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RCM MODELER

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This Month's Cover

Over 4,000 hours of work are involved in this totally scaled Shelley Foss Tug built from a basic Dumas kit. For complete details see page 64 of this issue. If you make it to Toledo, look for it on display there. The lovely lady waving the U.S. Coast Guard distress flag is Cindy Hassold Field, winner of the Miss New Jersey swimsuit competition in 1978. Ektachrome transparency by William R. Shaub.

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FROM THE SHOP

Don Dewey

As mentioned several times in the past, we receive and read approximately 200 R/C club newsletters each month. We are sincerely grateful for the opportunity to stay abreast of the happenings within the clubs. We hope that the club's membership appreciate the tremendous service their editors are performing.

In a recent issue of the DCRC Newsletter, Max Krupo, Editor, there apeared an article entitled, "A Visit With Walt and Joyce Good," by Bill Cavanaugh. Bill's article described Walt's home and his activities in Florida since he retired a couple of years ago. Along with being delighted at reading of the well deserved good life that Walt and Joyce are enjoying, our thoughts started going back over the years.

Walt Good is unquestionably the father of R/C modeling and he is a gentleman who we hold in the highest esteem. His accomplishments, contributions to model aviation, and the honors that have been bestowed upon him are matched by very few people. Even though he has retired, by no means has he settled down in a rocking chair. He is chairman of AMA's R/C Frequency Committee, active in R/C soaring competition as a member of the Pinellas Soaring Association, writing magazine articles, and is starting a history on radio control.

Many thanks to Bill Cavanaugh for bringing us up to date on a couple of our favorite people, Walt and Joyce Good.

★

Bill Effinger. Our readers who have become modelers during the last five or ten years will probably ask "what is a Bill Effinger?" But, for those who were building model airplanes during the 1930's and 1940's, we can almost bet that they built at least one Berkeley kit and Berkeley Models was started and operated by Bill Effinger.

Bill operated Berkeley Models until 1960 at which time he dissolved the business and went on to other endeavors. Now, in semi-retirement, Bill has decided to get back into model aviation with a design service under the name of W.E. Technical Services, Inc. He is offering plans for several of the Berkeley models that have been updated for R/C and has scheduled several 1/4 Scale designs. His concept is described in a design service bulletin that may be obtained by sending $1.00 to W.E. Technical Services, Inc., P.O. Box 76884, Atlanta, Georgia 30328.

Up the creek without a paddle! Bill Williamson needed to retrieve his modified Pondhopper (RCM Plan #634) from Bear Lake, Apopka, Florida, when he discovered that he had no paddle. A broom from his pick-up was substituted. Photo by Stuart Richmond.

Tichenor and Kidd solved the nose heavy problem with their latest model by using lighter fuel. This only happened on April 1.

We are pleased to see Bill Effinger, one of the greats in aeromodeling, back in the business and wish him all the success in the world.

★

This is from Tom Tom, newsletter of Indian City, R/C Club, Timothy Goon, Editor.

You Never Can Tell

Two caterpillers were crawling across the grass when a butterfly flew past. They looked up and one caterpiller nudged the other and said, "You couldn't get me up in one of those things for a million dollars."

Classified Ad:

HUSBAND FOR SALE CHEAP: Comes complete with RC gear, 1 pair jeans 2 shirts, boots, stable of model aircraft, and 4 gallons 10% fuel. Pretty good guy, but not home much from May through October. Will consider trade. For information call 555-1212.

★

FLASH!

The 1981 QSAA Las Vegas Fly-In will be held October 9-11. The Show Boat Hotel will be the headquarters and location for the banquet which will be held on Saturday night. Flying will take place from a 1/2 square mile asphalt paved parking lot with a designated 1300 foot long runway at the Silver Bowl Stadium, located 7 miles east of the Show Boat on the Boulder Highway.

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CUNNINGHAM ON R/C

Chuck Cunningham

Each Thanksgiving and Christmas, genial George Ware (former several times president of the Fort Worth Thunderbirds), throws our Turkey Shoot.

The Turkey Shoot is our version of musical pylons, with the prizes being an assortment of frozen turkeys. All of the frozen turkeys are not just wrapped up in plastic sacks. A goodly number of frozen turkeys are wandering around trying to fly. The method of operation of this type of fun contest is simple. It is played just the same as musical chairs, only without music. Four or five aircraft are in each heat. All are airborne, flying around a two pylon course. Somewhere behind the fliers is a maniacal judge armed with an air horn. At some very unspecified time this judge blows the air horn. This is the signal to land. You must fly around the pylon course to land, no cutting corners. The last aircraft to land is eliminated from that round, provided that all of the other aircraft were able to get airborne again. If, say, the number one aircraft to land breaks a prop and can't get back into the air, it is eliminated and, even though the last aircraft to land is indeed the last and can become airborne again, he is still in the round. Each round continues until only one aircraft has made a successful touch and go.

Sounds pretty simple doesn't it. Simple except when the horn blows and everyone is heading for the runway to touch and go . . . watch out, it can get just a bit wild. Very often the secret is making good landings and not bothering with what the other guys are doing. Also, the secret is in flying a doggy airplane that you really don't care about, because there is a good chance that the aircraft might not survive the entire day or, at the least, will take home a few battle scars. The other secret is in having one of two things. Either have lots of props in your tool box, or have a goodly amount of ground clearance between the tip of the prop and the runway.

This past Thanksgiving I decided that I had sacrificed enough props to the runway of T-bird field so the Turkey Terror was born. Some said that I cheated, but I say it's just a matter of superior design over mundane thinking. What I did was to take my doggy old Skooter II, take the engine off of the nose, add a trike gear set-up, glued a couple of pieces of 1/8" plywood to each side of the nose section of the aircraft, added a high firewall, with a shelf for the fuel tank to set on, and suddenly had an aircraft that finds it pretty darn hard to break a prop. The thrust line is raised about 5" from the normal, and the prop is operating just ahead of the original firewall. Strange looking creature, and I casually wondered what the flying results would be. I set the thrust at 0 up and down, and about 2° of right thrust. I checked the balance of the aircraft, since the engine was several inches further aft than original, and added a couple of Prather stick-on weights to bring the C.G. to about 25%. I had a chance to make one test flight prior to the Turkey shoot, and everything worked just great. Even three rolls were just about the same as the normal skooter. But it had two big added pluses . First, naturally, it's darn hard to break a prop, unless you get so greedy for a landing that you dive into the ground and, second, with all the drag of the flat plate original firewall coupled with the extra drag of all of that garbage up on top of the fuselage, when you want to make a landing, chop throttle and she sits right down, no floating by looking for a place to make a landing.

Results of the Thanksgiving Turkey Shoot were that the Turkey Terror tied for second out of 21 entrants. This afternoon is the Christmas version of the Turkey Shoot. The day is going to be a balmy 35°, with winds out of the north, and another gaggle of frozen turkeys, both in and out of the air. Who knows, perhaps a few more versions of the Turkey Terror will show up to haunt the skys.

If breaking props on loused up landings is your big problem in flying, you may want to try your hand at a Turkey Terror. The sketch shows how to do it.

Just about any of the popular low wing or shoulder wing aircraft can be modified in this manner. Make good glue joints, and fuel proof the whole thing with paint, and give it a try. Who knows, the prop that you save may fly you for years, and that would be a change, wouldn't it?

As you can tell, I'm writing this just a couple of days before Christmas, and a couple of new gadgets have caught my eye, and I hope that they can find their way under my Christmas tree.

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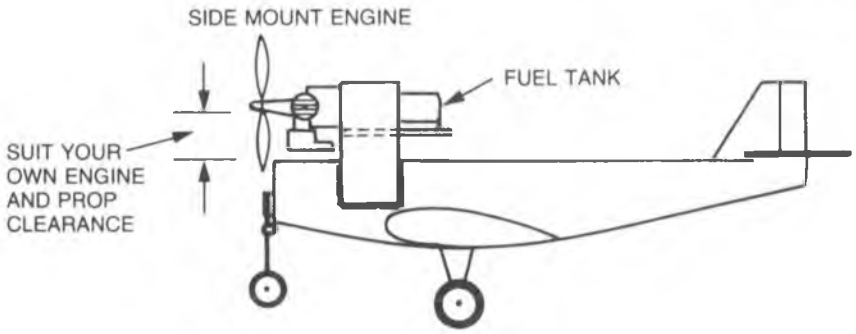
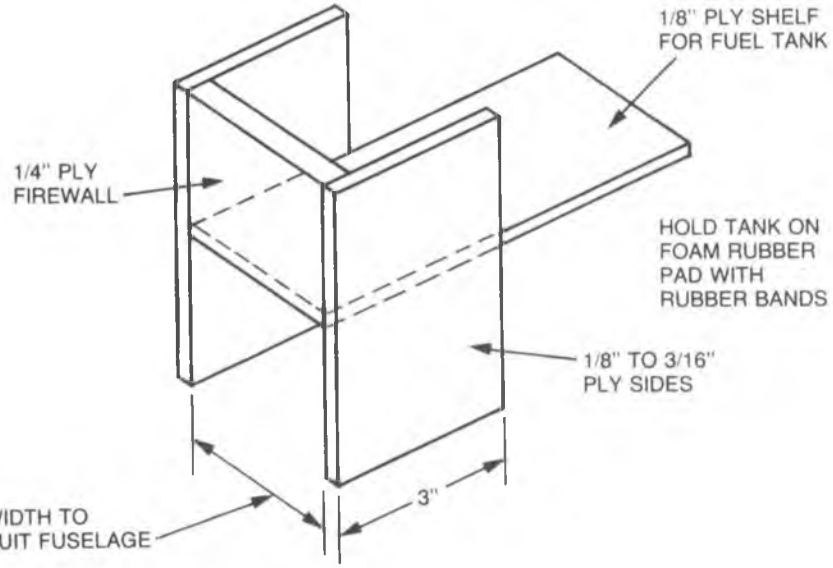


TURKEY TERROR



SUNDAY FLIER

Ken Willard

What's To Come In '81?

As I start this column, the date is January 2. You will be reading it sometime around the middle of March. By then, some of the things that will be happening in our sport during 1981 will already have taken place. But it's always fun to play the "psychic forecast" game. For example, at the beginning of 1980, all the "great" physics and astrologers, like Jeanne Dixon, Carroll Richter, and all the lesser lights in the art of bamboozling the public, made their predictions. At the end of the year, the actual events, compared to the forecasts, resulted in an overall accuracy of 2%! So much for **that** particular skill. Had you believed them and not had access to the facts, do you know who would be our country's president as you read this? Take your pick --- Kennedy, Carter, Reagan, Ford --- would you believe Anderson or Connally? Well, they were all picked by one or another of the psychics.

Shuckins'. I can do better than 2%. So here are some of my predictions for what's going to happen in radio control activities in 1981.

(1) In the compilation of the RCM readership preference survey, Clarence Lee will be voted the most popular columinst. Shortly thereafter, I will receive some letters which say the results were rigged, and I should have won. Chuck Cunningham, Al Doig, Don Lowe, Dick Phillips and the other columinsts will receive similar letters. Clarence will smile, knowing full well that as long as those pesky engines keep acting up, he's got it made.

(2) Jim Funduk will come up with another fabulous scale model; it will get honorable mention at the RAMS show, best in its class at Toledo, and best of show at MACS, even though not entered.

(3) The AMA will have a new president --- Jimmy "Sidecar" Wheeler. Jimmy has been a fast rising star in the radio control flying which we all love, but he will be elected president of the AMA as a result of winning his last five motorcross races. AMA, of course, stands for the American Motorcycle Association.

(4) Hanno Prettner will not win the Tournament of Champions. Bill Bennett will have discovered that Hanno is taking all that money home instead of returning it via the gaming tables. Therefore, the top five point scorers will have their names entered sequentially in a slot machine and be given a number of dollars equal to their point score. The last one to lose all his money will be declared the TOC winner. No matter to Hanno; he'll just take his money and run.

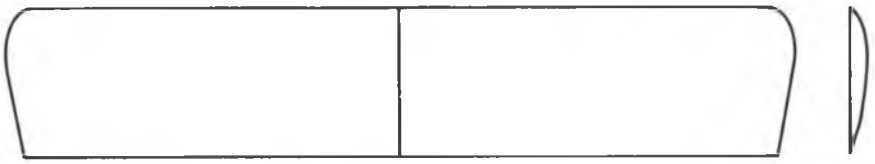
(5) The price of balsa will rise. How much? Whaddaya think I am, a spoilsport? Make your own guess. It will be too low.

(6) Very large models --- Quarter Scale, giant, mammoth, colossal, or whatever you want to call them --- will continue to grow in popularity. Dick Phillips might even win the popularity contest if the trend keeps accelerating. Nah. The darn things still need an engine that'll run before the plane will fly. Clarence smiles.

(7) Thousands of newcomers to the sport of radio control flying will find the same old problems which have plagued enthusiasts all the time. Clarence Lee will have to explain "degunking," which he has done every year, and someone will ask me, "Why do you put washout in a wing -- and by the way, what is it?"

So there's a few predictions for 1981.

Well mebbe I cheated a bit on that last one. I just received some mail from the RCM office, and the following letter from Piccini Henri, in Belgium, was in the bunch:



TRAINER WING PLANFORM AND RIB PROFILE

FIGURE 1

Dear Sir,

I want to know something more about the washout. Is it really necessary to have one in a wing construction? Some people say yes, others say no. The wing I want to make is the wing of a Hawker Typhoon. I drew the plans myself. On the root it has 47cm, about 18.5 inches, and on the wing tip, 25.5cm, about 10 inches. The half wingspan 106cm, about 41 inches. If it is really necessary to have a washout, my question is how to start this job. The airfoil section is a NACA 23021.

Yours faithfully,
Piccini Henri
Belgium

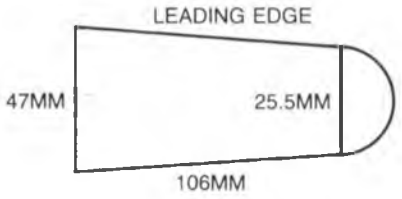


FIGURE 2

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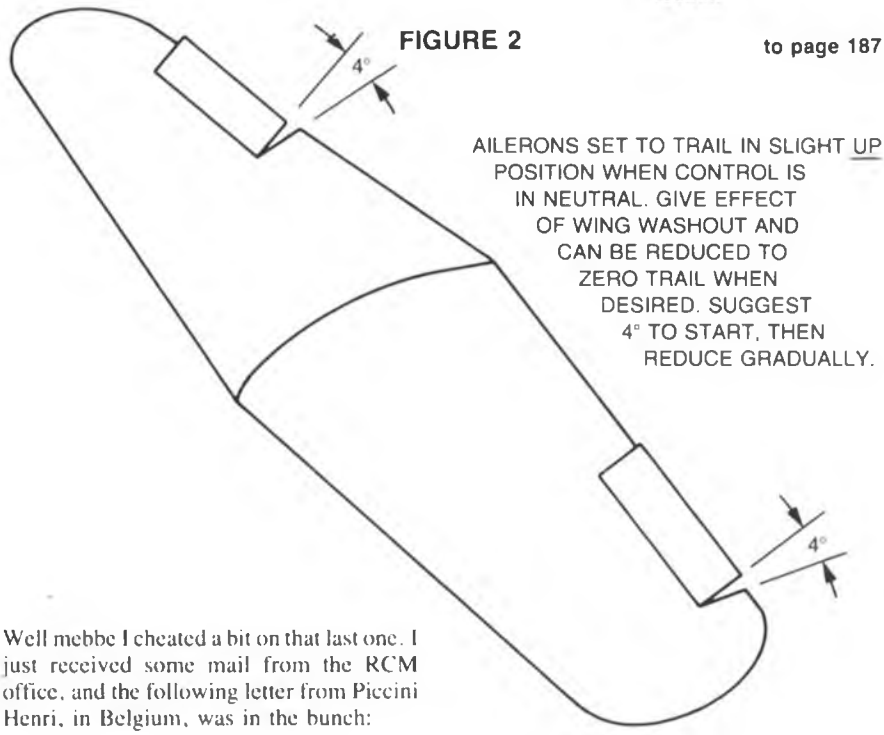

FLYING LOWE

Don Lowe

It's about time we got back to the subject of the ways and means of doing a better job of flying that wonderful creation of yours. We previously discussed some basics of selecting a good design and how to go about setting it up. There are a lot of subtleties in design and set-up that are important and won't be learned in one lesson.

As we previously mentioned, there are a number of good pattern designs on the market — some better than others. You must have noticed that the world's best flyers don't all fly the same design — far from it; so there is no **best** design! All designs have strengths and weaknesses. Unfortunately, it's not possible to have super capability in a given design for all maneuvers. Good designers are always striving, however, for that unreachable goal. For example, designing a model that will spin well; i.e., predictably, slow and without an excessive nose down attitude, seems to require a large, light wing loading model with plenty of control to obtain a deep stall. This requirement is somewhat in contradiction to requirements for super smoothness in other maneuvers as well as ability to handle windy weather conditions. I'm not personally aware of any pattern design ever created specifically to do good spins — usually we accept what we get — and if you fly Masters Class, you avoid spins.

Some models fly better with down and or right engine thrust. My own Phoenix designs, for example, don't like it at all. Several others also avoid offset thrust. By contrast the "Curare" and "Dirty Birdy" both use offset thrust. It's not possible to give a simple reason for this and it usually comes from trial and error. Its need is related to a complication of design and maneuver requirements for a particular design. Joe Bridi says he uses down thrust since it improves the power-on, power-off transition. The complicated corkscrew flow of the propeller over the fuselage and flying surfaces also affects the need. For example, we found the rotational flow from the prop created a very noticeable right trim condition under power on one of our RPV designs. The correction found for this was to add **up thrust**! Essentially what this did was to more symmetrically immerse the vertical tail in the rotational flow and **completely** eliminated the problem! So reasons and solutions are not always so obvious. Offset thrust (left) certainly was not the solution for this problem.

You will find that moving the thrust around can help at times to trim out subtle problems. For example, trimming in a slight amount of up thrust trimmed out a pitch down (with rudder) in knife edge flight for one of my ships. We have also found that offset thrust (right) to counter engine torque seems to be a very desirable thing for the Vegas-type aerobatic designs. The large slower turning props create more torque, the aircraft fly slower and change speed more in a maneuver. Suffice it to say that it's impossible to completely compensate for the engine in all maneuvers; you will simply have to learn to blend in a little rudder or elevator, or whatever it takes. You will also find that the airplane trim will change over a period of time and you must learn to recognize and compensate for this. The polished flyer understands these things and knows what to do with all of those levers simultaneously.

The best advice is to set up the airplane precisely as the designer suggests, and start from there. If your aircraft is precisely built, balanced, and controls sealed as previously discussed (RCM Dec. '80), then it should fly very well. Unfortunately, precise construction is rarely the case and we must struggle with the anomolies!

Trimming — Let's talk a bit about trimming the beast. Properly set-up, the ship should take-off with minimal effort with maybe a little right rudder (calm air) to counter torque if your ship has no offset thrust. A tad of up elevator should lift it off the ground. An aft C.G. and well tracked nose gear and rudder should make this easy. If the ship wants to jump off, you probably have it setting on the ground at negative wing incidence and/or the landing gear is too far aft of the C.G. (it sits on the nose too hard). Set it up so that the ship wants to sit on the tail with an empty tank. We also found that a ship with a very low placed horizontal stab seems to lift off easier and flare better for landing. This contradicts aero theory which predicts reduced stab performance close to the ground, due to ground effect, and a change in the apparent stab angle of attack. The evidence is profound, however, that a low stab is good; right on the thrust line or a bit below seems best. I might add here that bending the stab primarily has the affect of raising or lowering the stab. Some report bad side effects in gusty conditions but who can argue with Prettner's success? Several years ago I ran a series of experiments on pattern and RPV designs which profoundly concluded the importance of the vertical positioning of the stab — but I digress!

Once in the air, trim the aircraft for straight and level flight full bore. Be careful that the rudder is near neutral and try to observe any yawing in flight. If, indeed, it is flying yawed even though level, it cannot be trimmed. Now try a couple inside loops, preferably straight at you or headed away so you can observe the aircraft attitude. This must be done in calm air **or** directly into the wind. Be very careful that the ship is level at the start. You should be able to observe any yawing or banking in this condition. Make smoothly rounded loops so that the ship doesn't change speed much; don't do them abruptly or prop gyroscopic forces and "P" factor will get you. If it loops reasonably straight — great — be **careful** to input **only** elevator. If it rolls off, start over with a little aileron correction. Okay? — Now try outside loops the same way — if it rolls off now, correct with aileron to straighten it in the same way as before.

Okay — what to do since we don't have the correct trim for both inside and outside loops? If your trim was in the same direction to correct insides and outsides, go back and try correcting with rudder and not aileron (rudder will try to turn the ship in the same direction both inside and outside). If **opposite** aileron trim was required to correct, then the ship is rolling (and not yawing) and must be primarily corrected with aileron. Aileron affects the heading change in **opposite** directions for insides and outsides. Just reflect on it a little bit and think about the wing lift vector (right angles to wing) as you bank the airplane. Be sure that the aircraft is balanced laterally. If you have a heavy wing , then it will try to bank in the same direction for insides and outsides. The conditon should be aggravated in tight loops so a good check for a heavy wing is to check the symptoms in big loops as well as tight loops.

Be very sure that the elevators deflect equally both up and down. It's very easy for this not to be true if improperly set up with a split elevator. The elevator halves may deflect unequally if the pushrod is not connected equidistant from the hinge line on both, or if the elevator horns are not aligned exactly the same (not at same angle with pushrod). Sometimes out of trim insides and outside loops can be corrected by differential trim of the elevators. Think about them as ailerons and trim in the direction of desired roll. I have corrected loop tracking many times with this method. It will not be nearly as influential, however, as aileron and rudder trim.

If you have an unsymmetrical wing, i.e., contours top and bottom not the same on both panels, then you will have trouble

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ENGINE CLINIC

Clarence Lee

I imagine that most of the fellows reading this column and magazine also read most of the other model magazines on the market — Model Airplane News, Model Aviation, R/C Model Builder, etc. Several articles and letters have appeared the past few months regarding engine bore/stroke ratio and whether long stroke engines actually develop more torque and "lugging power." The most recent at the time of this writing (mid-December) were several letters in Bill Winter's "For The Fun Of It" column in Model Aviation (January issue). I do not know where this originally started but I have been receiving quite a few letters the past few months asking my opinion on the matter. So this month I would like to put my two cents worth in.

Many years ago when manufacturing my "Lee .45's" I chose an over square bore/stroke ratio, i.e., the bore is larger than the length of the stroke. This was due to past experience with both full size automotive engines and model engines. Experience had shown that as far as I was concerned long stroke engines developed their maximum torque at a lower rpm than short stroke engines. However, shorter stroke engines were capable of higher rpm and would develop more horsepower; horsepower being a function of torque times rpm. This is why a little 1/4 horsepower electric motor turning only 1750 rpm will run a power tool, etc., that your 1 horsepower plus .60 couldn't even turn over. It is high torque at low rpm. When it comes to model engines, a compromise has to be reached between maximum torque and horsepower to turn a propeller, in relation to the size of aircraft in which the engine will be used.

A good comparison that comes to mind is the old Doolings and McCoys of the late 1940's. The Dooling .61 with a bore of 1.015" and stroke of .750" had the highest bore to stroke ratio of any .60 size engine past or present that I know of. The McCoy .60, on the other hand, had a bore of .940" and stroke of .875"; still an over square engine but not to the extent of the Dooling. Although both engines were initially developed for race car use, the Dooling was developed strictly for high rpm operation. The McCoy, on the other hand, seemed to be designed to take advantage of lower rpm torque. It wouldn't wind up as tight as the Dooling but, with more torque, could be geared for equivalent speeds, although the Dooling eventually proved to be the number one race car engine.

Following WW II when U-control speed was really booming, the McCoy became the number one racing engine in aircraft as well as race cars. Then the Dooling came along and it was a neck and neck battle for awhile but gradually the Dooling again emerged on top in the racing field. But the point here being that, in order to get the Dooling to put out the required horsepower, it had to be run considerably faster. It would not turn the same prop as fast as the McCoy. Usually one less inch of pitch had to be used, i.e., if using a 9/12 on a McCoy, a 9/11 or even 9/10 was necessary on the Dooling. The lower pitch allowed the Dooling to turn faster and resulted in additional speed. I was active in U-control speed myself in those days and did considerable experimentation trying Dooling timing in McCoys, McCoy timing in Doolings, etc. Timing did not make a difference. The Dooling would turn a higher rpm with a small prop, but the McCoy would turn a larger prop at slightly lower rpm. The same thing held true with the McCoy .29 and Dooling .29. The Dooling, having a higher bore to stroke ratio, would not turn as much prop as the McCoy but, with a smaller prop, would turn a higher rpm. A 7/10 was the customary prop for the McCoy and 7/9 was used on the Dooling. In the early 50's when U-control team racing was at its peak, the McCoy proved to be the engine to beat due to a combination of acceleration and speed (plus fuel economy) being required. The extra torque developed by the McCoy helped to turn more prop for faster acceleration.

My findings did not just come about through comparing and modifying the McCoys and Doolings, however. I built many one of a kind bar stock engines over the years using varying bore/stroke ratios. So when it came to developing my Lee .45's in the mid-50's, I knew pretty well the bore/stroke ratio I wanted to use. The bore was .850" and stroke .800". I wanted the engine to turn in the 11,000 rpm range with an 11/6 prop and I figured this bore/stroke combination would be a good compromise between good torque characteristics and higher rpm capability. The engine turned out to be pretty successful as I never did fill all the orders I had for engines. They were strictly hand-made 12 at a time --- the first engines selling for $75.00 and eventually reaching a top of $225.00.

At this point the design was sold to Veco Products a subsidiary of Henry Engineering. Henry Engineering was owned by a gentleman named Gil Henry. Gil had been an aircraft engineer at Douglas Aircraft and had some full size automotive design experience. Gil felt that a "square" engine was the way to go, i.e., the bore and the stroke the same. I could not convince Gil that I had already proven the best combination and was quite reluctant to change the design of the engine. So to prove the point, and convince Gil, three identical engines were built. It has been a good many years so I do not recall the exact bore/strokes used but one engine had a larger bore and shorter stroke than the .45's I had been producing. The second engine was a "square" engine with the bore and stroke the same, and the third engine had a longer stroke than bore. Actually four bore/stroke ratios were involved. The same exhaust, bypass, and crankshaft timings were used on all engines. Compression ratios were the same. Case height and rod length were altered to keep connecting rod angularity the same. Rod angularity has an effect on piston/cylinder wall loading and resultant friction. All four engines would turn an 11/6 Top Flite propeller within 200-300 of each other. However, as larger propellers were tried, the long stroke engines proved to be better. The engine with the long stroke/smaller bore would swing a 13/5 almost 800 faster than the engine with the large bore and short stroke. However, the engine with the larger bore and short stroke would turn a 9/6 almost 1,000 rpm faster than the stroker. With everything else being equal, it is safe to assume then that the bore/stroke ratio certainly does have an effect on the torque characteristics of an engine. Long stroke engines develop their maximum torque at lower rpm and short stroke engines develop theirs at higher rpm. This is something those involved in working with full size automotive engine design found out many years ago. I naturally tried different timing combinations, i.e., raising and lowering the sleeve, but little was gained. The bore/stroke made the difference. Certainly timing can cause a long stroke engine to have a higher peaking speed, or a large bore engine to have better low speed torque characteristics, but the

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5% 5.50 x	50	275.00	Castor
10% 6.50 x	10	65.00	Performance
15% 7.50 x	35	262.50	Blend
25% 10.00 x	10	100.00	Castor
60% 18.00 x	5	90.00	Synthetic
Must total 125 or more Gal	125	$867.50	Your Cost Delivered

Pick the Nitro percentage you need and choose the type or Types of Oils. Multiply Cost Per Gallon by Number of each Nitro percent you selected. Then total them up and that is your cost delivered. Order must total 125 Gallons or More.

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(4) Add $2.50 to all C.O.D. orders

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ENGINE CLINIC

from page 12

bore/stroke ratio contributes considerably.

When it came to the production version of my Lee .45's, another compromise was met. Gil still liked the idea of a "square" engine so we started with the original .850 bore but increased the stroke to .820 making the engine actually a .46. Still not a square engine but closer. In fact, consideration was given to making the engine a .49 or .50 but in those days a 6 ounce tank was considered the maximum you could use so as to not change the Center of Gravity as the tank emptied (how things have changed). So we decided to go with the .46 size engine. Shortly after, I did go ahead and build some Lee .49's and .51's as larger tank sizes became acceptable (8 oz.). The last hand-made Lee engines were .51's.

So as you can see guys, I have probably done more experimentation with bore/stroke ratios than many of the fellows who are judging their findings on modification to existing production engines — comparing one make of engine with one bore/stroke ratio to another make of engine with another bore/stroke ratio, etc.

One other point that I would like to bring out is that there is also a relationship between engine displacement and bore/stroke ratio. The smaller displacement engines seem to develop their best torque/horsepower with a square or close to square bore/stroke and the larger the displacement engines favoring over square configuration. When you get into larger displacement engines you also run into piston speed that increases drag, vibration, etc.

To sum it up — if I were going to design an engine to develop a lot of torque in order to swing a larger than normal propeller, I would sure go with a "stroker." If the engine were intended for strictly racing application, it would have a larger bore/shorter stroke configuration. This is true when speaking of engine displacement sizes over .19 cu. in. In the case of the Veco .19, which I designed many years ago, I went with a square bore/stroke ratio which, as I mentioned previously, seems to be a better combination in the smaller engines. I think the Veco .19 spoke pretty well for itself over the years. There wasn't another .19 that could equal its power until K & B introduced their Schnuerle ported 3.5 (.21).

★

This past month I was visiting a local flying site where fellows fly their helicopters. One fellow in particular was having considerable difficulty getting his engine to hold a consistent setting. It would alternate between being rich and going lean. He had changed fuel tanks, fuel lines, tried different fuels, etc. Still the problem persisted. When I arrived he asked if I would take a look at the engine as he was sure this had to be the cause. One look and I knew what the problem was immediately. It was something I had never given a thought to in the past as I do not fly helicopters myself. I now wonder how many other fellows have been experiencing the same problem for years without ever finding the cause.

The fellow was using a K & B .40 with Perry pump. Now as all fellows flying helicopters know, you mount the engine vertically. At least in all that I have seen. Herein lies the problem. You cannot mount a Perry pump horizontally as would be the position with the engine vertical. The pump diaphragm inside the back cover portion of the pump is covered with a plastic disc and contains four small holes. Pressure differential caused by the up and down stroke of the piston actuates the diaphragm. However, when you mount an engine vertically, any excess fuel and oil drain into the diaphragm chamber and affect operation of the diaphragm. With the engine mounted hoirzontally, as in a conventional aircraft, the pump is vertical and excess fuel and oil residue can drain out the diaphragm chamber.

So if you are flying a helicopter with a vertically mounted engine, you cannot use a Perry pump. If you are using a large bore carburetor that requires the use of a pump, or have your fuel tank mounted some distance from the engine, then use the Robart pump/Automix unit. However, a word of caution here — with the pressure tap located in the back cover, fuel and oil can fill the line and cause the same problems as with the Perry pump. The pressure fitting in the back cover becomes a fuel/oil drain. To avoid this, the pressure fitting should be installed through the bottom of the crankcase or through the side of the mounting lug in a horizontal position.

★

Dear Clarence,

I'm planning on buying American R/C Helicopter's new "Mantis" (if they ever catch up on all the back orders) and putting a K & B .40 in it. This will be my first chopper so I'm not up on all the information.

Thumbing through back issues of RCM I ran across a statement in "Hover" in which Don said, "I see no reason for castor oil and anything more than 5% nitro. Now, I assume that you will be using top shelf fuel and not some trash that you're not really sure what's in it for nitro or what kind of oil and how much."

*What does all this mean? I fly R/C airplanes and have been using Sig 10% faithfully in my K & B .60's with no problem. But $17.00 a gallon hurts! I just purchased a gallon of Sheldens 10% at $7.95 which is under **half** price. I haven't used any yet, however, so I don't know what it's like. Is this what Don referred to as "trash?"*

Should I use 5% as he suggests in my helicopter?

Are these some of the fuels that are referred to as "trash?" BK Products' Blue Flame, Hobbyist's Red Max, Sheldons'

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POWER BOATING

Howard Power

This month's column will continue the propeller discussion that was started last month. Before we get to that subject, however, I would like to answer the following letter.

Dear Howard,

Last weekend I enountered a problem with my new outrigger hydro. Everytime I launched it, the darn thing ran fine for a time, but it would stop without even making a complete lap. I would appreciate it if you could give me some idea how to keep the boat running.

Yours truly,
Rod Schultz,
Morgan Hill, California

Well, Rod, you don't give me much to go on but I'll do my best. If the engine stops running it has either run out of fuel, run out of fire, or has ingested water. The latter condition is easily detected by loosening the glow plug and turning over the engine with your starter. If you see milky colored fluid coming from around the glow plug you can bet that the motor tried to run on water. Hydros are notorious for water ingestion problems because the motor is usually mounted close to the hull bottom. This means that the intake is close to a vibrating flat surface that will throw any collecting water right where it does the most harm. You can solve this problem by keeping the water out of the hull and by placing a sponge rubber pad below the intake to absorb stray water drops. Water can be thrown into the boat by rounded bottom edges of the fuselage or by spray coming from the turn fin or the sponsons. Sometimes the addition of spray rails to the fuselage will solve this problem. Water can also be kept out of the boat by making a tight fitting cowling over the tank compartment and the intake.

If water ingestion is not the problem, replace the glow plug and try again. If the motor stops again, it is running out of fuel. I will assume that you have not modified the carburetion system of the motor and that you are not trying to run the mixture too lean. If this is the case, your fuel system is probably the culprit. It is best to use two plastic tanks in most boat installations. Metal tanks have a habit of developing seam leaks due to vibration.

Two tanks are used so that the engine feed tank is full for a large portion of the engine run. This keeps the feed tank free from fuel foaming and provides for a constant fuel pressure head at the carb. Each of the two tanks should be assembled with only a pick-up tube and a vent tube. The pick-up tubes should be soft brass that has been bent so that the tip is positioned in the left rear bottom corner of the tank. Fuel will collect there due to accelerations produced by turning right hand corners. The vent tube should be positioned with the tip at the top right corner. The two fuel tanks are mounted side by side so that the feed tank (the one that the engine is connected to) is on the left hand side of the boat. The vent of the first tank is connected to the pick-up tube of the second tank by silicon tubing. In this arrangement the second tank empties before the feed tank. The vent of the second tank may be connected to pipe pressure or may be an atmospheric vent. Check all fuel system tubing for leaks. Silicon tubing has a nasty habit of tearing easily especially if you have left any burrs on the brass tubing. Any leaks in the system will cause a fuel feed problem. Check your tanks for foreign matter that could clog the pick-up tubes. I remember once that a small piece of plastic bag somehow got into one of my tanks. This clear plastic piece would sometimes block the flow. It about drove me crazy until I drained and disassembled the tank.

If the previously mentioned things are not to blame, you will have to look at your motor. Check it for any crankcase leaks which will keep the motor from drawing fuel. If you have a rear rotor engine check the rotor clearance which should be no more than 3/1000 of an inch. Check that your carb spray bar is free flowing and not blocked by foreign matter. Also check the orientation of the spray bar holes if you are using a draw venturi. If your spray bar has two holes, they should be oriented 90 degrees with respect to the flow direction through the venturi. If it has one hole it should "look" straight into the engine.

If your boat still doesn't run after checking all these items out carefully, Rod, you are probably having radio problems. Check to see if you have sufficient range while the engine is running. Also, be sure that you don't point the transmitter antenna at the boat while it is running. This can cause loss of control due to the inefficient radiation pattern that exists off the antenna tip. Check the switch by replacing it with a new one since it may be intermittent when vibrating. Also check the wiring and battery pack welds for problems. Replace the throttle servo to determine if it is bad. If you still have problems, you might consider taking up R/C sailplanes!

Let's return now to the topic of props. Last month we looked at propeller selection to achieve a desired speed. Now that you

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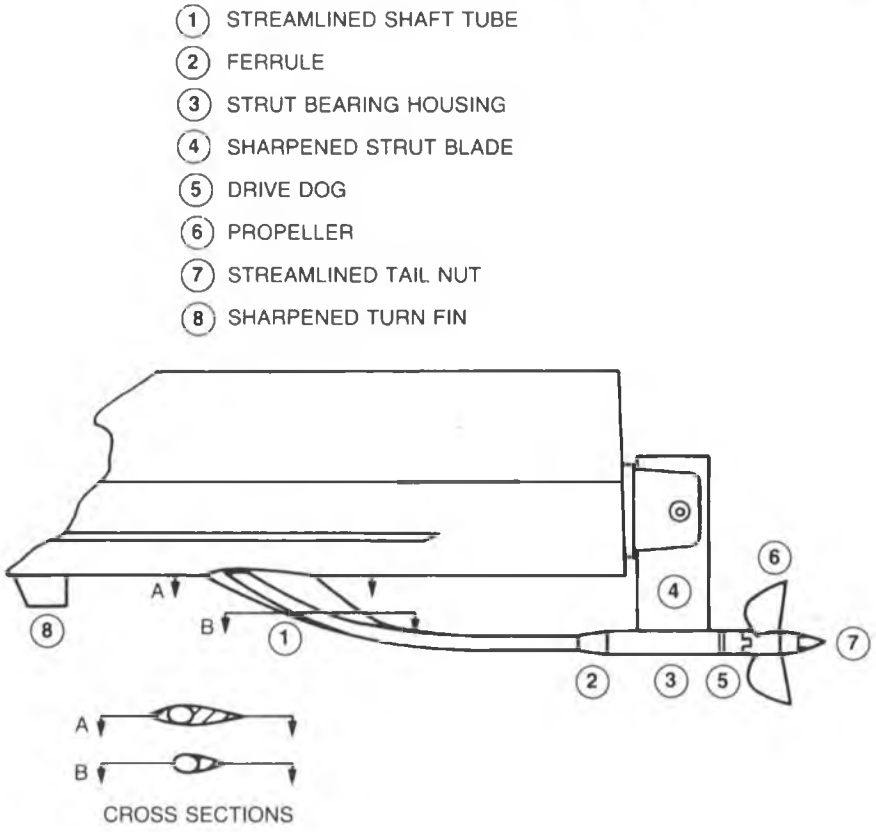
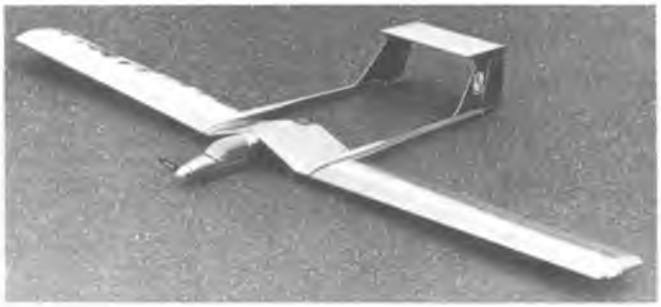


FIGURE 1

RCM PRODUCT REVIEW

Parker R/C Planes SORCERER



SPECIFICATIONS

Name	SORCERER
Aircraft Type	Powered Sailplane
Manufactured By	Parker R/C Planes P.O. Box 8195 Van Nuys, California 91409
Mfg. Suggested Retail Price	$68.95
Available From	Both Mfg. & Retail
Wing Span	92 Inches
Wing Chord	10" Root — 7½" Tip
Total Wing Area	815 Square Inches
Fuselage Length	44 Inches
Stabilizer Span	14¼ Inches
Total Stab Area	114 Square Inches
Mfg. Rec. Engine Range	Astro Flight .075
Recommended Fuel Tank Size	N.A.
Recommended No. of Channels	3
Rec. Control Functions	Rud., Elev., Motor cut off
Basic Materials Used In Construction:	
Fuselage	Balsa and Ply
Wing	Balsa and Spruce
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (4 pages)
Construction Photos	Yes

RCM PROTOTYPE

Radio Used	Futaba 3 channel
Engine Make & Displacement	Astro Flight .075 electric
Tank Size Used	N.A.
Weight, Ready to Fly	44 Ounces
Wing Loading	7.8 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Unusual design, excellent wood quality, part quality and fit, complete hardware package.

WE DIDN'T LIKE THE:

Difficult alignment of tail section, incomplete boom assembly instruction, short trailing edge.

We'll have to admit that at first glance most sailplanes, powered or not, look a lot alike. Of course there are different airfoils and flight characteristics but, aside from the occasional T or V tail, they do look like close relatives. The Sorcerer, designed by Charlie Parker of Parker R/C Planes, P.O. Box 8195, Van Nuys, California 91409, with its twin booms, pod fuselage,and gull wings is strikingly different. It is still a sailplane but it certainly won't win any look alike contests.

The Sorcerer first appeared as a construction article in the August 1980 issue of R/C Modeler and semi-kits were offered by Parker R/C Planes. The complete kit is now available. Inside the 37½" x 5½" x 3" box we found everything tightly packaged, no crumpled paper, just some of the best wood we've seen in a kit plus a crystal clear canopy. Small parts are bagged and the hardware includes metal clevises and virtually all the needed items. We spent considerable time just looking and touching before starting construction, very impressive.

Construction:

For being so unusual in appearance, the building techniques, with few exceptions, are quite conventional. One 36" x 60" rolled plan sheet shows all of the parts including both wing panels and an alternate power system for the Cox T.D. .049. The instructions are quite detailed and we suggest that the recommended sequence be followed --- there are some steps that just can't be done any other way. One thing frequently mentioned is weight. With this in mind, cyanoacrylate glues are suggested. We used both Goldberg Super Jet and Hot Stuff with excellent results.

The main fuselage pod is of the box type with plywood doublers; it just stops at the trailing edge of the wing. Tail booms are a bit more tricky — they are like small fuselages and are fragile until sheeted. Keep in mind that there is a left and a right boom. The instructions neglect to mention that an airfoil shape must be cut out of the boom sides so that they can slide over the center section. We suggest that this be done before starting assembly. The method we used was to stack the four sides using Scotch double sided tape to keep them in place. A rib is used as a template and aligned as shown on the plans. The cut-out has to be 1/16" larger than the rib to allow for sheeting so use a blunt soft pencil to trace around the rib; this will give just about the right spacing. We used a Dremel Moto Saw to cut on the outside edge of the pencil line.

Pre-cut balsa parts are supplied for a center section jig; even this "throw away" unit is of very good wood. We haven't figured out a use for the jig after construction but there must be some good use. The center section is the most critical portion and the most time consuming. There are a number of little pieces to cut and fit. The miter joints are best made by brushing a little baking soda on the joint and then applying Hot Stuff. During assembly it looks fragile, but when complete it is a very rigid structure. This is the one area where we couldn't meet the suggested weight. Nothing was added, it just came out about an ounce heavy. Alignment of the booms on the center section and installing the pushrods is a bit of a challenge, but follow the directions and it can be done. We found it easier to leave the front of the booms open until they were in place.

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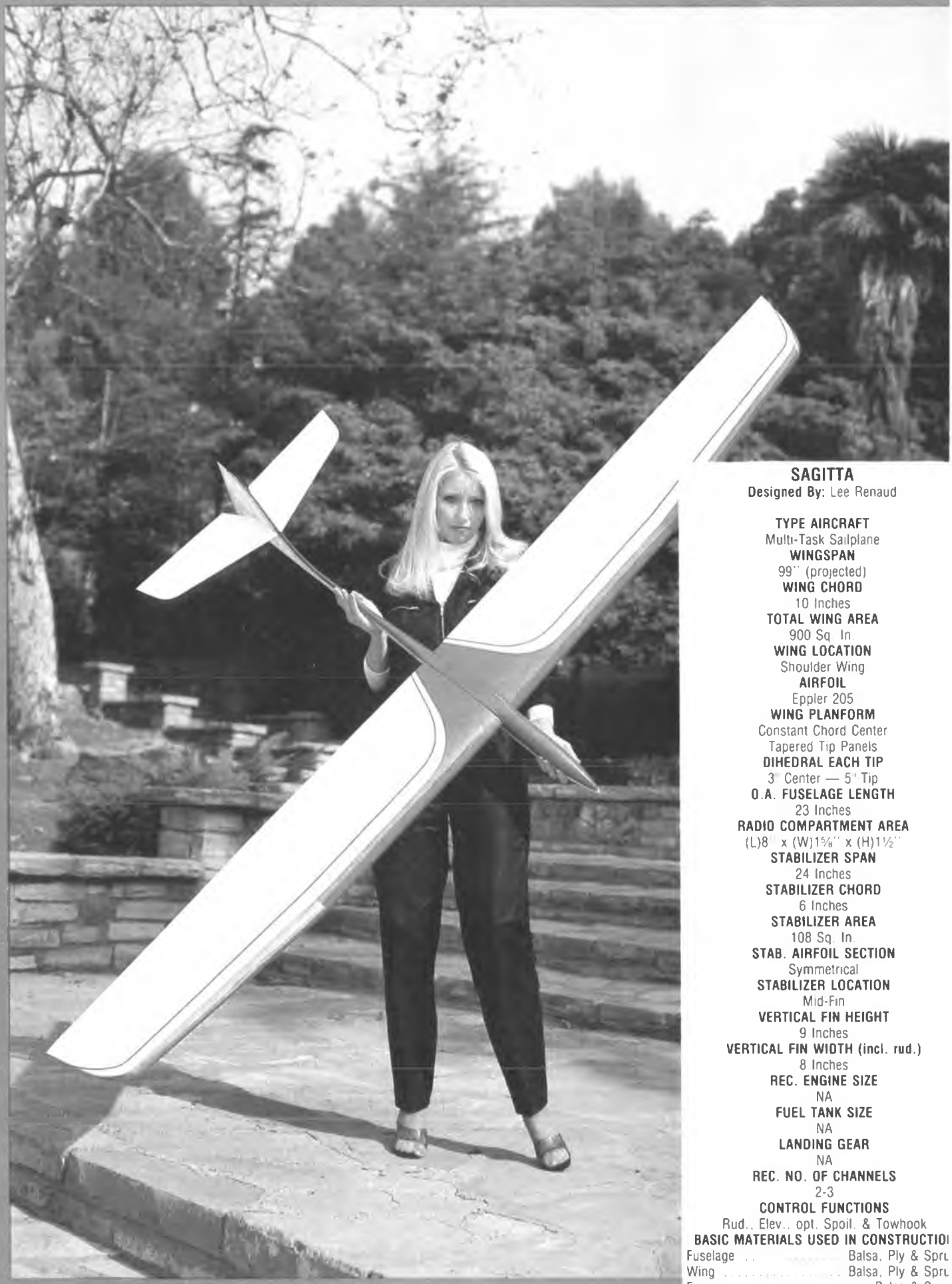


SAGITTA

Designed By: Lee Renaud

TYPE AIRCRAFT
Multi-Task Sailplane
WINGSPAN
99" (projected)
WING CHORD
10 Inches
TOTAL WING AREA
900 Sq. In.
WING LOCATION
Shoulder Wing
AIRFOIL
Eppler 205
WING PLANFORM
Constant Chord Center
Tapered Tip Panels
DIHEDRAL EACH TIP
3° Center — 5° Tip
O.A. FUSELAGE LENGTH
23 Inches
RADIO COMPARTMENT AREA
(L)8" x (W)1⅝" x (H)1½"
STABILIZER SPAN
24 Inches
STABILIZER CHORD
6 Inches
STABILIZER AREA
108 Sq. In.
STAB. AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Mid-Fin
VERTICAL FIN HEIGHT
9 Inches
VERTICAL FIN WIDTH (incl. rud.)
8 Inches
REC. ENGINE SIZE
NA
FUEL TANK SIZE
NA
LANDING GEAR
NA
REC. NO. OF CHANNELS
2-3
CONTROL FUNCTIONS
Rud., Elev., opt. Spoil. & Towhook
BASIC MATERIALS USED IN CONSTRUCTIOI
Fuselage . . . . . Balsa, Ply & Spru
Wing . . . . . Balsa, Ply & Spru
Empennage . . . . . Balsa & Spru
Wt. Ready To Fly . . . . . 42-44 (
Wing Loading . . . . . 6.7-7.1 Oz./Sq.

SAGITTA 900

Lee Renaud has developed in his latest design, the ultimate in U.S. designed sailplanes. It has earned its way on the U.S. World Soaring Team.

Designed & Introduction
By Lee Renaud
Construction Text
By Larry Jolly
Photos
By Taylor Collins

Introduction

The sport of R/C soaring has not changed significantly in the United States during the past five years. The major kit designs of the mid-1970's such as the Paragon, Bird of Time, Aquila and Olympic II are still competitive designs in today's contest environment. The most significant advances have been in moving the towhook further aft for higher launches, and adding ballast to extend the speed range and penetration characteristics for variable weather conditions. This approach has been quite successful for the majority of American fliers, and offers the beginning pilot a reasonable chance of success.

The world-wide scene, however, has undergone a significant change in design philosophy during the same period of time, largely due to the demands of FAI F3-B class competition. The European countries, in particular, have developed models which offer significant improvement in L/D ratios, using Eppler developed airfoil sections and advanced materials and fabrication techniques. In most cases, these aircraft are club or group efforts, due to the tremendous amounts of time and skill required to fabricate molds and produce models. These techniques have been quite successful, and have influenced R/C sailplane design around the world.

The requirements of F3-B competition are quite different from the typical AMA Thermal Duration contest. Only the select group of American fliers who are involved with the FAI activity truly recognize the potential performance improvement that is possible with detail design refinement and improved technique and piloting skills. This group demands the maximum available performance, and improved models must be developed to advance the state-of-the-art. Superior designs flown by superior pilots will dominate any class of competition. The improved efficiency and handling characteristics of the new generation of R/C sailplanes will affect the American contest and sport flier dramatically during the 1980's. A new breed of sailplane has taken wing, which fly further, faster and higher than their predecessors.

The Sagitta is one of the new breed, which has already proven itself a World Class design in both AMA and F3-B competition. First flown on July 20, 1979 (the tenth anniversary of the first flight of the original Olympic 99 and Neil Armstrong's lunar landing) — Sagitta has been very successful. The version described in this article is the original "gas-bag" which I flew to 3rd place in the 1979 International LSF Tournament. This same ship was flown by Skip Miller after the contest and turned sub-10 second speeds over the FAI F3-B course. Further developments of the design with straight wings and ailerons, plus fully sheeted wings helped Don Edberg to gain a place on the 1981 USA R/C Soaring Team. Dwight Holley also gained his team spot flying the version described herein, with a thicker stab section to suit Dwight's flying style. Four of the top six places in the Team Selection Finals were gained by Sagittas, including those flown by Skip Miller & Larry Jolly.

Sagitta, (pronounced Sag-ee-tah) is a Latin word meaning arrow. It meets all requirements for AMA Standard Class competition, yet is totally competitive in the unlimited class. The design is conventional in appearance with careful attention paid to minimizing aerodynamic drag and improving efficiency. Construction utilizes conventional model materials and techniques, with structural design optimized to provide a rugged airframe. This design can be easily duplicated by anyone who has a flat bench and who has already built a simpler ship, such as the Olympic II. Some additional time and effort in carving and sanding are required to develop the smooth flowing contours of the Sagitta, but the aesthetic and aerodynamic benefits are well worth the extra trouble.

Design Philosophy:

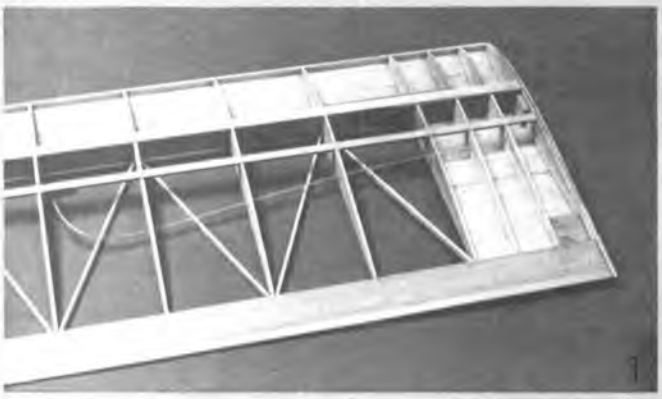
Two major considerations influenced the design of the Sagitta: First, to improve the flight performance of the Aquila and Aquila Grande; second, to allow complete access to the radio equipment and ballast without using any tools. In addition, we wanted to improve the spoiler hook up system used on the Aquilas. These requirements led to the forward hatch and hinged access panel which provide excellent fuselage access, and simple spoiler hookup as well as wing retention. As a bonus, the towhook becomes readily accessible, simplifying adjustment of releasable towhooks.

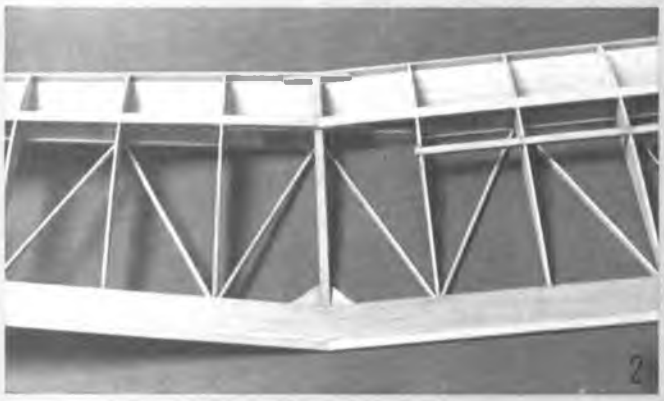
The fuselage design provides minimal frontal area and wetted surface for decreased drag. The shoulder mounted wing position eliminates two intersections, and the obtuse angle between the fuselage sides, and wing lower surface makes wing fillets unnecessary. The slim aft cross-section is possible through the use of stranded cable inside tubing pushrods. The side and plan view outlines represent the minimum envelope consistent with equipment space requirements and structural requirements. Two ballast compartments are provided, which permit the flier to more than double the the model's weight. Full length poplar ply sides with spruce longerons provide plenty of strength and rigidity.

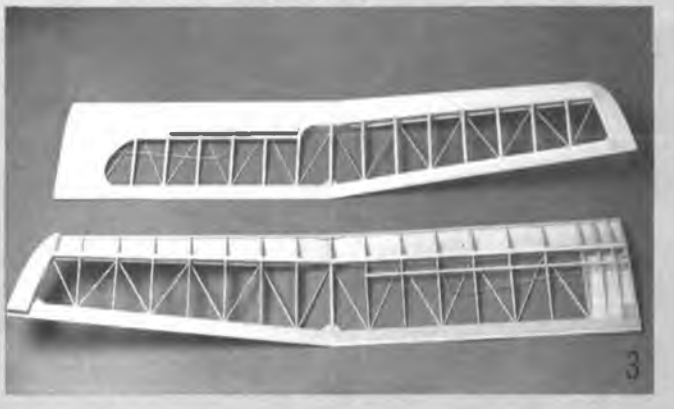
Of course the heart of any sailplane design is the wing. Sagitta utilizes a relatively low aspect ratio to raise the Reynolds Number and to pack 900 square inches into a 100" span. This approach has been proven in practice by the success of the Aquila and Oly II in Standard Class competition. Wing planform is contant chord center panels with double tapered tips. The center and tip panels are equal in span for better turning charactertistics due to improved structure and moments of inertia. The sharply raked tips provide low drag with distinctive appearance. Polyhedral is used for quick turn response with rudder/elevator control. The shallow center angle and increased tip angles improve efficiency and give better response.

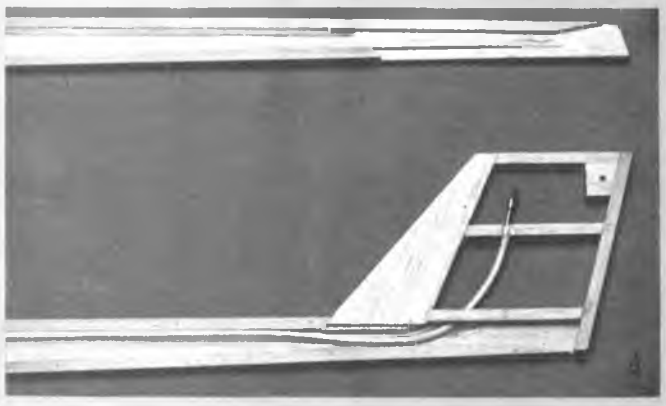
The airfoil used is a slightly modified Eppler 205 section. This section offers moderate thickness of 10.6%; large leading edge radius with substantial Phillips Entry, and a shallow trailing edge angle. It is also flat bottomed from the spar aft, which makes for easy building and alignment. Flight performance has proven the superior characteristics of Dr. Eppler's computer and I think the 205 is the best section currently available for normal wing loadings and flight tasks.

Wing structure is conventional, with a full D-tube section for bending strength and torsional rigidity. Warren truss bracing is used between the spar and trailing edge for extra insurance against high speed flutter.









(1) Left wing panel showing internal details including shear-webs, spar, sub spar, spoiler tube. (2) Left panel at polyhedral joint. Shows L.E. brace, polyhedral braces, T.E. detail and diagonals. (3) Wing structures showing right panel complete. Left panel complete except for top sheeting. (4) Aft internal fuselage detail showing pushrod installation into fin. (5) Aft fuselage with rudder assembly complete. Stab holes yet to be drilled out.

The wing joiner is 5/16" diameter music wire to provide extra rigidity at the center joints, while still allowing some flex to "read" the wing under high launch stress. Oversize spruce spars with shear webs which progressively decrease in thickness contribute to a "burst proof" structure. The "cross your heart" polyhedral braces ensure a strong joint without excess weight.

One feature of this design is the use of hardwood trailing edges on the wing and empennage. These are formed simply by adding rectangular section spruce strips to balsa spanwise members. These edges allow the trailing edges to be shaped to sharp edges, instead of the blunt edges possible with balsa structure. The sharp edges provide a significant reduction in drag, and we strongly recommend that you spend the extra time and care required to shape the trailing edges. The empennage design is simple with solid sheet leading edge sections and built-up Warren truss structure aft of the high point. This structure assures static and dynamic balance and permits easy shaping to the correct airfoil. Both vertical and horizontal surfaces are tapered in thickness from root to tip to minimize weight and to improve structural efficiency. Hardwood is used on the leading edges and tips for anti-nick resistance and to provide a guide while shaping the structure.

Sagitta incorporates landing spoilers for glide path control. They make setting up for spot landing much easier and their use is strongly recommended. As shown, they are very effective in reducing lift and increasing sink rate. Personally, I am not comfortable when flying in strong lift without spoilers as I have lost several ships under these conditions. If you have never flown a ship with spoilers we suggest that you try them on your Sagitta, since we think that they provide extra controllability during all flight phases and conditions.

Flight performance is excellent, with a wide speed range and very responsive controls. Tow characteristics are outstanding, both on winch launches or with a heavy duty hi-start. The first thing that will impress is the Sagitta's ability to cover large areas of sky with minimum altitude loss. In fact, to fully utilize the ship's potential you may have to change your flying style.

The Sagitta is a very easy handling ship, with no adverse characteristics. The general performance with forward balance is very similar to an Oly II, and is as easy to fly as any design I've handled. You can float around quite easily and get the feel of the ship without any feelings of panic or uneasiness. By moving the balance aft another 1/4" or 3/8" overall, responsiveness will increase. She is trickier to fly, but the L/D will improve significantly and you will experience a new level of performance. Either way we know that this is a design which will provide many hours of enjoyable flying, and which is going to

show up in the winner's circle many times during the coming years.

A complete scratch-builders kit for the Sagitta is available direct from Airtronics, 12160 Woodruff Ave., Downey, CA 90241. This includes the wing and stabilator joiners plus brass tubing for these items, a set of elevator and rudder pushrod cables, spoiler hardware, adjustable towhook and landing skid. The total price is $14.95 post-paid.

Building Notes:

Read through the building instructions and study the plans to familiarize yourself with the design before starting construction. We suggest that you cut all parts before starting assembly creating your own kit. This method reduces overall building time and lets you build several parts simultaneously.

Cut out all balsa wing ribs using plywood template for proper shape. The center ribs are made using the pinned sandwich method. While the #2 ribs are still pinned, relieve the ribs to accept the 1/8" x 1/4" sub spar. Cut the tip ribs in pairs. Pre-cut the shear webs. Note the different wood sizes used. Cut the 1/16" plywood webs and dihedral ties.

Cut the tip blocks to the outline shown on the plan. Use a table saw or plane to shape the spruce leading edge to the shape shown on the plans. Make the wing tube carrier and fuselage tube carrier out of pine. Use a table saw with a dado blade to groove the carrier to accept the tube. Cut the fuselage sides from 1/8" poplar plywood (Sig Lite or equivalent) tack glued together for accurate alignment. Drill holes for the brass tubes, spoilers, and rudder pushrod. Make sure the holes are accurately positioned. Cut all the fuselage formers from 1/8" birch ply.

Now study the plans and procure the necessary strip and sheet, balsa and spruce. For best rudder response, every effort should be made to keep the wing tips light. Remember this when selecting the wood for the tips.

If you're ready, grab the glue and pins and let's go — the air looks great this morning.

To build the Sagitta you will need the following:

(1) A building surface at least 10" wide and 48" long that you can push pins into.

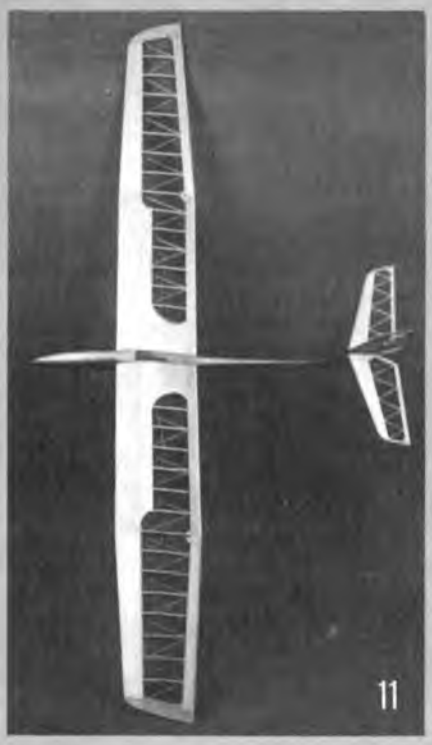
(2) A modeler's knife, #11 X-Acto or equivalent.

(3) A razor saw.

(4) T-pins.

(5) Epoxy — 5-minute Devcon or

(6) Detail of hatch layout, hinge, front hold-down plate and canopy shape. (7) Close-up of internal fuselage detail, hatch hold-down and canopy detail. (8) Completed fuselage shows canopy contour, hatch fit, hinge slot and wing joiner tubes. (9) Stabilizer detail before being cut in half. Also shows stab locks. (10) Photo shows wing fit, hatch detail and internal fuselage structure. (11) Completed Sagitta 900 framework ready for covering.



HobbyPoxy 4, plus HobbyPoxy Formula 1 or equivalent.

(6) Adhesive — two types will be used in construction, aliphatic — Titebond or equivalent white-type glue, and cyanoacrylate — Jet or Hot Stuff. It is safe to assume that the two types are interchangable; if a particular glue is desired during a construction phase it will be designated.

(7) Various grades of sandpaper, including 80, 120, and 180 grits for shaping; 220, 320, 400 and 600 grits for finishing.

(8) A soldering gun or iron and good grades of solder.

(9) Drill motor or pin vise and a 1/8" and 3/16" drill.

(10) Saran Wrap or equivalent to protect plans.

(11) Your choice of finish.

Constructing The Wing:

The wing is not difficult to build, but a few notes are in order. Put the spoiler mechanics in, even if you think you aren't going to use them. The Sagitta is a very clean, and efficient sailplane. It is very difficult to consistently make good spot landings without some sort of glide path control; of course you never know when you might want to lose large amounts of altitude in a hurry, the spoilers will let you do this safely.

If your work area permits, both wings can be built at the same time, thereby allowing reduced building time.

(1) Place the wing plan on your building board and add the protective sheet of Saran Wrap.

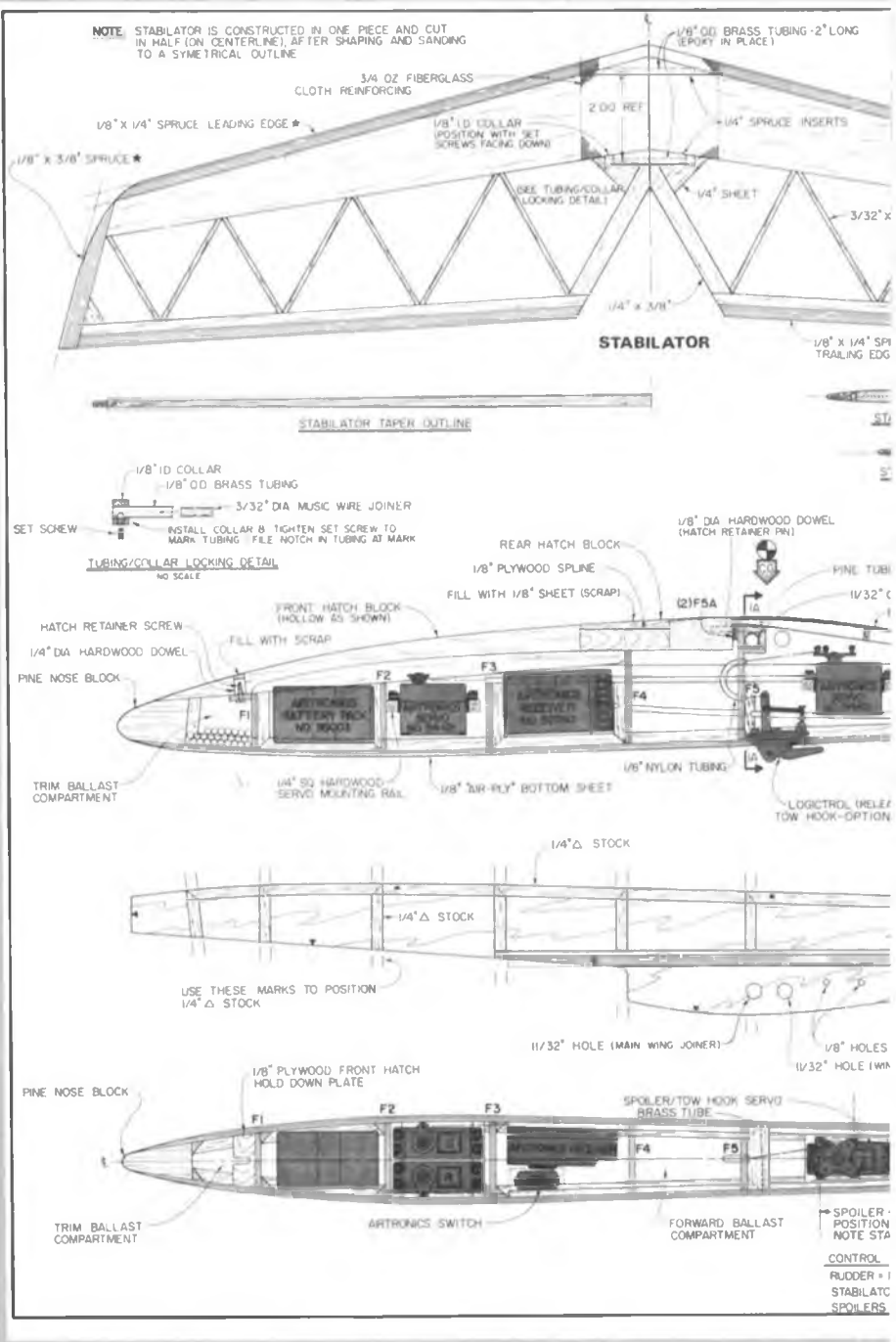
(2) Select a 1/8" x 3/8" x 24" spruce stick. Pin this in location for the bottom spar.

(3) Select a sheet of 1/16" x 3" x 24" balsa to serve as the bottom leading edge sheeting, glue this in position in front of the spar. Now find a piece of 1/16" x 3" x 12" balsa, follow the guide on the plan sheet to cut this into center aft bottom sheeting. Glue this sheet in location between trailing edge and bottom spar.

(4) Select a piece of 1/4" x 1" x 24" balsa trailing edge stock, also select a piece of 3/32" x 1/4" x 24" spruce to be used as the trailing edge cap. Find a piece of pre-shaped leading edge and 2 pieces of 3/32" x 3/16" x 36" balsa to be used as diagonals.

(5) Using a W-2 rib as a spacer between the spar and trailing edge to check its location, pin the balsa trailing edge in place, and glue the 3/32" x 1/4" spruce cap in position.

(6) Starting with the first W-2 rib, glue the rib in position on the spar and trailing edge. Note that the leading edge of the rib is raised off the bottom sheet approximately 1/8". It will be necessary to shim up the leading edge to fit the rib contour. A piece of trailing edge stock slid under the leading edge sheet and Saran Wrap works very well.



(7) Using the shear webs as spacers, glue all W-2 ribs in place. I like to glue the shear webs in place as I glue each rib. Use an aliphatic glue for the shear webs. (It is also a good idea to double glue. Put glue on the spar and shear web, touch them together for an instant, then pull them apart. The glue will have been absorbed by the end grain on the shear web). Add more glue and pin the shear webs in place.

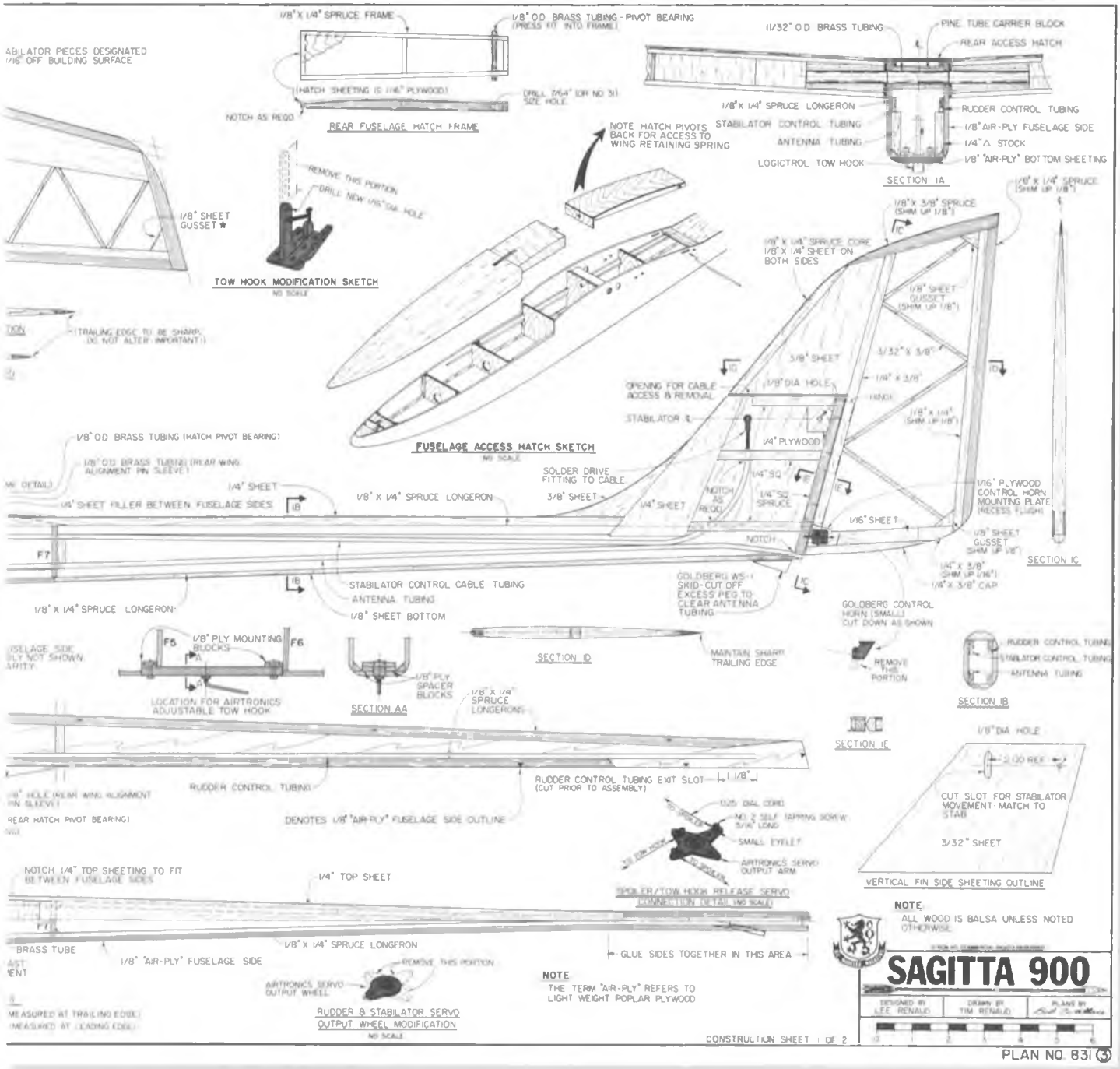
(8) Working towards the wing root, glue the 3/8" shear webs in place.

(9) Locate the wing tube carriers. Study the carriers, note that there is a definite left and right tube carrier. Select the proper tube carrier for the wing you are constructing and epoxy in place.

(10) Select another 1/8" x 3/8" x 24" spruce stick for the top spar, then glue in place. Again use Titebond and double glue.

(11) Study the plywood center webs. Notice there are two types. While both are the same length, one is 1/16" taller. The taller web glues on the back side of the spar trapping the brass wing tube in place. Note that the bottom sheeting must be trimmed so that the rear plywood web fits flush with the bottom of the wing. Locate the brass wing tube and roughen up the exterior surface with coarse sandpaper.

(12) Trial fit the brass wing tube in the carrier and, if everything fits correctly, mix up some slow drying epoxy and epoxy the tube and the rear ply web in position. A few clamps would be helpful. When the rear assembly is dry, epoxy the front plywood



FULL SIZE PLANS AVAILABLE — SEE PAGE 203

web in position.

(13) Trim the W-1 ribs to the proper length, and glue in place. Note the root rib is angled horizontally and vertically.

(14) Cut the alignment pin tube holder to length, and glue in place. It is 1/4" x 1" x 1-1/16" trailing edge stock.

(15) Glue the 1/8" plywood screw eye mount in place on the root rib.

(16) The diagonals can now be cut from 3/32" x 3/16" x 36" stock and glued in place. Note that the excess can be used to make the spoiler stops.

(17) Glue the 1/8" x 1/4" spruce sub spar in place. Note that the excess from this stick will be used to make the leading edge dihedral brace.

(18) Now glue the leading edge in position. The center section is now basically complete, except for top sheeting and cap strips. You must now decide whether you will build the tip panel on to the center panel, or build the tip panel and then join it to the center panel after its completion. I usually block up the center panel and proceed to build the tip directly to it. However, I will give instructions for the conventional sequence.

(19) To build the tip you will need to select a piece of pre-shaped leading edge; two 1/8" x 3/8" x 24" spruce spar material, 1 piece of 3/32" x 1/4" x 26" spruce trailing edge cap, 1 piece of 1/4" x 1" x 24" balsa trailing edge material and 2 pieces of 3/32" x 3/16" x 36" diagonal material. Select a light piece of 1/16" x 3" x 24" for the bottom sheet.

(20) Pin the bottom spar to the plan.

(21) Glue the bottom leading edge sheeting in place.

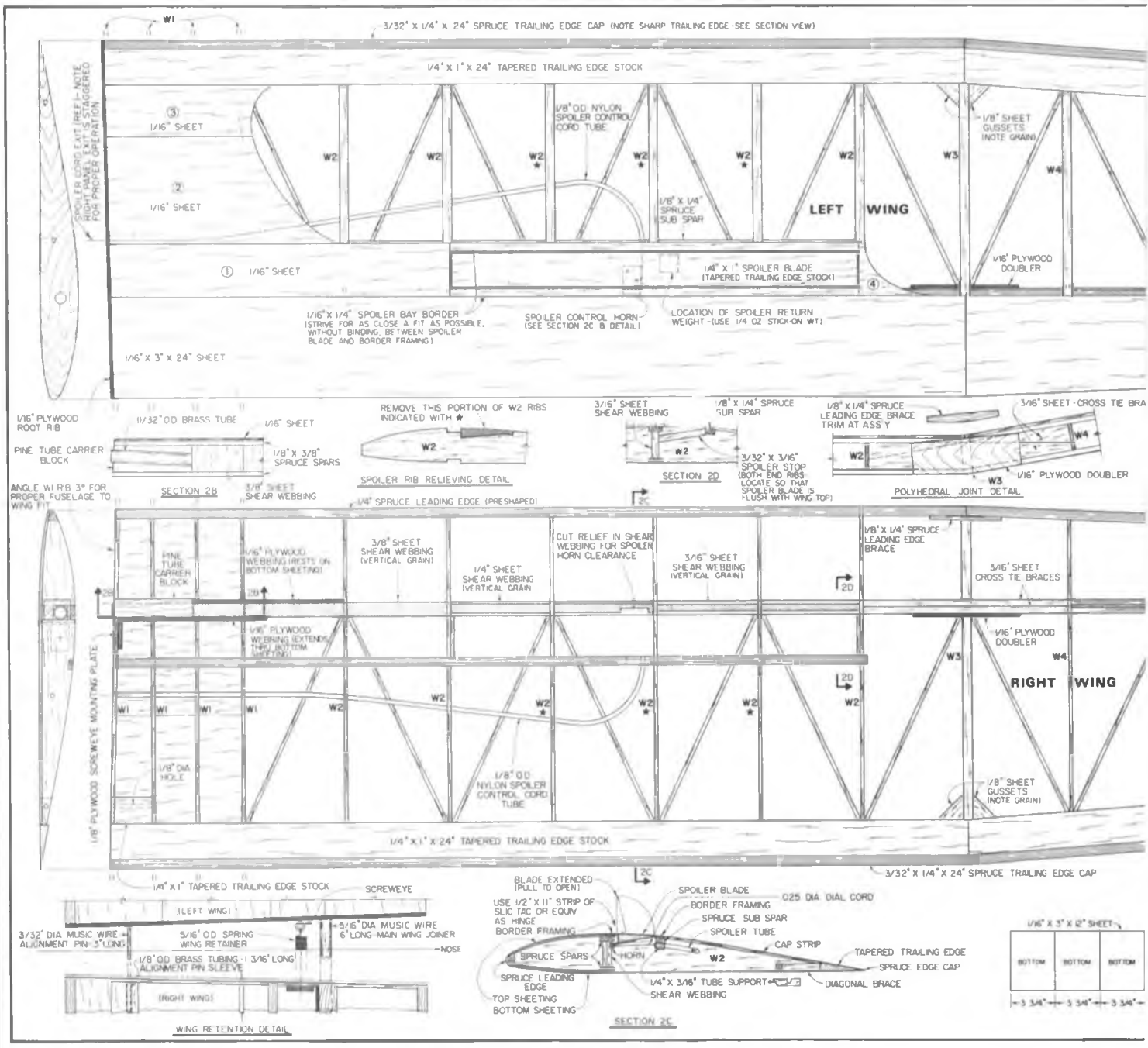
(22) Using W-4 and W-11 as spacers, pin the trailing edge in place and glue the trailing edge cap in position. Also block up the leading edge sheeting with a piece of trailing edge stock as you did when constructing the center panel.

(23) Now glue W-4 through W-11 ribs in position, using the 3/32" shear webs to space the first three ribs.

(24) Glue the leading edge and top spar in place.

(25) Glue the balsa wing tip in place.

(26) Cut the diagonals to length and glue them in place.



(27) When the tip panel is dry, remove it from the building board. Block the tip up so the distance from the bottom of the tip to the table measures 4-3/16" at the spar.

(28) Find the dihedral ties and glue them together as to plans. Note the end of the tie that extends into the wing tip needs to be tapered.

(29) Pin the center panel to the building board. Test fit the tip panel by blocking the tip to 4-3/16" above the building board and checking to see that leading edge, spars, and trailing edges all fit properly. If you're not satisfied that all joints fit well, rectify with your sanding block. Trial fit the completed dihedral tie. When everything fits well, epoxy the center and tip panels together with the dihedral tie in place.

(30) With the wing in this position, epoxy the 1/16" plywood brace in position, then glue the W-3 rib in place. Make the leading edge brace from excess 1/8" x 1/4" spruce from sub spar and glue it in position.

(31) Select a piece of 1/16" x 3" x 24" balsa for the top leading edge sheeting and a piece of 1/16" x 3" x 36" center sheet material. Using the guide on the plan sheet, cut the center sheeting to length.

(32) There are two ways to glue the top sheeting to the wings. Either white glue and lots of pins, or contact cement. Contact cement works very well and has two advantages; no pin holes, and the panel can be removed from the board immediately without fear of warps. Trim the 1/16" x 3" x 24" leading edge sheet to length and glue in place. Note that the sheet does not cover the entire spar but instead glues to the front 3/16" of it.

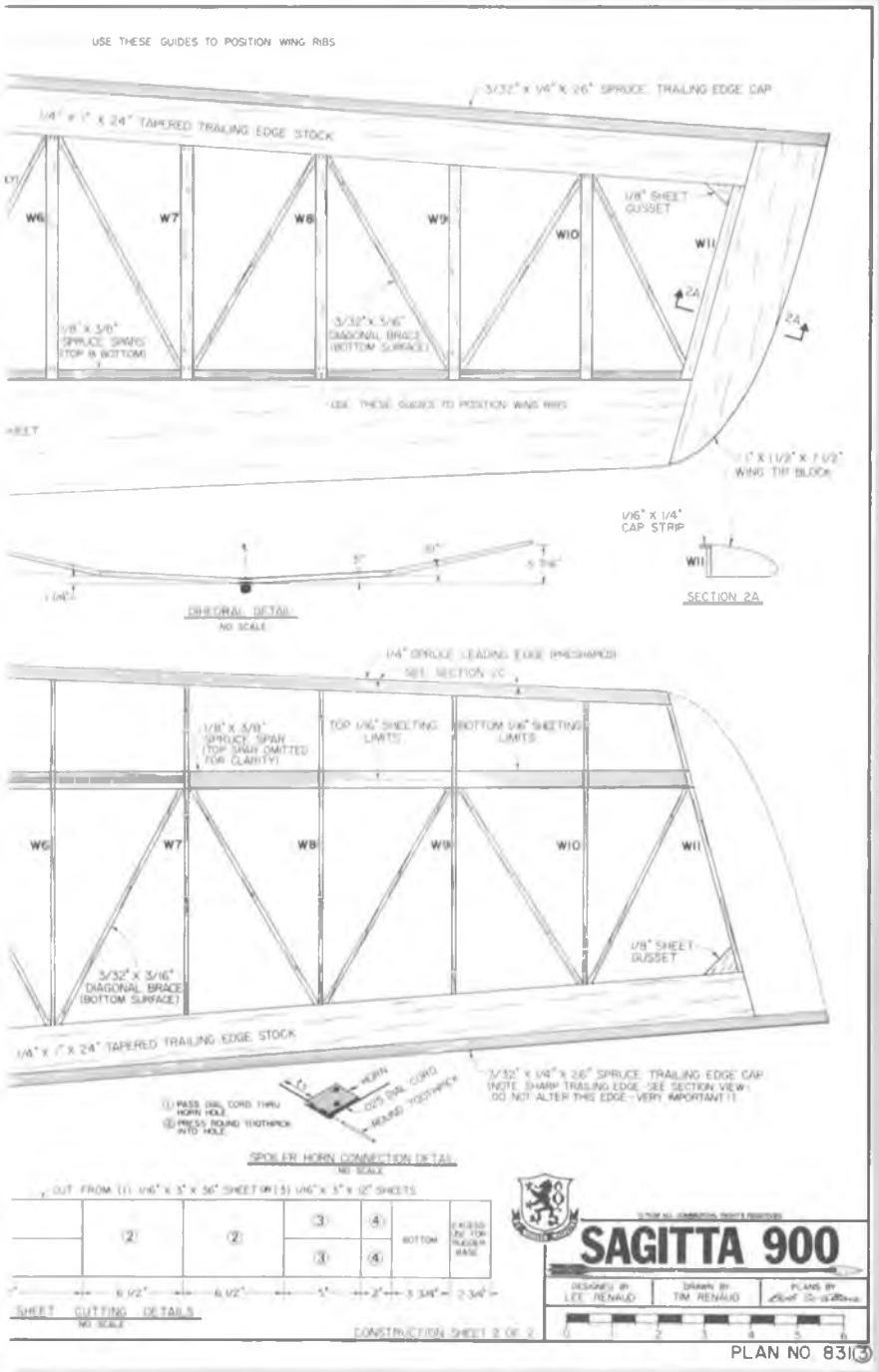
(33) Check the plan for proper location, then glue the nylon tubing that activates the spoiler in place. Make sure you secure the tube to the sub spar with a reinforcement made from excess 1/4" x 1/4" x 1/2" balsa.

(34) Relieve the three W-2 ribs in the spoiler bay to accept the spoiler blade.

(35) Add the 1/16" x 1/4" balsa stock to the leading edge of the spoiler bay.

(36) Glue the rest of the top center sheeting in place. Notice the trim line on the plans.

(37) Cut the spoiler from 1/4" x 1"



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trailing edge. Fit the blade to the bay. Now add the rear 1/16" x 1/4" to the spoiler bay. A proper fitting spoiler will have a 1/64"-1/32" gap all around it. This gap leaves room for MonoKote.

(38) Cut the 1/16" x 1/4" cap strips to length and glue in place on center section.

(39) Find the 1/8" x 1" x 6" gusset material and cut the gussets to shape; note grain direction. Glue the gusset in place at inside of W-3.

(40) When all sheeting and cap strips are dry on center panel, un-pin and pin tip panel to building board.

(41) Select a piece of 1/16" x 3" x 24" sheeting for tip leading edge. Trim the sheet to fit and glue in place.

(42) Cut the 1/16" x 1/4" cap strips to length and glue in place.

(43) Glue the two tip gussets in position.

(44) When the wing assembly is dry, remove from the board. Now build the other wing to the sequences that this one was constructed. When both wings are complete set them aside to await final sanding and fitting to the fuselage.

Fuselage Assembly:

(1) Align the right fuselage side over the drawing. Draw vertical lines indicating the noseblock and former positions. Transfer these lines to the left fuselage side; be careful to perfectly align the fuselage sides during this procedure.

(2) Trim the left fuselage side to accept the rudder pushrod. Pin the left fuselage side down, then glue the spruce longerons and balsa triangle stock in place. Now glue the rudder pushrod in place. Be careful to securely glue the pushrod along its **entire** length. A sloppy pushrod installation will give poor control surface centering or failure, so do a good job.

(3) Pin the right fuselage side in place over the drawing. Glue the top and bottom spruce longerons, and 1/4" triangle stock in place. When the fuselage side is dry, remove from the board and build the fin sub assembly.

(4) Locate the 1/4" sheet fin leading edge, the 1/4" plywood fin insert, the 1/4" sq. spruce fin post, and a 1/4" sq. balsa stick. Study the drawing and assemble the parts accordingly. When the fin assembly is dry, glue the fin in place on the right fuselage side.

(5) The next step is to glue the elevator pushrod in place. Note the curvature of the tube as it passes from the fuselage side into the fin. Be very careful that there is no binding of the cable. If you are having problems, use a heat gun to shape the tubing to the curvature on the plan. When you are satisfied that the cable operates freely glue the pushrod in place. Again make sure the pushrod is secure along its entire length.

(6) The elevator drive fitting is an Amp #34103 terminal connector. Solder the fitting on the elevator cable. Make sure you do a good job on the solder joint, as you do not want it to come loose. Install the cable in position and check for smooth control movement.

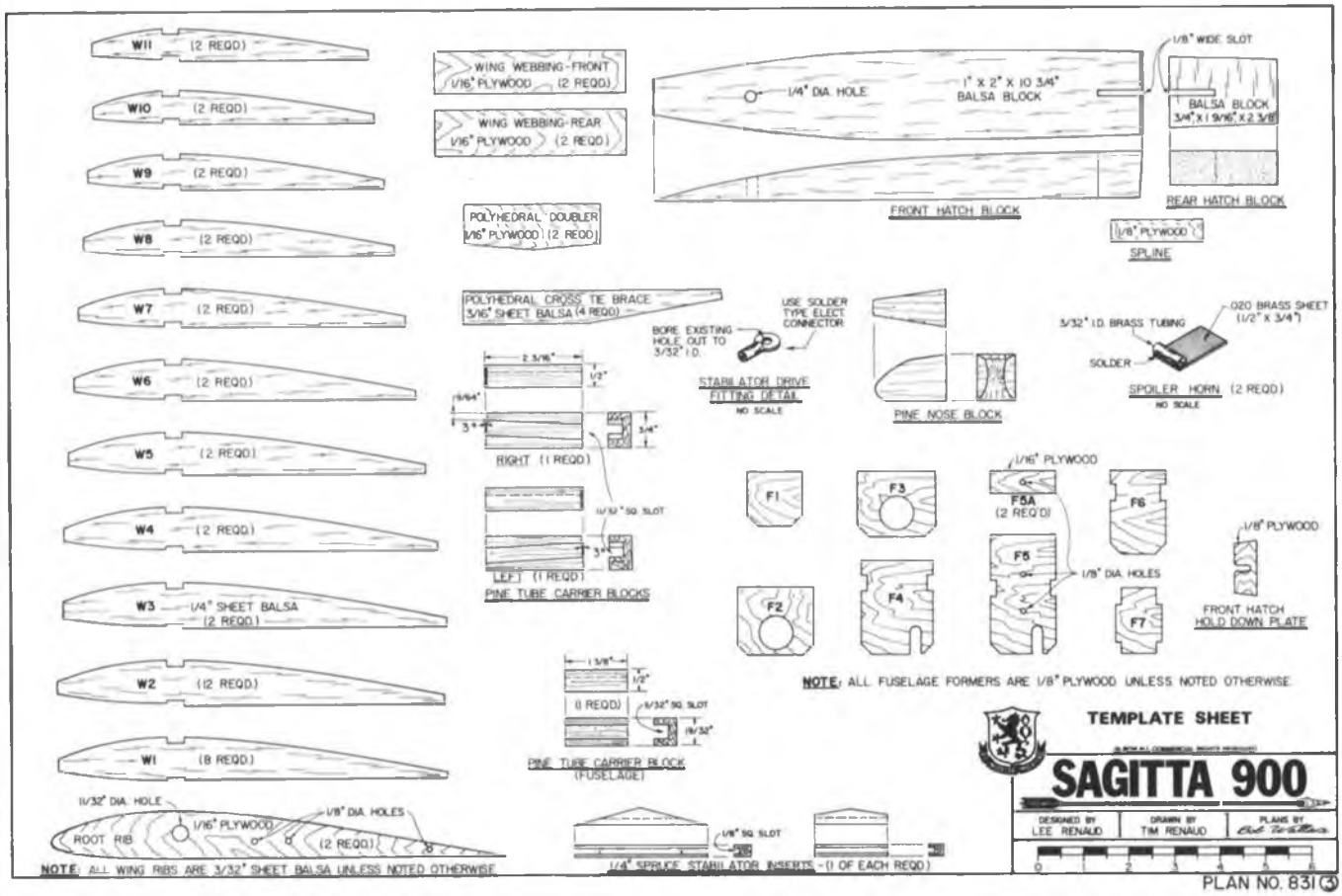
(7) This step is critical to proper fuselage alignment. Take the fuselage joiner tube and holding the two fuselage sides together and insert the tube. Now clamp the last 5⅝" of the fuselage sides together. Check that the wing tube extends from the fuselage side at 90 degrees. If the tube is not straight, or the fuselage sides are not flush at the aft end, re-adjust as necessary. When all is in alignment either Hot Stuff the sides together, or mix up some epoxy, unclamp the sides, apply epoxy, and re-clamp. Make sure you have proper alignment; if this is not straight your tail assembly will turn out crooked to the wing. Glue the antenna tube at the same time as the spruce stringers and pushrod.

(8) Now glue the F-5 bulkhead in place. Again check alignment of fuselage.

(9) Pull the nose together and clamp with the nose block in place. Sight down the fuselage and check alignment. If all is straight, epoxy the nose block in position. Now epoxy F-1 through F-4 bulkheads in location. When dry, epoxy the F-6 and F-7 bulkheads in place.

(10) Glue the plywood floor in position. Also glue the 1/4" balsa top sheet in place.

(11) Check to see that the fuselage is not twisted. To do this, put the joiner tube in the fuselage and put the joiner in place. The fin should be perpendicular to the joiner when viewed from the nose looking aft. If the fuselage is straight glue the bottom 1/8" sheet in place. If not straight, twist the fuselage slightly in the opposite direction



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while aligning the 1/8" bottom sheet.

(12) Glue the hatch block and aft hatch block together with the 1/8" plywood joiner. Glue the 1/4" dowel in place.

(13) Form the front hatch hold-down from 1/8" birch ply and epoxy in place. Put the hold-down screw in the hatch block and check for fit. You may have to do some work with the sanding block to get a good hatch-fuselage fit.

(14) If a radio actuated towhook is used, glue the 1/8" nylon towhook release tube in place in the F-5 bulkhead. Delete this step if you use an Airtronics adjustable tow hook.

(15) Check the machined pine joiner tube holder for fit. Make any needed adjustments with a sanding block. When you're satisfied with the fit, epoxy the tube and tube holder in place against the F-5 bulkhead.

(16) Now glue the 3/32" sheet to the sides of the fin. Note the grain runs parallel to the fin leading edge. Also glue the 3/8" dorsal fin in place.

(17) The fuselage structure is now basically complete except for the hatch assembly and shaping. Put the fuselage aside, we won't need it until we're ready to fit the wings and rudder assembly.

Stabilator Assembly:

The stabilator assembly is constructed in one piece and then cut in half after shaping.

(1) Pin the 1/4" stab sheets to the drawing.

(2) Select 1/8" O.D. brass tube 4" long. Cut the tube in half so that you have two 2" tubes. Roughen the exterior of one tube with sandpaper. Apply epoxy to the tube and install in the front tube holder, then epoxy the tube holder in place. When epoxying brass tubes, always plug the interior end so that epoxy will not enter and fill the tube.

(3) Trial fit the second brass tube in the aft tube holder. Slide a wheel collar on each side of the extending brass tube. Carefully tighten the set screws down on the brass tube so that a mark is scribed on the tube. Remove the wheel collars and notch the tubing with a small round file. Replace the collars without the set screws and carefully Hot Stuff the collars to the tubing. When dry, run a 4-40 tap through the collar into the tubing. If all fits well epoxy the aft tube holder and tube in place.

(4) Cut the 1/4" x 3/8" root outline pieces to shape, and glue in place.

(5) Laminate the 1/4" x 1/8" balsa and spruce trailing edge pieces together.

(6) Cut the 1/8" x 1/4" spruce leading edge, the 1/8" x 3/8" spruce tips, and laminated trailing edges to length. Block up the leading edge, tip, and trailing edge, 1/16". Glue the stab outline pieces together.

(7) Cut the 3/32" x 1/4" balsa ribs to length and glue in place.

(8) Glue the 1/4" sheet center gussets and 1/8" tip gussets in place.

(9) When the stab is dry, sand the stabilator to shape. The taper should be gradual to the tip. Keep the trailing edge sharp and put a nice radius on the leading edge. When satisfied with the shape, cut the stabs in half. For FAI use, it's not a bad idea to glass the stabs with light cloth to the line shown on the plans.

Rudder Assembly:

(1) Laminate the 1/8" x 1/4" spruce center leading edge to two 1/8" x 1/4" balsa outer pieces.

(2) Pin the 3/8" sheet rudder core to the plan. Glue the leading edge in place. Cut the 1/4" x 3/8" rudder post to length and glue in place.

(3) Cut the 1/4" x 3/8" base piece to length. Notice the top piece is blocked up 1/16" during construction. Glue the rudder base together.

(4) Cut the top of the rudder from 1/8" x 3/8" spruce. Laminate the trailing edge from 1/8" x 1/4" balsa and spruce. Block up the top and trailing edge 1/8" and glue in place.

(5) Cut the gussets from 1/8" sheet and glue in place. Cut the rudder ribs from 3/32" x 3/8" balsa and glue in place.

(6) While the rudder is still pinned to the board, in-lay the left 1/16" ply control horn mount. Note that the plate in-lays into the

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GIVE IT A WHIRL

John Gorham

AROUND AND ABOUT

Since I'm a relatively new columnist it still surprises me when I am writing the column to realize that you will be reading it nearly two months after it has been produced. That particularly comes to mind this time of the year since, while I am writing this, we have just had our first helicopter meeting of 1980/81, and our first trade show.

The helicopter meeting was the now well established 13th annual "Tangerine International Championships" held in Orlando, Florida, on December 27, 1980 through January 1, 1981. A resurgence of interest in helicopters was apparent at this competition since there were 34 entries. A good time was had by all. A new event, the 'Masters,' was tried for the first time and it appeared to be well received. This event takes some of the rush out of the present "AMA" 'Expert' class. The required maneuvers can be performed by nearly any helicopter, and thus the smooth flyer has just as good a chance of winning as the 'hot shot' who can do four-point rolls and inverted flight. Two guests from Belgium came over to enter the 'Expert' class and to show us the way they fly in Europe, which was of interest to all. Anyway the 1980/81 'Tangerine' is now over and let us hope that the increased interest in R/C helicopters shown at this meet will set the pace for improved attendance at all the helicopter meetings during 1981.

The first trade show of this year, the 'International Modelers Show,' has now been held in Pasadena, California. Reasonable attendance and a new event of indoor RC Scale was tried with reasonable success. The weather was good, as you would expect in California this time of the year, but because of restricted space we cannot fly R/C helicopters at this show. As you read this column we will be rapidly drawing near to the Toledo show; let's hope the weather is better this year and that it will permit some of the demonstration flying (unofficial) which usually occurs on the grounds of one of the nearby hotels.

More letters are arriving from flyers in various parts of the world. Michael Fitzgerald of Pawanalta, of New South Wales, Australia, tells me " . . .There is a noticeable surge of interest in choppers around Sidney in the past six months. So much so that I'm starting to get phone calls from novices buying and building their first machine. I have been busy building my flying skills and neglected to buy 'RCM' for almost a year but the rumors of chopper articles became too much so I have been forced to buy all the back issues from July, 1980!" Michael says, "I am an active member of what is probably Australia's largest and most progressive R/C model club, the "Warringah Radio Control Society," This club has 120 members and Michael is kind enough to say that the 'RCM' "Give It A Whirl" articles have generated great interest among non-chopper flyers. Michael also says that he believes the number of readers of 'chopper' articles is far greater than the number of actual flyers directly involved with the machines.

Michael offers to help any beginners in the area. He says, however, that he uses a single stick transmitter. If anybody in New South Wales area is near to Mike and needs his help, the following are his particulars: Mike Fitzgerald, (single stick) choppers, Sidney 683-3139.

Then from the opposite side of the globe a letter arrived from Yves Baroux in St. Fons, France. Yves says that he is a French R/C helicopter flyer and he also offers to help other modelers. He is already making loops and rolls with his 'Heli-Boy' and has modified his radio to start inverted flying which he hopes to do in the very near future. Thanks, Yves, for your letter and good luck with the inverted flight. Anybody in the area of St. Fons, France, can reach him on telephone number (16-7) 870-92-51. Then, Wally Rodriquez in Mastic, (Long Island) New York, " . . . offers his services . . . " to anyone in his area. His telephone number is (516) 399-1670. He is currently flying a 'Heli-Baby' and a 'Heli-Boy,' Wally won the 1978 Intermediate class of the East Coast Championships. Well, that just about sums up the more interesting mail for this month. This column will necessarily be a little shorter than usual because of the time I had to devote to the recent trade shows, and the 'flu' (over Christmas, of course!).

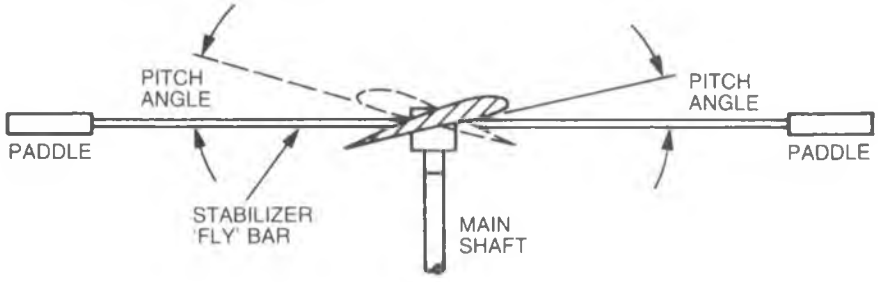
We did suggest last month that we would cover the topic of available gyros for helicopters and we have not, at this point, received enough information from the manufacturers to do so. We hope to be able to present this to you within the next few issues.

SETTING UP BLADE ANGLES

As the result of many telephone calls and letters, it is apparent that one of the differences between a helicopter and a fixed wing plane which seems to present problems for the beginner is the setting up and trimming of the main and tail rotor blades.

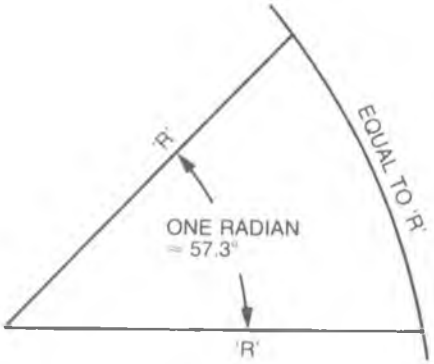
First, however, one important problem which presents itself is the need to **measure** the **angles** of the rotor blades accurately. With a fixed pitch helicopter the angles of the incidence (or pitch angles) of the main rotor blades are, of course, related to each other, but the datum point is the flybar itself so that the blade angle of each individual blade is referenced to the flybar.

There have been many simple gadgets developed in an attempt to make this measurement easier and there have also been several sophisticated devices produced to carry out this task. Remember that the basic problem is the need to first **measure** the small angles involved — we are now talking of setting a basic angle of 3 degrees to 6 degrees accurately and to be able to measure changes or errors of less than 1/4 degree. Perhaps the best help that we can provide in this column is to explain, for some of the less mathematically inclined modelers, that you don't necessarily need a scale measured in degrees in order to measure angles. In fact, for the small angles which are involved in R/C model helicopters this **can** be the **least** accurate way of measuring unless the scale is a very large one and the arm which indicates the degrees is a very long one. This usually is not practical, so the measurement of 3° or 4° or 5° of blade angle needs pretty good eyesight and lots of guess work. To help



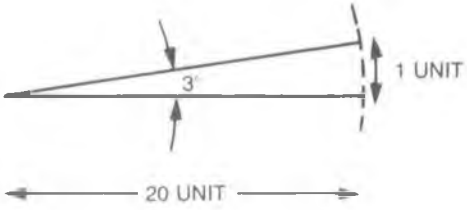
BLADE ANGLE REFERENCED TO STABILIZER BAR

simplify this understanding of small angles we will remember that an angle is usually measured in terms of a trigometrical ratio between two sides of a triangle and tables are then needed to calculate the angle. Of course, protractors are available which are already marked in degrees. Even with a very large protractor, however, the 1° marks are only spaced apart only a little more than 1/16''. Well, there is another way of measuring and calculating angles which is used by the more advanced mathematicians. A brief understanding of this method will help us in our measurements of helicopter blade angles, as you will see.



REGULAR MEASUREMENT IN RADIANS

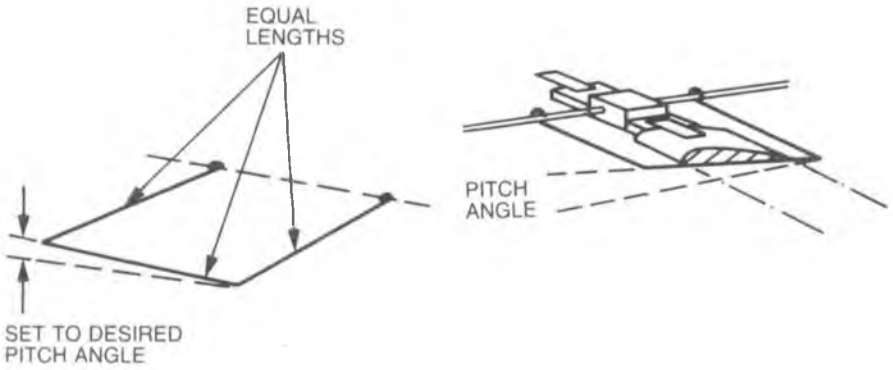
The sketch shows an angle subtended by two radii of a circle. When the length of the arc of the circle is equal to the radius of the circle, that angle is known as one radian, which is approximately 57.3°. Now, if we choose to be cavaliering and say that 57.3° is pretty near to 60° **and,** if we accept that for very small angles the arc of the circle is near enough the same as a straight line, then we can say that one degree is the angle subtended by two straight lines when the slope between them is 1 in 60. It also follows that for **any** small angle (up to about 10) the slope will be proportional — that is 2° would be a slope of 1 in 30, 4° would be a slope of 1 in 15.



APPROXIMATION METHOD OF MEASURING DEGREES

Therefore, if we wish to measure an angle of, say 3° all we need to do is set up a 1 in 20 slope.

If we wish to measure the angle of a **fixed** pitch helicopter, then we can use a very simple gadget using our newfound principle of a 1 in 60 slope equaling 1°. Since a fixed pitch helicopter almost inevitably uses a flat bottom blade section and the pitch is measured relative to the flybar, then a very simple device made of 1/16'' or 3/32'' wire (coat hangar wire is fine) can be used.

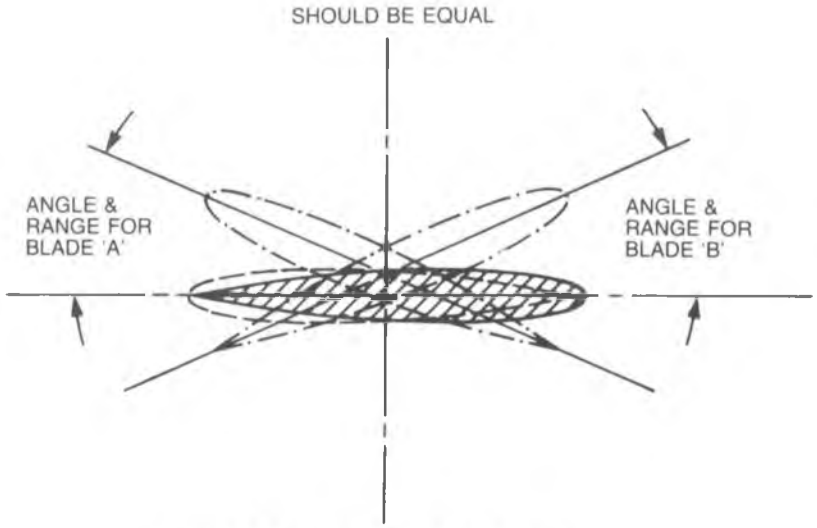


SIMPLE PITCH GAUGE

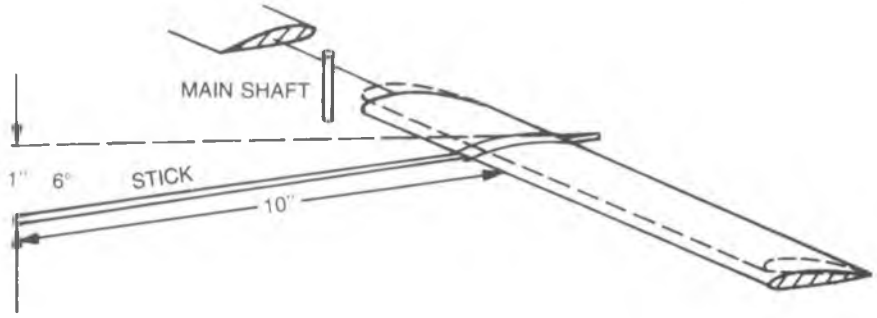
If we make the arm lengths exactly equal to the length of the horizontal portion, we can set-up this gauge to measure any number of degrees we want. For example, if a helicopter requires 5° of pitch on the main blades relative to the flybar, we would need a 1 in 12 rise in the slope of our gauge. And if the horizontal portion is 4'' long, we would need to have that slope 1/3'' rise in the 4'' length. Therefore, if we lay our wire gauge flat on the table, one of the ends should be 1/3'' higher than the other. Then, when this gauge is clipped to the flybar of the helicopter and lightly touched to the undersurface of the blade, the blade will have been set at exactly 5° when the parallel portion of the device just touches flat on the underside of the blade. So now we have a simple and quite accurate mehod of measuring the blade incidence of a fixed pitch helicopter.

With **collective pitch** helicopters we are very interested in having **both** blades maintaining equal **angles** when collective pitch is moved through its range, and also we are interested to know and be able to adjust the **range** through which the blades move. The actual datum setting of the blades at a low throttle setting may vary by a degree or two depending on the mixing relationships of the engine and collective linkages of the helicopter. Adjustment of this angle should be made, in any event, when the helicopter is being flight tested and trimmed. So we are looking for something a little different in setting-up the collective pitch helicopter from the fixed pitch helicopter — **equal** angles of **both** of the blades and equal **range** of movement for both blades.

A very simple way of measuring these angles is to attach to the main blade of the helicopter a 12'' long piece of say, 1/8'' square balsa, or hardwood, or music wire, or anything thin and stiff for that matter. The end of that piece of 'whatever' will move through 1/6'' for every degree that the blade angle changes provided that it projects 10'' out from the pivot axis of the blade. The piece of 'whatever' can be attached by rubberbands to any place on both of the blades and the distance that the end moves can be measured with a ruler or scale. The throttle would then be set to zero, main lever, and full idle trim and we would then adjust both blades so that they are approximately at zero pitch. When we move the throttle through its full range we would expect the blades to move through an angle of what your particular helicopter needs — 5, 6 or 7 degrees. Again using the formula we arrived at earlier, and assuming we have



COLLECTIVE PITCH BLADE PITCH ANGLES



arranged our stick to project 10" from the pivot axis of the blade, a 1" movement on the end of that stick will be 1 in 10 and, you may remember, this means that the blade will have moved through 6°.
So by factoring the 1" up or down we can measure angles very accurately. 1/2" would be equal to 3° and so on.

Another advantage of this method of measurement is that we can measure the pitch angles and the pitch angle **range** of movement of both blades at the same time. Don't forget when you measure the changing pitch on a collective pitch helicopter which has a flybar, the flybar must be clamped so that it is at right angles to the main rotor shaft while the measurements are being made, otherwise you can get errors when you make your measurements because the flybar will move around and this will change the blade angles.

So setting the pitch of the blades of your helicopter can be achieved quite readily with simple devices which you can find in your workshop. It is important to note, however, that if a manufacturer suggests that a specific pitch angle on his main rotor blades is required, then try to stay very close to that recommendation. One of the reasons for this is that the **tail** rotor size, speed and pitch angle of range is related exactly to the angle which he intends you to use on the main blade system. If you **increase** the angle on the main blades too much, then, in order for you to stop the helicopter spinning around the tail blade pitch would have to be increased to a very large angle to compensate for the increased torque created by the main rotor blades and there would then be a chance of running out of tail rotor **range.** In addition, the tail rotor blades would be much less effective at these high angles even if we could obtain enough **range** of movement. So try to keep to the manufacturer's recommended blade angles. Naturally, if you are at a high altitude, you may have to experiment and change the angle settings of the main blades.

'CONING' ANGLE

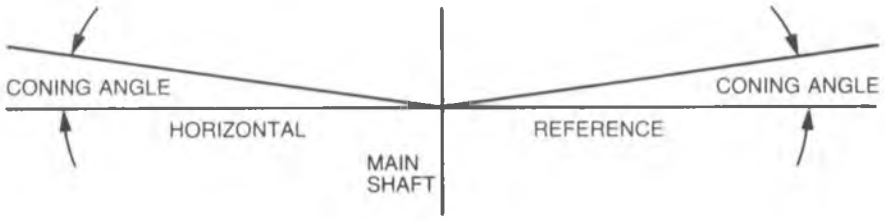
To finish up this month's treatise on rotor systems, another question which is commonly asked is how important is the coning angle. First we should be sure we all agree on what coning angle is. Coning angle is identical, physically, to dihedral on a fixed wing plane but there the similarity ceases. We will talk more about this in later articles. Coning angle is the angle at which each blade rises above a horizontal reference.

Coning angle is the angle generated by two forces, lift force upwards and centrifugal force outwards, naturally, under different rotor blade speed conditions and under different 'g' conditions (when the helicopter weighs greater or less depending on the flight maneuver that it is performing) the coning angle requirement would also change. The physical angle which is normally set-up on the helicopter would be the one related to the weight and blade speed of the helicopter for normal hovering conditions.

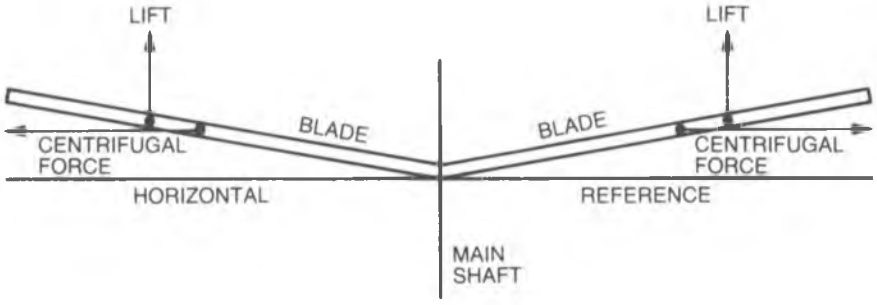
A simple measurement of coning angle can be made by placing the helicopter on a flat surface, measure the distance from the flat surface of the hub of the blade and then move the ruler out to the tip and measure the increase in height of the tip over the hub (or root). Use our 1 in 60 equals 1° formula to measure the coning **angle.**

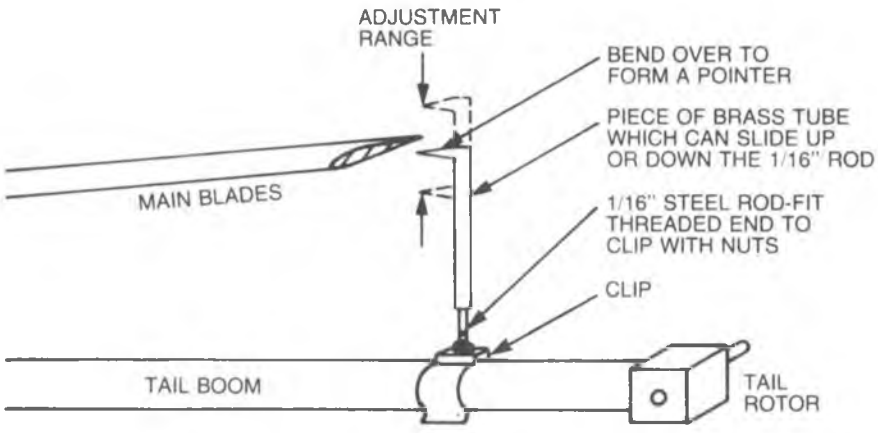
A simple device which I developed several years ago can be easily made and is very useful in checking equal coning angle and hence the **static** tracking of the blades. Static blade tracking means that each blade must have the same coning angle so that the tips track at very low blade speeds. Dynamic blade tracking — well, here is a sketch of the gadget — easy to make and very useful when your blades go out of track to find out if the static tracking setting (equal coning angle) has changed **or** if a blade pitch angle has changed.

See you next month. □



CONING ANGLE





RADIO SPECTRUM

Jim Oddino

As I've mentioned in the last few columns, the mail has been kind of sparse lately. My wife says it's because I'm not controversial enough. Maybe so. Maybe I need to take a harder stand on a few issues and see it it stirs anything up. I haven't taken a position on such things as the pros and cons of specific brands of radios before, for a couple of reasons. First of all I'm not a very typical R/C modeler and my standards are probably much higher than need be for the average guy. Secondly, I really don't have a lot of first hand experience with a lot of different brands so I would have to depend a lot on hearsay. Nevertheless, when the following letter came in (I get plenty of this type in the mail) I decided to give it a try.

Dear Jim,

This letter was not written to be included in your column, but I sincerely hope you will take a few minutes to answer it. I would greatly appreciate your opinions. They have to be a lot more based on fact than my own, which can only be based on advertisements.

I am in the market for my second radio. I want at least 7 channels and D/R. I want a good quality set so I can use the transmitter for any plane I fly. I have been reading your column and I realize that there are definite differences in equipment with respect to interference, rejection, servo accuracy, etc. All of the ads say --- we are best, etc; we are best for the least price, etc. I would appreciate it very much if you could comment on some of the sets I have been looking at (in magazines, catalogs, etc.).

At the present I am strongly considering three radios: Kraft KP7C Series 81 with D/R and roll button; Ace Silver Seven metal gimbals and JR Radios 7 channel. I am sure Kraft is good quality — at least everyone says so. What I am not sure of is about the other two. JR has similar features but a lower price. My main interest has been in the Ace S/S system. My feelings are that if I build it myself I can later fix it myself. Also, their radio offers the most adjustments, "bells and buzzers" (options) for my price range. From what I have seen mentioned in your column the Silver Seven seems pretty good but what about Ace's receiver and servos? Does the receiver compare to, say, Krafts? The servos seem a little low in power — are they strong enough for a big plane (.60 size)? And can you tell me if they are accurate or just accurate enough, etc?

Your opinions will be very greatly appreciated.

One short question which I don't believe Ace would be totally truthfull about. Do you know how their dual rates and xpo functions affect neutrality? Keep up the good work — I enjoy your column even though I'm without a good electronics background.

Thank you,
Stuart Chale
Freeville, New York

Let's start with the Kraft- KP7C. I can speak with some authority because I've been flying a KP7C/FM transmitter and receiver for the last couple of years. I added the dual rates and roll button myself and have had only one significant problem. The wire wound pot on the throttle was the culprit and once that was replaced with the conductive plastic type it has been perfectly stable. I would feel very comfortable recommending this transmitter / receiver combination to anyone for any model application. Please note that this is the FM version which is on 53.1 MHz. I wouldn't stake my reputation on the Kraft Standard AM equipment on 72 MHz, although it is obvious that it can't be too bad by the number of guys using it. Just looking at the AM receiver schematic though, I see a very typical receiver with no special features to give it an edge over the run of the mill stuff, although it is very well built. I do not fly Kraft servos and I've always felt this was the weak link in the Kraft equipment. The problem is the pot/wiper combination which doesn't seem to hold up very long, and requires excessive maintenance. Kraft has recently gone to a carbon button type wiper which might solve the problem although my personal experiments with those wipers was not very good. I may not have had the proper wiper/pot combination, however, because it is common knowledge that the Giezendanner carbon wipers do solve the problem. If I were to buy Kraft servos, the first time the pots gave me trouble I would install the Giezendanner wipers.

I have built the Ace Silver Seven encoder and am familiar with the transmitter RF section. I would rate the transmitter electronics excellent. I believe the metal gimbals are those originally engineered by Bob Dunham and my only hesitation would be regarding the quality of the control pots which I've never seen specified. I'm a firm believer in starting with a good pot in the transmitter such as the Spectrol conductive plastic units used in the Kraft KP7C.

On paper the Ace receiver doesn't look any better or worse than the Kraft, although Ace has been considering a receiver with a balanced mixer front end. I'm not sure it is available yet. I have tested and flown a Novak receiver which uses this front end (as does the Kraft FM) and feel that it might be a little better than the standard transistor mixer. Whether Ace's version is as good, remains to be seen.

The Ace servos use the Signetics NE 544 amplifier which I prefer over the Kraft primarily from the linearity standpoint, although the difference is probably impossible to measure when flying. It is just the purist in me giving the edge to the Signetics chip. I believe Ace is using Clarostat conductive plastic pots in their servos which I think are better than the standard Krafts, but maybe not as good as the Giezendanner wipers.

I can't say much about the JR equipment because I haven't seen much of it except what you see in the ads. Don Weitz has been flying one out here on the West Coast but it hasn't had much time out in the hands of the public yet. My advice is to wait and see how they perform. Perhaps by the time this is printed there will be more sets out on which to base some opinions.

Your statement about being able to fix the Ace yourself is a good point if you are good at electronic assembly. Personally I would dread the thought of soldering all those Deans connectors without getting any solder wicking which leads to broken wires. If I were going the Ace transmitter route, I'd be tempted to buy a factory built Novak receiver. On the servos I'd make sure that I could install real Giezendanner wipers, not "Giezendanner type." I don't think you can do this on Ace servos, and I know you can't on JR.

As you can see, it is my opinion that no one manufacturer has the best of everything in spite of what the ads say. So here is my first ever, and probably the last, recommendation on a system --- I really find this difficult --- buy the Kraft Signature or 7C transmitter, Novak receiver, and Kraft KPS 20H servos and install Giezendanner wipers --- if and when they need it. I think you will have an excellent system for whatever you want to do unless you are into real small stuff in which case the little Novak servos are probably as good as any.

Okay! Now that ought to cause a little controversy. So let's hear it pro and con. If you think I've given Stu a bum steer, sing out. If you think you've got something better let us know why. I don't claim to know everything about everything (or anything) and I know that there is a lot of other good equipment out there. For instance the EMS 20H might be better with the Kraft 20H. The Proline custom competition transmitter gimbals are probably the best but I'm not so sure about the encoder. The Proline receiver is probably the best around except it has that

FIGURE 1. FOR STANDARD SIZE MODELS
(ONLY ONE SERVO HOOK-UP SHOWN)

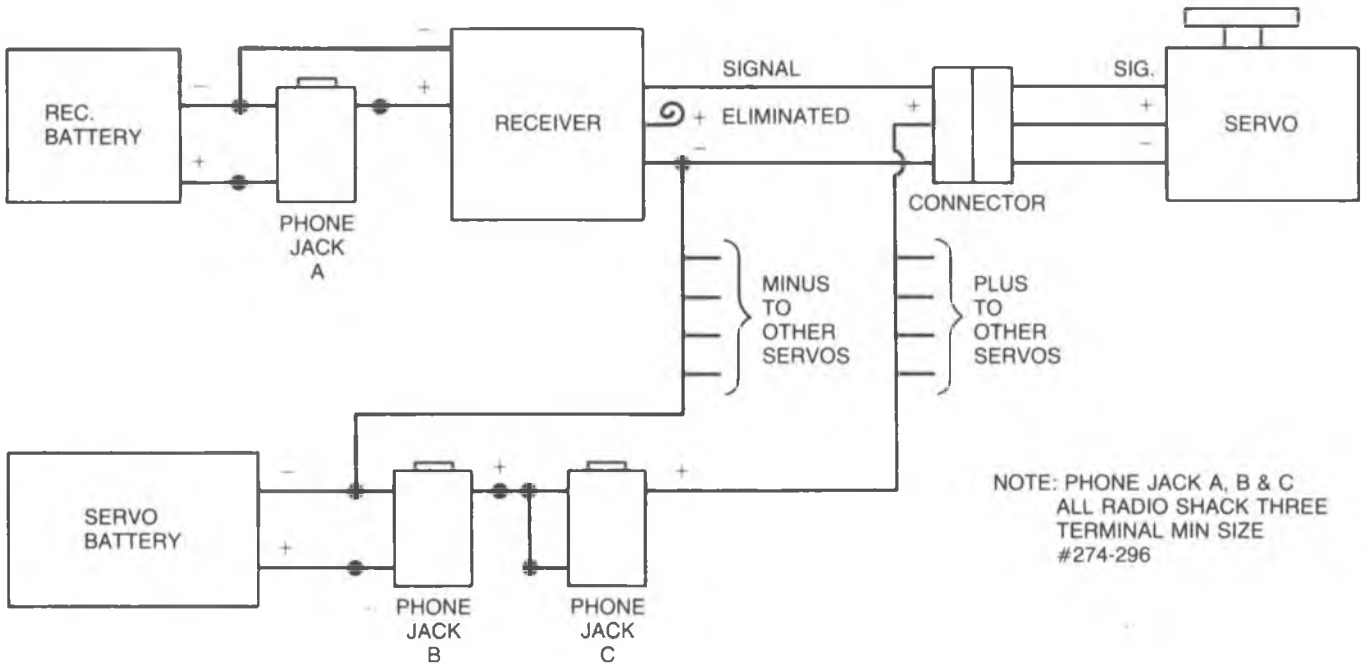
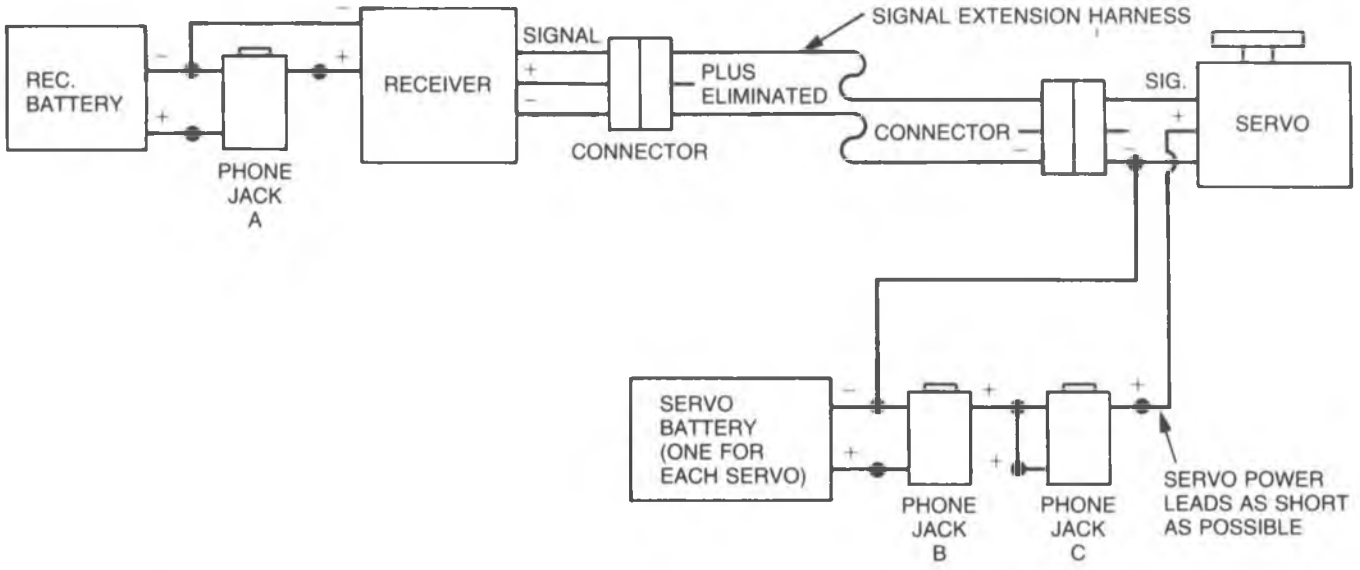


FIGURE 2. FOR OVERSIZE MODELS
(ONLY ONE SERVO HOOK-UP SHOWN)



NOTE: PHONE JACKS A USED AS ON-OFF SWITCH BATTERY CHARGE JACK AND CONTINUITY TEST POINT. A DUMMY PLUG IS INSERTED IN THIS JACK TO TURN THE RECEIVER OFF.

PHONE JACKS B ARE USED THE SAME AS PHONE JACKS A TO CUT, CHANGE, AND TEST SERVO BATTERIES. THEY ARE ALSO TURNED OFF WITH A DUMMY PLUG.

PHONE JACKS C ARE USED TO TEST POWER DRAIN OF INDIVIDUAL OR COLLECTIVE SERVO MOTORS. A TWO TERMINAL JACK PLUG WIRED TO A MILLIAMP METER IS USED. THESE JACKS ARE WIRED IN AN ON CONDITION AND SHOULD BE LEFT THIS WAY AT ALL OTHER TIMES.

confounded negative pulse which makes it incompatible with the rest of the world. I'm sure everyone has an opinion, so let's hear it!

New Frequency Proposal

Dear Jim:

I have just finished reading your article in the January '81 R/C Modeler. I have enjoyed your column through the years and, though obviously not an electronics expert, I have managed to build a few electronic things for use in my R/C hobby.

My main concern was your information on the possibility of more frequencies for our use. This is great. The timetable for phase out of the old equipment, however, did raise a number of questions. 'After ten years use of it would cease' --- does this mean 10 years after adoption of the rules or 10 years after the banning of the sale of 'old'

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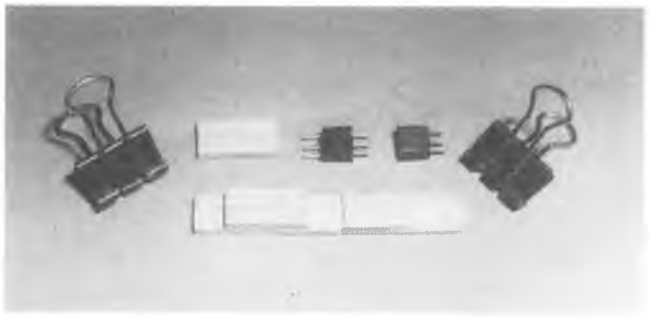
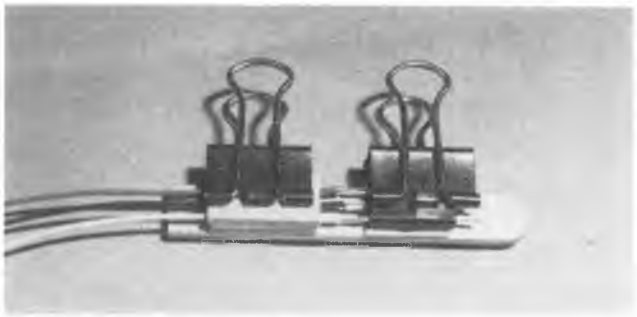
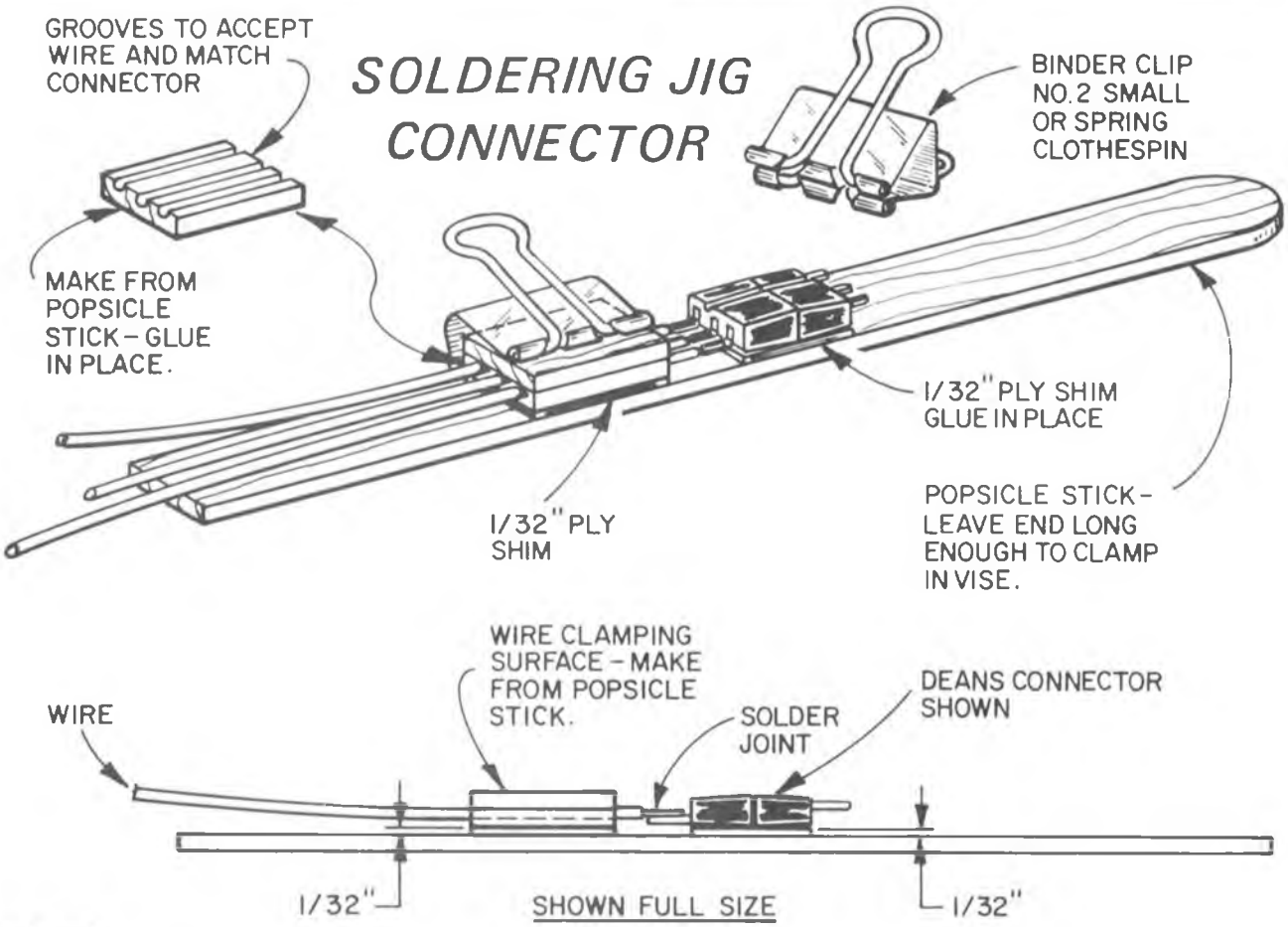
HERE'S HOW

By Jerry Smith







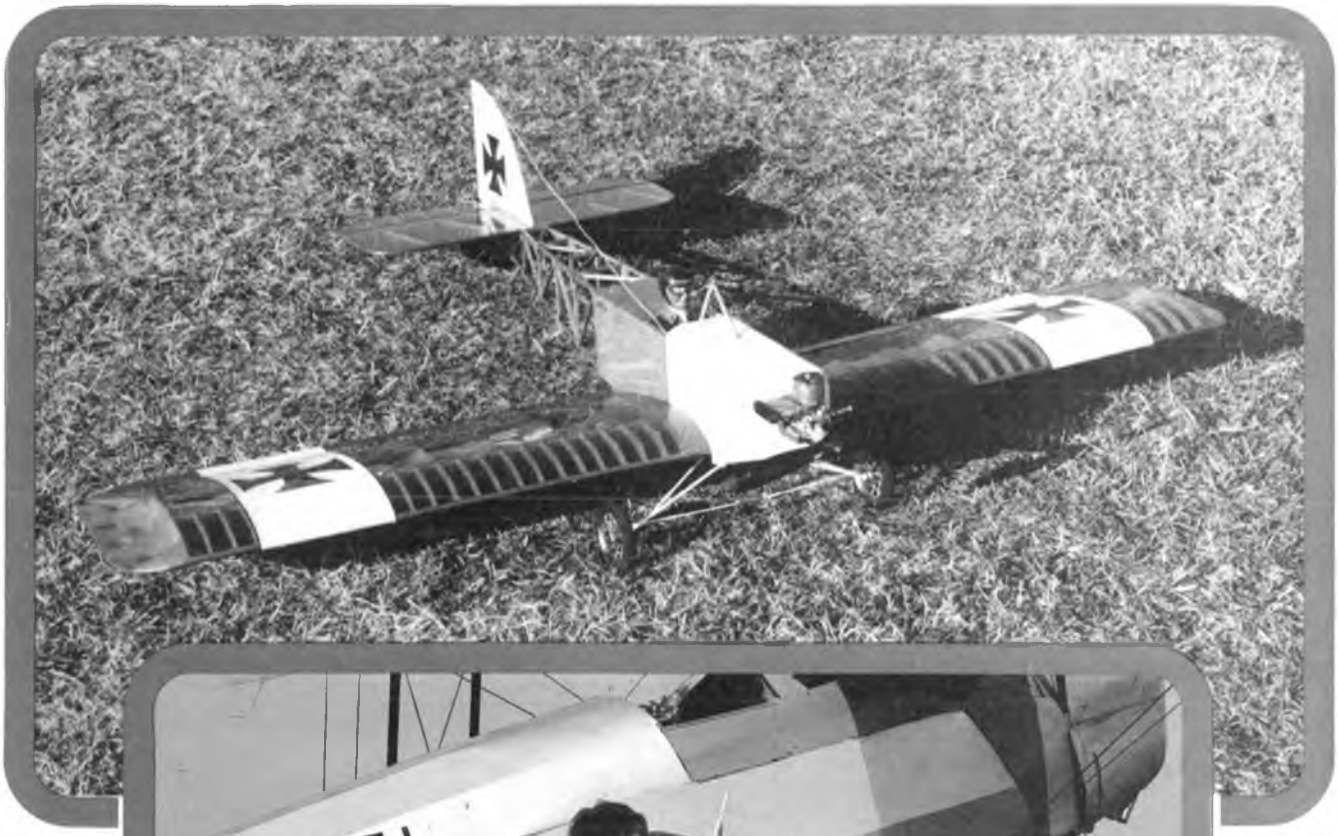
Many of us are making up cables to accommodate servos located further than usual from the receiver. For example, aileron servos located in each wing panel seem to be quite popular with the Quarter Scale buffs. Some radio manufacturers will make up cables of certain lengths, however, it is best to custom-make your own so that it fits your particular installation. Generally, all that is required is hook-up wire, shrink sleeving, connectors that mate with your radio gear and some soldering technique. Yes, the soldering technique is very important and here is where some of us get into trouble.

Lew Koontz of South Bend, Indiana, was in the process of soldering a new connector on one of his servos. Each time he held the wire on the connector pin his hand would move slightly causing a poor solder joint. Lew could not satisfy himself, for the sake of reliability, with a good solder joint and was becoming frustrated with the whole mess.

The connector soldering jig presented here is the end result of Lew's frustrations. And, what could be simpler. A popsicle stick, a couple of binder clips and you're in business. Of course, the binder clips can be substituted with spring clothespins which have less clamping pressure. However, either will work sufficiently. The grooves in the wire support block must be reasonably in line with the pins on the connector. Most connectors are polarized making the pins unequally spaced, so it is a good idea to use the connector pins to establish the groove spacing in the wire support block. Make the grooves just deep enough to accept the wire. The clamp should hold them firmly in place. Don't forget to leave enough end on the popsicle stick to clamp in a vise. I made mine a little on the short side (see pictures).

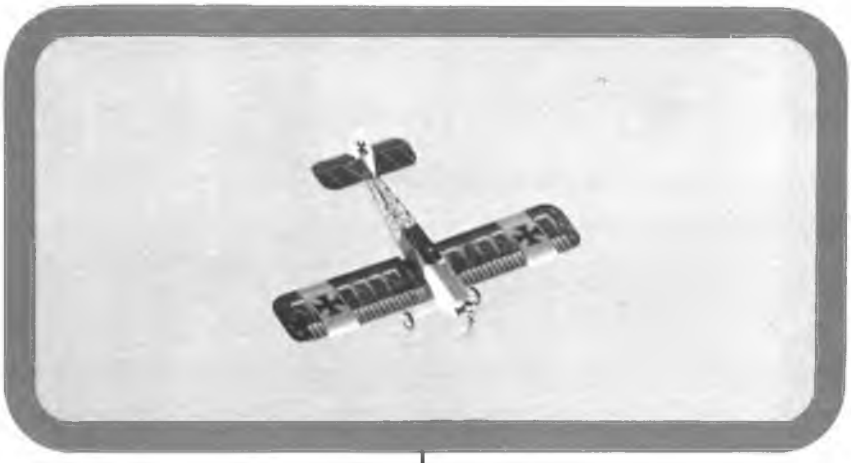
The connector soldering jig is certainly a nice tool to use. It frees both hands for soldering. It allows you to get just the right amount of heat and solder on the joint and takes all the worry out of holding. Everything is held firmly in place. No more cold solder joints due to movement. A super way to more reliable solder joints. It is a good idea to have the connector mated when soldering as I have shown in the sketch. The other half will give additional heatsink. Too much heat could damage the connector.

If you are interested in making your very own servo extension cables why not try Lew's idea. Hook-up wire, shrink sleeving and connectors can be purchased from: Royal Electronics Corp., 3535 S. Irving St. Englewood, Colorado 80110, or Ace R/C, Inc., Box 511, 116 W. 19th St., Higginsville, Missouri 64037. They have a good supply of different make connectors. Thanks for the great idea, Lew. □



AEROTIQUE

If old airplanes excite you, then this Aerotique should be your airplane. It's aerobatic and can be set up for slow and easy flying or for the hotdog pilot. By George F. Jennings



Aerotique is a continuation of my design efforts to capture that special thrill of aviation when it was in its infancy. Let's face it, old airplanes excite me! Although not a scale airplane, the Aerotique looks old, flies slow and easy, and attracts lots of attention. Landing gear geometry is such that take-offs and landings can almost be made with your eyes shut. Because of the thick, high-lift airfoil and the light wing loading, it can be landed at a snails pace and never drop a wing!

But friends, we put the wing on the bottom for a reason! With lots of control throw and the Center of Gravity slightly to the rear of that shown on the plans, Aerotique lives up to its name. It is aerobatic! The roll rate is brisk, loops are tight, snaps and spins are instantaneous and inverted flight is a breeze.

If you like to putt around the pattern in slow flight like I do, Aerotique is for you! Or, if you are a real hot dog pilot like some of my friends, Aerotique is for you!

Just a word about construction, Aerotique, like her sister, Miss Vintage (RCM June 1976), is designed to look complicated. Yet, the construction is sound, fast building and economical. The fuselage is constructed of 1/8" Sig Lite Ply and Spruce. Tail surfaces are balsa and spruce and the flat bottom airfoil balsa wing can easily be built on any flat surface. In case you are doubtful about strength of this type of construction, I pranged one in from about 100 feet up. It was at full power and straight in to frozen ground! Only one wing tip was damaged and the tail broke loose. The problem was radio failure so the radio was already broken! If you decide to build this aerobatic oldie, stick with a .25 or .35 engine. Aerotique was designed to fly — like in "airplane" — and not be guided — like in "missile"!

Before beginning, try to secure all materials needed for the job as this will save you time in the long run. Spruce and Lite-Ply can be purchased directly from Sig Manufacturing Co. in Montezuma, Iowa, if you can't find them locally. During construction, time can be saved by using one of the new generation of instant glues such as Carl Goldberg's Super Jet. Use 5-minute epoxy in high stress areas as called for in the building instructions. Parts can be transferred from your plan to the wood by putting the wood under the part outline on your plan and perforating the outline with a pin about every 1/8". Remove the wood, join the pin holes with a ballpoint pen and you are ready to cut out the part. The main advantage of this method is accuracy plus the plans stay intact for future building projects. Think **light** when you build. Your finished ship ready to fly, less fuel, should weigh in at 4 to 4½ lbs.

Construction

Wing:

☐ Cut four pieces of trailing edge sheeting from 1/16" balsa 1½" x 24".

☐ Cut two 1/4" square medium balsa leading edge pieces 24" long.

☐ Cut four main spars from 1/4" square medium balsa 24" long.

☐ Make all ribs from 3/32" balsa sheet. You will need: (16) R-2's; (28) R-2A's; (8) R-1's; (2) R-1AA's; and (8) R-1A's. Stack up the rib blanks and hold them together with straight pins. Mark the outline with a ballpoint pen and saw out on a bandsaw. Sand lightly to remove the balsa fuzz.

☐ To build the left hand panel, pin down the 1/4" square main spar over your waxpaper covered plan on the building board. Also pin down the bottom 1/16" trailing edge sheet.

☐ Glue the 3/16" square balsa rear spar on the trailing edge of the wing.

☐ Glue all eight R-2 ribs in place.

☐ Glue the 1/4" square leading edge in place.

☐ Add the top 1/4" square main spar.

☐ Glue in all R-2A half ribs.

☐ Bevel the 3/16" rear spar to match R-2 ribs but leave off the top 1/16" trailing edge sheeting for now.

☐ Repeat the last 7 steps and build the right hand wing panel.

☐ Next cut three dihedral braces, the two main spars from 1/16" aircraft plywood and the rear brace from 3/16" plywood.

☐ Build the center section over the plan as follows: Pin down the lower trailing edge sheet and glue the 3/16" square rear spar in place. Glue in four R-1 ribs. Sandwich the two 1/4" square main spars between the main dihedral braces and, when the glue has set, butt the main dihedral brace against the front of the R-1 ribs and glue in place. Add the four R-1A ribs and the 1/4" square leading edge. Again bevel the 3/16" square rear spar like you did on the main panels. Notch out rear of R-1 ribs to accept the 3/16" plywood rear dihedral brace and glue in place. Add the 1" x 1" x 1" balsa block which will be used to anchor the wing hold-down dowel. Also notch the bottom of the ribs forward of the spar 1/8" deep to accept the 1/8" x 1" x 3½" plywood landing gear mount.

☐ Pin the center section flat to your building board. Trial fit the wing panels in place. Block up each wing panel so that you have 1" dihedral under each tip when measured from the surface of the building board to the bottom of the main spar at the outboard end of each wing panel.

☐ Join the wing panels by gluing, pinning, and clamping the dihedral braces securely to the spars. Make sure the glue is thoroughly dry before removing.

☐ Add the remaining R-1 and R-1AA ribs.

☐ Pin the left panel flat to your building board and add the top 1/16" trailing edge sheet.

☐ Add the 1/16" balsa vertical grain webbing behind the main spar.

☐ Add the trailing edge 1/16" balsa vertical grain webbing, only this time insert between the top and bottom of the trailing edge sheeting. **Caution** — Do not eliminate the webbing, as the wing gains much of its strength from it.

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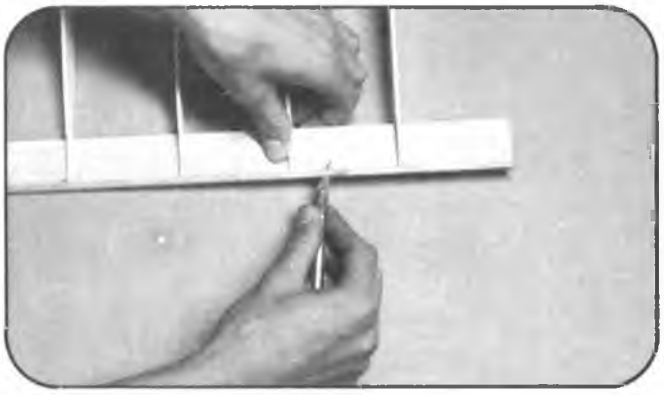
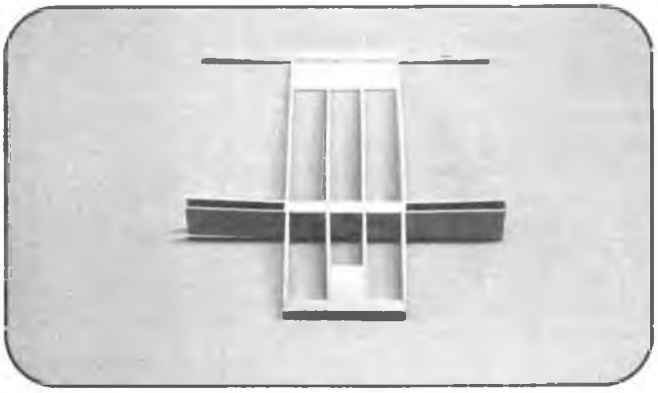
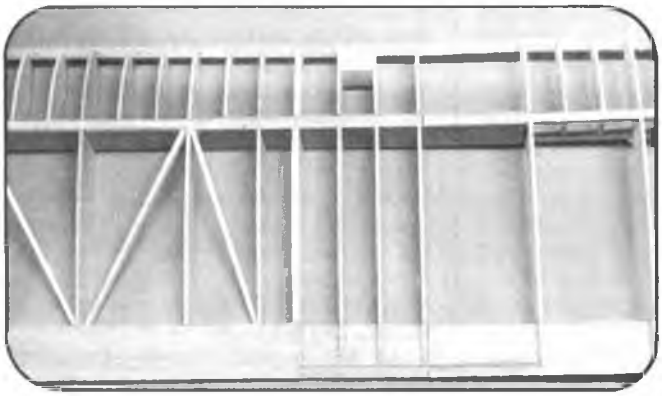


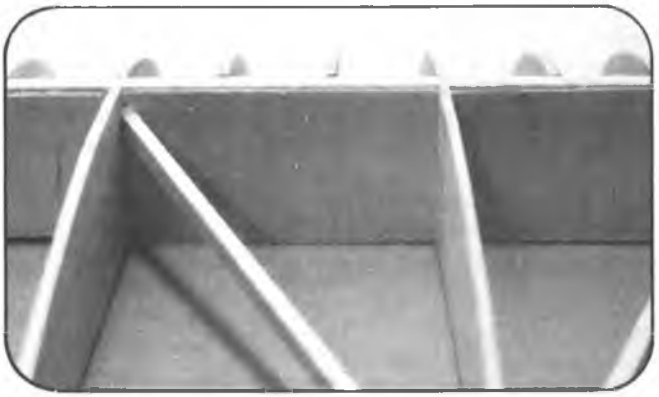
Taper 3/16" square trailing edge to match rear of ribs.



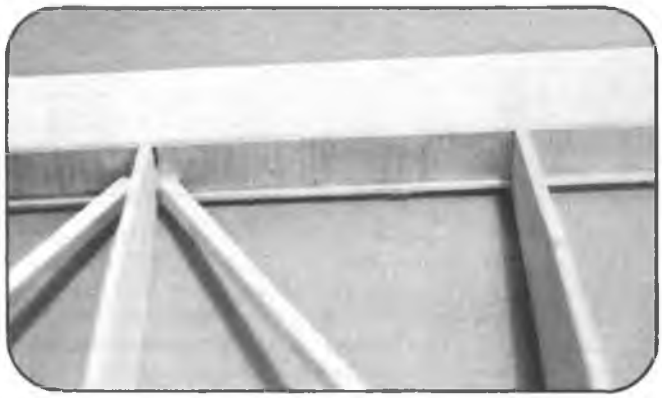
Center section shown completed and ready to accept outboard wing panels.



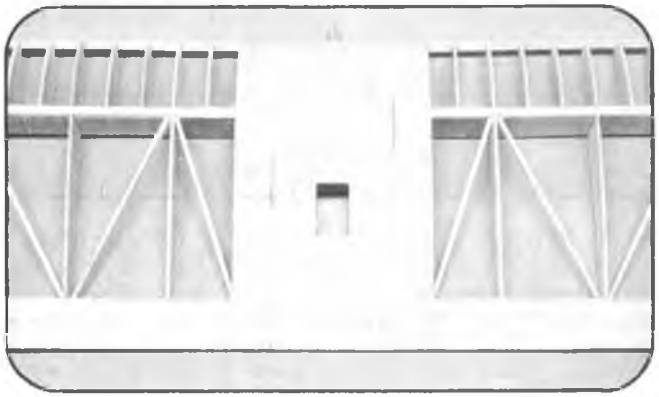
Wing panels shown joined to center section. The top 1/16" trailing edge sheet is in place as well as the extra ribs on the left panel.



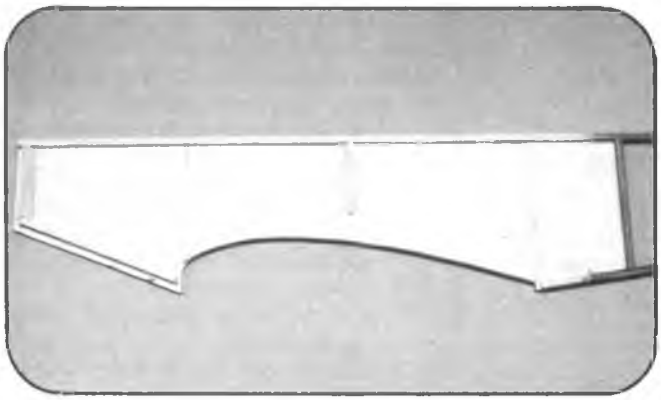
Webbing for main spars is 1/16" vertical grain balsa butted against rear of main spars. Diagonal braces are 1/8" x 3/16" spruce.



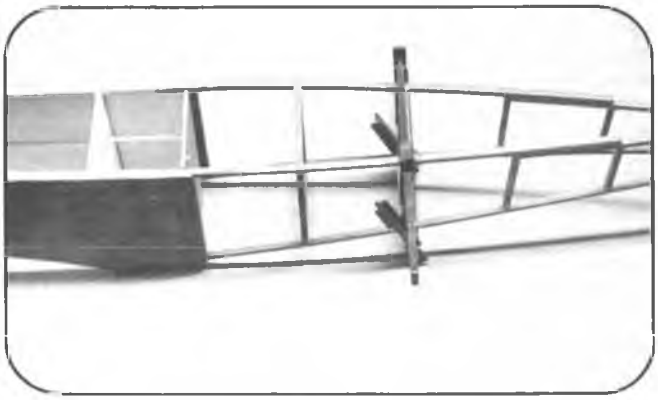
Webbing for trailing edge is 1/16" vertical grain balsa inserted between top and bottom trailing edge sheeting.



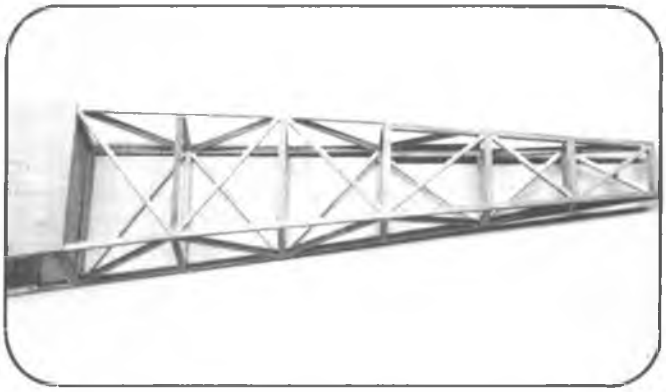
Finished wing with 1/32" plywood center section covering in place and aileron servo hole cut. Photo shows ply overlapping T.E.



Right fuselage side is built directly over the plan.

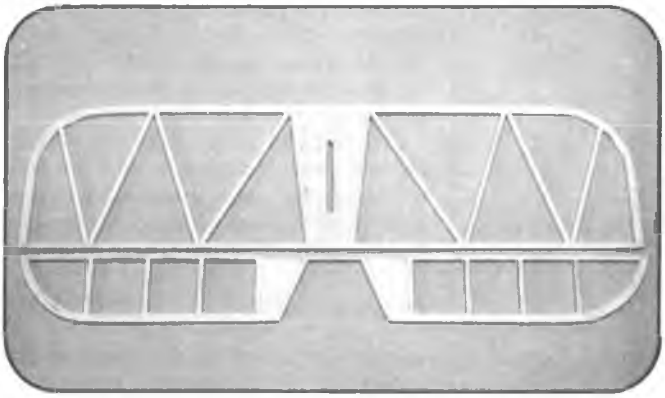


Fuselage sides joined and 3/16" square spruce cross members being installed.



Fuselage with 1/8" x 3/16" spruce diagonal braces in place.

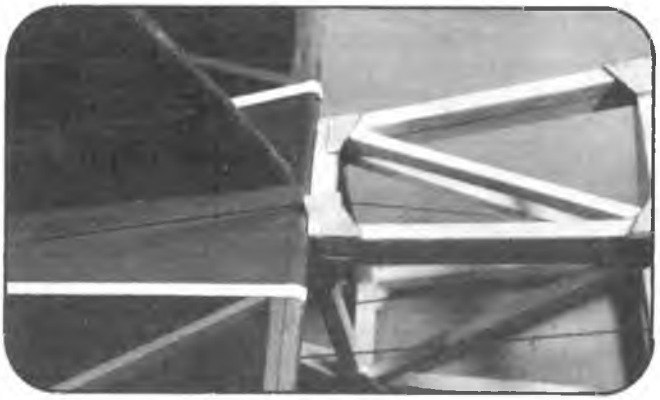
Plywood jig used to form the double pieces of 1/8" x 3/16" spruce in the stab, elevator, fin and rudder.



Completed stab and elevator.

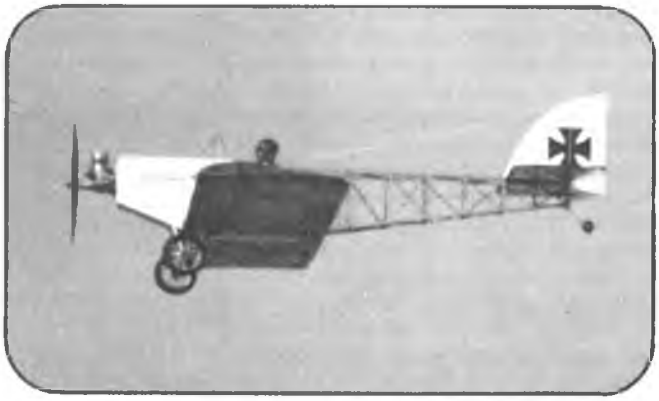
An easy method of marking the spots for drilling the 1/4" holes for the nylon 1/4 x 20 wing hold-down screws.

Control cables shown exiting the fuselage. Note that both cables exit through the same piece of inner Gold'N-Rod.



Small pieces of inner Gold'N-Rod are used to route the control cable through the open structure of the fuselage.

Flair out just before touch-down.



A slow fly-by.

☐ Add the 1/8" x 3/16" spruce diagonal braces between the ribs as shown on the plans.

☐ When the left panel is thoroughly dry, repeat the previous 4 steps and complete the right panel.

☐ Next add two 1/4" x 3/8" soft pine servo mounts to the center section. Space these to accommodate the servo you plan to use.

☐ Cover the center section, both top and bottom with 1/32" plywood. Cut the 1/32" plywood by scoring with a sharp model knife.

☐ Add the 1⅛" wide strips of 1/32" plywood to the top and bottom to the main wing panels next to the center section.

☐ Cut out the hole for the aileron servo.

☐ Add the wing tips and tip braces which are cut from soft 1/4" sheet balsa. Cut lightening holes in the tips as shown on the plan.

☐ Add the soft balsa blocks at the leading edge of the wing tip and shape to the contour of the airfoil.

☐ Round the leading edge of the wing as well as the wing tip with a sanding block. Go over the entire wing lightly with fine sandpaper using extreme care so as not to destroy the airfoil by sanding the ribs too much.

☐ Add the 1/4" dowel wing hold-down by drilling through the leading edge into the 1" x 1" x 1" balsa block and gluing in place.

Make strip ailerons from 1/4" sheet medium balsa, 1¼" wide, and simply round off both the front and rear edges. Hinge them temporarily and install the strip aileron horns. Do not permanently install until the wing is covered.

Fuselage:

☐ Cut two fuselage sides from 1/8" Sig Lite Ply.

☐ Cut F-1 from 3/16" aircraft plywood and install 4-40 blind nuts for the radial engine mount.

☐ Cut out F-2 from 1/8" aircraft plywood and F-3 from 1/8" Sig Lite Ply.

☐ Cut out F-4 from 1/8" balsa.

☐ Place the right hand fuselage side over the plan and glue in the 3/16" square spruce brace as well as the 3/8" triangular balsa firewall brace and the 3/16" square spruce longerons. Add the vertical 3/16" square spruce braces to the open tail structure.

☐ Build the left hand fuselage side directly over the right hand side so that they are matched. Place waxpaper between them so they don't stick together.

☐ Pin down the completed right side and glue F-1, F-2, F-3, and F-4 in place with 5-minute epoxy. Use a 90° triangle to be sure that the formers are true.

☐ Epoxy the left side in place making sure everything is straight and true.

☐ Bevel the fuselage sides at the rear of the fuselage where they join with a sanding block.

☐ Set the fuselage upside down over the plan and weight down with a brick or other heavy weight so it can't move. Draw the tail together so that the tailpost lines up directly over the plan in perfect alignment. Glue and clamp with spring clothespins until thoroughly dry.

AEROTIQUE

Designed By: George F. Jennings

TYPE AIRCRAFT
Vintage Sport
WINGSPAN
57½ Inches
WING CHORD
11-5/16"
TOTAL WING AREA
642 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
1 Inch
O.A. FUSELAGE LENGTH
35 Inches
RADIO COMPARTMENT AREA
(L)10" x (W)3¼" x (H)3¼"
STABILIZER SPAN
19 Inches
STABILIZER CHORD (incl. elev.)
7¼ Inches
STABILIZER AREA
138 Sq. In.
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
7 Inches
VERTICAL FIN WIDTH (Incl. rudder)
7¾ Inches
REC. ENGINE SIZE
.25-.35 Cu. In.
FUEL TANK SIZE
6-8 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Throt, Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply & Sig Lite
Wing ..... Balsa, Ply and Spruce
Empennage ..... Balsa and Spruce
Wt. Ready To Fly ..... 64-72 Oz.
Wing Loading ..... 14-16 Oz/Sq. Ft.

☐ While the fuselage is still weighted down, add the 3/16" square spruce cross pieces.

☐ Add the 1/8" x 3/16" diagonal spruce braces as shown on the plan.

☐ Cut the gusset plates from 1/32" plywood scrap and glue in place with Super Jet instant glue.

☐ Add the forward 3/16" plywood fuselage bottom. **Do not add** the 1/32" plywood rear sheeting at this time.

☐ Construct the landing gear from 1/8" music wire. The 1/16" music wire shock absorber crossbar is functional so don't delete it! Wrap the joints with copper wire and solder with low temperature silver solder.

☐ Epoxy the hardwood 1/4" x 20 nut blocks in place on the fuselage as shown on the plans.

☐ Trial fit the wing in place. Make sure the wing is aligned perfectly. Insert a drill bit that just fits inside the threaded nut block hole through the hole and twist with your fingers to make a mark on the wing surface. Now drill the 1/4" holes through the wing and insert the 1/4" x 20 nylon bolts.

☐ Trial fit the landing gear in place making sure placement is exactly at the position shown on the plans. Secure with 1/8" nylon landing gear clips and wood screws. The front two clips screw into the fuselage bottom and the back two screw into the plywood landing gear mount you installed in the bottom of the wing. When you remove the wing the two back clips must be loosened and two wood screws removed to detach the landing gear from the wing.

☐ Add the top and bottom 1/32" ply sheeting to the fuselage as shown on the plans.

☐ Tack glue the 3/4" soft balsa top hatch block in place and carve and sand to shape. Cut in two with a razor saw on the joint directly above former F-2. Permanently glue the rear portion to the cockpit area. The front portion serves as an access hatch to the fuel tank and battery.

☐ The hatch may be attached with short lengths of 1/8" hardwood dowel at the rear, and plywood tabs and 4-40 blind nuts and bolts at the front.

☐ Install lengths of inner Gold-N'-rod tubing between F-3 and F-4 as shown on the plan. These serve as a guide through which the control cables are run.

Tail Surfaces:

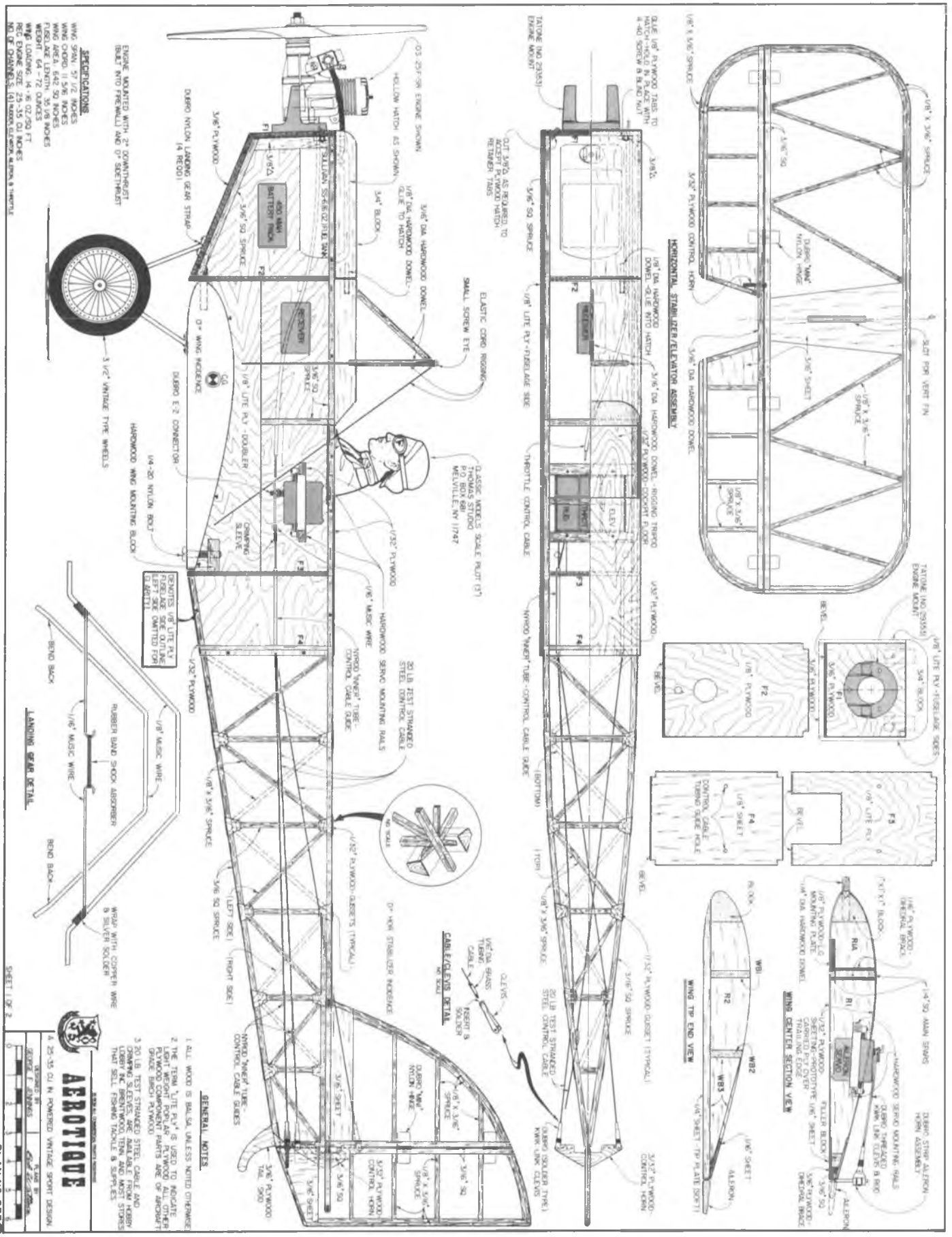
☐ Using scrap plywood, make jigs to form the laminated spruce for the elevator, stabilizer, rudder and fin.

☐ Lay down the plan and cover with waxpaper. Next tack the jigs in place over the plan.

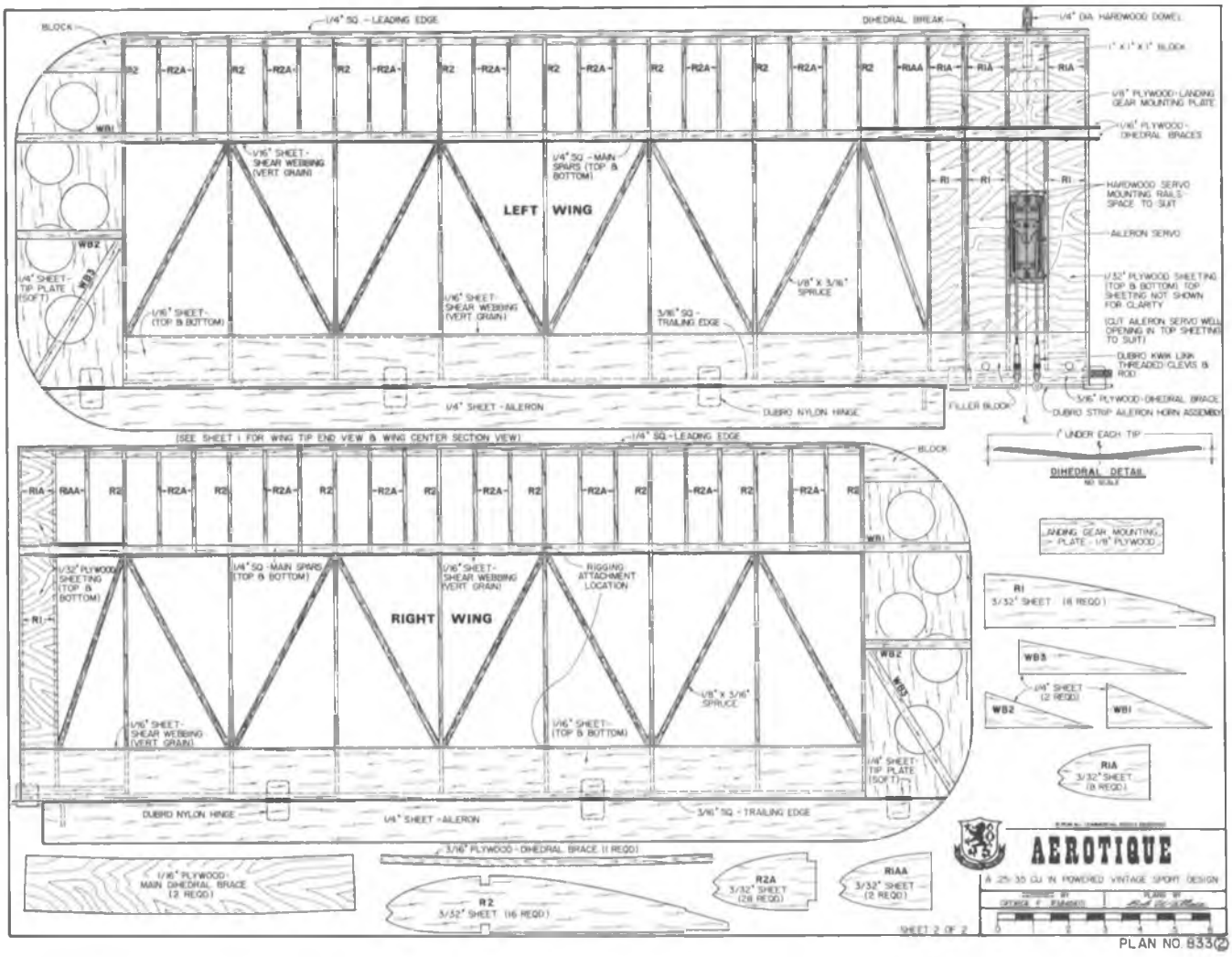
☐ Soak strips of 1/8" x 3/16" spruce in warm water until they become very pliable.

☐ Bend the double strips of wet spruce around the jigs and hold in place with small blocks of wood. **Do not add glue** at this time!

FULL SIZE PLANS AVAILABLE — SEE PAGE 203



FULL SIZE PLANS AVAILABLE — SEE PAGE 203



☐ When dry remove the pieces from the jig and they will retain their shape. Now add yellow glue and laminate the two strips together and place back in the jig until thoroughly dry.

☐ When the lamination is dry, remove the jig from your plan and build the empennage in a conventional manner using the necessary balsa and spruce as shown on the plan.

☐ When everything is thoroughly dry, sand all tail surfaces and round the edges of the surfaces. Temporarily hinge the tail surfaces, however, the tail surfaces should be covered before the stab and fin are installed on the fuselage and permanently hinged.

Finishing:

☐ Cover the wing and tail with your favorite covering material. A transparent finish gives a nice effect or you can get a more realistic vintage finish by using Super Coverite.

☐ After covering, install the 3/32'' plywood control horns as shown on the plan. Make a slot in the control surface and slip the horn in place and epoxy securely. The control horns as well as the open structure of the fuselage should be finished as natural wood. If you like, you can stain this to suit your taste.

☐ Permanently install ailerons and horns.

☐ Glue the stab and fin in place on the fuselage making sure they are aligned properly.

☐ The forward fuselage can be finished in any conventional manner. On this prototype, the rear of this was finished with stain and the front was given two coats of surfacing resin, sanding after each coat. A spray coat of Superpoxy white paint was then applied. Be sure to protect the portions you have left natural wood by giving them a brush or spray coat of polyurethane clear or satin varnish.

☐ Add the 3/16'' dowel tripod on the front of the cockpit and finish to match the rear of the fuselage.

☐ Install a dummy pilot.

☐ Flying wires are non-functional and are simply for appearance but add to the realism. Use control cable or elastic cord.

☐ Add a tail skid or a steerable tail wheel if you prefer.

☐ Attach the wing, main landing gear, wheels, engine, muffler, gas tank and hatch.

☐ Stand back and admire your work and make airplane noises!

Radio Installation:

☐ Mount the aileron servo in the wing. Hook up the ailerons to the servo with 1/16'' wire clevis and rods.

☐ Trial fit the battery under the fuel tank and the receiver and the servos in the main compartment. Install the wing and shift the servos forward or back until the correct balance is achieved as shown on the plans. To correctly balance, turn the plane upside down and suspend the plane on your two index fingers directly next to the fuselage at the balance point shown on the plans. When properly balanced the plane hangs slightly nose down.

☐ When the position of the radio is found for correct balance, epoxy two pieces of 1/4'' x 3/8'' square soft pine across the fuselage to support the servo tray.

☐ Wrap the battery and receiver loosely in foam and place in a plastic bag for fuel proofing. String the antenna wire to the tail. Install the receiver switch.

☐ Use nylon covered braided steel wire fishing leader for control cables. Use at least 20 lb. test. **Do not** use monofiliment fishing line because it will stretch with use. Measure and cut four lengths of control cable several inches longer than needed, running from the control horns to the servos. Attach a clevis to each of the four lengths. See detail on plan sheet.

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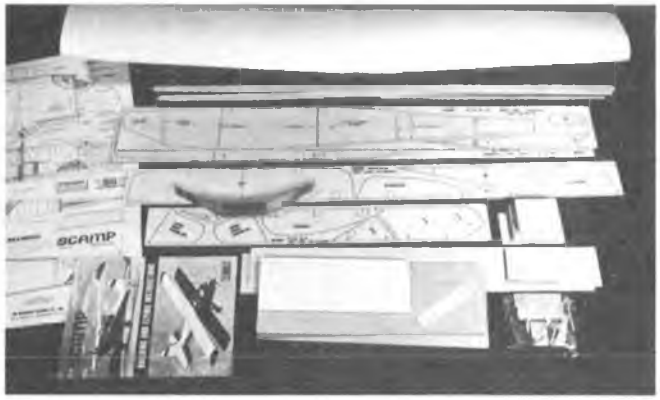
RCM PRODUCT REVIEW

Sig Mfg. Co. SCAMP



The latest R/C kit offering from Sig Manufacturing Company, Montezuma, Iowa, is a high-winged sport aircraft called the Scamp. Priced at $26.95, the Scamp features a ready to use molded foam wing and is designed to be powered by engines of .09 to .15 cubic inches of displacement. Due to its one piece (45" span) molded foam wing, the Scamp is packaged in a rather large box, that is adorned with an attractive full color label. The kit components are packaged in a neat and orderly fashion. Included in the kit is a slip indicating which one of the folks in Montezuma did the packaging. Connie V. is to be commended for her conscientious efforts as our kit was complete in every respect.

Construction:

The 17" x 22" plan sheet is accompanied by a sixteen page illustrated assembly and instruction booklet that is truly outstanding. Every construction phase is completely covered in a sequential manner and complemented by ample photos and diagrams. The assembly instructions are such that even a beginner would not have any difficulty in constructing the Scamp. This booklet also covers flying suggestions and tips, including recommended control surface travel limits. The ready to use molded foam wing is a flat bottomed design and may be used as it comes. However, it is recommended by Sig (and RCM also) that it be covered with any of the low temperature film type covering materials (Econokote, Solarfilm, Hobby Lobby's Superkote, etc.) after several strips of 3/4" wide fiberglass reinforced tape have been applied (span-wise) to the bottom of the wing for additional strength. The wing can also be finished with a paint such as Sig's Plastinamel. The fuselage is of balsa and plywood construction and is assembled by gluing the fuselage reinforcing stringers and plywood side doublers directly to the pre-painted balsa fuselage sides. The plywood bulkheads are then installed, followed by the top and bottom balsa sheeting. The fuselage assembly is quite conventional and very similar to other Sig kits such as the Kadet. All plywood parts are cleanly die-cut in a crisp fashion. The tail surface pieces, like the fuselage sides, are printed directly on sheet balsa and need to be cut out by the builder. The wood quality in our kit was very good and the parts fit (assuming that the builder cuts the parts to the printed lines vertical strokes) is equally good. The hardware package is outstanding. All necessary hinges, control links, threaded rods, control horns; assembly screws, nuts, etc., are included. A formed aluminum landing gear and aluminum engine mounts are also provided. In assembling our test Scamp, Custom Model Products fast bond cyanocrylate adhesive was used for all construction aspects, except for the plywood fuselage doublers and bulkheads which were installed with Custom Model Products Quick Cure 5-minute epoxy. These fine glues greatly reduced the assembly time.

Covering:

We covered the molded foam with with Hobby Lobby's Superkote film covering material after applying the suggested 3/4" wide strips of fiberglass reinforced tape to the bottom surface of the wing. The fuselage and tail surfaces were finished with K & B Superpoxy primer and enamel.

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SPECIFICATIONS

Name	SCAMP
Aircraft Type	Sport
Manufactured By	Sig Manufacturing Co. 401 S. Front Street Montezuma, Iowa, 50171
Mfg. Suggested Retail Price	$26.95
Available From	Both Mfg. & Retail
Wing Span	45 Inches
Wing Chord	6½" Avg.
Total Wing Area	292 Square Inches
Fuselage Length	34 Inches
Stabilizer Span	16 Inches
Total Stab Area	76 Square Inches
Mfg. Rec. Engine Range	.09-.15
Recommended Fuel Tank Size	4 Ounce
Recommended No. of Channels	3
Rec. Control Functions	Rud., Elev., Throt.
Basic Materials Used In Construction:	
Fuselage	Balsa and Ply
Wing	Molded Foam
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (16 pages)
Construction Photos	Yes

RCM PROTOTYPE

Radio Used	Westport International Variant
Engine Make & Displacement	OS Max .15 R/C
Tank Size Used	4 Ounce
Weight, Ready to Fly	40 Ounces
Wing Loading	19.7 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Instruction book complete and well prepared, good wood quality and hardware package.

WE DIDN'T LIKE THE:

No complaints. It's difficult to fault this kit.

SOARING

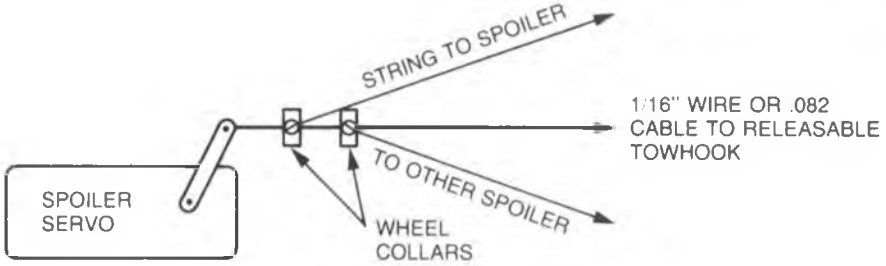
Al Doig

Due to the vagaries of pulling a magazine together and shoving it out the door, this gem is being written on the last day of 1980. I'm sitting here in the doldrums, sails limp, making no way at all. Reminds me of when I was a Project Engineer and had to write a progress report, when there had been no progress. The reason I'm sharing all this with you is that I've found that even though my mind isn't in gear, if I race the motor, the fan will pull me forward. The important thing is to start writing **something.**

Just to prime the pump, I'm going to let you in on a "For What It's Worth" sent in by Byron Blakeslee of Sedalia, Colorado. Byron has a neat way of adjusting spoilers. He says: "The 'string pull' method of actuating spoilers works well, but fine adjustment of string length must be made by fumbling with knots and/or toothpicks. This tip is primarily for installations using one servo to operate spoilers and a releasable towhook. (The idea could also be employed on a spoiler-only ship.) The sketch is pretty self-explanatory. Replace the wheel collar socket head set screws with short, large head screws. Make loops to just fit over the screw heads. Then, fine adjustment is made by loosening the collar and sliding along the wire." See accompanying sketch for details.

Don Edberg readies his Sagitta for FAI Trials. See the feature construction article on the Sagitta this month on page 25.

July 12-17 the FAI World Soaring Championships will be held in the San Francisco area. Don Edberg worked his buns off to make the team and to fly off to some exotic place like Australia or Liechtenstein or somewhere. Don happens to be studying for his Ph.D. at Stanford University in Palo Alto, 30 odd miles South of San Francisco. In a wild burst of generosity, the Torrey Pines Gulls, of which Don is a member, has offered to sponsor Don's trip. They are sending him a buck-ten bus ticket from Palo Alto to San Francisco, with return.



TOP VIEW OF INSTALLATION

★

One monumental event I sure would have liked to attend was the model airplane seminar conducted by the Smithsonian Institute in Washington, D.C. This event, called "Model Airplanes: Then and Now" was held Feburary 22-27. It was five full days of review of every phase of modeling from R/C to plastics. Each phase was covered by an expert in the field. RCM's Don "Flying Lowe" Lowe spoke on "R/C Aerobatic Models." Dr. Walter Good covered "R/C Models: Historical Highlights." Walt, now one of the biggies in Soaring, was billed as "The Father of Radio Control Aviation," and rightly so. He and his brother Bill were real pioneers of R/C back in the 1930's. The vehicle for their early experiments, a plane called "Guff," is on display at the Smithsonian. Walt really worked to prepare the presentation. We talk by ham radio on Friday afternoons and he was continually prodding me to remember things from the dim past. For the hams in the crowd, we carry on at 21.407 MHz, 2100 UCT, propagation permitting. Glider guiders who are home at that time are welcome to sit in.

★

In the September 1980 issue I reported on the experiments with wingerons (whole wing rotation instead of ailerons) by Steve Manganelli, of Encinitas, California. Steve's latest configuration was a 2-meter ship specifically designed to compete in the "2-Meter World Cup" contest held in January 1981, in Palmdale, California.

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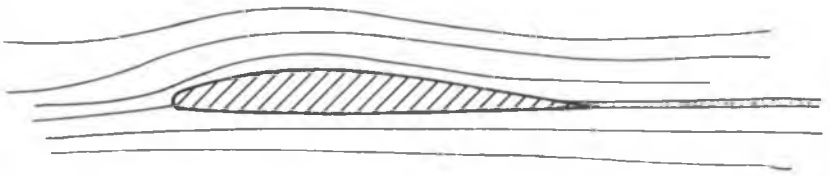


FIGURE 1
AIR FLOW PATTERN BEFORE STALL

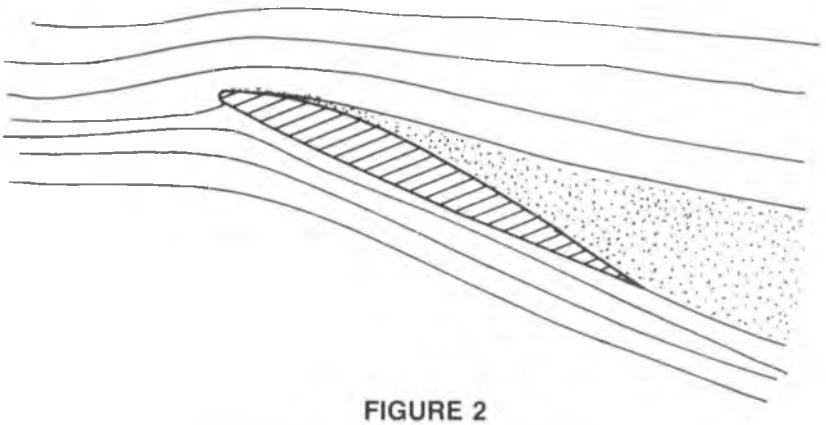


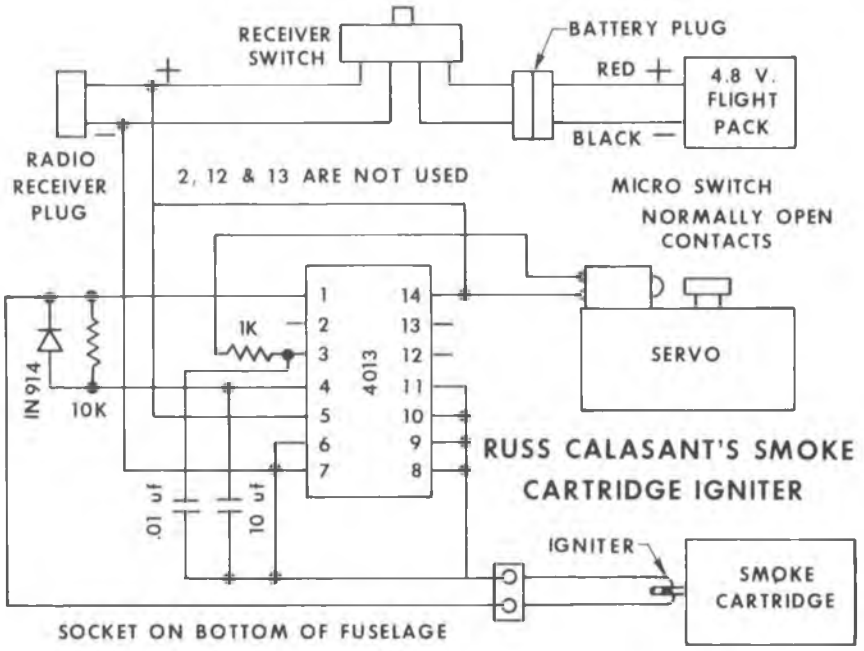
FIGURE 2
AIRFLOW PATTERN AFTER STALL

SCALE VIEWS

Claude McCullough

More On Smoke

In the February issue of RCM, Scale Views showed the Superior smoke cartridge as a handy snap-on device for creating a smoke trail at a demonstration or air show without the necessity of a specially equipped model. We mentioned the difficulty of lighting the fuses on these cartridges in the slipstream. Russ Calasant (15 Penncove Road, Niantic, Connecticut 06384) of the RC Prop Busters AMA Show Team 119 has come up with a way of lighting the cartridge in the air so that there is no smoke wasted during take-off and climb to aerobatic altitude. His method makes use of a model rocket igniter, obtainable for around a dollar at hobby shops that stock rocket supplies. If you want to carry a separate battery --- he suggests a 3 volt, 500 MAH --- it can be triggered by a micro switch hooked to a separate servo or placed at full travel of one of the flight control servos. For an installation using the flight pack as the power source, Russ has used the circuit shown in the accompanying drawing.



Instructions from Russ: "Cut the fuse on the cartridge to 1", then cut along the fuse about the last 1/2". Open the fuse by pulling the cut apart and place the tip of the igniter in the cut. Then slide a 1" piece of heat shrink tubing over the igniter and fuse and apply heat to shrink the tube around the igniter. This will form the electrical airborne fuse. Now all you have to do is set it off in the air with a short pulse from a battery." He points out that the Superior cartridges are found in plumbing supply stores since they are used by plumbers to trace sewer lines. The AMA ban on the use of pyrotechnics does not apply to these cartridges since they smoke by chemical reaction. They do get hot, however, so mount them on a standoff as shown in the February Scale Views.

In the Showgram, newsletter of the AMA Show Teams, Bill Altenhofen, Team Manger of the Bloomington, Minnesota Blue Eagles RC Flying Team, has some interesting comments about smoke installations on a couple of Balsa USA J-3 Cubs with Quadra engines. He says:

One member uses a pressure tank to feed the oil. Pressure to the oil tank is controlled by a regulator. The control valve controls both air in and oil out of the oil tank. The oil is then injected into the muffler of the Quadra engine for burning.

The regulator used was made by the C.A. Horgren Company of Littleton Colorado, 80120. It is part number R04100RGKA and is for 1/8" and 1/4" pipe sizes. It was obtained from a company listed in the Yellow Pages under Gauges & Gages. Brass fittings and copper tubing convert it to the air line size.

The air supply tank is pressurized to about 90 psi with a Sonic hand pump, while the operating air pressure is set at about 5 psi. A pressure gauge is temporarily connected to set the regulator. The air charging valves and the air lines are Sonic.

It was found the smoke valve would not work with this system. The valve would not hold the air pressure, so a homemade valve was used. It consists of a valve body made of a piece of brass tubing with four small brass tubes soldered to the side. The valve is another piece of brass tube with washers on the ends and four "O" rings spaced by plastic tubing. With four "O" rings, both the air and oil are controlled in both the on and the off positions.

The oil used is machine cutting oil. However, Corvis oil, which is used by commercial smoke writers, and crankcase oil have both been used. They all work. The controlling factor seems to be how much oil can be delivered to the muffler and still obtain adequate burning. The more oil burned, the greater and longer lasting the smoke.

One thing that must be watched when building the valve is to insure the "O" rings are compatible with whichever oil is to be used. I believe rings made of Buna N rubber can handle petroleum products.

The second member's system uses crankcase pressure to feed the oil. This eliminates the air pressure tank and the regulator. However, a check valve is needed. The one used is a Humphrey minature check valve; the smallest one they make.

Another correspondent in the Showgram also mentions Corvis oil and says that Don Anderson used it on his Kwik-Fli at the Nats. Don Klein went on, "It is a release agent for concrete and when I tried to buy some in Middletown, the oil distributor had sent his last drum to a Lebanon, Ohio airport to, of all things, a smokewriter company." Another user is Pete Myers, the noted stunt pilot.

Scale Data Bank

Waco Factory Drawings. As a certified Waco nut, the following list of drawings made me drool and should have the same effect on most any scaler. Nearly all of them are large 30" x 42" sheets. (Smaller ones cost less, larger ones more than $1.05.) These blueprints are made from original Waco tracings and, therefore, show some effects of age. But cracks and smudges aside, underneath are good plan layouts --- not super detailed, but everything needed for model design with the aid of a few pictures. So many Wacos have been preserved that it is not too difficult to come up with photos from one place or the other. I ordered a number of these plans. At such reasonable prices they should be of interest to collectors as well as builders. Now if I can just get going on my half-built "N" (the tricycle geared version) and have it ready to fly by spring!

2982	Waco 10 OX-5	1928	$1.50
26003	VKS-7	12-14-37	1.05
21589	VKS-7 G	5-24-37	1.05
	F-6	2-17-36	1.05
	C-6	2-10-36	1.05
48282	E	11-28-36	1.05
13820	UEC	1-26-32	1.05
21440	UPF-7, VPF-7	4-28-37	1.05
21505	DPF-7	6-4-37	1.05
11505	QCF	9-21-31	.45
11505	QCF	9-21-31	1.05
48293	WRE	12-5-39	1.50
20509	CPF, CPF1	7-5-35	1.05
18008	UMF	4-12-34	1.05
45555	EGC-8, C-8	3-22-38	1.05
45556	AGC, VGC, ZGC-8	3-21-38	1.05
45252	ZGC-8, VGC-8, AGC-8	11-18-37	1.05
45253	EGC-8, C-8	12-3-37	1.05
45058	ZGC-7, YGC-7 Seaplane	7-7-37	1.05
45059	DGC-7, EGC-7	7-7-37	1.05
47047	ARE	4-21-39	1.50
38130	YVN-7, ZVN-7	7-1-37	1.05
38601	YVN-8, ZVN-8, AVN-8	11-12-37	1.05
37640	DGC-7, EGC-7	3-22-37	1.05
37641	VGC-7, UGC-7	3-23-37	1.05
13887	BEC	3-1-32	1.05
14002	KBA, IBA, TBA	12-9-31	1.05
13771	ODC	9-8-31	1.05
664	Waco 10 Whirlwind	3-7-29	.30
749	Waco CT	8-15-29	.30
2722	Waco ASO	3-15-28	.30
2723	Waco 10 Siemens	3-15-28	.30
2741	Waco 10-T ATO	3-15-29	.30
3709	Waco HSO	3-22-30	.30
2710	Waco HTO	3-22-30	.30
2581	Waco Insignia 6½'' Frt.		.30
2582	Waco Insignia 13'' Rear		.30

Address orders for Waco plans to: Aircraft Drawings, National Air and Space Museum, 3904 Old Silver Hill Road, Suitland, Maryland 20023.

I have a roll of color photos of R.J. Hardin's beautiful red YOC N15244 from Justin, Texas, that is frequently seen at Fly-Ins of the Antique Airplane Association. There are pictures of details and the cabin on the roll as well as the full aircraft. I'd be glad to have reprints made for any Waco "C" fan who would like them for the cost of the prints and postage. My address is: Box 40, Montezuma, Iowa 50171.

Flightmasters Scale News and Views. I first picked up the Waco list from the fine newsletter put out by the well known California free-flight scale club. While content naturally gravitates around their specialty, a lot of it is of interest to every scale modeler. They feature rare 3-views, building tips and data sources, seasoned with a dash of humor --- some the latter directed at the broad target presented by RC types. Carlo Godel has just stepped into editorship of FMSNAV, replacing Bill Warner, whose efforts in the job deserve a salute. Associate membership in the Flightmaster with a year's subscription to the newsletter is $9.00. Full membership with newsletter is only $1.00 more --- $10.00. Send to Phyllis Warner, 423-C San Vincente Blvd., Santa Monica, California 90402.

Scale Bookshelf

Diamond In The Sky — A Pictorial History of the USAF Thunderbirds and **Reflections of Blue — A Pictorial History of the U.S. Navy Blue Angels** 8½'' x 11'', softbound, 168 pages. $12.95 each. Published by Specialty Press, Box 426, Osceola, Wisconsin 54020. These two books are more specialized than those

usually selected for review in Scale Views but, with the growth of ducted fan use, will become less so rapidly. For example, at least two entries at the 1980 Nats used Blue Angel's color schemes. We've got a non-scale purpose in mind as well. That's the large number of sport fliers (hopefully, readers of this column) who like the attractive color schemes of the stunt teams and adapt them to their models. Plenty of choices here, from the early Bearcats and Hellcats to the T38's and Skyhawks. There is not much text, just page after page of great pictures, mostly black and white but with 8 color pages in each book. Since many shots were taken during aerobatics, bottom views and other odd angles are fairly easy to find.

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PIT STOP

Gene Husting

The winning Associated Team had 1 driver and 5 mechanics. No — I'm only kidding. The coveralls were used to keep warm during the cold night hours. From the left is Rick Davis, Bill Jianas, Curtis Husting — drivers, then pit men Bill Newlin and Carl Petri and Team Captain, driver, pit man, car builder and tuner Mike Rowland.

The action never stopped for 24 hours at Tropical Park in Miami, Florida, site of the Annual 24 Hour Enduro Race of Miami.

Winning Associated RC300 car featuring Rich Lee built K & B-McCoy engines with OPS carbs and Futaba radio.

3rd Annual 24 Hours of Miami Enduro

The So. Florida R/C Car Club again sponsored the Annual 24 Hours of Miami Enduro race. The identical track as previous years was used, and is located on a parking lot in Tropical Park. Tropical Park is a large public park including a football stadium, tennis courts, lakes, etc. The track is located on a parking lot next to a main street attracting a large spectator audience. The track itself is fairly smooth and about the perfect size for a 1/8 size track.

This being the 3rd Annual 24 Hour Race, there were two previous 24 Hour Races here. The first race had 4 entries, all Delta cars, with the factory Delta Team winning. Last year the race was won by the Associated Team, with Delta taking 2nd and MRP 3rd. This year there were 8 teams entered, 4 Delta, 2 MRP and 2 Associated. Drivers came from California, Texas, Michigan, Iowa, Washington, Florida, and even 1 team from Puerto Rico.

Last year the Associated Team cut down on horsepower out of the Rich Lee prepared K & B engines, by using 40 size carburetors, and focusing mainly on reliability to win the race from start to finish. Because last year seemed so easy, this year they decided to run 60 size OPS carbs on their Rich Lee built K & B-McCoy engines. The Delta Team also figured they might need a little more horsepower this year, so they were running their new big slide valve carbs on Picco engines. They were also serious enough that we heard they were testing on this track the week before the race.

The race was scheduled to start at 2 p.m. on Saturday and run non-stop to 2 p.m. on Sunday, with Friday and Saturday morning to practice. Last year, having never run in an Enduro this long, the Associated Team had a 9 hour practice session. They ran the car 9 hours non-stop, to become familiar with Enduro conditions, a couple weeks before the race at home. This year the car was never run at home. The plan was to use Friday to adjust motors, set linkages and for the drivers to get used to the car and track. The best laid plans don't always work. Friday all

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2nd Place finishers, Team Delta car with Delta carbed Picco engines and Futaba/Delta radios.

The most important part of every team was their pit area, and this is what Associated's looked like after the race.

Spectator interest was so high many stayed 3, 4, & 5 hours to watch the close, exciting racing during the day.

24 Hours Of Miami — Lap Chart

TEAM	2 Hours	4 Hours	6 Hours	8 Hours	10 Hours	12 Hours	14 Hours	16 Hours	18 Hours	20 Hours	22 Hours	24 Hours
Associated	297	592	846	1138	1440	1733	2025	2343	2639	2970	3308	3649
Delta	314	628	947	1269	1522	1827	2105	2388	2688	3010	3299	3572
Future Homes	298	590	878	1173	1472	1733	1998	2266	2560	2845	3146	3396
Fort Myers	266	546	834	1121	1383	1627	1908	2191	2486	2737	2924	2962
Ja-Lea	308	531	714	882	1057	1323	1581	1800	1955	2201	2451	2738
Bean Bandits	201	371	580	839	998	1206	1485	1602	1829	2022	2116	2357
Puerto Rico	242	447	648	790	969	1160	1341	1531	1660	1862	2078	2323
Kemp Precision Circuits	137	245	395	500	729	832						832

BIG IS BEAUTIFUL

Dick Phillips

This month there is some good news from Quadra --- quite a bit of it in a letter from Bob Cooper who is Quadra's new marketing manager. Firstly, for the benefit of those of you living in the U.S. and who have had a problem with shipping your Quadra engines back to Canada for servicing. Be of good cheer. Dario Brisighella (1032 E. Manitowoc Ave., Oak Creek, Wisconsin 53154) has just been appointed as a service center for the Quadra engine. He will be able to do Warranty work in addition to any repairs, will stock parts and engines for sale along with accessories as they become available. Dario is well-known as the originator of the 'over-balance' job that makes the Quadra run as smooth as it does and has undertaken to keep the turn-around time as low as possible.

In addition, Bob Cooper has advised me of the following changes and improvements to the engine, all of which will make a good product even better.

External changes on the engine are:

The elimination of the cooling fins above the spark plug base. Most of us cut these off anyway as they often intefered with cowling the engine and covering it all. Cutting them off had to be done with care so as not to cut into the plug threads, and not to get any cutting chips or file chaff into the cylinder.

All mounting screw lands will have gusset supports for increased strength.

Exhaust port and carburetor mounting faces will be increased in size for added strength in these areas.

Internally, the bypass ports have been enlarged and the deflection angle has been changed. A new connecting rod has been designed and is in use. A new crankshaft is being incorporated. The internal changes are expected to add as much as 10% to the peak horsepower and performance.

Also, for U.S. modelers, is the announcement that all U.S. orders will be filled from TML's (Trail Manufacturing Limited) facility in Port Huron, Michigan. This will cut delivery time to a few days via UPS (which, incidentally, is not available for shipments to and from Canada) and will end the customs and border hassles which have been a minor annoyance in the past.

☆ ☆

I have mentioned water flying in previous columns, but a couple of regular readers have suggested that a little further information might be of some help to those of you thinking about building a float equipped model, or putting floats on one of your existing models.

Float flying has some advantages and some disadvantages, and what doesn't? If you are one of those guys who never has an engine failure in flight, and who can always land and taxi right up to his feet, then the disadvantage is very slight, if it even exists. That is the need to carry a recovery boat along with you when you go to your favorite lake to do a little float flying. I have a couple of great stories about guys who have gone water flying without a boat and, I can assure you, it isn't worth it! It can be a cold, wet afternoon if you need to retrieve a model and don't have a boat along!

B-17 'Sentimental Journey' from Germany returns from a mission with outboard port engine out. 50 pound model was built in less than one year by Modellflugclub of Rhein-Main and was brilliantly flown by Manfred Poznanski at Las Vegas QSAA Rally in October of 1980.

Another possible minus in float flying is that in the event of a crash, you can't just walk out and pick up the pieces, you have to dive for them unless you arrange some means of flotation to keep the remains afloat until you can recover them.

Water getting into an unprotected model can be a source of problems as well. Water and radios don't mix too well, and balsa wood will soon become very weak if the model is not well protected from water getting aboard.

The advantages are great, however, and well worth the effort. The sight of a water borne model throwing spray aside on a take-off, or the sight of water draining off the floats in the sunlight as your bird climbs away from the surface are not soon forgotten thrills. Unlimited take-off and landing space is not hard to take, and the ability to always land and take-off right into the wind, whatever its direction, is a large plus.

The fact that the model is sitting on the floats very close to its flight attitude makes for somewhat easier take-offs and landings and the unlimited area available makes learning to fly from floats easier than the original learning to land in a restricted area. We all recall that take-offs were easier to learn than landing and anyone with any experience in flying will have little difficulty making the transition to float flying. That doesn't mean you should not try to land in a specific area, but if you don't, well . . . there's no harm done.

Rigging a model to accept floats is not difficult. We can often use the existing gear legs, and add a second brace behind them to mount the rear of the floats to the fuselage. The step on the float should be near the C.G. location of the model. If the floats are built so the mounting to the gear legs and rear braces is adjustable over an inch or so, this will permit a little experimentation as to what location best suits the particular model being flown.

If at all possible, the front mount for the floats should be free enough that the floats can move vertically, independent of one another. This allows the floats to 'walk' a bit when landing, and will allow them to compensate for slightly rough water. If the floats are mounted solidly, and the landing is a bit 'one wing low,' the float striking the water first will tend to rebound, throwing the other float into the water and possibly causing it to dig into the surface. A spectacular 'water loop' can result with possible damage to the wing mounting. If the floats are able to move in relation to one another, especially at the bow (or front) end, this one wing low attitude will be absorbed by the spring in the float mounting and the model will settle properly onto the surface. This 'give' in the bow of the floats will also absorb some of the punishment rough water can dish out, making it possible to fly off rougher water than might otherwise be the case.

Wooden props take an awful beating from water being thrown into the prop arc, so you should plan on installing spray rails on the inner, bow section of the floats, just as is done in full scale practice. These can be simple strips of light plywood or ABS, glued to the sides of the floats and projecting downward into the water. A little experimentation will tell you how much is needed on your particular model and float, to keep the spray clear of the propeller. Spray flying into the prop will wear the prop out pretty quickly, but it can also keep an engine from developing full power and thus inhibiting take-off. The spray rails are worth the little time and trouble they take to install.

Water rudders are also a good idea. If not two, then at least one. A model sitting in the water will weathervane to the wind, especially if it has any significant side area, and this 'weather-cocking' can create problems for you in taxiing the model. I have seen several that would not turn downwind without the application of considerable power and, invariably, you'll be in a situation where this application is not

practical. Water rudders could be raised by a servo, to get them out of the water for take-offs and landings, or they can be spring loaded to move out of the way in anything but low speed taxi maneuvers. If you are going to leave them in the water, your model will be extremely sensitive at high speeds, which could be a problem. Rigging the rudder or rudders for steering will vary in complexity from model to model. Some may be easily driven from the rudder, or you may wish to use an auxiliary channel to steer the water rudder and leave the air rudder to do its job unhindered by complicated wiring to the water rudder(s).

Be sure that water is not able to enter the fuselage around strut mounts or seams in the model. Any such areas should be protected with some sort of sealant (silicone works well) in order to prevent water getting into the unprotected structure. Alternatively, the inside of the fuselage may be painted or treated to prevent water damage and both methods may be used for added certainty that water will do no harm.

Radios, too, should be protected from possible immersion. One of the best ways to do this is to wrap as much of the radio as possible in plastic bags. Where the wires come out of the baggies, sealing the openings up with tightly wrapped elastic bands will inhibit the entry of any water which might get to the radio.

Wrapping the receiver with foam for vibration protection and then sealing it into a plastic bag can also provide some flotation in the event of a crash in the water and could aid in the recovery of the model or the radio in the event the model breaks up on impact. A few slugs of styrofoam inside the model can also aid in recovery and add no significant weight.

A sub-fin on the model (as in full scale practice) can also be of help in handling of a model, not to mention that it also looks prototypical and will enhance the appearance of the waterborne model.

Flying such a model with unlimited take-off and landing space can be quite simple. Be careful on take-off as the model is sitting at flight attitude, it will come un-stuck a litle less readily than a tail dragger from the earth. It will take a bit more speed than on wheels to get the floats loose from the water, so avoid trying to horse the model off the water. When it's ready, it will almost fly itself off the surface. Landing is simply a matter of holding a flat attitude, and cutting power to permit the model to settle onto the surface. The sight of such landings and take-offs is pretty impressive and a sight you won't soon get tired of.

In the event of a radio becoming wet, especially in fresh water, all that is required is to remove the parts of the radio which were wet, open the cases and allow the electronics to air dry. The process may be hurried a bit by the careful use of a little warm air blown across the circuit boards. Only rarely will any damage result from exposure to fresh water.

Salt water can be a different situation as the water itself is a conductor of electricity and serious harm can result to your radio gear if it is immersed for any length of time in salt water. In any case, turn off the power as soon as possible and disconnect the battery. Then flush the wet parts of the radio thoroughly with fresh water and dry as before. As some fresh waters may be high in dissolved minerals, distilled water is quite safe for this purpose.

Despite the unnerving prospects raised by the last few paragraphs, water flying can be a good deal of fun and being prepared for trouble doesn't mean you'll have some! If you do intend to try flying off water, the above tips may well help you to enjoy such flying and may also save you some problems.

Floats are becoming more readily available lately, you'll find that Balsa USA have a float set that is a good one. These are built up and come as a kit for their big J-3 Cub, or, if you prefer foam floats, they are available from D.G. Prentice, 86 Lakeshore Dr., St. Catherines, Ontario, Canada L2N 2T5. These require skinning them with balsa (or whatever you choose) and then finishing. They have the advantage that they will not fill up with water from a leak and sink, come to think of it, that's a pretty good advantage!

☆ ☆

I am sure many of you have wondered, and a few have asked, why I have avoided mentioning the International Miniature Aircraft Association (IMAA) here in the column.

For the benefit of those who are not aware of the circumstances, there are two organizations dedicated to the furtherance of large model aircraft. The Quarter Scale Association of America (QSAA) and the IMAA. Both organizations have the same basic idea behind them, that is the encouragement of the building and flying of the larger model. They each approach this goal from slightly differing points of view. QSAA specifies scale models of existing man carrying aircraft at the Las Vegas Fly-In. The organization headquarters is based in Las Vegas, Nevada, and is incorporated in Nevada. Neither of the organizations restrict models as to type or to a particular scale within the activities of their charter chapters.

Now as to my reservations about commenting on the supposed rivalry between the organizations, I feel that I have a responsibility to you, my readers, not to try to sway you one way or another. I look upon the column as a means of reporting to you on the **big** scene and try to avoid suggesting you do this, that, or the other thing. In other words, I prefer to give you the facts as I know them and let you make up your own mind as to what you want to do, and that's why IMAA has had little coverage here. As it happens, I am a member of both groups and have good friends in both, and have nothing against either.

The rumors that IMAA and QSAA were fueding are not true. Don Godfrey interim President of IMAA is a member of QSAA and has been for some time. Ed Morgan, founder of QSAA and long time **big** builder, has been invited to become a member of IMAA and I will be surprised if he does not. QSAA has been invited to fly with IMAA at their as yet unannounced rally next summer and have indicated their interest in doing so. The basic differences between QSAA and IMAA are rather minor, partly organizational and partly philosophical, and I would suspect the two will grow more closely together as time passes, rather than the opposite.

So, if you are a **big** buff, look them over, make your own choice or, do as many have, join both. If you are not presently a member of either, consider joining, the support you give to the organization of your choice may well contribute to the betterment of our section of this great hobby/sport of ours. The existence of the organizations, and the ever-growing numbers of us interested in large models has already resulted in both the U.S. and Canada changing their rules as to sizes, power permitted and weights allowed in competition. While neither of the two organizations are particularly interested in competition, in fact, both discourage it, they both recognize that there are those who will wish to fly large models in competition and their efforts have made a difference in the past and very likely will do even more in the future. The large numbers of modelers interested in building **big** will, one day, I am sure, see the flying of large models in international competition. As I see it, I think that will be just great!

☆ ☆

Some new products have been reported to me recently and I thought I'd pass the information along to you.

R/C Consultants (11809 Fulmer NE., Albuquerque, New Mexico 87111) have a very light glass cloth in 5 yard and 10 yard continuous lengths. This cloth is 0.6 oz. per square yard which is like gossamer and would enable you to glass a large model without adding pounds of weight. The light cloth will not absorb large quantities of resin thus adding significantly to the weight of the model, but increasing its strength dramatically. So if you have been looking for light glass cloth, R/C Consultants have the answer for you. The 5 yard pack sells for $16.65 and the 10 yard for $29.70 postpaid in the U.S. Slightly higher for Air Mail delivery outside the U.S.

☆ ☆

Nick Ziroli, whose F4U and P-40 have been reported here in the past, now has a Grumman Bearcat plan on the market with a span of 94" for you WWII fighter fans. The weight on Wash Martin's model is 34 pounds, and power is a 3.15 Kawasaki engine. Wash fitted Custom Retracts (air operated) to the model and uses a Goldberg retract nosewheel for the tailwheel.

Principal construction is balsa, mahogany and aircraft plywood, covering is Super Coverite with nitrate dope and enamel primer with enamel final finish. The plan, cowl and canopy are all available from Nick

Wash Martin of Tamaqua, Penn., built this Bearcat from Nick Ziroli plans. Kawasaki powered WWII Navy fighter is a real barn burner (more in text).

Ziroli (29 Edgar Dr., Smithtown, New York 11787). The plan is $25.00, cowl $25.00 and canopy $10.00, direct from Nick. These prices are subject to change, of course, as what isn't these days!

Silicone insulated firewall by Richard Morell of Watervliet, N.Y. Layer of silicone between double firewalls isolates engine vibration from fuselage. Note safety wiring (more in text).

An interesting idea and technique was received from Richard Morell of Watervliet, New York, recently. Richard wanted a firewall that would absorb vibration and isolate the engine from the fuselage, so he designed his own. His construction consists of two firewalls, drilled to accept blind (or Tee) nuts and also drilled to permit a coating of silicone to flow through the two pieces, bonding them together (see sketch). The two firewalls in Richard's example are 1/4" aircraft ply; the holes for the silicone to flow through are 3/8" and the Tee nuts can be sized to suit your own application. A 1/4" plus layer of silicone is applied to the firewalls and they are then pressed together, forcing the silicone to flow through the 3/8" holes. The silicone will form a sort of rivet head on the outside of the plywood and the adhesion of the silicone and the rivets will hold the whole thing together. Safety wire or reliable locknuts must be used to prevent the attach bolts from unscrewing.

Providing this non-rigid connection between the engine and the firewall will certainly cut down on the amount of vibration transmitted to the fuselage. Richard has also incorporated another rather handy advantage in his construction. The engine, firewall, fuel tank, smoke tank and landing gear can all be removed from the model in one assembly, certainly very handy when repairs or adjustment are necessary.

Richard comments, "The layer of silicone soaks up the engine vibration very well and I feel this is most important in 1/4 sized aircraft." I could not agree more --- keeping the vibration out of the fuselage (and away from the radio) will provide greater life expectancy to the model and greater reliability to the radio equipment. Thanks to Richard for his tip.

☆ ☆

The Okanagan Valley is putting on a combined effort of several clubs to host you and your families at a giant model aircraft fly-in on the Easter weekend, April 17th through 19th. The location will be the Kelowna Ogopogo Radio Controller's paved field at Kelowna, B.C., Canada, with water flying facilities nearby. IMAA, QSAA, and local field regulations will

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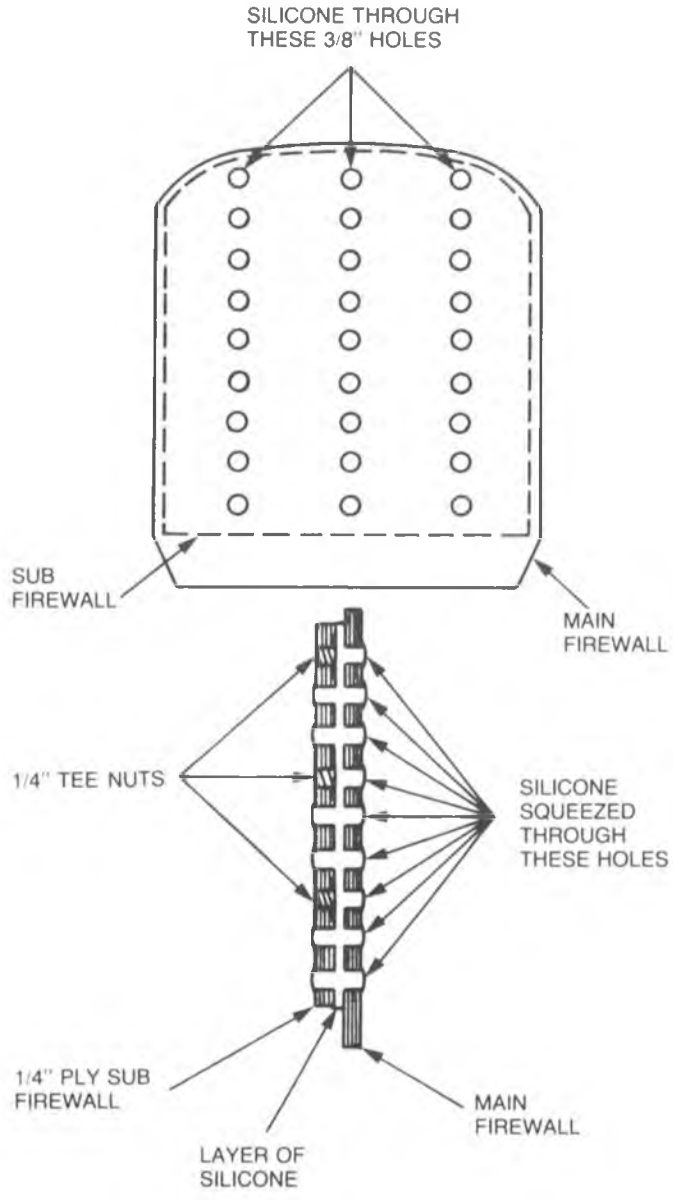


HONKER ROCKET

Just the thing for sport or fun-racing. Imagine where the high point of the day is getting four ships tip-to-tip coming out of the near pylon --- everybody carries that image with them long after they've forgotten who won the heat.

By Dave Thornburg

For the past few months, a group of us here in northern California have been racing a "formula one" version of the Honker (June '73 RCM) and having a ball. The airplane uses the Honker wing and stab on a simple, realistic shoulder-mount fuselage, and our racing rules are only eleven words long: "No changes to airfoil, decalage, planform or Cox Black Widow engine." Period. Most of us fly rudder and elevator, although aileron/elevator is legal.

The object of the game is fun, not all-out speed. When the San Jose Wavemasters were holding their quarterly "Honker Races" last year, they were flattening the undercamber, sharpening the entry, playing with the decalage, running pressurized Tee Dees and turning within one or two seconds of the best "open half-A" times --- too fast for us Sonoma County hippies! So we decided not to go that route. Instead, we wanted a stable, light, realistic airplane that built quickly and would be good for sport flying as well as fun-racing. The Honker Rocket fills that bill!

The Rocket is just as easy to build as the original Honker. The wing is the same simple all-balsa design: two pieces of light sheet glued together with 1/4" undercamber. No ribs, no spars, no nonsense. The wide fuselage has plenty of

A fleet of 'Rockets' in various configurations. Note on HR-8, the aft end of fuselage was open for pushrod as in construction photos. This was on prototype only.

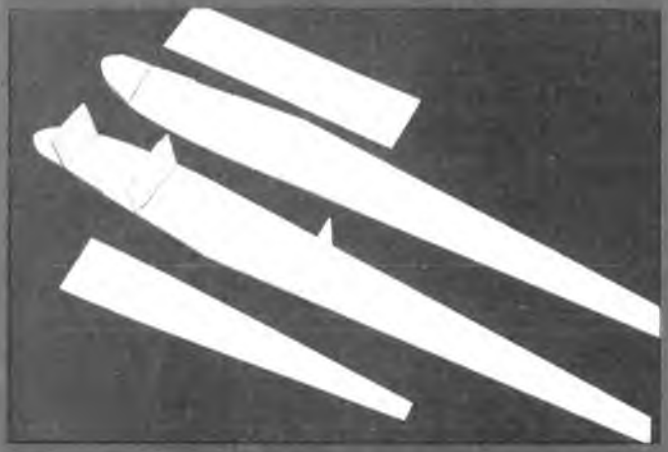
HONKER ROCKET

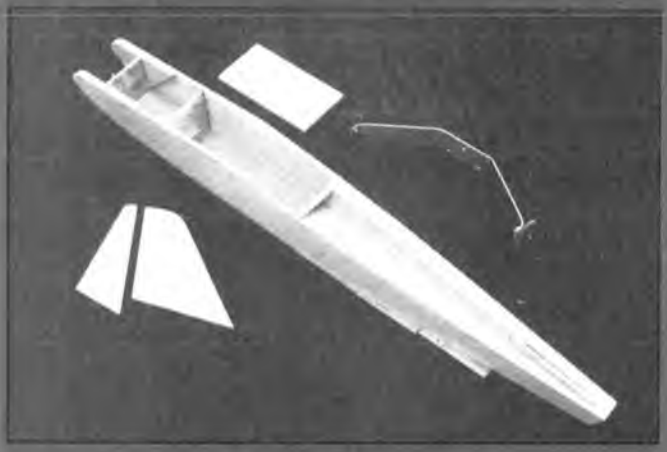
Designed By: Dave Thornburg

TYPE AIRCRAFT
Sport/Fun Racing
WINGSPAN
36 Inches
WING CHORD
7 Inches
TOTAL WING AREA
252 Sq. In.
WING LOCATION
Shoulder Wing
AIRFOIL
Undercamber
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
1½ Inch
O.A. FUSELAGE LENGTH
28¼ Inches
RADIO COMPARTMENT AREA
(L) 7" x (W) 2" x (H) 2½"
STABILIZER SPAN
12 Inches
STABILIZER CHORD (incl. elev.)
4⅞ Inches
STABILIZER AREA
58½ Sq. In.
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Bottom of Fuselage
VERTICAL FIN HEIGHT
4¼ Inches
VERTICAL FIN WIDTH (incl. rudder)
4" (Avg.)
REC. ENGINE SIZE
.049-.051 Cu. In.
FUEL TANK SIZE
Tank Mount or 2 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
2
CONTROL FUNCTIONS
Rud. & Elev., or Elev. & Ail.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage ..... Balsa and Ply
Wing ..... Balsa
Empennage ..... Balsa and Ply
Wt. Ready To Fly ..... 20-25 Oz.
Wing Loading ..... 11.4-14.2 Oz./Sq. Ft.





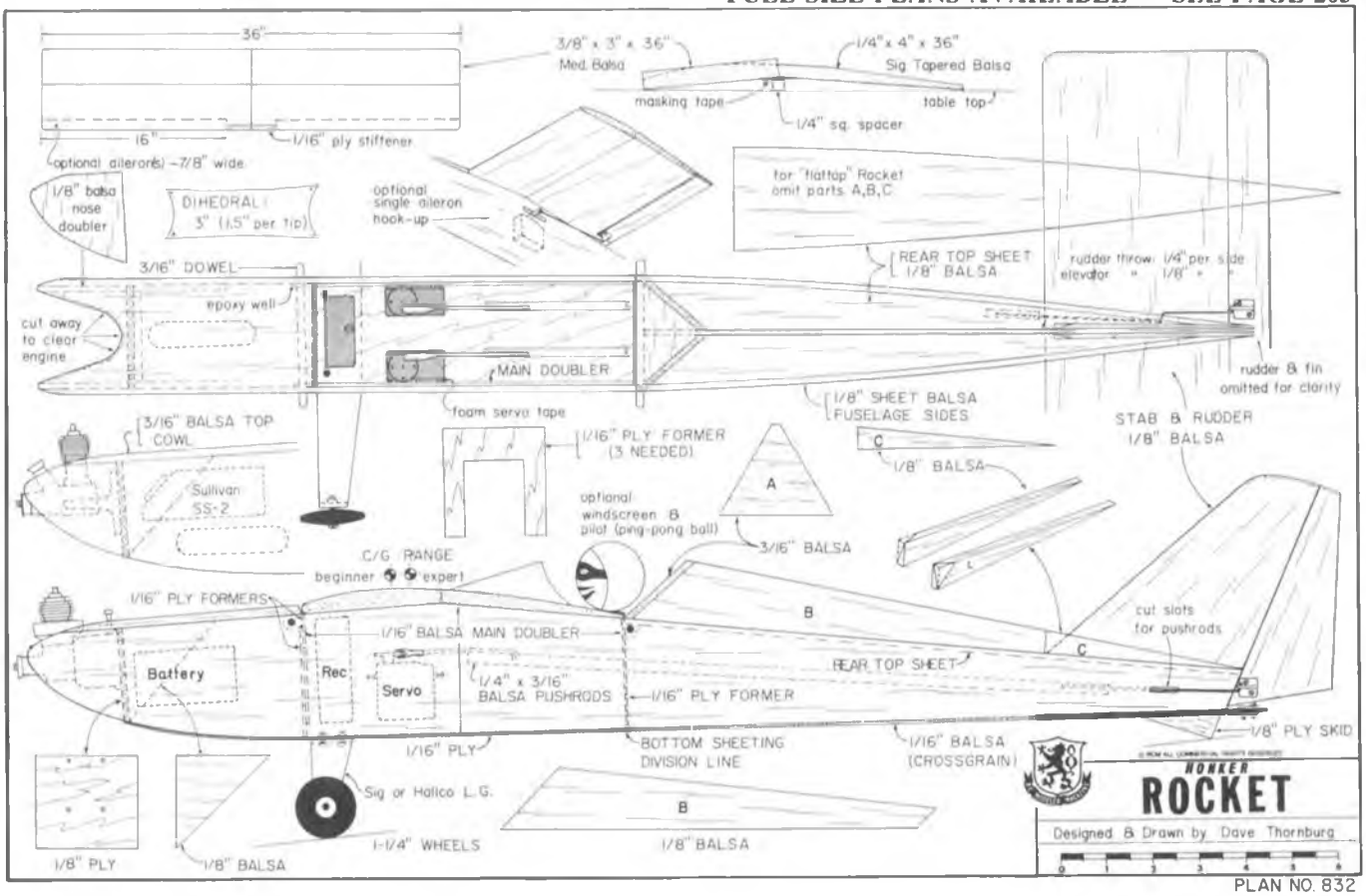
ABOVE LEFT: Fuselage sides with doublers and formers in place ready to join sides. ABOVE RIGHT: Ply bottom glued in place and held together with masking tape. LEFT: Fuselage complete minus top cowl. Bottom rear sheeting to be trimmed. BELOW LEFT: Completed 'Rocket' sanded and ready to be covered. BELOW RIGHT: Completed 'Rocket' together for some hangar flying. (Don't we all do it?)

working space around the radio. Up in the battery compartment there's room for a two-stack (ok, if you insist on using a Tee Dee or Medallion engine. The hole through Former One is large enough for a 500 mah battery pack, and I admit to having used one in Rocket number eight. But a 450 or 500 pack isn't recommended --- for this or any other half-A model. Weight is too important in small airplanes to toss in an extra ounce and a half of batteries --- get yourself a 225 pack and some sub-miniature servos and find out what half-A flying is **really** about!

Like any other design that's been around awhile, the Rocket has had a few modifications. The first thing the guys did to her was "strip her down" for racing: they left off the landing gear and the entire triangular turtledeck, and bolted the wing in place like the big boys do. Hot rodders! They added about ten mph to the Rocket's flying speed! For punishment, we put these "Flattop Rockets" into a seperate racing class. Just for photo purposes, I built one of these flattops, and I have to admit they **do** go together quickly. But I haven't been in a cold sweat to get her flying -- it looks a little rapid for my reflexes!

So you have to make some choices before you begin your Rocket. First, will it be "flattop" or "formula one" style? The flattop version saves time, and not only because there's no turtledeck to build --- there's no cockpit to detail, either. If getting into the air quickly is important, build a flattop and leave off the gear. Using cyanoacrylates and 5 minute epoxy, you can frame her up ready for covering in just over two hours. But my honest feeling about the flattop is, if you want a Junior Falcon, go buy one! I still prefer the more realistic

FULL SIZE PLANS AVAILABLE — SEE PAGE 203



PLAN NO. 832

"formula one" Rocket, with open or closed cockpit. The triangular turtledeck isn't hard to cover --- it can be done with a single piece of MonoKote, before the rudder is slipped into its slot. And a simple canopy, with either a plastic pilot or a nice death mask of your Aunt Piggatha, is hard to beat!

A second choice you have to make (who told you life was simple?) is whether to go with rudder or ailerons. Here are the pros and cons:

Rudder control is easiest to hook up. Everything happens inside the fuselage, using simple pushrods. If the wing pops off of an aileron bird, even in a non-fatal crash, it usually knocks the servo loose. Rudder linkages rarely get hurt in a prang. Rudder planes do sloppy axial rolls, but aileron birds won't spin. And a take-off without rudder control calls for extraordinary good-luck.

On the other hand, aileron birds are more crisp and precise to fly than rudder birds. They have lower dihedral, so they're more neutrally stable: if you drop one wing, it will usually stay dropped until you pull it back up with opposite stick. This gives aileron planes a "mechanical" look when flying: they respond to roll commands very quickly and with a machine-like jerkiness --- unless you're pretty smooth on the sticks. But for all-out precision --- for flying **through** the goalposts instead of around them --- most pilots seem to prefer ailerons to rudder. Ailerons give you a sense of being fully in charge. You have to fly an aileron bird all the time --- it isn't going to fly itself, the way a well-trimmed rudder plane does.

So the choice is yours. If you choose rudder, be certain you get the proper dihedral in the wing (1.5" per panel, 3" total.) For aileron flying, it's possible to leave the wing flat. This is another time-saver, but the penalty is in appearance: a wing with zero dihedral always looks like it's sagging, even though it's perfectly flat. I like about 1/2" per panel (1" total) and not just for looks alone --- it seems to make her a little more stable to fly. This effect is probably all in my head --- but then I do a lot of my flying there.

Construction

Cut out all of the fuselage parts from materials called for on the plan. Race planes take a beating. I like to build two or three Rockets at once, or at least cut the parts for three and squirrel away two "kits" for later. If you have a jigsaw or bandsaw, this is a snap: it's no harder to cut three firewalls than one. Don't bother cutting the 1/16" balsa main doublers to exact shape --- just cut a couple of sections of 3" wide balsa to 6⅞" length. You can trim them to fit the fuselage sides after gluing them in.

Begin by gluing a nose doubler to each fuselage side (one left, one right). Use a bit of care here, because these doublers align your firewall, which should meet the top edge of the fuselage at exactly 90° to give the proper downthrust. I like Goldberg's new Super Jet for doublers, although a **thin** coat of 5 minute epoxy will do. (Never use white glues for doublers --- they warp!) Drill the firewall for your particular engine and epoxy blind nuts in place on the rear. Next, epoxy the firewall to one of the fuselage sides, flush against the nose doubler. Use a 90° triangle or one of the firewall doublers to make sure it dries exactly perpendicular to the fuselage side (right thrust isn't necessary in the Rocket.) Glue a firewall doubler in place behind the firewall.

At this point, lay both fuselage sides on the plan and mark the position of Former One on each side carefully. Build Former One over the plan and glue it to the fuselage side, once again checking to see that it dries perpendicular. Add a main doubler sheet, and Former Two right behind it (open end up). You should now have two formers and a firewall sticking up from the same fuselage side. Run a bead of epoxy down their edges and lay the other fuselage side in place. When dry, add the second firewall doubler and main doubler. Add the top cowl sheet and the 1/16" plywood bottom. **Tip**: use masking tape to hold sheeting in place while the glue dries.

Now pull the two fuselage sides together around the rear top sheet. Hold things temporarily with tape while you check alignment by laying the fuselage on its side on a flat surface and measuring the gap at the rear. The gap should be the same on both sides, about 1⅛". When the rear is aligned, glue the rear top sheet in place, then add the crossgrain bottom sheeting. Don't forget to leave the final 4" open for the stabilizer. If you're building a "flattop", your fuselage is now complete. Sand all the corners round

and she's ready for plastic film. You could just paint it, instead, but I don't recommend it. Paint is much heavier, and it doesn't add any structural strength. In fact, it makes the wood more brittle. Stick with the plastic film.

If you're building the "formula one" style Rocket, adding turtledeck parts A, B and C is next. Part B must be aligned with care, otherwise your fin and rudder will be off-center later. Sand the bottom angle on Part A before gluing it in place. Use the fin for a spacer between the two C's during gluing, but be careful not to glue the fin itself --- it slips in place later, after covering. When A, B, and C are dry, sand them lightly to the cross-section shown, and give your whole fuselage the once-over with 220 sandpaper before covering it.

The rudder and stab can be flown with only a minimum of sanding to radius all the corners, but your Rocket will look a lot more "pro" if you'll take the time to feather the elevator and rudder as shown. Bevel one edge of each for hinging, as shown on plans. Don't be afraid of plastic film hinges: they're the lightest and strongest and easiest of all to make. When you have both tail surfaces covered, add the control horns and then epoxy the surfaces to the fuselage. You'll have to cut away the film covering over the rudder slot before slipping it in place.

The wing is built from a piece of 3/8" x 3" soft sheet and a soft piece of 1/4" x 4" Sig tapered balsa. If you can't locate the tapered sheet, use 1/4" x 3" stock and glue a 1" strip of trailing edge to the rear to bring it out to a full 4". Pick your wood carefully --- the finished wing, ready to cover, should weigh no more than five to five-and-one-half ounces. Bevel the 1/4" sheet appropriately (the angle is 7°, if you hapen to have a shaper) to make a tight joint with the 3/8" balsa. Use masking tape on the underside of the joint while the glue dries, and jig the undercamber with a piece of 1/4" square balsa under the joint line. (This is how we test racing wings to see that the undercamber is legal: put them on a flat surface and try to slide a 1/4" dowel under them. If it won't go, then the wing was built too flat, or too much was sanded off the bottom of the leading edge. Either way, the wing is illegal.) When the wing dries, shape it to the airfoil section shown, using a block plane (easy!) or sanding blocks with progressively finer paper (hard!).

If all this sounds like too much hassle, you can order hand-built wings, machined to the proper airfoil and finish-sanded, from the people who make Honker kits. Price is $11.95 plus $3.00 shipping from: Mark's Models, 1578 Osage Street, San Marcos, CA 92069.

You can cut and glue the dihedral joint either before or after you cover the wing. I prefer before --- it's neater. Either way, you want to mark the centerline carefully with ruler and 90° triangle --- no room for sloppy measuring here! Cut the wing in half with an X-Acto knife or coping saw. Block-sand each side to a slight angle, depending on dihedral desired. Try to make as neat and tight-fitting a joint as you can. When you're ready for the 5-minute epoxy, punch each root full of pinholes, 1/8" to 1/4" deep. Rub the epoxy well into these holes before joining the panels. This will give you dozens of miniature dihedral braces --- a strong joint! Block one wingtip up at the proper dihedral (1" for aileron, 3" for rudder) and allow it to dry throughly. Sand the joint smooth and go back over it with a second coat if you wish, using a moistened finger (epoxy tastes awful!) to smooth the glue before it sets. Cover the wing, and add any cockpit details you wish.

Go over all exposed balsa, especially the engine compartment, with dope or epoxy paint for fuel proofing. Don't skimp --- fuel proofing is what makes a model **last**. I like to pour a 1/4 ounce or so into the battery compartment and slosh it around. But you'll want to mount the engine first, or the paint is sure to clog the blind nuts. Drill the holes and mount the landing gear, then double-coat the whole inside in the gear area with epoxy glue, for extra strength.

The object of radio installation is always to get every piece as far forward as possible, to avoid tail heaviness (**nobody** builds models too nose heavy --- don't worry about it.) Wrap your batteries in foam rubber and place them clear up against the firewall, stuffing the rest of the compartment with foam rubber or wadded paper to keep things in place. Pad the receiver and place it against Former One. I use double-sided 1/16" foam tape for mounting my servos, even though most manufacturers don't recommend it; I've never had a servo fail due to vibration. But then, I fly mostly Half-A ships --- and gliders! Position your servos snugly against the receiver, to hold it in place. Make up two pushrods and attach them to the surfaces with the 3/64" wire to the rear. Never put adjustable clevises on the rear of a small airplane like this --- put them up front on the servo end. And keep even the 3/64" wire as short as possible, because every single **gram** counts when it's that far aft of the Center of Gravity.

For aileron control, follow the drawings on the plans. Two ailerons are shown, but I've flown Honkers for years with only one. It's plenty.

Now what about wing hold-downs? There are three tried-and-true methods for the Rocket. First is the conventional rubberband system: two 3/16" dowels and four #62 rubberbands. It doesn't look too fancy, but it's simple. You need a piece of 1/16" ply on the wing trailing edge to keep the bands from sawing into the wing. And be sure to epoxy the dowels well, down inside the fuselage. The second system is internal rubberbands, stretched between a J-bolt through the wing dihedral joint and another J-bolt through the fuselage bottom. Again, lots of epoxy for safety. And don't ever use a single rubberband, even doubled or tripled. What if it breaks? The third system is a pair of Sig threaded blocks (part #SH219) epoxied to either fuselage side (I like a little 1/16" ply here, to spread out the strain.) Use 8-32 nylon bolts, and put large thin washers under the heads to keep them from pulling through the wing. Very pro!

Flying:

Your Honker Rocket **must** balance in the range shown. If you've built the tail light, shaved off every excess gram, this should be no problem. Don't ever try to fly a Rocket (or any small R/C plane) in a tail heavy condition; you're almost sure to crash. Even moving the CG as little as 1/4" behind the range shown makes the plane ultra-sensitive to the elevator. Be certain that the controls move no more that the distances shown.

There are only two important angles to determine longitudinal trim: **decalage** (the difference in angle between the wing and stab) and **downthrust** (the nose-down angle of the engine which keeps the plane from trying to loop or stall). Both these angles are built into the Rocket's fuselage sides, so you should have no trouble achieving a flat glide with the correct CG. Just be sure the rudder and fin are straight, and your engine has no side thrust, and your Rocket should fly "right off the building board."

Always launch your Rocket with plenty of airspeed, and directly into the wind. Like the original Honker, it will probably seem sluggish for the first couple of seconds of flight: the tail will go down, she will seem to wallow, then start dogging along like a slow and stable trainer. Then, just about the time you're beginning to think, "What a boring airplane," the tail suddenly comes up, the wing goes on step, and off she goes --- like a Rocket!

Troubleshooting:

Here are a few tips for flying your Rocket that apply to just about all Half-A R/C planes. If you're having more frustration than fun with Half-A, chances are one of these four suggestions will help.

(1) Model won't climb. Here's the scene: your plane staggers along after launch at the same five feet of altitude until your first rudder command --- which promptly flips it on its back and crashes it! Sounds like your plane is either underpowered or overweight, or both. A Cox Black Widow or Golden Bee should fly a 20-25 ounce model at sea level with power to spare, **provided the engine is running properly**. Are you using a high-nitro fuel, such as Cox Racing Fuel? Don't waste time and money on cheaper "sport" fuels: Cox Racing, Fox 40-40, K & B 1000 are worth the extra money when you're flying R/C. Especially with the Golden Bee, which doesn't have the double-ported cylinder of the Black Widow and, hence, is a bit weaker.

And how about your prop? I know a Top Flite nylon will outlast a Cox plastic ten to one, but it won't deliver the thrust that a Cox will. Our standard racing prop for the Widow is the Cox 5.5/4 gray plastic; it's the prop I use for sport flying, as well. And check your glow head: is it seated tightly? Did you forget to install a gasket with it? Look over the info sheet that comes with the engine for further suggestions on how to

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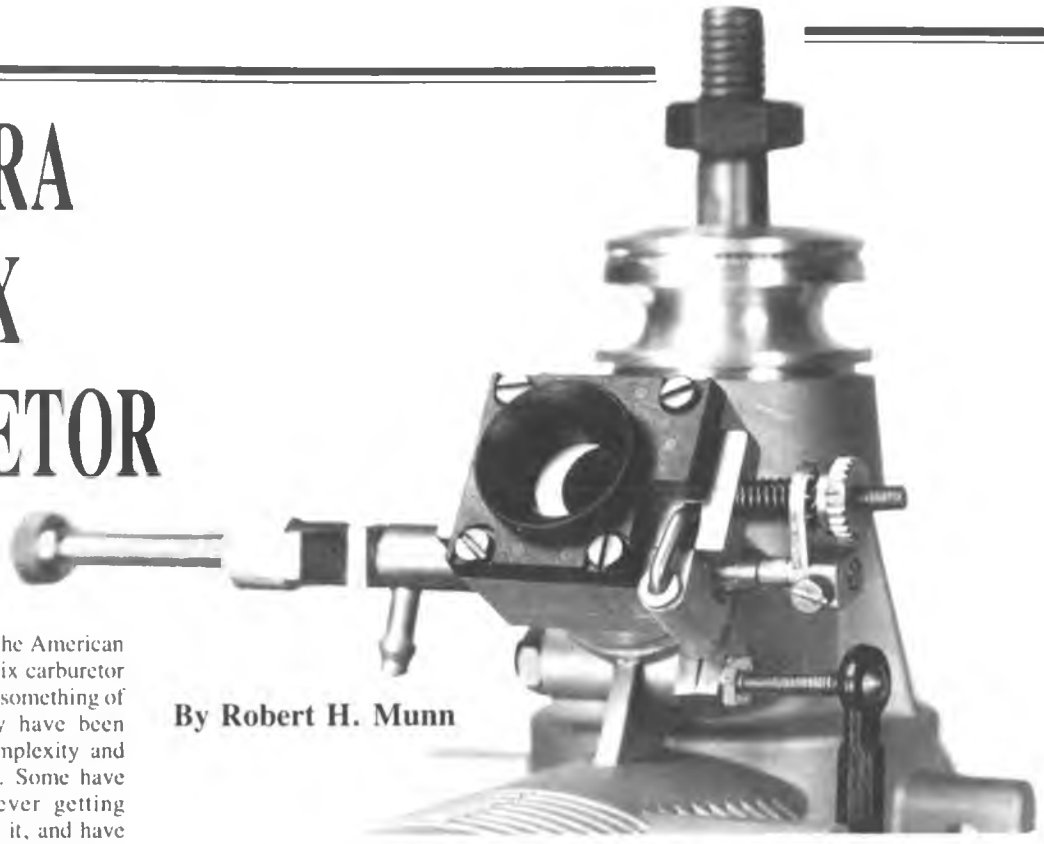
The WEBRA DYNAMIX CARBURETOR

BEAST OR BEAUTY?



By Robert H. Munn

Since it appeared in the American market, the Dynamix carburetor seems to have been something of a contentious gadget. Many have been frustrated by its apparent complexity and tendency to be tempermental. Some have simply given up hope of ever getting dependable performance from it, and have set the Dynamix aside for an often times more expensive replacement. Webra's instructions are incomplete and misleading, so perhaps the following discussion of the Dynamix operation and some of its special pitfalls will help us understand what is happening when the knobs are tweaked.

To start with, **take special note** of the following points while considering the parts shown on the simplified diagram, and how they interact:

Needle Valve A adjusts, and in effect limits, the maximum amount of fuel that can be drawn into the carb (at any given fuel pressure — more on that later). Once A has been set with Air Control Slide Valve C fully open, the position of C can make the fuel/air mix richer but not leaner.

Metering Valve B allows maximum flow of fuel only in a position in which its hole is within Orifice Y in the meter valve sleeve.

If Meter Valve B is set farther to the left in relation to Air Valve C (such as if knurled Nut D has been somewhat unscrewed counter-clockwise) then the hole in B will no longer be fully within Orifice Y. A reduced amount of fuel can be drawn through the tapered groove in B.

If the foregoing situation prevails, no setting of Needle Valve A can richen the mixture, since the maximum fuel flow is being governed by the position of the tapered groove in B in relation to the edge of Orifice Y.

If at full throttle position, the hole in B is not somewhere within Orifice Y, very little "accelerator pump" effect can be obtained when the throttle is opened suddenly, thus compressing the fuel chamber located between Needle Valve A and the hole in B. The engine will almost invariably starve in these cases.

A typical sequence of unhappiness often begins with the pilot trying to obtain a good high speed setting. Let's assume that the Dynamix is installed as received, and everything seems to be functioning properly. With the throttle wide open, the pilot adjusts Needle Valve A in or out until things sound about right. Then he closes the throttle to low speed and the engine seems to starve and die. From force of habit, many will then unscrew Nut D counter-clockwise (as Webra instructions also tell one to do to richen the mixture) . . . but we can see that such an adjustment really makes the idle setting more lean. When he re-starts, he will probably also find that the high speed setting is wrong now . . . also too lean. Many complain that they don't seem to be able to get the engine to run rich with the Dynamix. We can see that it is probably because the adjustments started with Meter Valve B too far to the left (Nut D backed out too far) so that even at full throttle the hole in B did not come within Orifice Y, making it impossible to get full flow of fuel no matter how Valve A is opened. Notice also that if Meter Valve B is well to the left, the pilot could properly have screwed Nut D clockwise and gotten a slightly richer idle mixture. But when he goes back to full throttle, the mixture will now be too rich. He then screws Valve A in again to lean out the high end, and finds the low setting too lean. What frustration! What despair! What language!

DYNALAW NUMBER ONE:

The hole in Meter B must always be within Orifice Y at full throttle (with C wide open). Only then can one get a proper full throttle setting by adjusting the main Needle Valve A, and return to that correct setting every time the throttle is returned to wide open. There is just a little leeway in this position, which you can determine quite accurately and perhaps will want to mark on Meter B for reference. Check to see that the hole in Meter B is clearly within Orifice Y. Start the engine and set a good steady and slightly rich running adjustment with Valve A. Now, still at full throttle, unscrew Nut D until the engine begins to pick up speed or sound a bit leaner . . . you will now be moving the hole in B far enough to the left that the fuel flow is being restricted. Now screw Nut D in one or two clicks to restore the original RPM, and mark this full-flow position with a scratch on Meter B right against the end of its sleeve. Remember now that no matter how you may want to tweak the knobs, that scratch must **never** be away from the end of the sleeve in an outward direction when at full throttle. It can and probably will be invisible inside the sleeve after idle adjustments are completed.

DYNALAW NUMBER TWO:

Never change the setting of Needle Valve A except when the throttle is wide open. You can now see that, if you attempt to adjust the idle by doing this, it will give an incorrect high speed setting. Use the main Needle Valve A to achieve the basic (and not too lean) high speed fuel/air mix appropriate to the fuel, plug, propeller, and atmospheric conditions.

Now for the idle adjustments. Assuming that the engine is well broken in, close the throttle slowly to about 1/4 position. If you have started the procedure with the hole in Meter B just at the very left edge of Orifice

Y when the high speed was set, you will normally find that at lower speeds the mixture will be too lean. Screw Nut D clockwise to richen the mix, going just one click at a time because that little groove in B is very sensitive when the air volume has been reduced. You can then continue to close the throttle lower and lower, adjusting the mixture **only** with Nut D. If you have started by setting the high speed with the hole in Meter B well within the Orifice Y, the mix will be considerably richer as you close the throttle because it will not begin to lean out until the hole in B passes into the sleeve. You can safely lean the idle mix by unscrewing Nut D counter-clockwise so long as your reference mark on B remains within or at the end of the sleeve when in the full throttle position.

I have had only one Dynamix carburetor that demanded a leaner mix at low throttle when the starting point was with the hole in B at the left edge of Orifice Y. If you encounter this, having set the main Needle Valve A at the safest lean position you can tolerate for high speed, you can achieve further leaning as follows:

(1) Remove Meter B by sliding the whole assembly to the left and loosening set screw Z. Carefully flow a little solder along the sides of the groove to the right of the hole. You must maintain a gradual taper to the shape of the groove or the idle adjustment will become very critical. Making the groove smaller gives a leaner mix at any position of the groove relative to the edge of Orifice Y, so fill in just the tiniest bit. When cleaning off excess solder from Meter B, use great care not to get the outer surface out of round, as fatal air leaks can result. **OR**

(2) Remove Meter B and carefully file away the right side of the hole, making it into an oval that extends further to the right into the long part of the groove. This will allow you to position Meter B further to the left while maintaining a full flow opening in Orifice Y. But you can see that idle settings will begin leaning earlier.

From this discussion you can see that during break-in, with the high throttle set well on the rich side, it may well be impossible to get a good idle without adjusting Meter B so far to the left that its hole remains inside the sleeve when set back to high throttle. Don't try to get any really low idle speed until your engine is thoroughly broken in. On the other hand, it is now understandable how a properly set carburetor will provide an "accelerator pump" effect, giving a squirt of fuel when opened suddenly. The chamber between the hole in B and Needle Valve A is then momentarily under additional pressure, forcing fuel into the carburetor throat (as well as some back through the needle valve).

Let's look now at some of the mechanical pitfalls peculiar to the Dynamix.

DYNALAW NUMBER THREE:

Be sure that Meter B is in its correct position when slid into its sleeve and carb body. In one case I found Meter B to be reversed so that the long channel ground in the rear and extending from its hole to the far end of Meter B was facing into the carburetor instead of the grooved side. Idle Nut D has no effect whatever in this situation, since whatever fuel is being admitted by Valve A flows freely through the channel and dumps into the carburetor. Meter B must be inserted into the linkage so that its end is flush with the outer surface of the link against which Nut D operates, and so that its tapered groove is centered in Orifice Y. Visual inspection can verify this. It is helpful to file a little flat precisely in alignment on the end of Meter B so screw Z holds it exactly in position.

DYNALAW NUMBER FOUR:

Be sure that the sleeve, or brass body, for Meter B is in the correct position with Orifice Y exactly flush with the inside of the carburetor throat. One of the most common problems results when someone wants to remove the main Needle Valve seat for cleaning purposes. It is almost automatic to put pliers or wrench to nut X and unscrew it counter-clockwise . . . but what's this, it doesn't unscrew . . . more force and then a little movement. You have now rotated the Meter B sleeve out of alignment with the carb throat. That's because nut X is a jam nut which is turned counter-clockwise to hold the needle valve seat in position after it has been screwed onto the threaded part of the sleeve. Hope you noticed this before you started! But if you have accidentally rotated the sleeve, it might be possible to re-position it by putting clockwise pressure on the needle valve seat so that it will rotate back into position. You may be able to get away with this once or twice before the sleeve becomes so loose it won't hold its

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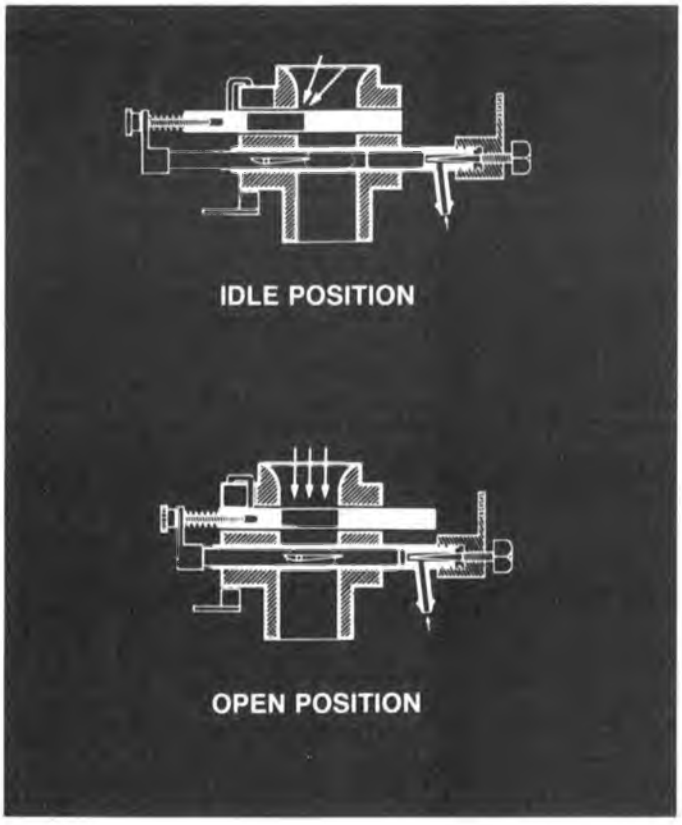
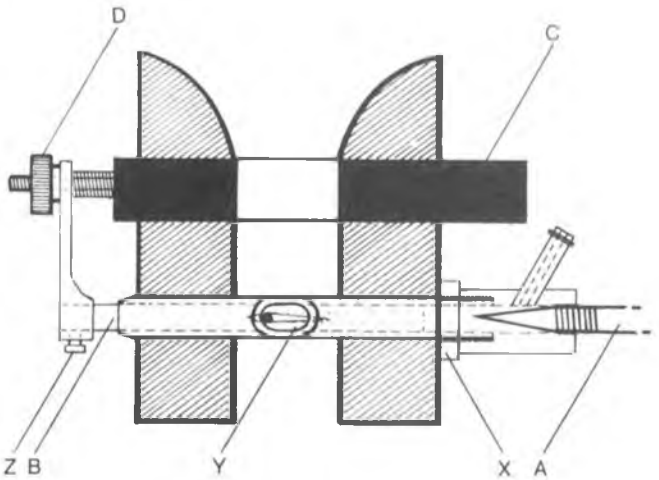


SIMPLIFIED WEBRA DYNAMIX (FULL THROTTLE POSITION)



A — MAIN NEEDLE VALVE (HIGH SPEED)
B — FUEL METER SLIDE VALVE (LOW SPEED)
C — AIR CONTROL SLIDE VALVE
D — MIXTURE ADJUSTING NUT
X — NEEDLE VALVE SEAT NUT
Y — ORIFICE IN FUEL METER SLEEVE
Z — METER RETAINING SCREW

ANYONE CAN DO A BALANCING ACT

By Frank Tiano

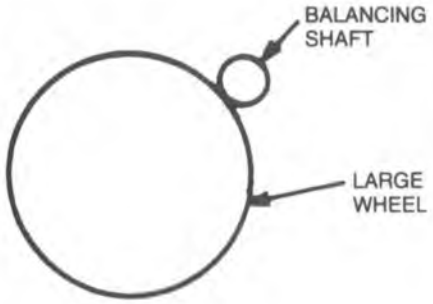


FIGURE A

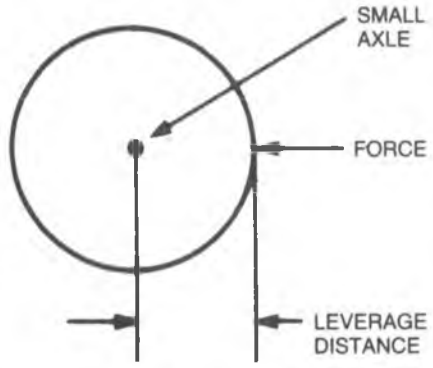


FIGURE B

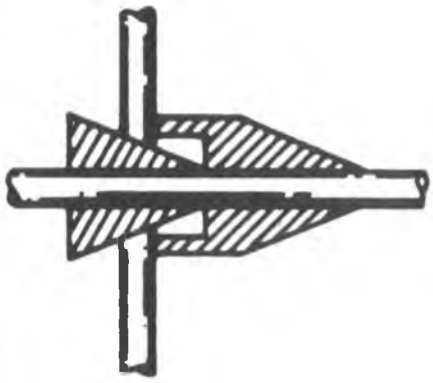


FIGURE C

Do you ever wonder why some guys never, or hardly ever, have radio failures? Or why those same pilots get a thousand rpm's more from the same engine you have? Did you ever notice that it's rare for them to have anything loosen up in flight from vibration. In other words, are they lucky, fortunate, or do they have the inside scoop on how to make things run faster and longer without the risk of total destruction. Actually the reason is that they take three feathers from a Zulu Bird and wave them over their aircraft before every flight!

All kidding aside or behind, those fortunate few are just a little more careful during the preparation of their models than some of the rest of us. Other than good building habits that insure strong, straight structures, there are many other things that can be done to insure the longevity of our precious model aircraft. Leaving them home hanging from the ceiling is the easiest. But if we want to fly for a while, one of the most important things we can do for our own sake and that of the airplane is to balance anything and everything that turns and that might be the cause of vibration. Primarily this would include props, spinners, backplates - - - not wheels, output arms and clevises. It may not seem like much at first, but when you stop to ponder, any moving part that's out of balance will shimmy and shake somewhat. And all that shaking must produce some sort of vibration farther on down the aircraft. And those parts which are shaky eventually will weaken and force some other part to loosen and possibly fail. That makes sense, doesn't it? It's really a vicious chain reaction that takes very little time from start to finish.

Spinners and backplates are easy to balance, High Point instructions tell you how.

An out of balance prop can rob your engine of rpm's to the degree that performance suffers drastically. As the vibration carries on rearward, the fuel stands a good chance of foaming in the tank. A little aft, the receiver will be doing the Irish Jig and the battery pack will be going through hell. The pots in the servos start to jitter, passing on these pulses to the flying surfaces and — Presto — instant accident!

Taking it way back from the beginning to the prop and spinner combination let's see what really happens in a bit more detail.

An out of balance propeller will definitely turn less R's so we don't have to be a college grad to know that the plane will probably fly a little slower. But if that out of balance prop is causing enough vibration to foam our fuel, still another problem exists. When fuel foams, the engine cannot get a proper fuel

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The High Point Balancer comes in a neat case for protected storage when not being used.

Legs can be extended to allow large props to swing through.

A BETTER WAY TO FINISH FOAM WINGS

By C.J. Viosca

Cutting the glass cloth to fit wing. Allow to completely envelope the wing.

Apply 50-50 aliphatic resin/water mixture — let dry and apply second coat.

Tack cloth at trailing edge of wing, pull tight, tack at leading edge, pull to trailing edge and tack again.

The currently accepted method of finishing foam wings is by covering them with glass cloth and epoxy or resin then priming them and painting.

A better, faster, lighter way is now possible, thanks to Eddie Chavez — master model builder.

Necessary materials required are: Hot Stuff, Titebond, glass cloth, brush and Dap spackling compound.

Prepare your foam wing (and/or other foam parts) by sanding lightly, being careful not to sand hard enough to ball up the foam. If necessary fill any holes or bad spots in the foam surface with Dap spackling compound.

Prepare a mix of 50% Titebond glue and 50% hot water, and paint onto the foam surfaces. After this has dried, smooth out any rough spots by light sanding and apply a second coat of the 50/50 mixture. When the second coat has dried, you are ready to apply the glass cloth.

Normally two ounce glass cloth will be used on most models, but you should use your own discretion. On small models or foam tail sections you should use 3/4 or 1 ounce cloth.

Start by cutting the cloth to fit the foam wing (or foam part) with some overlapping and allow for the material to go completely around the wing in one piece. (Example — from trailing edge over wing, around leading edge, over underside of wing and back to trailing edge.)

Tack the cloth at the trailing edge with Hot Stuff, pull the cloth around the leading edge and tack along the leading edge as you pull the glass cloth taut. Now pull the glass cloth from the leading edge back to the trailing edge and tack again along the trailing edge.

Apply Hot Stuff in 4" squares and rub with applicator made from foam or felt pad in a polyurethane bag.

Take a polyurethane bag and put a piece of felt or foam padding inside to use as a rubbing aid. Apply Hot Stuff to the glass cloth in an area about 4" square and gently rub with your pad. This rubbing action spreads the Hot Stuff and, at the same time, pushes the glass cloth tightly to the surface.

Continue applications of Hot Stuff in 4" squares until the wing has been completely bonded. Now you have a neat, strong and light wing. Sand if necessary, then apply two coats of K & B primer, sanding between coats. When sanding the primer use care not to sand through into the glass cloth. When satisfied, apply K & B epoxy paint.

If you are wondering why the Titebond glue coatings are required, it's for two reasons. First, it seals the foam and prevents the Hot Stuff from dissolving it; second, it adds strength.

Recently, a friend of mine built a Mr. G's Widgeon and, after covering the foam wing with balsa sheeting, he asked me how I would suggest he finish it. My answer was to use a modification of the above outlined method. We painted the balsa sheeting with only one coat of the Titebond 50/50 mixture to seal the pores of the wood. (If you don't seal the pores of the balsa sheeting, the Hot Stuff will bleed through and dissolve the foam.) We then applied the glass cloth with the Hot Stuff, then primed and painted as previously stated.

One other modification of this method was used by me to cover the center section of my Bud Nosen Big Stick wing. It is applicable to all center sections. If the model has a built up wing as mine has, the

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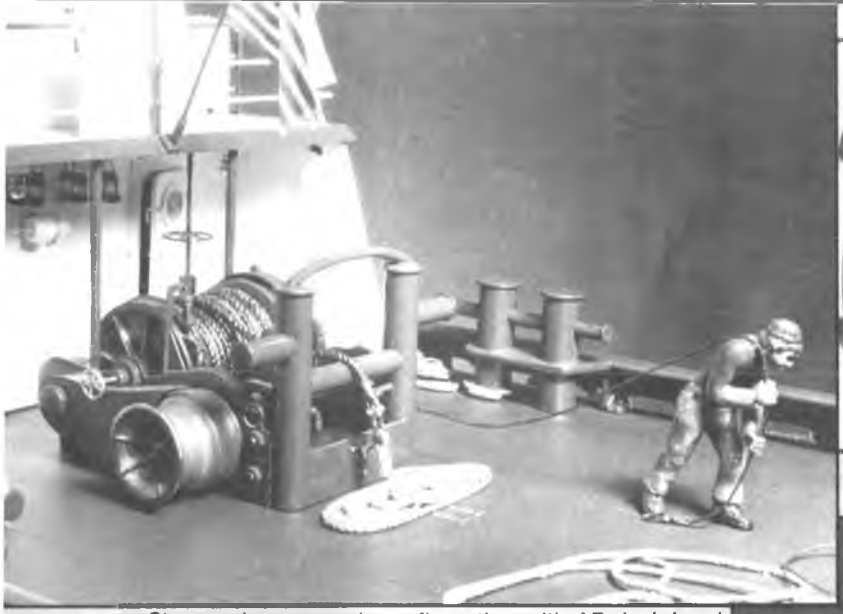
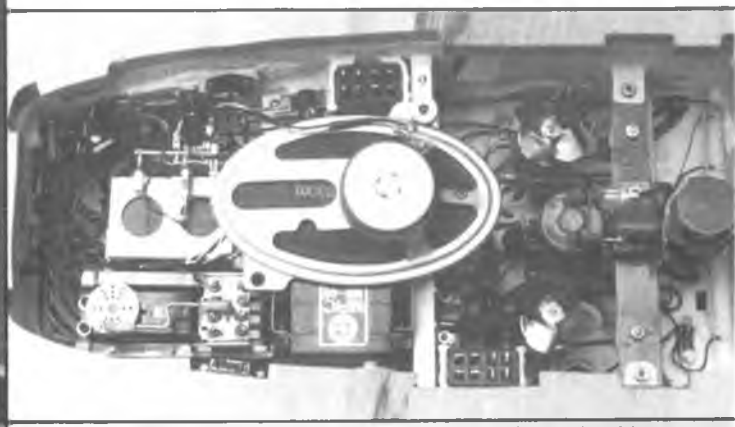
Sanding the glassed and primed surface.

Completed surface, ready for paint.

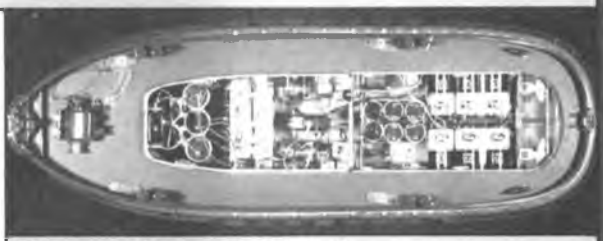
Completed wing — a hard, smooth, glossy, finished product.



Stern and rear wench configuration with AB deck hand made of Devcon ST50.

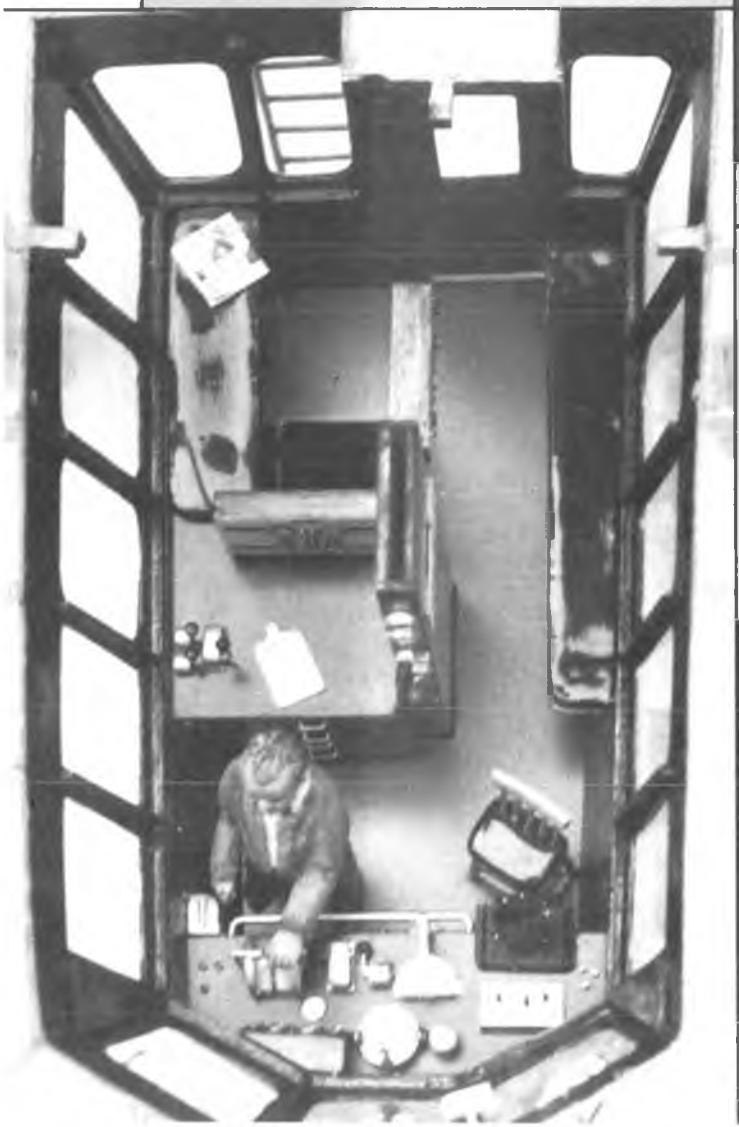


Layout of electronic equipment as viewed from the underside of the deck cabin.



Placement of power plant in hull.

View of starboard side showing position of ladders, railings and other components.



LEFT: Interior detail view of pilot house, note newspaper on rear cushion by window. RIGHT: Bow and forward wench configuration. BELOW: A view of the pilot house showing the captain made of Devcon ST50 liquid steel.

By William R. Shaub

THE SHELLEY FOSS

A Tugboat Built to a T

When I sent Dick Tichenor, Assistant Editor of RCM, my proposed cover, I told him I had a couple of ideas for an article to go with the cover picture. Dick called me about my ideas, and I told him that one of my thoughts was a story about putting together the cover photo. Dick's reaction was that RCM received more than its share of cover photos and he suggested I write about one page on my Shelley Foss tug. After Dick hung up, I had to ask myself how does one write a page on three years and nine months of work totaling over four thousand hours? Okay, you say, very thoughtfully.

Approximately four years ago, Dr. McMeel, a retina specialist in Boston, informed me that I needed an eye operation which would take place in a month. My reaction was simple. I purchased a Dumas Shelley Foss tug kit with the idea of keeping my mind off the operation until it was time. I promised my wife that it would be a fun boat to sail and there would be no scale details like the Emma C. Berry schooner I had just finished. I managed to complete most of the basic hull construction before the operation. The operation was a success, but because of a condition I have in the eyes, there would always be problems of hemorrhaging and loss of vision. I guess with this in the back of my mind, I became obsessed with testing my sight and began wondering more and more about details that were missing in the basic kit.

I called Jay Brandon at Dumas and asked if they had more scale information. Jay told me that Tom Hibben of Seattle had built a Shelley Foss and had a set of pictures he had taken. I called Seattle and got Tom's brother who informed me that Tom moved to Texas. I called Tom in Texas and he graciously agreed to send me his couple of dozen slides of the Shelly Foss. I made copies and a set of black and white prints. I was in business.

The scale used on this model was 1/30th or 4/10ths of an inch to a foot. This scale is not common, but the Dumas kit hull is 36" long and the original tug's length is 90'. Fortunately, I had a good dial caliper to work with. I wouldn't recommend trying scale work without one. Using a dial caliper allows you to make accurate measurements down to 1/4" scale or, in the case of 1/30th scale, .002.7 of an inch equals 1/4". The dial caliper allows you to scale from photographs with a high degree of accuracy.

To give you some insight as to what went into the making of the Shelley Foss tug, beyond the basic kit hull construction, there are 334 parts with a total of 4632 pieces made for those parts. An example would be the rear wench is considered one part, but it took 115 pieces to construct that rear wench. The part is the item and the pieces are what was needed to make up that item. There is 100 feet 6 inches of wire used in the electrical system with 33 miniature wheat and rice 12 volt light bulbs used, all replaceable. Each part had to be scaled, then materials had to be worked out and then constructed.

I think the enjoyment of working in scale is finding a solution to what seems to be an impossible problem. Sometimes hours and sometimes days were spent on a single problem. Scale many times has to be an illusion of the real thing, and this takes time and imagination that is not always realized when one looks at the finished product. An example would be the cable used on the rear wench. Heavy cord was dyed black, then silver powder was mixed into the cord and coated with gloss medium acrylic polymer (found in art stores and used for acrylic painting). Your finished effect — steel cable. Matte medium is excellent for coiling and arranging line, rope, etc. Soak and arrange on waxpaper, allow to dry. Presto, it stays where you put it.

Before discussing the R/C equipment, let's go over some of the construction. The hull is mahogany plywood covered with

Deck cabin, cabin deck, pilot house, pilot house ceiling, and pilot house deck with mast.

Ladders being assembled with silver solder. Heavy gauge steel was used to transfer heat away from brass joints.

fiberglass. I used Hobbypoxy Formula 2 with the fiberglass because of its elasticity and pot life (working time). All railing, ladders, prop shafts, and bracing along with the Kort Nozzles (the rudder system used on the Shelley Foss) are silver soldered. With a small torch and a little patience, silver soldering ladders and railing eliminates the problem of joints breaking open after the project is finished.

The four bladed brass props were designed and built by Ed Hughey of Dial-A-Prop. The Kort Nozzle, shafts, supports and props were chrome plated, because the original Shelley Foss tug is stainless steel. The bumpers and tires presented their own problems. Jigs had to be made to line up the small rectangular rubber pieces which were then sewed together with nylon thread. The bumper rubber came from bicycle inner tubing. Weeks were spent trying to find a tire the right scale size. I found a tire the right scale size made of plastic. From this tire I made a half dozen two piece plaster molds and cast the fourteen tires needed using Abrub RTV rubber mold material and added black coloring agent that is used to color epoxy. The finished tire is a very flexible rubber. They were put on a lathe and different treads were cut into the tires.

I mentioned before that I had an excellent set of photographs which made it easy to detail and scale the exterior of the tug, but I needed detailed information on the Pilot House. I called Foss Tugs in Seattle for more information and wrote Don Hogue, Administrative Assistant, a letter explaining my needs. Don sent me a set of colored prints that gave me every detail of the Pilot House from ceiling to floor. It was a "scale nuts" dream. I won't go into detail but my Shelley Foss Pilot House has every item including the pencil sharpener, along with a clip board on the chart table, and on the clip board is a letter from Mr. Hogue. It is photographically reduced to scale and is readable with a good magnifier.

The figures (captain) in the Pilot House and the AB deck hand on the after deck were made using wire for the armature (skeleton) and built up with Devcon St50, a steel-like putty used for repairing metal parts. It can be shaped, ground, drilled, etc., when dried, and produces a very durable figure.

Another problem was the American flag needed for the Shelley Foss. A standard flag is 3' x 5'. There was no way I could ever find a 1/30th scale American flag, so I cut two stencils on silk screen film, one for the blue field and stars and one for the red stripes, and silk screen printed my flag on very thin nylon with textile inks. Why all that trouble for one flag? The answer is simple. Once you're commited to scale, you search for perfection.

By the way, silk screen printing is easy. A good book at the library will teach you how. While we are on the subject of stencils and printing, the best stencil material I have found for lettering is Carlan Decorative Covering found in hardware and variety stores. It's a self-adhesive vinyl, like shelf paper. It has just the right amount of tack, easy to cut fine detail, and being vinyl it holds together well; the Shelley Foss lettering on the tug was done with Carlan.

The electronics and R/C equipment in a scale model requires precise detail and planning. My transmitter is a six channel MRC 7662. The stick configuration was not designed for nautical use. I wanted to modify it so that it would be more compatible with boating. I explained my idea to Bruce Tobojka, a technician at MRC, and he assured me it was feasible, and when I finished the modification, he would check it out.

I replaced the two axis sticks with four

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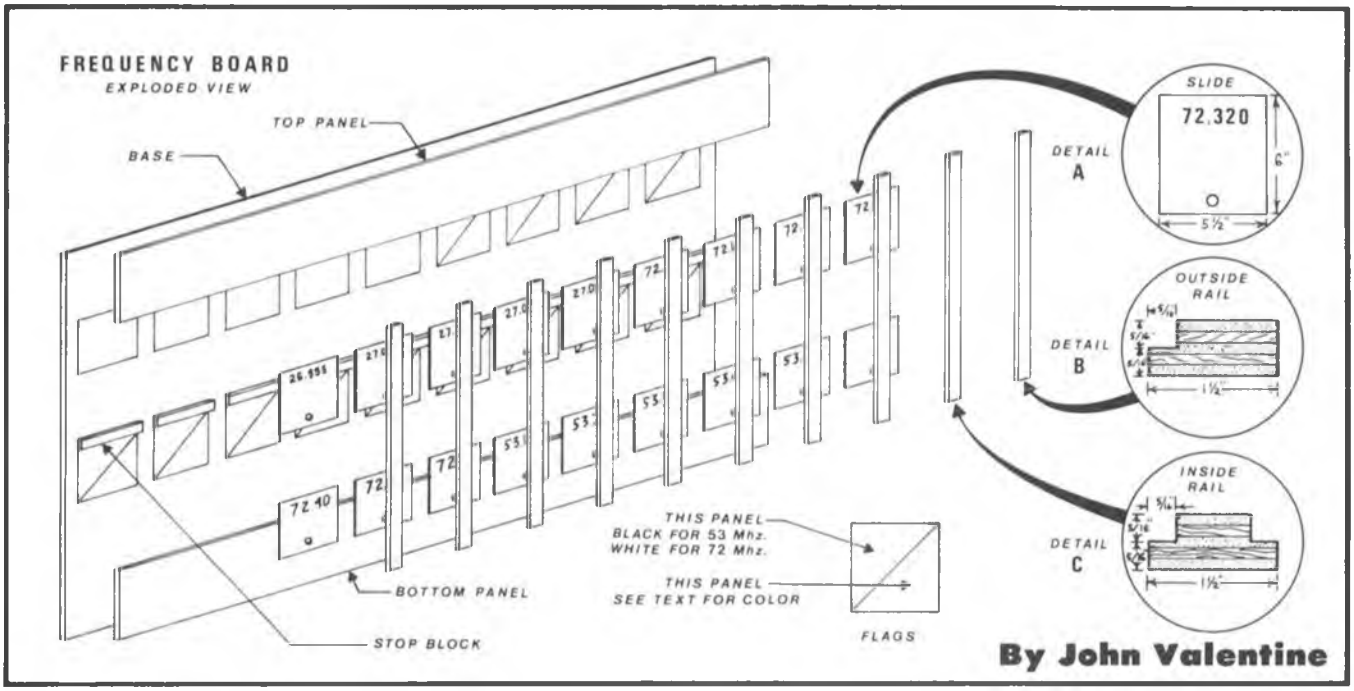
The manufacturing of rubber bumper tires using Abrub RTV molding rubber.

The MRC transmitter modified to be more compatible with boating.

A FREQUENCY BOARD FOR PEACE OF MIND



By John Valentine

It was during one of our winter MARCS (Madison Area Radio Control Society, Madison, Wisconsin) board meetings that the business of an effective frequency control system was presented. All too fresh in our minds were some of the uncomfortably close calls and several all-out disasters caused by an apparent loophole in our existing frequency control system. Our system consisted of a piece of plywood about 18" long with all of the frequency flag colors painted on it. Each flyer provided an ordinary clothespin with his name on it. A pin on a particular flag meant that frequency was in use; no pin meant an open frequency. Should work, right? Enter the human element . . .

It was one of those perfect Sunday afternoons. The pit area was crowded and air traffic was moderate. Someone forgot his pin. Someone else had used the frequency and was down and off but still out on the field assisting another flier. Someone cleared the frequency with someone else and agreed to lend his pin. Never removing it from the board, he proceeded to fly. A little later, someone else, having been somewhat preoccupied at the moment of the agreement, returned to the pits and removed his pin. Yours truly spotted the open flag, placed my pin on it, revved up and turned on. The rest is history. Although it was not my pride and joy sprawled at the bottom of the crater, my feelings were anything but relief.

Frequency	Colors
72.08 Mhz	White & Brown
72.16 Mhz	White & Blue
72.240 Mhz	White & Red
72.32 Mhz	White & Violet
72.40 Mhz	White & Orange
72.96 Mhz	White & Yellow
75.64 Mhz	White & Green
53.10 Mhz	Black & Brown
53.20 Mhz	Black & Red
53.30 Mhz	Black Orange
53.40 Mhz	Black & Yellow
53.50 Mhz	Black & Green
26.995 Mhz	Brown
27.045 Mhz	Red
27.095 Mhz	Orange
27.145 Mhz	Yellow
27.195 Mhz	Green
27.255 Mhz	Blue

It was with this incident in mind that I decided to set about designing as foolproof a system as I could devise. My list of requirements was somewhat hampered by a history of late-night vandalism at our flying sight. For that reason, I eliminated any system utilizing detachable parts. For this same reason and for ease of visibility, I decided to go large and rugged.

The board is constructed of 5/8" plywood doubled to a 1¼" thickness. The 1/4" ply slides are retained by 1½" rails secured from the back with wood screws. The flags are painted onto the base of the board with artist's acrylic paints. When a slide is lifted, it covers the flag and a 5/8" hole at the bottom of the slide aligns with a 5/8" hole in the base of the board. Any object inserted in this hole will retain the slide in this position. When your frequency flag colors do not

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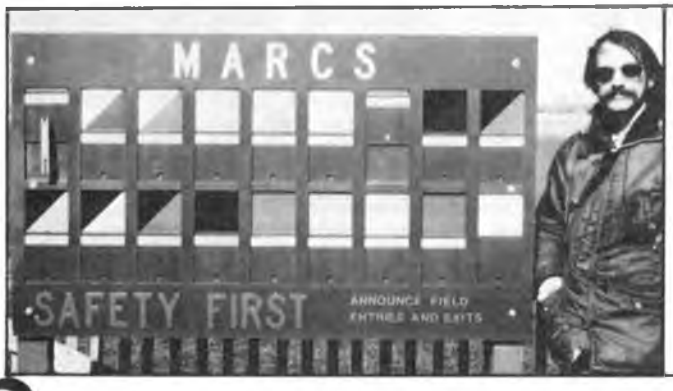
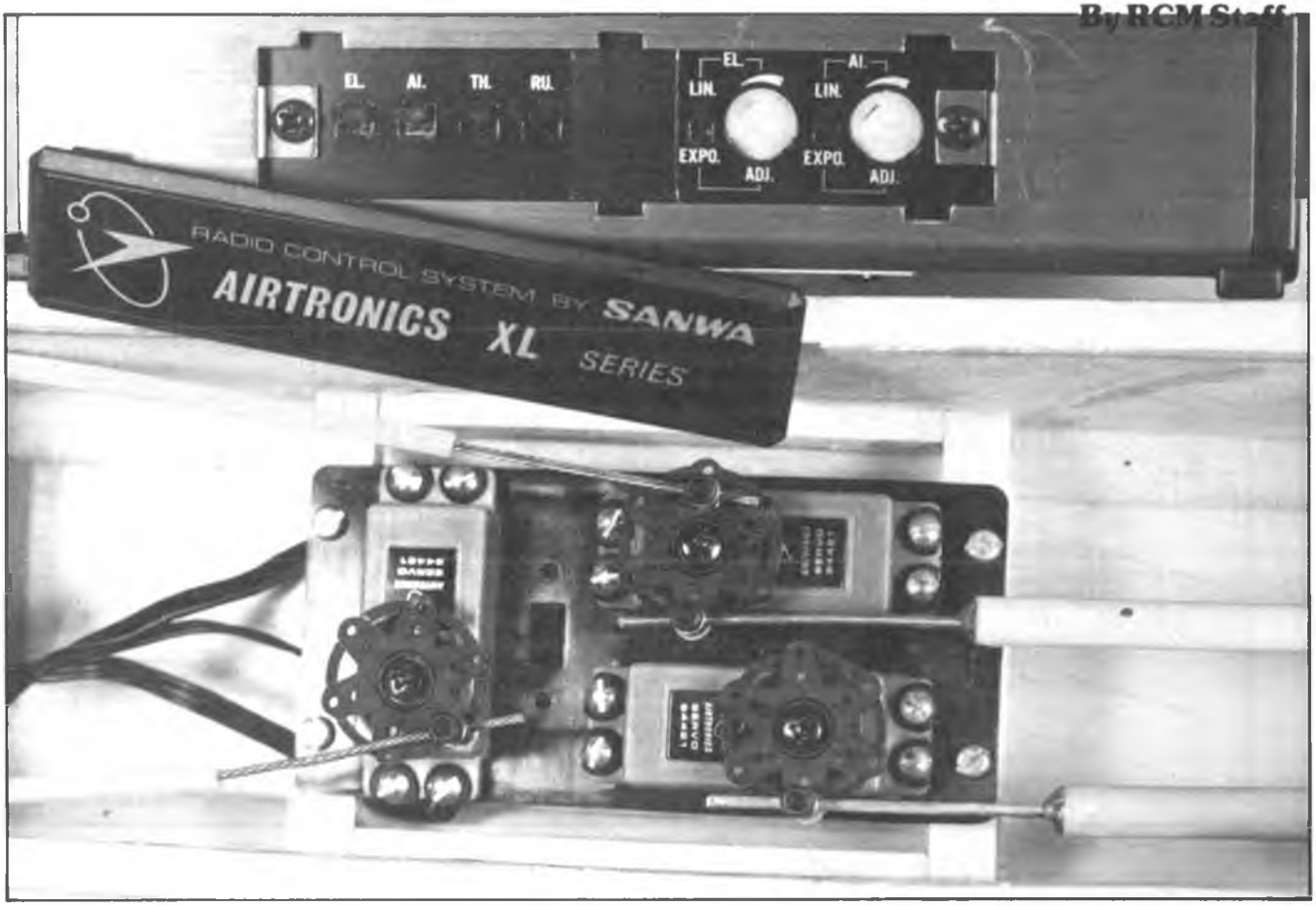


Parts List

Part	No. Req.	Size
Base	1	3' x 5' x 5/8"
Top and Bottom Panels	2	6½" x 5" x 5/8"
Outside Rails	2	1½" x 23" x 5/8"
Inside Rails	8	1½" x 23" x 5/8"
Stop Blocks	9	1" x 5" x 5/8"
Slides	18	5½" x 6" x 1/4"

All parts are exterior or waterproofed plywood. Use vinyl adhesive-backed lettering.

By RCM Staff



Underneath the innocent appearing nameplate on the Airtronics' XL Series transmitter case is a group of the most beneficial features to be offered since the transistor.

THE AIRTRONICS XL TAKES THE MISERY OUT OF CONTROL HOOK-UP

Wow! Lookit all those switches, buttons, whistles, and bells on that transmitter! Most of us react something like that when we see a new exotic radio at a trade show or in magazine ads. On one hand we marvel at the technological advances and fantasize about how we could impress our buddies at the club field if we showed up with one of these magic boxes.

On the other hand, we realize that we are not Don Lowe, or Dave Brown, or Jim Oddino and our Sig Kadet or Falcon 56 ain't gonna fly no better with a roll button, a spin button, or a kick-up switch. So, we go merrily on our way, fat, dumb, and happy with our plain Jane 4 channel sport series radio and do our thing. And that's not at all bad either, but didn't you ever wonder why those brilliant engineering wizards don't come up with something beneficial and practical for we heavy thumbed, Sunday flying hackers?

Amazingly enough, from the prolific brains at Sanwa comes the neatest thing since Ray Arden invented the glow plug. Now I can make a servo installation as neat as the experts do in the magazine photos with the pushrods running straight to the output arms. I no longer have to worry about the direction of servo arm rotation, just connect the pushrod, turn on the radio and move the stick. If the control goes in the correct direction, all is well and good. If the control goes in the opposite direction, don't sweat it, Sanwa has saved our day.

All you have to do is to pop off the Airtronics nameplate from the lower part of the front panel of the transmitter and there you will find a row of switches identified in the same manner as the connector sockets on the receiver. These are servo reversing switches. Merely flip a switch and the corresponding servo operates in the opposite direction. At last, a radio manufacturer remembered those of us who fly for fun. Sanwa has included this feature in its XL Series and while they were under that nameplate they slipped in another goodie.

You will find one or more knobs (depending on how many channels you have) marked LIN. and EXPO. Which are abbreviations for the linear and exponential adjustments. As mentioned earlier, we aren't all Jim Oddino so let's see if we can explain this so that we hackers can understand it. With the linear control we get the same relative movement between the transmitter control stick and the servo output arm from neutral to the end of the travel. This arrangement is fine if you want your control surfaces to respond to the slightest movement of the control stick.

Now, if you would like to slow down the control surface so that it is not so sensitive to the control stick movement around center but would increase more rapidly with the stick displacement, then you turn the knob to vary the exponential adjustment.

This feature benefits the nervous, the uncoordinated, and the elderly hacker types. When you are trying to impress your buddies with a smooth fly-by and your knees are shaking and your thumbs are twitching, the controls aren't so sensitive and you get the smooth fly-by. Then, at the end of the run, you can still get crisp response to the half roll, split S out, and make the smooth fly-by in the other direction. That should help you earn your airplane driver hero medal, thanks to Airtronics.

Now, if all engines of the same displacement had the same mounting dimensions . . . Oh well, we can't expect everything. □

By Roy A. Mayes

A CESSNA 180 WITH A LOW WING

This model was modified from a Hobby Shack 1/2A Cessna 180 Foam ARF kit. Changing the model into a **low** wing was a fairly simple process. The nose of the fuselage was cut off at the point even with the leading edge of the wing. The nose of the fuselage was then turned upside down. In order to reduce the fuselage height, approximately 3/8" was trimmed from the top of the lower fuselage molding. The upper and lower fuselage moldings were glued together and then the nose section was glued to the inverted fuselage. The bottom of the fuselage was cut out to accept the wing and the windshield area was re-cut to a more pleasing slope. A new, larger rudder was cut from 1/8" flat balsa and shaped to give a modern appearance. The wing and stabilizer are as per original except the main landing gear, which is 3/32" wire and mounted in the bottom of the wing. A nose wheel strut was mounted on a plywood firewall, as well as a Kraft motor mount which holds a Cox .09 Medallion engine with a sleeve throttle.

This is my original revision of a popular low priced foam ARF kit. Performance is very good, mainly due to the larger engine. The model has a 41" wingspan and weighs 25 oz. complete with 3 Ace Micro servos and four AA nicad batteries with an Ace Digital Commander 1-8 Double Deck Receiver. My future plans include the addition of ailerons.

I assembled the Ace Digital Commander 3 channel system kit radio and converted it to a 4 channel single stick by adding an Ace rudder knob to the single stick. The radio has been used in several other models and performs excellently.

The airplane is painted with orange Hobby Shack Foam Luster. The trim is black MonoKote and the windows are blue MonoKote.

(Ed. Note: Roy is a member of the AMA and a retired 66 year old senior citizen.) □

RCM PRODUCT REVIEW

Hobby Shack QB 60

SPECIFICATIONS

Name	QB 60
Aircraft Type	High Wing Util./Trainer
Manufactured By	Pilot for Hobby Shack 18480 Bandilier Cir. Fountain Valley, California, 92708
Mfg. Suggested Retail Price	$89.99
Available From	Direct from Hobby Shack
Wing Span	84 Inches
Wing Chord	13 Inches
Total Wing Area	1069 Square Inches
Fuselage Length	59 Inches
Stabilizer Span	29½ Inches
Total Stab Area	225 Square Inches
Mfg. Rec. Engine Range	.60
Recommended Fuel Tank Size	14 Oz.
Recommended No. of Channels	4-6
Rec. Control Functions	Rud., Elev., Throt., Ail. Bomb Drop Door & Glider Launch
Basic Materials Used In Construction:	
Fuselage	Balsa and Ply
Wing	Balsa, Spruce and Ply
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	Yes
Instruction Manual	No
Construction Photos	Yes

RCM PROTOTYPE

Radio Used	Futaba
Engine Make & Displacement	Super Tigre .60
Tank Size Used	14 Oz. Sullivan
Weight, Ready to Fly	136 Oz.
Wing Loading	18.3 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Detailed blueprint plans, construction sheet w/building pictures for bomb drop door & glider launch, ease of assembly, quality die cutting, bagged parts by component use.

WE DIDN'T LIKE THE:

No right wing and right stab plans.

The QB 60 is strictly for sport, a seven foot monster that may be used as an aileron trainer, for airborne photography, for aerial bomb drops and for aerial parachute drops. It is definitely a model that does it all.

The roomy, beautifully decorated full color box measures 42" x 12½" x 4". The first thing that catches your eye is the plans that are printed in white on a dark blue surface, identical to the old blueprints. Everything pertaining to a particular function is neatly contained in large plastic bags. Also included is an identity sheet upon which every wooden part is pictured, the dimensions are given and even the cross section is included. It is a snap to identify any part.

Construction

The construction plans are extremely well detailed in English, Japanese and German. Every part is named and numbered to avoid confusion. If we could be granted one request, it would be that the right wing and stab be included with the plans. There are two extra constructions sheets --- one which shows, in photographs, step-by-step construction and another sheet, using isometric drawings, details construction of the bomb drop door and the glider launch mechanism.

As usual with Pilot kits, the quality of materials is high, rarely does a part have to be duplicated. Other than the fact that one aileron was of hard stock and the other of soft stock, we were well pleased. Perhaps the most outstanding feature of the kit is the die cutting. Rather than the conventional method of using one set of dies to cut all the way through the wood, it appears they used two sets of dies. These dies, perfectly matched, cut from each side of the material through to the center. The ply is the only die cut material and the parts just fall from the sheet.

The seven foot wings, built in two parts, were finished in one evening. On all flying surfaces the L.E. and T.E. have notches for the ribs which just drop in. The only part which takes any time at all is sheeting the center sections of the wings. The stab is built in such a way that it may be bolted to the fuselage. It is easily removed, if necessary, for transport or storage.

Both the bomb drop door and the glider launch were accessories which were included in the kit and they were fully complete even to the hardware. Full open to full closed the bomb drop door is controlled by the fifth servo which is located nearby in the fuselage. When the door is fully up, it snap locks in place making it unnecessary for the servo to remain under a load to keep the door closed. The plane is large enough and so stable that a fully opened door does not affect the trim. Don't land with the door fully opened — it will drag.

Be sure and sand the aft fuselage and tail surfaces well or you will have to add a small amount of weight to the nose to bring the C.G. to the correct location.

Covering:

Our QB 60 was covered completely with white Super MonoKote and trimmed with red and black MonoKote trim sheet. The glider launch was sprayed with three coats of Pactra Formula U polyurethane white.

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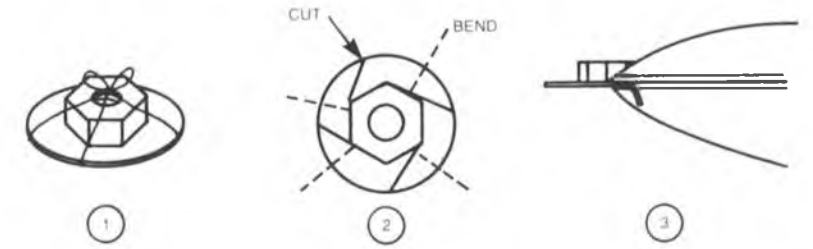
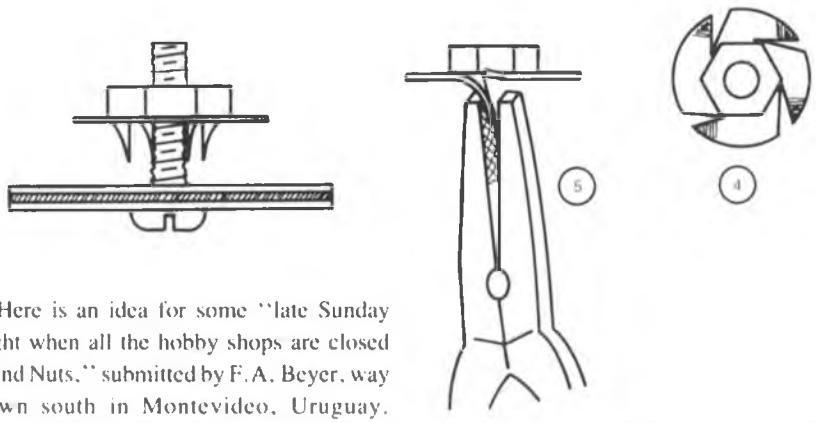
FOR WHAT IT'S WORTH



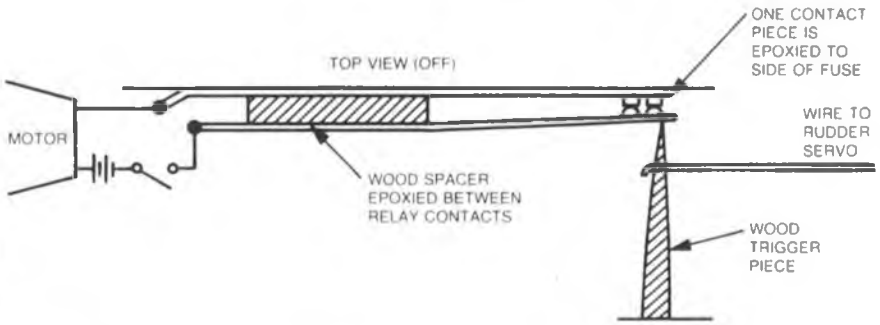


Here is an idea for some "late Sunday night when all the hobby shops are closed Blind Nuts," submitted by F.A. Beyer, way down south in Montevideo, Uruguay. Follow the sketched sequence: he silver solders a thin washer to the appropriate size nut, cuts and bends the washer down in the manner seen on the commercially available product. The idea is also good when you need unusual sizes, such as No's 3, 5, or metrics. And now and then we'd like a blind nut with a larger diameter that would have a larger bearing surface against the wood; just roll your own.

This sketch shows David Carlson's, of Las Cruces, New Mexico, simple and inexpensive electric motor shut-off. He uses the contacts removed from a surplus relay, mounted on the side of his plane and connected in series with the motor wiring. A piece of wood holds the contacts together for normal running, which is pulled off by a wire going to the rudder servo upon application of full right rudder with full right trim. The contacts spring open, and the motor stops.

An exhaust plumbing how-to from Don Williams, Houston, Texas. Something that might be of interest to builders of the "biggie" aircraft is something Don found in an auto parts store and is currently using on his Balsa USA Sopwith Pup. This discovery is aluminum flex hose in 3/4" diameter. The Sopwith Pup has a cowled-in engine and it works very well in routing the exhaust where you want it. Since Don's exhaust stubs on the Quadra engine muffler are about 9/16" o.d. he had to split the end of the flex hose a little bit, and let the end lap, then clamped it tightly to the exhaust stub with a small radiator hose type clamp.

The aluminum flex hose comes in about 3' lengths and is called "carburetor air-per-heater hose." It is put out by "Everco" and the part number is 2705. Don is using a piece of this flex hose on each side of the muffler about 10" long and has experienced no problems with it and feels it is a worthwhile item.



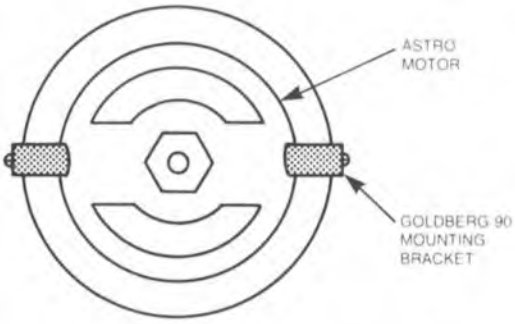
Here is a good suggestion from Richard L. Shirey, Sewickley, Pennsylvania. Modelers have been using clothing dye to color canopies for many years. It has been Dick's experience that they look better, longer, it the dye is on the inside of the canopy only. This is not hard to do on a bubble canopy. All you need to do is to turn it over and fill it up with the dye solution and let it set till it gets as dark as you want. If you are cutting a windshield or window from sheet material then the situation is a little different. Just one side can be dyed in this case, by rolling the sheet into a cylinder and taping the seam with plastic tape. A circular bottom piece is then cut and taped on, to make a water tight seal. The cylinder is then filled with the dye solution.

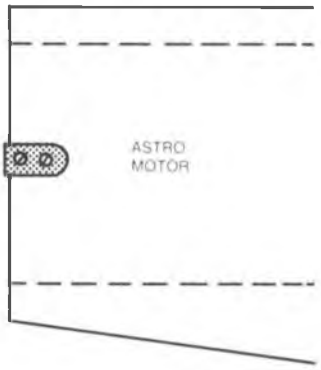
With the dyed surface on the inside, the canopy or windows will not get "streaked" or faded from fuel or cleaning and wiping, as they would if the coloring was on the outside where it could be worn away.

Carl Lindsey, Overland Park, Kansas, forwarded this problem and solution. Du-Bro ball links are excellent devices for control linkages, but, there is a possible problem that could exist --- especially if more than one ball link is in the system being actuated by a single servo. Dry, clean nylon has a high coefficient of friction and a good tight fit just makes matters worse. In a scale airplane with conventional ailerons and all control rods terminating with ball links the surface would not center (neutralize). Carl solved the problem by "breaking-in" the joint and lubricating with Ace servo pot lube.

Gary Gau, N. Tonawanda, New York, reminds us of an often overlooked final touch. After checking with fellow club members he found out that no one bothers to wax their models before they begin to use them. Two coats of a good car wax (Gary uses Rain Dance) after the model is finished and before it is used will make it shine brighter, clean off dirt and smudges, make it easier to clean, and helps fuel proof it by getting into the seams and cracks before the fuel gets a chance to. A coat of wax before the flying season will also make your models look like new and help them last longer too.

FOR WHAT IT'S WORTH





He didn't say if he calls it a Goldberg-Astro or an Astro-Goldberg, but Jeff Smith of Hamburg, New York, sent in his drawing (see sketch) of how he uses Carl's 90 degree mounting brackets to hold Astro electric motors in the usual "motor in a tube" installation.

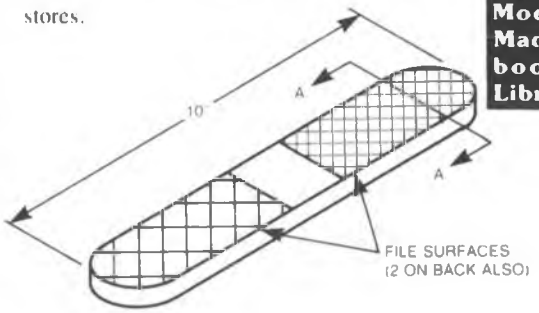
This technique for cleaning a model came from Wally Wallin of Lake George, Colorado. Wally's wife came up with this idea when she heard him muttering one night while trying to repaint repaired crash damage on a Kaos. Despite cleaning off the plane with alcohol and lacquer thinner, there was enough fuel residue on the surface to prevent the masking tape from sticking properly. She had read in one of her veterinary books that to make adhesive tape stick to an animal, spray the area with engine starting fluid — the stuff you spray in the carburetor when you're ready to leave for the flying field and your car has other ideas. Needless to say, because of the ether content in these products, make sure you use it in a well ventilated area otherwise you'll be "sawing logs" instead of cleaning off your plane. The ether did not affect Wally's polyurethane finish, but you should check your finish in an inconspicuous spot before spraying a large area. After this treatment, the masking tape and paint stuck like a dream. Evidently, the ether is just the right substance for removing fuel.

Lisle R. Wheeler of Bushnell, Illinois, submits an idea that he has used for years. When gluing down a leading edge or other hard to glue sheeting, our heat shrink irons turned up to the highest heat will set Elmers or Titebond glue in seconds. Just hold down sheeting with the flat of the hand and go over it slowly with the iron. Lisle never uses pins in a leading edge. The iron can also be used on damp wood to glue around sharp curves.

Having been thoroughly frustrated with trying to remove the gummy adhesive left from pressure sensitive tape and labels, S/Sgt Luke Akemon found the answer while doing his laundry. The product called Shout not only removes that kind of goo but other dirt and grime as well. This sounds like something all of us can use.

Have you ever tried to checker-board a wing surface and had trouble lifting the masking squares without messing the paint job? Try this method sent to us by Ken Gulliford of Summerville, South Carolina. Cut your masking squares from contact shelf paper. Arrange and paint your usual way **except**! Put the wing out in the sun to dry. A while later when you check you will find that the shelf paper has shrunk on all four sides leaving the tape removal easier than you have ever seen. If you don't have sunlight like we do in South Carolina I guess a heat lamp or heat gun would work almost as well.

Mike Mitsch of Pomona, California, sent us his drawing of a 2-sided combination rasp he has found extremely handy during his building efforts. It has one flat and one rounded surface, as shown in the sketch, with half of each side having different cuts. Mike tells us that not only balsa falls away easily with this rasp, but that he uses it also on plywood and other hardwoods. And, apparently the price is right also, about $3.00 currently at most tool and hardware stores.



SECTION A A

From Oklahoma City, Oklahoma, Donald Stephens tells us that he has a better way to mount a dummy pilot. It's all done with silicone rubber seal, and the methods are quick, simple, and just about foolproof. To mount a plastic pilot, first set him where you want him and draw his outline on the mounting surface. Then, using any size bit from 1/16" to 1/8", drill a generous number of holes, both in the base of the pilot and in the surface to which he is to be mounted. Now, being generous again, rub silicone rubber seal well into the holes and leave a coating about 1/16" thick between the pilot and mounting surface after he is set in place. When it is cured, the sealant in the holes forms little "rubber nails" which withstand vibration and sudden stops. Using this method over the past six years, Don has never had a pilot come loose by accident, yet it can easily be removed when the time comes, by exerting a hard steady pull. Two of his pilots have stayed in place during one of those easy-looking cartwheels that pop every joint in the fuselage loose, and later, one of these pilots stayed in place again when the wings came off at about 400 feet, although the impact was so severe that the pilots goggles popped off and broke! The fuselage was demolished.

For a "better than factory" edge on any cutting blade, particularly X-Acto blades, try "stropping" the stoned edge with plastic drafting film (preferably mylar) laid flat on the edge of your workbench, matte finish up. It is available from most engineering supply or blueprinting houses. It wears out fairly quickly but it will put a mirror finish on the hardest steel. Also it will remove any "wire edge" left on your blades after stoning — if there is one. This handy hint was submitted by Robert E. Hiebesch of Grand Island, New York. □

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

QB60

from page 72

Engine:

The engine used was a Super Tigre .60, a standard muffler with a plastic tube affixed to run exhaust gases out below the plane. The engine was beam mounted in accordance with the plans, all parts were furnished. It was mounted to a phenolic block which is attached to the beams with hardware. The tank, a 14 oz. Sullivan slant front, is located just behind the firewall. The canopy is built as a hatch and is readily removable for access to the tank. The throttle and front wheel pushrods are directed well away from the sides of the tank.

Radio:

A Futaba FP 6FN was installed in the very roomy fuselage. The six S-16 Futaba servos controlled the conventional rudder, ailerons, throttle, and elevator. The fifth servo, installed in the fuselage, controlled the bomb drop door and the sixth, in the wing, operated the glider launch mechanism.

Flying:

Ground handling is the best we have ever seen. The weight, wide stance of the main landing gear, and trike configuration, make it easy to taxi over almost any field. Both take-off and landings were fantastic --- we have even made completely hands-off landings. The QB 60 is exceptionally stable.

It is not necessary, but a tad of rudder makes the turns more realistic. It turns well on rudder only; perhaps it could be flown 3 channels.

It is not intended to be aerobatic, but will do the basic maneuvers intended for an aileron trainer. It is a classy looking high winged airplane. In a recent Fun Fly event, 30 second engine run and a 2 minute max with dead stick, our QB 60 picked up a ride in two different thermals and maxed long before landing was necessary. How is that for an 8½ lb. monster?

Conclusion:

The QB 60 lived up to our greatest expectations --- it performed flawlessly. It is for the intermediate or more experienced builder, however, a novice could fly it. We would suggest that two experienced flyers be involved in the glider launch. It wouldn't hurt a bit if they flew both planes in turns, etc. It also would be a great plane for a glider club to have as a club plane, then they could fly from fields too short to stretch out a hi-start or winch. Our QB 60 has been and still is a joy to fly. □

SHOWCASE '81

from page 71/70

No. QM-TT2, can be used with any Pitts or Cessna type of cowling. The upright twin pipe muffler, Cat. No QM-TT3, has side exhaust pipes which work nicely with many inline engine scale models. These mufflers are made of aluminum and attach easily to the engine with two screws provided. Two lengths of heat resistant, fuel proof neoprene tubing plus nylon hose clamps are included to extend the exhaust out of the cowling if necessary. Prices for these new mufflers are $19.95 each. See your dealer or order direct from Quarter Headquarters, P.O. Box 12321, San Francisco, California 94112. In ordering direct, add $1.50 for postage and handling, California residents add 6% sales tax.

HOBBY HIDEAWAY TEE-SHIRT

My Tee-Shirt is the latest quality product made available by Hobby Hideaway. The Laird 400 Super Solution is outlined in green on a yellow Tee-Shirt. The Tee-Shirts are available in childrens Sizes 6-8, 10-12 and 14-16 for $5.80 each post paid or in adult sizes — S, M, L or XL for $6.00 each post paid. To order, send the sizes and quantities wanted along with a check or money order covering the total cost to: Hobby Hideaway, Delavan, Illinois 61734.

FREQUENCY BOARD

from page 67

appear on the board, your frequency is closed. If you don't see it, **don't use it**!! On each slide is the corresponding frequency number. This feature was greatly appreciated by several members of our club who suffer from color-blindness and have difficulty determining some colors from others.

CONSTRUCTION

Cut all parts to the dimension on the parts list. Cut a single rabbet groove 5/16" x 5/16" in one edge of the two outside rails (see detail 'B'). Cut two 5/16" x 5/16" rabbet grooves in both edges of the eight inside rails (see detail 'C'). Drill a 5/8" hole in each of the 18 slides, centered on the 5½" side and 1" in from the edge (see detail 'A'). Now permanently secure the top and bottom panels and the two outside rails to the base. Use glue and wood screws to secure them from the back. Lay the base assembly flat and temporarily position all slides and rails properly. Allow plenty of play so the slides work loosely in the rabbet grooves. Now secure the inside rails to the base from the back with wood screws. Do not glue. Permanently attach all stop-blocks to the base with glue and finish nails. Center them on a line 18" in from the top and bottom of the base. Push all slides to the top of their respective slots and mark the base through the 5/8" hole in each slide to facilitate proper alignment. Remove all inside rails and slides and drill all eighteen 5/8" holes in the base. Sand all parts smooth and paint all surfaces with a good-quality exterior latex paint. Mark off all the flag areas and apply a base coat of white artists acrylic paint. After all painting and lettering is done, apply three coats of Varathane UV retardant liquid plastic clear finish to all surfaces. Reassemble the slides and rails and mount the entire assembly on two 4" x 4" posts, using 4" lag bolts.

Happy flying! □

SHELLEY FOSS

from page 66/65

single channel D.R. sticks and separated the trim levers, using Dunham Auxiliary function assemblies. On the right side, two sticks are vertically placed for motor throttle control. The bottom half (reverse) is spring loaded to return to center off; the top half (forward) can be moved and left at any speed. The two single channel sticks on the left are horizontally placed. The top stick is auxiliary used for smoke, and the bottom stick is rudder control. The center proportional auxiliary channel is used for lighting and allows for individual groups of lights to be turned on and off. I added a push button switch to the on-off channel for the boat horn. The MRC 7662 transmitter case's interior allows for these changes; another transmitter might require a change in cases to insure enough space.

The lighting system is made up of four circuits: running lights (10); deck lights (15); internal lights (4); and flood/spot lights (4). To turn each circuit on and off with one servo, four micro switches were placed side by side. Over the switches is a plate that slides on two rails back and forth where it is activated by the servo. The plate has eight set screws, two lined up on each micro-switch so that the different combinations can be programmed, and much like a music box works.

The most complicated problem was to create smoke. When I was in Toledo, at the '77 show, I asked one of the scale exhibitors how he created his smoke. His answer was, "That's a secret." It is a shame modelers aren't willing to share their experiences. We all know none of us will ever get rich on modeling secrets. Personally, I find it very satisfying to share my findings with others.

The hard part was finding a good smoke generator (or heater). A Lionel train smoke generator was the answer. The smoke generator was placed in the bottom of a Humbrol paint can. A small copper tube was soldered into the lid for the fuel intake. A large copper tube was soldered on opposite sides of the can so that air could be forced in one tube and the smoke would exit the other tube. I used a Mabuchi RE36 motor and made an enclosed squirrel fan which would force the smoke out of the can through the tubing into the stack. Feeding the fuel into the generator was the big problem. Solution: On the cabin deck there are two large tool boxes, one on the starboard side and one on the port side. The port side tool box has a small airplane gas tank modified so that I can fill the tank with smoke fuel through a removable tube. Another tube goes down into the top of the smoke generator can and a third tube is hooked up to an insulin syringe that is activated by the servo. The fuel is vacuum sealed. The syringe has a small hole drilled in the side about 5mm from the end. When the servo then pulls the plunger back, it allows air into the syringe. When the servo pushes the plunger in, the air is forced through the tubing into the tank, and a few drops of fuel is allowed to flow into the smoke generator. When the servo is activated on the left, it disengages from the syringe and activates two micro switches and sends current to the fan motor and smoke generator.

The horn is a Simcoe activated by a servo and micro switch. All of the above equipment is stored in the deck cabin along with the MRC receiver and batteries. The receiver also has a voltage regulator designed by Frank Galler, of Galler Electronic Industries, so that the receiver can be operated off the 12v system. The receiver has an MPS Power Alert which gives a warning if the power source falls below a prescribed voltage.

The Shelley Foss tug is powered by two Mabuchi RS550A motors. Nat Polk of Polk Hobbies generously supplied me with these motors. Each motor is connected to a Richard gearbox with ratios from 3-1 to 60-1 which gives the 38 lb. tug all the power it can use. Distance and time must be scaled to create the proper effect. Too many times we ignore this problem and scale models are traveling five to ten times faster than their full scale counterparts. A nautical mile is 6080'. At 1/30 scale a nautical mile is 202.6'. The Shelley Foss's speed (running light) is 13 knots per hour; that means the 1/30 scale tug would travel at top speed 2634.6' per hour or 43.9' per minute. This can easily be worked out in distance and time and the effect is beautiful. Each motor is equipped with a Mocontrol VB speed controller made by Galler Electronics. The units give excellent forward and reverse speed control. Placed over the two motors is a thermo-sensor that operates two Mabuchi RE36 fan motors. When the temperature reaches 90° near the drive motors, the circulating fans, which are located in the bottom of the deck cabin over the drive motors, go on.

The power plant is composed of Gates Energy cells. Each cell is about the size of a D battery and can be connected together with silicone to form whatever shape fits the need. Each drive motor has its own 12v 5A supply. Lighting, horn, and smoke generator are supplied by another 12v 5A unit. The circulating fans and smoke fan is supplied by a total of a 12v 2.5A unit. There is a total of 48v of battery power carried on the Shelley Foss tug. Incidentally, the Gates cells are excellent because each cell is 2v 5A or 2v 2.5A and that is a lot of amps for their size. The drive motors are equipped with MPS Power Alerts to warn of low battery power.

The time spent on constructing the Shelley Foss demanded that I develop a failsafe system, so I also installed a water sensor with a probe by the rudder shafts and a probe by the motor shafts. If even a drop of water enters the hull, a signal will sound warning that water is leaking past the seals. One last item before leaving the hull. The steering servo is located in the bow. Fifty pound test nylon fishing line is used to telegraph the movement to the Kort Nozzles (rudders). The servo output has a 3'' plexiglass disc with the line attached on the left and right sides. The rudder shafts are connected together with Du-Bro Ball Links so they work together. The line forms a closed loop. It is a very responsive method of steering and the servo is away from shaft and motor interference.

Painting the Shelley Foss was the finishing step. I called Don Hogue in Seattle concerning the exact colors used on the original Shelley Foss. His answer --- Kelley green with standard red below the water line. The stack was black and the rest of the tug was white. Well, Kelley green is just a name and could be anything. The color slides were some help, but a great deal of time mixing and experimenting was used to achieve the right effect.

Years, ago, I received a scholarship to the Art Institute of Chicago where I studied color. One thing I learned was that color is not always what it seems to be. Sometimes it is necessary to add colors to other colors that you would never believe to be right. Thus to achieve the perfect Kelley green, it was necessary to add a small amount of red. Yes, red. I used Hobbypoxy enamels because it is possible to achieve a wide range of finishes by mixing their high-gloss and flat hardeners. The Shelley Foss tug was designed so that all parts and pieces could be painted individually, then assembled. In this way you achieved clean edges and spraying was easier without a great deal of masking.

On July 6, 1980, the Shelley Foss was finished. I called the Seattle Times in Washington and they sent a copy of the July 6 Seattle Times to me Air Mail. I photographically copied the Times and reduced it to 1/30 scale. In the pilot house, by one of the windows, you can see that newspaper. My Shelley Foss was complete! □

A BETTER WAY TO FINISH FOAM WINGS

from page 63

Titebond 50/50 mixture is eliminated. Just apply the glass cloth directly to the balsa or plywood with Hot Stuff, prime and paint.

I must add that covering materials such as Super MonoKote and Coverite (iron on coverings) stick to the Hot Stuff surface with excellent results. If you had trouble trying to stick iron-on coverings to resin or epoxy, then try the glass cloth and Hot Stuff method next time.

Sometimes modelers are bothered by the Hot Stuff fumes burning their eyes. This burning is not toxic and is only a bother. My suggestion then, is to place a fan in a position so as to prevent the fumes from burning the eyes by blowing the fumes away.

When you finish your foam wing, parts, or center section as I have outlined, I know you will be pleased with the results. □

ANYONE CAN DO A BALANCING ACT

from page 62

charge and usually runs very lean. Sometimes the condition is so bad that we cannot get the engine to 4-cycle at all and we rarely complete a flight without an engine failure due to overheating due to the extreme leanness. As you can see, just this small example can be a vicious cycle.

Let's suppose, for a moment, that the fuel tank is not picking up that much vibration or that the fuel isn't foaming badly enough to cause an erratic engine run. Whatever vibration there is will have to wind up somewhere and it's usually the area of the fuselage where the radio gear nestles. This vibration will quickly work on servo pots and produce jittery movements. At best we might get away with flying for several flights, but when the vibes finally take their toll we probably will lose control of at least one flying surface - - - usually elevator or aileron. Now, unless we have some sort of back-up system, the chances of a crash are almost certain. And even if we didn't lose one surface right away, at best it would start to flutter and cause some other chain reaction with the same likely results.

"What can I do?" you ask. Well first it might be a good idea to make sure that the engine is securely mounted to an engine mount that is securely mounted to a firewall that is securely mounted to some sort of fuselage which is securely mounted to something resembling a wing and tail group.

With all these things in order, we move on to the prop and spinner assembly if we are using one. There are many, many ways to see if a prop is in or out of balance. The easiest, but least reliable, is to stick a pencil

through the hole and see if one blade drops. If you have to wedge the pencil into the hole, it won't give an accurate reading. Either drill the hole larger or shave down the pencil! The next best thing is to purchase an inexpensive balancer which may be hand held and will give fair results. If you're looking for Utopia, trade in your snow tires for a precision balancer like the one offered by High Point Products, 3013 Mary Kay Lane, Glenview, Illinois 60025. If you live in a warmer climate and don't own a set of snow treads, scrape up $23.95 and make one of the wisest investments of your modeling career. If you don't, your career may not be as long as you would have liked. Please don't take this as an endorsement for a High Point Balancer but since there is nothing else on the market at the present time that even approaches its quality, it's the only product I can recommend that will do the proper job of balancing props, fan blades, spinners, and the like. To give you an idea of how it works I'll quote the instruction sheet that is included with every unit.

"The High Point Products Co. balancer is an efficient balancer design used by industry for a long period of time. Only the design features have been miniaturized for model use. Unlike other balancers, it does not have to be level to use properly, nor is there any friction involved in holding the balancing shaft. The extreme sensitivity of the balancer will enable all modelers to minimize vibration in their aircraft, cars or boats, and utilize more available power from their motors."

A close look at the balancer reveals just how the unit works to achieve its extreme sensitivity. The balancing shaft which holds the object to be balanced, is of small diameter. This shaft rotates against a large diameter wheel and the action becomes a mechanical force something like a small gear driving a larger gear. Therefore, any unbalanced weight on the small shaft will be magnified on the wheel itself. (See Figure A.) This force is further magnified through a leverage type of force to the small axle. (See Figure B.) Therefore, any unbalanced weight on the balancing shaft is greatly magnified, enabling the balancer to achieve extreme sensitivity. The second wheel duplicates the first wheel in magnifying forces but then retains the balancing shaft in position, free to rotate in location without any requirements.

The balancer is constructed of anodized, tempered aluminum. The side frames are designed for quick assembly and disassembly by inserting the uprights in the proper mounting holes at the base. This will allow a 7" diameter prop to rotate freely. By loosening one screw on each side unit, the sides may be rotated 180 degrees to allow a 12" prop to swing through. I'm told that in the near future there will be special blocks with longer posts available to allow a 24" prop to swing through.

The centering cones on the balancing shaft will accept any item with a 1/8" diameter to a 3/8" diameter hole. One centering cone is fixed permanently on the shaft and the other cone slides on the shaft with a friction fit to hold an item in place. The movable cone may also be reversed to allow centering and squaring of thinner objects such as spinner backplates. Take a look at Figure C and you'll get the picture.

Almost any item may be mounted on the balancer. These include props, spinners, backplates, boat props, flywheels, car wheels, and ducted fan rotors. When balancing, the heavy side will always fall to the bottom of the balancer. When perfectly balanced, the item will stop rocking back and forth and it can stop in any position and stay there. Props may be balanced by removing material, carefully, from the front side of the blade near the tip. Spinners should be balanced by doing the backplate first and then add the cone portion to the plate and remove material from the heavy side.

The High Point Balancer is not a delicate instrument but some care should be exercised when using it. The unit should never be dropped or run over with a car. The shaft and wheels will lose their accuracy if they are bent or nicked with a pair of vise grips so be careful. The unit comes in a handy storage case and I suggest a lock or your wife will be using it around the house. Bunnie, my wife, tried balancing window shades with mine.

If you find the price a little steep for the amount of flying you do, may I suggest that two or three guys get together and share the cost. That way, all three will be insured of less vibration and safer flights. To properly balance a dozen props takes only about 45 minutes. One thing is for sure, if you do procure a High Point Balancer, you'll wonder how you got along without one for so long. □

WEBRA DYNAMIX CARB

from page 61/60

position. After a thorough de-oiling, some Hot Stuff may hold it. Otherwise, remove the circlip from the unthreaded end carefully, and work the sleeve out of the carb body gripping the needle valve seat to achieve this. Don't try gripping the threaded part of the sleeve or you may distort it just enough that Meter B will no longer slide fully into it. This can also happen when side pressure in a crash may force the needle valve and seat sideways so that the sleeve is very slightly bent. It's almost impossible to correct without installing a new sleeve. Once you have the sleeve out, clean everything carefully, apply a little Loctite, and replace and position the sleeve, re-fitting the circlip. Let it set thoroughly and treat it gently from now on.

DYNALAW NUMBER FIVE:

Use Loctite or a similar holding agent on all threads and bolts in the Dynamix (except Nut D and main Needle Valve). Don't over-tighten anything — you won't have to force it if Loctite is applied to clean surfaces.

If everything seems to be in order with the Dynamix itself, but you still cannot get a rich setting at high speed, there are some standard points to be investigated now:

(1) Restriction in fuel line: check the tank pick-up, filter, line and the nipple joint where it is soldered into the needle valve seat. I've often found solder or brass shavings partly clogging this junction. a Number 53 drill will clean things out. You can enlarge the nipple passage a little with a Number 52 drill, but **do not** enlarge the needle valve passage.

(2) Air leaks in the fuel system: tiny cracks in the brass tubing, or more likely in the silicone tubing cannot be permitted.

(3) Needle Position: once in a great while you may find that the needle has been pressed too far through the brass threaded and knurled cap so that, when the cap is reasonably screwed onto the seat, the mix will be too lean because the needle is already too far in. Tap it back about 3mm very carefully to avoid deforming the needle end.

If you still cannot get a rich enough setting at full throttle, you probably are violating

DYNALAW NUMBER SIX:

Maintain adequate pressure in the fuel system. The Dynamix will simply not function properly without a slight but perceptible amount of pressure in the fuel system. I do not know in technical terms how much is required, but many popular mufflers and some pipes will not provide adequate pressure, particularly at low speeds. To test your system,

(1) Fill the tank about 1/4 full.

(2) With motor running, put the nose up as if doing one of the vertical maneuvers.

(3) Throttle back to your "safe idle" mark.

If the motor quits, you have (a) set the whole system too lean, (b) arrived at your settings incorrectly by making them with a full tank and the aircraft horizontal all the time, or (c) your muffler system is not providing enough pressure to lift fuel adequately at low speed. You may feel that you will never throttle back in that attitude with a low tank, but then repeat the test with the tank at the lowest level you can foresee doing such a maneuver — and be generous in your estimate, since during practice sessions you may do these near the end of flights too. Too many fliers fill the tank, gun the motor, tweak the throttle in to get the loudest scream, and let her go. If you are using a mechanical pump which maintains constant pressure, you can be reasonably sure of adequate feed in almost all circumstance. But if you are using exhaust pressure, most of your flying will be at a too lean, perhaps dangerously so for engine life, setting of the needle valve.

The Dynamix will function well with slight pressure if your tank position is correct. That means close to the rear of the engine and with the tank centerline no more than 3/8" below the level of Meter B/Orifice Y. Some products labeled muffler

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R/C MODELER MAGAZINE
GUIDE TO ADVERTISING POLICY

ABOUT THE MAGAZINE

R/C Modeler Magazine is published monthly by the R/C Modeler Corporation, 120 W. Sierra Madre Blvd., Sierra Madre, California 91024. Phone: (213) 355-1476. Founded in 1963, R/C Modeler Corporation has been a leading publisher of hobby magazines and books designed to appeal to the hobbyist and sportsman. Conceived in 1963, the publisher's first magazine, R/C Modeler Magazine, dedicated to the radio control enthusiast, now has a paid circulation in excess of 125,000 copies and is distributed world-wide. Equal emphasis is given to the beginning, sport, and competition flier. Featured are detailed aircraft construction articles, special step-by-step, how-to features, technical articles, and RCM product reports. The staff of R/C Modeler Magazine is composed of serious and dedicated hobbyists with Contributing Editors representing all segments of the radio control hobby. Freshwater And Marine Aquarium Magazine was founded in 1977 and is designed as a comprehensive monthly publication dedicated to the aquarium hobbyist with equal emphasis given to the beginning, intermediate, and advanced aquarist. The paid circulation of Freshwater And Marine Aquarium Magazine is in excess of 44,000 copies monthly.

CIRCULATION AND DISTRIBUTION

The character of circulation of R/C Modeler Magazine is to the adult radio control hobbyist and sportsman. The publication is sold in hobby shops and by annual subscription in the United States, Canada, and foreign countries. National newsstand distribution is also utilized to encourage potential new hobbyists and to regain the interest of former hobbyists. The cover price of the magazine is $2.25. The one year subscription rate is $24.00 and the two year subscription rate is $47.00. Foreign subscription are $32.00 for one year (no two year foreign). This includes Canada and Mexico.

ADVERTISING GUIDE

The publishers of R/C Modeler Magazine provide advertising space for the mutual benefit of manufacturer, retailer, and consumer. Eighteen years of publishing experience indicate that the reader must be able to expect satisfactory service from the advertiser, or his products, in order to respond to future advertisements. It is by providing quality products and satisfactory service that advertisers can expect their advertising to continue to be productive. Advertisements which are submitted to this publication which, in the opinion of the publishers, are not in the best interests of either the advertiser or of the industry in general, or which may mislead consumers, will be refused. While the publishers conduct periodic customer checks of advertisers in an effort to assure truthfulness and accuracy of advertisements, it is impossible to guarantee every consumer's satisfaction with an individual advertisers manner of doing business. And the reader is, therefore, reminded to evaluate advertising claims and to exercise commonsense in responding to any advertisement either directly or at the retail level.

PRODUCT DESCRIPTIONS

Products offered for sale in this publication shall be accurately described. Verification by RCM's Customer Service Department of an advertiser shipping damaged merchandise, or substituting merchandise, without authority from the consumer, will be sufficient cause for declining or suspension of further advertisments since the submission of an advertisment for publication is considered a warranty by the seller that all items offered are as represented. In the case of a direct mail advertisement, any purchase of an item that has been misrepresented in an advertisement, or in the case of a substitution for an advertised item without the authority of the purchaser, the purchaser shall be entitled to a full refund within 5 days.

COMPLAINTS

All advertisers will be notified of complaints received in writing from the readers of R/C Modeler Magazine. Prompt adjustment by the advertiser, if warranted, and notification to the publication of such adjustment will be expected as a condition of continued acceptance of advertising. Failure of an advertiser to adjust the cause of a complaint, or satisfactorily explain the same, will be considered a sufficient reason for declining or suspending further advertising.

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from page 77/60

are really no more that manifolds which develop virtually no back pressure. They won't work. A flow-through muffler which is open in front also fails to give adequate pressure for the Dynamix. In general, to develop adequate pressure, a muffler must be restrictive enough to cut the top RPM a little. With the power available in most engines today, only those attempting to fly a lead sled cannot afford the slight power loss involved here. Almost any muffler resembling that furnished with the OS .60 FSR engine, for example, will develop fully adequate pressure, even if bored out a little.

With tuned pipes, one either assumes that the manufacturer's position for the pressure off-take is correct, or experiments to find a better point. Make sure that the pressure nipple has a fairly generous inside diameter. In most cases the tuned pipe will furnish adequate pressure, though you may have to keep the RPM up a little in the nose-up vertical maneuvers, while easing it down lower when descending in a more horizontal position.

Webra, however, has yet one more thing available which can substantially overcome most problems of lower fuel pressures now and then . . . the in-flight adjustable main Needle Valve. For a slight additional cost, much less than pump and new carb combination, there is available a different needle valve seat equipped with very coarse threads. Onto this goes a nylon body with an actuating arm molded in, and in the end of that, a needle with a somewhat steeper taper slope than usual. Once adjusted for a good high speed setting more or less in the middle of your servo travel, the servo can move the needle sufficiently to overcome almost any fuel adjustment problem that arises in flight. A very great percentage of experienced European competitors find this in-flight adjustment very useful with the tuned pipe. This, or perhaps some of the other points mentioned here, will hopefully assist you in obtaining the top quality performance your Dynamix is fully capable of providing. □

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What: Radio Control, Model Show, Airplanes, Boats, Cars, almost everything in the hobby field.

When: March 21, 1981 (Saturday 9-4).

Where: 3850 Stelzer Rd., Columbus, Ohio, just follow the signs from the Morse Rd. exit of the 1270 Columbus outerbelt. Less than 2 minutes from the outerbelt to the show.

For further info, contact:
Richard R. Ritchison, 1834 E. Beaumont Road, Columbus OH 43224

WARNING:
Inflation can be hazardous to our sport!

It goes without saying; inflation is putting the bite on all forms of recreation. Our form of recreation is certainly no exception. The cost of building and the cost of flying have more than doubled in the past few years. "People find that after paying for the necessities of life there is little left for enjoying the life they've just paid for."

No one escapes this "economic Frankenstein", not even the manufacturers of RC modeling products, and of course you all know what's happened to the cost of fuels!

We at Hobby World vow to do our part in containing this demon. As our costs increase we must pass them on but that's where the buck stops! We refuse to be seduced by greed and become a part of this evil.

Our prices will increase *only* in proportion to our costs. We will make no excess profits at the expense of our friends and the sport we love.

As we've said before, WE'RE ALL IN THIS TOGETHER!

BOB REUTHER'S
HOBBY WORLD

6602 HIGHWAY 100 NASHVILLE, TENN. 37205 U.S.A.
(615) 356-1225

from page 59/56

increase power output.

If your engine is screaming and your plane flies fast but still won't climb, it's probably too heavy. Weigh it on a good scale. Thirty ounces is too much weight to ask a reed-valve engine to lift. Even 27 is overweight for a Rocket. (My heaviest, with a 500-mil pack and Futaba S-17 servos, weighs 25.2 ounces.) If you have trouble building light, or if you have nothing but an overweight ten-year-old radio to fly, then Half-A isn't for you. Build something in the .19 to .40 range instead. Small, heavy airplanes just aren't for amateurs --- they're no fun to fly, even for the experts. Removing the landing gear is one way to get rid of weight and drag both; if your ship is marginal, it might get you airborne. But a smaller radio, and lighter building, is the ultimate answer for successful Half-A flying.

(2) Plane crashes right after every launch. It's very possible that the launch is at fault. Launching is a learned art --- nobody's born with it. Find some tall (24" or more) grass and practice throwing the plane straight and level (radio on, engine off) until you can get a long, smooth, straight glide out of it. This will accustom you to the plane's natural flying speed, so you won't be launching too hard or too soft. It will also let you know if your plane is badly out of trim.

(3) Engine quits on launch. The engine's probably set a bit lean --- back the needle valve out 1/4 turn or so. Also, you may have to learn to run with the plane and accelerate it more smoothly into the launch --- a hard jerk will often kill an engine.

(4) Plane always gets blown downwind. What are you doing flying Half-A in that much wind? If the wind is more than 5-10 miles an hour, flying a small airplane becomes more challenge than fun. It's just like trying to row a boat in a strong river: all

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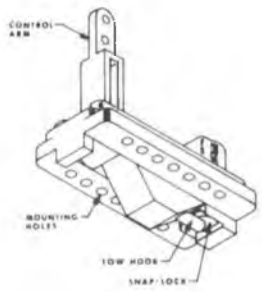

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HONKER ROCKET

from page 82/56

your energy goes into fighting the current.

Small planes like the Honker Rocket are designed for warm, calm evenings at the local schoolyard. (Snap on a QZ muffler to keep the neighbors happy.) When you get bored with just roaring around, shoot a few full-speed touch-and-go's on the sidewalk. Or round up a couple of flying buddies and a flag person or two and go race around the goal posts. There is nothing prettier than three evenly-matched Rockets banking into the far turn together, wingtip-to-wingtip, engines screaming! Nice smell of castor in the air. Flip, flip, launch 'em together, seven quick laps, neck-'n-neck finish and then roll inverted to kill the engines! Hoo! I won that one! Let's fuel 'em up for another run! □

BIG IS BEAUTIFUL

from page 55/53

apply to ensure a safe and enjoyable meet in one of Canada's best vacation areas. For full details write: Ron Shettler, Site 4, Comp. 19, R.R. #3, Vernon, B.C. V1T 6L6 Canada, or phone at your low rate (604) 542-4151. Please enclose 50¢ to cover costs of information package and postage.

☆ ☆

To those of you who have a winter project on the go, drop me a line and a picture of your creation, there are lots of us who want to hear about it.

☆ ☆

Bill Hannan recently printed a comment that really hit home with me. A non-modeler who referred to model airplanes as 'toys' was told that they were toys, toys for my soul. I think that says it about as well as anyone could. See you next month. □

PIT STOP

from page 52

the other teams were out practicing while the Associated Team was in Fort Lauderdale trying to pick up their motor home, which was supposed to be ready the night before. A faulty transmission held them up until 3 p.m., before they got to the track, and then it started to rain, just as they arrived. The rain stopped in about an hour, and in another hour the track had dried out, but now it was dark. The track was fairly well lighted with 4 light posts inside the track, so they did their practicing under the lights.

Saturday morning everyone was at the track bright and early to practice; getting motors dialed in, drivers practicing with unfamiliar cars, practicing pit stops, tire

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$79.95 **FOX .45 BB-RC**

PIT STOP

from page 84/52

changes, etc. The rules require that each car must finish the race with the same chassis and body they started with! How many of you have made a body last 24 hours?

At 1:30 p.m. the track was shut down for a picture taking session, with the race to start promptly at 2 p.m. It was a Le Mans type start, with the cars on the starting line, with the engines off, drivers on the drivers stand ready. At 2 p.m. the horn sounded, the pit man ran to the car and took it to the pits to start the engine. The Associated car was first on the track, and first off the track, as the cold engine immediately died. The Delta Team car with Arturo Carbonell driving, took off in the lead closely followed by the Ja-Lea Associated car and the Future Homes Delta car. The Future Homes Team featured Joe Tassilio Jr. and Ray Hepner as drivers of this all Florida Team, and they were looking pretty good.

But the big surprise in the early going, was the Ja-Lea Team with their Associated RC300-D car. This Texas based team was doing an incredible job! After 2 hours of running they were in 2nd place and only 6 laps behind the leading Delta Team, which had Arturo driving the first 1½ hours, the maximum any driver could drive, with a 1 hour space before he was allowed to drive again. The captain of the Ja-Lea Team, Joe Sullivan had set his car up so all of his drivers could drive the car equally fast. Joe naturally used a differential, and he used a small super stock size carb on his K & B engines. The car was a little slower than the others on the straightaway, but in the infield it was the fastest. Joe Sullivan started the driving, but the car looked equally as fast as Mike Hess and John Lucido driving. And when 14 year old Ralph Burch Jr., starting in only his 4th 1/8 race, drove the car, Ralph was able to pass every other car on the track. If they could keep this pace up for 24 hours, they had a great chance to win it all.

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MAY 24, 1981

• "All Cash Prizes" • AMA Sanction No. 85 "A"
• Registration 8:00 AM • Flying Begins 9:00 AM.

C.D.: Mike Lucas, 194 Middle Rd., Calverton, N.Y. 11933 — (516) 727-7473

from page 88/52

laps down at 6 hours and 131 laps down at 8 hours. Things sure didn't look good for Associated at the time.

Then about 10 hours, Delta's diff started to slip and it had to be changed, and the gap closed to 82 laps. Then they blew an engine and the gap closed to 45 laps. Associated had to change a steering servo and the gap opened back up and Delta changed a servo. The gap closed down again. Then about 10 o'clock the next morning, Art was having radio problems, but only on the straightaway. They changed the crystal and the car was okay. Then while Steve Sanders was driving, their diff went out again. Then at 11:50 a.m. the Associated Team took the lead. It looked like their choice of racing without a diff wasn't too bad.

At noon Associated was only 12 laps ahead. An extremely close race. But the traction on the track now was very good and no matter how hard Sanders tried he was getting farther and farther behind, as Curtis, Jianas and Davis rotated driving jobs every 1/2 hour now. The traction was such, that the Associated car was really flying, going faster than ever. Now at 12:30 Art started driving again, but even Art was falling farther and farther back. The lead grew from 12 laps at noon to 46 laps at 1:40 p.m. Hard as Art would try it wasn't fast enough, as Curtis, Jianas and Davis continually increased the lead.

Then at 1:45 p.m., as Art turned a corner, the car didn't straighten out. A steering servo had gone out with 15 minutes to go. This increased Associated's winning margin to 77 laps, with Delta finishing 2nd and Future Homes taking 3rd.

A 24 hour race is an extremely long race, and is not over until 24 hours. Associated had all their problems the first 12 hours, giving Delta what appeared to be an insurmountable lead. But in a race this long, things even out and Associated ran the last 12 hours virtually trouble-free, while Delta started experiencing their problems. All of the teams in a 24 hour race have problems and so it's not only important to have a good car and good drivers, but good pit work is extremely important in this kind of race. All of the cars finished the 24 hour race, except the Kemp Precision Circuits Team from Ohio. Their Super Tigre powered MRP car ran out of gears after 12 hours, but they said they enjoyed the racing to that point.

Although only one team can win a 24 hour race, I think you can compare it to a runner's 26 mile marathon race. One man might win the race, but every one that finishes a marathon, feels a great sense of accomplishment. And so it should be too, to all the teams that finish a 24 hour Enduro. You should all feel proud of conquering a 24 hour Enduro. My congratulations to all of you.

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PIT STOP

from page 94/52

I was quite surprised by the amount of spectator interest in this race. Saturday and Sunday the bleachers were packed, with other people standing all around the track. Many stayed 3, 4 and 5 hours to watch. Mainly because there was always good close racing going on for 24 straight hours! After the race the Miami News newspaper, in their People/Sports section, devoted the whole front page to a colored photo of the starting lineup, showing Joe Sullivan with his car. Joe's Ja-Lea Team and the Delta Team had super looking racing pant/shirt outfits. They added a lot of class to this event. Also, inside the People/Sports section, there were 2 more full pages of photos and story on the race.

Thanks Miami — you're alright!

SCALE VIEWS

from page 51/50

A number of line drawings and 3-views provide further markings and color information. The collection got to me to the extent that I am drawing a new decal set for the Sig Kougar using the current star circle and tail number motif used by the Thunderbirds. The publishers have a special offer on now, both books at a combination price of $22.95 plus $1.95 postage and handling.

Shades of Phineas Pinkham

Since 1961 a non-profit organization of World War I (and earlier) historians, restorers and model builders has been steadily gaining ground under the dedicated leadership of Leonard Opdyke. Its 5-times-a-year journal, called World War I Aeroplanes, has recently grown to 62 pages in a single issue. The magazine is packed with photos, drawings and news about anything connected with the subject of WW I aircraft. One department on models, edited by Wally Batter of Sault Ste. Marie, Canada, covers material directly related to scale building. A "Publications" section deals with new books, foreign magazines, catalogs and the like, all indispensable to a serious researcher. "Wants and Disposals" lists a lot of intriguing items for sale, or trade, including Mercedes, OX-5, Gnome and LeRhone engines, Curtiss Jenny parts, factory drawing sets, etc. I was especially interested in these last items, it seems that many of the construction drawings of WW I are still available, and can be obtained for restoration or model design projects.

Any modeler who grew up on a diet of Flying Aces and G-8, as well as the large

number of younger types who find WW I aircraft appealing, can't help but find membership in this organization rewarding. No set yearly membership fee but $15 is the minimum cost per year of printing and distribution, so most members donate from $15 to $25. A sample copy of the magazine can be had for $3.00. Back issues are available and indexes of the contents are featured from time to time. Write to World War I Aeroplanes at 15 Crescent Road, Poughkeepsie, New York 12601.

Aviation Collectables

Andrew Paterson, RR 1, Rutherglen, Ontario, Canada PH 2EO, sent me some latest issues of postage stamps that feature airplanes relating to Canadian air history. There are evidently others in the series for the stamp on his envelope showed the Canadair CL-135 "Water Bomber," in a

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SCALE VIEWS

from page 96/50

good enough view to serve as a color painting guide. He suggests that hobbyists who combine scale modeling with stamp collecting will find them of interest. Many stamp collectors specialize in air mail and aviation stamps. Some of the rarest and most valuable issues are early air mail examples. In recent years of steady inflation such things as stamps and coins have established excellent records as financial investments, their yearly gain in value out-pacing the inflation rate.

The second example of air subject stamps is a 1st Day Cover of the Fiftieth Anniversary of New Guinea Aviation, with a series of stamps designed by Australian modeler Langdon Halls, who has drawn a number of great 3-views, including the ones I used for my Yak 18 and Fletcher FU-24 scale models.

Russians Say Nyet To Sport Scale

Bob Wischer, our delegate to the Paris FAI meeting, reports that the 1982 World Scale Championships are almost certainly going to be held in the Soviet Union. In the

to page 108

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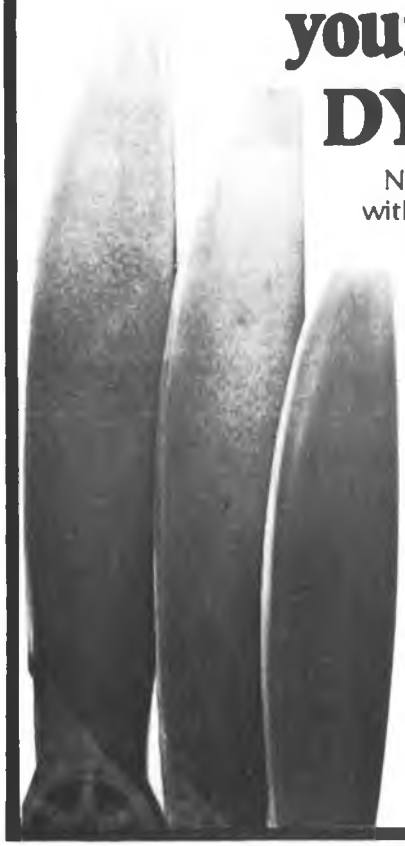

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from page 100/50

sense that this will make an interesting trip for the U.S. Team, it's good news. But the bad news Bear contributed some, saying they do not intend to sponsor an RC Sport Scale event. Since Sport Scale is not yet an official International event, they are not required to hold the event in order to be approved as host. No other country has bid to put on the Championships. There probably is a little gamesmanship here. They have no large numbers of Sport Scale fliers and see no gain in sponsoring something they have little chance to win. On the other hand the eastern Bloc countries are big on CL Precision Scale, so it appears the necessary 5 or more required countries to hold this event will be on hand for the first time since 1976.

U.S. aspirants to the Team had better step up their building and detailing. I have little doubt that the Commissar of Modeling already has a full time group making certain that the U.S.S.R. will debut in international RC Scale competition with a block-buster of a team. The last time they appeared in CL, it was with unique and mechanically sophisticated entries.

From The Mailbag

Jim Newman (4 Cleveland Terrace, Hobart, Indiana 46342), who has submitted several useful items to this column in the past, is now looking for some assistance in return. He wants to buy a Xerox copy of, or borrow a copy of NACA Aircraft Circular #101, dated September-February 1928-30. If the original is loaned to him, it will be returned via registered mail.

A letter from Ed DeYoung (Kent, Washington) says: "Scale Views is the first thing I turn to in each new issue of RCM. Now that I have learned to fly RC with some small skill, I'm ready to get started in scale. You have contributed greatly to my knowledge of how to go about it. I say this with the proof in front of me. I am almost finished with my card file of information

to page 124

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SCALE VIEWS

from page 108/50

gleaned from all the model magazines I've collected over the past 6 years. In the area of Scale, the number of cards taken from your column far outnumbers the ones from all the other "Scale" columns combined." Thanks for the kind words, Ed. I reprint the compliment because I appreciate it but also to give me the chance to say that the information you found useful came in many cases from other scale builders who sent it in to me. A monthly column burns up material at an incredible rate. So if anyone out there has something of interest to other scale builders, send it in and we'll feature as many as possible in Scale Views --- with full credit to the contributor, of course! □

SOARING

from page 48

Some characteristics of this ship proved rather disappointing, highlighting the problems with this type of control. The ship had bad adverse yaw problems, especially at low speed. Adverse yaw means that when a turn is attempted in one direction, the plane actually points its nose in the other direction, and usually doesn't turn at all. The original version had no rudder at all. Steve finally had to perform surgery and add coupled aileron/rudder control in order to get satisfactory turning characteristics.

To understand why wingerons are particularly troublesome in the adverse yaw department, we must remember how gliders roll into a turn. In order to initiate a roll, one wing must generate more lift than the other. With an aileron controlled airplane, the roll is started by deflecting one aileron down and the other one up. The wing with the down-aileron generates more lift than the one with the aileron up. Now the problem starts. Increased lift means increased drag. Therefore, the wing trying to go up has more drag; the wing trying to go down has less drag. The result may be that the aircraft yaws away from the direction of desired turn, and flys straight. In order to overcome this problem, aileron controlled aircraft often have differential aileron control. This means that the ailerons go up much more, perhaps three times, than they go down. Thus, the lift on one wing is increased only slightly, but the lift is considerably decreased on the other. The aircraft then

Typical aileron controlled sailplane, the "Camano" has differential ailerons.

rolls quite well. There are other ways of reducing the effect of adverse roll, but differential throw is a common method.

In a wingeron, or all-moving wing, there is no equivalence to differential throw. As the rolling moment is generated by the difference in angle of attack of the two wings, any attempt at differential throw merely changes that difference. In a thermal turn, the problem is amplified. Unless the ship is spirally unstable, it is likely that a small bit of control into the turn will be required. This will cause yaw to the outside of the turn. Because of the small amount of dihedral, the yaw angle at which the ship stabilizes will be greater than that of a ship with dihedral. This will increase the fuselage drag to a point where the advantages of the lower drag wingerons are lost.

Anyway, Mr. Manganelli says this is probably his last gasp with wingerons. But, this is what makes things interesting and makes for progress. Steve may have learned a bit more than the last guy who fooled around with wingerons; or he may even have found why others failed.

In past issues I've talked about stall angle and stall speed and tried to impress the idea that whether a wing stalls or not depends only on the angle of attack and has little to do with the speed. This is true over quite wide ranges of speeds. As you remember, Reynolds Number, Re, is dependent on wing chord and speed. It takes an eight-fold increase in Re to make roughly a 0.2 difference in coefficient of lift. This eight-fold increase only increases the angle of stall by about 2 degrees. As the speed range of most garden variety sailplanes is only 3 or 4, it seems we can consider the stall angle to be independent of speed. Every airfoil, however, has what is called a stall speed. As the angle of attack of a wing is increased, the lift increases in a nearly linear manner until suddenly, at about 15 or 20 degrees, lift falls rapidly. At 90 degrees, the lift has fallen to zero and the wing acts like a flat plate opposing the air flow. As a glider slows down, the decrease in velocity causes a decrease in lift. In order to keep from falling out of the air, the angle of attack must be increased with a little up-elevator. As slowing continues, the angle of attack must be continually increased. Finally, the stall angle is reached and the wing stalls and loses lift rapidly.

If you will look at Figures 1 and 2, you will see what happens. In Figure 1 we see the airflow flying at an angle below stall. You will notice that, although the air flows smoothly over the airfoil, there is an area of dead air directly behind the trailing edge. This air is roughly at atmospheric pressure and caused by separation at the trailing edge. This dead air causes an increase in profile drag but has very little influence on the generation of lift. It can be minimized with a very sharp trailing edge.

After the stall angle has been reached, the airflow looks like that in Figure 2. Separation of the airflow occurs near the leading edge and a region of dead air

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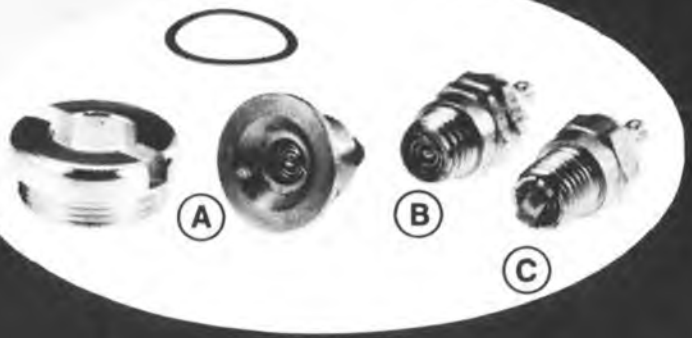

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appears over the upper surface of the wing. This region of dead air is, again, at atmospheric pressure. As the lift of the wing depends more on low pressure on the upper surface than high pressure on the lower surface, lift decreases rapidly.

So, if you want a glider you can fly, and land very slowly, you need one that is either very light, or has an airfoil with a high coefficient of lift. There is an optimum thickness of 12% to 13% of chord and that will give the highest value of lift coefficient. Anyway — the whole world is a compromise and you generally don't want the most of anything at the expense of the least of something else.

Howzat! □

SCAMP

from page 47

Engine:

Our test aircraft was powered by an O.S. .15 R/C engine, which was fed from a four ounce Sullivan fuel tank.

Radio:

A Westport International Variant radio system was installed along with a 225 MAH battery pack. The Scamp fuselage is large enough to accommodate any standard size radio system. Our finished ready to fly Scamp weighed in at exactly 40 oz.

Flying:

We anticipated that the Scamp would be an easy to fly stable aircraft and we were not disappointed. On occasion it has been cynically stated by some that aircraft test reviews tend to over-use the claim that "the aircraft flew with no trim or control surface travel changes being required." In all honesty, the only change that we made to our test Scamp was the addition of a few turns of down trim to the elevator clevis in order to re-center the trim lever. Our test flying was conducted from a grass field and, since the grass was rather thick and in need of mowing, we elected to take-off via hand launching.

to page 128

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SCAMP

from page 126/47

The Scamp, with its 2" diameter wheels, would undoubtably take-off from a hard surfaced or closely mowed runway with relative ease. After its maiden flight, our Scamp was flown by a variety of pilots of varying levels of ability and each agreed that it was a docile easy to fly aircraft. No bad tendencies or nasty traits were in evidence. It will perform all the usual maneuvers that one would expect from a rudder and elevator equipped sport aircraft. Designer Mike Gretz has created an aircraft that is compatible with even the limited flight capabilities of the fledgling RC'er.

Conclusion:

If this reviewer were to be captious of the Scamp in any aspect, it would be in regard to the vulnerability of the molded foam wing. The convenience of a ready to use (or finish) molded foam wing has its price, in that it is very soft and, consequently, far more prone to dinks, gouges, and terminal damage, than a balsa sheeted foam or built-up type wing. On the positive side of this issue, a replacement wing could easily be purchased should the original be damaged beyond repair. We mentioned this more as a factor for the potential buyer to consider rather than as a criticism.

In summary, the Scamp is a well engineered beginner sport type aircraft that is very complete and, at a list price of $26.95, an excellent value. It should find widespread appeal among sport flyers who are interested in a compact size fun design. ☐

AEROTIQUE

from page 46/41

☐ Attach clevises to the control horns and, by trial and error, thread the cable through the open part of the fuselage and on through the Sullivan inner rod guides that were installed earlier. Both control cables from the elevator are run through one guide and the two from the rudder are run through the other. Because the guides are nylon and the cable is nylon-covered, there is very little friction and no wear. You will need to epoxy several small pieces of Sullivan inner rod approximately 3/16" long to the open framework back near the tail to serve as guides and keep the cable from rubbing on the framework.

☐ Attach the control cable to the servo arms in the following manner: Take four pieces of 2" long 1/16" diameter music wire and bend the end of each into a tight loop or hook. The control cables attach to the wire loops or hooks by making a small loop and then applying a standard crimping sleeve. Du-Bro EZ connectors are then attached to the servo arms and the cable connnectors are slid into the Du-Bro connectors. This makes a system with easily adjustable control surfaces.

☐ Use 1/32" music wire, nyrod, or a Du-Bro throttle cable, for the throttle pushrod. Adjust the linkage accurately so that the servo throw matches the throttle throw.

☐ For your initial flights control throw should be set as follows: rudder 3/4" each direction; elevator 5/8" each direction; and ailerons 3/16" each direction.

☐ Double check your balance point and you are ready to go to the flying field!

to page 142

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AEROTIQUE

from page 128/41

Flying:

Check your radio installation one more time. Be sure you have adequate radio range. You did balance your propeller, didn't you? Do the controls work properly and move in the right direction ? Remember the aileron that drops is on the wing that lifts. I remember a certain scale model of a Cessna Skylane I once built that had the ailerons hooked up backwards. All of the club members present were very impressed with my gutsy approach to a first test flight which included an aileron roll on take-off. The immediate inverted landing at full throttle, however, sent them back to their own pursuits muttering about how dumb that was. I was one embarrassed test pilot.

Fire up your engine and taxi into position. Check the controls one more time and then slowly advance the throttle. Hold the elevator in neutral and in about 5 ft. the tail will come up all by itself. You may have to slightly nudge the rudder to the right to get a straight run into the wind. At about 20 ft. out, ease back on the stick and you're airborne. Gain some altitude before trying anything fancy. Aerotique has no nasty habits so just relax and enjoy the flight.

Landing is a piece of cake! Throttle back to about 1/2 throttle on the downwind leg and reduce to 1/4 throttle on the base leg just before turning on to final. Allow her to come on in and when you have made the field put the throttle to idle. Remember, your elevator controls your speed and your throttle controls your rate of descent. Many R/C flyers get this mixed up and try to stretch the glide with up elevator which kills the airspeed and eventually the airplane! (It stalls and falls.) Anyway, getting back to the landing, when you are ready to touch down, slowly bleed off your airspeed with a gradual increase in up elevator and start your flair when you are several inches above the ground. Keep feeding in up elevator by the time your wheels touch you should be holding full up elevator. After touch down, ease off the up elevator, steer her through the roll out with rudder. Sounds easy and it is once you get the hang of it.

Aerotique is so much fun to fly that you probably won't ever want to land. I thoroughly enjoy just putting around the sky at about 30 ft. altitude and at 1/3 throttle. This ship will really fly slowly and a favorite past time is to throttle back into a stiff wind (there is always a stiff wind in Michigan) and fly backwards across the field. I am planning to try a Saito .30 4 cycle on my next Aerotique. It should be a real show stopper!

Good luck with your Aerotique and I hope you have as much fun with yours as I have had with mine! □

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The Good News

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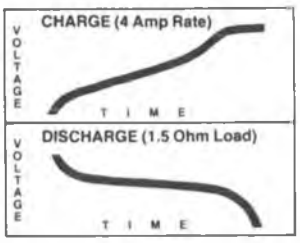

Charts show charge/discharge characteristics of R/CARS 6 cell pack. Curves are typical of prime commercial grade Sub-C Nicads.

Price Comparison:

	GE	R/CARS
6 cell	$32.50	$15.00 (plus $1 handling)
4 cell	$24.50	$10.00 (plus $1 handling)

These are typical prices as supplied by various OEM sources and are subject to change.

The Bad News

1st - R/CARS Sub-C's are homely — Plain Gray Wrapper.

2nd - GE Sub-C's come pre-assembled in a pack of 4 or 6 cells. R/CARS don't, they come as pairs with solder tabs. That means you have to make a couple of solder connections for a 4 cell pack — a couple of more for a 6 cell pack. A $16.50 savings for 10 minutes work. At that rate you'll be saving about $100 an hour. And that's the bad news!

4 sub-C's — $10.00
6 sub-C's — $15.00

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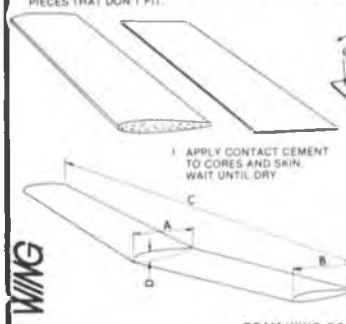

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ITEM	A	B	C	D	
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#F2	A = 8"	B = 8"	C = 46°	D = 1-1/16"	$ 9.95 set
#F3	A = 8-1/2"	B = 8-1/2"	C = 50°	D = 1-1/8"	$ 9.95 set
#F4	A = 10-1/4"	B = 10-1/4"	C = 67°	D = 1-5/16"	$16.50 set
#F5	A = 10-3/4"	B = 10-3/4"	C = 54°	D = 1-1/4"	$ 9.95 set
#F6	A = 11-1/4"	B = 11-1/4"	C = 64°	D = 1-1/2"	$15.50 set

SEMI-SYMMETRICAL AIRFOIL (STRAIGHT WINGS)

ITEM	A	B	C	D	
#S1	A = 7"	B = 7"	C = 40°	D = 1-1/8"	$ 8.95 set
#S2	A = 7-3/8"	B = 7-3/8"	C = 48-1/2°	D = 1-1/8"	$ 9.95 set
#S3	A = 8-1/2"	B = 8-1/2"	C = 48°	D = 1-1/8"	$ 9.95 set
#S4	A = 9-3/8"	B = 9-3/8"	C = 54-1/2°	D = 1-3/8"	$ 9.95 set
#S5	A = 10-5/8"	B = 10-5/8"	C = 66-1/2°	D = 1-3/4"	$15.50 set

FULLY-SYMMETRICAL AIRFOIL (STRAIGHT WINGS)

ITEM	A	B	C	D	
#Y1	A = 8-1/4"	B = 8-1/4"	C = 45-1/2°	D = 1-5/16"	$ 8.95 set
#Y2	A = 8-7/8"	B = 8-7/8"	C = 46-3/4°	D = 1-1/2"	$ 9.95 set
#Y3	A = 10-3/8"	B = 10-3/8"	C = 48-1/2°	D = 1-11/16"	$ 9.95 set
#Y4	A = 11-3/8"	B = 11-3/8"	C = 60°	D = 1-7/8"	$15.50 set

FULLY-SYMMETRICAL AIRFOIL (TAPERED WINGS)

ITEM	A	B	C	D	
#T1	A = 10-3/4"	B = 7-1/8"	C = 50°	D = 2"	$ 8.95 set
#T2	A = 11-5/8"	B = 8"	C = 58°	D = 2-1/4"	$15.50 set
#T3	A = 12-1/2"	B = 7-3/4"	C = 53°	D = 2-5/16"	$16.50 set
#T4	A = 13"	B = 7-5/8"	C = 68°	D = 2-1/16"	$16.50 set

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RADIO SPECTRUM

from page 38/37

equipment? If indeed it means the former it amounts to a virtual disaster for R/C modeling. The vast majority of us do not use up a set in ten years --- we just do not fly that much! My 1972 and '73 sets are still 'mint' condition. I do not need dual rates, etc., etc., so my sets are very adequate.

It would seem that modifications to present sets at a reasonable cost is definitely a necessary consideration. I would be most interested in your thoughts. I am sure there are a number of solutions.

Sincerely,
Joseph P. Mlinar, M.D.
Austin, Minnesota

The "no use" ban occurs ten years after the rules are adopted according to the proposal. When I first read the proposal, I must admit I thought that ten years was quite adequate but maybe that's not enough. What do the rest of you think? You actually have a little more time with this info being published before the rules are adapted. In other words, if you buy a system this year, make sure it is one that can be converted. If you've already bought one, you've probably got eleven years, because it will take another year before the rules are approved. By the way, the mods to accommodate the new rules will probably only be for the transmitter. I doubt that any receivers will be modifiable. They are going to require better crystal stability and accuracy and they might need narrower bandwidth which means the current I.F. transformers will have to be replaced with a more selective circuit. Ceramic and crystal filters will probably be used. The net result will be a better system. So even though your old sets might be in mint condition it might still be desirable to have the newer equipment.

Elevator Reversing Switch

Mr. Oddino,

I have an old 7 channel Kraft (doesn't have changeable frequency modules) and an EK Nimbus Sport 4 channel. I would like to add an elevator reversal switch so when I'm inverted I can flip the switch and the controls will be normal. Which radio would be the best to make the modification to? Can I use the new Ace components that can be bought separately?

Thank for your time

Van Vandenberg
Port Neches, Texas

My advice is don't do it, but if you must I would do it to the EK. The best way would be to install the Ace electronics (Silver Seven encoder with reversing capability). In order to make it work properly you must be able to adjust the control pots to the exact center. The Kraft pots might be keyed so you can't do that, but I think it is possible on the EK. Check this out before you start the project. The only other thing you need to do is wire the elevator reversing circuit to a switch mounted on the outside of the transmitter instead of mounting the reversing switch on the PC board.

I still think you are better off learning to

to page 149

FLASH!

Just as we went to press, RCM received a call from Mr. Ernesto Jimenez, Chairman of the Mexican Committee for the 1981 World Aerobatic Championships that the date and site for that event has been changed. The new location is in Acapulco — so tune your engines for sea level, and the dates are September 23 through the 27, 1981.

ERRATA

In RCM March, 1981, issue on page 142, RE: Midwest RK-20B, the arithmetic should read:

RK-20B fan rotor area	= 13.35 sq. in.
$A = \pi r^2$ 3.1416 $(2.062)^2$	= 2.76 sq. in.
Less hub area 3.1416 $(.9375)^2$	= 10.59 sq. in.
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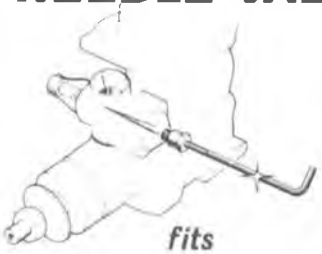

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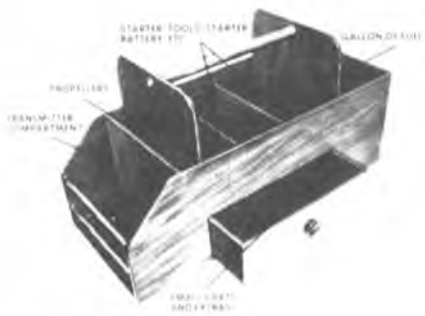

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from page 144/37

fly inverted without it. You learn to fly when the airplane is coming at you. The problem is the same. After a little experience you don't even think about it.

Multiple Battery Packs

Dear Mr. Oddino:

I think I may have come up with a novel way to supply power to flight packs and will lessen the possibility of powerless crashes in standard models and give more power, speed, torque and dependability to over-sized or Quarter Scale models.

The idea is to separate the power supply to the servo motors from the other electronics of the flight pack. In this manner you could have a 100ma pack running the receiver decoder, servo amplifier, etc., and a separate, larger pack running the motors. Thus, if the servo motors do drain their pack from either prolonged use or binding control surfaces you should be able to detect their slow down in flight and still have complete power in the rest of the system. This will prevent false commands to the servos which actually cause crashes.

For the over-sized models, the advantages are even greater because you could supply each servo motor with its own battery pack right next to the servo as space allows. There would be no power loss over long, thin, highly resistive power lines and maximum voltage to the component which needs it most — the servo motor.

The system should be applicable to all three wire systems and should be altered to accommodate positive pulse and negative pulse systems. The system with which I am experimenting is the World Engines Expert.

I am using three terminal Radio Shack Mini Jacks throughout my wiring harness modifications because they offer easy access to the wires for charging and load testing of the servo motors. If you pot them in epoxy they are very light and almost vibration-proof (see Figures 1 and 2).

As indicated in these figures, Jack A can be used in each case as a vibration continuity test point if you have an electronic battery cycler. Wire a phone jack to the cycler, start the engine, give it full throttle, insert the plug and turn the cycler onto "drain." If the cycler cuts off, there is a problem.

I have not put the system in the air yet, so if you see a problem I may have overlooked please send me a quick warning in the enclosed self-addressed envelope. Otherwise, you are welcome to pass the idea on to your readers at your discretion.

Sincerely,
Rudolph Miller
Indian Head, Maryland

A lot of guys are putting larger battery packs in their big airplanes, but the multiple pack approach might have some advantages. Unfortunately I don't think you would see the servos slow down before it is too late, with the circuit shown. I've known

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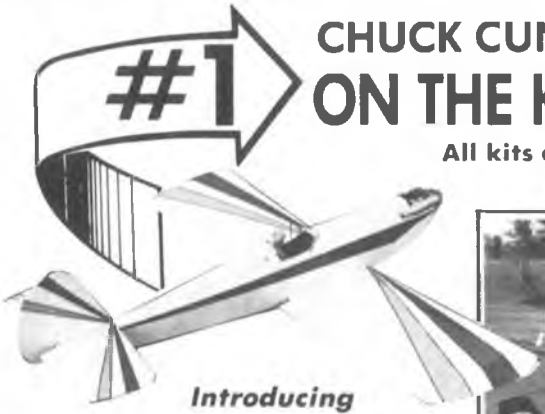

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guys to fly on three cells for months without knowing it. This means they were operating at around 3.6 volts. A normal good pack will go from over 4.0V to nothing in a matter of seconds when they run out of juice. The receiver might be working perfect but if the servo amplifiers don't work, and they won't below about 2-3 V you are going to crash. If you could power the servo amps from the receiver pack and only the servo output to the motors from a separate pack, you might stand a chance. The advantages I can see are better receiver operation because the noise that the servo motors puts on the battery power lines really degrades the receiver. In fact, if you were flying in a weak signal area, the servo noise can cause the receiver output to jitter which, in turn, causes more ripple on the supply and increases the total current drain which runs the batteries down faster. The separate packs might also alleviate the long servo lead problem many guys have in big airplanes. If anyone cures a long cable problem this way, I'd like to hear from you.

I didn't like that comment about **almost** vibration proof and I would be tempted not to put anything between my battery pack and system that I didn't absolutely need. Using the jacks as switches doesn't sound like a good idea to me. I would use a switch with redundant contacts so if one opens you don't lose everthing.

It is always tough to decide if adding things to a system improves or degrades reliability. With the multiple packs you depend on two packs instead of one so your chances of a battery failure doubles. What you would like is a set-up where the system could operate on one **or** the other. Then your chances of a catastrophic failure are cut in half. Therefore, one big battery is more reliable than two smaller ones wired as shown. However, the idea is interesting from the potential improvements I mentioned above. By the way, would you believe that Space Control, the first proportional system back in the early 1960's, did this very thing for the reason I mentioned, to keep the servo noise out of the receiver. □

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from page 32/25

rudder post. Add 1/16" scrap balsa behind the horn plate.

(7) When the rudder assembly is dry, remove from board and add the right horn mount and 1/16" fairing.

(8) Rough shape the rudder. Note the taper is shown on the plan. Gently radius the leading edge and keep the trailing edge sharp.

Fitting and Shaping:

(1) Assemble the wings on the fuselage. Check to see that the wing-fuselage joint is tight with no gaps. If necessary, sand the wing root or add balsa and sand to get a flush fitting joint.

(2) When you're satisfied with the wing fit, add a protective sheet of Saran Wrap to the fuselage side and epoxy the wing root rib in place.

(3) Slide one wing panel on to the joiner and align the wing on the fuselage. Using a long 1/8" drill, inserted from the opposite side of the fuselage, drill the hole for the alignment tube. Remove the wing and install the other wing and duplicate the process. Insert the brass tube into the fuselage as a temporary joiner and plug both wing panels in place. Check the wing alignment to the fuselage and each other. Both wings must have the same angle of attack. If all fits are satisfactory, remove wing panels. Cut the rear tube into three sections and epoxy in place in fuselage and wing panels. Be careful not to get epoxy inside the tubes. Trim flush and chamfer ends.

(4) The wings are now ready for final sanding. Using the drawings and root rib, as a guide, shape the leading edge. Sand the trailing edge as thin as you can, but not to the point that it becomes wavy and fragile, a trailing edge thickness between 1/32" and 1/64" is sufficient. Use a large sanding block, and work carefully, checking your work often so that you don't sand an irregularity into the trailing edge.

(5) With the wings still plugged in, carefully sand the top of the fuselage sides in the hatch area. The object is to get a flush fit with the wing surface.

(6) Rough sand the rear of the fuselage to shape. Pin or tack glue the rudder in place. With the rudder now in position, contour the fin and rudder assembly into shape. Keep all gaps to a minimum.

(7) Prepare the rudder for hinging by carefully beveling the rudder post as to give clearance for rudder travel. Mark hinge location on fin and rudder and insert the nylon-type hinges in position. I have used the Rocket City Nylon Hinge Strip with great success on the Sagitta. Their hinges give the advantage of being able to be put in place, checked for proper rudder clearance, and then Hot Stuffed in position without

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from page 152/25

being removed. However, don't glue them in yet, we still have to cover the rudder and finish the fuselage.

(8) Using the plans as a guide, locate the stabilator pivot location in the fin and open the hole in the 3/32" fin sheeting. Also find the location of the stab drive fitting and carefully open a slot in the sheeting to allow stabilator travel. Use a small round file and do a good job.

(9) Insert the 1/8" brass tube into the fin. Install the 3/32" stab wires and slide the stab halves in location, locking them in place with the set screws. Note the set screws go to the bottom side. Check the stab roots, see that they fit the fin contour as close as possible. Any gaps are drag, so keep them as tight as you can. Now slide the wings on to their joiners. Check that the wing and fin and stab are all in alignment. If all is straight, remove the stabs and epoxy the tube in place. When dry, sand flush and chamfer ends.

(10) The last construction to be done is the hatch assembly. Before starting construction, let's look at the objective. The plan shows the shape of the hatch. The idea is a rear hinged, flush fitting unit with minimum gaps that is locked in place by a dowel pin imbedded in the hatch block.

(11) Start construction of the hatch by making the framework from 1/8" x 1/4" spruce. The shapes are shown on the plan. I would advise building the frame and shaping it to the top of the fuselage. Sand it in such a way that the framework is 1/16" under size from being flush. When the frame is the proper shape, glue the 1/16" plywood hatch top and lip in place. Again check for fit.

(12) I will give you a couple of suggestions for hinging the hatch. The first one is to install a brass tube at the back of the hatch framework to act as a hinge. For this to work properly the very aft edge of the hatch must be carefully beveled in relation to the sheet immediately behind it. If both surfaces are shaped properly a minimum gap will result. The method I chose, which is somewhat easier, is to install a brass tube in the framework and extend the tube through the fuselage sides. Now carefully elongate the holes forward 1/8"-3/16". This allows the back of the hatch to fit perpendicular to the surface behind it. To work the hatch you lift the front lip slightly, pull the hatch forward, then pivot the hatch on the brass tube.

(13) Using the hole in the F-5A as a guide, drill a 3/16" hole into F-5. Be careful that you don't drill into the joiner tube.

(14) Cut a 1/8" dowel to 7/8". Round one end and sharpen the other end to a sharp point. Close the hatch, install the round end of the dowel through F-5A into F-5, locking

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from page 158/25

the hatch in place. Carefully slide the forward hatch into position, guide the sharp end of the dowel into the hatch block. Now remove the hatch block and epoxy the dowel in place. When dry, put the hatch block in position.

(15) This step is the final shaping of the fuselage. The Sagitta is meant to be a graceful, soaring machine, with smooth flowing lines. It is not meant to be a square box. Sand the aft fuselage to the cross section shown. When shaping the nose section, try to shape it as streamlined as possible. The canopy block should flow into the wing joint, thereby reducing interface drag.

Covering and Finishing:

(1) Sand the entire airframe with smooth grit sandpaper. The wings and tail surfaces should be covered with MonoKote.

(2) The fuselage finish is your preference. I like to fiberglass the entire fuselage and fin with lightweight glass cloth, and then use the Super Poxy finishing sequence to paint the fuselage. I have seen excellent results from glassing the fuselage and then covering with MonoKote. If you prefer, you can simply MonoKote the fuselage. The structure will probably look better and last longer if you elect to glass and paint.

Spoiler Installation and Rigging:

(1) Slit the covering in the spoiler bay and fold down and iron all around to the frame edges. Trim off surplus material and seal edges. Check blade fit and cover both sides and all edges of the blade. Be sure that you cover top and bottom and shrink covering carefully to avoid warping the blades. Glue the spoiler horn in place.

(2) Cut a strip of Slictac or similar material 1/2" wide by 12" long. Drop blade into opening and center so that the gap is even all around. Press on hinge and then iron firmly to the wing and spoiler blade. No internal pieces are required. Trim ends and check blade action.

(3) Feed the dial cord through the nylon tubing into the spoiler bay. Insert the cord into the spoiler horn. Let the cord extend through the horn about 1" then take a piece of a round toothpick and push into the spoiler horn, trapping the cord in position. By doing this you can adjust the cord length slightly by sliding the cord one way or the other.

(4) The final step is to terminate the servo end of the cables, which is done after the spoiler servo is installed in the fuselage. Note the cables stack to different sides of the servo sheet. Insert a # 2 5/16" sheet metal screw and eyelet on each side of the servo horn. Wrap 1/2" loop around the eyelet and tie a loose knot. Note, you want to be able to slip the knot off the eyelet, so don't make the loop too tight. Check the servo rotation

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suggest that you run through the following pre-flight check list. It is a good idea to develop the habit of regularly checking the model and radio system between flying sessions. Many times you will find a problem in the shop which, if not corrected, might cause a crash.

(1) Inspect the model carefully. Check the radio operation by trying all control functions and make certain that the surfaces move in the proper direction. Be sure that the rudder and stabilator surfaces are neutral when the transmitter trims are set at neutral. Check that the spoiler blades close tightly and extend equally. Adjust clevises and/or spoiler cables, if required.

(2) Check that the servos are firmly mounted and that the receiver and battery pack are secure. Make sure that the nose trim ballast is firmly mounted and cannot shift forward or backward. A strong launch can shift things toward the tail.

(3) Check all flying surfaces carefully for warps. Remove any warps present by re-heating the film covering. Be sure that the tip panels are not washed-in (leading edge higher than trailing edge at the tip). A small amount of wash-out is okay as long as both tips are the same.

(4) Check the span-wise balance by making a string sling and supporting the ship by the main wing joiner. If it rotates span-wise, add weight to the lighter wing tip. A slight tilt can be tolerated but excessively out of balance wings will cause erratic turns. Remove the wing panels and re-check that the fuselage hangs level when supported by the main joiner. This will provide slightly nose heavy trim which we find is safer for the first few flights.

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

Flying the Sagitta:

When you have completed all pre-flight checks, take your Sagitta to a suitable flying site. I prefer to hand launch any new sailplane a few times before putting it up on the line. Turn on the radio and check the controls one last time. Hold the Sagitta in the launch position and run a few steps into the wind. Launch it with a smooth follow through. The Sagitta will travel quite a distance from a hand launch. Watch the Sagitta --- does it climb or dive or turn left or right? Make any trim changes you think necessary, and go find a tow line.

When winch launching you'll find that the Sagitta likes to fly a little faster than your average Paragon type. Keep it straight and as you climb through 30 degrees, start pulling up elevator. With practice, you will find that you can easily get the highest launches on the field.

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Sagitta is one great flying sailplane. If you find lift right off the launch, practice circling in it. You'll find that the Sagitta is a little different to thermal, but when flown efficiently it has the highest climbing velocity I've seen. You may think this statement a little off, but to really appreciate the Sagitta, you have to fly it in heavy sink. You know the kind you find on a ten minute straight duration flight. If you put the nose down, you'll be amazed at what happens. The Sagitta has a definite step, and once on the step, the L/D goes out of sight. You'll be able to cruise right through the sink to the lift that's sure to be on the other side.

When flying in wind, I normally don't add ballast until the wind gets to be steady at 15 mph. Speaking of ballast, you'll find you can stuff plenty into the Sagitta. For windy weather flying, I start out by adding 20 oz. of lead. This gets the wing loading to 9 oz. or thereabouts — anyway it's a good place to start.

On your first few landings practice slowing the Sagitta, on the downwind leg. When you turn onto final, use the spoiler to adjust your glide path. The Sagitta lands fine, but get used to bringing the nose up to get it a little dirty. The worst thing you can do is put the nose down and let the Sagitta regain its efficiency. Chances are if you try to land hot, you'll slide right through the landing circle.

Good luck with your Sagitta, we hope you enjoy the ship as much as we have. □

SORCERER

from page 22

After the center section, the wing panels are a snap. The wing is a flat bottom airfoil and constant thickness from root to tip. Since the wing is tapered, the tip is a higher percentage airfoil. It also means that there is no need to taper the leading edge or to use blocks at the tip. The ribs are all machine cut and fit beautifully. Sheeting is used only on the upper leading edge and center rib bay, the rest have capstrips. If you haven't tried Super Jet for capstrips, now is the time. It works great! We did find one minor problem while building the wing. If the cut line on the plan at the taper joint is followed, the trailing edge comes out 1/4" too short. The easy cure, and the one we used, is to move the tip rib inboard 1/4". The manufacturer will be correcting this on future kits.

Covering;

Usually we ry to cover using the least number of pieces. On the Sorcerer small pieces are almost unavoidable since the center section and tail booms are assembled before covering. Any of the film materials can be used and we decided that MonoKote Mettallic Purple (they call it Plum Crazy) would be appropriate. For trim, we picked Solarfilm Yellow. Pactra's Solarfilm works nicely over MonoKote since the lower iron temperature doesn't cause it to shrink. Careful application will minimize air

bubbles and any that won't go away can be removed with a pin.

Motor:

The Sorcerer is designed for the Astro Flight 075 motor system. The 075 motor is slightly longer than the 05 and about an ounce heavier, but it has a lot more thrust. In sailplanes, the same 9.6 volt battery is used so there is little weight penalty. Those of you with electric powered sailplanes might do well to consider the 075 as a performance booster. With the pre-drilled nose block, motor installation is simplicity itself. The motor slides in from the rear and is held in place with a strip of masking tape — just don't block the rear cooling vents. The motor battery fits nicely in the space provided.

Radio:

The radio compartment is large enough to accommodate just about any of the current systems, however, weight should be considered and the micro systems are much preferred. We used a 3 channel Futaba with S-20 micro servos and a 225 MA flight pack. The third channel was used to provide motor control via a micro switch attached to the servo. Du-Bro adjustable pushrod connectors were used at the servo ends and the rudder connector was drilled out with a 7/64" bit so that both rudder cables could go through the same connector.

Since the motor battery must be charged after each flight, we have been using a field charger on the radio pack while the Astro Flight Rapid Charger is working on the motor battery. It tends to look like an electrician's nightmare in action but it sure is nice to know all the batteries are charged for each flight.

Flying:

With the radio and motor batteries installed, as shown on the plans, the C.G. came out right on the aft edge of the spar without any need for adjustment. The control throws were set at 1" each way for both the rudders and elevator. It looks like a lot of throw, but the Sorcerer has a short tail moment and needs the extra push. Test flights were done with a Master Airscrew 8/4 prop and, after some experimenting, this still seems to be a good choice.

The Sorcerer likes a level launch and it doesn't take a mighty heave, just a gentle toss. After picking up some speed it will climb out at a very respectable rate. The Astro 075 will run about 4 minutes before the power drops off but all we ever used was 2 to 3 minutes and had plenty of altitude. In light lift we found that 15 minute plus flights were the norm, in anything better the only limit is your own. One interesting characteristic was noted, rudder response is quicker after the power is off. The only trim change we made was in the tip washout. One inch of washout is called for but after a while this was reduced to about 1/2" at each tip. The glide is flatter but you do have to watch the speed more carefully. The Sorcerer is quite agile and it is fascinating to watch in the air.

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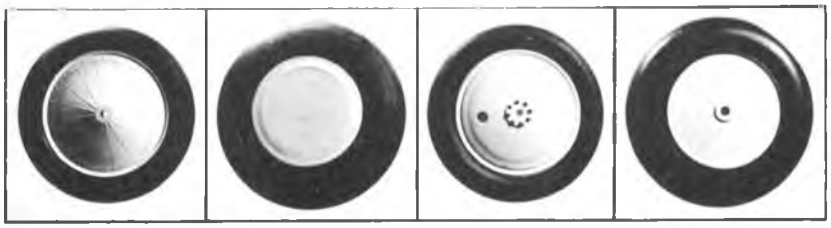

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SORCERER

from page 167/22

Conclusion:

This is a builder's airplane. The kit is very well done but don't plan on building it Friday night for Saturday's flying. We enjoyed the building process, largely due to the excellent wood and parts. The finished product is what really counts and the Sorcerer is certain to bring a lot of admiring questions. We've had a lot of fun flying the Sorcerer and still find people stopping to watch. At a kit price of $68.95, the Sorcerer is a bit more than some others, however, the price is well justified by the level of quality. If you have built a few "normal" sailplanes, give the Sorcerer a try. We think you will enjoy the difference. □

POWER BOATING

from page 16

have an idea of the pitch that is required for your purposes, you have to buy some propellers with similar pitch.

Cast metal propellers require careful preparation if maximum performance is to be realized. Each propeller blade must have the same weight distribution, blade area, shape, diameter and pitch distribution. If the blades are different, the resulting unequal loadings will cause vibration that robs power and eventually destroys the strut bearings or the propeller stub shaft. The first step is to equalize blade diameter and area. If you have a lathe, this is a simple task. If not, you will have to make a paper pattern of the small blade and trim the other one to match. Once shape and diameter are equal, the propeller should be sharpened and balanced. The best balancer I have found is one made by Racer's Edge, Cupertino, California. This balancer has its pointed balancing-shaft ends supported by matching dimples in spring steel supports. This balancer is so free that a balanced prop will free-wheel when you walk past it and create

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a draft!

A prop can be considered statically balanced when it comes to rest at any position when given a small spin. If it comes to rest at a particular orientation the heavy parts are, of course, below the shaft axis. The light blade should be identified and its leading edge sharpened. Work only on the back of the blade (the convex side) when sharpening and balancing. I use chain saw files and a small flat file to do this work. A 3/16" chain saw file is also used to dress out the prop shaft hole. The heavy blade is now sharpened and thinned until it has a weight distribution that is similar to the light blade. If the prop is very far out of balance you can use your Dremel tool and a sanding drum to speed up this truly distasteful job. Work until the propeller is balanced.

The blades should now be checked to equalize the blade pitch distribution. This is most easily done by using either Steve Muck's or Dial-A-Prop's pitch gauge. Check the pitch at several radial distances from the hub as well as at the leading and trailing edges of the blade. Octura and J.G. props are very accurately cast so it is rare that you will find unequal pitch on a new prop. After you have run the prop, however, blade pitch may change by contact with foreign objects or the prop may even be bent by too much power. If you find unequal pitch, the blades will have to be bent. I use a 3/16" steel shaft inserted into the hub and a pair of pliers to bend on the blades. Dial-A-Prop makes a couple of steel prop anvils that are useful in straightening badly bent blades. The prop blade is laid over the appropriate shaped area of the anvil and an X-Acto brass tipped hammer can be used to beat the prop back into the proper shape.

Now that your prop is sharpened, balanced, and has equal blade area and pitch distribution, you can do the final surface finish. Use slightly worn 250 grit paper to smooth the blade surface and perform a final balance check. I have proven to myself that highly polished props do not improve performance, but if you are into attracting fish, it's neat!

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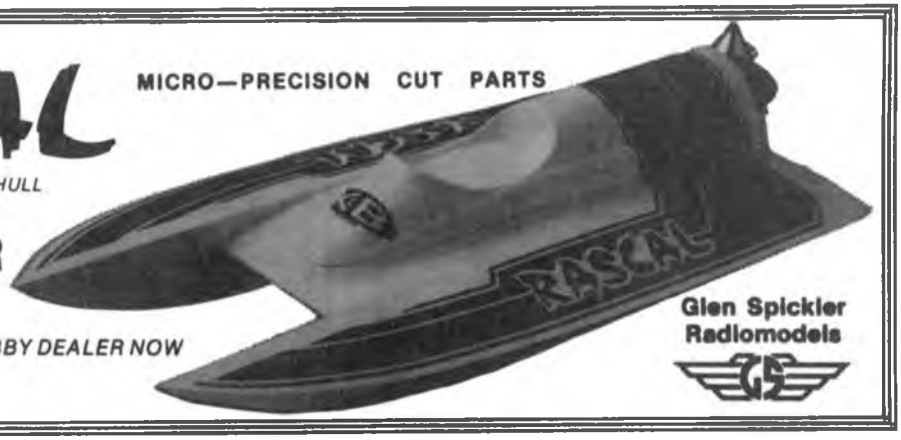

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from page 171/16

If you intend to use the prop without any modifications you can now heat treat the prop to increase its strength. Heat treating increases the tensile strength of the metal but also makes it more brittle. After heat treatment the prop will be stronger but very difficult to rework or repair. Berillium copper propellers may be hardened by first annealing them. Heat the prop with a propane torch to a dull red color and immediately drop it into water to cool. Then put the prop in your oven and heat treat it at 625° for three hours. The propeller color should be noticeably dark after treatment. If it isn't, your oven probably isn't getting hot enough. In that case you can try turning the oven to broil and let the prop heat for another three hours.

Now that your propellers are ready, it is time to consider the effects that boat underwater objects have on prop efficiency. If you remember, it was pointed out that propeller blades really are lifting foils. Most disturbances that are created in their flow field tend to reduce efficiency and, therefore, should be avoided. Disturbances travel at the speed of sound in water. This means that unless your boat travels faster than 3240 mph, even a rudder mounted far behind the prop will affect the performance of the prop! Best performance is realized then by cleaning up all underwater elements to make the water flow cleanly without turbulence. The best prop cannot work properly if it is not "biting" good clean water.

Turn fins on monoplane hulls should be as thin and sharp as possible. Drive train components should be streamlined. This is one big advantage of using a flex drive.

Figure 1 shows how this is easily accomplished by adding spruce strips fore and aft of the flex drive brass tube. These strips are carved to streamline form after being epoxied in place. As a rule of thumb, objects that pierce the water surface should have sharp leading edges. If the object is

to page 176

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POWER BOATING

from page 174/16

always submerged, a rounded leading edge is preferred. Do not fill in the entire area between hull and drive line. Filling this area in will seriously deteriorate turning performance. I use 1/4" x 1/2" spruce behind a 1/4" brass tube and a 1/4" square piece in front of the tube only if the boat rides with the drive line showing. This streamline fairing greatly decreases turbulence behind the drive line and also decreases drag. A streamlined ferrule is used to connect the drive tube and the strut bearing housing. The strut should be sharpened both front and rear. The strut bearing housing, drive dog, prop hub and prop nut should all be equal diameter so that smooth flow is maintained near the propeller hub. Octura streamlined tail nuts are recommended after you have determined the propeller you will use on your boat. Be sure to use Locktite to keep it and the propeller securely fastened to the prop stubshaft. While you are experimenting with various props, the self locking prop nuts sold by K & B are very convenient.

Even with these precautions, a portion of the propeller disc area is masked by the drive line. A two bladed prop will have one blade at any time working in disturbed water. Theoretically, a two bladed prop should be more efficient than one with three or four blades because each blade interfers with the flow field of all the other blades. This blade interference reduces the total prop efficiency of multiple blade props. However, when we consider strut masking, the three bladed prop has two-thirds of its blades working in clean water at any given moment. Three and even four bladed props may be desirable for many applications. Another advantage of using more blades on a propeller occurs when the prop is used in a surface piercing configuration. In this case the three and four bladed propellers smooth boat turning and ride characteristics.

Next month we will continue our prop discussion. Please send me your questions, comments, contest reports, and photos so that I can make this column what you readers want. Howard Power, Hobbies Unlimited, 766 Broadway, Seaside, California 93955 (408) 394-1200. □

ENGINE CLINIC

from page 14/12

Fuel.

Thank you very much.

Matt Dralle
Davis, California

That must have been a pretty old issue of RCM that you were thumbing through Matt. Don hasn't written the Hover column for at least two years and probably longer. It was

replaced by other columns of similar nature a long time ago. Ron Sheldon wasn't even in the fuel business (on a commercial level) at the time.

By trash fuel, Don was referring to home brews, fuels that guys at the flying field mix up and sell below hobby shop prices, some club brews, etc. Most any commercially made fuel is okay to use. Some work better than others but I do not know of any really bad ones on the market — those that are advertised in RCM that is. There are a lot of local home brews around that individual hobby shops make up to sell to their customers so I cannot vouch for these. Ron Sheldon can sell his fuel cheaper because he sells direct and does not go through regular distribution channels. At least as far as I know.

As far as nitro content — if your helicopter will fly to your satisfaction with 5%-10% nitro fuel, then there is no point in using more. The difference between 5% and 10% is not all that much. Don was just making the point that higher nitro fuels — 25%, 40%, etc., were not necessary for helicopter flying; especially when 90% of the flying time is hovering at partial throttle and full throttle used very little.

Dear Mr. Lee;

I am an old timer who has returned to modeling. I am really impressed with the advances in motors, radios, and construction in the hobby. I finally feel fairly competent flying again — but a little slow on reaction time. My flying is sport and scale — no pattern, and I am now considering buying a new .60. Can you help me with the following?

(1) Are ABC engines as durable as regular?

(2) Do you need a starter with ABC?

(3) Are ABC as easy to start as regular?

(4) Are ABC as susceptible to damage on a lean run as regular are?

This is a tremendous hobby with thanks to people like you for your help in modeling matters.

Thank you,
J. Anderson

Generally speaking, ABC type engines are just as durable as lapped iron pistons or ringed engines. However, in the case of a ringed engine — when over the hill you can often just replace the ring/rings and piston. With an ABC engine, the piston and sleeve are only sold as a unit. The sleeve being made of brass and chrome plated makes for a very expensive assembly. As an example, K & B charges $25.00 for an ABC piston/sleeve for their front rotor 6.5 (.40) Schnuerle engine. A new ring for their front rotor conventional .40 sells for $2.00 and the piston for $4.75. Even if a new sleeve is required this is $7.00 so you can see ABC set-ups are more expensive to replace.

The fact that an engine is of ABC design does not change its starting characteristics. They start just as easy and an electric starter is not required providing, of course, the engine is properly fit. ABC piston/sleeves

to page 179

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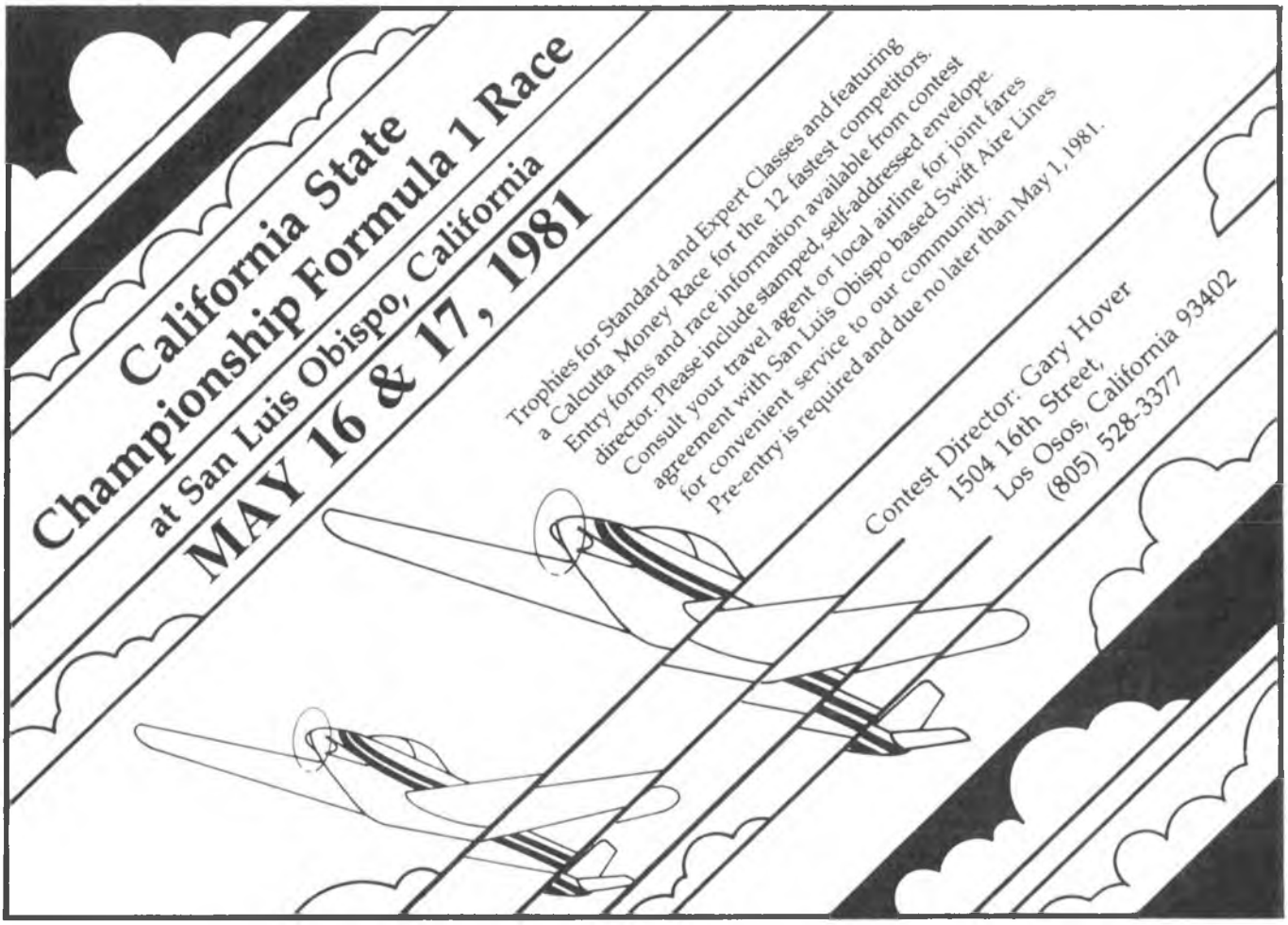

ENGINE CLINIC

from page 177/12

are fit a little tight at the top to allow for differential expansion. If fit too tight, an electric starter might be necessary to get the engine running the first time or two. However, herein lies your answer to your fourth question. Due to the differential expansion, an ABC engine is less susceptible to damage on a lean run due to the sleeve growing more than the piston and lessening the chances of seizing. The engine just loses power. Of course in the case of racing engines with high nitro the lean run results in temperatures being generated that can cause damage.

Dear Clarence,

You've helped out before, so let's see what you do with this one . . .

About two years ago I bought an Enya .60 III and ran it in a "Tin Lizzie" helicopter (using the mechs. of a Kalt Huey). I don't think I ran it over a half hour, tops. For some reason, I don't remember what it was, I set it aside, after loading it with 3-In-1 Oil.

It sat on the shelf, until recently. I tore it down and cleaned it --- gave it the soap pad and alcohol routine and it came out nice and clean. Then, again loaded it with 3-In-1, and back on the shelf. Up to then, no problem.

Tonight a friend, who is very adept with engines, was visiting and spotted the Enya in my engine cabinet. After looking it over, and turning the shaft a few times, he said he thought he detected something about the way the compression checked out. So he asked to take it over to his house and tear it down so he could check out his suspicions. I agreed and away he went.

Later he called back and told me that the wrist pin was jammed in the piston and wouldn't float, and said the piston was warped! He suggested I order a new piston and ring from MRC. Is this possible? I'm

to page 183

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ENGINE CLINIC

from page 179/12

going to order them anyway, but I would like a word about it if you could, please.

Thank you for your help, and your engine column is tops! After the girl on the front, of course!

Best regards,
Tom Waller
Bronx, New York

Without knowing your friend's qualifications I am afraid he might not be as "adept" with engines as you may believe. An engine that has been disassembled, cleaned, and then reassembled with 3-In-1 is going to have considerable compression leakage. This is due to the low viscosity of 3-In-1 --- not much more than kerosene in viscosity. 3-In-1 is okay as an after run oil when you are only diluting the heavier oil remaining in the engine but should never be used as an assembly oil. It also has a bad tendency to evaporate after a few months.

Piston warpage is a pretty common thing with a ringed piston engine. A lot of machining steps are required when making a piston that cause and relieve internal stresses within the metal. When an engine gets hot, stresses change and the pistons will go out of round. In a ringed engine this seldom causes any harm unless warpage is really excessive. You may buy a brand new piston and find it to be .001"-.002" out of round. You would never want a lapped piston/sleeve engine to be out of round but a ringed engine is not that critical. I am assuming that your friend judged the piston warpage with a michrometer — not just because the piston had some shiny spots on it. The shiny spots are normal but a lot of fellows seem to think this should not be. After all, the piston has to ride in the sleeve and transmit power to the con-rod and crankshaft. Piston loads are going to create shiny spots.

A tight wrist pin is no problem. Maybe this is how your friend judged the piston to be warped. Many times new engines will come with tight wrist pins. The cure is to use

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some #600 grit Wet or Dry emory paper and light oil wrapped around the shank end of a drill. A few passes back and forth through the wrist pin hole will loosen it up. Be careful, however, as it doesn't take much. A nice slip fit is what you are after.

One final comment. It is not a good idea to use alcohol to clean an engine. The alcohol attracts moisture and, upon evaporation, there will be rust spots. Although you may think you have gotten all the alcohol out of the engine a few drops in the bearings might remain causing rust. It is best to use a good solvent — kerosene, lacquer thinner, etc., something that does not draw moisture. Then, when assembling the engine, use a good grade of gun or sewing machine oil --- something with a little body to it that will not evaporate like 3-In-1. Do not use castor oil unless you intend to run the engine right away. Castor oil turns to gum after setting for a period of time. □

FLYING LOWE

from page 11

trimming loops. If you have a twisted wing or stab — forget it. **These must be straight**, and properly centered and aligned. Sometimes a minor twist can be removed using Jimmy Griers' technique. Simply cut through the skin (preferably on the bottom) diagonally from root to top — leading edge to trailing edge. The wing or tail will now twist. Block up with a bit more twist than required to straighten and epoxy the cut. It will spring back some when released; so this is cut and try. I've seen several ships salvaged this way — including one of my own. Dave Brown did this to the stab of one of his ship several years ago.

Just to add one more example of one of my recent trim jobs — my Phoenix looped nice and straight inside — outsides were something else even though everything checked straight. So I corrected by trimming with aileron to straighten outsides and also trimmed a little opposite rudder to keep insides straight. So — you may have to try combinations.

As I previously mentioned, trims will change some due to structural changes and/or control system drift — or — inadvertent movement of trim levers. Another sublety — a sagging pushrod can mess up loops; positive and negative "G's" can cause the rudder pushrod to bend and effectively shorten, pulling the rudder off. If the ship trims off the same direction both inside and outside, check for this. The pushrod should be very stiff and light and/or well supported — some use guides near the middle. Using a cable pull-pull system would eliminate this possibility. Some also report that cable systems seem more positive. This would certainly be true if you had any buckling of the pushrod under compression.

You can see from all of this that the whole

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from page 184/11

package is important — we haven't even discussed the radio and that's as important as anything else. For example, a flaky radio or poor stick gimbal system that has cross talk and trims the aileron or rudder as the pitch axis is exercised, will cause untold grief. I've seen many sets where electronic "mixing" between elevator and rudder or aileron causes weird trim conditions. The best check for this is to carefully move the stick up and down and carefully check for any rudder or aileron movement. It doesn't take much; if you can see any, it's **no good**! Sometimes it can only be checked on a pulse counter or electronic set-up that will isolate and picture the rudder and/or aileron channels and you move the elevator. I've seen it on **all** brands of systems. From the most expensive to the cheapest — electronic mixing of this nature can be corrected only by an expert. If you have it, you're out of luck until it's corrected. If it proves to be electronic mixing (and not mechanical stick problems), you can salvage the situation by switching channels so that the off ended channel is used for throttle or landing gear or auxiliary where it's not critical.

You can see from what we've discussed so far that I find it impossible to discuss trimming without covering design and the reasons for the conditions that you observe. I feel that if you can understand the reasons then you can progress much faster in solving your own problems.

While we're discussing loop trimming, let's talk a little more about propeller effects. You've all heard about torque — for every action there is an equal and opposite reaction. The propeller rotates in one direction and torque tries to rotate the aircraft in the other direction. The only way to counter this is to trim aerodynamically (aileron/rudder) or offset the thrust vector to counter it. Unfortunately, these offsets do not act equally under all flight conditions, as the torque changes, more or less offset is required; as the speed changes, the aerodynamic offset is more or less effective.

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There are other little engine/prop effects to contend with. "P" factor is little understood by the average modeler. Suffice it to say that as you pull angle of attack, the up going and down going prop blade halves see a change in angle of attack. The net result is differential lift across the prop disk and a force at right angles to the angle of attack, i.e., as the pitch up, a force is generated which tries to yaw the aircraft to the left and an opposite effect when pitched down. There are also gyroscopic precession effects which are a function of the precession rate; i.e., the rate at which you pitch or yaw. These forces act at right angles to the commanded maneuver. There is also rotational flow off the prop that can screw things up as we previously mentioned. So you can see that the snarling beast up front, while doing a great job of providing lots of thrust, is also contributing its share of trim problems. What we need is a contrarotating prop system or a reaction engine.

Well we've rambled long enough this time. Tune in again and we'll talk about roll trimming, some more about radio requirements, and might even talk about flying maneuvers. □

SUNDAY FLIER

from page 8

True, Piccini did not ask what washout is --- only if it is necessary. I sent him a direct reply, since it would be too long before he saw an answer in RCM due to our lead time, but coincidentally, I was asked the same question just the other day at our field, so it seems that the time has come to review the pros and cons of wing washout. So let's get down to some serious talk, now that the silly season for predictions is over. Those of you who know all about wing washout can skip out.

Many years ago the Ryan Airplane Company came out with a cabin plane they named the "Ryan Brougham." Very hoity-toity. And a good airplane, too. Stable, easy to fly, and a very gentle stall.

to page 190

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from page 187/8

The first model, though, had a nasty stall trait. Depending on small variations in the air currents around the wing tips, one or the other wingtip would stall before the rest of the wing, causing the wing to drop rapidly. The nasty part of it was that you didn't know which tip was going to stall. During the flight tests, this characteristic caused some pretty rough landings, even though the approaches and flare-outs were smooth. The answer was simple; decrease the angle of incidence of the wing gradually from the center section to the tip. Thus, when the angle of attack of the entire wing was increased to give high lift for landing, the angle at the tips was less, and the center section reached the stall point first. The tips continued to lift, so the airplane had a straight ahead "mushing" type of stall that was easy to handle. The feature was incorporated in production models, and the advertising department had to come up with a good gimmicky name for the washed out tips. They did. The Ryan Brougham was touted in the ads as "the plane with the wing with the aerodynamic twist!"

I don't know whether that was the first commercial use of washout. Maybe one of you readers might now. Also, who coined the term "washout" to describe incidence decrease from center to tip of wing and, conversely, "washin" for the opposite?

Piccini asks if it is really necessary to have washout in a wing, saying that some modelers say yes and others say no, Both answers are right --- depending on what you want your model to do. Another important factor is whether the wing is "straight," that is, the leading edge is straight, and the trailing edge is parallel to the leading edge, or whether the wing is tapered --- narrower at the tip than at the center. Wing sweep also has to be considered. Finally, it is possible, by varying the airfoil section from center to tip, to achieve the same effect as washout, but without the disadvantages. Yes, there are some disadvantages to washout, depending on the purpose for which the airplane is intended. Now let's consider some of the cases.

First, take the simplest case --- the rectangular wing planform, as used on most trainers for beginners. The span is usually somewhere around five times the chord, give or take a small amount. The wing ribs are the same shape from center to tip. This makes it very easy to build and, in addition, it can be built on a flat board, particularly if the bottom line of the rib is a straight line. In this case, no washout is necessary. The wing will stall uniformly along the span. However, it is important to make sure that the wing does not have any warp which results in the tip section having "washin," or tip stall will occur. To be absolutely safe, a very small amount of washout is okay. See Figure 1.

Now let's look at the wing Piccini plans to use on his Typhoon. The taper is just a bit under 50%, from 19" to 10". The section (airfoil) is a thick, symmetrical shape with a blunt leading edge. This section has a relatively gentle stall. Due to the taper, the Reynolds number at the tip will be less than at the root, so, if the section is uniform, the tip will stall slightly ahead of the root if it is at the same angle of attack (no washout), but the stall will probably be manageable for most flight attitudes. Since it is a fighter model, aerobatics will be desired. With that in mind, no washout is the way to go. Sure, he'll have to land a little faster to avoid a tip stall which could occur in a full stall landing, but the mild tip stall characteristic will make it much easier to get good snap rolls and spins. Slow rolls are done at low angles of attack, so there's no problem in that maneuver. A high speed, high G turn could possible result in a snap roll, but it also is unlikely with the thick section.

On the other hand, if pilot skill is marginal, washout is always the safe way to go with a taper wing model. And, believe it or not there's a way to have the best of two worlds without having two separate wings. Simple. Build the wing true; then, when you install the ailerons, set them so that at the neutral setting, they trail upwards slighty. Instant washout. But only if you are using tip ailerons. It doesn't work with strip ailerons. Then, as you learn the flight characteristics of the model, you can gradually lower the trailing edges of the ailerons at the neutral setting until they trail in line with the rest of the wing. See Figure 2.

Pattern models, and models intended for precision aerobatics, such as the Laser 200, do not use washout. The objective is controlability --- not stability --- so they use a set-up in which the model goes where you point it, whether it is right side up or upside down. Remember, washout in a wing becomes washin when the model is inverted. That could create problems in outside loops.

Finally, one way to avoid tip stall is to vary the airfoil, so the airfoil at the tip stalls at a higher angle of attack than the airfoil at the center.

So as you can see, the use of washout in a wing depends on several factors. As I said earlier in the column, we discuss these things from time to time, then repeat them for new readers, who may not have the earlier issues of RCM. Just so you can look into this matter of washout further, let me refer you to two articles I wrote a couple of years ago or so. In the February 1979 issue of RCM, I talked about the ways to check your wing to make sure it is in true alignment, and in the July 1979 issue I showed some airfoil curves and discussed the pros and cons of washout versus airfoil variation. You might want to check them out, if you have access to copies. If not, perhaps there may still be some left in RCM's files.

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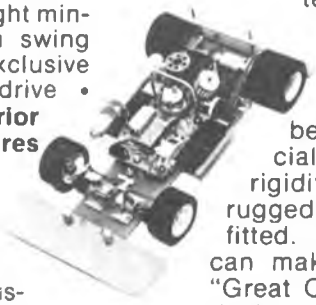

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SUNDAY FLIER

from page 191/8

So, as we go into the flying season for 1981, I've given you some predictions -- for fun --- and some facts which may help you to have some great flying this year. I hope so.

Now it's your turn. Let me know what you want to see in the column. It's for you --- the Sunday Flier.

Keep in touch. Write. □

CUNNINGHAM ON R/C

from page 6

The first is the new Black and Decker Sharp and Sand that uses the power of a 1/4" hand drill to operate a small belt sander. The sander has a fence on it so that you can sand square edges or at an angle, as well as sharpen your trusty whittl'n knife. If it doesn't find its way under my tree, I'm going out looking for one in an after Christmas sale.

The other is a toy that I saw the other day. It is a rather large battery operated vehicle with an on-board computer that you can pre-program for the truck to go through a number of different operations. Now, suppose that you removed the guts from this toy and used the computer and all of the mechanical linkage, etc., to do various things in your big bird. A pre-programmed sequence to drop a bomb, or toss out the pilot in a parachute, or dispense leaflets, or operate a canopy, or perhaps motorize your fuel box to move out to fill up your aircraft, or any of a thousand things that your inventive mind can dream up. The next decade will find that computers are a complete way of life. Just think, you can pre-program your computer to take your aircraft out to fly, fly it, land it, clean it up and drive home, all while you sit and watch. Sounds terrible, doesn't it? But, if someone could pre-program a gadget to sand my aircraft for me, while I sit and watch, that would really be progress.

Speaking of sanding, one of the problems in construction is in carving the leading edge of a wing out of a piece of balsa. Some time ago this method was mentioned but, like everything else, half of the people reading this issue weren't involved in R/C when this bright idea was published. The simplest carving tool to use in shaping leading edges or balsa blocks is a simple hand held potato peeler. They are readily available at any supermarket kitchen tool department, and are very inexpensive, and work great. You must peel the correct way with the grain of the wood, but you will find this out with a little experimentation. When it gets dull, toss it away and get another.

Another simple idea that may have been overlooked is how to drill a hole in an area that is hard to reach with the normal drill bit. You can look around for a surplus store that sells long drill bits, or you can make your

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CUNNINGHAM ON R/C

from page 195/6

own very easily. For example, take a piece of 1/8" wire, and a piece of 1/8" inside diameter brass tube about 1" long. Slip a 1/8" drill bit in one end of the tube, slip the 1/8" wire into the other end, solder them both to the tube, and then cut the 1/8" wire off to the desired length. This makes it pretty easy to drill a hole in the firewall for the throttle pushrod after everything has been completed. If you want to make an extension for smaller drills, I would suggest that you use the 1/8" wire, then step down the tube size with several pieces of tube until you get to the drill size. You can use smaller wire, but you have to be more careful when drilling the hole because of the flex of the wire.

I received a letter the other day from Ron Shettler of Canada, who, as most of you know, is the developer of the Quadra engine for model use. Ron enclosed a set of large model wheels to try out. They look great.

The wheels are 5" in diameter, beautifully made, with a teflon bearing hub housed in aluminum. The tires are inflatable, and the pressure can be varied to give a ballon look or a more streamlined look. They will support most large aircraft and will absorb considerable shock. Until distribution channels are set up in the U.S. they can be ordered directly from R. Shettler Ent. Site 4, Comp. 19, R.R. 3, Vernon, B.C. V1T 6L6 Canada. The price for a pair

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FROM THE SHOP

from page 199/4

petunias. The last straw came last Wednesday when our lawn mower broke down and he insisted on finishing the job by running his plane back and forth across the front yard while I held the flashlight. Please Help!

Desperate Debbie

Dear Desperate:

Yours is not the only letter I've received about this situation, and I've come to find this is not an uncommon problem among wives of R/C flyers. There are steps you can take, however, to remedy the nuisance through careful planning, precise timing, and a bit of natural womanly wit. Here are some suggestions that have worked for other wives:

1. Tell him you have signed him up to sing in the church choir and the reverend is expecting him for both services each Sunday and for practice on Saturday.

2. Tell him your mother's psychiatrist advised her to become interested in her son-in-law's activities to mend differences, and she wants him to teach her how to fly the plane he spent all winter building.

3. Tell him the smell of glue has the distinct tendency to give you a headache in the evening.

4. This is a bit stinky and technical, but unscrew and criss-cross the aileron pushrods in his plane's wing (you know those long, flappy things on the back of each wing).

5. Secretly move all trim levers on his transmitter to random positions after each flying session.

6. Sneak out to the flying field when no one is around, steal his plane's frequency clip, make 2 or 3 duplicates, then sneak back and place them on the clip stand.

7. Tell the local hobby shop owner one of two things --- your hubby has a rare and incurable disease which is highly contagious, or he's printing counterfeit twenties in your basement and the FBI is watching his shop for possible accomplices.

8. Tell your husband your veterinarian has advised you that your pet St. Bernard has developed an allergy to balsa dust which evidently affects his nerves and causes him to become "overly excited" around house guests and your favorite rubber tree plant.

9. Pour some water in his flight box fuel supply, reverse the prop on his plane, pour clear nail polish in all his glow plugs, and insist on going to the field with him to see what your grocery money is being sacrificed for.

10. Attend the next flying club meeting with liquor on your breath, trip a little, mumble incoherently, and fall headfirst into all the planes on the display table.

Pull any of those little goodies, girls, and it's cure 'em or commit 'em time at the ol' hangar --- and that's the truth. Br-a-a-a-ack!

★

See you next month. □

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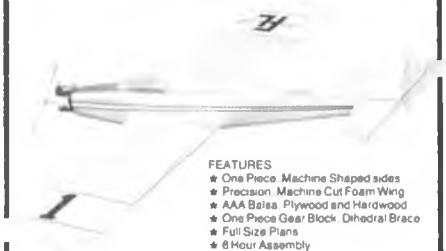

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