edge should be cut off flush with the end ribs. The top sheeting will be added later after the aluminum tubing is installed.

To build the left inboard wing section, the plans must be turned over so that you are working on the back side of the paper. By applying a light coating of vegetable cooking oil (swipe it from the kitchen when your wife isn't looking), the lines will become sufficiently visible for building.

When building the right and left outboard wing sections, a separate gauge is provided on the plans for the rib at the polyhedral joint. This rib is installed so the top edge of the rib is angled toward the wing tip. Note that no balsa webbing is used in the bay at the polyhedral joint. The ply polyhedral brace is installed at that location.

After the ribs, spars, leading edge and trailing edge are installed and the adhesive has had enough time to set up, cut the wood off flush with the rib at the polyhedral joint and at the tip rib. Glue the triangular stock tip block in place so the bottom edge is aligned with the bottom of the tip rib. Sand the tip block to the rib contour and it will assume the top view shown on the plans.

With the wood cut flush with the balsa root rib on both inboard wing sections, hold the wing sections together to check the fit at the center for the desired dihedral as shown on the plans. Sand for as good a fit as possible without sanding away too much of the balsa.

Next, use a tiny drop of 5-minute epoxy at the leading and trailing edge of the ply ribs to tack glue them together, making certain that they are perfectly aligned. Apply 5-minute or slower set-up epoxy to the outside of the root ribs on both inboard wing panels. With the ply ribs between them, clamp the wing panels together, making sure that the wing sections are perfectly aligned with each other and that the ply ribs are aligned to the wing panels.

After the adhesive has set up, remove the clamps and cut the tack-glued ply ribs apart. Any gaps between the ply cap ribs and the balsa root rib can be filled with epoxy or epoxy and micro-balloons.

This technique should give you a perfect, no gap fit of the wing panels when they are plugged together.

To provide a sturdy connection between the left and right wing panels, a 1/4" hardened steel rod is used. A 5/16" O.D. (9/32 I.D.) aluminum tube is installed in each wing panel to receive the steel rod. By checking the wing plan front view and the top view, you'll find that the aluminum tubes are installed so they are glued to the front of the spars and extra webbing piece. If you didn't do so earlier, add the second webbing piece in the first two bays in each inboard wing section so the front of the webbing is flush with the front of the spars.

The holes shown on ribs W1, W2 and W3 are to locate the aluminum tubing. Rough-up the outside of the aluminum tubing with some coarse sandpaper and slide one tube in each inboard wing section so the end of the tubing is flush with the outside of the ply cap rib. Tack glue the tubing to the inside of the root rib.

To check the alignment of the aluminum tubes, slide the steel rod into one wing panel and join it to the other one. Adjust the tubes as necessary by slotting the hole in the ribs so the wing panels mate squarely at the center. When you've adjusted the aluminum tubing so the wing sections mate properly and with the steel rod still in place, clamp the wing sections together at the center. Tack glue the aluminum tube to the front of the spar. After the adhesive sets up, remove the clamp at the center and slide the wing sections apart and back together again to make a final check of the alignment. If it all

looks okay, slide the wing together again and glue the aluminum tubes to the ribs and the webbing. Add the triangle stock braces as shown on the plans. Glue a piece of scrap hardwood from the spars at the outboard end of the pieces of aluminum tubing to act as a stop for the steel rod.

Glue the top wing sheeting in place onto the first bay of the inboard wing sections. The balsa sheeting should butt up to the ply cap ribs.

To prepare to join the wing inboard and outboard wing sections at the polyhedral joint, cut a slot in the area of the ribs to be joined between the top and bottom spars. The slot should be 1/8" wide and at the center of the spars. Then fit the ply polyhedral brace into both wing sections, checking to assure that the leading edge, trailing edge, spars, and ribs mate as they should for a good glue joint. Then glue the ply brace into one wing section. The brace should be glued to the top and bottom spars and to the ribs. After the adhesive has set up, use slow set-up epoxy down the ribs, spars, leading and trailing edge and in the slot and top and bottom spars to which the brace is to glue. Slide the wing sections together. Make absolutely certain that the wing sections are perfectly aligned to each other. Clamp the mated ribs together, block up the outboard section and let it set up overnight.

Finish sand the wing leading edge and ribs and sheeting by using a sanding block. Shape the wing L.E. exactly as shown on the plans. Perform a tip-tip balance of the wing by mounting the wing panels onto the steel rod and tape them together at the center. When holding the wing upside down, balance the wing panel at the center. Add weight to the tip of the light wing panel as necessary. We balanced our wing by gluing a medium size nail to the inside of the tip rib of the light panel.

Fuselage:

The fuselage sides are made of three pieces of 3/32" sheet balsa. Three are used because it would cost an arm and a leg to buy a sheet large enough for a one piece side even if you could find it. On the inside of each side sheet is a 1/16" plywood doubler. The outer edges of the doubler are noted on the plans with solid triangles.

RCM BIG BIRD TOO
Designed By: Dick Tichenor

TYPE AIRCRAFT
Sport/Trainer
WINGSPAN
84 Inches
WING CHORD
11½" (max)
TOTAL WING AREA
900 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Flat Bottom
WING PLANFORM
Straight Center
Tapered Outer Panels
DIHEDRAL EACH TIP
5¼ Inches
O.A. FUSELAGE LENGTH
52½ Inches
RADIO COMPARTMENT AREA
(L)12-5/16" x (W)2⅜" x (H) 4"
STABILIZER SPAN
26⅞ Inches
STABILIZER CHORD (incl. elev.)
6¾" (Avg.)
STABILIZER AREA
181 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
9 Inches
VERTICAL FIN WIDTH (incl. rudder)
6⅝ Inches (Avg.)
REC. ENGINE SIZE
.10 Cu. In.
FUEL TANK SIZE
4 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
3
CONTROL FUNCTIONS
Rud., Elev., Throt.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Ply
Wing ..... Balsa, Ply, & Spruce
Empennage ..... Balsa
Wt. Ready To Fly ..... 56 Oz.
Wing Loading ..... 8.96 Oz/Sq. Ft.

Cut out the side pieces and assemble them over the plans. Cut out the ply doublers. The doublers are then attached to the side sheets making sure to **make a left and a right side.** Epoxy is recommended for this assembly to prevent warping. The easiest procedure is to smear the epoxy close to the edges all around the doubler. Then spread beads of epoxy in a zig-zag pattern generously across the doubler. Next, position the doubler on the side sheets being careful to line up the edges and press them together firmly. You did make a left and right side, didn't you? If not, you can start making another side correctly.

Mark the location of all formers, strips, and triangle stock with a soft pencil on the right hand side sheet. Glue the strips and triangle stock in their respective locations. Next, the formers are glued in place, making sure that they are correctly located and square to the side panels. Use epoxy to attach F1 and F2. Also, use epoxy to attach the landing gear mounting blocks. When the glues have set up, drill holes for the landing gear struts through the 1/4" ply bottom plate and the 3/8" pine blocks. Trim a radius on the edge of the holes to allow the wire struts to seat completely in the groove. Goldberg or Du-Bro landing gear straps are used to retain the struts in position.

This is a convenient time to make the servo installation. You will have to make mounting provisions for your brand of radio. Wouldn't it be nice if the radio industry had dimensional standards? We used a Futaba FP-T4L radio and can only say good things about it, it is everything a good radio should be. The only suggestions on servo installation that we will make is to be sure that the servos are mounted high enough in the fuselage to clear the wing center section. Also, follow the manufacturer's instructions.

Locate and bolt the engine mount to F1, blind nuts on the back side of F1 and 4-40 screws make a neat installation. Bolt engine to mount and rig the wire pushrod between the servo and the carburetor arm.

The Sullivan Gold'N-Rod pushrods to the tail surfaces can be fitted to the servos at this time. Do not cut the pushrods to final length

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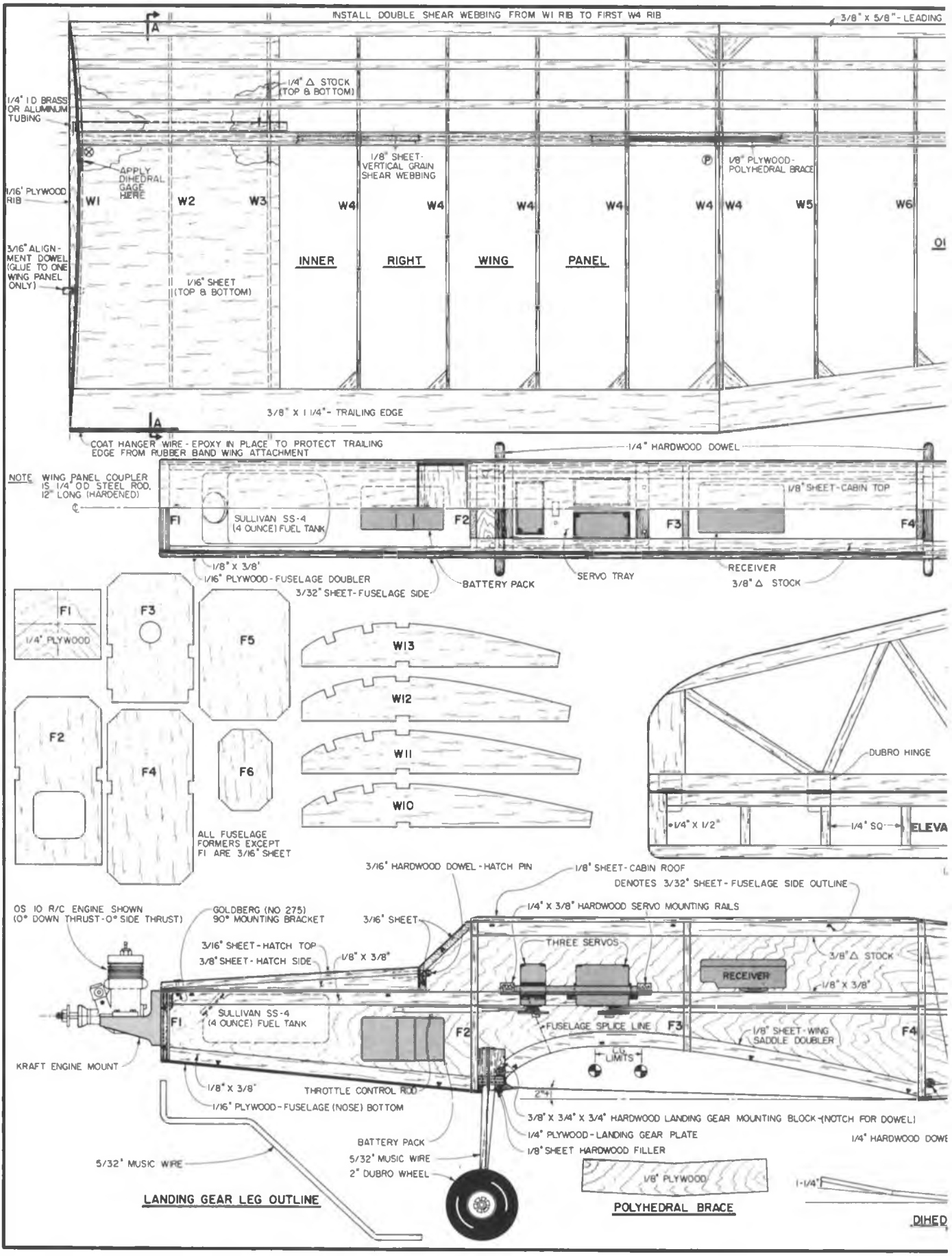
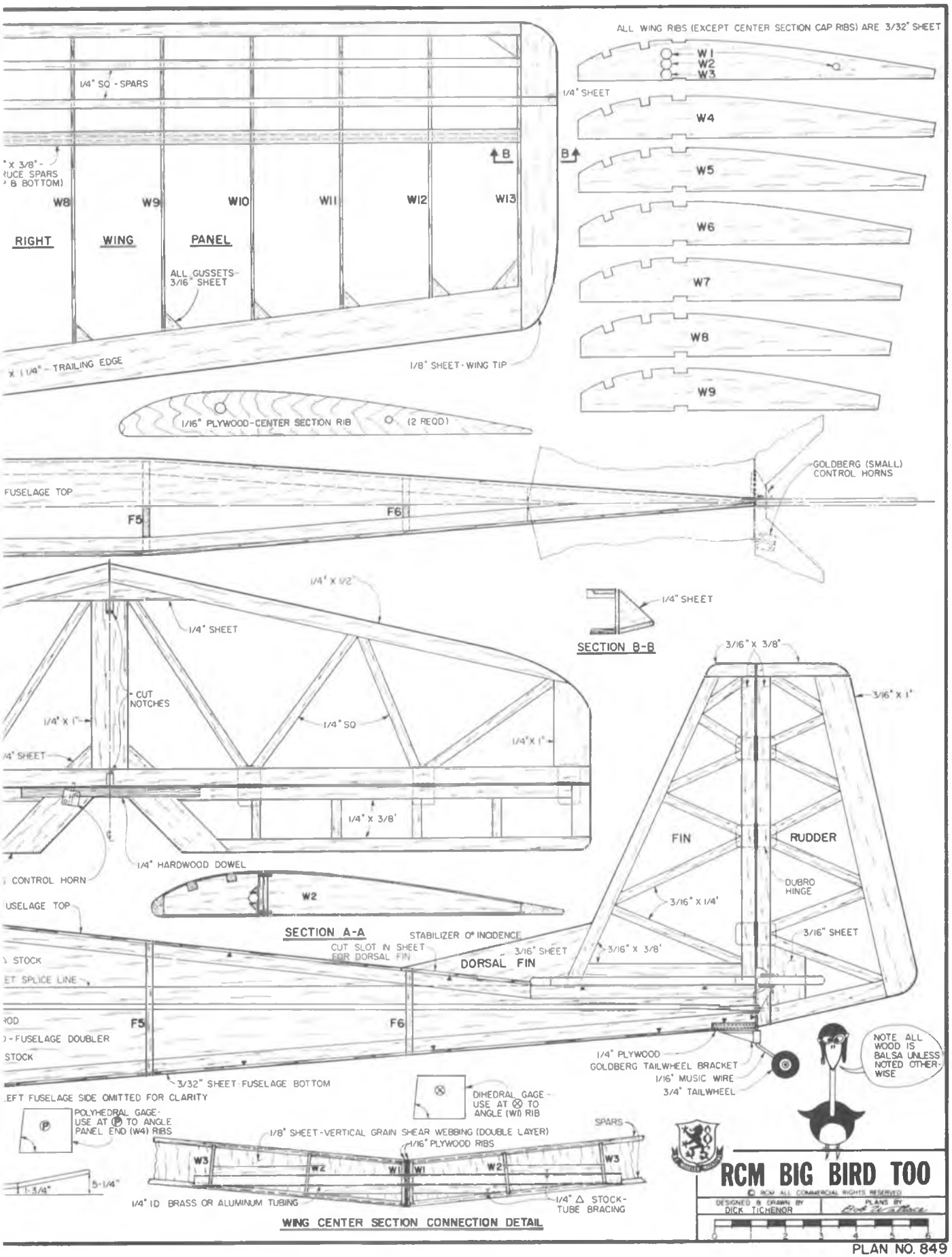

INSTALL DOUBLE SHEAR WEBBING FROM W1 RIB TO FIRST W4 RIB
3/8" X 5/8" - LEADING
1/4" △ STOCK (TOP & BOTTOM)
1/4" I.D. BRASS OR ALUMINUM TUBING
APPLY DIHEDRAL GAGE HERE
1/8" SHEET - VERTICAL GRAIN SHEAR WEBBING
1/8" PLYWOOD - POLYHEDRAL BRACE
1/16" PLYWOOD RIB
W1
W2
W3
W4
W5
W6
3/16" ALIGNMENT DOWEL (GLUE TO ONE WING PANEL ONLY)
INNER
RIGHT
WING
PANEL
1/16" SHEET (TOP & BOTTOM)
3/8" X 1 1/4" - TRAILING EDGE
COAT HANGER WIRE - EPOXY IN PLACE TO PROTECT TRAILING EDGE FROM RUBBER BAND WING ATTACHMENT
1/4" HARDWOOD DOWEL
NOTE WING PANEL COUPLER IS 1/4" OD STEEL ROD, 12" LONG (HARDENED)
1/8" SHEET - CABIN TOP
F1
SULLIVAN SS-4 (4 OUNCE) FUEL TANK
F2
F3
F4
1/8" X 3/8"
1/16" PLYWOOD - FUSELAGE DOUBLER
3/32" SHEET - FUSELAGE SIDE
BATTERY PACK
SERVO TRAY
RECEIVER
3/8" △ STOCK
F1
1/4" PLYWOOD
F3
F5
F2
F4
F6
W13
W12
W11
W10
ALL FUSELAGE FORMERS EXCEPT F1 ARE 3/16" SHEET
DUBRO HINGE
1/4" X 1/2"
1/4" SQ.
ELEVA
3/16" HARDWOOD DOWEL - HATCH PIN
1/8" SHEET - CABIN ROOF
DENOTES 3/32" SHEET - FUSELAGE SIDE OUTLINE
1/4" X 3/8" HARDWOOD SERVO MOUNTING RAILS
OS 10 R/C ENGINE SHOWN (0° DOWN THRUST - 0° SIDE THRUST)
GOLDBERG (NO 275) 90° MOUNTING BRACKET
3/16" SHEET
3/16" SHEET - HATCH TOP
3/8" SHEET - HATCH SIDE
1/8" X 3/8"
THREE SERVOS
3/8" △ STOCK
RECEIVER
1/8" X 3/8"
SULLIVAN SS-4 (4 OUNCE) FUEL TANK
F1
F2
FUSELAGE SPLICE LINE
F3
1/8" SHEET - WING SADDLE DOUBLER
F4
C.G. LIMITS
KRAFT ENGINE MOUNT
1/8" X 3/8"
THROTTLE CONTROL ROD
1/16" PLYWOOD - FUSELAGE (NOSE) BOTTOM
3/8" X 3/4" X 3/4" HARDWOOD LANDING GEAR MOUNTING BLOCK (NOTCH FOR DOWEL)
1/4" PLYWOOD - LANDING GEAR PLATE
1/8" SHEET HARDWOOD FILLER
1/4" HARDWOOD DOWE
BATTERY PACK
5/32" MUSIC WIRE
2" DUBRO WHEEL
5/32" MUSIC WIRE
LANDING GEAR LEG OUTLINE
1/8" PLYWOOD
POLYHEDRAL BRACE
1-1/4"
DIHED

FULL SIZE PLANS AVAILABLE — SEE PAGE 129



ENGINE CLINIC

Clarence Lee

Those of you who bother to read the advertisements in RCM will have noticed that Perry Aeromotive has been advertising a new mixture control carburetor the past few months. However, those who visited their friendly hobby dealer to see or purchase the new carburetor found that it had not been released for sale. Manufacturers have to submit their advertising copy three months in advance of magazine release and try to time release of their new product with publication of their ad. However, things do not always go as planned and oftentimes ads will appear long before the product is available to the public. This was true in the case of the new Perry mixture control carburetor. Minor production difficulties and finalization of the design held up the release of the carburetor. During this period I have received many letters from readers wanting to know when I was going to do a review on the new carburetor knowing that I have always been the first to announce new products from John Perry. I held off doing a review until the design had been finalized and production versions were available. Prototype models of the carburetor have been under test for the past year but it was not until this past month that the finalized production versions were available. At the time of this writing (late June) the carburetor is scheduled for release the first part of July, so by the time you read this it should be available at your hobby dealer.

Although still basically the same carburetor that Perry Aeromotive has sold in the past, two new features have been added. The one of most importance is being able to change the mixture setting without an extra servo and mixture control needle valve. I imagine most everybody has gotten off too lean at one time or another and, unless they had a mixture control device on the engine, had to land and set the mixture richer. This can be particularly exasperating to those flying competition. You get off a little lean and have to try and make it through the whole pattern --- usually at the expense of a cooked engine and loss of points for the different maneuvers.

The new Perry mixture control carburetor will solve this problem as you will be able to richen your mixture simply with the throttle trim.

Any properly designed carburetor should have a venturi shaped intake. The venturi shape adds to the fuel draw capability of the carburetor. By being venturi shaped, the opening above and below the spray bar will be larger in diameter (area) than at the location of the spray bar. When opening the carburetor for high speed, maximum rpm will be reached slightly before the carburetor barrel has reached full travel. This is due to the fact that once the area of the upper part of the venturi is the same as the area at the spray bar, no more air can be brought into the engine. The last 10%-15% carburetor movement does not give any added increase in rpm. Perry has taken advantage of this dead spot in the carburetor and added an extra enrichening stage. In actual operation, as you advance the throttle, rpm will increase in the normal manner until just before the carburetor has reached maximum travel. A slight richening will be noticed and then at full travel the carburetor returns to maximum rpm. This richening just before maximum travel is only noticeable if the carburetor is opened very slowly. Opening in the normal manner it will not be noted.

The carburetor mixture is set in the same manner as with any carburetor — the only thing is that you have to be sure the carburetor is at maximum travel. If not, the extra enrichment stage will be in operation. In the air if you find that you have gotten off a little too lean all you have to do is move the throttle trim a notch or two. This, in turn, moves the carburetor barrel into the enrichment area and approximately 20% more fuel is fed to the engine. This enrichment system does not decrease the power of the engine in any way. This can easily be proven by setting the engine for maximum rpm at full throttle travel and checking the rpm. Then use the throttle trim to richen up the engine and, again, at this throttle position adjust the needle valve for maximum rpm. You will find it exactly the same as with full throttle travel. So any lowering of rpm when moving the carburetor barrel to the enrichment stage is due to the richening of the mixture — not through closing down of the throttle barrel.

Being able to richen the mixture has many nice advantages. There are many maneuvers in the AMA and FAI pattern that will cause an engine to lean out. The Top Hat for example. How many times when you have pointed the nose up for the Top Hat maneuver has the engine started to sag and you have commented "aw shucks" or similar? With the Perry mixture control carburetor you have only to hit the throttle trim, richening the mixture and completing the maneuver. Or, how many times have you gotten off with what seemed like a good setting but towards the end of the flight the engine starts to go slightly lean? Again — with the Perry mixture control you have only to hit the throttle trim and continue the flight.

So far I have been speaking of the advantages in regards to aircraft. However, boaters will find this new richening feature of invaluable use — those using tuned pipes in particular. How many times have you set the mixture — launched the boat — and then when it came "on the pipe" the engine went lean due to the added fuel requirement? So the next run you richen the mixture — launch the boat — and it continues to run rich and will not come on the pipe. With the new Perry mixture control carburetor, you launch the boat with the proper setting and when the engine comes on the pipe, hit the throttle trim which enrichens the mixture to allow for the additional fuel requirement of the engine. John Perry, an active boater, has been using this enrichment system in his

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boats for the past two years without many fellows knowing about it.

The new carburetor is not a 100% mixture control carburetor, i.e., you cannot both richen and lean the mixture with one trim setting. The carburetor can be used to lean the mixture (if this feature is preferred) by opening the carburetor until the enrichment stage is reached and then setting the needle valve for normal rpm. Any further travel will then lean the mixture. There may be applications where leaning would be desired but the main intent of the carburetor is to richen the mixture since nine out of ten times fellows will get off too lean rather than too rich. And, if you do get off with a too rich setting, you are not going to damage your engine as with a lean setting.

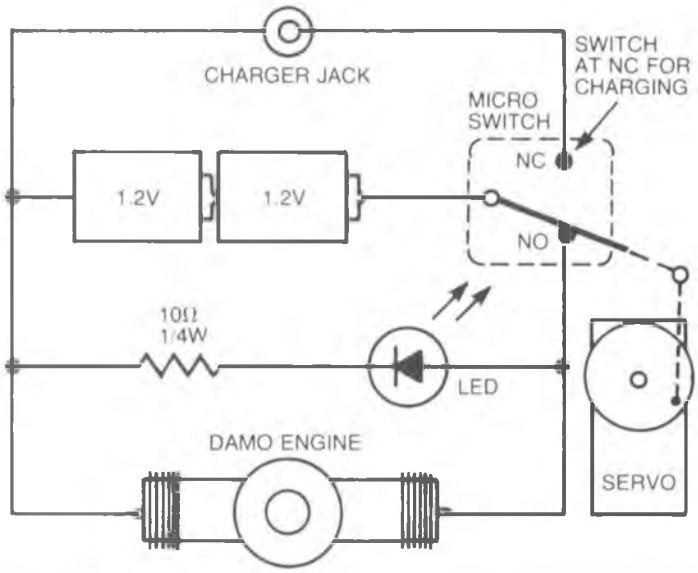
One point John wanted me to be sure and point out is that when setting the needle valve and then throttling down to idle, if the engine suddenly dies at half throttle you have the mixture set far too lean. This is due to shutting off the enrichment stage as you close the carburetor. With a proper setting the transition should be linear and normal. If the high speed is set too lean the engine will stop at approximately half throttle. This is a nice built-in safety feature that will keep you from normally getting off too lean to begin with. You set your mixture at full throttle and slowly throttle down to idle. If the engine dies at approximately half throttle you have the high speed set too lean so richen it up slightly. This pertains only to the mixture control carburetor with its extra enrichening system — not other carburetors in the Perry line.

Another new feature is a micro adjustment screw for setting the idle mixture disc. Users of Perry carburetors will know that this can sometimes be a little difficult after the carburetor has been in use for a while and the "O" rings in the fuel reservoir that retain the mixture adjustment disc take a set. You move the mixture adjusting disc slightly and it springs back to its original position. Or some of you thick thumbed guys can't move the idle mixture disc in anything smaller than 1/8" increments. The new micro adjusting screw lets you move the mixture disc a few thousandths at a time.

At this time the Perry mixture control carburetor will be available only for the .60 size non-pump equipped engines. A pump version will follow later as will the .40 and smaller sizes. At the time of this writing, the exact price of the carburetor has not been set but will be roughly $3.00-$4.00 more than the standard non-mixture control carburetors. The present non-mixture control .60 size carburetor sells for $22.95.

The new Perry mixture control carburetor is only one of several new items under developement at Perry Aeromotive. Being sworn to secrecy I cannot tell you at this time, but the next product to be introduced by Perry Aeromotive will be quite revolutionary in the model engine field. So keep reading Engine Clinic as we will be the first to let you know.

Technical editor Dick Kidd gave me a call this past month regarding an idle problem a good friend of his was having with his DAMO four stroke twin. We kicked around the various things that I thought could be causing the trouble which Dick, in turn, relayed to his friend. I, in turn, received the following letter.



Dear Mr. Lee:

Through our mutual friend, Dick Kidd, I asked for your help in solving idling problems in my DAMO engine. I appreciated your attention at the time. I think that the best way to return your kindness is to tell you what the outcome was.

As Dick explained to you, the DAMO in question had about two hours running time, and everything looked okay. We all would like a jewel like this to idle at 1000 rpm and respond to the throttle like a good motorcycle engine should; we know that's wishful thinking. However, this engine was idling good at 2300-2500 rpm on the first model, on which I used it. The recovery was guaranteed by on-board Nicads switched on by RC. Now I couldn't get it to idle at 3500 rpm, even with the batteries on. It was very rough and erratic; the high end was okay. I tried different glow plugs — the Fireball hot is still the best — more nitro, loosening the plugs to reduce compression. No change for the better.

Then I tried choking the carb while at idle and realized that I had an air leak somewhere, because the engine kept on running for a while with the carb completely closed with my finger. It was in the intake tubes, at the head joint. The nuts were snug (you don't tighten ***hard*** *on aluminum heads) but there was no good seal.*

To find the leaks I closed the needle valve, opened the throttle, put the carburetor in my mouth (ugh!), moved the pistons to get all valves closed, and sucked hard while listening carefully. I also used this way to monitor the tightening of the nuts; it took about an eighth of a turn on each. Now the DAMO is idling very good again.

This engine is ideal for models of the slow and/or antique kind, with plenty of wing area, to which the addition of four or five ounces of batteries and servo means very little in performance. The increase in reliability and ease of operation is so greatly improved that I highly recommend the use of on-board glow batteries. A pair of Sub-C Nicads in series will fire the hot Fireball plugs for thirty continuous minutes, which means they will be good for a couple hours of flying time if you use them only for starting, taxiing and landings. These same batteries will last only 10 minutes on more regular glow plugs, like the Cox Long, for instance. If weight is not critical, by all means it is better to use "D" size batteries. ***A word of warning:*** *the "D" size batteries available in the general market (GE, Radio Shack) are just a "D" size plastic shell with a Sub C battery inside.*

The simple circuit I'm using includes a Light Emitting Diode (LED) and a ballast resistor. The light goes on when the glows are energized. The LED uses so little energy compared to the glow plugs that it is negligible. For about four dollars you can buy the micro-switch, the LED, the resistor and a grommet to hold the LED. The charging jack and the charger depends on what you may have in your junk box. Tatone has a suitable charger. I use the retract command on my transmitter to operate the glow-servo; I suppose you could just activate the micro-switch with the throttle servo if you don't have an extra channel in your radio. The LED is mounted so you can tell right away whether you left your glows glowing. The only bad point of this system is if you touch one of the plug wires to the engine body, the other plug gets 2.4 volts and burns. It's a matter of being careful or having some spare glow plugs handy.

Once again, thank you for your attention.

It goes without saying, that you may use any part of this letter in your column, if you wish.

Yours truly,
Henry Arance
Upland, California

Thanks for sharing the solution to your problem with us, Henry. It is always nice to know when problems have been cured — and how. I receive many letters every week

from fellows having problems but few ever write back to let me know if my suggestions solved the problem or not. It is always appreciated when fellows do let me know.

Leaking intake tubes on a four stroke engine can really cause erratic performance. This was a major problem with the old Morton/Burgess M-5. In order to get the engine to run at all, you had to seal all the intake tubes as well as all other gasket surfaces. It was one suggestion I did not think of until receiving your letter.

Dear Clarence;

I've been reading your column in RCM since it started, and have found much of the information very useful.

I thought I'd take a minute and describe to you how I solved an engine rust problem.

Last year I started using piped engines for the first time. Within weeks I began experiencing very severe engine corrosion. It was not just a little discoloration here and there, but thick brown rust. At one time I had a Rossi so corroded that it looked like the inside of an old auto radiator.

I had been using commercial 5% nitro, synthetic oil fuel (Sheldon's). Engines were run dry after each session, and lubricated with WD-40.

Only my piped engines were affected; several conventional muffler engines were sparkling clean on the inside.

I switched from WD-40 to after-run oil, and gun oil, and found very little improvement.

In desperation I started partial disassembly and flushing after each flying session. This stopped the rust, but was a real pain.

I started questioning as many fellow pattern fliers as I could about their corrosion problems. The results were startling. Some people had no corrosion, and attributed it to religious use of things like gun oil, after-run oil, WD-40, etc. Others had no corrosion and did nothing. A third group like myself were having severe corrosion. All of them were experiencing it only in piped engines. Fuel brand didn't seem to matter. They had a wide range of suspected causes. Moisture in fuel, menthanol left in engine, nitromethane left in engine, moisture in air, etc., etc. It was clear that everyone was guessing at the cause. These people were experimenting with many techniques to control corrosion. Things were being tried such as running the engine on straight WD-40 and coating all exposed internal parts with gun blue.

Note: Engines only run on WD-40 after flying session to remove foreign matter left in engine.

I decided at this point that no one really understood what was happening and, although my procedure of flushing worked, it wasn't really attacking the cause.

About a month after I started flushing, I was examining the pipe at home. I noticed what appeared to be water droplets collecting on the inside. These droplets turned out to be very acidic. An X-Acto blade would become corroded with thick brown rust in minutes with the liquid extracted from the pipe. As a reference, tap water would only slightly discolor a blade after a day.

What I believe is happening is the following:

(1) On final approach, the pipe cools down. Corrosive exhaust gases can then condense on the inner surface.

(2) In handling the airplane, some of this condensate finds its way into the engine.

(3) After-run oil, etc., can't neutralize or fully protect against the acid.

(4) My partial disassembly and flush after each session worked because: a) The flush removed any acid; b) I always left the pipe off --- not by design, but because I wanted to get on with something else.

The condensation of acid inside the pipe fully explains to me the failure mechanism. It accounts for most of the observations, such as the differences between piped and muffled engines.

What I can't account for is why some people do not have corrosion. Perhaps one of your other readers is a chemist, or chemical engineer, who can explain or account for the chemical reaction that forms the acid.

At any rate, until I'm sure we have an additive or fuel that doesn't form corrosive gases, I've adopted the following procedure at the end of each flying session.

(1) Run the engine wide open until the pipe is "smoking hot."

(2) Pull the fuel line and run the engine dry.

(3) Remove the pipe until the next flying session.

(4) Flush the engine several times with WD-40. I load engine through exhaust and intake and drain through the exhaust.

(5) Load the engine with Hoppe's gun oil.

This procedure has 100% eliminated corrosion for me. It requires about as much time as a pre-flight range check and retract hook-up.

If anyone thinks it's overkill, I can produce several hundred dollars in Rossi engine parts ruined by corrosion.

Very sincerely yours,
Dennis D. McDonald
San Jose, California

In years past rust was never much of a problem when our fuels contained castor oil for lubrication and few engines used mufflers. Of course castor would make a lot of carbon, varnish, and gunk in general, in an engine. When the synthetics came along the rust problems began as many synthetics are derived from acid base stocks. The UCON synthetic oils are an exception although they do stain and darken aluminum. With the use of mufflers becoming more universal the rust problems increased. Tuned pipes seem to magnify the problem even more as you have found out. Acid residue in the pipe is pumped back into the engine as well as condensation as the pipe cools after a flight. This condensation is highly acidic in nature.

I wish that there was an additive that could be put in the fuel that would solve the problem but I am afraid there is none that I know of. The complete solution is to remove the pipe and run the engine out dry at full throttle at the end of a flying session. Upon returning home, remove the back cover and flush the engine with a kerosene type solvent. **Do not** use alcohol — this only attracts more moisture. Then load the engine with a good after-run oil. Those sold in your hobby shop, gun oil, sewing machine oil, etc. I have always mentioned 3-In-1 in the past as it is the most easily obtainable but not necessarily the best oil. However, it is better than no oil at all. I realize few fellows are going to want to bother pulling the engine and flushing with solvent — myself included. Just removing the pipe and running the engine out dry at full throttle will help immensely. You want to run the engine out dry at full throttle since doing so at idle still leaves considerable fuel residue in the engine. Then load the engine with an after-run oil. It also wouldn't hurt to flush the pipe (if used) out once in a while to get rid of all the accumulation that will form in it.

As far as some fellows doing nothing and having no corrosion or rust at all — they just think they don't. They might be surprised if they pulled the back plate and took a look at the rear bearing. I repair many engines every week and seldom get an engine in that is not rusted or has corrosion in some degree or another. Those with no rust are those using castor oil based fuels such as K & B 100 with castor, Duke, Fox fuels, etc., and no mufflers.

Dear Mr. Lee;

Before asking my question, I want to say thanks for the advice and suggestions that you have so willingly provided over the years. I, and many other modelers, have benefitted from your experience and saved ourselves many long hours of experimentation and often frustration to find solutions to our problems. When we want to experiment, you offer encouragement and advice for us also. Many thanks Clarence.

My question this time involves engine bearings. I recall that you have discussed this before, but I was unable to locate that material. After crashing an airplane with an OS .45 FSR, I completely disassembled the engine to check for damage. I always replace any parts that are questionable. I found no damage whatsoever so I installed new gaskets, reassembled the engine, and mounted it in another model. The engine ran as good as always, however, it pumped as much or more fuel out the front bearing as it burned. It didn't do that before the crash. I suspect that the front bearing is bad, but it feels good. The crankshaft is not bent. I obtained a new bearing at a bearing store, however, it is double sealed and pre-greased. The grease adds a little drag to the bearing. I suspect this will decrease as

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SUNDAY FLIER

Ken Willard

Let's talk about seaplanes. Or maybe, to be more accurate, let's talk about waterborne aircraft.

Every now and then somebody asks "What's the difference between the terms 'seaplane' and 'flying boat'?" Well, basically, a seaplane is an airplane that can land on the water, and take off from the water, but uses floats to do it. The fuselage, or body, is up out of the water, mounted on struts to the floats. The flying boat is, as the name implies, a boat to which wings have been added so that it can take off from the water. The body of a flying boat is correctly referred to as the hull.

Most amphibians are flying boats with retractable wheels, but there have been some seaplane designs where wheels have been added to the floats and capable of retracting into them.

Seaplane design has challenged aeronautical engineers to dream up many variations in flotation gear. One of the earliest concepts was merely to replace the main wheels with floats, put a smaller float at the back where the tail skid normally would be, then made take-offs and landings just like you would on wheels. But it was necessary to be very skillful — especially when there was any chop on the water. Floats have considerably more drag than wheels, and if one float breaks loose and the other one is still planing, it's pretty easy to "water loop" and spin around on the float that's still planing.

Twin floats have good lateral stability in the water, but they still can spin the aircraft around if one breaks loose early; even though the tail float concept was discontinued, the same approximate forces are in effect when twin floats are "up on the step."

The flying boat concept has always been my favorite — probably because I've had the most success with it. It is even more attractive when radio is added. One of the problems with the free flight flying boat was adjusting it so the wingtip floats would be clear of the water at take-off, because a dragging tip float can cause problems. This becomes less critical when you can keep the model level with radio control. Another advantage of the flying boat set-up is that you don't have to rig up a Mickey Mouse lashup from the air rudder to the water rudder — particularly if you use the long planing hull, where the bottom of the air rudder serves as a water rudder.

Lateral stability on the water can be obtained by tip floats for the wing of the flying boat, or by "sponsons" which stick out from the side of the boat hull. The sponson doesn't give the same degree of stability, but it's easier to keep it clear of the water when on the step, thus virtually eliminating the water looping tendency.

An interesting development in waterborne aircraft is the flying boat with water skis attached. The only model I've ever seen with this idea was the one made for Lockheed by Lanier Industries as a part of a research project. There have been several full scale aircraft that experimented with it — Martin and Convair tried it. So far, the results have not warranted widespread use, although the basic idea, on full scale aircraft, should be of value. At take-off speeds, the hulls of flying boats take a tremendous beating, and if you could lift them clear at slower speeds and then take off from the ski, the structure wouldn't get such a battering. Of course, with models, this problem is greatly lessened.

The single float seaplane, with tip floats, as used for catapulting from battleships prior to the aircraft carrier era, makes a good rugged seaplane set-up, and one that lends itself to radio control.

Then there's the twin hull flying boat design, like the Savoia Marchetti design that Italo Balbo flew across the Atlantic back when that was an adventure rather than an everyday travel mode.

No matter what float set-up you use, one of the design problems is the placement of the step — and you can get into some pretty heated discussions about it. Should it be ahead of the C.G.? Behind it? How much? Or should it be right under it? And which is best — just a transverse break in the hull line, or a boat-tail type that comes to a point?

For years, on free flight designs, I used to place the step ahead of the C.G. — almost under the leading edge of the wing. It seemed that if I put it where the full scale designers had theirs (mostly right under the C.G.) the free flight model would get up on the step, skitter across the water with the nose down, and refuse to take off unless it happened to bounce into the air from a slight ripple. Even then it would occasionally porpoise back into the water and go skipping along. So I moved the step forward as a substitute for up elevator control, and it worked. With the advent of radio control, I continued to use this set-up because, at first, all I had was rudder control. And I used the straight transverse step because it worked okay and was easy to build.

With the advent of proportional control and the capability of getting up on the step by applying up elevator, then neutralizing while on the step, and maybe holding just a little back pressure to keep the nose from digging in, it became apparent that take-offs could be made easier with the step under the C.G. like it is on full scale seaplanes. So that's where I put it now.

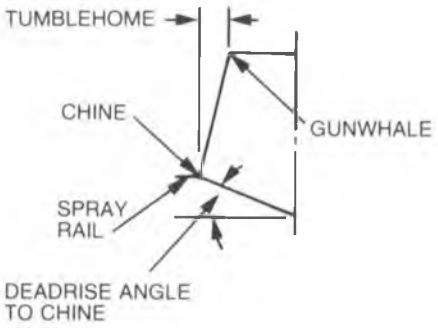

FIGURE 1

A very useful feature that you'll see on several flying boat designs is the spray rail which is added to the hull forward of the step. This is a flat strip along the side of the hull on either side which extends the planing surface beyond the side of the hull. (See Fig. 1.) It does two things; first, as you start to plow through the water before coming up on the step, it deflects the spray outward and away from the hull. Then, after you are on the step, it increases the lateral stability by giving the effect of a wider hull. I've seen several designs that were marginal on take-off suddenly become very reliable when the chine was added.

How about the thrust line on a single engine flying boat? Should you use up thrust, since the engine is above the C.G. and gives you a diving moment as power is increased? And what about side thrust?

There is no standard answer, since the conditions will vary with each design. However, if you are using a design where the angular difference between the wing and the stab incidence is more than a degree or so, you'll find that this will more than offset the diving moment of the thrust line. On one design, where I have three degrees differential, it was even necessary to add downthrust to the engine. Interestingly, I also had to add left thrust, because with the engine setting high, the slipstream vortex was hitting the right side of the fin instead of the more normal situation where the flow goes around the fuselage and hits the left side.

Another thing that you have to keep in mind is that the wing should be at a lifting angle when the model is on the step — otherwise you've got a fast hydroplane that

Jetex powered flying boat using "Sponsons" for lateral stability on water. Marginal effectiveness in cross winds.

Profile view of "Dreamboat," an early R/C design which had rudder and "kick-up" elevator. Note step under leading edge of wing to reduce "plowing" before applying the elevator, which could only be used momentarily since it was full throw.

The "Wavemaster" had full house control (rudder, elevator, aileron and engine control) and was very responsive both on the water and in the air. Step was located under the C.G. location and was of "boattail" design instead of transverse.

The "Pondhopper" hull was essentially a box-type cross-section with a straight transverse step under the C.G.

The twin float "Sunday Seaplane" has good water performance because the floats are large and spaced well apart.

Dick Hanson's Top Flite Taurus has spectacular performance. Efficient float design was developed by the Skyknights R C club of Portland, Oregon.

won't leave the water. But if you overdo it, the nose of the floats — or the hull — will tend to dig in.

So there's a few of the design challenges that make waterborne aircraft so much more interesting than landplanes — at least to me. Add to that the fact that you're flying from a lake or a pond, and it's usually cleaner and more pleasant, and you've got things going for you. Then too, flying sites are being gobbled up by housing and industrial developments, whereas developers are building more and more artificial lakes for second home resorts, and you're not so

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Converting a land plane to a seaplane by replacing the landing gear with a single float and wing tip stabilizing floats, as in the "Islander" design, usually gives more reliable water performance than will twin floats.

CUNNINGHAM ON R/C

Chuck Cunningham

Chucki, 13 year old Weimarainer watches over the bones of 30% size Fly Baby.

Fly Baby without cowl, but with the same pilot who has flown all of my Big Birds.

There are a number of super products on the market to make the life of an RC'er easier. Some enterprising guy, probably working out of his basement or garage, invents a gadget or a gimmick, brings it to the model market and presents it to the public. Oftentimes this gadget or gimmick becomes a success and the inventor goes on to operate a tidy small business. Just as often, and perhaps even more often, the inventor or designer attempts to market his product but, even though the product is good, the sales simply are not great enough to pay for the cost of producing and advertising the product. The unfortunate result of this is that another good item disappears from the model market. This is the reason that the little man in the hobby has such a tough time staying in business, and the reason that so many fine kits have come on the market to suddenly disappear forever.

There were simply not enough sales to warrant the time and investment to bring the product to the modeling public. It's really a tough business.

The same problem affects the neighborhood hobby shop. The man bringing you the service of stocking engines, kits, accessories, radios, etc., must get paid for this service. If he dosen't get paid for this service in the form of sales and profit, he has to close his doors. Big, mega-bucks discount mail order companies are great, they have just about everything in stock at a super price, and if you want it they will ship it to you. They, too, offer a service. Sometimes in the pursuit of more and more sales, they will offer super discounts. But, if the overall volume falls, the discount structure simply doesn't allow enough "profit" to continue operations. Several rather large, excellent mail order discount houses have been forced to close due to this.

What's the answer? Really beats me. We need the inventor working in his garage to perfect a new item. We need the small kit producer to bring a wide assortment of kits to the market. We need the large kit producers building fine kit lines and accessories. We need the corner hobby shop to supply our needs and, quite frankly, we need the large discount houses to offer their kind of service. We need all of them. How to keep them all afloat in this age of inflation and recession is a tough question to answer. I don't have the answer; certainly it's not a problem for government, it's a problem of economics. The most able will survive, and those with not enough sales or profit margin will be forced to close. Whenever any one of these operations has to close his doors, the general modeling public suffers.

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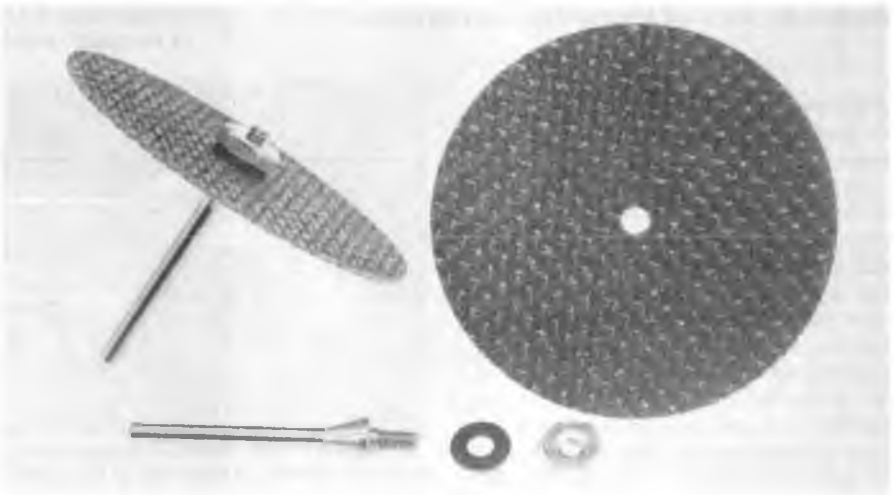
How do you bend wire? If you're a serious modeler who likes to design and build his own creations, building wire parts can become something of a problem. If you only construct kit models you really don't worry about bending music wire --- that is until you have to straighten out a bent landing gear, then you begin to wonder how you bend wire. I am quite happy when working on my own designs. Something in me has always pushed me along to design and build my own aircraft, and I have been pushing you to do the same for many years. I've told you how to design, how to build, how to cover, how to install radio equipment, and how to learn to fly, but I've never taken the time to talk about wire bending, so here goes. First, however, let me say that I don't believe that today's music wire is nearly as strong or as stiff as the wire that was available twenty or thirty years ago. I'm sure that I'm not getting stronger, so it must be the wire. If any of you know about this for sure, I would really like to know, because the wire that we're using really doesn't seem as tough as it was, even though a lot of our aircraft are larger and heavier. But, back to wire working.

Bending smaller wire, 1/16" and under, is a snap. So is cutting it. I simply purchase a pair of large, flat nose lineman's pliers with a cutting jaw and you will be able to handle



all of the smaller sizes of wire. When you move up to 3/32" wire it becomes a bit more of a challenge to cut it. You can still make pretty good bends with the pliers, but cutting it off with a pair of pliers gets a bit tough, unless you're an arm wrestling champ. The next tool to acquire for wire working is a Dremel tool with a cut-off wheel. First rule of operation: always clamp the wire to be cut in a vise, and always wear a pair of safety glasses when operating a cut-off wheel. The next thing to acquire is a House of Balsa Tuf Grind cut-off wheel. These are reinforced wheels, 2" in diameter, and do a beautiful job of cutting music wire with very little wear, and almost no breakage. Get one, they're super.

Okay, now that you can cut a piece of music wire, how do you bend it — pliers, a vise, or a wire bending tool? Harry Higley produces a bending tool that will work well for simple bends in 1/8" wire and smaller. For really serious wire bending you need a product produced in the basement of Breiten Products, 1000 E. Byrd St., Appleton, Wisconsin 54911. Hobby Lobby also handles the Breiten line. At any rate, this is truly a wonder wire bending machine. It will bend up to 5/32" wire, and will allow you to fabricate your own 5/32" coil nose gears. I have used mine for over ten years and it is still working well. The only problem that I have is that it will not bend wire of larger diameter than 5/32", so when working on landing gears for large models I have constructed my own wire bender along the same lines. Now I can form 3/16" and larger wire, not with ease, but with a lot of muscle. Also, using the same simple leverage idea as the Breiten bender I have made wire benders to do special jobs. I have one for bending small bolts to make 'J' bolts, one for bending 3/32" wire for tail wheels on larger aircraft, one for bending 1/8" wire with a bend on each end so that you can bend pairs, or more, of wire parts that will have exactly the same length at each bend. This type comes in handy when making cabane struts for biplanes when you want each bend length to be exactly the same. I have one last little jig for bending strip aileron fittings so that I can get two bends at ninety degrees to each other. Sometimes I will sweep the aileron wire forward on a low wing aircraft to put a differential movement to the ailerons for a smoother roll rate, but often I want two right angle bends at ninety degrees.

All of the wire jigs are easy to make, the only problem that you may have is in finding the raw material to fabricate them from. I use steel flats, 1/4" thick x 1½" wide. Most steel fabricating companies generate a goodly amount of short pieces that get tossed into the scrap tub, but finding a steel fabricator who will take the time to dig them out of the scrap tub is a bit tough. For pins I use short pieces of 5/32" wire on the small benders and short pieces of 3/16" wire for the larger benders. If you're going to build a larger bender for lots of uses, go to a store that sells supplies to machine shops and purchase some drill bit stock, 1/4" diameter will just about do the trick. You will probably have to cut it to length with an abrasive cut-off wheel since a hack saw will just bounce off the drill stock. You can use a hack saw to cut the steel flats to shape. You can drill the required holes in the steel flats with a normal hand drill, but you will also burn up several bits doing it unless you have a variable speed drill. Steel should be drilled at about 800 rpm or less, while most drills are designed to turn a 1750 rpm. Be sure to wear your safety glasses when working with steel, and watch out when you're drilling because the metal can get darned hot and give you a painful burn.

Breiten wire bender.

Once your bending jigs are complete, you can hold the wire posts in place with Hot Stuff. Be sure to clean off the wire before you try to stick it to the base with Hot Stuff. The oil coating on the wire will prevent its sticking. If you want to build your own wire bender, give it a try but, frankly, I suggest that you purchase a Breiten Bender, since all of the hard work has been done for you. Breiten also makes another item, a wire cutter which will cut up to 5/32" wire with no burr. It actually is a wire parter, pinching the wire between two tooling dies, causing the stiff wire to fracture at the pinch spot. There are several large commercial wire parters on the market costing three or four hundred dollars and up, but for us modelers, Breiten does it for a lot less money. I'm not sure of the current cost of these items, but if you're interested write to Breiten or check in Hobby Lobby's catalog.

When it comes time to fasten two pieces of wire together to form a landing gear or cabane strut, make sure that the two pieces of wire are well-cleaned, using fine sandpaper. Mate the two parts together and wrap with copper wire. When well-wrapped, solder the parts together with a good soldering iron and Stay Brite Silver Solder. Be sure that after soldering you wash off the solder joint with soap, water, and an old toothbrush. If you do not, the flux used with the Stay Brite solder will cause the joint to rust. Fabricating wire parts doesn't have to be a chore, it can also be one of the fun things in model building.

●

While on the subject of how-to-do-it, Helmer Johnson wants me to pass along another of his great suggestions. Most of us put a drain hole or drain pipe out of the engine cowl of the aircraft so that any burned or spilled fuel or oil can run out. But how many of us build a drain hole into the tank compartment so that if the fuel tank leaks or the fuel line ruptures the spill will run out of the model before that tank compartment gets soaked or the battery pack gets eaten up by fuel? It's a very good idea, and one that can prevent a disaster. Did you ever have a rubber stopper come loose in your tank, flooding the front end with raw fuel, and you didn't even realize it until the damage was done? If this hasn't happened to

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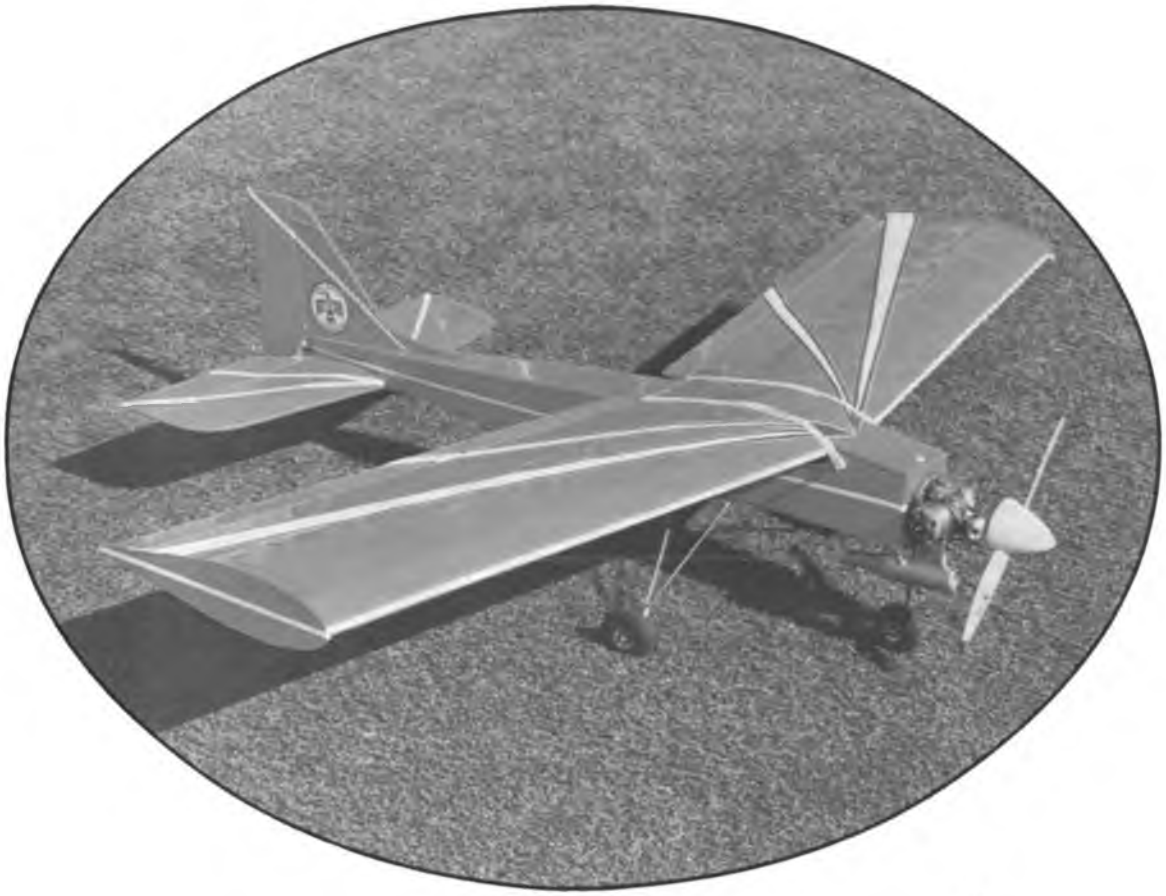
Bob Husk's P-63 King Cobra customized from an Andrew's Trainermaster kit.



HOOKER

This .60-.61 powered Hooker, with its swept-back wing, has been used extensively as a club trainer and in fun-flys for the Ft. Worth Thunderbirds Club.

BY CHUCK CUNNINGHAM

The Hooker is a fun airplane. She is easy to build, easy to transport and, best of all, a dream to fly. There is nothing complicated about the Hooker; the swept wings are easy to construct, and the fuselage goes together fast and simple.

Swept wing designs have been around for a long time. It has been proven over the years that by sweeping the wings aft, a tremendous amount of stability can be achieved, and yet the roll rate does not suffer as it does with excess dihedral.

Swept wing models such as the Hooker are quite at home in Fun Fly type contests. She can take off in almost no distance, spin either way at most any throttle setting (either normal or flat spin), roll as fast as you want, loop in a tight radius, and yet come in for landing just about where you want. With swept wing aircraft you can make either a greased-in landing, or rack back and fan down like a 747 coming home.

The Hooker has been used extensively to train beginning fliers; they also find her very easy to handle. Two things aid the Hooker's ability to fly so gently. First, the tip plates contain the airflow over the wings and, second, the simply made diamond section airfoil of the horizontal stab keeps the aft end of the aircraft flying much longer than does a flat plate of balsa.

Swept wing designs have been flying here in Texas since the early Sixties, dating back to the Sweeper design by Bernie Haire and Edd Alexander. Pattern aircraft swept wings were pioneered by Don Lowe, and they too have withstood the test of time. If you really want to enjoy a superb flying, easy to build, non-scale-like-anything, airplane, then grab your trusty X-Acto knife, stack of balsa, and pot of glue, and get started. You won't be sorry.

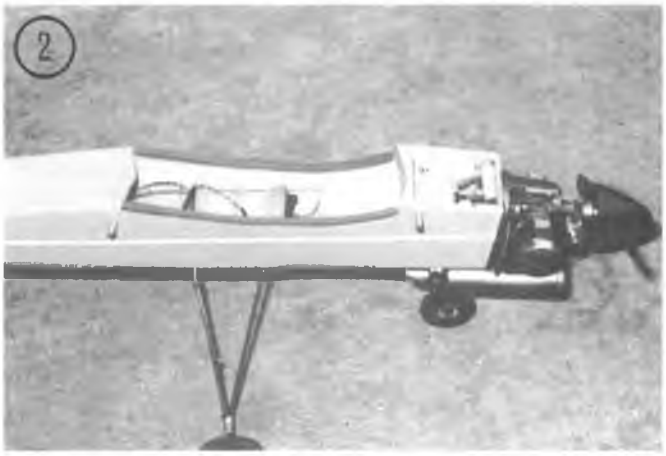
CONSTRUCTION

The best way to begin this, or any other model that you want to build, is to first study the plans and to read the construction article over a couple of times. You can "kit" all of the pieces before starting, or do like I do when scratch building --- start working on the fuselage and, then when you're committed, build the wings and then the tail feathers. No matter how you start, it will go very quickly. The prototype used Hot Stuff Super T throughout, but you can use Titebond and epoxy, or a combination of all three types of glue. Get out your fine point felt marking pen and let's get started.

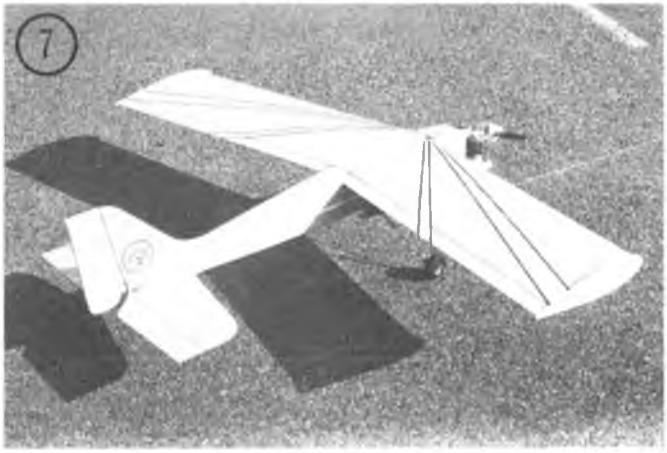
Fuselage:

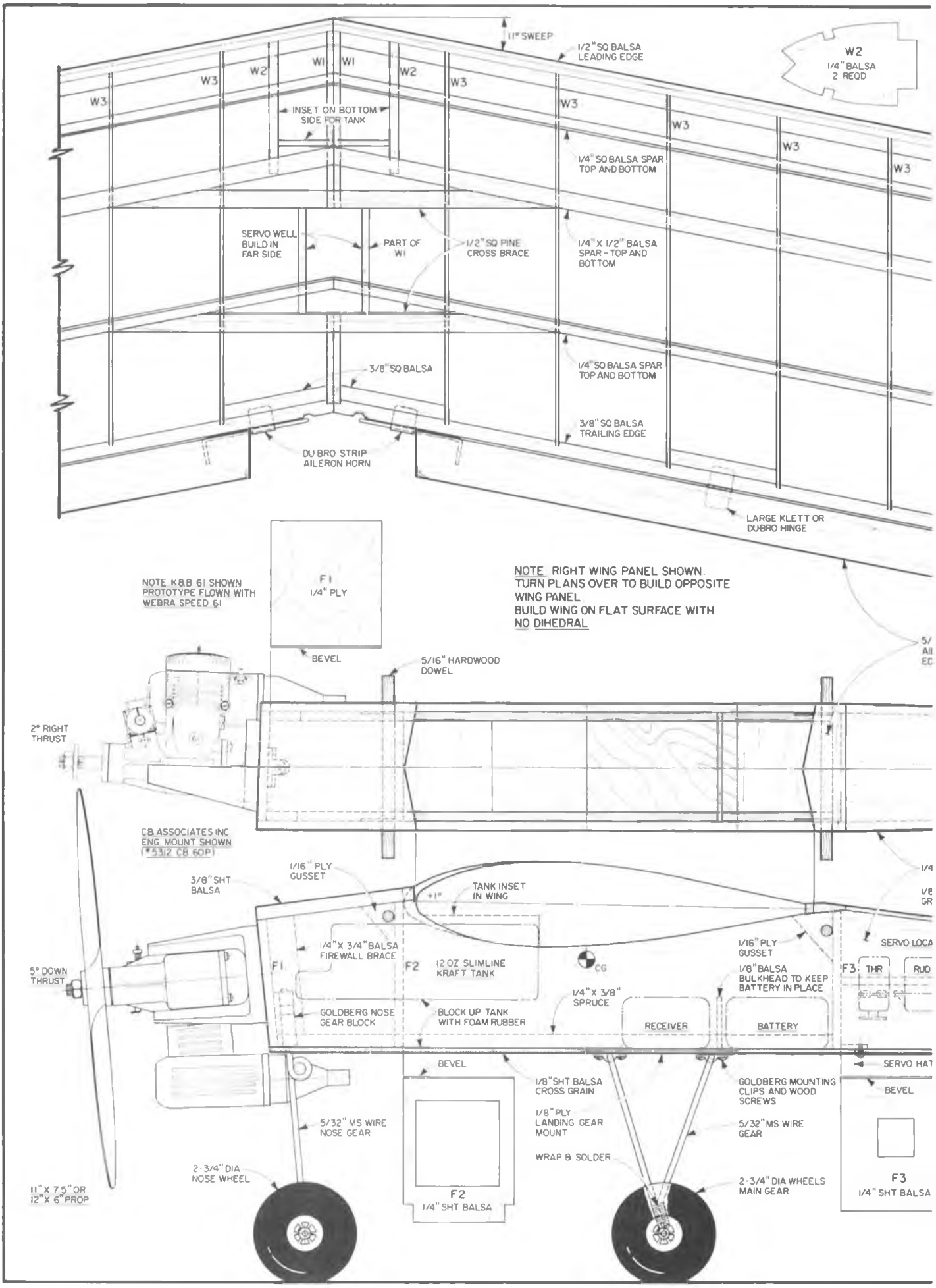
Carefully draw one fuselage side on a 1/4" x 4" x 48" piece of balsa. Double check that you have everything drawn correctly. Draw in the location of the firewall (this piece will be the right side, so be sure and mark the firewall to give you the needed right thrust. Examine the top view on the plans. When you have drawn everything to your liking, and you're sure that the wing saddle is correct, with the proper amount of incidence as shown, pin the first side to another piece of balsa of the same size and strength. Cut the two sides out at the same time, using a sharp X-Acto knife and, a good straight-edge. Cut the wing saddle out with either a knife or on a jig saw. Leave the sides pinned together. Turn over and again mark the former locations on the

text to page 44

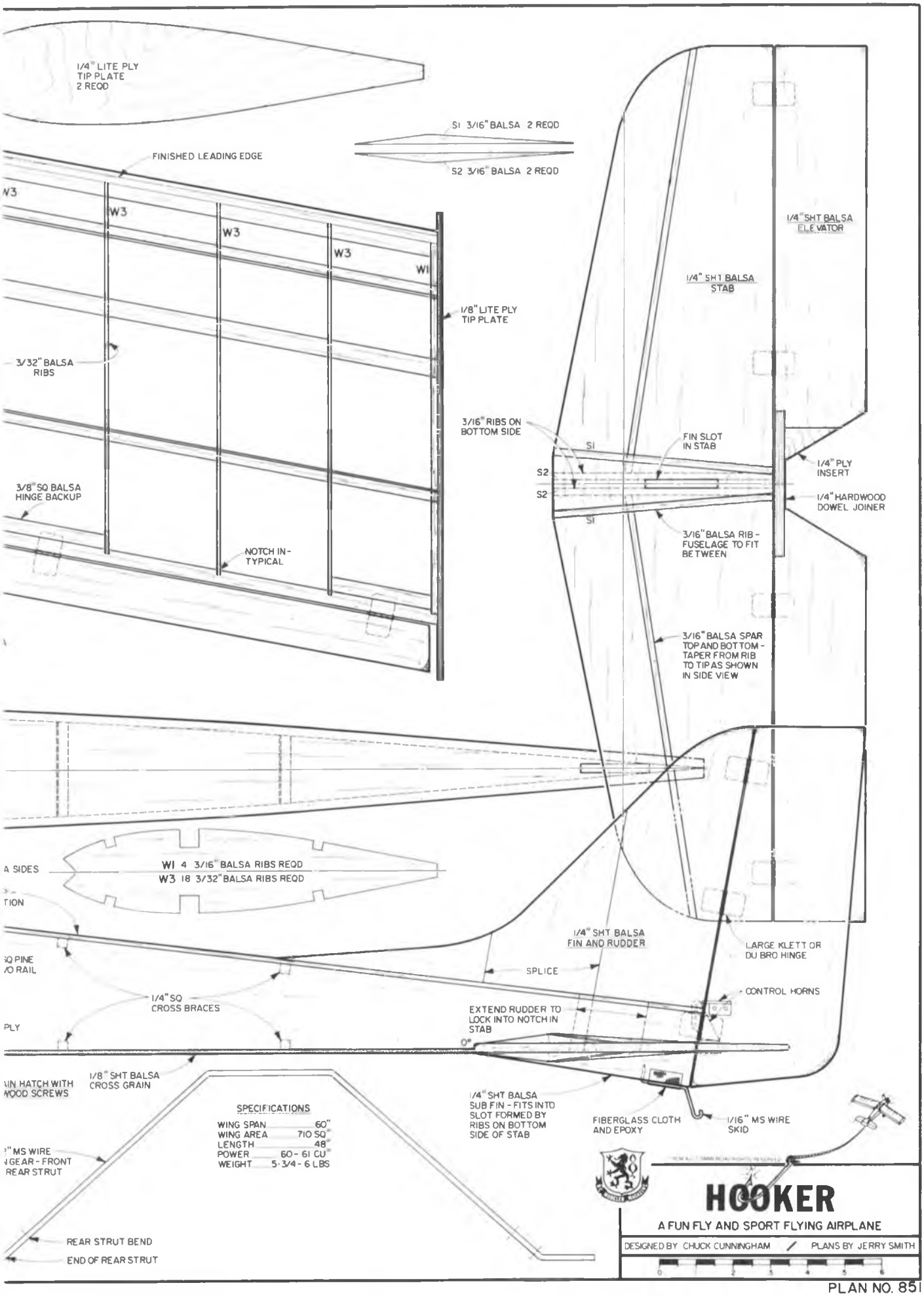


#1 Wing and hatch removed showing 12 oz. Kraft tank to feed the Enya .60 up front.
#2 With side mounted engine and muffler hanging below, helps keep fuel residue to a minimum on clean up.
#3 Removable servo hatch on bottom for access to servos.
#4 Aileron servo installation and leading edge cut out to clear large Kraft fuel tank.
#5 Elevator pushrod makes a straight run to servo, note the eye grabber club decal.
#6 Rudder pushrod also makes a straight run to servo making a more positive action for control movement.
#7 Photo shows the swept back wing and tip plates on the 'Hooker.'




11° SWEEP
1/2" SQ BALSA LEADING EDGE
W2
1/4" BALSA
2 REQD
W3
W2
W1
W1
W2
W3
W3
W3
W3
W3
INSET ON BOTTOM SIDE FOR TANK
1/4" SQ BALSA SPAR TOP AND BOTTOM
SERVO WELL BUILD IN FAR SIDE
PART OF W1
1/2" SQ PINE CROSS BRACE
1/4" X 1/2" BALSA SPAR - TOP AND BOTTOM
3/8" SQ BALSA
1/4" SQ BALSA SPAR TOP AND BOTTOM
3/8" SQ BALSA TRAILING EDGE
DU BRO STRIP AILERON HORN
LARGE KLETT OR DUBRO HINGE
NOTE K&B 61 SHOWN PROTOTYPE FLOWN WITH WEBRA SPEED 61
F1
1/4" PLY
BEVEL
5/16" HARDWOOD DOWEL
NOTE: RIGHT WING PANEL SHOWN.
TURN PLANS OVER TO BUILD OPPOSITE WING PANEL
BUILD WING ON FLAT SURFACE WITH NO DIHEDRAL
2° RIGHT THRUST
CB ASSOCIATES INC ENG MOUNT SHOWN (*5312 CB 60P)
3/8" SHT BALSA
1/16" PLY GUSSET
+1°
TANK INSET IN WING
1/4" X 3/4" BALSA FIREWALL BRACE
F1
F2
12 OZ SLIMLINE KRAFT TANK
CG
1/16" PLY GUSSET
F3
THR
1/8" BALSA BULKHEAD TO KEEP BATTERY IN PLACE
5° DOWN THRUST
GOLDBERG NOSE GEAR BLOCK
BLOCK UP TANK WITH FOAM RUBBER
1/4" X 3/8" SPRUCE
RECEIVER
BATTERY
BEVEL
1/8" SHT BALSA CROSS GRAIN
GOLDBERG MOUNTING CLIPS AND WOOD SCREWS
BEVEL
5/32" MS WIRE NOSE GEAR
1/8" PLY LANDING GEAR MOUNT
5/32" MS WIRE GEAR
WRAP & SOLDER
2-3/4" DIA NOSE WHEEL
2-3/4" DIA WHEELS MAIN GEAR
11" X 7.5" OR 12" X 6" PROP
F2
1/4" SHT BALSA
F3
1/4" SHT BALSA

FULL SIZE PLANS AVAILABLE — SEE PAGE 129



PLAN NO. 851

outside of the bottom piece. Draw in everything carefully, again noting that the piece that you are drawing on will be the inside of the left side, so mark the firewall location to give the required amount of right thrust.

Cut the bulkheads and cross pieces from the portion of wood left from making the fuselage sides. You can build the top hatch in two pieces from leftover wood stuck together with Hot Stuff. Draw a center mark on the bulkheads and on the back side of the firewall.

Right now is the easiest time to drill all of the holes in the firewall for the radial engine mount. You can mount the engine upright or on the side like the original. You must plan ahead for the nose gear bracket and engine mount bolts so that they do not interfere with each other. I found that on the prototype, using a CB mount turned sideways, one of the mounting holes lined up exactly with the Goldberg nose gear bracket. If you like to use a glass filled motor mount, then you can drill a hole in this mount to serve as the nose gear bracket. The choice is yours, but figure it all out on the firewall, drill all holes, and install all blind nuts before you go any farther with construction. Keep the thrust line in the same location no matter how you mount the engine.

Install the 1/16" plywood doublers for the wing dowels, the long pieces of 1/4" x 3/8" spruce, and the servo rails to each side before you glue the fuselage side together.

Next, pin the formers to the top view of the plans with the centerline of the formers exactly over the centerline in the top view. Line up with a drafting square, or a square block of balsa. Run a bead of glue on one side of each former and pin one side piece in place. If you're using white glue, you can make adjustments; if you're using Super T, better hurry with the adjustment, you've got a little time, but not much. Whoops, forgot to mention that you're building the fuselage right side up on the plans, with the bottom of the fuselage contacting the building board at all points. Now, glue the second side to the bulkheads. Glue in the firewall doublers and then the firewall.

So far, everything should be perfectly lined up. Make sure that everything is dry, then bring the tail of each fuselage side together and glue, but make sure that they join exactly over the centerline of the plan. Hold them in place with clothespins. If you have been careful, you will have taken the first step toward building a good flying aircraft — perfect alignment. Install all of the aft end cross braces and the top sheeting from the wing saddle to the tail. Remove the fuselage and install the bottom sheeting. Do not cut out the hatch for the servos until after you have finished sanding.

Install the cross brace in the wing compartment to keep the battery in place. You may want to build in some wire clips to pass a rubberband across the battery to keep it from moving around. More on balance later. Set the fuselage aside and build the wings.

Wings:

First, you must build the wing ribs. Note that there are eighteen 3/32" thick ribs and four 3/16" ribs. If you use the bandsaw method of cutting out ribs be sure to build up the stack with the 3/16" ribs located in the stack at the same location in the wing. If you're cutting out ribs with a razor knife, then when you build the stack for final sanding make sure that the ribs are in the correct location. Also mark your stack so that you always know which is the top side. I usually draw a line down the main spar slot with a marking pen. This way you can't mix up tops and bottoms, which is much more important than you may realize.

THE HOOKER
Designed By: Chuck Cunningham

TYPE AIRCRAFT
Fun-Fly & Sport Flying
WINGSPAN
60 Inches
WING CHORD
11¾"
TOTAL WING AREA
710 Sq. In.
WING LOCATION
Shoulder Wing
AIRFOIL
20% Symmetrical
WING PLANFORM
Constant Chord — Swept
DIHEDRAL, EACH TIP
None
O.A. FUSELAGE LENGTH
48 Inches
RADIO COMPARTMENT AREA
(L) 12" x (W) 3" x (H) 2¾"
STABILIZER SPAN
24 Inches
STABILIZER CHORD (incl. elev.)
7½" (Avg.)
STABILIZER AREA
180 Sq. In.
STAB AIRFOIL SECTION
Diamond
STABILIZER LOCATION
Bottom of Fuselage
VERTICAL FIN HEIGHT
10 Inches
VERTICAL FIN WIDTH (incl. rudder)
7" (Avg.)
REC. ENGINE SIZE
.60 to .61 Cu. In.
FUEL TANK SIZE
12-13 Oz.
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail., Throt.
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa & Ply
Empennage	Balsa
Wt. Ready To Fly	**92 Oz.**
Wing Loading	**18.7 Oz./Sq. Ft.**

Pin the lower spar to the plan (of course, you do cover the plans with waxpaper or Saran Wrap don't you?). Use the lower rear 1/4" square spar as a rib block. Pin this spar to the plans just ahead of the normal rear spar location. Check the wing rib, setting on the spar block and slipped over the main spar. If the center of the leading edge slot is exactly the same height from the building board as the center of the trailing edge of the rib it is correct. If not, adjust the spar block until this is correct. Mark this location on the plans so that you can build the second wing panel exactly the same. Glue all of the ribs in place on the main spar, pinning them to the spar block.

Next, install and glue the top main spar in place then the leading edge spar, the leading edge, and the aft spar. Notch and glue the trailing edge piece in place as well as the extra pieces that help to brace the trailing edge and the hinges. Remove from the building board and glue the bottom aft spar in place. Set this wing panel aside, turn the plans over and build the left wing panel in exactly the same way. Make sure that you block the wing ribs exactly the same.

When both wing halves are finished, and you're sure which is the right wing panel and which is the left (it's a good idea to mark them while under construction because it's hard to tell after each is finished), pin the right wing panel to the plans, and block up the trailing edge exactly as you did when building the left panel. Now, position the left panel in its correct final location and block it up exactly the same. Take a square and measure that the leading and trailing edges of the center section and both tips are exactly the same distance from the building board. When you're sure of this, glue the two wing panels to each other.

When this glue joint is dry take a razor saw and cut out the slots for the wing center section braces. You can make these braces from 1/2" x 1/2" pine or spruce, or you can make them of two pieces of 1/4" x 1/2" plywood laminated together to make a 1/2" x 1/2" spar. When this is dry, remove the wing from the building board, turn it over and install the bottom braces in the same manner. I used epoxy for this, as I had a few gaps to fill up between the main spars and the braces. Make sure that all of this is done well, as this is the entire joint method.

Now, build the servo well on the bottom and then the tank well also on the bottom of the wing. You will have to make two false ribs to go on either side of the tank well, and then remove the center ribs. Due to the forward location of the wing, the tank must nestle inside the leading portion of the wing. Line this well with scrap 1/8" balsa. Do not install the tip plates until after the wing is covered.

Tail:

All of the tail feathers are simply made from 1/4" sheet balsa, except that the horizontal stab has the addition of two ribs on the top and two on the bottom. The top ribs are spaced to go on either side of the fuselage, while the bottom ribs are spaced to go on each side of the 1/4" wide sub fin. Make sure that you cut the slot in the

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RCM PRODUCT REVIEW

Circus Hobbies F-16a

The Circus Hobbies F-16a is an all foam, .049 size, almost ready to fly sport scale model. All the buyer need add is an engine and radio. It is manufactured by IM Products in Japan for Circus Hobbies. This exciting looking two channel model sports a symmetrical airfoil, ailerons and a full flying stabilizer. A factory applied red white and blue paint scheme adds a lot to the model's scale appearance. Opening the 6" x 10½" x 32½" highly decorated box revealed careful packaging. All the foam parts were wrapped to prevent transit damage. The hardware is bagged in plastic, grouped as to usage. A nine page instruction manual is provided to assist the buyer in assembly. It is illustrated with good quality line drawings describing each phase of construction, as well as written text. Anyone with some knowledge of model aircraft will have little trouble putting this model together.

Construction:

One of the things we liked best about the test model was the fact that all the high stress items are installed by the builder. If the firewall, landing gear, or wing, falls off, you can't blame the factory. These parts take a little extra time to install, and just knowing the glue joints are good is worth the time spent. Two complete nose assemblies are provided so the buyer can choose between a reed-valve or T.D. type .049. We followed the instruction sheet step-by-step, and assembled the model in about 12 hours. No major difficulties were encountered and minor problems are described under the proper item.

Covering:

No finishing whatsoever is necessary other than putting the mylar decals in place. The surface finish of the foam on this model is not as smooth as some of the other models now on the market. This does have an advantage, though, as dings and hangar rash aren't so noticeable. The colorful paint is indeed fuelproof.

SPECIFICATIONS

Name	F16A
Aircraft Type	Sport Scale
Manufactured By	Circus Hobbies 1241 E. Glendale Sparks, Nevada 89431
Mfg. Suggested Retail Price	$49.95
Available From	Both Mfg. & Retail
Wing Span	31 Inches
Wing Chord	7" (Avg.)
Total Wing Area	217 Square Inches
Fuselage Length	29.5 Inches
Stabilizer Span	16 Inches
Total Stab Area	57.5 Square Inches
Mfg. Rec. Engine Range	.049
Recommended Fuel Tank Size	35cc
Recommended No. of Channels	2
Rec. Control Functions	Elevator, Ailerons
Basic Materials Used In Construction:	
Fuselage	Foam
Wing	Foam
Tail Surfaces	Foam
Building Instructions on Plan Sheets	No Plans
Instruction Manual	Yes (9 pgs.)
Construction Photos	Yes

RCM PROTOTYPE

Radio Used	Cannon
Engine Make & Displacement	Cox T.D. .049
Tank Size Used	35cc (as provided)
Weight, Ready to Fly	22 Ounces
Wing Loading	14.6 Oz. Sq. Ft.

SUMMARY

WE LIKED THE:

Beautiful packaging; colorful box; large hardware assortment; great flight characteristics; ease of assembly.

WE DIDN'T LIKE THE:

Finish of foam. Oversize holes in wheels. Lack of American translation on T.D. installation. All metric measurements. Pushrod on stabilizer.

Engine:

A Cox T.D. .049 was used in the test model. A 35cc clunk type tank is provided and was used. We think it is a bit too small, giving only about 3 minutes flying time. There is plenty of room in the nose for a larger tank. While we had no trouble, it should be noted that the T.D. instructions come in the plastic bag with the motor mount and are printed in Japanese! Following the clear line drawings on these instructions made assembly possible. Circus Hobbies was contacted and stated they will correct the problem. We used no muffler on the model, but since the engine head is un-cowled, one could be installed with no problems.

Radio:

A Cannon Sport 4 was used in the test model. Two servos were installed controlling ailerons and full flying stab. A 225 mah battery pack provided airborne power. There is ample room inside for almost any size radio. The receiver and one servo fit into pockets molded into the bottom of the wing. The stabilizer servo mounts to a plastic tray which is then screwed to the fuselage.

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A BIT OF-
R/C FREQUENCY HISTORY

By Walt Good

Forward
By Bob Aberle, Chairman
AMA R/C Frequency Committee

It has been over two years since the AMA petitioned the FCC for additional R/C frequencies. Before these new frequencies are actually granted it is likely that two more years will pass. The entire rule making process is tedious and, as a result, requires a great deal of patience on the part of the petitioner (in this case the R/C modeler). Dr. Walt Good, a member of the AMA R/C Frequency Committee (and a former Chairman), prepared the following article concerning the "history" of obtaining new R/C channels. The message is simple, the procedure was always difficult in the past and is likely to be the same in the future --- so please be patient!

Jamming Thwarts Model Fliers
(Reprinted from the Chicago Daily News March 27, 1965)
By Charles A. Betts

WASHINGTON — The plane climbed into a steep stall, faltered, plunged into a tailspin and crashed to Earth as the crowd watched.

Tragedy? Fortunately not, because this was a radio-controlled model. But the primary cause for such accidents has model airplane fans boiling mad and deeply involved with the Federal Communications

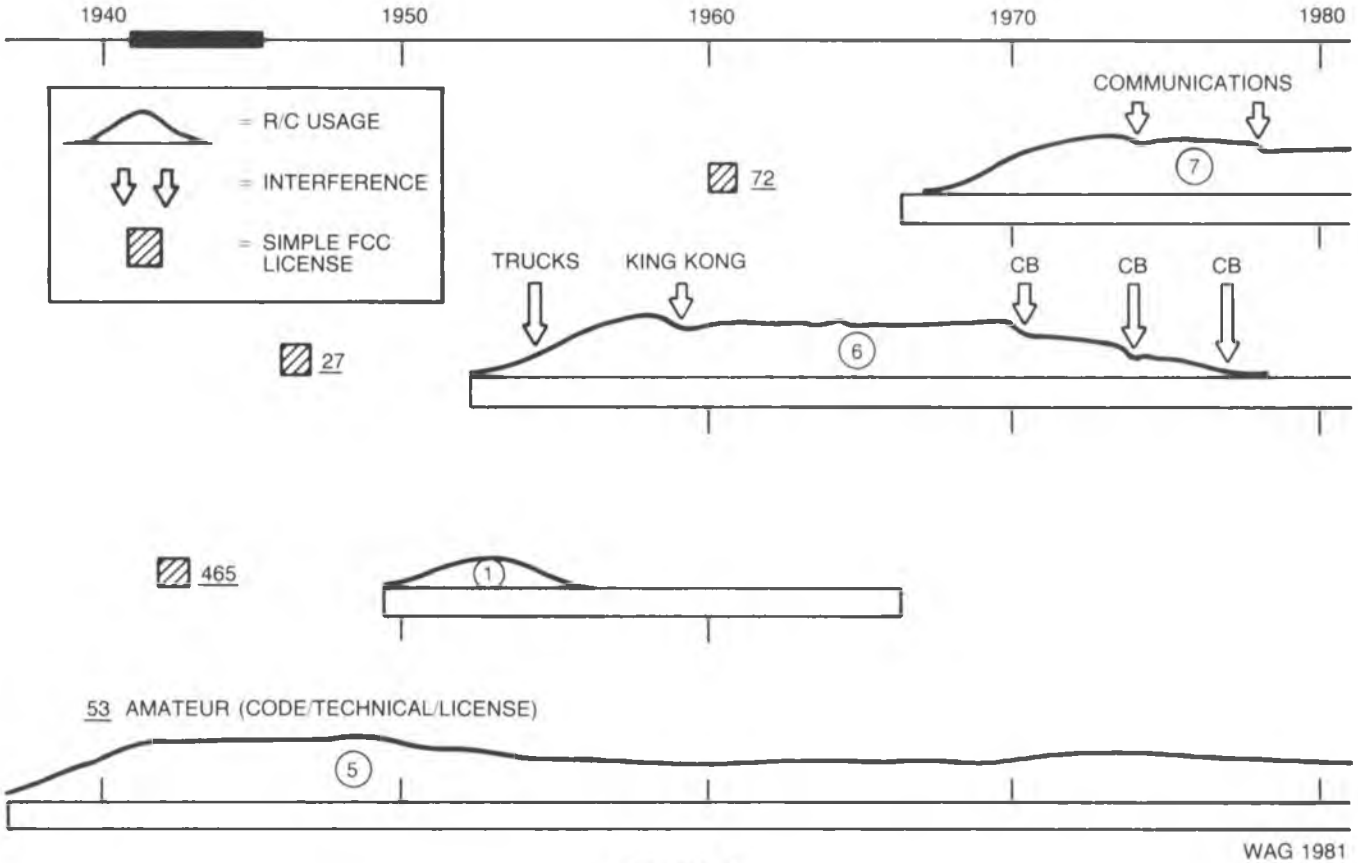

CHART 1
R/C FREQUENCIES — MHz

Commission.

The problem is that the radio frequency assigned for use of the model airplane pilots is shared by others with different radio objectives. As a result, a man pushing a switch to operate his automatic garage door or cutting in his two-way car radio may interrupt the radio beam to the model plane and send it out of control.

As put by Dr. Walter A. Good of Bethesda, Maryland, a spokesman for the Academy of Model Aeronautics, "This is no joke when you consider that some of these models are very complicated, have a 5' wing span and cost up to $500 or more."

Radio-controlled model airplaning has an estimated 10,000 enthusiasts across the country who engage in several hundred competitions each year under the auspices of the academy. The big meet is the national championship, this year to be held July 26-31 at the Willow Grove (Pa.) Naval Air Station.

The interference is raising such havoc with the sport that Dr. Good and his associates have before the FCC a petition for a new frequency.

The models now are classed as C-type users on a 27-megacycle band. Also in Class C are such radio devices as automatic garage door openers and individual, pocket-size radio paging devices. Class C operators use five-spot frequencies.

Also on the 27 megacycle band are Class D users with 23 frequencies, among which the five from C are sandwiched. Class D uses include walkie-talkies and two-way car radios.

Dr. Good says that Class D users are growing rapidly with over 1,000,000 stations now in the United States.

Unfortunately for the model airplanes, the lightweight radio equipment is unable to discriminate properly because of lack of sensitivity, so that more and more D signals are jamming the planes.

The solution being urged on the FCC is to assign the model plane fliers another frequency far enough removed from the other users to eliminate interference.

The acquistion of RC Frequencies has always been a difficult and time-consuming task. With the great majority of AMA members involved in RC flying it is important for the AMA to respond to the need for more useful frequencies.

Perhaps a bit of history of past RC frequency acquisitions will help show what the AMA has done in the past, and place the present efforts in perspective.

Chart 1 shows the several RC bands versus the years from the late 1930's to 1981.

When RC was being pioneered before WWII, only the Amateur Radio Service provided the RC modeler with possible radio frequencies. An amateur license with code and technical exams was required. Thus RC modeling, as a technical hobby, started in the ham bands, which are still being used today. The lower graph in Chart 1 shows this continuous use. Today, five channels at 53 MHz are being used by about 10% of the RC'ers.

The 465 MHz band shown next on the chart required only a simple CB (Class B) license in 1950 when commercial RC equipment became available. However, only commercial, FCC type-approved equipment was permitted in this class — no home-built allowed. Thus the 465 RC equipment served as a step in RC experimentation but was quickly replaced by a frequency in the 27 band.

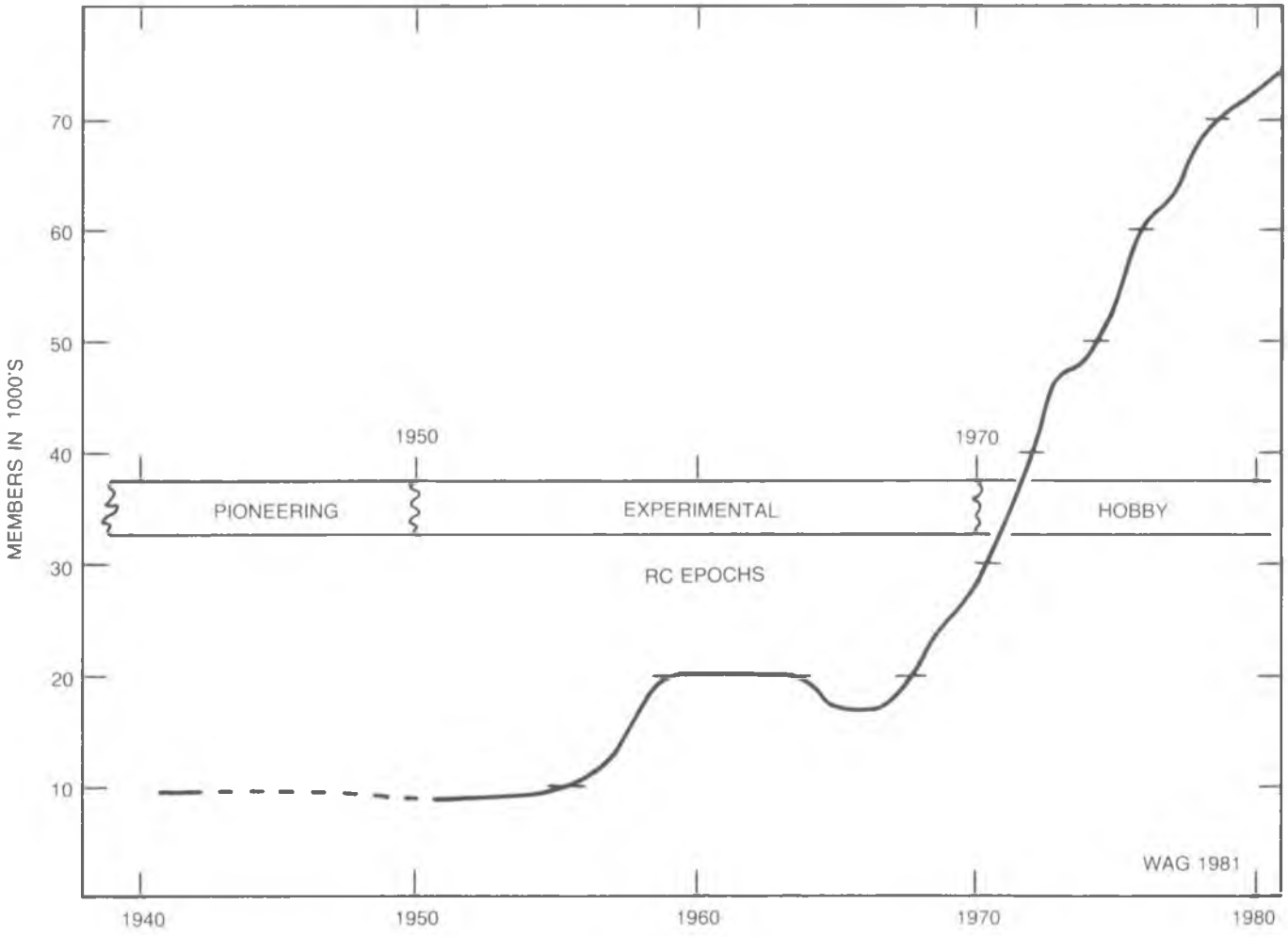

CHART 2

AMA MEMBERS
1940-1980

CONTEST

MISSISSIPPI VALLEY SILENT FLYERS
1981 R/C SOARING CONTEST
September 20, 1981
For Further Information, Contact:
Leroy K. Satterlee, 1604 Huntington Rd., Waterloo, Iowa 50701; or Paul Wilson, RR 1, Middletown, Iowa 52638.

LONG ISLAND DRONE SOC. INC.
23RD ANNIV. BIPLANE & SCALE R/C CONTEST
September 27, 1981
Nassau County Model Aerodrome, Cedar Creek Park, L.I., New York
For Further Information, Contact:
Howard Applegate, 2703 Hyacinth St., Westbury, New York 11590. (516) 333-5119

D.C. RADIO CONTROL CLUB
ANNUAL SOARING MEET
October 3 & 4, 1981
Belmont Plantation, Leesburg, Virginia
For Further Information, Contact:
DCRC Soaring Contest, Jack Sparkes, P.O. Box 831, Columbia, Maryland 21044. (301) 992-4218

SCALE SQUADRON OF S. CALIF.
SCALE UNCONTEST
November 15, 1981
Mile Square Park, Fountain Valley, California
For Further Information, Contact:
Bert Ayers, 24733 Ravenna Ave., Carson, California (213) 835-3336

INTERNATIONAL MINIATURE AIRCRAFT ASSOC.
1ST ANNUAL INTERNATIONAL FUN FLY FESTIVAL
September 25-26-27, 1981
E.P. Tom Sawyer State Park, Louisville, Kentucky
For Further Information, Contact
Dave Mullins, Festival Coordinator Days (502) 425-7140, Eve (502) 245-5648

KEYSTONE R/C CLUB
2ND ANNUAL KRC ELECTRIC FLY
September 20, 1981
KRC Club Flying Field, Hatfield, Pennsylvania
For Further Information, Contact
Bob Kopski, 25 West End Drive, Lansdale, Pennsylvania 19446

ASSOC. OF GREATER CHICAGO R/C CLUBS
CHICAGO EXPO
October 24, 25, 1981
DuPage County Fairgrounds, Wheaton, Illinois
For Further Information, Contact
AGCRCC, P.O. Box 221, Morton Grove, Illinois 60053
Or call John Carney, Chairman, (312) 495-4517

ANNOUNCEMENTS

Home-built RC gear was allowed in 1952 when the single 27.255 MHz frequency was approved by the FCC. This is when the RC activity really took off and became the experimenter's paradise. Only the simple CB (Class C) license was required plus crystal control of the transmitter. It took the AMA almost six years to acquire this single frequency even with the direct help of one of the FCC Commissioners! Within the first three years other users of this channel became apparent. Truckers and traffic signal control were using high powered transmitters on the same frequency! The Los Angeles modelers dubbed their traffic control transmitter "King Kong" because of the crashed RC models. Chicago and Long Island had similar problems. The very wide-band superregen RC receivers easily picked up the traffic signals several times a day in the affected areas. AMA action with the FCC in 1955 started the acquisition of five new 27 MHz frequencies in 1958. Only three years were required this time! The old wide-band superregen receiver was not compatible with new frequencies because now the narrow-band superhets were required to handle the 50 KHz spacing. This transition took several years, but flying several planes at the same time was a real advantage over flying one-at-a-time.

But then interference in the form of CB voice units began to grow and RC again began to suffer. This interference is shown as arrows marked "CB" in Chart 1. Today very few fliers use the 27 band, although it is still used successfully by the RC boat and car fans.

Again, the AMA launched a petition with the FCC for additional usable frequencies. In 1963, with the help of J. Courtney's law office, an appeal was made for channels in the 72 MHz band where only a few other users were situated at that time. So in June 1966, five new RC frequencies were authorized under the Class C license. Even with three years of AMA and legal effort, the RC petition was narrowly approved by only a 3 to 2 vote of the FCC commissioners. The reason given by the

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SOARING

Al Doig

Striking slope soarer by T.J. Moran.

Biff, you know ya been flyin' a long time when the roof of your mouth gets sunburned!

If anyone cares what's inside his radio, let me recommend a very good book. Kalmbach has just published *Getting the Most from Radio Control Systems*. It was written by Fred Marks who designs for Ace R/C. I must congratulate Mr. Marks for a superb job. It is written on a level that makes sense to engineers and yet with sustenance for non-electronic readers with a curious nature. For someone contemplating building from a kit, the book would be invaluable. For those who like to maintain their own servos — excellent. For those who do not care what goes on inside his radio, let me recommend a cold beer, or a dry martini. Which shows I've a recommendation for everyone.

◇ ◇ ◇

Shown in the lead photo is a slope soarer designed and built by T.J. Moran of Santa Barbara, California. The airfoil is a .8 thick Eppler 374, tapering to .6 at the tip. Chord is 10", with a 60" span. Wing sweep is 5 degrees, with no dihedral. The fuselage is fiberglass over urethane foam. Control is provided by 3 channels, with flaperons coupled to elevator. Roll response is exellent, due to 3" wide by 22" long ailerons. The ship flies quite nicely, and is very striking in the air. All-up weight is 40 ounces. As an aside — anyone submitting photos for publication would do well to make them in black and white. While RCM has equipment to convert color to black and white half-tones, something is always lost in the translation.

◇ ◇ ◇

The odd looking sailplane in the photo is not just an attempt to be different. Writing in the May, 1981 issue of *Silent Flyer*, newsletter of the San Fernando Valley (California) Silent Flyers, Editor Bill Forrey tells about this unusual sailplane.

If you've been out to Pierce College

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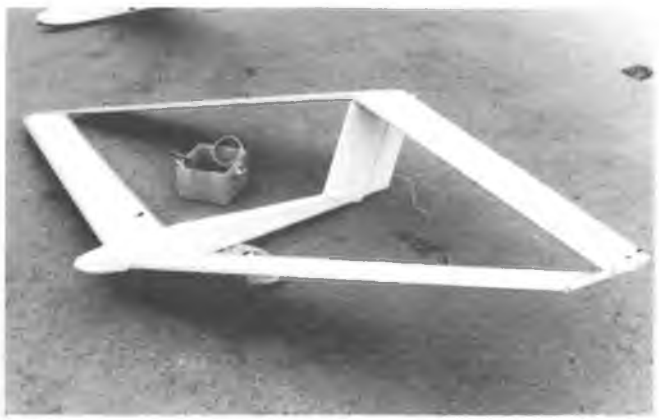


Joined wing aircraft by Tom Finch, West Covina, California.

Larry Jolly's electric sailplane "Olympian."

GIVE IT A WHIRL

John Gorham

Well, here we are practically at the end of our season of shows and competitions. It has been a good year for the R/C helicopter and many new machines have become available to give us all a variety of choice, with all the benefits that this brings. Certainly, at this point in the year, a lot more people seem to have accepted the challenge, and "won the battle," of learning how to fly the R/C helicopter. It would be interesting to know the statistics but, from the readers' letters that I receive and from the observations I've made in traveling around, I'm pretty sure that the R/C model helicopter has now firmly and successfully established itself as much more than a curiosity or freak in our modeling community. Sometimes you can actually see two or more R/C helis flying at one time!

Now that the traveling around and the writing about shows has diminished considerably, we are able this month to get back to some technical discussions which are aimed at assisting the beginner in understanding how to handle some of the problems which arise when he first faces the operation and flying of the R/C helicopter.

When it comes right down to basics, the problems which the beginner seems to encounter from the time when he first opens the box containing the helicopter kit, the buying and installing of the radio and the engine, etc., to a successful flying machine, lies in about three broad areas. Assuming that he is mechanically minded enough to assemble the basic structure and mechanism properly, the **installation and set-up of the radio** is one cause of the problems which can arise in flying his 'chopper. Then, **setting up the tail rotor control** to produce the right results seems to cause many builders problems until they fully understand the function and needs of this important part of his helicopter. A poorly set up or operating tail rotor can make life almost impossible at the outset. And, finally, of course, there is the vexed problem of **vibration** which, in most cases, is caused by lack of knowledge of what goes on in the helicopter's main rotor head. There is still a lot of mystery in this last item (even for some "experts," too!). So for this month, I will try to help you in understanding and fixing some of the causes of the vibration problems. Later on I'll devote a full column to radio set-up and perhaps another one to tail rotor system functioning and setting up.

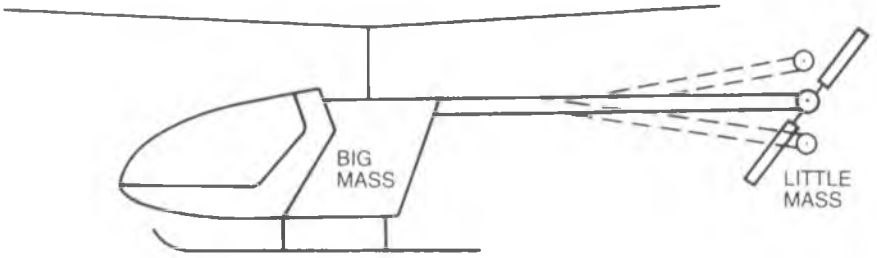


FIGURE 1
DOG WAGGING THE TAIL

Vibration and the Main Rotor System

There is so much that could be written about just this part of the helicopter alone and a treatise on how the various parts of the many different types of rotor head systems function would take up the whole of the magazine this month. However, if you really want to know more of the design aspects of rotor heads, there are now several good books available which attempt to explain this very complex subject to the average modeler. And, if you have the time and patience to read them, you can certainly learn a lot about how the various rotor head systems used in R/C model helicopters work.

First we should be clear on the type of vibration we are seeking to cure. A large percentage of today's R/C helicopters are constructed with an open metal frame and a single (often unbraced) tail boom or tube. The tail rotor system (belt or gearbox driven) is mounted at the end of this tube. So we now have a small but significant weight mounted at one end of a long and flexible structure, with the other end fixed to a much larger mass which is the helicopter itself (see Figure 1).

The basic mechanical arrangement shown is an excellent candidate for a resonant vibration in a frequency range readily excited by the mechanical vibrations which out-of-balance forces of the main rotor system can produce. Many times the

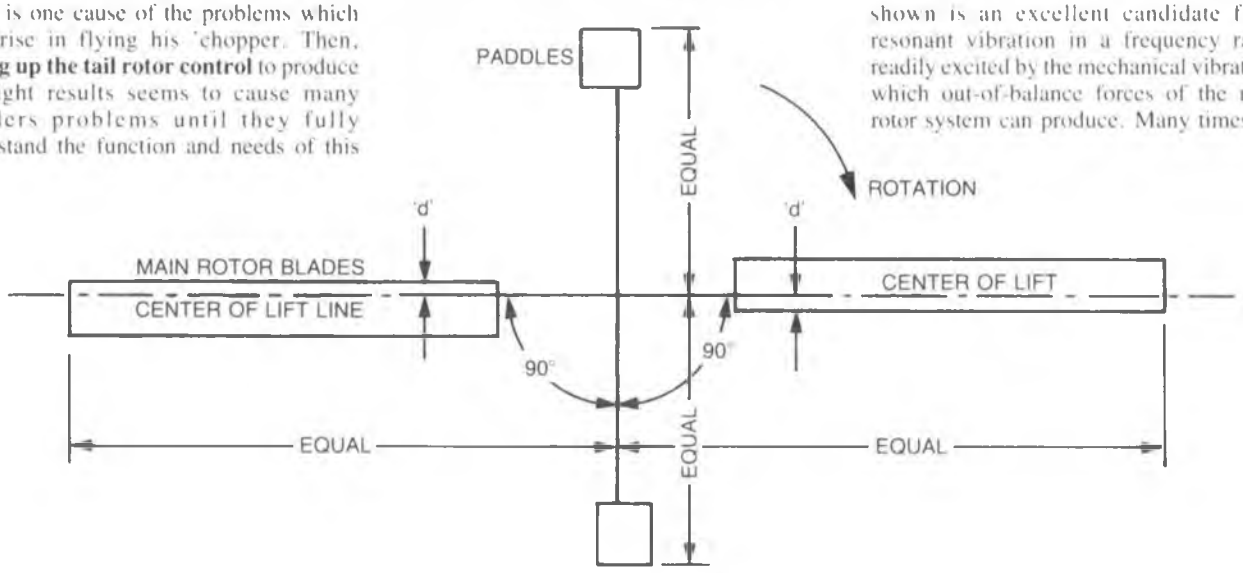


FIGURE 2
GEOMETRY OF MAIN ROTOR SYSTEM

beginner says, "It can't be the main blades out-of-balance because it's the tail which is shaking." Well, the 'tail' will shake very easily if any reasonably large forces exist to excite its resonant frequency. This is because the dog wags the tail — the tail seldom wags the dog!

This doesn't mean that the tail rotor blades should not be in balance, too. They certainly should be and any serious out-of-balance here can also cause problems. But a small out-of-balance of the tail rotor blades will usually not cause much trouble in terms of boom or visible mechanical vibrations. However, a **very** small out-of-balance in the main rotor blades or rotor head system can have a very large influence on the vibrations or "shake" of the tail boom of the helicopter. To excite a resonant system such as the tail boom there needs to be a **power** input, and the **main** rotor blades and main rotor system can provide such levels of power because of their weight, size and speed of rotation.

Please remember that we are discussing large amplitude vibrations of the helicopter, and especially those of the tail boom stucture, of the open frame model. Any out-of-balance in the model helicopter can still be important and needs to be avoided even if it does not produce large visible structural movements such as when the helicopter has a rigid fuselage structure to support the tail rotors.

Vibration nearly always results from forces caused by rotational out-of balance which, in turn, will be caused by weight or dimensional inequalities. So let us first examine the basic geometry of the rotor head system to understand and eliminate the dimensional errors. Since there are many different arrangements of rotor head on different makes and models of helicopters, we will only look at a very much simplified arrangement which is basic to nearly all types.

Figure 2 shows the basic plan view of a rotor system so that we may be aware of the **measurements** and angular line-ups which are important. The main blades are normally attached to the rotor head by a bolt or bolts which are fixed a certain distance (d) from the leading edge of the main rotor blades. This distance has been set by the designer so that the blade is attached at a point across the chord at which the main lifting force of the blade is centered — the "center of lift" point (see Figure 3).

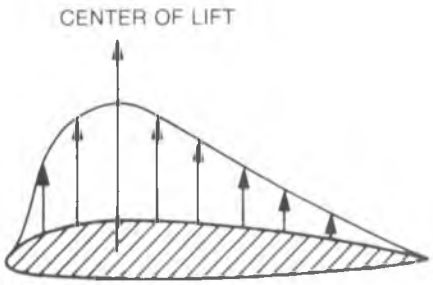


FIGURE 3
ROTOR BLADE AIRFOIL
CENTER OF LIFT

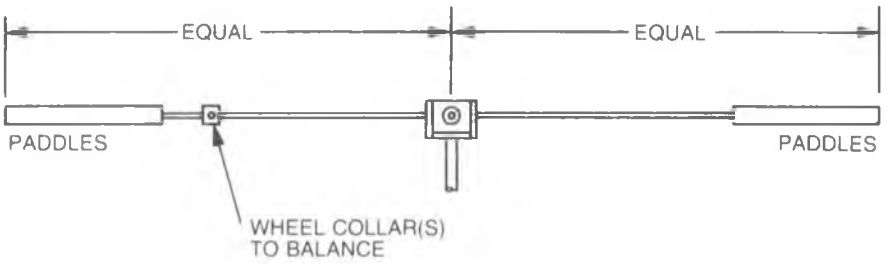
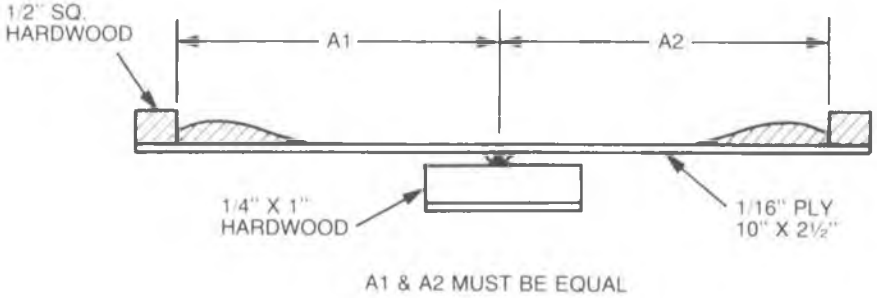


FIGURE 3A
BALANCING THE STABILIZER BAR



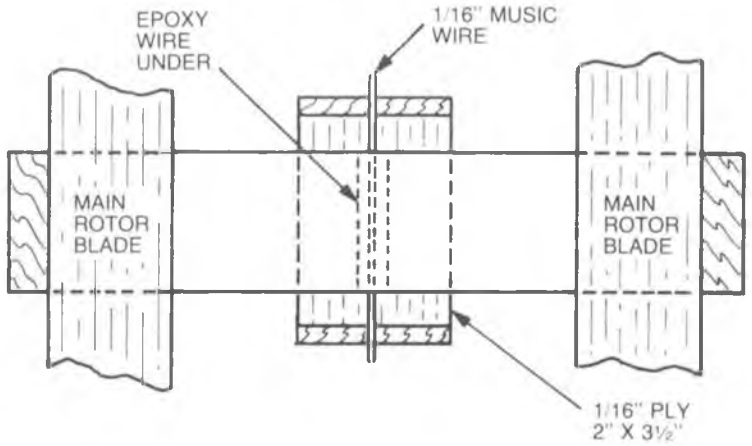
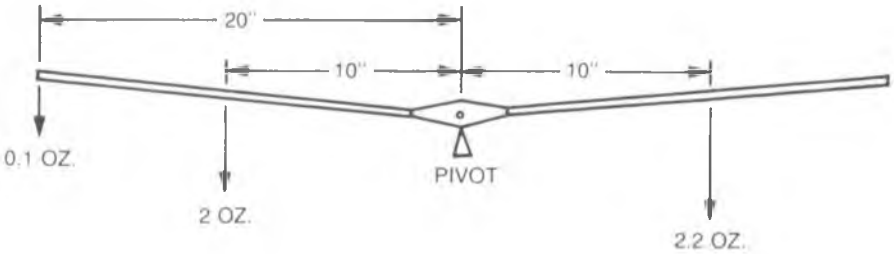


FIGURE 4
BLADE BEAM BALANCE SCALES



20 X 0.1 + 10 X 2 = 10 X 2.2
SO 2 + 20 SHOULD EQUAL 22
IT DOES, EUREKA! WE HAVE STATIC BALANCE

FIGURE 5
ROTOR BLADE STATIC BALANCE

The main blades must be lined up across the rotor system so that (a) this line remains parallel to the leading edge of each blade and, (b) these lines of the blades will be at 180 degrees to each other and will intersect the center of the main rotor shaft.

Some manufactures and expert fliers will set the blades up so that both blades lag or lead the 180 degree "center of lift" line. These adjustments are mainly concerned

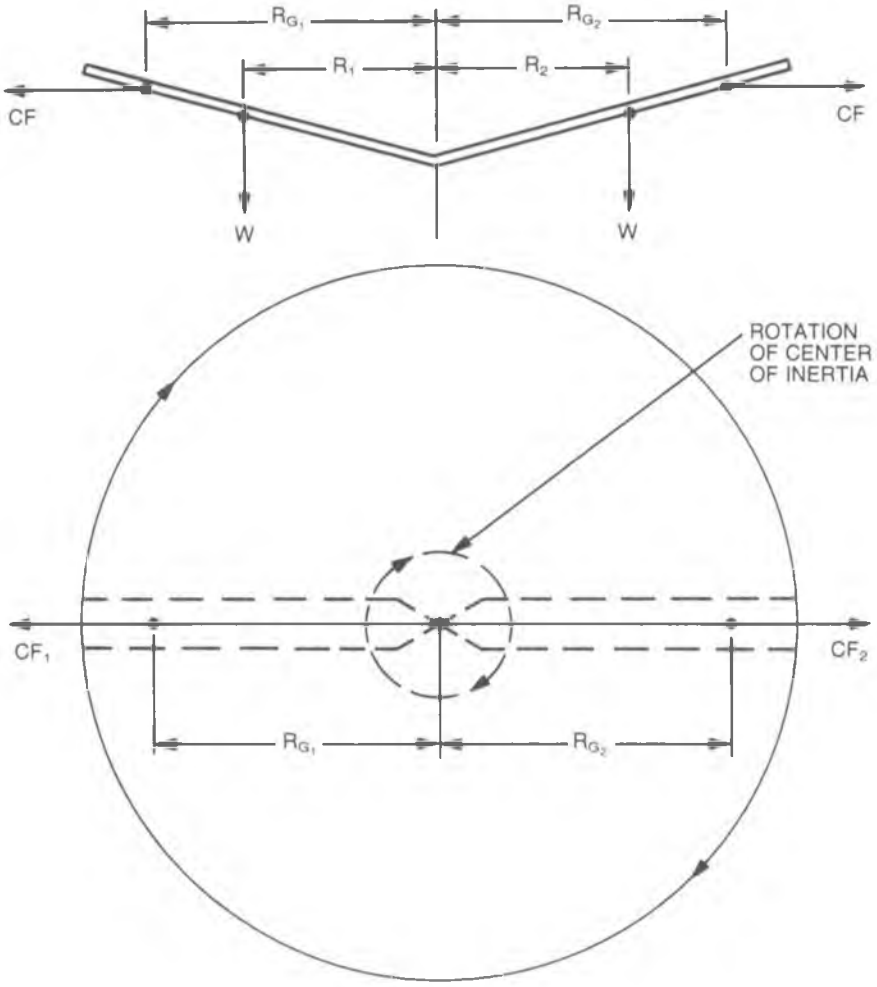


FIGURE 6
EFFECT OF ECCENTRIC MOMENT OF INERTIA

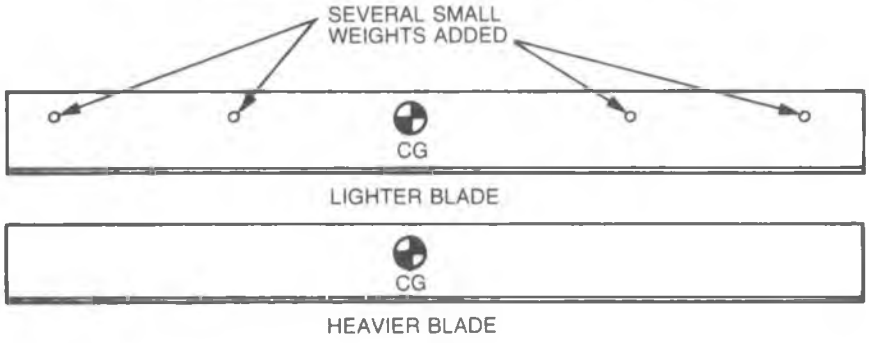


FIGURE 7
BLADE BALANCING TO ENSURE DYNAMIC BALANCE

with minimizing control and vibration problems in fast forward flight and we should not concern ourselves with them at this stage.

Next, if the helicopter has a "Hiller" paddle control, then the stabilizer bar and paddles must be set so that they project equally each side of the main shaft. So far so good with the **dimensional** set-up of the main rotor head.

Now to be sure that our rotor head is in balance. There are two forms of "balance." The first is **static balance.** As the name implies, this means balance when the system is at rest, or "static." If we have a system with a stabilizer, or 'fly' bar, and paddles, first we must be sure that this part of the head is in balance. This balancing **must** be done with the main rotor blades removed since they can confuse our balancing of the 'fly' bar. Assuming that our paddles are exactly equidistant from the center of the main shaft (see Figure 2) then we must add a little weight on the side which is light. Usually a wheel collar of the proper diameter can be fitted on to the lighter side and slid in or out to achieve the balance we want. When we know the proper position of the wheel collar (or collars) we should tighten down the set screw, not forgetting to 'Loctite' it at the same time. By the way, if you have a helicopter which is a little too fast for you, two or three extra wheel collars fitted right out adjacent to the paddles can help to slow the response down a bit for you (but you must then rebalance as described above).

Each of the main rotor blades should be of approximately equal **weight** before we start, and a simple beam balance scale can be used to check this. The balance is shown in Figure 4.

This is easy to make up. Use 1/16" ply and glue everything together (except where it pivots) with 5-minute epoxy. Check your scales before use by placing a new penny (or any coin) at each end just touching the 1/2" square shoulders. If one end is a little light you can add a bit of tape or epoxy under that end to achieve a neutral balance. These balance scales are used by placing the rotor blades on the balance as shown, before covering and checking which one is heavy. Don't forget that if the leading edge faces out on one side, it must also face out on the

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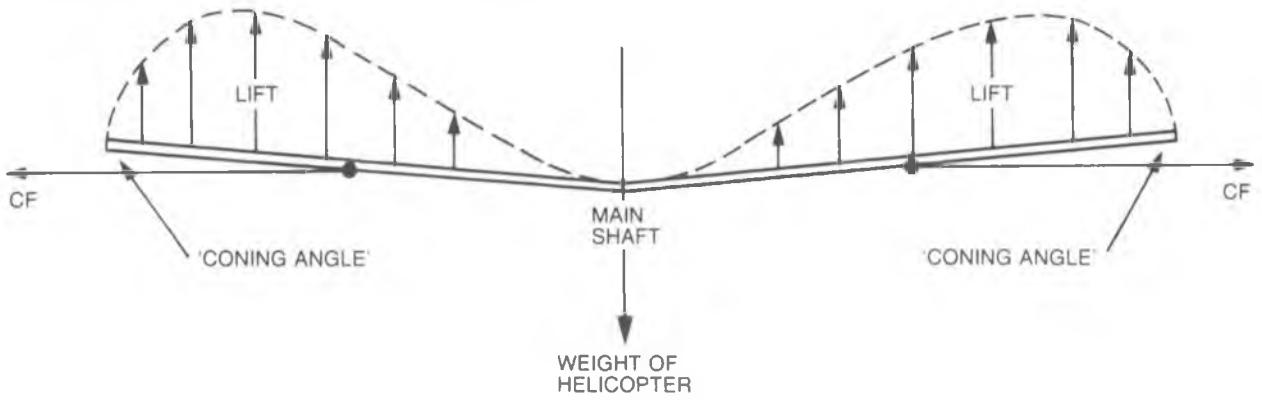
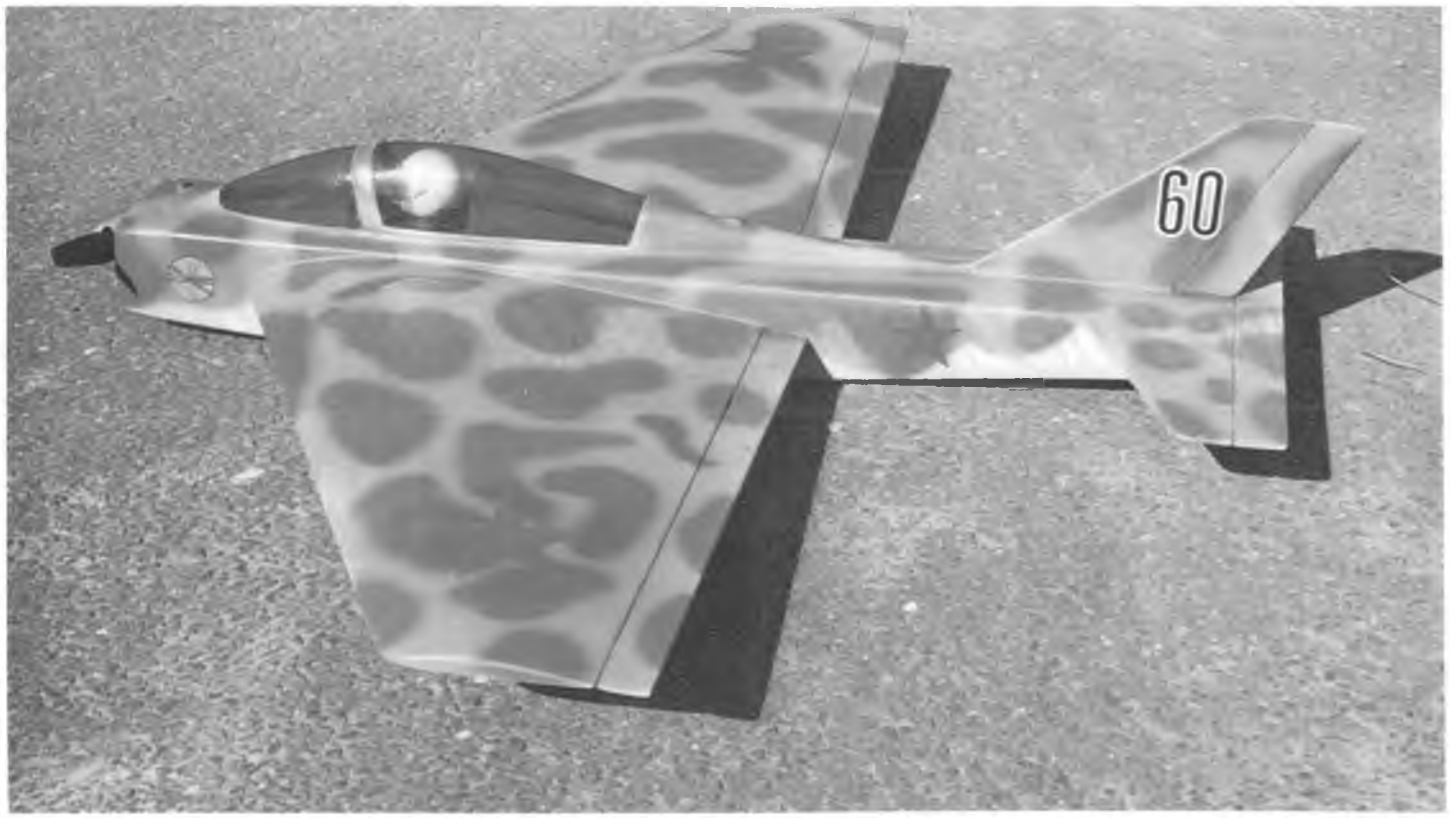


FIGURE 8
LIFT DISTRIBUTION OF MAIN ROTOR BLADES

CHERRY BOMB



Cherry Bomb, a term with perhaps little significant meaning for younger modelers, but one that brings back fond memories for many fellow members of the "over the hill gang." Who can forget the Big Boomer, the granddaddy of all audio pyrotechnics, the M-80 of its day. With its deep roar, which was easily distinguishable from the "snap, pop and crack" of less potent fireworks; the "legislated out of existence" Cherry Bomb still remains as a term synonymous with raucous power or high performance.

The R/C aircraft which is the subject of this article is aptly named. Under full power and moderate control surface throws, it is a real "boomer." It is fast and responsive, yet smooth, with a roll rate somewhat akin to a flying corkscrew. With reduced control surface rates, it becomes a far more docile aircraft and well-within the flying capabilities of any intermediate level sport flier, who is a thoroughly proficient four control function flier. Obviously, the Cherry Bomb is not a beginner type aircraft! It is a fast flying sport-type aircraft.

The design of the Cherry Bomb was precipitated by an urge to produce a high performance sport aircraft, with good flight characteristics, that would be a bit different, be easy and quick to build, inexpensive, and one possessing a military appearance. Being a hand launch type, it can be easily flown from any type of open area and its high performance with a conventional .19 size engine will put most of the present .40 to .60 size sport type aircraft to shame. The key to obtaining optimum performance, however, is in keeping it light. Our Cherry Bomb weighed 41 ounces ready to fly, with standard size servos and receiver and a four ounce fuel tank. We did opt for a 100 mah battery pack instead of the normal 450 mah pack, in order to reduce weight by several ounces.

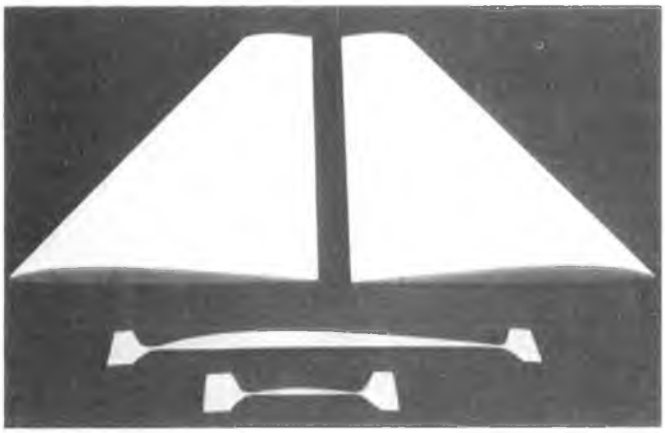
The 'Cherry Bomb' is guaranteed to put a "little zest" back into your sport flying activities and also is an airborne attention getter!

BY BOB WALLACE

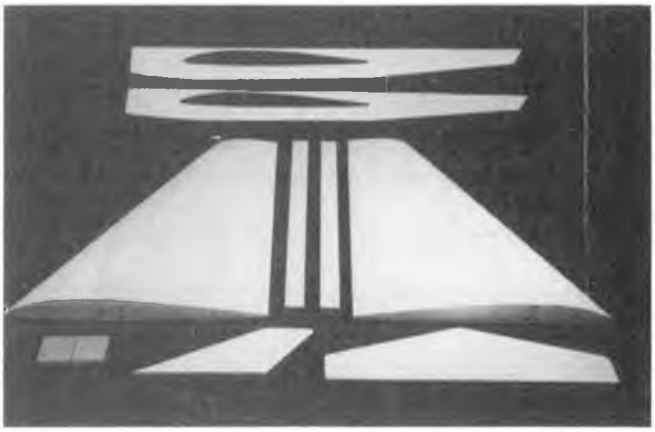
CONSTRUCTION

The only construction phase that could be defined by some as being somewhat difficult is the cutting of the foam wing cores; due to their rather sharp taper. The foam cores shown in this article were cut by the author with no problems, however, this step is simplified if two people do the cutting with each person operating one end of the hot wire cutting bow. Foam is inexpensive, so it is no great loss if you ruin a piece or two in order to obtain a set of good cores. The core cutting templates shown in the photo were cut from scrap pieces of plastic laminate (Formica). They can also be made out of 3/32" to 1/8" plywood or 1/16" aluminum. Half of the secret to obtaining good foam cores is to use good smooth templates. Be sure that there are no burrs or rough spots on them which will cause the hot wire to "hang up" and produce a ridge in the foam core. It also helps to slightly radius the template edges and to wax them prior to use. I use an old candle for this purpose.

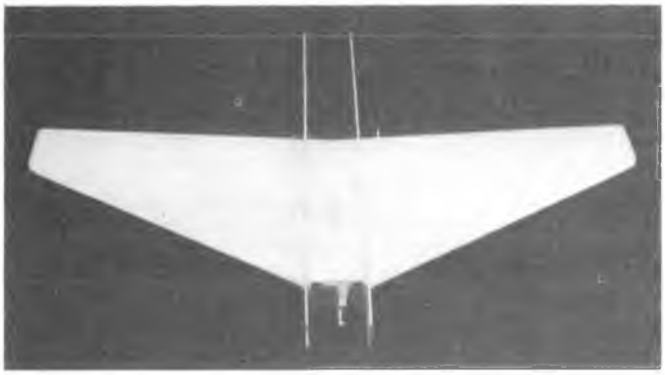
For those modelers with no foam cutting experience, RCM offers an excellent book,



Completed foam cores and cutting templates that were cut from Formica.



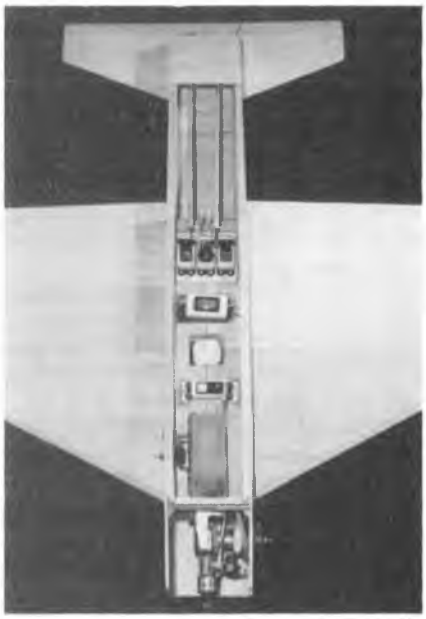
All the basic components needed to build your 'Cherry Bomb.'



Wing panels are joined and the model is then assembled right on the wing.

Internal rudder linkage components using Du-Bro ball link.

Completed rudder linkage shown attached to rudder.



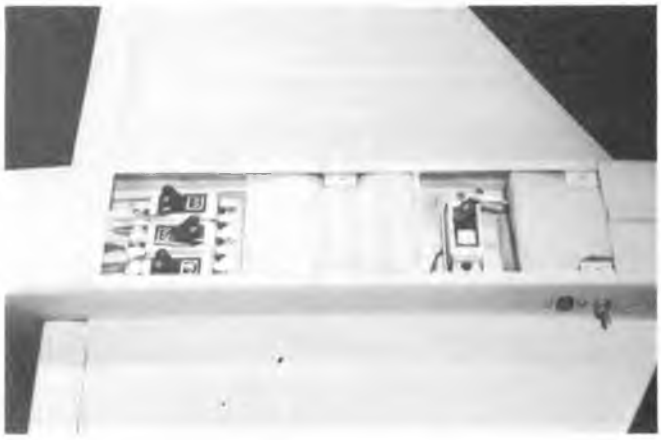
Bottom view showing Authur's well-planned equipment layout. 100 ma battery pack used to save weight.

which covers all aspects of cutting foam cores entitled "Foam Wings"; priced at $4.95. (See the RCM Anthology advertisement elsewhere in this issue.)

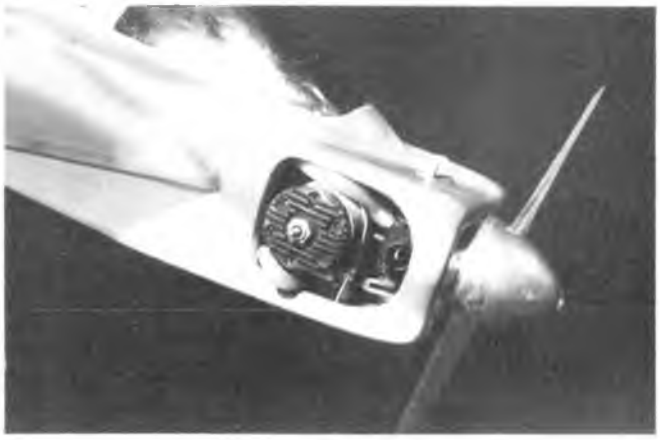
As we mentioned, the Cherry bomb is not a beginner type aircraft, so our outline of the construction sequence will be just that, an outline, and not a step-by-step of detailed instructions.

Wing:

We will start by assuming that the foam wing cores have been successfully cut. The cores are covered with 1/16" balsa in the conventional manner. We used 3M (6060) spray contact adhesive for this assembly phase. The balsa leading and trailing edges and tip plate blocks were then glued in place. After sanding each wing panel to the indicated airfoil, the two panels are joined together. The dihedral angle of the wing is obtained by simply joining the two wing panels with the top of the wings laid flat on any true surface. The taper of each wing panel then produces the correct dihedral angle. The wing center section joint is then covered with a 6" wide strip of two ounce fiberglass cloth and resin (top and bottom).



Bottom hatch removed giving access to all servos. Note ample foam around receiver and tank.



Side mounted K & B .19 gives it a sleek look up front.

Exhaust is blown out the bottom via a Du-Bro Mini Mufflaire.

A close fly-by which could be mistaken for a Russian jet making a low pass.

Tail Surfaces:

All tail surfaces are cut from 3/16" medium hard balsa sheet. We elected to use an internal horn assembly on the rudder of our aircraft in order to improve its general appearance. A conventional external control horn could be used. The internal horn linkage is shown on the plan sheet.

Fuselage:

The fuselage is essentially a box that is built around the wing. Cut the two 1/8" sheet balsa fuselage sides out and slide them onto the wing and into place. Cut out the 1/4" plywood firewall and drill the necessary engine mount, fuel line, and throttle cable holes. Install blind nuts for the engine mount on the plywood firewall. The fuselage sides and plywood firewall are carefully aligned so that the sides are straight and true with the firewall butted up against the leading edge of the wing and positioned so that a 0° - 0° engine thrust line will be achieved. Glue the fuselage sides and firewall in place. The fuselage 1/4" triangle stock is now installed along with the stabilizer/elevator assembly which is also positioned at 20° incidence angle. Glue the vertical fin/rudder assembly in place. At this point it is suggested that the fuel tank, radio system component pieces, control pushrods, throttle cable, and ailerons be installed (see photo). It is much easier to make these installations before the fuselage bottom sheeting and access hatch are added. The cut-outs in the wing center section for the fuel tank and radio system equipment wells should be only large enough for each component piece and a layer of cushioning foam. Avoid removing large areas of the wing section which could weaken the wing. A little thought and advance planning should be exercised before cutting the fuel

CHERRY BOMB
Designed By: Bob Wallace

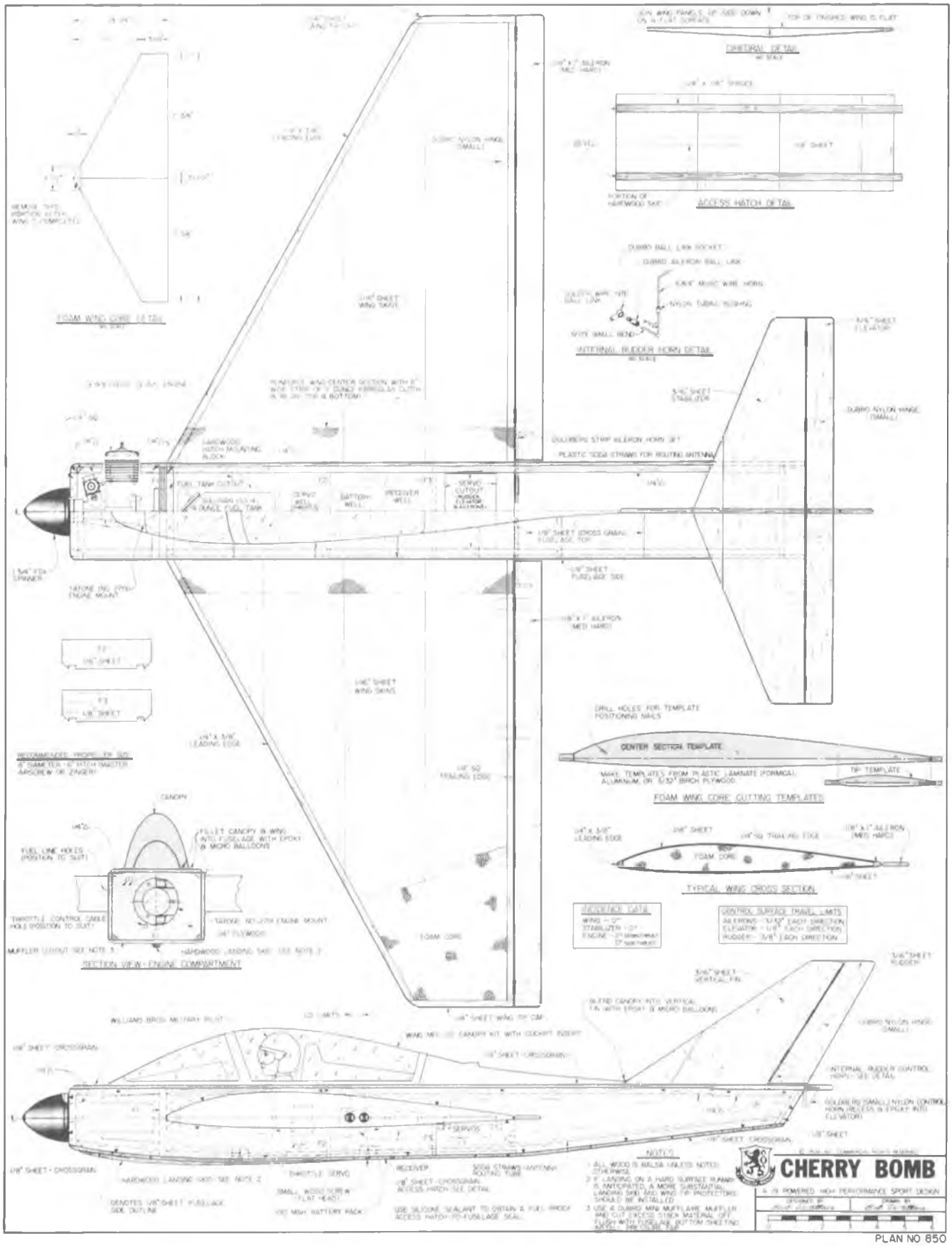
TYPE AIRCRAFT
Sport (High Performance)
WINGSPAN
36 Inches
WING CHORD
9½" (Avg.)
TOTAL WING AREA
342 Sq. In.
WING LOCATION
Mid-Wing
AIRFOIL
Semi-symmetrical
WING PLANFORM
Tapered Leading Edge
DIHEDRAL EACH TIP
5/8 Inches

O.A. FUSELAGE LENGTH
27 Inches
RADIO COMPARTMENT AREA
(L)8½" x (W)3¼" x (H)*
STABILIZER SPAN
14 Inches
STABILIZER CHORD (incl. elev.)
3¾" (Avg.)
STABILIZER AREA
52½ Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
4½ Inches
VERTICAL FIN WIDTH (incl. rudder)
4¾" (Avg.)

REC. ENGINE SIZE
.19 Cu. In.
FUEL TANK SIZE
4 Ounces
LANDING GEAR
None (Skid Only)
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Elev., Ail., Throt., Rud.

BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply & Hardwood
Wing ..... Balsa & Foam
Empennage ..... Balsa
Wt. Ready To Fly ..... 41 Oz.
Wing Loading 17.3

***Varies — components recess into wing**



tank opening and equipment wells. The wells for the battery pack, servos and receiver, do not penetrate the wing top sheeting. We used a standard size radio system, except for the 100 mah battery pack, which was used to keep the weight to a minimum. (Our Cherry Bomb has been deliberately put through every violent maneuver possible — "figure nines" excepted — and has not suffered any structural problems.)

The top and bottom sheeting, access hatch and landing skid, are now installed. We used a hardwood skid on our aircraft as all of our flying is done from grass fields. If you contemplate flying from hard surfaced fields, a more substantial skid arrangement

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What a day! Krainock and fellow-SFVSF members did it again: Eight National Records including a 66 mile (105 kilometer) flight. It started off inauspiciously enough, and they didn't make their first launch 'til noon, but boy did they make up for lost time.

Ed Slobod, designer of the "Paramount," Jerry Krainock, pilot, Mike Bame, Contest Director and Bill Forrey, driver.

100 KILOMETERS, That's Incredible!

By Jerry Krainock and Mike Reagan

Allow us to introduce ourselves. We are members of the San Fernando Valley Silent Fliers, an active group of sailplane enthusiasts based in the Los Angeles metropolitan area. We have been cross-country flying in the desert for ten years now. We sometimes have "grand tasks" for the year and this year our task is the 76 km. Great Race in Chicago. May 9th was our first practice day, and of course, we also had a sanction for AMA Record Trials.

I (Jerry Krainock) had been watching the forecast since the previous Thursday, and the weather was looking really good. A high pressure cell had been building up over Utah, and was not supposed to break until Monday.

Bob Bower called Flight Service in Lancaster and they were predicting winds "light and variable" and temperatures in the nineties. Knute Johnson, an old soaring friend, said the northeasterly flow should bring good flying conditions (little did he know).

Everyone was on time at our normal meeting place and we only had one slight hitch. I forgot the rubberbands for my Paramount, and Reagan didn't have any for his either. Bill Forrey and I returned to my house and sent the rest on to Holiday Valley (launch site of previous successful record attempts) so they could get started.

Bill and I arrived in the Antelope Valley about 10:15 a.m. It was windy enough to cause whitecaps on nearby Quail Lake. The previous Saturday the winds were from the west at about 12-15 mph and we couldn't fly. Now they were from the east at about 8-10 mph. There looked to be some bumps, judging from Benny James' Two Meter ship which was the first ship to fly --- we obviously couldn't fly there.

Bill and Alex were low on gas so a trip to Lancaster or Gorman was going to be necessary. We decided to go east another 15 miles to check the weather. Still windy. The possibility of being blown out was now very real.

Since Benny was to become a Senior on May 11, we really wanted to fly. We discussed going to the Taft area but it was two hours away. Gasoline and food decided the issue and we went to Lancaster.

Benny James with his "Paragon." Two Junior National records.

We held a meeting in the local Carl's Jr. and again debated going to the Central Valley. I got a road map out of the car and added up the mileage to where we were thinking of going. One hundred thirty-two miles was just too far to drive at 11:00 a.m. so we were committed. It was to be the Antelope Valley or we were going home. I knew the terrain east of High Vista was suitable and unpopulated so our three cars set out.

We got to 260th St. East Ave. G at 11:45 and started to set up. The wind was still 8-10 mph and I was not optimistic.

We had to select Goals before we launched so Reagan declared Highway 138 and Interstate 14, about 27 miles west.

FAI team alternate Garry Itner, and his Tai-Pan. Five National records for his 12.21 mile flight.

Left to Right: Benny James, Mike Reagan, Gary Itner, Alex Bower, Mike Bame and Jerry Krainock. The location is the San Bernardino County line and Ave. G. in Antelope Valley, California.

Several years ago I decided to never declare a Goal under 100 km. (on a good day you might make it and on a bad day it doesn't matter) so while I first thought of Quartz Hill Airport, I later realized it wasn't far enough. I declared Gorman after looking at the map because I was sure it was over 100 km. and I thought the day was so bad it wouldn't matter anyway.

After pictures were taken, I made the first launch a little after noon. I hit a couple of bubbles but couldn't work them and semi-crashed a quarter of a mile away. The ship was okay, but I was disappointed. Reagan was next and immediately got away. He jumped into the car with Forrey and was soon gone from sight.

I gave Alex a couple of tows and the Goose never saw a ripple. Benny then brought his Paragon up and I towed him. The Paragon was so much lighter than the Goose that I could hardly feel it. Benny hit a little lift but couldn't handle it. Conditions didn't look good. I had Mike Bame fly the Paramount and he was down in two minutes.

Reagan showed up again and said he had landed 5.5 miles out. He only had one good thermal the entire flight and that was right at the launch.

It was my turn again so off I went. I hit lift on tow and started circling immediately. This was my third flight with the ship and only the second since I fluttered the stabs off May 1st. Bill, Mike Bame and I got in the car and set out. I rolled out of the thermal and we headed west.

Soon I knew a couple of things: I had the rudder and elevator throws correct and we were moving along at over 40 mph ground speed. Before I knew it we were past Mike's landing point and still high. When we got to 160th St. I started working my way north to prepare for the dog leg. I had the glider about half-way between Avenues G and E flying a diagonal course while Bill drove about 70 mph to Avenue E. We made that corner and about a mile west I was overhead again.

I had expected trouble on that leg, but it had been easy. I now thought we had a real shot at the freeway, about 14 miles away. I would have been satisfied with that, as I still didn't think we had a chance at Gorman. In retrospect, I might have remembered that oftentimes record flights are easy, and I was having a very easy time of it.

I couldn't believe the ground speed. I have usually netted around 18 miles in an hour and I think my best was 21 miles. Bill, Mike and I figured out average speed a couple of times and it was working out to 27 or 28 miles per hour. If this sounds like a slow speed, try cross country flying for a season and see how fast you go.

Soon the dog leg at Sierra Highway showed up and was completed. We continued west on 138 across the Antelope Valley Freeway at good altitude. I was making excellent speed and thought I might have a chance at Jack Hiner's open distance record of 42 miles. I figured it would come up around 160th or 170th St. West.

I slowed the glider down somewhere in here which was probably a mistake. I had been cruising using half down trim and making 45 mph but I now started to conserve a little and was using only neutral trim or half up. As a result, my fast cruise speed slowed to 40 mph and medium cruise to 35 mph. I think the tail wind may have slowed a little but more speed at that point might have made all the difference in reaching the goal.

Meanwhile, Reagan and the boys were starting to get rolling — — —.

With Jerry gone, we set about readying Benny James for his record attempt. I (Mike Reagan) decided he would have a better shot at a record with his Paragon. He got it ready for flight. My decision was based on the fact that Alex, flying his heavy fast Goose, was having a hard time staying up. Alex landed and we launched Benny.

I calmed him down long enough so he could climb out in a nice strong thermal and we waited until his stab was barely visible before we got in the car. We took off at a fairly fast pace but the glider was getting smaller and moving away. We sped up and I got Benny to speed up. This is when we discovered the trim settings were off as the plane began a dive and began to build up too much speed. He pulled out without breaking up but he was so high it was hard to see. Benny's transparent blue and red MonoKote was not showing up against the light cirrus cloud cover.

Fighting a slight cross wind, he moved back closer to the road which greatly improved his visibility. We had to slow down from 40 mph in the car because Benny's eyes were tearing too much. The

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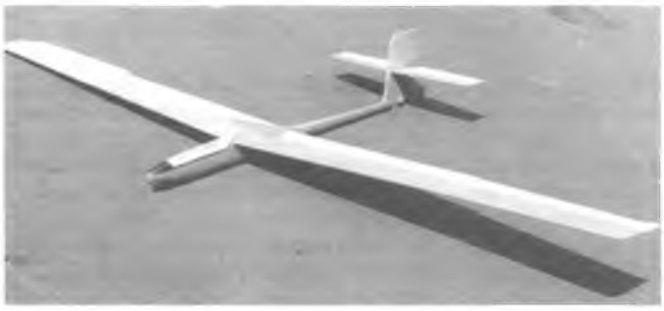
Jerry Krainock circles his Paramount at low level over the Mojave Desert.

RCM PRODUCT REVIEW

Dodgson Designs CAMANO "100"



SPECIFICATIONS

Name	CAMANO "100"
Aircraft Type	Sailplane
Manufactured By	Dodgson Designs 2904 S.W. Camano Drive Camano Island, Washington 98292
Mfg. Suggested Retail Price	$149.95
Available From	Both Mfg. & Retail
Wing Span	98.5 Inches
Wing Chord	10" root, 7" tip
Total Wing Area	850 Square Inches
Fuselage Length	44 Inches
Stabilizer Span	24 Inches
Total Stab Area	93 Square Inches
Mfg. Rec. Engine Range	NA
Recommended Fuel Tank Size	NA
Recommended No. of Channels	4
Rec. Control Functions	Elevator, Flaps, Coupled Ailerons/Rudder, Landing Spoilers
Basic Materials Used In Construction:	
Fuselage	Fiberglass & Ply
Wing	Foam core, balsa sheeting
Tail Surfaces	Foam core, balsa sheeted
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (3 pgs.)
Construction Photos	No

RCM PROTOTYPE

Radio Used	Airtronics 6 channel XL Series
Engine Make & Displacement	NA
Tank Size Used	NA
Weight, Ready to Fly	56 Ounces
Wing Loading	9.5 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Completeness of kit; ease of construction; fit of parts; flying characteristics.

WE DIDN'T LIKE THE:

Price; added cost of wing sheeting tape.

The latest offering from Camano Island, Washington, is the Camano "100." Bob Dodgson's objective was to achieve "top multichannel glider performance from a kit with easy to build foam wings." The "100" is exactly like the larger Camano (see RCM Product Review, November 1980), but with a 98.5", 850 sq. in. wing, instead of 111.5", 936 sq. in. wing. The wing loading is the same for either size wing. The price is also the same for either size. So, it all depends on whether you get your enjoyment out of building wings or not; and how they fly.

The kit arrived in a king sized box 50" x 12" x 5". Parts were neatly bagged and packaged. There was a Long Balsa Package, a Short Wood Package, a Small Wood and Hardware Package, and some miscellaneous items, such as a fiberglass fuselage, wing and stab foam cores, canopy, and blueprints. Included also, was a list of materials, identifying every item, and giving it's location. For goodness sake, don't take the bundles apart and lose the parts location. This list is really a time saver. One thing to keep in mind is that Camano Kits are the most pre-fabricated kits this reviewer has ever had the pleasure to build. When the plans call for four 1/4" x 1/4" x 1/2" spruce ballast-bay corner blocks, don't grab your X-Acto knife, just look in the Small Wood and Hardware Package, and voila there they are. Assume everything has been cut and shaped — you won't be far from wrong, just look in the List of Materials. All parts fit beautifully and all parts are included, except finishing materials, and radio. There are even special pushrod-to-servo hardware, to make installation easy and neat.

Construction:

Plans were on three sheets 2' x 3'. Instructions were typed on one of the drawings. The instructions are more than adequate to keep an experienced builder out of trouble. There are no photographs.

The big advantage of foam wings is not the ease of construction, but the probability of having a straight, true wing when you are finished. All construction is done in the foam cradle from whence the core was cut. With the cradle sitting on a perfectly flat surface, chances of a bum wing are really low. The Camano "100" cores are cut very accurately. The Eppler 193 is not a simple airfoil, and we feel the foam produces a more accurate airfoil than built-up balsa. The parts all fit very well and no difficulty was encountered. The wing cores have all spar slots, control rod, and spoiler tube channels pre-cut. The wings go together super fast. Balsa sheeting is 4' long, so does not require spanwise splicing. Sheeting is applied using 3M Transfer Tape. This makes the sheeting job a snap. Our tape was ordered from Dodgson Designs and sells for $5.00 a roll; two rolls are required.

One error was found on the drawings. The rear fuselage support rails, F13, are called out as 1/8" x 1/4" spruce on the side view and 3/32" x 1/4" spruce on the top view. If we had also looked in the List of Materials, we would have seen that 3/32" was the correct thickness.

Pay particular attention to properly locating the rear wing pin in the slot provided in the foam core. Improper location will result in one trailing edge being higher than the other. After sheeting the bottom side of the wing panels, poke a pin through the hole in the aileron bellcrank, and through the sheeting, and mark the location. This will save a lot of agony in locating the pushrod cut-out position after you get the top sheeting on. Do the same for the ballast hatches.

We started out using Scotch Plastic Tape for wing hinges, and the

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1. Erik Richard's Zlin 526

2. Precision Scale Gee Bee by Granger Williams.

3. Douglas SBD-3 Dauntless by Kent Walters.

4. Bob Parcell built this beautiful B-25J.

5. A Ryan PT-22 by Buz Watson.

6. Harry Apoian's Bristol M-1C.

7. Detailing on Garland Hamilton's F4U-1D.

8. Garland Hamilton also had this P-47D.

1981 SCALE MASTERS
WESTERN Regional Qualifications

By Dick Tichenor

The California Scale Squadron's Seventh Annual Western Scale Nationals was used as the western regional qualifying contest for the 1981 Scale Masters Championships. From the dozens (we didn't count 'em) of contestants who gathered at Mile Square Park, the top five place winners in the Expert Sport Scale event qualified to compete in the Masters Championships at Louisville, Kentucky.

The quality of the aircraft and of the flying was superb. One of the most popular scale operations options was the bomb drop. There were numerous near miss bomb drops to aircraft on the runway and in flight. The only damage sustained was to the nervous system of the pilots whose planes were the unintentional targets.

While not the usual contest report, Pete Sepulveda related his personal experiences in participating in the meet. We can relate to

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1980 Scale Masters Champion and top 1981 Western Regionals qualifier, Kent Walters and his Douglas SBD-3 Dauntless.

Granger Williams, assisted by Larry, placed second in AMA scale.

John Lockwood earned first place in AMA Scale with his Fokker E III Eindecker.

Second place in Expert Sport Scale was Garland Hamilton with F4U-1D.

A part of the infamous One Eighth Air Force. Impossible to get 'em all together.

Rick Meyers' F6F Hellcat, Jemco kit, 9 lbs., K & B .61.

Bob Parcell/Frank Kelly, team entry, B-25J, Royal kit, 13 lbs., 2 O.S. .40's.

Bob Frey's P-47, Holman kit, 10½ lbs.

Bristol M.1C, 1/4 Scale, Harry Apoian, 10½ lbs., O.S. .90.

Larry Webster's Twin Commanche, Stafford kit, 10 lbs., 2 Lee/K & B .40's.

Jerry Ortego and his original FW 190, 1/6 Scale, 11½ lbs., O.S. .90.

Pitts S-1 by Orv Hinshaw, Midwest kit, 6¾ lbs., K & B .61.

Built from a Jemco kit, Steve Alvarado's F4U Corsair, 6¾ lbs., O.S. .50.

Zlin 526 by Erik Richard, Sig kit, 8 lbs., O.S. .60 ABC.

Ken Kileen's FW 190, Platt kit, 10½ lbs., ST Blue Head .61.

Rick Lake's P-51D, Jemco kit, 6 lbs., K & B .40.

John Lockwood's Sportmaster, original, 1/4 Scale, 11½ lbs., Webra .91.

Mike Peck's Liberty Sport, Sig kit, 7 lbs., O.S. .61.

Jerry Kitchen's P-47D, Jemco kit, 9 lbs., O.S. .60 FSR.

Shane Cramer's Spitfire MK V B original, 5 lbs., ST .61.

John Lockwood's Eindecker, original 1/4 Scale, AMA Scale, 12 lbs., Webra .91.

Shane Cramer's F8F-2 Bear Cat, original, 8¼ lbs., S.T. .61

Garland Hamilton's P-47D, Holman kit.

Jerry Kitchen's T-6, Jemco kit, 6½ lbs., O.S. .40

Don Lien's F4U-1D Corsair, Royal kit, 11½ lbs., O.S. .61

Rick Cassell's P51B, Top Flite Kit, 8 lbs., O.S. .60

Denny DeWeese's ME 210, original design, K & B .61's.

Mike Mann's F6F-5 Hellcat, Jemco kit, 10 lbs., K & B .61.

Dan Parson's Martin Baker MB-5, original, 9¾ lbs., O.S. .60.

Pete Sepulveda's Claude A5M4, original, 7¾ lbs., O.S. .50.

Diego Lopez's T-28, Pica kit, 8½ lbs., S.T. .60.

Erik Richard's Spitfire Mk IX, Platt kit, 8 lbs., O.S. .61.

Roland Baltes' T-6 Wirraway, Holman kit, 9 lbs., S.T. .60.

Joe Zimmerman's P-51D, Bridi kit, 10 lbs., O.S. .61.

Buz Watson's PT-22 landing gear details.

Dan Parsons trying to get his act together.

ME410 built by the late Marty Moad. Memorial flights by Ed Root and Bob Frey.

Lewie Kear's F6F Hellcat, Jemco kit, 8¾ lbs., S.T. .60.

Rich Westlake's Aircoupe, Stafford kit, 5½ lbs., K & B .40.

Col. Bob Thacker's Omac I performed beautifully.

Mike Kileen's Zero U-128, Holman kit, 8 lbs., K & B .40.

Pete's story and wish to share it with our readers along with photos of some of the models entered.

My First Scale Contest
or "How To Go Bald
In Three Days"
by Pete 'Kamakazi' Sepulveda

The Seventh Annual Scale Squadron Western Scale Nationals. Wow, doesn't that sound prestigious? Not your basic "let's go out and give it a try type contest." But then what the hell can you expect from a collection of weirdos called F-Troop?

Leaving myself plenty of time (I built "Claude" from scratch during the final week before the contest). By the way, "Claude" is a Mitsubishi A5M-4 Type 96 Carrier fighter. The model right before the Zero. Allowing myself lots of practice (I flew "Claude" for 43 seconds between Static Judging and the flying portion of the contest). One landing (nose-over, of course) and no take-offs; I was truly ready to go out and beat Kent Walters, John Lockwood, Bob Frey, Garland Hamilton and anybody else dumb enough to get on the same field with me.

My partner in crime, Rick Cassell, let me fly his beautiful P-51B Mustang that had about 54 man-years of effort built into it. There **are** some people dumber than me! We figured that if I had two planes, one of them might last at least until static judging was completed! Another illustrious F-Trooper, Ron Wiser, was allowed to enter the contest even though we all were pretty sure that he would embarrass us to death by actually showing everybody that he was a good flier. Ron flew Steve Alvarado's Jemco F-4U in Team Scale. He even went out and beat half

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CONTEST RESULTS

EXPERT SPORT SCALE

1. Kent Walters, SBD	185.50
2. Garland Hamilton, F4U	179.375
3. Bob Frey, P-47	178.125
4. Don Lien, F4U	176.00
5. Jim Meister, P-47	173.875
6. John Lockwood, Sport Master	170.875
7. Jerry Kitchen, P-47	170.625
8. Rick Meyers, F6F	170.375
9. Jerry Ortego, FW 190	166.75
10. Buz Watson, PT-22	165.375

SPORTSMAN SPORT SCALE

1. Mike Mann, F6F	174.875
2. Orv Hinshaw, Pitts	169.75
3. Mike Peck, Liberty Sport	151.00
4. C. Bruce, Skybolt	147.50
5. Roland Baltes, Wirraway	146.625

AMA SCALE

1. John Lockwood, Fokker EIII	717.5
2. Granger Williams, Gee Bee	683.5

GIANT SCALE

1. Harry Opolan	Bristol M.1C
2. Shane Cramer	A5M6-3 Zero

TEAM SCALE

1. Webster Lockwood, Twin Commanche	175.375
2. Parcell Kelly, B-25	169.375
3. Westlake/Baker, Aircoupe	155.5

BEST MILITARY SCALE
(Special Award)
Buz Watson — PT-22

Rick Meyer's Hellcat filled fuel and air tanks through scale hatches.

Details on Steve Alardo's Corsair.

Details on Garland Hamilton's Corsair.

Details on Don Lien's Corsair.

What would the scale guys do if there had not been a World War II?

Bryan Browns of the Scale Squadron with Mathoozala of the One Ape Air Force.

Jerry Ortego was awarded a low rider transmitter trophy.

All contests must end. Paige O'Meara does the clean-up for his dad, Brian.

1981 SCALE MASTERS
EASTERN Regional Qualifications

By Frank Tiano

We hustled from up and down the Eastern Seaboard to converge on the little city of Bowie, Maryland, to do our thing. June 13th and 14th were the last dates in our region to attempt to qualify for the 2nd Annual Scale Masters. If you didn't do it here, the Nats was the last place to try. Nobody forgot that only the first five finishers in Stand-off Scale and the first three in Precision would get the prestigious invitation to the Masters to be held the last weekend of August in the State of Kentucky. The PGRC club was the host and they promised good weather, fair judging, and a good time for anybody who would "Come on Down" to fly. They didn't lie!

The minute I stepped out of the car I knew that this was not going to be an easy, rinky-dink, event. Everywhere I looked I saw familiar faces and more familiar airplanes. The heavies were out in force and the chills ran through my body despite the 90 degree temperature at 9:00 a.m. that Saturday morning.

Off to my left, the well-known Mr. Art Johnson was unloading his big F-82 Twin Mustang and his large P-40 that we saw out in California at last year's Masters during a demo. Art left last year's competition early to be admitted into a hospital but he sure looked very well recovered and in fine spirits for this competition.

Expert Stand-Off Scale winners: (L to R) 1st Art Johnson, 5th Frank Tiano, 4th Garrie Taylor, 3rd Dave Platt, 2nd Don Srull.

One look at the big Macchi, Italian fighter and I knew that Dave Platt couldn't be far away. Sure enough, there he was, lecturing on the angle of attack of his documentation.

In the next area sat a beautiful BE2 biplane that looked like it had just won WW I. Don Srull was the proud owner and the plane was a work of art.

George Rose kept the pedal to the metal all the way down from New Jersey with his fabulous World Class P6E Hawk and his brand-new P-38 designed by Savo Melee. The P-38 will become Mallory Models newest kit and since Bill Hinnant, the owner of Mallory, was part of the PGRC, everyone awaited the P-38's first flight impatiently.

Another old adversary but a real nice guy, Garrie Taylor, had brought along his Royal Bearcat that looked a whole lot better than it did at last year's regional in Philadelphia. Garrie said that he added a bunch more

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Giant Scale: (L to R) 1st Art Johnson, 2nd Mike Winter, 3rd Bill Lepley.

Precision Scale: (L to R) 2nd Dan Santich, 1st George Rose.

Giant Scale Tiger Moth by Mike Winter.

Beautiful Platt Jungmeister, 1/4 Scale by Roger Rashner.

Dave Platt's 1/5 Scale Macchi Italian fighter. O.S. .90, 14 lbs.

Art Johnson's 1st Place Expert SOS F-82 Twin Mustang.

Don Srull's 10 year old BE 2A is highly detailed.

Mario Yederlinc's Quadra powered giant scale PT-19 flys very well.

Gemini twin powered Heath Baby Bullet was 2nd in Precision Scale for Dan Santich.

Bill Lepley's giant scale Nosen Citabria is .60 powered with prop drive.

Art Johnson very carefully feeds the shark mouth.

Frank Tiano's controversial P-51B in Kelly Green. Hollman plans, .60 power.

Art Johnson's F-82 scored well with landings like this.

Aeronca C-3 Collegian by Roy Smith.

Dave Platt's Macchi in a realistic take-off run.

Garrie Taylor flew this Royal Bearcat, .60 power and retracts.

Art Johnson's 1/5 Scale O.S. .90 powered P-40.

Roger Rashner readying his Jungmeister.

detail and some finer weathering for a more realistic finish. He certainly did a great job.

Another look around and we saw a neat Christen Eagle, a very nice Aeronca C-3, a pair of T-28's, some very well done Giant scale jobs and a beautiful Heath Baby Bullet owned by Dan Santich. I really had second thoughts about how my funny looking green Mustang was going to do at this affair. I started thinking about the time required to go home and get my new FW 190A8!

Well, enough worrying already, it was time to look around, say hello to a few people that I hadn't seen in a while and take in this gorgeous flying site. The PGRC club is fortunate enough to have a minature airport for a flying field. There are two separate runways, macadam of course, running a 90 degrees to each other and appropriate taxi-ways as well. The rest of the infield is well-manicured grass. This place was definitely the nicest field that I have ever seen. Bill Hinnant and Phil Sibille were the contest directors and they were aided by a professional crew of judges and score keepers that would make any C.D. envious. The event was geared 100% for the contestant. Phil called it the "No Hassle Approach to Flying." If someone had a balky engine or a bad battery or some other minor inconvenience, the flight line coordinator simply moved that man to the rear of the line so that he could iron out his problem. Everyone got a fair shot. No hassles, no aggravation, no nervousness, just as relaxed an atmosphere as you could hope for, considering the high powered contest that this was shaping up to be.

The first round of Stand-off Scale (Expert) set the stage for the rest of the contest. Just as Phil Sibille had done at last year's regional, and just as Kent Walters had done at last year's Masters, Art Johnson did this year. His first flight gathered 93 points and coupled with a 93 static, Art would be the man to beat. The real competition would carry on from 2nd to 5th place as far as most were concerned. The F-82 did perform flawlessly and Art deserved the high score. Don Srull also put in a good flight with the BE:2 to put him up there in 2nd and the rest of the field followed by doing the best they could. Garrie Taylor had a good flight with the Bearcat and so did Bill Lepley with his P-47. Frankie T. (that's me) somehow managed a respectable 79 flight to keep in the running, too. George Rose had his hands full with the P-38 because of some trim problems and Dave Platt just couldn't get his engine to last an entire flight before it starved. The fine looking C-3 belonging to Roy Smith put in a good flight but the big Nieuport of Mario Yederlinic was running a bit too lean and came in dead stick. The rest of the pilots were doing their darndest to stay in the thick of things but in any contest there must be some leaders and there must be some followers.

Over in Precision Scale, another part of the Masters, George Rose and Dan Santich were fighting it out but, with only two entrants, there wasn't that much pressure. Doc Marggraff was having the same fun in Novice Stand-Off because there were only two entrants in his class too. But Novice wasn't being considered for the Masters and the PGRC decided to run it for the benefit of the contestants. In Giant Scale, Art Johnson was leading but not by much. Bill Lepley's Citabria was close behind followed by the big PT-19 of Mario Yederlinic and the beautiful Tiger Moth of Mike Winter. Mike hails from the DCRC club in Washington D.C., the largest in the world. Even though Doc Marggraff was doing very well, Roger Rashner's T-28A eased ahead in Novice, and old Roger was close behind the boys in Giant Scale with the prettiest Platt Jungmeister that you'll ever see anywhere.

Before the first round, and after the second round, we were treated to some exceptional flying demonstrations by two fine pilots. First we saw Joe Solko put a Mallory Models' Laser 200 through its paces with a Cass Engineering twin drive and two 40's for power. Next Norm Cassella was to demonstrate his new giant scale Christen Eagle but a mixup by somebody put the wrong transmitter in the right hands and the Eagle bit the dust. Last word is that it's repairable.

Getting back to the competition, the second round was almost a carbon copy of the first. The 13 year old whiz from Florida, Tom Velosky, was trying desperately to catch up but his Eagle was just a little off. Dr. Lyle Pepino put in a good flight with a Pica T-28 but would have to do better. Dave Platt still had engine problems as well as squirreling out of the top of his Immelman turn. Mario went dead stick one more time while Garrie Taylor moved up a notch. Don Srull and Art were still leading the pack.

We quit flying at about 5 p.m., grabbed a quick shower and then joined the rest of the guys for a tour of the Silver Hill Air Museum. Bill and Phil thoughtfully set up this marvelous tour and it was a treat for the scale modeler's eyes and heart. If you're ever in that part of the country, don't miss it. Later on a bunch of us had dinner together and we solved Dave Platt's fuel starvation problem. The next morning Dave was out at 7:30 and flew the big Macchi for an uninterrupted 30 minutes! That's what two 12 ounce tanks will give to an OS .90 at half throttle!

Sunday morning at 9:00 the first plane took to the air and the competition was on again. In Expert Stand-Off Scale, the contest was shaping up to be a drawn out affair between seven pilots. Art Johnson was still solidly in first place but biting at his heels was Mr. Don Srull and the BE:2 that he's been flying for an amazing 10 years. Dave Platt, Garrie Taylor, Bill Lepley and the P-47, George Rose and the new Mallory Models P-38, and yours truly with the funny green P-51, were the only ones left in contention. Roy Smith and the C-3 was almost there but the wind started knocking the ultra light plane around a bit and his scores started suffering.

By the end of the 4th round it was very clear that Art Johnson would be the winner in Stand-Off and that Don Srull was going to take 2nd place. But 3rd through 5th were still up for grabs amongst five pilots. Garrie Taylor fired up the Bearcat and put in an amazing flight to move up to third temporarily. My P-51 acted just great and somehow I jumped up into 4th. Bill Lepley and George Rose had to get ready for the last round as Dave took to the air with the Macchi from flight line A. George finally got the two fans turning in the big Lightning and took off from flight line B. One of these guys could knock Garrie out of third and knock Mr. Frankie T. right out all together with the right flight. But old Lady Luck must have smiled at Dave Platt and frowned on poor George Rose because David had his best flight of the weekend and George had his worst. The Macchi flew so well that Dave thought his body was possessed by some reincarnated pattern flier. The P-38 flew flawlessly also, but a hung-up landing gear spoiled the score and forced a belly landing with resulting minor damage. That left "Wild Bill" Lepley and his P-47 as the only spoiler but the big Thunderbolt didn't track too straight on take-off and that blew the gig for Bill. That's all there was — there was no more. The first five finishers were Art Johnson, Don Srull, Dave Platt, Garrie Taylor and Frank Tiano. Art also pulled the win in Giant Scale followed by Mike Winter and the big Moth, Bill Lepley's Citabria, Roger Rashner's Jungmeister and Mario Yederlinic's beautiful PT-19. Doc Marggraff stole Novice away from Roger Rashner's pretty T-28 and George Rose's P-6E Hawk beat out Dan Santich and the Bullet in Precision.

At 3:00 p.m. Eastern Standard Time, the last plane had landed. By 3:05 the contest was history. Remembering back, it was really a fine affair — quite enjoyable. I think we all had a good time and I believe I would have said that, even if I hadn't qualified. The trophies and prizes were second to none by any means. All five finishers in Stand-Off, and the first three in the other classes, received a beautiful Tower Hobbies 4" propeller with a clock imbedded in the center. They were the trophies! The prizes consisted of three deluxe radios donated by MRC, Kraft, and Futaba, as well as a Dremel disc sander, a Sullivan starter, kits from Pica and Sig, as well as over $500 worth of hardware from Carl Goldberg Models. It was really nice to see the manufacturers support so important a function as this and I personally wish to say thank you to all of them whether I remembered them all or not. It was a real nice gesture on their part.

The highlights of the meeting were Mr. Frank Borman, ex-Astronaut and current Director of Eastern Airlines, the pleasure of flying with and against some of the best and nicest guys in the country, and the peace of mind that this was a fair contest in every way. All of this sent me home feeling very good inside. I have only one word for the Prince George R/C club and to Mr. Bill Hinnant and Mr. Phil Sibille especially ... **BRAVO!!** □

PIT STOP

Gene Husting

The McCoy racing team, consisting of Harold McCoy, on the left. Harold is the all-time drag race king. Dana Smeltzer is chief engine tester and the motor wizard himself, Dick McCoy.

Arturo Carbonell, on the left, wins the 9th Annual McCoy Race. Dick McCoy is holding Bill Jianas' Top Qualifier trophy. Bill took 2nd place and Gene Husting finished in 3rd place.

Jim Aguirre won one race and has given Lavacot plenty of competition.

9th Annual McCoy Race & 1/12 Calif. Championship Series

9th ANNUAL McCOY RACE

It was time again for one of the most popular 1/8 gas R/C car races in the country. The 9th Annual McCoy Race drew 113 entries, with ten coming from Japan, one from Singapore, as well as racers from all around the country. The Pit Shop in Pomona (formerly Thorp's), was the site of the race, with the ProCar club running the event. All of the really beautiful trophies were sponsored by Dick McCoy.

The Delta team was well-represented with Arturo Carbonell, Georgia and husband Ken and brother Bill Campbell. Without a doubt, the fastest husband and wife team I know of.

The track surface wasn't cleaned ahead of time, as was normally done in the past, so the traction never really came up to its normally high peak. However, it was very good, and everyone was going quite fast with the help of differentials. The Associated team was running new prototype ball differentials. Bill Jianas used this ball diff to win the Cajun Gran Prix. This ball diff is working quite well. They should be available about the time you read this. About 98% of the racers were using some type of differential. But somebody going quite fast with a solid axle was Jerry Snow. His car was working quite well. A few of the other guys tried solid axles, but the track wasn't good enough and they immediately put the diffs back in.

Qualifying was Friday and Saturday with the Mains on Sunday. The ABC system was used. Everyone got to run 6 qualifying heats. I think this is an excellent idea. If you can't do it in 6 tries, it just isn't your day. The qualifying heats were 4 minutes long and you finished the lap you were on, so everyone got laps plus time.

After the 1st round of qualifying, the incredible Arturo Carbonell had fast time, turning 12 laps in 4 minutes 12 seconds. But there was an unknown racer only 1 second behind Art, Gene Husting turned 4:13 for second spot. Don't ask me how I did it, I don't know. The car just seemed easy to drive. The next round, Art lowered his time to 4:11, but I was able to beat it with a 4:10! I had top spot — for a short time anyway. In the last heat, of the 2nd round, Bill Jianas put it all together with a super 4:05. During the next few rounds, Art lowered his time to 4:07.72, but Curtis Husting edged him with a close 4:07.13. I lowered mine to 4:08. After the 5th round, that was as close as anyone got to Bill's 4:05. Then Rick Davis

Art couldn't quite beat Jianas, so Jianas beat himself by hitting the "Jianas Killer" dot.

Mike Lavacot is certainly going to be the man to beat. Mike has already won 3 out of the first 4 classes.

I'm not sure what Kent Clausen, on the left, is thinking, but he seems to be eyeballing Butch Berney's batteries awfully hard.

9TH ANNUAL McCOY RACE RESULTS

"A" MAIN

PLACE	NAME	QUAL. LAPS	TIME	LAPS
1	Arturo Carbonell	12	4:07.72	100
2	Bill Jianas	12	4:01.30	100
3	Gene Husting	12	4:08.62	96
4	Tom Wong	12	4:12.46	92
5	Curtis Husting	12	4:07.13	91
6	John Thorp	12	4:13.59	90
7	Dana Smeltzer	12	4:11.72	88
8	Chuck Phelps	12	4:13.37	87
9	Rick Davis	12	4:04.88	22
10	Rich Lee	12	4:14.88	18

"B" MAIN

1	Jerry Snow	12	4:17.90	90
2	George Lindner	12	4:17.20	88
3	Mike Kimrey	12	4:16.37	87
4	Eustace Moore	12	4:19.01	83
5	Ken Campbell	12	4:16.28	74
6	Randy Tentschert	12	4:17.63	74
7	Bill Campbell	12	4:18.49	47
8	Matt Azzara	12	4:19.45	28
9	Georgia Campbell	12	4:17.71	24
10	Mike Lavacot	12	4:18.22	1

"C" MAIN

1	Jim Nelson	12	4:21.63
2	Randy Wente	11	4:01.84
3	Roger Curtis	12	4:21.26
4	Joe Sullivan	12	4:20.52
5	Mark Miranda	11	4:02.22
6	Mike Rowland	11	4:01.95
7	Jerry Brower	11	4:02.27
8	Chuck Moon	11	4:01.03
9	Bill Newlin	11	4:01.83
10	Barry Grossenbacher	11	4:01.92

Mike Wibben lead the "A" Main with his new Associated McRae sports car body.

put it all together, and in a super smooth qualifying run turned 4:04! But there was still Jianas's turn to go. The odds were against it, but that's when Bill seems to do his best. And he did it again, with an unreal 4:01!! He just missed 13 laps by 2". I think it's about time to change his name to Bill "TQ" Jianas officially. Another thing that made me feel pretty good, was Jianas', Curtis' and my engine were the new K & B's that I told you about last month. They're looking good. Four of the Japanese qualified for the "D" Main with the fastest being Kazuya Mori at 11 — 4:04.64, Kenji Masuda 11 — 4:05.74, Masahisa Yamashita 11 — 4:05.94 and Junichi Tanizaki at 11 — 4:08.77.

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CALIFORNIA CHAMPIONSHIP SERIES NO. 1 RESULTS

STOCK CLASS — EXPERT "A" MAIN

1. Mike Lavacot
2. Jim Aguirre
3. Frank Killam
4. Kent Clausen
5. Mike Wibben
6. Al Chuck
7. John Thorp
8. Jerry Case
9. Tim Neja
10. Gene Husting

MODIFIED CLASS EXPERT "A" MAIN

1. Jim Aguirre
2. Mike Lavacot
3. Kent Clausen
4. Jerry Case
5. Frank Killam
6. Joel Mayer
7. Bruce Hickman
8. Mike Reedy
9. Mike Wibben

AMATEUR "A" MAIN

1. Ken Stephenson
2. Dave Kisbey
3. Ken Jones
4. Jeff Bates
5. Huw Powell
6. Ken Vehle
7. Mike Pallotto
8. Terry Ballard
9. Randy Tentschert

AMATEUR "A" MAIN

1. Dave Kisbey
2. Randy Tentschert
3. Ken Stephenson
4. Robert Cavazos
5. Terry Ballard
6. Rene Cortez
7. Ken Vehle
8. Ken Jones
9. Doug Kott

NOVICE "A" MAIN

1. Larry Stevens
2. Sonny Maddison
3. Barry Borin
4. Charles Maddox
5. Mike Buffington
6. Charles Hendrickson
7. Chuck Bishop
8. Rob Pellettieri
9. Kerry Cavazos

NOVICE "A" MAIN

1. Charles Hendrickson
2. Rob Pellettieri
3. Barry Borin
4. Gary Slayton
5. Sam Ellis
6. Bill Gafford
7. Larry Stevens
8. Mike Buffington
9. Sonny Maddison

CALIFORNIA CHAMPIONSHIP SERIES NO 2

STOCK CLASS — EXPERT "A" MAIN

1. Mike Lavacot
2. Jim Aguirre
3. Kent Clausen
4. Jim Greenemeyer
5. Mike Wibben
6. Mike Reedy
7. Frank Killam
8. Jerry Case
9. Rich Douglas
10. Bruce Hickman

MODIFIED CLASS EXPERT "A" MAIN

1. Mike Lavacot
2. Kent Clausen
3. Mike Hickman
4. Jim Aguirre
5. Tim Neja
6. Frank Killam
7. Bruce Hickman
8. Jim Greenemeyer
9. Butch Berney
10. Mike Reedy

AMATEUR "A" MAIN

1. Randy Tentschert
2. Doug Kott
3. Ken Stephenson
4. Ken Jones
5. Mike Pallotto
6. Mike Toland
7. Greg Bocella
8. Mike Westfall
9. Robert Cavazos
10. Russ Aguirre

AMATEUR CLASS "A" MAIN

1. Randy Tentschert
2. Doug Kott
3. Ken Jones
4. Ken Stephenson
5. Huw Powell
6. Mike Pallotto
7. Mike Toland
8. Dan Golden
9. Rene Cortez
10. Bob Hayes

NOVICE "A" MAIN

1. Sam Ellis
2. Barry Borin
3. Larry Stevens
4. Wayne Taylor
5. Bruce Ashmore
6. Gary McAllister
7. Ted Graaf
8. Rick Marks
9. Kerry Cavazos
10. Ron Conway

NOVICE "A" MAIN

1. Barry Borin
2. Gary Slayton
3. Larry Stevens
4. Sam Ellis
5. Sonny Maddison
6. Phil Ruggiera
7. Wayne Taylor
8. Gary McAllister
9. Rick Marks
10. Bruce Ashmore

SCALE VIEWS

Claude McCullough

7th Annual Sig IMAC Championships

As the sun came up on June 20th, it dawned on the Montezuma modeling clan that our relaxed little "fly mostly for fun" contest had nearly outgrown its britches. Modelers were flocking in from at least 13 states, including a distinguished visitor, John Grigg, President of the AMA. Entries had taken a monster jump over 1980 to a total of 119 in the seven scheduled events. Fortunately, the contest has been operated from its inception by members of the Des Moines Modelaires and they have accumulated a cadre of skilled and knowledgeable people who knew how to keep things moving along. If the weather had been a little less volatile, the extra fliers might have fitted into the weekend without effort. But there were a number of interruptions from thankfully brief showers causing shut-down of the flight lines. Undaunted, the two sets of judges kept on steadily scoring flights, helped by the unique IMAC method of having the next-up contestant waiting in an airborne 'ready box in the sky,' poised to move into the aerobatic box as soon as it was vacated by the previous performer.

If you've been thinking about attending one of these scale-like aerobatic classics, don't be discouraged on planning to do so next summer by this report of growing pains. The group sponsoring and operating the meet recognize that it is to be expected that it will be even bigger next year and plans are already under discussion as to what measures, such as more flight lines and judges, can be taken to accommodate all comers in 1982.

International Miniature Aerobatic Club contests are not too familiar in some sections of the country, so if you want to find out more about the idea look up the Scale Views columns in the October 1978, 1979, and 1980 issues of RCM. Background, development and method of operation for these scale-like aerobatic competitions originated by IMAC founder, Jerry Nelson, are covered in these columns and we won't repeat them here. Also, look up the section in the AMA Rule Book called "RC Sport Aerobatics," which has the official regulations for both biplane and monoplane events. And one of the best ways to support this growing activity is to join the specialist group that promotes it. Send $5.00 to Glenn Carter, Sec.-Treas., International Miniature Aerobatic Club, 2020 Gill Port Lane, Walnut Creek, California 94598, for a year's membership which includes a license card, IMAC decals, contest operation information and a newsletter subscription. These events combine the best features of scale and pattern and as the Montezuma experience indicates, once started in an area, they catch on and go.

As one of the original IMAC meets and, almost from the start — the largest, the SIG meet has tried to test out rule ideas different from the official book versions. We figure that on-the-field checkout of new concepts is better for the sport than promoting untried theoretical "paper" changes. We find out what works and, what doesn't work. Last year, the specs for the Giant event allowed a slightly strange mix of models. Some were the usual biggies the class was intended for, but some weren't all that large and seemed

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Flight Line Director Roger Schlenker holds a monitor for possible interference problem. Doesn't happen often out here in the boondocks, didn't seem to be any this time.

SPORTSMAN BIPLANE — 34 entries

1. Stephen Peck, Omaha, NB — Aeromaster ..... 361 pts.
2. Dick Boles, Hanna City, IL — Stafford Akro Sport ..... 356 pts.
3. Jim Koch, Raytown, MO — Sig Skybolt ..... 352 pts.
4. Dave Feazell, Hudson, IA — Sig Smith Miniplane ..... 350 pts.
5. Dave Goulet, Moline, IL — Waco ..... 344 pts.

ADVANCED BIPLANE — 18 entries

1. Chuck Jones, Spencer, IA — Knight Twister ..... 375 pts.
2. Bob Nelson, Waterloo, IA — Sig Skybolt ..... 361 pts.
3. Jerry Zebrauskas, Country Club Hills, IL — Sig Skybolt ..... 361 pts.
4. Steve Hershberger, DeKalb, IL — Sig Skybolt ..... 345 pts.
5. Burnis Fields, Jacksonville, FL — Sig Skybolt ..... 340 pts.

UNLIMITED BIPLANE — 6 entries

1. Darrell Gideon, Norwalk, IA — Sig Skybolt ..... 363 pts.
2. K.K. McClure, Bartlesville, OK — Sig Skybolt ..... 361 pts.
3. Doug Brueshaber, Minneapolis, MN — Sig Skybolt ..... 357 pts.
4. Don Kadous, Spencer, IA — Sig Skybolt ..... 342 pts.
5. Dean Maupin, Prophetstown, IL — Sig Skybolt ..... 316 pts.

SPORTSMAN MONOPLANE — 22 entries

1. Dale Cooper, Rochester, MN — Sig Cessna 150 ..... 321 pts.
2. Dave Feazell, Hudson, IA — Bridi Super Fli ..... 309 pts.
3. Jim Van Loo, Dubuque, IA — Akromaster ..... 309 pts.
4. Tom Stoudt, Erie, IL — Midwest T'craft ..... 309 pts.
5. Alan Pooley, Apple Valley, MN — Sig Chipmunk ..... 300 pts.

ADVANCED MONOPLANE — 13 entries

1. Jerry Zebrauskas, Country Club Hills, IL — Midwest T'craft ..... 329 pts.
2. Don Fuller, Mason City, IA — Sig Chipmunk ..... 319 pts.
3. Bob Nelson, Waterloo, IA — Original Zlin ..... 317 pts.
4. Bill Schneider, Colwell, IA — Sig Chipmunk ..... 315 pts.
5. Chuck Jones, Spencer, IA — Sig Chipmunk ..... 309 pts.

UNLIMITED MONOPLANE — 5 entries

1. Darrell Gideon, Norwalk, IA — Sig Chipmunk ..... 376 pts.
2. K.K. McClure, Bartlesville, OK — Sig Chipmunk ..... 349 pts.
3. Roger Schlenker, Des Moines, IA — Sig Chipmunk ..... 341 pts.
4. Harold Lee, Des Moines, IA — Sig Bonanza ..... 302 pts.
5. Dean Maupin, Prophetstown, IL — Sig Chipmunk ..... 286 pts.

GIANT AEROBATIC SCALE — 21 entries

1. Chuck Jones, Spencer, IA — Nosen P-51 ..... 281 pts.
2. Lynn Jorgenson, Panora, IA — Great Lakes ..... 244 pts.
3. Dale Cordes, New Ulm, IA — Zlin Z-50L ..... 244 pts.
4. Larry Scott, Harlan, IA — Waco Taperwing ..... 243 pts.
5. Wendy Van Wyngarden, Sioux Falls, SD — Orig. J-3 Cub ..... 238 pts.

A Bridi Super Fli by David Feazell (Hudson, IA) had a beauty of a multi-toned finish. And those aren't bumps on his finish, just rain drops from one of the showers that passed through.

Looks just like Bob Lyjack's full-size Waco Taperwing, but it's Larry Scott's (Harlan, IA) sharp looking original of the Polish Eagle's aircraft.

Bill Schneider (Colwell, IA) checks out the needle valve setting on the S.T. Bluehead in his 54" Knight Twister, scratch-built from Bill Heger plans.

Ray Dray (Rochester, MN) had a Fox twin in his 16 lb. Nosen Citabria. Fox twin is an ideal engine for this type of cowl.

Howie Wayne (Longmont, CO) guns the S.T. .60 in his Sig Yak to clear it and add some castor oil smog to the low haze. Ray Dray holds.

A shiny Sig Skybolt was flown by Maurice Rossi (Rochester, MN). Has the standard red, white and blue color scheme of the kit, O.S. .60 powered.

Randy Hill (Country Club Hills, IL) checks for incoming traffic while Pete Frankenthal holds on to the Byron Originals Pitts. Quadra powered, weighs 16 lbs.

Great flight shot by Mike Gretz catches Nosen P-51 by Chuck Jones (Spencer, IA) on take-off. Twenty-six pounds pulled by a Homelite engine.

A Quadra powered Great Lakes flown by Lynn Jorgensen (Panora, IA) stubbed its toe on landing and slowly upended.

Dale Cordes (New Ulm, MN) built this O.S. .90 powered Zlin Z-50L from an Ohio Super Star kit. 80" span, in colors of German World Aerobatic team.

Line up to fly was by frequency. The Flight Director can tell at a glance how many of each frequencies are left in a round.

Wesley Van Wyngardon (left) and Wayne Helgager (Sioux Falls, SD) both flew J-3 Cubs that had been enlarged to 84" wingspan from the Sig J-3 kit design. Identical except for a red diamond on the wing of Wesley's model. .60 powered, 8 pounds.

Don Sobbe (Evergreen Park, IL), of Vortac and Circus Hobbies, who believes in markings for his Aeromaster, watches the action as his turn to fly approaches.

Bill Benton (Omaha, NE) gets ready to taxi out for take-off with his Kraft Super Fli, a 15 lb., Quadra powered 80" version.

Mrs. Fields anchors for Burnis as he starts up his Sig Skybolt. That sunny emblem on the tail means they are from Jacksonville, Florida.

Darrell Gideon (Norwalk, IA) went home with the money in the Unlimited Monoplane event. Sig Chipmunk design, 7¼ lbs., with Art Scholl markings.

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Dave Goulet (Moline, IL) cranks up his blue and yellow Pica Waco. He flew the 7 lb. ship in Sportsman Biplane.

Pete Frankenthal (Oak Forest, IL) put on a good show with a smoker-equipped Byron Originals Pitts.

Jewel Ness (Cannon Falls, MN) prepares to tweak the nose of his Sig Miniplane. Richard Stein has a good grasp of the situation. Jackets indicate cool front going through.

Sig Super Chipmunks are popular entries in the Monoplane Aerobatic events. Here Chuck Jones (Spencer, IA) primes the Kraft .60 in his.

No control lines in sight, but nevertheless that is Jim Van Loo (Dubuque, IA) flipping the prop on his .91 powered Akromaster.

Doug Brueshaber (Minneapolis, MN) puts on his specs and gets down to the job of filling out his flight sheet. His Sig Skybolt waits for the action.

Burnis Fields (Jacksonville, FL) bent his Bud Barkley Moth at the Louisville Fly-In, repaired it during the week in Montezuma, flew it during the contest. Good Performer.

The Quadra in Richard Steine's (Minnetonka, MN) Gee Bee Senior Sport hauls its 19 lbs. up convincingly. 90" span, red and cream.

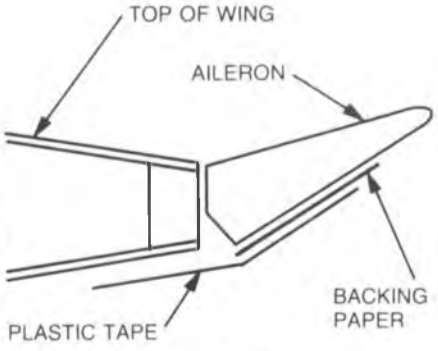
FOR WHAT IT'S WORTH

Ralph Leidner, Coral Gables, Florida, found a good product to do a needed job as shown in the accompanying sketch.

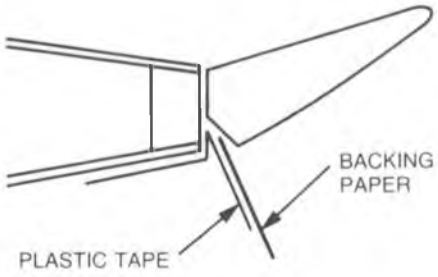
The benefits of sealing hinge gaps at the wing to aileron, and stabilizer to elevator has long been known, however, it has always been very difficult to accomplish because the tape can unintentionally stick to the wrong surface. It is hard to find wide enough Scotch Tape, and the adhesive is not very long lasting.

"Contact" brand makes a transparent adhesive plastic in rolls, 18" wide. A 40" length is under $1.00 and readily available in hardware stores.

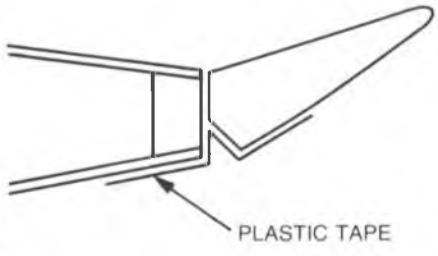
Strip off a 1½" width and you have enough for one wing and stab panel (usually about 27" + 10"). Remove all oil from the surfaces with "Glass Plus" or thinner. Strip the adhesive from its backing and **save** the backing. Temporarily tape the backing to the **movable** surface so that it slightly overhangs the hinge line and covers the movable surface. Keep the "waxy" surface of the backing **up** so that the plastic cannot permanently stick to it. Work on the bottom of the wing, with the aileron locked in full up, so that you are looking into the widest possible hinge gap.



STEP 1



STEP 2



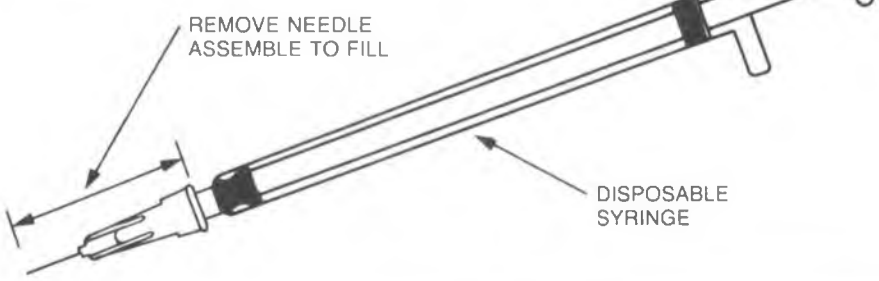
STEP 3

Lay the plastic strip on the clean bottom of the wing so that it covers about 1/2"-3/4"; it will stick only to the wing in a permanent fashion and only lightly to the backing.

Release the backing from the aileron and fold it and the clear plastic up. Now use a thin metal ruler, with a rounded end, and push the adhesive against the trailing edge of the wing about 1/4" into the hinge gap (see sketch). Next discard the old backing and use the ruler to push the adhesive against the leading edge of the aileron. Now use your thumb to fold the adhesive plastic down on the aileron at the front portion only. Finally, smooth it over the rest of the aileron.

John Gregory of Chelsea, Massachusetts, advises us of a great accessory for all those Dremel tools out there. They are called dental burrs and were purchased through an industrial and military surplus catalog. The company Jerryco Inc., 5700 Northwest Highway, Chicago, Illinois 60646 will send out a free catalog upon request. The dental burrs are $3.00 for a package of 24 and they come 6 to a box and a 4 box assortment, Stock AX-1009-4. John has found them to be fantastic for cutting, carving, and shaping hardwood, plastic, metal, aluminum and, needless to say, balsa! If you cannot afford the $3.00, try asking your dentist for his used burrs.

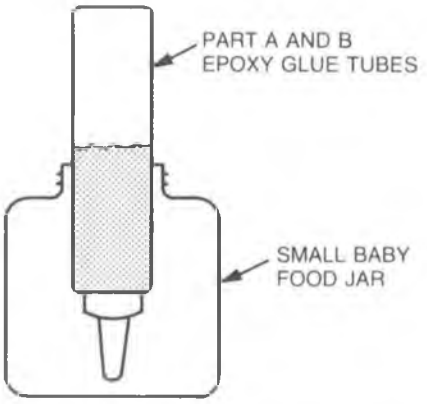
Frank Magnusson, Wexford, Pennsylvania, has a method for removing bubbles in plastic film coverings as shown in the sketch.



On surfaces such as slab-sided fuselages or sheeted wings, Frank sometimes gets wrinkles in the MonoKote after they have been flown many times. To help get rid of the wrinkles, he takes a small disposable syringe commonly used for allergy injections, and fills it with Balsarite. Inject the Balsarite into the wrinkle, and then run the MonoKote iron across it. This does not completely eliminate the problem, but it helps considerably. When filling the syringe, it is necessary to remove the needle assembly.

J. E. Uebelhoer, Ft. Wayne, Indiana, tells us of his solution to an old problem.

Use two small size baby food jars to keep epoxy glue tubes in an upright position. They are perfect in size and can be moved anywhere on the bench for convenient use. This keeps the glue in the top of the containers so there is never any waiting for the glue to move to the nozzle. See accompanying sketch.



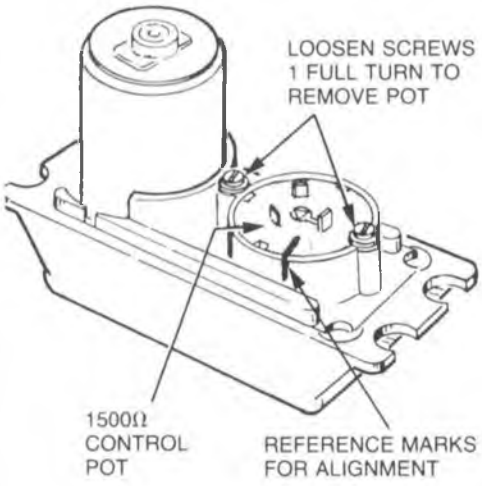
Greg Pfeiffer of Columbus AFB, Mississippi, tells how he solved the lettering problem on his model. After cutting out many small letters and numbers from trim sheets and masking off or hand painting his graphics, Greg knew he had to find a much less time consuming way.

FOR WHAT IT'S WORTH

A brand of transfer letters called "Velvet Touch" are very easy to align in the proper position, rub on, and admire! Then, 3 or 4 coats of Pactra Aerogloss "fuel proofer" works well to provide a protective fuel proof finish. The "fuel proofer" will not eat the transfer letters, and the result is a professional "decal-looking" graphic.

Here is a trouble preventer from Keith Klingebiel, Colesville, Maryland. Those of you who clean the pots on your servos know that after reassembly, the servo must be re-centered to assure that the control surfaces will be the same as before the cleaning. One way of assuring this is simply to scribe a light pencil mark on the pot as well as the center case section (which holds the pot) **before** disassembly for cleaning. After cleaning, you merely have to align the pencil marks to assure the same center point as before. This reference mark can be used the next time the pot is cleaned.

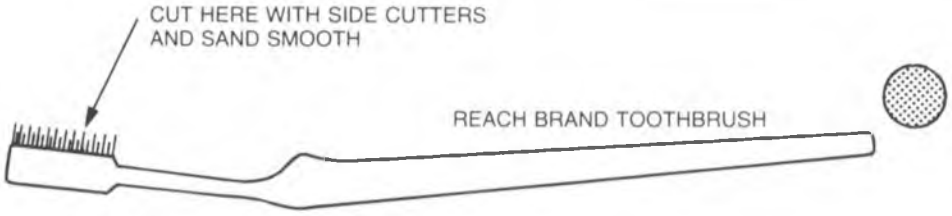
TYPICAL SERVO

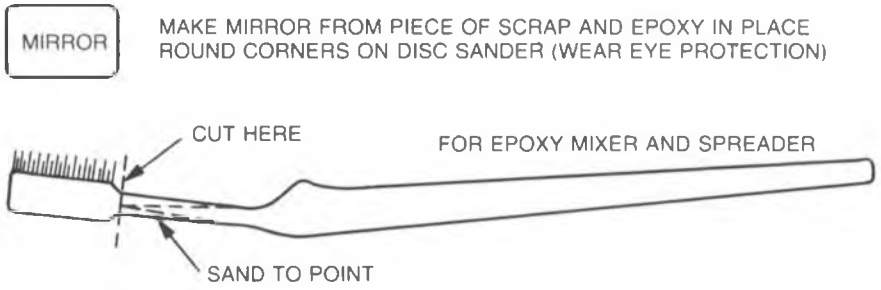


This tip for boaters comes from John Kurzynski of Green Bay, Wisconsin. John has been using plastic containers like Tupperware for his radio boxes in his boats. They come in many different shapes and sizes. One will be just right for your boat. Silicone sealer is used to attach wood to the bottom and sides for mounting servos. The plastic lid makes for easy access to the radio gear and with the lid snapped on the box is water-tight.

A useful recycling gimmick was submitted by Jeff Mercer, Aurora, Colorado.

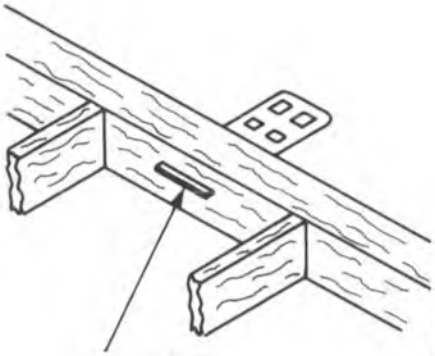
Put that old toothbrush to work again in your workshop!



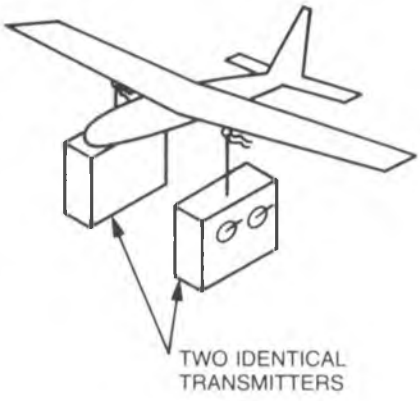


Jeff buys those Reach brand toothbrushes that look like a dental tool. After they have served their purpose don't throw them away, but put them to work in one of these two ways. First, cut away the bristle portion with a pair of side cutters, as shown in the sketch. Then epoxy a mirror on the remaining bristle pad. You can use this tool for checking servo wire connections, blind nuts, clevis connections or whatever falls in those hard to see areas. Secondly, by cutting the entire bristle pad away and sharpening the remaining arm to a point, you have an excellent epoxy mixer and spreader for those hard to reach areas.

This hinge installation method was submitted by Howard Pinckard, Ft. Benton, Montana. Howard's best method for mounting nylon hinges is to use 3M 180 wet/dry sandpaper with a couple of drops of "Zap" on each side. To date, there has been no problem whatsoever with a hinge working loose. The sketch shows the proper method.



Here is a goodie from Bill Sarby, Parma, Ohio. As the sketch shows, two identical transmitters back to back make good C.G. balance finders.



Rick Sked, Nellis AFB, Nevada, shares his helpful discovery with us.

After seeing permatex plastic cleaner #403 D used to polish canopies on the fighters, he gave it a try on his two year old Sporty Ace bipe. Surprise! All of the grease oil, dirt, plus the scratches left by the iron when it was put on, were gone, it left the MonoKote sparkling like new and it also allowed him to give his bird some heat so it can tighten up the usual new bird wrinkles that MonoKote develops. Rick strongly suggests this for any cleaning problem you would have with MonoKote --- this is the answer.

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

THE R/C COCKPIT

By Kent Walters

Within the R/C recreation there have been many innovations in the past to make an R/C model more realistic to full size aircraft. Relatively few of these have been at the transmitter end of the R/C system which is perhaps the reason I found some fascination with evaluating an R/C cockpit system.

The product was manufactured by Cockpit Control Systems and represented a pilot production assembled version of their initial production configuration.

I was initially apprehensive about testing such a product since I was not an experienced licensed pilot. However, the opportunity to combine the skills of R/C flying into a conventional cockpit environment was just too much to pass up.

The assembled system is built on a 23'' x 45'' carpet covered platform comprising an adjustable folding chair, control stick, inclined control pedestal for securing the transmitter, the throttle arm, and rudder pedals. In addition to these are the rather ingenious but simple control hook-up hardware to provide the mechanical linkage to a two stick mode II transmitter for assimilation of a cockpit.

The system can be purchased as a hardware only kit excluding platform, chair, and pedals. It is advertised to require 4 hours of assembly time, but I would guess more like 6-10 hours considering the fabrication and assembly of the parts not included. Considering these factors, this makes the $60.00 extra price tag for the assembled system seem like a bargain compared to the kit price of $319.95 excluding shipping and handling.

On assembled kits, there is a minimum amount of assembly and adjustments requiring approximately 45 minutes to one hour to complete. This includes mounting the brackets provided to position and secure your transmitter case relative to the linkage provided. Variations in transmitter case sizes make this an individual fit requirement in order to assure no lateral movement of transmitter during operation. The transmitter stick grips must be removed prior to installing the linkage of the cockpit. After completing all of the initial installation adjustments, the transmitter could be installed or removed in a reasonably short time including linkage connections. Convenient removal was an apparent design feature in the system. Various other features permitted adjustments to control travel or means to prevent over-control of the transmitter sticks by the cockpit system. Good quality metal parts were used in many places.

I had three different transmitters of my own to try fitting into the brackets and linkages for comparison. I found that a ten year old Heathkit radio case did not fit the linkage due to its front to back dimension which was too high for the rudder-throttle control pivot bracket to operate over its full travel. Modern transmitter cases that are less than 2¼'' deep should present no problem, otherwise a special bracket can be requested as I did.

The metal positioning brackets for the transmitter need to be covered with a tape to minimize cosmetic scarring of the transmitter case during repeated installation and use.

I was introduced to flying with this system initially with a ''buddy box'' on standby using the manufacturer's pattern aircraft.

As might be expected, the item that felt initially awkward was the sitting position very close to the ground and the need to use foot pedals for rudder control. This latter problem would likely present no difficulty for individuals experienced in full size aircraft. After a ''zig-zag'' take-off run, I found that the aileron-elevator stick control held with my right hand required little or no time to adjust to this new experience compared to that ''thumb control'' I had normally used directly on a transmitter. After a few more minutes of concentrated flying, coordinated use of ailerons with rudder came surprisingly fast. Throttle was also a bit difficult to initially adjust to, but with a little time I managed to perform several maneuvers requiring coordinated use of all controls on this first flight.

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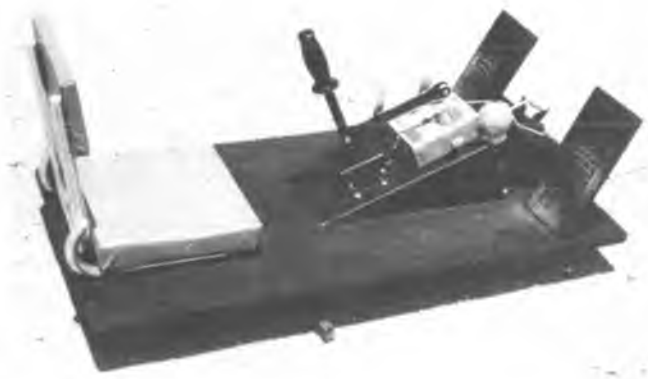

SHOWCASE '81

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recoil starter — no more need for electric starters, belts motorcycle batteries, chargers, power panels, field support box, just to get your engine running. All you need is already on the Marine Magnum. Off/on switch; machined aluminum motor mount with bellcrank installed for throttle linkage 8" wide; water cooled aluminum head with custom brass fittings; water cooled dual exhaust system to fit all hulls. Complete with pipes, connectors, plus fittings for the transom of your boat. Exhaust and cooling water exits through fittings on the transom of the hull for that scale appearance. Just like full size power boats; powerful 1.9 C.I.D. needed for those large hulls. Two h.p. at 10,000 rpm; no expensive or messy glow fuel. Will run 1/2 hour on 12 oz. regular gasoline mixed 16 to 1 with oil. Twelve oz. tank, hose mounting bracket included; factory warranty — service and parts available throughout U.S.A.

Complete hardware is included — the finest available components in the model boating industry today are used in this package. This is a total package. There is nothing to buy. It has been tested and proven. The drive train is set up for flex drive. Collet, flex cable 24", stuffing box, strut, thrust bearings, drive dog, metal prop tail nut. It's all there. I'll bet you wanted to know how you were going to steer the boat — rudder, and tiller arm included. The Marine Magnum is priced at $289.00. Order direct, send certified check or money order. (Add $4.00 if C.O.D.) from Major Marine, 6650 North Seeley, Chicago, Illinois 60645, (312) 743-1010.

NEW HANDYMAN® LINE OF PLIERS AND WRENCHES

A new line of Handyman® quality pliers and wrenches at a price the do-it-yourselfer wants to pay offers an assortment of tools to handle all the holding, gripping, fastening jobs around the home, workshop or garage. Made of high carbon, drop-forged tempered alloy steel, the line includes slip joint pliers (6" and 8"); groove joint pliers (10" and 12"); long nose pliers (5", 6", and 8"); linesman pliers (7" and 8"); and diagonal cutting pliers (5", 6", and 7"). Slip joint and groove joint models have polished chrome finish and all products are finished to resist rust. Long nose, linesman and diagonal cutting pliers have precision-machined and finely honed cutting edges. All models have bonded vinyl grips. There are also adjustable wrenches (6", 8", 10", and 12") of tempered chrome vanadium steel with rust-resistant polished chrome finish and handy hang hole; and a set of five individual open end wrenches (1/4" to 3/4" capacity), rust-resistant polished chrome finish, with metal clip for easy carrying and storage. Suggested retail for the pliers range from $3.79 to $11.29 each; adjustable wrenches from $6.35 to $12.45 and the wrench set is $9.79. From Stanley Tools, Department PID, Box 1800, New Britain, Connecticut 06050.

IMPROVED HINGE SLOTTING KIT

Our hinge slotting kit which made the problem of installing hinges easy for the first time has been expanded and improved. We have added a centering guide which will give the modeler perfectly aligned hinges; works with both sizes of Klett regular hinges

and the newer flex points. The only set that's complete — all 7 pieces including the handle for only $2.95. Available from Carl Goldberg Models, Inc., 4734 West Chicago Avenue, Chicago, Illinois 60651.

THE C.G. PRECISION BALANCER

As you know, proper balance can be as important to R/C models as turning on the radio. The C.G. balancer is designed to balance planes and boats quickly and accurately. It is convenient and easy to use leaving hands free to shift radio gear or weights. At only $5.95, it is a must for every modeler!

TWO OFFSHORE DESIGNS

Warderaft Marine, 2212 199th St. S.W., Lynnwood, Washington 98036, (206) 775-3969, is now producing two offshore designs, one for .21 size engines and the other for .65 to .90 size engines, for competition or sport running. Both hulls are available in two bottom configurations, deep vee or modified vee incorporating a flat running pad.

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All hulls in the Warderaft Offshore Series are constructed of polyester fiberglass employing top quality hand layup techniques. Hull reinforcements are of aircraft grade plywood and glassed into the hull. The boats in the Warderaft Offshore Series feature a unique deck design that generated downward thrust at top speeds helping to increase boat stability.

The Warderaft Offshore 44 or 44FRP (flat running pad) is capable of handling single .65 or .90 size engines or twin engine installations. The hull has a length of 44", a beam of 13", and a projected operating weight of 10 to 12 pounds depending on type of engine installation. The Offshore 44FRP is legal for both NAMBA Offshore or Monoplane events. Under IMPBA specifications, the 44FRP could participate in Monoplane events but not in Deep Vee contests. The Offshore 44 is legal for IMPBA Deep Vee contests. The Offshore 44 boats are available as kits for $129.95 or a joined version can be obtained for $169.95. These prices are less cost of shipping.

The Warderaft Offshore for .21 size engines comes in two lengths, 33" or 31". The Offshore 33 is a deep vee design while the Offshore 31FRP features the flat running pad bottom. Presently, the Offshore 33 or 31FRP are available only as kits and sell for $89.95 less shipping charges.

Warderaft Marine is the first model boating manufacturer to offer the modified deep vee incorporating the flat running pad bottom. This concept has proven very successful in full scale offshore boats and most effective in model boating application. During the past five years, Warderaft designs have captured world and national championships while establishing numerous records in straightaway speed and oval competition.

Complete hardware kits featuring strut and rudder, mounting brackets, ride plates, flex-cable drive shaft, shaft housing, and the necessary nuts and bolts to attach the hardware to the hull are available. The 60/90 kits is $74.95 and the 21 kit is $49.95.

For more information, write or call Warderaft Marine. Dealer and distributor inquiries are invited. □

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

RC COCKPIT

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On subsequent days I flew many more flights with my own fun fly model (a real Ugly Stik). This gave me a better impression of specific characteristic differences between the cockpit system and an airplane I had flown earlier with a hand-held transmitter.

The control sensitivity using the cockpit tends to be reduced. If your model sensitivity requires considerable movement on the transmitter sticks, it will likely be desirable to increase sensitivity on the model itself for comfortable control in the cockpit attitude. Trimming the transmitter in the cockpit is well-within reach, however, initially it does require momentary eye movement away from the airborne model to locate trim positions.

It was very evident to me that the cockpit system should be further elevated off the ground in order to provide better access in and out of the seat as well as provide better visibility of the runway. A quick exit could be important when located on a flight line for safety reasons. This is left up to the ingenuity of the modeler to provide or resolve.

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RC COCKPIT

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The entire system weighed approximately 38 pounds in assembled form, however, this included a swivel mechanism to permit rotation of the entire cockpit on the ground. This option was unnecessary for me but could be useful to others with assistance of a navigator.

On some transmitters, I noticed that the RF meter did not peak out when placed in position on the cockpit as when hand-held. Normally your body serves as a direct or capacitance coupled reflective ground plane for the transmitter antenna which improves its efficiency. This could be solved on these particular radios by simply connecting a wire from the base of the hand-held cockpit stick to a metal part of the transmitter case (not the antenna) via an alligator clip. I understand this is now included on the production version. Several radios had been flown in the cockpit prior to my observation of this without any apparent problem indicating its overall relative benefit is dependent on specific radio parameters including the relevant accuracy of "RF" meters itself.

Due to the forces that were exerted by foot control of rudder, the linkage control cable on the pilot production model was found to be susceptible to coming loose at one end. The manufacturer quickly resolved this by threading the cable mount which was also thereafter included in subsequent production versions.

Since this is a new experience in the way you can pilot an R/C model, I believe it is initially advisable to use a buddy box system until you have acquired some degree of confidence.

Due to its relative cost, this system might initially be considered as a club acquisition which would offer exposure to the members of its possibilities prior to their further individual investment and exploitation.

I suspect many modelers with scale interests or full size aircraft experience will give this new cockpit system consideration.

The Quarter Scale segment may particularly have an interest in this system since their flight style characteristics and response complement the cockpit environment.

In general, for any R/C flier who is looking for something different or a means to provide an added element of excitement to R/C flying, this can provide it, based on my relatively short experience with it. □

SCALE VIEWS

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out of place. In an attempt to remedy the problem, this year Giants had to have a minimum wing span of 65" for biplanes and 80" span for monoplanes. Models smaller than that had to enter the regular biplane and monoplane events (which were limited to a maximum of engines not exceeding 1.25 cu. in. and 15 lbs. total weight). The new classification specs seemed to do a good job of splitting the classes equitably. The new restrictions did not discourage entries in Giant since there were more entries than in 1980. As usual, they were the focus of a lot of interest from both spectators and contestants. There's just something extra about those big birds other than the size.

Byron Originals Pitts was the most popular Giant entry, with 5 on hand. Other types were: 3, Nosen Citabrias, 2, Nosen Cubs, 2 original Cubs, and one each Platt Jungmeister, Nosen Champ, Nosen P-51, Kraft Super Fli, Concept Fleet, Gee Bee, Zlin, Great Lakes and Waco Taperwing. That last one, by Larry Scott, has made its mark in Midwestern contests having taken 1st place at Lincoln, Kansas City and Council Bluffs and Best of Show at Waterloo. With a great finish and lots of detail, it attracted a lot of favorable comment. My observation was that some of the Giants were a little underpowered for this type of contest. A lot of torque comes in handy in vertical maneuvers, not to mention getting off quickly on a narrow runway with a crosswind. You can always throttle back when scale-like flight is desired. The

liveliest of the Byron Pitts' was flown by Pete Frankenthal, using a Roper, though it was also the heaviest at 21 lbs. It was interesting to note that the Byron Pitts, which started as a lightweight .60 powered model, has evolved in the hands of many fliers into a heavier and higher powered model. But not to say that there isn't still room for a light and low powered model such as the 5th place winner, Wendy Van Wyngarden, who flew an 8 lb., 84" span Cub with a K & B .61 for power. The thing to avoid is low power and high weight.

In the regular size events, the biplanes included 23 Sig Skybolts, followed by the increasingly popular Sig Smith Miniplane at 13 entries. There were 8 Aeromasters, 2 Midwest Pitts, 2 Pica Wacos, 2 Soarcraft Skybolts, 2 Knight Twisters, and 1 each Pica Jungmeister, Stinger, Stafford Acrosport, Phaeton, Sperry Messenger and an original. Monoplanes were led by the Sig Super Chipmunk with 10 flying, 5 had Sig Cessna 150s, 5 originals, 4 Sig Clipped Wing Cubs, 4 Midwest Taylorcrafts, 2 Stafford Chipmunks, 2 Cosmic Winds and 1 each Bridi Super Fli, Sig Citabria, Laser 200, Sig Yak and Sig Bonanza.

Modeling is my hobby, not photography, and though I have to take a lot of pictures, I neither like nor trust cameras. I have a phobia that there should always be a back-up camera or photographer on any kind of a "photo-opportunity" that is non-repeatable, such as a contest. At this one, both Mike Gretz and Bill Fleming were helping, so there were three cameras clicking. Later in the darkroom it was discovered that one camera had a total internal operational failure and had produced only blank film. Another seemed to have suffered a slight malaise --- maybe it was the second or third bounce that did it! So the fickle finger of fate left some good models and model builders(who should have had a chance to be in the editor's final photo selection) lying "on the cutting room floor," as the saying goes out there in the film capital. But we got some of them left to star in this production and we'll let the pictures tell the rest of the Sig meet story. □

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"C" Main

Sunday ended up with a 98° heat wave, plus more smog than anyone needed. But this didn't dampen the enthusiasm. Thanks to a half page size article on the front page in the sports section of the local paper, a large crowd of spectators were on hand.

Apparently even 6 rounds of qualifying isn't enough for everyone, because in practice, Jim Nelson was getting around the track as fast as the "A" Main cars. But qualifying crashes put him in the "C" Main. He obviously didn't belong in the "C" Main because he won it by 4 laps over Randy Wente in 2nd with Roger Curtis taking 3rd.

"B" Main

The "B" Main had 10 cars evenly matched, with only 3+ seconds separating the 1st & 10th place cars. The whole Campbell family ended up in this Main. And the fastest was — not Bill — not Ken — but it was Georgia Campbell! I don't know what happens to the men in Iowa, but they seem to get older and the women seem to get younger. Maybe it's the long winters.

Jerry Snow must have felt this was his Main, whether he had a diff or not, because nobody could keep up with him. He was flying, and won the "B" Main by 2 laps over George Lindner in 2nd and Mike Kimrey in 3rd.

"A" Main

The start of this race was really something. Rick Davis, the 2nd place qualifier, was in the pits trying to figure out what his radio problem was. With 5 seconds to the start, Dana Smeltzer was going up the driver's stand as a spectator was coming off the driver's stand. The spectator inadvertently bumped Dana. As the race started, Dana was laying flat on the ground, the transmitter fell out of his hand and the battery pack came out of the transmitter! Dana wasn't hurt, but he lost a few laps at the start.

At the start, the car next to me, hit me, I hit Curtis, sending him stuck in the boards with me alongside. Jianas and Art took off in the lead, with the rest of the field behind. At the 20 lap point, Bill and Art were still pretty close, but now Bill was starting to slowly pull away from Art. I was passing cars and before long I was in 3rd place. Curtis's motor was too rich and he was falling back.

At 50 laps, Jianas was almost 1/2 a lap ahead of Art. I was another lap down in 3rd. The Pomona curse had struck me again. Whenever I run there in the summertime, the smog bothers my eyes so bad they water

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PIT STOP

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up and it's hard to see your car. I wouldn't have caught Bill or Art, but I might have been closer.

At the 75 lap mark, of this 100 lap race, Jianas now had just a little over 1/2 lap lead over Art, and I was still in 3rd, about 2 laps back. Jianas was cruising to a certain win. Jianas has been racing for 8 or 9 years now, but this was the first race that his mother and father had ever seen him run. Also, Bill's brother, Alex, was there, with a complete video truck, taping the race. I don't know if all this was on Bill's mind, distracting his concentration, but on the 76th lap, Bill hit a dot that no one ever hits! It's so far off the line, it's still yellow, whereas all the other dots have turned from yellow to black with tire marks. He hit the dot straight on, punched. The car went into the air, carried 20 feet and landed upside down in the infield. A turn marshall ran out, got the car, but the wing was bent all out of shape. Bill drove it to the pits, the wing was bent back close to shape and Bill took off. But in the meantime, Art had taken over the lead and added a 1/2 a lap lead to it. Art was able to maintain his lead and went on for the win with Bill 2nd, myself 3rd, Tom Wong 4th and Curtis 5th.

I must say that this was one of the best run races I have ever been to, and a great deal of thanks must be given to Race Director John Thorp, counters Dick and Chrissy Camp. Chuck August did an incredibly great announcing job all day long. He definitely made the races much more exciting. And from all the racers, I'd like to give Dick McCoy a very big thank you for the huge amount of very large and beautiful trophies.

1/12 CALIFORNIA CHAMPIONSHIP SERIES

Last year, this 4 race series averaged over 210 entries for each of the 4 races, making it, by far, the largest series in the country. And this year, with 2 races already completed in Bakersfield and Sylmar, over 210 racers have competed in each of the 2 races. The final 2 races, in Costa Mesa and Monterey, California, are sure to break records.

ROAR National Champion, Kent Clausen, was the big Series winner last year, winning both the Stock and Modified classes. This is quite an incredible success. Will Kent be able to repeat this year? Not if another ROAR Champion, Mike Lavacot or Jim Aguirre have their way.

The first race of the 1981 Series was in Bakersfield. It was a nice track in a shopping center with good traction. It was

also a tire eater. The Bakersfield club really worked hard to run a good race, to the extent of even having a computer to tally race results with instant printed race results. However, humans were involved, and the best of computers cannot correct incorrect human inputs. But this was finally changed and the racing was really close.

Stock "A" Main

The Stock class was run on Saturday and in the Expert "A" Main, Jim Aguirre took off in the lead with Kent Clausen close behind. Clausen pressured Aguirre, but Jim held on to the lead. In the meantime, Mike Lavacot moved into 3rd place and was closing on Clausen. Then Clausen flipped and broke his antenna. Lavacot took over 2nd and closed on Aguirre. On the last lap Lavacot was right behind Aguirre, then he passed him to take the lead and the win, with Aguirre 2nd, Frank Killam 3rd and Clausen finishing 4th.

Modified "A" Main

In the Expert Modified "A" Main, an Amateur, who had just moved up into the Expert Class, Mike Wibben took the lead, and showed he knew what to do with it. For 3 minutes Kent Clausen rode right on Wibben's tail, but couldn't get by. Then, at the 3 minute mark, Wibben flipped over and Clausen took the lead. It looked like Clausen had a sure win, but at 7 minutes his batteries dumped, and in an 8 minute race, this is always a heartbreaker. Jim Aguirre then took over the lead, but now, Mike Lavacot was right on Jim's rear end. I'm sure Jim was remembering this identical situation in the Stock "A" Main, and he was determined to hold on to 1st place. And hold on he did, to win by a scant 3 feet over Lavacot with Clausen holding on for 3rd and Jerry Case taking 4th.

The 2nd race of the Series moved to Sylmar, which is a few miles northwest of Los Angeles. This is a good driver's track with good traction. 215 entries made for two full days of close racing.

Stock "A" Main

In the Stock Class "A" Main, using ROAR Stock motors supplied by the race officials, Mike Lavacot jumped off to an early lead. And if you're racing in one of these races, this isn't exactly the situation you want to face, because once Lavacot has the lead he never gives it up. He certainly never gave it up this time and went on to win with Jim Aguirre right behind in 2nd, Kent Clausen 3rd and Big Jim Greenemeyer 4th.

Modified "A" Main

Mike Hickman took the early lead in the Modified Class, with Kent Clausen 2nd and Butch Berney 3rd. Lavacot got tangled with Reedy at the start and was last place. For anybody else, it would have been a hopeless situation, but I've seen Lavacot win too many races starting from last place, so don't count him out yet. Hickman held the lead for a couple minutes, then Clausen got by to take the lead. In the meantime, Lavacot was moving up through the field and was now in sight of Clausen, but he couldn't quite catch him. Then Clausen's batteries started to go again, and Lavacot got by to take the win, with Clausen finishing 2nd, Mike Hickman doing a great driving job taking 3rd and Jim Aguirre 4th.

Although Lavacot has a lead in the Series so far with two races to go, it's still anyone's Series. If Aguirre can only hold on to the lead when he gets it, or if Clausen's batteries don't die — who knows? □

1981 WESTERN REGIONAL QUALIFICATIONS

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the other people. You just can't trust anybody anymore.

So, it was truly up to me to uphold the F-Troop image. And hold it up I did. On my first flight, I nosed-over after taxiing 11" and broke a prop. **Zero** for take-off. I replaced the prop and lined up to complete the flight. I actually got the plane up in the air and was really going to town when I sighted a station wagon parked on the tarmac watching me take off. It was parked about three feet away from where my plane was and directly in its flight path. I was starting to wonder why everybody was

yelling and waving. Through superb mastery of the sticks **and** an the ability to keep my eyes tightly closed, I was able to maneuver around the obstacle (I don't know which side of the car I was on, but I missed it so who cares). The lady in the station wagon was seen waving to "Claude" as it passed overhead or beside her.

Being ever so cool, calm, and collected; I finished the flight without incident (and without doing several of the maneuvers). Not counting the landing, of course. I lined it up beautifully, floated her in, flaired out quite professionally and dumped it right in front of the whole world. Kent was asleep so I don't think he saw it. I received a fantastic 41.5 flight score. And she was still air worthy, as soon as I tweaked the wheel pants. Wheel pants are not recommended for people who can't land. I'm used to a grass field (the Tailspinners Field in Buena Park), if you nose-over you just quit rolling. At Mile Square if you nose over you file off 3" of cowl and wheel pants.

I skipped telling you about the first flight of the P-51. It was easy. In fact, I don't even remember flying. I do, however, remember that the gear wouldn't go up, the engine sagged to about 23 rpm and it flew tail-heavy **all** over the sky. I also remember the landing. It was just as bad as the one with "Claude." I must have done a pretty good job though because I got a magnificent 32 for my very **first ever** competition flight score.

The second flight on the P-51 was a snap. I was really in the groove now. The gear went up, the engine stayed running and the lady in the station wagon was gone. I even did all the maneuvers. Most of them weren't recognizable, but I did do them. I finished the flight with one of my patented power-on spot landings. But did so with enough finesse to receive a 3½. I was on my way now. People were starting to pay attention (so they could duck in time).

The second flight on "Claude" was superb. By now I was as calm as Don Knotts. The take-off was smooth. I did all the maneuvers in fairly reasonable shape, and the judges never left their seats (I forgot to mention that they had bailed out a couple of times on the previous flights). As I lined up for what surely would have been a perfect landing and roll-out, someone decided to carry out a Quarter Scale mutha' for take-off. Everybody was yelling, so he turned around to watch me land. The man was truly brave. Luckily he stayed in one spot so that there was no way I could hit him, even if I tried. At least this time I had him as an excuse for the inevitable nose-over.

Rick decided to pull the P-51 out of the contest. It had finished the first day and he still had it in one piece (except for the shaved cowl and engine head). Some guys just have no guts. But he proved that he did have brains. But I wasn't worried because "Claude" was still available to me. The wheel pants by now looked like grass hula

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1981 WESTERN REGIONAL QUALIFICATIONS

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skirts; but the wheels still turned.

The last (I skipped the third flight because it was uneventful, except for the nose-over on landing) flight on "Claude" was borderline perfection. I was actually in control at all times. My low fly past was finally below 30,000 feet. The judges actually saw what the plane looked like. Even the Figure Eight looked more like an eight than a seventeen. Naturally, I had never done one prior to the contest. At our field there's a building in the way. This time as I was going around to line up for landing, the B-25 dropped four bombs about 6" in front of my nose and scared the heck out of me. After my caller put me back on the ground I did my normal nose-over. But this time I missed the entire landing strip, flipped over and cut my Rx antenna. I was done for the contest. But I got four of the six flights in and was making my move on next to last place.

In total, I got six flights in, counting the two on the P-51B. I got a static score of only 63, I was probably laughed at by 99% of the crowd, my highest flight score was a mere 48.5; but all the rest of the guys in the contest combined couldn't have had as good a time as I did.

The Scale Squadron went out of their way to make this first timer feel at home and like I really belonged. The One-Eighth Air Force were friendly and helpful (and crazy). Biggies like Colonel Thacker and John Lockwood actually started conversations with **me.** All the other guys (the independents, so to speak) were fantastic. And to top it all off I won a six channel receiver at the Saturday night banquet! That banquet could be an entire 'nother story. You can bet your begonias that I'll go to Phoenix next year just to see how the "One-Ape" Air Force gets even! **Thank You All,** I am truly hooked. I've been building for 31 years and I can't imagine why I waited so long to have this much fun. □

CAMANO "100"

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. . . . Hinge Points furnished with the kit, on the rudder. After the fourth flight, all three Hinge Points broke, and the Plastic Tape was not holding the ailerons and flaps in satisfactory alignment. All hinges were then replaced with Klett hinges. The flap and aileron hinges were inlaid into the sheeting, and epoxied in place.

Covering:

K & B Super Poxy primer, and paint were used on the fuselage. Both were

applied with a two-buck sprayer. This little gem is called Preval, made by Precision Valve Corp. It consists of a power unit, and spray bottle. When it runs out of poop, after 3 or 4 fuselages, just buy a new power unit — works great! Top Flite MonoKote was used to cover the flying surfaces. If you have trouble with wrinkling on sheeted wings, just keep taking them out with the blower as they appear. After half a dozen times, they stay out.

Radio:

An Airtronics Model XL 9160, 6 channel radio was used in the review model. The Camano plan shows 3 Ace Micro Servos mounted crosswise in the foreward fuselage. Even the Airtronics 94401 Mini Servos won't mount crosswise. So, two were mounted foreward, side by side. These worked elevator, and spoiler releasable towhook. Next comes a standard 94431 servo for flaps. Another standard servo was mounted at the wing root for aileron/rudder. The first installation glitch came when we tried to squeeze the battery into place. In order to mount the battery, using padding, the battery case had to be removed.

Although a 4 channel radio is all that is required with a multichannel sailplane, you really need a 5 or 6 channel transmitter. In a 4 channel, Mode II transmitter, the rudder lever is useless for spoiler control. The 6 channel works just fine. There is a trimmable control on the right side top of the transmitter for spoilers. As a matter of fact, after leaving the spoilers up the whole first flight (releasable towhook connected to the spoiler servo), we installed another servo for towhook release, and connected it to the retract switch on the left hand top of the transmitter. This worked out neatly, adding an ounce of weight, and a pound of peace of mind.

Flying

We recommended balancing on the aft C.G. position, 1/2" behind the wing rod. This required 4 ounces of lead shot in the nose compartment. This brought the total flying weight, with 5 servos, to 56 ounces. Control surface throws were as follows: rudder rear ± 1¼", ailerons 1/2" up and 1/8" down, flaps +7° -65°, stab rear ± 3/8".

The first few launches produced a violent yaw to the right. Upon checking the towhook position, it was found that it had been inadvertently mounted 1/2" behind the place shown on the drawing. Correcting this required surgery, but it sure fixed the problem. Now the Camano "100" launches very straight, and very tall.

Flight characteristics are just super. We have flown the 111" Camano quite a bit, and really think the handling of the "100" is a tad better. At any rate, as near as can be judged, the "100" flys as well as the larger version. Thermal turns require a bit of opposite aileron from time to time to hold a given bank angle. With full flaps and spoilers, the Camano comes down like a parachute. It's lots of fun to fly.

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CAMANO "100"

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Although considerably less time consuming to build than the built-up wing Camano, the Camano "100" requires a fair degree of building skill. Most of the required skill is related to rigging the controls, and properly aligning the control surfaces.

Despite the high cost, the kit is a good value. The prefabrication saves lots of time and frustration. The completeness of the hardware saves endless trips to the hobby shop. All in all we were impressed. □

100 KILOMETERS, THAT'S INCREDIBLE

from page 61/60

plane was leaving us. Benny was still fighting a cross wind and finally started to lose altitude. The plane got down to about 600' before we found another thermal but Benny was circling down in it. I yelled and screamed and Benny found he already had full up trim. He pulled out (much to my relief) and had to hold about half back stick.

The lift was strong and bumpy. When I asked Ben, he said he had put a pound of ballast in his plane which was throwing his trim off. He managed to climb out and leveled off about 1200'. We started down the road again feeling good as we passed the half way point. Ben was having trouble keeping his plane from diving and I would jump and yell until he pulled out.

We covered more ground and lost a little altitude. Ben found another thermal and circled back up to a comfortable height. As we crested the next hill Ben was low again but the Goal was now in sight. When we drove on, Ben was in the first sink of the flight. Finally, at about 300', he found that one last thermal he needed.

He started to climb slowly and it got stronger the higher he got. When he was high enough, he made his final run and easily crossed the telephone lines making a perfect landing near the road.

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100 KILOMETERS THAT'S INCREDIBLE

from page 128/60

Ben, Alex, and I did much back-slapping, for Ben had set two new Junior National records (a great birthday present) that would not easily be broken.

We also wondered how Jerry was doing. — — —.

Jerry was just fine, thanks.

90th St. West showed up quickly. Just west of there is Fairmont Butte, an area where I've hit sink before, but always while coming from the other direction. I found good lift and climbed out.

Sure enough, I came down quickly after I crossed the Butte and I passed 170th before I hit the next thermal. I figured Holiday Valley was possible now and kept on going.

I had been thermaling about four times an hour and my task was much easier with three pairs of experienced eyes watching. More than once I was over-ruled and, at one point, I think Bill Forrey was going to stop the car because he wanted me to take a thermal I was going to pass up. We stopped and it was the right move.

The thermals had been coming up regularly at 4-6 mile intervals and had not been going too high. Usually I could see the stabs (medium altitude) and only 3 or 4 times were they gone altogether (high altitude). Tom Finch later told me that at Rosemond Airport that day, no one had gone over 7,500' and the thermals were very weak.

After 170th St. the thermals and downers were more pronounced and the ups and downs in-between were not as productive. Some place short of the California Aqueduct, we stopped and the wind was obviously lighter. For a moment, Bill thought the wind had changed direction but, fortunately, it hadn't. His comment was a portent of things to come, however. I continued to climb as I crossed the Aqueduct and turned downwind to Holiday Valley. It was only 2-3 miles away but the day was starting to deteriorate.

I got to Holiday Valley below 500' for the first time since launch. I hit a good thermal right at the dog leg on 270th St. and made my last really good climb. Cruising between thermals was considerably harder now due to increased "down air." Nevertheless, I now thought we had a real shot at Gorman. I really wanted to make 100 km. It just has a kind of magic sound to it.

As we cruised west, I started to think about flying past Quail Lake. I wanted to be

on the North (upwind) side to avoid the possible effects of downwind sink. The wind had started to shift to the north and the valley comes to a point here with the road close to high mountains on the south side. I was low just short of the lake though, and had to take a thermal and drift southwest. I drifted in towards the mountains and continued hoping to find slope or wave lift. I crossed into Peace Valley at about 600' and turned up the Gorman Post Road.

Now, the reader should realize that one of the many attractions of cross country flying is wild flowers. The last weekend of April and the first and second weekends of May are the best times, and Gorman has acres of Poppies, Lupine, and Mustard and it's still green. The area was just beautiful but I had to quit looking because the glider was in hard sink.

The wind had shifted more to the north and I think I may have been in some down-wash from the Tehachapi Mountains. In any case, I yelled at Bill to turn around and we started back to Highway 138. The ship was so low now, that when we went through a little cut in a hill, the glider was lost from view. About 10 seconds later (it seemed longer) I had it again. I was less than 100' up and a quarter of a mile away.

I was going to set up for a landing when I hit a little thermal and turned into it. Bill drove the car to the freeway on ramp and we stopped to talk as I climbed out.

The wind was now from the northwest and, while all of us wanted to at least try to go into Gorman, the freeway was the only available route. We only had about 4 miles to go but it was up wind and up-hill to boot. I knew we would only be able to go in spurts and we would then have to park. The thought of freeway traffic passing by at 60 mph is sobering to say the least.

I decided to take the glider as high as possible and try it.

There were hills on the west side of the freeway that we thought might give some slope lift so I rolled out and started northwest above the hills. We remained parked until the ship was about a half mile ahead of us and then took off. We caught up soon and it was evident the glider was coming down fast. When it was obvious I couldn't clear the next hill in front of me, I flew overhead, dropped the flaps and landed in a beautiful field.

Boy it felt good! Even though I hadn't made Gorman, I had made an excellent flight and set a National Record for Open Distance. The time was only 3 hours and 16 minutes, which is really fast. It had been easy until Quail Lake. If I hadn't been flippant, I'd have known before I started that I could never make Gorman because the wind always blows through the canyons there. The 138 Interstate 5 Interchange or Quail Lake air strip would have just made the 100 km. and are not nearly as windy. Ahhh, hindsight.

After we broke the glider down, we drove the 2.7 remaining miles into Gorman. We had a drink and speculated on how the rest of the guys were doing — — —.

Back at 260th, we wondered what had happened to Jerry. After Ben's flight, our imaginations soared; could he be half way to Gorman.

We again tried to launch Alex and the Goose, but the hand-tow wouldn't get him up.

Gary Itner got Tai Pan ready and the wind switched around. The first three tows showed little lift and much sink. On the fourth tow, Gary found lift and climbed out very high. Tai Pan proved to be much more visible with its Black lower covering. We got in the car and drove about a half a mile (to catch up with the drift) and Gary took it out to an amazing altitude.

We went over the first hill and it became apparent that we were not going downwind as fast as Ben's flight. The thermals were smoother but not as strong. Gary stayed high and stayed in any lift he found.

At the halfway point, he was about 600'. He couldn't get back up to his starting altitude though, and the next four miles were spent playing with teasers and light broken thermals.

Gary was back down to low altitude again, with the Goal in sight, when he found what he was looking for. He took Tai Pan back out with only a mile to go, all down hill. The lift got even better and we tried to get him to speed up, but he still played conservative. He finished with a good 100' of altitude and was still in lift.

The Declared Goal flight, with a 100" sailplane, meant that Gary would net 5 records; only four if Jerry had made it to Gorman. We wondered; he still wasn't back.

At 8:00 p.m. we finally all caught up with each other at Ed Slobod's house. We drank three bottles of Champagne before we went out to celebrate.

What a day! Eight new National Records and the season is only beginning. Maybe this is the year we will catch the perfect day and after 5 hours and 100 miles we'll have to decide whether to land or press on. □

CHERRY BOMB

from page 59/56

would obviously be advisable. The engine and mount are now installed. Remove only as much of the fuselage side as necessary in order to allow for engine installation and removal. The engine compartment should be reinforced with 1/4" triangle stock and, after removing the engine, it should be entirely sealed with either polyester resin or thinned epoxy. We used a Du-Bro Mini Mufflaire muffler with the excess stack material removed so that it extended flush with the fuselage bottom sheeting. The entire aircraft is now shaped and sanded to the outlines shown on the plans. The wing and tail surfaces are lightly filleted into the fuselage with epoxy and micro-balloons. The streamlined Wing Manufacturing canopy is now added along with any desired

cockpit detailing. The canopy is also filleted to the fuselage with epoxy and micro-balloons and blended into the vertical fin.

Finishing:

Our entire aircraft was finished with K & B primer and R & S camouflage enamels. The insignia and decals were sealed with a coat of K & B satin clear epoxy. The decision to use Russian insignia was prompted by it being late on a Sunday night, and the only Super MonoKote trim sheets in our possession were red. It was either going to be of Russian or Japanese origin and stars won out over circles.

As mentioned, our ready to fly (less fuel) Chery Bomb weighed in at a modest two pounds nine ounces. The indicated aft C.G. point should be adhered to, especially for initial flight testing, along with the suggested control surface travel limits.

Flying:

The maiden test flight of our Cherry Bomb proved to be a bit exciting, as it became quickly apparent that the aileron and elevator travel limits were far too excessive. Subsequent flights with a sharp reduction in the travel limits of the ailerons and elevator were an absolute joy! All hoped for inflight characteristics were met. The Cherry Bomb hand launches very easily and is a stable, groovy type aircraft, that is also responsive. It is fast, surprisingly so for an aircraft powered by a sport type .19 size engine. The old reliable K & B (Veco) engine that we used was more than adequate as a power source, and also easy on the "fuel budget."

If you are a competition or sport flier, who has become somewhat jaded with the conventional sport aircraft types, the Cherry Bomb is guaranteed to put a "little zest" back into your sport flying activities. Needless to say, the Cherry Bomb is also an airborne attention getter! □

GIVE IT A WHIRL

from page 54/52

other side. The difference in weight can then often be made up by using **more** or **less** covering material (all along the **length** of the blade) on the **lighter,** or on the **heavier,** blade of the pair. The result will be to "balance" the blades so that they now both **weigh** the same. More importantly, since we have added or subtracted weight along the length of a blade, the C.G. of each blade will be in the same location along the length of each blade. The significance of this is as follows: static balance could be achieved by setting up the whole rotor head on a pivot point. The heavy blade will naturally fall and we could add weight at the tip of the blade (so as not to add too much) until a balance is achieved. What we would have **actually** achieved would be to make the 'moment' of each blade the same around the pivot point (or main shaft center). Now a

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GIVE IT A WHIRL

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on the main shaft and it will circle around the main shaft (see Fig. 6). So there will be an offsetting force continuously trying to bend the main shaft away from its normal position. And this, at about 1,500 times a minute. Guess what sort of problems this can cause — especially since centrifugal forces are in the order of hundreds of pounds for a reasonably large R/C model helicopter. Now, to solve this problem we must somehow make the **dynamic** characteristics of each blade equal around the center of the main shaft so that we eliminate this problem.

The simple trick described earlier, of adding weight along the length of the blades, helps a lot and, in most cases, **will** do the trick. Another method, which I don't like because of its potential weakening effect on the blades, is to drill little holes at various points along the blade length and add small weights so as to distribute the increased weight around the original C.G. and, again, provide a pair of blades which match each other perfectly. Now, before you experienced fliers write in (or write me off!) I realize that an across chord balance is

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

GIVE IT A WHIRL

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also desirable, but this column is mainly for beginners, and you know what to do anyway.

Now, we can go through all of the foregoing and sometimes we still finish up with an unexplained source of vibration. So what do we do? Well, when we don't understand why a mathematical solution doesn't work, we have a little engineering trick called applying an 'empirical' solution. 'Empirical' means we don't really fully understand why a particular solution works but trial and error has shown that it does. So let's look at a couple of 'empirical' solutions to eliminate vibration. Here they are.

Go through all the check and balance procedures described earlier and, of course, also 'track' your blades (see 'RCM' "Give It A Whirl" December 1980). So you still have vibration. Take a strip of your favorite vinyl (or other) blade covering material about 1½" x 5" and wrap it tightly around one main blade in the middle of the blade. Which blade? I don't know — just pick one — remember this is an 'empirical' solution. Now run up the helicopter again. Vibration less? Great! Try moving the piece further out on the blade. Better? Add another piece. Worse? Take some off. Believe me, this technique can have dramatic (and successful) results. There is an explanation for this effect but we don't have space enough for it here (which is just as well!). Let's just call it an 'empirical' method. If it works, why knock it? By the way, if the vibration is **worse** when you add the covering, just put it on the **other** side and repeat the process. If vibration increases either way, you were okay and in dynamic balance to start.

Now here's the second 'empirical' solution. We have always been told that our blades **must** be 'in track.' This is true — they must be for a perfect rotor system with perfect blades. **However,** being 'in track' really means that the "lift" from each blade is equal in magnitude and identically distributed along the length of each blade. Then with an equal centrifugal force on each blade, the coning angle and, hence, the tracking of the tips of the blades will be coincident — or 'in-track.'

But being 'in track' does not **necessarily** mean that the **tips** must be exactly coincident as the blades revolve. Again, we can try an 'empirical' solution. What we really need is symmetrical **lift** and, if each blade is not exactly flat and true, or the pair is not exact in all details which would produce symmetrical lift, **then** we may have to be 'out-of-track' a little in order to have equal lift from each blade. So, if all else fails in your quest to eliminate vibration, try deliberately setting one blade a little (say 1/2 blade thickness) out-of-track in one direction by changing its incidence.

Vibration less? Then try varying the out-of-track either bigger or smaller until you get a smooth running rotor head. The same approach here applies as for our first 'empirical' solution. If the vibration gets worse, try a small 'out-of-track' adjustment in the opposite direction. Now to set the minds of all you purists out there at rest, I'm not suggesting that we have just described the ultimate technique of setting up a rotor system. Of course it would be better, much better, to have perfect blades in all respects. But if you are like me and want to fly a lot with the least effort and the least vibration, the foregoing may help. Especially, I hope it will help the guy who was about to give up because of the vibration bogie.

Next month I'll introduce some new ideas in setting up the tail rotor system.

'Till then. □

SOARING

from page 51

lately, you have undoubtedly seen Tom Finch's new sailplane. You really can't help noticing it. Looking more like a George Lucas (Star Wars) creation than a glider, Tom's 'joined wing aircraft' is, to put it mildly, different. However, looks aren't everything — the oddball aircraft really flies!

The basic JWA design has been around since the late 1930's when something similar to it appeared in one of Frank Zaic's ***Year Books.*** *MIT has studied the JWA concept, and a guy named McMasters has written about it in the SSA magazine* ***Soaring.*** *More recently, Dr. Julian Wolkovich (a British consultant for DSI) has improved on the design considerably and has a patent on the concept. He is working with DSI and Bert Rutan on various joined wing aircraft. So, as you can see, it's not really a new idea, but is one that has only recently received the attention it deserves. Developmental Sciences, Inc. (DSI), where Tom works, has been experimenting with this design concept. Tom got the idea for his model from DSI's prototype Navy cruise missile now in the initial design-proposal stages. Tom intended his 46" span model to be a 'stability control test vehicle,' as well as a novel, fun sailplane. He used a computer program to help design the beast. Theoretically, the JWA design loses very little energy to 'tip loss.' Also, the combination of the two wings meeting at the tips optimizes airflow over the rear wing making it more efficient.*

Structurally, the JWA can be built lighter and stronger than a conventional aircraft of the same span. Tom is very happy with his new ship. It is highly responsive to the rudder-elevator controls, can be banked up to such a degree that the rear wing panel goes nearly vertical, can circle in the tightest thermals, and is pleasingly fast. Its sink rate is about right for a 46" span ship, but is not that impressive. This, however,

may be due to the fact that Tom designed it for a lift coefficient of .5, which may be too low. Initially, at high C_L, (most noticeably on tow and at 'mush' speeds), the rudder was being blanked out. This problem was linked to the 6 degrees of washout in each panel that the computer printouts indicated were optimum for minimum induced drag. Evidently, at high C_L, the front wing's inner panel region was stalling, thus heavily turbulating and otherwise disturbing the airflow headed for the tail. Tom decreased the washout by 50% in all panels and almost completely eliminated the problem. Tom's next project is a 2-Meter version which he intends to fly in the 1982 2MWC (2-Meter World Cup). With all he has learned from this one, it should be a fantastic sailplane.

The JWA shown in the photo is the 2-Meter version. It has a wing area of 1080 sq. in. and a wing loading of 5.6 oz./sq. ft. It flies very well but looks weird in the air. It's hard to tell whether it is coming or going. Tom says he is considering covering the rear wing with transparent MonoKote for a better visual presentation in the air.

◇ ◇ ◇

Electric powered models are coming on the scene with a roar (really a swish). The Pacific Soaring Association of Anaheim, California, has held two electric powered sailplane contests this year and has two more scheduled for 1981; one on August 30 and one November 8. The November 8th contest will be the first FAI F3E type. Previous contests have allowed a 2½ minute motor run, an 8 minute max thermal flight, plus landing points. Five rounds were flown, with the top three used for scoring.

There is a problem arising in U.S. electric power sailplane competition. It is one that has plagued all phases of modeling, especially those using developing technologies. It is the problem of rules. I remember twenty years ago there was a class of powered models called "Rudder Only." This was meant to allow the fellow with a simple radio and a simple airplane to enter competition on an equal footing. The rules required a "single channel" radio. All you could do was turn one thing on and off. Rudder actuators were simple escapement mechanisms, powered by rubberbands. It didn't take Howard Bonner long to figure out how to compound one escapement from another, and get control of motor speed. Then someone else decided that if they installed a big motor, with up-thrust, and put in a three speed control, they would have an effective up-elevator control, without having an elevator. Then someone developed a fully proportional radio, with servo output, that conformed with the letter of the rules, if not the intent. As fast as rules could be devised, someone designed around them.

To illustrate the same general idea, I would like to draw your attention to the electric sailplane in the photo. Larry Jolly, Santa Ana, California, put together this high

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SOARING

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performance electric system. The sailplane is called the Olympian. It has a 120" wingspan, with an Eppler 205 airfoil. It weighs 5 pounds, and has a 10 oz. wing loading. It is powered by a German electric motor, the Geist 40-14, distributed in the U.S. by Wilshire Hobbies, Santa Monica, California. The motor and gear box sell for $200. The folding prop is geared down 3½ to 1 and turns at 4200 rpm. It uses 17 volts worth of batteries, which are charged in a parallel arrangement from 12 volts, and run in series to get the high voltage. The motor will run 8 minutes on a charge. Larry estimates the climb at 1000 ft. per min. Having seen it, I believe it.

So, you see what happens! They get some nice comfortable rules to fit the old Astro Flight 05 powered ships, and along comes a new breed that will blow everyone away. With a 2½ minute motor run, Larry can get to 2000 feet. At a sink rate of 2 ft. per second, he can get 16 minutes, in dead air.

So, now we need some more rules. "To encourage more interest in electric powered sailplane flying, several people have suggested we establish a separate class for 05 powered sailplanes. A possible additional requirement for the 05 class, to encourage beginners, could be that all sailplanes used must be built from readily available kits, with only those modifications necessary to convert the design to electric power be allowed." Then some guy gets Geist to build a special red hot 05, and we need another rule. Then . . .

I certainly empathize with the people trying to make rules which will encourage development of this facet of sailplaning. It's going to take some long-range thinking. It seems likely that at least the "top of the line" class will go the way of Formula I Pylon. It will take a jillionaire, or at least a Dentist, to be competitive.

Howzat! □

RC FREQUENCY HISTORY

from page 48/46

two dissenters was "too trivial a use!" Some evidence of this attitude still exists today.

Five years later in 1971, two more 72 band channels were added so that boat and cars could share some of the now seven channels. It should be noted that the original five channels were listed for RC aircraft — so the boats and cars had no use of the 72 band until 1971.

The 72 band gave almost completely interference-free results in the early years. It is recalled that during the early 1970's one of the famous SOAR RC Gliders meets near Chicago saw as many as 15 sailplanes in one thermal at one time! That was a moment in RC history when 17 usable frequencies were put to excellent use (5 on 27, 5 on 53, 7 on 72).

What is the situation of usable RC frequencies for model aircraft today in 1981?

First, the 27 band is useless for RC model aircraft because of the interference caused by CB voice units, some of which use RC frequencies and excessive power, both illegal.

The 72 band still has seven useful channels in most areas. But in many areas the commercial high power assignments have nullified the RC use on some RC channels. This is due to a great increase in the number of commerical uses, such as point-to-point control of paging systems, and to the fact that the FCC takes no responsibility in preventing shared use of a 72 MHz channel by simultaneous high and low power users. Thousands of high power (up to 300 watts) assignments are now using most of the 50 channels available from 72 to 73 MHz and the number is increasing every day.

So, here we are, again petitioning the FCC, attempting to obtain more useful RC frequencies for more modelers, now and in

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RC FREQUENCY HISTORY

from page 158/46

the future. Chart 2 shows an interesting correlation between the growth of the AMA membership and the development of the RC hobby.

During the Pioneering phase, up to 1950, the membership was static at about 10,000. RC pioneering had been done by only a small number of individual modeler/hams, so most of the AMA members were primarily in free-flight and control-line categories at that time.

When the 27 band, with its simple license, opened in the 1950's RC Experimental efforts by a large number of modelers, boosted the membership to 20,000, of which about half were RC'ers.

In the 1960's the RC equipment became standardized, reliable and available, accounting for the change of RC from Experimental to the status of a hobby. It is clear that the fantastic growth in membership during the 1970's to 70,000 was caused primarily by the RC Hobby activity. It is estimated that 80% of today's AMA members are RC modelers.

Is it any wonder that we have an RC frequency problem with such a dramatic increase in the RC membership since the last increase in RC channels over 10 years ago?

It is hoped that this brief history has demonstrated the pattern of "frequency acquisition" — always taking several years; "frequency use" — usually taking a year or two to adapt to the newness; and "frequency erosion" — which sets in due to the increased numbers of other shared users.

The latest AMA efforts for new frequency acquisitions will probably encounter the same patterns of the earlier efforts.

There is much more background to the frequency history, but it is clear that every attempt has involved a large expenditure of effort, both professional and volunteer --- and it appears that the future will require more of the same. □

F-16A

from page 45

The plans call for heating the stabilizer control horn with a soldering iron and bending the hot plastic to a 45 degree angle. Once this is done, a two piece wire pushrod is connected to the servo and horn, then Hot Stuffed together! In the interest of safety, a Z-bend was put in the longer of the two pieces, and it was used as a single unit. The stabilizer pivots on a single piece of wire, which was found to be amply strong in flight tests. No trouble was found during aileron installation. The only gripe we had was all the control surface throws were given in millimeters instead of inches.

Flying:

The finished product weighed 22 ounces dry. The Center of Gravity is given in millimeters but was easy to find. No ballast was necessary to get it right. We started with 1 2" total travel on the stab, and about 3 8" up and down on the ailerons. The instructions show how to cement strips of sandpaper to the fuselage so the model is easier to hand launch. This is an excellent idea and Circus Hobbies should be commended from a safety standpoint. We noted during tests that the model's landing gear was a little close coupled and she would tip rather easily. This was not noticed unless you tried to land cross wind. Once airborne, the model is a joy to fly. Loops, both inside and out, rolls, and inverted flight were accomplished with ease. The model tracks well and glides good when the engine quits.

This model might make a good slope soaring glider, if the engine and wheels were removed. The F-16a is a good transition trainer for a flier wanting to learn to use ailerons. Those with no prior stick time would most likely be happier with something that had rudder control.

Conclusion:

The Circus Hobbies F-16a is an above average performing 1 2A foamie. Its good looks, reasonable price, and ease of assembly, make it even more attractive. Though the finish of the foam isn't quite as slick as some, the dents **are** harder to see. So if you're looking for something out of the ordinary, but don't have the time to build it, you should take a long look at a Circus Hobbies F-16a kit. You might just fall in love with it!

HOOKER

from page 44/40

horizontal stab, and that you extend the vertical fin down to fit inside of this slot. This makes for a very strong tail section, one that will withstand the "rudder launch" that is so typical of some helpers. Cut a slot in the top of the fuselage to accept the vertical stab. Install the spars top and bottom on the horizontal stab, tapering out to the tips. The covering material will form the airfoil, simply and easily. Do not be tempted to cut lightning holes in the tail section, it's a bit hard to get the C.G. far enough aft as it is with the short nose.

Finish:

Sand all of the parts of the structure and then cover with your favorite material. I like to use MonoKote and Trim MonoKote, with striping tape, but then I'm just a bit lazy when it comes to finishing. Make sure that the top of the wing looks different from the bottom; it's tough to tell at a distance which is which. Be sure to seal all hinge gaps with MonoKote strips unless you build your hinge lines very tight.

Landing Gear:

Bend the landing gear 1/16" wire from

5/32" wire as shown on the plans and solder together. You may want to add cross braces to the main gear. The main gear is held to the fuselage with Goldberg Mounting Clips and wood screws. You might want to use bolts and blind nuts if you fly from a grass field. Make sure that the 1/8" ply landing gear plate is securely glued to the fuselage sides and to the spruce main brace.

Radio Equipment:

Install the radio equipment using your favorite method. Try to locate all servos in the aft servo well. The battery, because the weight is needed aft, is located behind the receiver. Be sure to secure it in place with bulkheads and rubberbands.

Balance:

This is most important on any aircraft. Balance exactly as shown on the plans. If you need to add weight to the tail to bring to the correct location, then do so. Use Prather Stick On Weights installed on the underside of the fuselage. If you need to add nose weight, which I doubt, then add weight to the inside of the tank compartment. You can hold the front hatch in place with any convenient means, rubberbands or nylon screws, but make it removable for easy servicing of the fuel tank and nose gear. Always balance the finished aircraft without fuel in the tank.

Flying:

Set up the controls with 3/4" up and down elevator, 1" right and left rudder, and 3/8" up and down aileron movement. You will find that the elevator movement is very effective and, with continuous input of up elevator on landing, you can slow the Hooker down, nose high, gear just reaching for the runway. You may want to go to more throw later, but I have found these amounts to be best for my style of flying. Generally, flying the Hooker is much easier than most aircraft since she is so very forgiving.

When you're ready to make the first test flight, make sure that all trims are at neutral, and that all control surfaces are set at zero. Check over your radio installation one more time to be sure you didn't forget to put the screws in the servo arms, and that everything looks secure. Fire up the engine and taxi out to the runway, point her nose into the wind, and let her roll. Rotate slightly for a gentle climb-out, grab about 75' of altitude, then make a gentle left turn. Everything working okay? Great, now sit back, relax and enjoy flying the Hooker --- I know that you will like her.

Random Thoughts: The original Hooker is powered with a Webra Speed .61 engine, but you do not need this much power. Any .60 engine will do the job, as will some of the smaller engines. I know that she would fly fine on a .40 but would not be as responsive. The finished Hooker, without fuel, should weigh between 5¼-6 pounds. Anything heavier than this and you've been building with lead rather than balsa. Side mounting the engine gets the main part of the engine weight way down low, which adds to the stability even more. You will also find with a side mounted engine that the top of the aircraft remains clean, but boy,

does the bottom ever get loaded with goop! Props depend upon your choice of engine, but I have used both 11/7.5 and 12/6 with good results. I like the 11/7.5 on the Webra Speed as it will really let out and run on this prop. You needn't worry about brakes or flaps on this aircraft because landing speeds are so slow that the roll out really isn't very much. The Hooker handles windy days with ease; the low profile and lack of dihedral keeps her from blowing about the sky, and landings in 25 mph winds can be made with a roll out of two or three feet or less. You really must try a swept wing, especially one with tip plates. This set-up opens up a whole new world of flying. The airfoil is 20% thick and the aircraft tends to fly at a pretty constant speed through everything.

Good Luck and Good Flying with your Hooker. □

CUNNINGHAM ON R/C

from page 39/38

you yet, you're lucky. Put in a little drain hole, then you can at least see the fuel running out when a mishap occurs.

•

Robert Husk of Climax, Michigan, sent in pictures of his P-63 King Cobra, which he built from an Andrews Trainermaster kit. Listen to Robert.

Dear Chuck:

For a long time I've wanted to thank you for your 'RC Design Made Easier' columns and your ideas for customizing kits. Both have added a special thrill to my RC building and flying over the past few years. After placing so much effort and hope into a new plane, it's special to me and I want others to think the same. How deflating to walk up to the flight line and not be able to pick out your Falcon, M.E.N., etc., from the other seven parked alongside.

I've now tried both customizing and my own design (strictly within all of your dimensions and percentage guidelines) and I'm delighted with both. The comparatively little extra time required to customize a kit, however, makes it more feasible for me at the moment. It took only a few extra hours to modify my Andrews Trainermaster along the lines of a P-63 King Cobra. Wing and body outlines, markings, etc., were taken from a small plastic model. The panel lines are simply super thin border tape from a stationery supply store. It's inexpensive and comes with a mild adhesive backing, making it fast and easy to apply. Fuel proofing of all lines, decals, and MonoKote edges was done with clear R.S. Perfect Paint. The camouflage paint (olive green and sand) were also R.S. from cans applied over clear MonoKote.

The modifications haven't changed the fine flight characteristics of the Trainermaster, but nobody recognized it as a Trainermaster on first inspection.

I hope that your call for feedback in the March issue is successful. I'm looking

forward to seeing more examples of customized kits in RCM and at the field.

Sincerely yours,
Robert Husk

I agree with Bob — customizing an existing fine design can give you all sorts of fun. For those of you who have been doing this, send in pictures of your bird (black and white only, please).

Time to start thinking about your winter project, so better get thinking and building now. Build a kit, customize a kit, or design your own --- no matter what you do, or how you go about it, keep the fun in RC. Learn to fly safely and correctly and enjoy the sport. It's the greatest hobby/sport there is. Don't be left out. □

from page 37/36

likely to be kicked out, either for noise or other reasons, because you won't make as much noise as the water skiers. But you will have to learn to live with them.

Perhaps one of the biggest advantages of seaplane flying is that a crash into the water is seldom as destructive as one into a runway. But there can be a disadvantage if you're flying from salt water because, if it gets into your radio, forget it! You need a new one. Not so with fresh water, although you may need a retuning after it has dried out. And one of the basic rules of seaplane design is, "If there is any place that water can get in, it will."

In the fifty five years (!) that I've been fooling around with seaplane designs, I've seen many variations. My first design was simply to add floats in place of wheels to a baby R.O.G. rubber model. It didn't work. Two years later, in 1927, I stuck some spindly long legs on an indoor endurance model, had it jump free from a big pan of water on which it rested with some small, jap tissue covered floats, and set a new indoor seaplane endurance record. Five years later, in 1932, I had my very first article published in a model magazine. It was on the design of a set of twin floats for a rubber powered "cabin sport model." They looked very much like the twin floats which are in use today. Since then, I've designed some sixty, or seventy seaplanes — not all

of them successful, but, as the design engineers are wont to say — "Not all test objectives were achieved, but the experiment was extremely valuable in the lessons learned."

So give this highly challenging aspect of radio control aircraft a bit of your time. You'll find it rewarding, frustrating, and great fun.

Try designing one of your own — or buy one of the kits if you prefer. Or you can build from some of the published plans. Even if it doesn't take off, it'll scoot across the water. You may not qualify as a Sunday Flier. But at least you'll be a Sunday Sailor.

More next month on hull and float design. □

ENGINE CLINIC

from page 35/32

the engine heats up. I am now wondering if I made a mistake by not using original parts from the manufacturer. I don't want that much fuel leaking out of the front bearing though. Can I use the double sealed bearing with satisfactory results?

Also, I seem to remember from your previous discussion on bearings that we should not use a close tolerance bearing in model engines. I am not sure what the tolerance is on the bearing I bought, but I suspect it is not a close tolerance bearing. Thanks, in advance, for any information and advice you can offer.

Sincerely,
James R. Kale
Lawton, Oklahoma

The front bearing has nothing to do with the amount of fuel that leaks out the front of the engine. The front bearing provides nothing in the way of a seal. Although sealed bearings are available, as you have found out, I know of no engine manufacturer using them. I have tried sealed bearings in the past and found them to do little in the way of holding back excessive fuel leakage. The intention of the seals are to retain grease in the bearing and keep out dirt and foreign matter in applications where this

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DIESEL POWER—THE INFLATION FIGHTER

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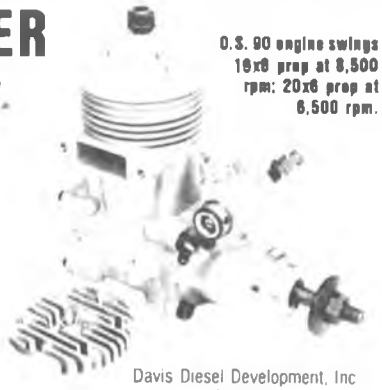

Davis Diesel Development, Inc
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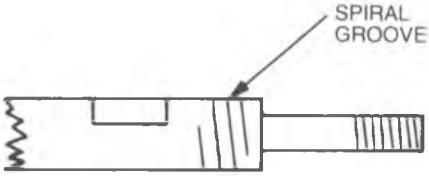
Milford, CT 06460
(203) 877-1670 Call after 6:00 p.m.

ENGINE CLINIC

from page 165/32

type of bearing is required. Fuel leakage is controlled by the fit of the crankshaft in the crankcase. The area directly behind the front bearing is considered the seal area in a front intake engine. Either you bent the front plate on your engine or did not get all the dirt out and it has lapped away the seal area. Sometimes if you have an engine blowing fuel like a spray gun, cutting a spiral groove on the front portion of the crankshaft with your Moto-Tool and cut-off disc will work like a pump and move excess fuel towards the rear away from the front of the housing. The groove need only be about .015" deep with two or three turns around the crank about 3/32" apart. Be sure the spiral is right hand (same direction as the threads on the end of the crank) so as to move the fuel towards the rear. If cut the wrong way it will only make leakage worse. Start the spiral about 1/16" from the front edge of the crank. Also be sure and remove any burrs that are formed.

As far as any grease in the sealed bearing — this will flush out the first few times you run the engine and will cause no problem.



Dear Mr. Lee:

I have a McCoy .35 with about 12 hours on it. This engine is not noted for outstanding performance, but it hauls my Kadet around nicely. The problem is that it has no compression, literally. To give you an idea, there isn't much of a change if the glow plug is in or out! Yet, it runs, and can turn a 9/6 at 9500 rpm at full throttle on a good day. The cylinder head is tight as well as every other screw, and the engine has never been damaged or run lean. I run it on Sheldon's fuel, 10% nitro. Testors says that a loss of compression when the engine is not running is normal, but, then again, they say to use a 12/6 prop on their .35!

Any comments will be appreciated.

Sincerely yours,
John Strong
Aloha, Oregon

9,500 with a 9/6 prop means you have a real sick engine. A Veco .19 will turn a 9/6 in the 10,500-11,000 range to give you a comparison. I can only assume you must be using an electric starter to get the engine started because without compression it would be very difficult to hand start.

A fully broken-in lapped piston engine will leak compression a little when cold, i.e., when you turn the engine over slowly.

However, when flipping, it should have good compression and a snappy feel. No compression at all is **not** normal! Whoever gave you this information at Testors must have misunderstood what you were saying or someone answered your inquiry who was not experienced with model engines.

I cannot tell you what is wrong with the engine without seeing it but, providing the head is tight and not leaking, there would have to be a scored piston or sleeve, or maybe at some time you ran some dirt through the engine wearing out the piston/sleeve fit.

Testors is no longer manufacturing engines and I do not know what the repair policy on engines they have manufactured will be. I would check with them right away regarding a new piston/sleeve as they may still have some in stock. Remaining parts get used up fast once an engine manufacturer ceases production or even drops a particular model from their line. □

RCM BIG BIRD TOO

from page 29/24

or secure them in place. Remove the pushrods and set them aside. Also remove servos, engine, and landing gear so that we can finish the fuselage structure.

Glue the 3/8" triangle stock to the left hand side sheet aft of F2, top and bottom as shown on the drawing. Check for fit with right hand side and make any adjustments needed for good fit. Measure the plans on the top view of the fuselage at the rear end for the bevel trim of the triangular stock. Trim and sand to fit.

Prepare for assembly the left hand sheet by mixing epoxy and spreading it on the edges of F1, F2, and the landing gear mount. Quickly lay a bead of Wilhold on F3, F4, F5, and the forward structure. With the right hand side resting on a flat surface, carefully place the left side in position, check alignment, and hold in place by weighing it down with any heavy objects that you have handy.

The rear end is glued together and held with pins, clothespins, rubberbands or what-have-you, until the glue sets. Slip the outer tubes of the pushrods back into place and secure with a couple of drops of Jet at each hole where a tube passes through the structure. Trim and sand the tubes flush with the fuselage sides at the rear end.

Attach the 1/16" plywood bottom panels fore and aft of the landing gear groove with epoxy. The top and bottom sheeting can now be glued in place. The 1/4" ply tailwheel mount must have a slot sawn to accept the Goldberg tailwheel bracket. Cut notch in bottom of fuselage so that the top of plywood is parallel to stabilizer mount. Epoxy the plywood in the proper position.

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BIG BIRD TOO

from page 173/24

Lay out and cut 3/16" wide slot along top centerline for dorsal alignment. Lay out and drill 1/4" diameter holes for wing mounting dowels. Make trial fit with dowels but do not glue in place until after covering is applied.

The nose hatch is assembled from a top piece and two tapered side pieces. A 3/16" dowel is imbedded in the center of the top piece at the aft end. The dowel fits in a matching hole in the cross member below the windshield. The hatch is secured with a #2 x 3/8" screw through the top and into a Goldberg angle bracket that is mounted on the back of F1. A scrap piece of the outer tube of the Gold'N-Rod pushrod is used to bush the screw hole.

Now that you have completed all of the structure for the RCM Big Bird Too, take a few minutes to examine everything and to smooth up all the surfaces with a #150 grit, or finer, sandpaper. The smoother the surface, the smoother the covering.

The fuselage, hatch, fin, stab, elevator, rudder, and wing may be covered at this time. Any of the iron-on film covering materials may be used. Follow the instructions that are included with the film. It is easy, just have patience. Then, with the covering material removed from the areas to be glued, the stab and fin are glued in place onto the fuselage, being sure that the alignment is true and square. Once the fin and stab are glued in place, the elevator should be hinged. Then, the rudder is added.

Check the wing and tail surfaces for warps and correct as necessary by gently twisting while applying heat to the film. Slip the landing gear into position and install the retaining straps.

Final installation of the radio equipment is now in order. Cut a hole to fit the radio switch in the left hand side of the fuselage, opposite the engine control servo and below the servo mounting rails. Install switch (push forward for on). The servos are secured in position and the pushrods are connected between the servos and the horns on the control surfaces as shown on the plans. Pass the servo and switch wires forward through the hole in F2 and plug into their respective connectors in the receiver. Wrap the receiver loosely with 1/2" thick foam rubber and insert it into the receiver compartment as indicated on the plans. Connect the proper switch lead to the battery, wrap the battery with foam rubber and stuff it in the forward compartment.

A four ounce fuel tank fits in the nose with pieces of foam rubber wedged in around it. Run fuel feed and vent lines through holes drilled in F1. Install engine and connect throttle pushrod and fuel line.

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BIG BIRD TOO

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Make sure that the throttle goes from full open to low within the complete travel of the servo with **no binding or stalling of the servo.** Adjust as necessary by moving the pushrod to inner or outer holes in the servo arm.

Make a reassuring check of the radio operation by standing behind the tail surfaces with the transmitter in hand. When you move the rudder control to the right, does the trailing edge of the rudder move to the right? When you pull the elevator control toward the bottom of the transmitter case, does the trailing edge of the elevator move upward? When you move the throttle control toward the top of the transmitter case, does the throttle move toward the open position? If the answer is no on any of the above, you have something installed incorrectly and this is the time to correct the problem.

Secure the hatch with the #2 sheet metal screw.

Flying The Big Bird Too:

It is much safer and most practical for the beginner to have an experienced flier to assist with the first test flights. He can usually prevent disaster by recognizing and reacting to unexpected conditions that invariably occur, particularly on the first flight.

For those who go it alone, we can only make some basic suggestions. For take-off, use full power, keep it headed directly into the wind, and use very little (if any at all) up elevator to get it airborne. At low altitude you should not make a steep climb or steep turn. Keep the airspeed up by holding the nose down and apply elevator and rudder gently.

If you do not have a suitable place for a usual take-off and must hand launch the Big Bird Too, keep the following in mind. Launch with the nose level or slightly down, **never with the nose pointed upward.** Launch with enough force to obtain as much

airspeed as you can.

When you reach an altitude of 100', or more, go ahead and do whatever you want as it is slow enough to give you time to react for corrections, or just neutralize the controls and it will right itself.

For landing, keep the nose down to maintain flying speed. Steer to line up with the runway, you may need to feed in a bit of up elevator when applying rudder on the landing approach to keep the nose from dropping too much. Level off when the Bird is a couple of feet from the ground and let it settle down. Keep in mind that this machine has a pretty flat glide angle so set up the landing to use the downwind end of the runway.

Fini:

This article has been much longer than usual in an effort to assist the newcomer to R/C. Even so, there simply isn't enough space available to cover every detail. We strongly recommend the RCM Flight Training Course Vol. 1, as the most comprehensive book available on how to build and fly an R/C aircraft. You will find it to be an invaluable aid toward your success in R/C. Flight Training Course, Vol. 1., with ordering instructions is shown in the RCM Anthology Library ad in the back pages of every issue of RCM.

We hope that you enjoy your RCM Big Bird Too as much as we are enjoying ours. □

POWER BOATING

from page 22

several questions about prop selection in general, and suitable props for larger-than-normal boat engines in particular. This gives me a chance to review the two methods of prop selection that were outlined in the March issue of RCM by way of this example problem.

The problem of prop selection is to find a value of pitch that can be expected to produce a desired boat speed. Simple screw theory predicts that the required pitch P in

inches is related to the desired speed V in mph and engine rotational speed rpm by the following relationship:

$$P = \frac{1056V}{\text{rpm}\ (1 - S/100)}$$

The prop slippage S is unknown but experience has shown that it varies between 15 and 20 percent. To be conservative we will use the 20 percent figure. Assuming that the motor will be propped to run at 8,000 rpm the pitch required is related to the desired speed in this case by:

$P = 0.165V$

To achieve a speed of 30 mph the above equation predicts that a pitch of 4.95'' will be required. If a 50 mph boat speed is desirable, a pitch of 8.25'' will be required. As you can see, the relatively low rpm operation of chain saw engines require large values of propeller pitch to achieve even a moderate boat speed.

The same information can be extracted by using the Hughey Speed Card even though the card shows only rpm betwen 16,900 and 25,300. The chart is used by picking an engine rpm and speed desired combination, then reading the required pitch from the left hand column of the card. In this example the desired rpm is 8,000. If rpm is constant, pitch and speed are related to each other linearly. This means that if we multiply the rpm by some factor (in this case 3) we will multiply the resulting speed by the same factor. By multiplying the 8,000 rpm of our engine by 3 we may use the 24,000 rpm column to determine the pitch required for a speed of 30 mph. But since we multiplied the rpm by 3 we must also multiply the desired speed by the same factor to get an accurate result. If you now go down the 24,000 rpm column until you reach 90 mph (3 times the desired speed of 30 mph) you will find that the pitch required is approximately 5. This result compares favorably to the more exact equation result but requires no computation.

We now know that to have a reasonable boat speed using chain saw engines we will need props with a pitch of 5'' or more. The only manufacturer of such large pitch props that I know of is Octura Models. The following is a list of propellers that may possibly work along with their pitches and the calculated estimated speed that would result at 8,000 rpm shaft speed.

PROP	PITCH	SPEED
1475	4.13	25 mph
1967	5.01	30 mph
2260	5.2	32 mph
2167/3	5.54	34 mph
2267	5.8	35 mph

You will now have to try each of these props to see if your engine can turn them the required rpm.

If anyone out there has experience with large two cycle boats or has any information about the availability of large pitch props for

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from page 182 22

these boats, please contact me so that I can pass the information on to my readers.

★

Dear Mr. Power,

A few questions:

Where can I obtain a book or reference guide pertaining to plans and/or working drawings, prints, etc., of "Thunder Boats?" Being a beginner in R/C boats (2 years) with 2½ boats — a Quickie 40, a 40 Crapshooter that I'm into presently, and a D.V. 21, I was very impressed by the Scale Hydro Static display at Toledo. Fantastic! A club member took second place (Oakland R/C's Jerry Badgero) and I was really hooked at our Memorial Day Unlimited race when I finally got to see some great heats. Anyway, anything you may be able to steer me to would be greatly appreciated. Full size plans, scale plans, anything.

*Second, I'm running a K & B 7.5 in my "shooter" and I am wondering if anything can or should be done to the "innards" for possibly a smoother or quicker motor (not necessarily quicker). Will polishing the ports help or hurt? How do you stand on balancing the crank? It runs super now, but the vibration has already ruined one plywood cowl, and I've just finished building the second cowl; **every** part from the crank back (not the crank) has been balanced individually and as an assembly, running a Mr. G's stainless steel prop shaft with three needle bearings and a J.G. J-30 prop. Is the stock K & B crank generally in good balance from the factory?*

Finally, I think I am lucky to have become interested in R/C boats at approximately the same time as you joined the RCM staff. I have already amassed a great deal of information that perhaps would have taken years to learn from experience. You are a boon to "greenies" and I thank you.

Sincerely,
Michael T. Harrison
Columbiaville, Michigan

The best source I know of for information pertaining to model and full-size "Thunder Boats" is Roger Newton. Roger is the NAMBA Unlimited Hydro Chairman and has a very complete plan and photograph service available to those who want to build any of these boats. Contact him by mail or phone at the following address: Roger Newton, 14518 167th Pl., S.E., Renton, Washington 98055. Phone (206) 228-6028.

If there is anyone else out there with similar information, please send me the details of your services and I will pass on the information.

I have never been able to convince myself that "port polishing" improves our two stroke engine's performance. In my opinion, the most important thing to remember when you are carving the insides of port walls is that surface ripples and

sudden changes in cross-sectional area are far worse than a slightly rough finish in the port. In fact, smooth surface finishes can produce flow separations that can actually deteriorate performance. I would recommend that you use the time it would take you to polish the ports to make sure that the liner ports and the crankcase passages are aligned the best you can make them. Do not, however, change any of the port angles cut into the liner of a Schnuerle port engines.

All single cylinder engines vibrate because there is no way to compensate for the dynamic forces produced by the translating mass (piston, wristpin, etc.) of the engine. Rotating parts such as the crankshaft, rotor disc, and flywheel, can be readily balanced, but parts like the connecting rod with its complex motion cannot be easily balanced. The crankshaft is purposely unbalanced by itself so that the combination of the crank, rod, wristpin, pin clips, piston, and rear rotor disc (if used), is approximately balanced when these parts are in motion. This is dynamic balancing. It turns out that if an object is statically balanced (balanced in a stationary condition) it is not necessarily also dynamically balanced. Dynamic balancing our engines is far too complicated to be discussed in any depth here. The engine manufacturers spend a lot of time developing our racing engines and are far more expert in this aspect of mechanics than most hobbyists. I would not recommend changing the crankshaft balance on any engine being run in more or less stock condition. If you mix parts of other engines in your motor, or if you change the engine timing so that you increase the operating rpm significantly from that of the manufacturer's design rpm you may run into excessive vibration problems. These problems will necessitate rebalancing the engine. In your case, I would leave a good thing alone.

Well, that does it for another month. Send your questions and photos to the address at the end of the column. Include a self addressed, stamped envelope if you want an answer. Howard Power, 766 Broadway, Seaside, California 93955. Phone (408) 394-1200. □

FLYING LOWE

from page 14

superbly; so, one must experiment. Incidentally there is definitely a significant speed difference between a buried pipe ship and an equivalent one with external pipe. Personally, I feel that the slower ship is easier to manage and fly consistently.

Aircraft choices were widely varied with Tipos, Curaries, Phoenixes, Bootleggers, Compensators, etc. In the top ten there were eight designs used. I guess all that means is that any good sound design, in the hands of an expert, can be a winner.

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FLYING LOWE

from page 187/14

Trimming Trickery:

I received an interesting letter from Seth Sterling concerning a strange trim phenomena that I would like to share with you. Seth writes:

"I enjoy your column very much and, since reading your recent series on flight trimming, I've decided to tell you about my "backwards" Kaos 60.

At the start of each flight I have to feed in considerable ***down trim****. During the second half of each flight* ***up trim*** *is applied. I should point out that I'm carrying a full 16 oz. tank in the beginning of each flight and, when I say "down trim," I'm actually centering the elevator, whereas the "up trim" is actually approximately 5° up elevator. The only variation from the plans on this plane is the elimination of all right and down thrust in the engine.*

I'm hoping you can explain what's happening!"

This problem is certainly strange and I can't say that I have an answer. Normally, with a full tank one would need some up trim at the beginning of a flight, and this requirement should reduce as you burn off fuel and the C.G. moves aft. Maybe Joe Bridi, who designed this ship, could answer this one. Are you out there, Joe? I can understand that some down trim would be required if the ship is set up without the down thrust normally used, however, the trim movement should be the same. One suggestion: have you checked to see that the elevator trim control trims in the proper direction? I've done a lot of control reversing in the transmitter, and sometimes I forget to also reverse the trim control interesting!

Pattern Maneuvers:

Okay, let's look now at a couple of maneuvers as a continuation of our discussion of pattern flying. First the **square loop with half rolls:** This is a high K

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from page 191 14

factor maneuver and well it should be, since it is difficult to do with great precision. It is supposed to be an exact square loop with half rolls precisely centered in each leg. The corners do not have to be 10 G maneuvers, but should be fairly crisp. If the legs are fairly long, then the corners can be softened. The maneuver should be balanced so that the corner radii match the side length to make it look like a square loop. You will have to play with the size of the maneuver to suit the speed and power of your ship, however, you should never rush it and make it excessively small. Of course, the maneuver is balanced in front with the half rolls top and bottom precisely centered in front of you. The biggest mistakes in this maneuver occur when the ship isn't precisely level or square, particularly for the first pull up and the fourth corner. This will cock the lines and really foul things up. If the ship comes out crooked after a corner, try your best to straighten it with rudder before half rolling. Try also to make your roll rates the same in each half roll.

This maneuver will be a lot easier if your ship is properly trimmed. It should hold a precise vertical line on the first pull before and after the half roll. It should also execute the half rolls without pulling off heading. If it doesn't, it makes life much more difficult and you will have to compensate. It's best to practice this maneuver with someone criticizing; particularly the squareness. I have tried counting to adjust side lengths. This is fairly good in calm air, but head and tail winds of any significance fouls this up.

One additional thought: you will need lots of down elevator to execute the fourth corner following the down line. As in all maneuvers, present the maneuver elements distinctly, i.e., do not blend the corners with the rolls. Also, give a distinct pause between each element. So, running through the maneuver it goes like this: pull up smartly, pause, half roll, pause, push to upright on top, pause, half roll to inverted, pause, pull to vertical down (as you pull off power), pause, half roll, pause, push to horizontal inverted (add power), pause, half roll to upright, exit at least 50' and call "complete." Be careful not to hump the fourth line; this is aided by putting the bottom at a reasonable altitude to prevent "ground fright."

Now that you have that perfected, let's look at the Square Horizontal 8.

This is also a tough maneuver since it's very demanding of good airplane trim. It's simply two square loops, one inside and one outside end to end. The biggest errors in this maneuver are making it too flat with not enough vertical line. As with the square loop with rolls, the corners should be fairly smart. Making them too tight usually slows the aircraft excessively and may cause it to

pull off heading. Since the squares will be smaller than the single square loop with rolls, then the corners probably should be tighter. Make sure that you have plenty of down elevator so that the outside corners can be as tight as the insides. Okay, let's run through it: pull up and pause for at least a count or two, pull inverted, absolutely level. Now, pull vertically down right in front. Push to level inverted, push to vertical up, push to horizontal upright, push to vertical down on the identical center downline as before and then pull to upright. Exit at least 50' and call "complete."

It sounds simple, but certainly is not easy since it's difficult to balance the maneuver, making all lines and corners with precision. Try playing with the size of the maneuvers; do not make it excessively small but not so big that you have forgotten the first elements by the time you finish. If you think this maneuver is easy, forget it. Dave Brown feels that it cost him the World Championships in South Africa in 1979!

Well, that it for this time --- □

BIG IS BEAUTIFUL

from page 6

large models, be of good cheer. A card from G. McGinnis of 144 Murray Ave., Goshen, New York 10924, indicates that he has what you need and will supply special sizes if you need them. Lengths range up to 72" and sample cost for 1/4 square is: 36", 32¢; 48", 42¢; 60", 52¢; and 72", 58¢. This is clear basswood and a note to Mr. McGinnis with a stamp will get you a card showing the prices for all the standard sizes and the cost of special cuts as well.

Nick Ziroli, the prolific producer of large scale WWII fighter plans has another ready for all you fliers out there who are WWII buffs. His new Grumman F8F Bearcat plan is now available and it looks as good as the P-40 and F4U which have been available for a while. The Bearcat is 2½" = 1' or about 1/5 Scale. Span is 86" and area is 1480 squares. Weight, Nick says, should be between 20 and 30 pounds and that's a pretty wide mark to hit. Plan consists of over 60 square feet in area and a construction photo packet is part of it. Recommended engine is 2 to 4 c.i. and I would be inclined to stay a bit large in that area in order to get the performance the Bearcat should deliver. Plan set is $25.00; a cowl in fiberglass is available at $27.00 and a canopy is $10.00. All from Nick Ziroli, 29 Edgar Dr., Smithtown, New York 11787.

Nick's prototype is painted in Al Williams' "Gulfhawk" colors and it looks great. My personal preference would be in Navy colors as is the version done by Wash Martin, but that's my Navy background talking.

Nick is currently working on an AT-6 plan and there is a good possibility it will be available in a glass fuselage version. The

AT-6 has always been a favorite of mine and I will be surprised if we don't see some Reno style Pylon racing with the large Texans when they arrive on the market. I can't think of much that would be more impressive than a covey of these in 1/5 or 1/4 size rounding a set of pylons and look forward to being able to see it at Las Vegas one of these years. I'm not competitively minded myself, but I know there are some of you who will be turned on by the thought of such an event.

I used a picture of the R/C Manufacturing built F7F Tigercat in my coverage of Toledo and have since heard from Bob Campbell that it was successfully flown at the Mint Julep Meet on April 26. The two Quadras apparently hauled it around with no problems and I can imagine the sound of them beating against one another in the air. They used 2½ sets of Platt retracts on the bird with good success.

Plans are available at $45.00 a set from them at 706 Easton NE, North Canton, Ohio 44721. They are also considering kitting the big bird and, if there is enough demand for it, will do so. The kit should come in somewhere in the neighborhood of $500.00. They expect to be flying it at all the Quarter Scale meets they can get to this summer, so keep your eyes open, you might get the chance to see it in the air. I am hoping it will be at Vegas in the fall.

Their Quarter Scale Chipmunk is ready for the market (see photo) and is finished in Art Scholl's colors. Kit sells for $179.95 and the glass cowl is available separately for $15.00 if you happen to have a Chipmunk on the building board.

Accounting/Clerical Services 3351 Pruneridge Ave., Santa Clara, California 95051, have announced the availability of their Waco YKS-6 and are now working on a Ryan S-C which should be close to the market by the time you read this. I have a couple of their plans and they are very good. While I have not seen all of the eight large plans they have on the market, I have seen their Cessna 180 plan and it is well-done and is apparently a superb flying machine which also looks very good in the air. If they continue to produce great plans at the rate they have done so in the past, there soon will be a plan for all but the most obscure aircraft in the larger sizes! All I can say to that is **good!** Back in the early days of **building big,** I hoped to be able to have in my own collection all of the large plans available. At that time that was a reasonable aspiration. Now, I doubt it very much, the space required to store my present collection of about 50 of them is taking up some shop space and a complete collection might move me out into the street. I'll have to live to be about 200 as it is just to build the ones in the collection that I really favor!

Behren's Plan Service is not letting any grass grow under their feet either. I met Jerry at Toledo back in April and have a

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copy of his Travelaire 2000 plan. It is well-done and one of the ones **I hope** to build before the 200 years runs out.

Jerry also has a Travelaire 4000, a Fokker DVII and a convertible he calls a JB Special. Yes, Virginia, a convertible, meaning you can fly it as a monoplane or a bipe, your choice. It means building three wings (great for you guys who love wings and hate fuselages) but gives you a very flexible model to fly.

Jerry also has an ambitious program laid out for the production of further plans which include: an 80" Sopwith Pup, a 90" Waco UPF-7, an 85" Nieuport 11 "Bebe," an 80" Sopwith Tripehound, a Waco ATO (the Lyjack version) and a Fokker DRI at 72". Now if that's not ambitious, I don't know what is. For further information contact Behrens Plans Service at 31-27 Healy Ave., Far Rockaway, New York 11691.

For those of you who have recently ordered my *Building Big Is Beautiful* booklet, the supply ran out some time ago and the revision and printing of a much expanded version is progressing well. I expect to be filling your orders long before you read this and you will be receiving the new version at the old price in short order. My sincere thanks for your patience and for your kind remarks on the first edition. Naturally, the second will be **bigger** and **better!**

I mentioned a couple of months back that I had moved to another city, another house and another job. I also suggested at that time, if you have a choice, don't do it. That statement has been reinforced and strengthened since that time. Moving is bad enough at any time, but after 20 years in the same place, it is horrendous! I sent truck loads of stuff to the dump before the move and I know there was good modeling stuff in those loads that I am going to miss one of these days. What's worse, I have no doubt that I am going to have to lay out good money to replace some of the good things I was forced to abandon.

Taking on a new job always supplies its own hazards and requires a lot of concentration which takes away from the time available, the moving into a new house always requires some fine tuning and that takes time, the revision of the booklet took a lot of time, my correspondence takes a fair amount of what is jokingly referred to around here as 'spare time,' which has left one of the most important tasks to take what time is left, and very little it is. That is the converting of a nice big garage into a shop so I can get something done on the models I have under construction. I had decided that this shop would be a show-place. Peg board on all the walls, lots of electrical outlets (13 at present) lots of shelving and places for

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BIG IS BEAUTIFUL

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wings and fuselages to be hung when not being flown . . . oh, it was a great dream!

It is still in progress and I have managed to get some of it done, but it has left no time for either building or flying to date. What the heck's the fun in having a **supershop** if it isn't being used? Not much, I can tell you, but I am perservering and will have it all done in time for the winter building season, I hope. It seems we are getting factory second hours these days, as I do not seem to be able to get everything done that needs doing. I always run out of time before I run out of jobs; it's about the same with the dollar these days. I always seem to run out of them before I run out of week!

Anyway, things are beginning to look as if it will all come together soon, and it won't be too soon for me. I am tired of being a carpenter and want to get back to building models, although there are certain similarities when you are building **big!**

My new location, near Edmonton, Alberta, has two flying fields and, quite by coincidence (honest), the house my good lady liked is situated almost exactly between the two of them. Fifteen minutes to either field and they are both great places to fly. If there ever was any doubt about modelers being pretty great people, a move would dispel it. The guys here have made me welcome and I already have my mowing assignment! I suspect they were glad to have another body for the mowing task.

Speaking of task, I have just been taken to it by E.A. Barsditis of Pittsburgh, E.A. detected some serious inconsistencies in my June column where I mentioned Mel Van Vianens all steel fuselage for a Fokker DVIII. I used the terms **welding, brazing** and **soldering**, as if they were interchangeable, and they are not the same thing, of course. Mr. Barsditis is well-qualified to correct me, as he is a senior metals joining engineer with Westinghouse. He generously gave me a short course in metals and metal joining technology and I am much chastened over my faux pas. I won't do it again especially with his wealth of information to fall back on.

He also pointed out some of the hazards and I wanted to pass them along to you now.

Ventilation: Brazing alloys contain zinc, cadmium and copper, their fluxes contain fluorides, all of which (and their vapours) can be harmful to your health, so . . . don't use them in a closed area, provide good ventilation.

Skin Burns: If you do burn yourself with hot or molten metal, rinse the burned area with cool water for at least 10 minutes, wrap in a clean cloth dampened with cool water and see you doctor. Cool (not cold) water will rinse away any flux residues.

Eye Protection: For the sake of your sight, always wear eye protection when

brazing. If your eyes sustain any injury whatever, see your eye doctor immediately.

Good advice for all and I trust you'll treat it with the attention it deserves. My thanks to Mr. Barditis for his comments and I'll be passing along more of what he had to say next month. My apologies for any misconceptions my comments may have caused, and I certainly defer to Mr. Barditis' expertise. He is obviously far better qualified than I am to put us all on the right track. □

FROM THE SHOP

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Seen in the Dope Can, Byron Sauriol, Editor, newsletter of the Suburban Aeroclub of Chicago, was the following report on the Toledo Show:

Phantom Report called "Seen At Toledo"

Who was the "Dude" at the Sig Booth with the cowboy hat and feathers? Must have been Hopalong Hester and his trusty sidekick Tatone!

Frank from MRC looked wilted on Saturday — (So did everybody).

Bruce McAvenue looked fresh as a daisy at Hobby Shack's booth. (Till Saturday.)

Is it true Bud Nosen is cutting kits for the "Pilot" label now? (38 foot wingspan, Corsair — watch for it! Powered by a 2000 hp P & W.)

Don Sobbe of Vortac was out to choke 1/4 Scale guys, and trying to sell 1/4 Scale epoxy mixing sticks.

Du-Bro almost sold Goldberg one of their new spinners, but Carl wanted to trade some wheel collars and his Metric size wheels. Dewey said no deal.

Goldberg also announced that he will be kitting that balsa monument that was built with Jet, 40 x 60 size. Plans and wood are being cut now.

Hazel Sig also showed the new prototype of their latest kit at the show. Four landing gears, all steerable, covered with the new revolutionary fur lined Koverall, has a very wiggly tail, stringers and longhorns made of whalebone, and has its motor running at all times. For a slight additional charge it will come with a live talking bird for the cockpit. Price to be announced.

Sid Axelrod tried to donate that partial wingtip he's been MonoKoting to the Smithsonian but they refused.

What secret did Dario have under the table at Quadra USA? Rumor has it that it was a 60" Chainsaw powered by a K & B .61 and unbalanced so it shakes like the real thing.

Finally, it was noted that Jack B. & Flip were making deals in the rain outside the swapshop. (Watering down the prices.)

★

In closing, we can all be thankful that people with minor defects are not being recalled by their Maker.

See ya at the field. □