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RCM radio control MODELER

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RCM MODELER

VOLUME 19 NUMBER 1 USPS 509190 ISSN 0033-6866 JANUARY 1982

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This Month's Cover
presents a dramatic view of Miss Kim Rold of Corona, California, displaying Ron Black's modified Pierce Paragon. Built by Steve Kaneshiro, the Paragon has a 118" wingspan, weighs 51 ounces, is covered with K & B epoxy and MonoKote and is modified to a full flying tail. Ron uses a Hobby Shack Aerosport radio with his model. Kodachrome transparency by Ron Black.

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FROM THE SHOP

Don Dewey

Art Nelson and his Fokker triplane. The tripe is a modified VK kit with scores of flights on it. Art is the extremely talented artist with an unparalleled imagination and sense of humor who creates cartoons for RCM. He is a long time employee of Northrop Aircraft.

As mentioned before in this column, one of the most rewarding aspects of publishing RCM is getting acquainted with so many superb people. Art Nelson is one of those people, a photo of Art with his Fokker Triplane appears on this page.

Our good friend, Bob Dick, frequently takes pen in hand to describe the humorous phenomena that all modelers experience, his latest exasperation is related a bit later in this month's column.

★

The following note from Ken Kruchek brightened up our day.

Dear Don:

Thank you very much for publishing the "Bat" in your November issue.

We thought you might like to see the Bat in flight. My son Robert, who is also an R/C buff, took these pictures with a small Kodak pocket camera. Besides Bob, there is also Kevin who just took 1st place in his first fun fly, and Karen who hasn't gotten her hand in R/C yet. Robert is 18, Kevin is 13 and Karen is 11.

We will be most happy to answer any and all letters about flying and building the Bat.

Very truly yours,
Ken Kruchek

★

We overheard a conversation at a recent seaplane flying session at Lake Elsinore where Irwin Ohlsson was showing off with a bit of trivia by asking if anyone knew who invented the step in boat hulls. Of course, no one present knew the answer so Irwin advised that an Englishman, the Reverend Charles W. Ramus, invented the step in 1872. The speedy response from Harry Apoian was; "Does that make him the original step-father?"

★

Here is the letter from Bob Dick, it speaks for itself.

Dear Don:

Well, it happened again. Just a few minutes ago, as a matter of fact. I'm talking about ***Reverse Hallucination****, or RH as I call it. You say you don't know anything about RH? Sure you do . . . you just don't recognize the name. First of all, you know that hallucination is where you* ***think*** *you see something that* ***isn't*** *there. Well RH is just the opposite. It's where you* ***don't*** *see something that* ***is*** *there! Still don't recognize it? Read on, and I'll tell you about the RH that hit me within the last hour. I've been working on a scale model of a 41' Coast Guard utility boat, and had been using an X-Acto knife on a piece of pine. I laid the knife down on the workbench (which is really a cardtable), right alongside a sanding block, and busied myself gluing up some of the cabin top. This took about 30 seconds (I was using Super Jet . . . very carefully). When I was through, I sat the glue bottle down, and reached for the X-Acto knife. It was gone! Now, I don't want you to get the wrong impression here. I had not misplaced or lost the knife. I had very deliberately placed it alongside the sanding block just about 30 seconds before, and now it was gone! Disappeared! I felt a tingle on the back of my neck, because I knew immediately that I was witnessing a classic RH happening. "Aha," I shouted . . . "RH!" I must have yelled it out pretty loud because Kelly (he's my dog) started barking, and Suzi (she's my wife) stuck her head in the doorway and said, "I thought you bought a bunch of those just last week!" Well, with no small effort I got both of them out of the room, locked the door, and went at it a step at a time. I mean scientifically. I picked up each tool, each piece of material . . . everything on the workbench was looked at, into, and around. Yes, I looked in my shirt pockets, my pants pockets, and if I'd had cuffs on my jeans I would have looked there too. No X-Acto knife. Just like I said, it had disappeared! But had it really? Like everyone who has ever worked with tools, I had been hit by RH before, and knew that in a matter of minutes that cottonpickin' X-Acto knife would reappear. I also knew that as long as I looked for it, it would stay gone. So, knowing the ground rules, you might say, I went back to working on the boat, and waited for "it" to "come back." I kept looking out of the corner of my eyes. Nothing. Once while I was bent over the boat (acting like I was working) I whisked about and stared right at the sanding block, but no X-Acto knife alongside it. I heard a noise and looked across the room. Suzi was outside looking through the window at me. Well, enough is enough. I needed that knife, and if it wasn't going to show up I'd just have to get the spare one I had in my desk drawer in the den. I reached down to pick up the door key (remember, I had locked the door), and there it was. The X-Acto knife! Another successful RH happening had taken place, and I had proved to myself that it was nothing to panic over . . . that it was something that happened at least once to everybody on any sort of building project. So there you are, my report on RH, and I'll bet the whole thing rang a bell with you, too.*

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ENGINE CLINIC

Clarence Lee

Dear Clarence:

It was with great interest that I read your column in the July issue regarding long-stroke versus short-stroke engines and which was better at producing low-end torque. The answer given by C.J. Baker as to the advantage of the long-stroke engine in this regard was not in agreement with an article I read in an issue of 'Cycle World' magazine published a number of years ago. I believe the article was written by Gordon Jennings, whose formulas for two-stroke exhaust systems are still used by many tuned-pipe builders today.

Anyway, the author stated that he did not believe that the bore-stroke ratio of an engine had any significant effect on its ability to produce torque and that it was other factors such as cam (or port) timing, compression ratio, carburetion, and other variables which determined whether an engine was a "screamer" or a "torquer." He reasoned that although it was true that a long-stroke engine had its work applied over a greater distance and a longer lever (the crank throw), this would be compensated for in a short-stroke version of equal displacement by the fact that the piston, with its larger diameter and thus greater surface area (on top) would provide more of a push on the shorter lever, regardless of rpm and assuming, of course, equal combustion pressure. Simply put, the greater push would make up for the shorter lever, and it does sound logical.

In years past most long-stroke engines were not designed for high rpm and, thus, had the timing, carburetion, and heavy flywheels suited for good, smooth low-end "grunt," while short-strokers were designed to take advantage of their lower piston speeds and produce their power at higher rpm's. Nowadays, however, the fact is that most modern big-bore dirt bikes (which require gobs of low-end punch) are decidedly over-square and can be wound up quite high when needed. This applies to both two and four-stroke versions. In Hondas most recent 500cc four-stroke dirt bike they have employed a short-stroke engine with fairly "wild" valve timing for good top-end power. To reduce the detrimental effects on low speed torque of the long valve duration and overlap they have installed a reed-valve in the intake tract between the carburetor and intake valves (four valve head) which prevents carburetion blow-back at low revs. This results in a torque curve almost as flat as a pancake!

Another point I would like to make regards the statement I have read in your column on several occasions that model aircraft engines are the highest performance non-supercharged engines, for their size, ever made. Well . . . maybe! I must refer you to the 50cc Suzuki 3 cylinder G.P. engine of 1970 vintage. This engine, with disc valves and three separate crankshafts geared together, produced in excess of 18 hp at something over 20,000 rpm on ***pump gasoline!*** *This would equal about 5½ hp out of your Webra .91. Wonder what it would have done on 50% nitro? Of course, one might think that possibly a Suzuki technician may have "leaned" on the dyno a bit were it not for the fact that the flea-sized engine would propel both bike and rider at speeds well over 110 mph. However, there were drawbacks. Like the 500 rpm(!!) powerband which necessitated a 14 speed sequential transmission to keep the engine "on the boil" and resulted in a gear-box nearly twice the size of the engine.*

Well, I don't want to bore you with more "bike" talk, except to say that there is much to be learned from both motorcycle and model engines since they are both lightweight, high performance, high rpm engines built mainly for sport and recreation.

By the way, I do enjoy your column very much. It keeps me thinking!

Sincerely,
Skip Ruff
Taft, California

I heard from several "bikers" concerning Gordon Jennings' theory regarding long stroke/short stroke engines. Although I did not see the article you refer to in Cycle World, Gordon says pretty much the same thing in his book "The Two Stroke Tuners Handbook" which I have mentioned in past columns as being an excellent source of information on two stroke engines. Although written strictly for the motorcycle enthusiast, much of the material is directly applicable to model engines. Although Gordon is certainly considered an authority in his field, I am sure there are many who do not agree with this particular theory. Having been heavy into hot-rodding, drag racing, and other forms of full size automotive racing since the late 30's, plus my experience with design and development of model engines, I'm afraid I do not go along with Gordon's theory. Pick any topic of this nature and there will always be two sides that will prove they are right.

This brings to mind the article I did on horsepower and torque many years ago in which I said that "torque was the culprit that caused your aircraft to go left on take-off." I received more correspondence regarding this statement than from any article since. Some thought it was gyroscopic precession, some spiral slipstream, others "P" effect, etc. However, that was all hashed out years ago so please guys don't start firing in letters regarding this topic again. My reason for mentioning this again is that at that time I received many letters from knowledgeable people. Among these people were Bob Kress the designer of the RK series of ducted fan units sold by Midwest. Bob was design engineer in charge of the F-14 project and sent me a very nice letter with his views on the subject. I also received a letter from a gentleman that was a chief engineer for Lockheed Aircraft whose name I do not recall now. His views were exactly 180° from Bob's. I thought it quite interesting that here were two fellows in charge of full size aircraft design for two different aircraft firms with completely different thoughts on the subject. The same thing exists in the automotive, motorcycle, and model engine field, as well.

I am not familiar with the 50cc Suzuki engine you mention so cannot comment here. What was the displacement and how much did it weigh? You know I have always qualified my statements by saying that our model engines develop more power for their size and weight as well as displacement than any other full size internal combustion engine, with the exception of some of the "blown" (supercharged) drag race, etc., engines burning high concentrations of nitro.

Dear Clarence,

I am looking forward to building my first .60 size pattern aircraft and have

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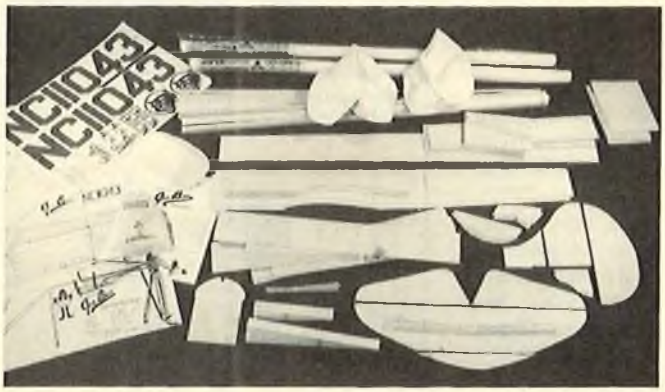
RCM PRODUCT REVIEW

Coverite
GEE BEE SPORTSTER



SPECIFICATIONS

Name	GEE BEE SPORTSTER
Aircraft Type	Sport Scale
Manufactured By	Coverite 420 Babylon Rd. Horsham, Pennsylvania 19044
Mfg. Suggested Retail Price	$99.95
Available From	Retail Outlets
Wingspan	56 Inches
Wing Chord	10⅜ Inches
Total Wing Area	524 Square Inches
Fuselage Length	39 Inches
Stabilizer Span	20 Inches
Total Stab Area	130 Square Inches
Mfg. Rec. Engine Range	.40-.50
Recommended Fuel Tank Size	8-10 Oz.
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt., & Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa & Ply
Wing	Balsa & Ply
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (17" x 22" sheet. One side is instruction and isometric drawing, and other side is photos and scale documentation on full size aircraft.)

RCM PROTOTYPE

Radio Used	MRC 775
Engine Make & Displacement	Super Tigre X-60
Tank Size Used	Sullivan 12 Oz.
Weight, Ready to Fly	92 Oz.
Wing Loading	25 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:
Parts fit, completeness of kit and flying performance.
WE DIDN'T LIKE THE:
Landing gear wheel pant installation (see text).

Coverite's rendition of the 1930 Gee Bee Sportster, their very first kit offering, is unique in many ways. First, it's one of the few Stand-Off Scale models available of a Classic or Golden Age era race plane. Secondly, it's a proven model design from the deep corners of Henry Haffke's mind that builds very quickly. Third, the Gee Bee is a very complete kit with the exception of the engine, mount, tank, wheels, and radio. Coverite has included everything necessary to finish the Gee Bee in a way that should make it very competitive in Stand-Off Scale competition. Included in the box, which measures (L) 39¾" x (W) 9" x (H) 3¼", are rolled plans 28" x 45" along with all the hinges, bellcranks, gear straps, links, rods, horns, bolts and screws. The landing gear wire is exactly formed as well as the tail skid. A spool of elastic thread is even included for those of us who wish to rig the Gee Bee with simulated rigging cables. The decals are something to marvel at and we must not forget the two rolls of Super Coverite included in every kit.

Constuction:

Construction of the Gee Bee Sportster is conventional in almost every way. Most of the airframe is built of balsa and plywood while the hard to form pieces are thoughtfully provided in heavy, durable, molded plastic. An experienced modeler should be able to completely frame the airplane in about 10 to 12 hours. For a more scale appearance, the fuselage can be narrowed down about 3/4" by trimming all the forward bulkheads 3/8" on either side. This makes for a better looking ship and allows the cowl to fit neater also. The fuselage is simply formed from two fuselage sides and a number of formers, followed by a few stringers along the rear top as per the real aircraft. The bottom is sheeted with balsa and the resulting structure is strong yet light.

The tail surfaces are merely sheet balsa and need only to have their leading and trailing edges rounded off for the perfect effect. After sanding, these surfaces should be covered and then mounted to the fuselage. It's a lot easier than trying to cover them after they are permently glued.

The wing is also conventional in its structure but only one half of the plan is shown. We made things a bit easier by turning the plans over and oiling the reverse side to build the other wing panel. Although we prefer to have the entire wing on one side of the plans we must admit that turning them over and oiling them is a minor inconvenience. Special attention must be paid to the construction of the ailerons and the wing tips to insure a true wing. When completed, the entire wing should flow in its lines with no abrupt protrusions or indentations. A little effort with the sanding block will produce the desired effect. What little wash-out the Gee Bee has is built in the tips so be sure to follow the plans exactly. To make the landing gear wheel pants a little easier to install; we would suggest extending the center section sheeting one more bay span-wise. As it is, the pants are cemented together around the installed preformed gear wire after the wheels are fixed. This seems

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SOARING

Al Doig

Well, the epoxy is coming out of the squeeze bottle more slowly, and we hope you all had a Merry Christmas. The years seem to roll by faster and faster.

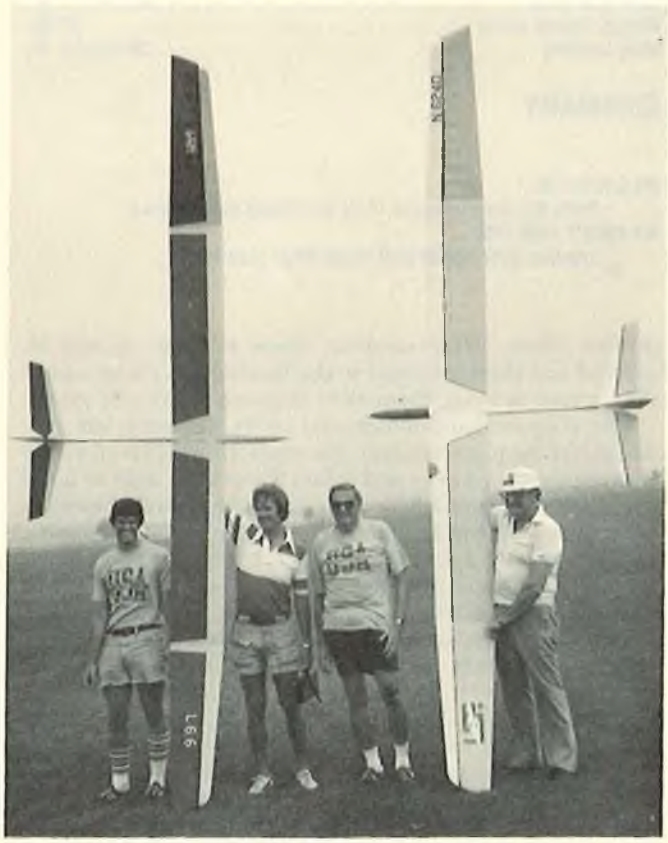
Speaking of big sailplanes, the "Great Race" brought out the giants. The Great Race is held each year, near Chicago, and is sponsored by the S.O.A.R. Club. The race is around a thirty-odd mile course. Rotten weather put a damper on this year's event. A low ceiling, and misty rain, produced very little lift. Pat Flynn of Dearborn, Michigan, was 1st, flying a lightly loaded Mrlik design for 14 miles. Don Harris of Columbus, Ohio, got 9.3 miles out of a modified Sailaire. Skip Miller, from Colorado, coaxed his 14' Sagitta for 8.9 miles. Lee Renaud, Chief Honcho of Airtronics, plans a limited run kit of this colossus after the first of the year. He is taking a list of prospective purchasers now. The price — $150-$200.

Another biggie is a new kit by a new company, Pacific International Hobbies, 1453 N. Cuyamaca St., El Cajon, California 92020. The ship is a 1/3 Scale ASW 20. Wing span is 16'5" and the weight is 15-19 pounds. The price is $259.

On the other end of the ruler, 2-Meter Class seems to be gaining momentum. John Brown from Anaheim, California, flying his 2-Meter "Icarus" in Standard Class, blew everyone away at the 1981 AMA Nats. John won the Hi Johnson award for the highest overall score of the contest. John also flew the Icarus in the 2-Meter contest and came in 6th. See what happens when **everyone else** also has the advantage of flying a 2-Meter ship! Incidentally, there were only 45 entries in the Nats 2-Meter event this year, against 62 last year, whatever that means.

There seems to be a lot of 2-Meter contests that include a speed event. I guess this was pioneered by the 2-Meter World Cup event. I note that the Grand Valley Radio Control Club of Nunica, Michigan, held a two day 2-Meter contest in August. They had a speed event the first day only, with speed counting 25% of that day's score. Despite minimization of the effect of the speed event, participation was disappointing. Only 11 showed the first day, and 15 the second. Entries were RO8, Drifter II, 2X2, and Gentle Ladies. The CD, Jim Benson, felt that perhaps speed scared away many potential contestants.

"I don't know anything about it officer, you'll have to ask the little pilot inside it."



Tim Renaud, Skip Miller, Lee Renaud and Gordon Pearson with Skip and Gordon's 14' Sagitta. Lee's design. Both flew in the great race.

Yan Noel, Pacific International Hobbies with 1/3 Scale ASW 20.

1/4 Scale Twin Astar also by Pacific International Hobbies.

Since returning from the World Championships in Sacramento, California, I've done quite a bit of thinking on the interest in this type of event in the U.S. As currently constituted, the present FAI F3B triple task event has only a bit more than zero interest in the U.S. In Australia and New Zealand, interest is also at a low ebb. However, a bit of light is shed from the Heathcote Soaring League Newsletter (Australia) in the May-June issue. An article titled Competition Scene (Or the status of F3B) says: *It seems obvious that this club's assumption that the running of F3B multiple task glider events was causing the marked lack of interest in glider competition in past years and was overreacted to. It is true that F3B draws less pilots to the flight line than the normal run of the mill thermal contest, but it seems obvious that there is a serious drop in attendance at all contests in all categories of late. Most sailplane contests are only drawing entries in the high 'teens or very low twenties, with some categories that were, at best, sparsely attended, are now being cancelled due to lack of support and, in some cases, totally ignored. Getting back to sailplane contests, some reasons for not attending an F3B event are: (1) Lack of expertise. (2) Tasks are too difficult. (3) Uncompetitive model. (4) Too restrictive. (5) Not enough flying time involved. (6) You need to be part of a team.....* The author goes on to answer these points, but it is interesting to note that the same pattern seems to be forming in the U.S. I can observe that attendance seems to be down at soaring meets this year. Many fliers have become bored with the same old thermal tasks meet after meet, and drop out, because there is no place else to go. F3B events might offer a new challenge, but there are no F3B meets to speak of.

For those millions of readers who have never been to one of these clambakes, let me describe what I'm talking about. F3B events are Speed, Distance, and Duration. The Speed course is 150 meters (492') long and the flier is timed for one complete circuit (300 meters). At the International Championships the fastest time was Wright, of Canada, at 8.5 sec., or 79 mph average. A relatively slow time would be 15 sec., or about 42 mph. In the Distance event, the flier tries to make six complete circuits of the course (1800 meters, or 5904'). In the Championships, out of 245 Distance attempts, 124 made it all the way, or 50%. In Duration, the target time is 6 minutes, with points for spot landing. In the Championships, out of 244 flights, 134 made within 15 sec. of the target time, or 55%. 19% landed within 1 meter from the spot, 18% within 2 meters, and 14% within 3 meters.

In this type of contest, the contestant is responsible for all launching equipment he uses. He must furnish the equipment and has a certain preparation time after he is called to fly in which to set up the winch, or whatever he uses, and get ready to launch. On a signal, working time starts. The flier must complete the task within this time. He may relaunch as many times as he wishes within the working time. In Speed, working time is 4 min., but once entering the course, the flier must attempt to complete and cannot relaunch. Working time for Distance is 8 minutes. When the glider enters the course, he has a 4 minute period to complete the 12 laps (6 round trips). He may abort and try again but if still in the air at the end of the 4 min. flight time, or the 8 min. working time, count is stopped at the last full lap. If he lands during the flight time, short of the 12 laps, points are given for partial laps. The Duration working time is 9 minutes. One point is awarded for each second duration up to 360 sec., and one point deducted for each sec. over 360, or past the 9 minutes. Landing points are awarded up to 15 meters from the spot. Landings farther than 100 meters (328') from the spot voids the whole flight and neither flight nor landing points are given.

Anyway — after that long dissertation, I've probably lost my whole audience. You can quickly see several reasons for the lack of popularity for the event as it is currently constituted. First, running the meet is a three ring circus. You need to lay out an accurate course; sometimes a couple of times if the wind shifts drastically. You need a herd of people who are working, not flying; flagmen, timers, judges, scorekeepers, ad infinitum.

The flier needs a sailplane that has a somewhat better performance than a Gentle Lady. As the Australian article says: *. . .you do not take up international archery with a bow and arrow set bought from 'Woolies,' nor would you take up Formula V racing with your kid's 'billie cart,' etc.* Many fliers prefer more gentle sailplanes

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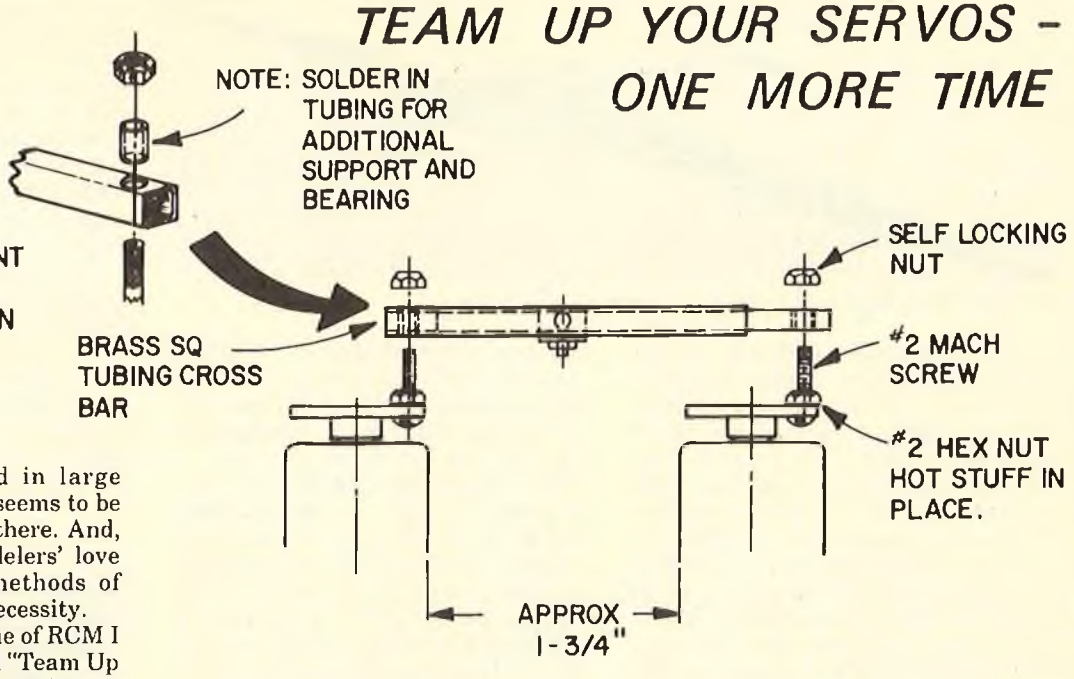
Otto Helthecker and his giant tailless flying machine. Flew in the great race.

HERE'S HOW

By Jerry Smith

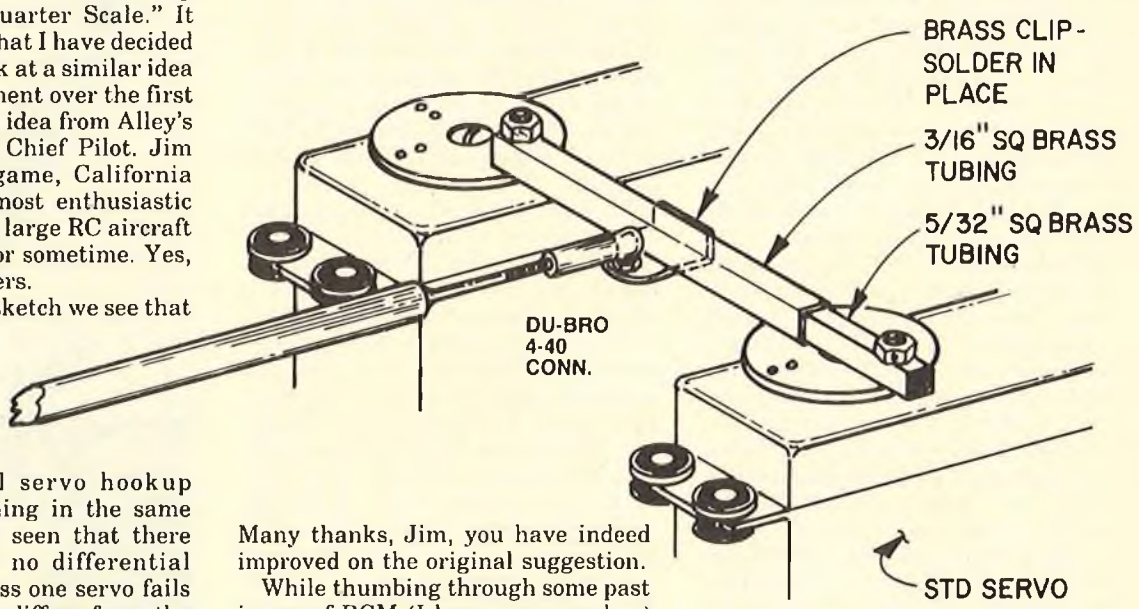
TEAM UP YOUR SERVOS - ONE MORE TIME



The upward trend in large scale RC aircraft seems to be hanging right in there. And, with this new found modelers' love came many ideas and methods of construction out of pure necessity.

In the January 1981 issue of RCM I presented and idea entitled "Team Up Your Servos for Quarter Scale." It worked out so well that I have decided to let you have a look at a similar idea with a big improvement over the first one. I picked up this idea from Alley's Hanger, Jim Alley Chief Pilot. Jim hails from Burlingame, California and is one of the most enthusiastic guys, with regard to large RC aircraft that I've talked to for sometime. Yes, there are many others.

Looking over the sketch we see that Jim's differential servo hookup utilizes servos turning in the same direction. It can be seen that there would be little or no differential (sliding) action unless one servo fails or its reaction time differs from the other. The distance between the servos is not critical although it should be far enough so that there is enough overlap in the telescoping sections for strength and sliding bearing surface. The amount of push/pull action remains the same regardless of servo spacing. The sketch above completely shows the construction of Jim's telescoping arm. The arm is made entirely of K & S square brass tubing. Make sure the brass clip is soldered securely in place. A DuBro 4-40 ball link connector is shown connected to the pushrod. Of course, the bottom line of Jim's idea is to give added push/pull capacity to the control surface. Plus, should one servo fail, you can bring it in on the other.



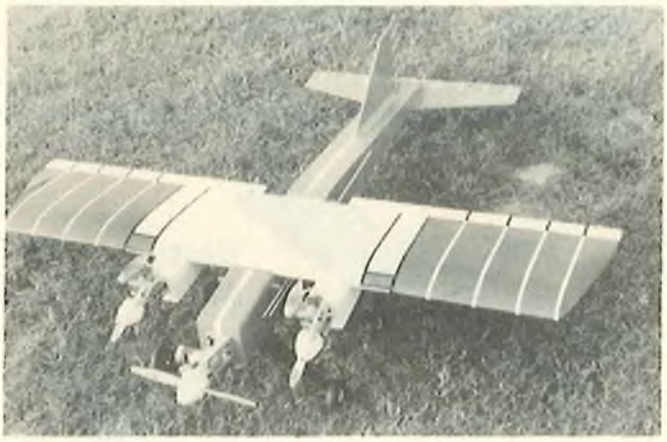
Many thanks, Jim, you have indeed improved on the original suggestion.

While thumbing through some past issues of RCM (I hope you save 'em) July 1981 to be exact, I refer you to my Here's How on "simulated pinked tape method." It looks great when applied properly, however, it is a time consuming process to cut the tape. Since then I have had a few comments from modelers about how nice it would be to have ready made tape. Yes it would, and wouldn't you know, somebody has found a good usable tape, serrated edges and all. The find was made by our friend and prolific model builder, Bob Seigelkoff. Bob heads up C.B. Associates Inc. The fine people who make engine mounts and control fittings among many other things.

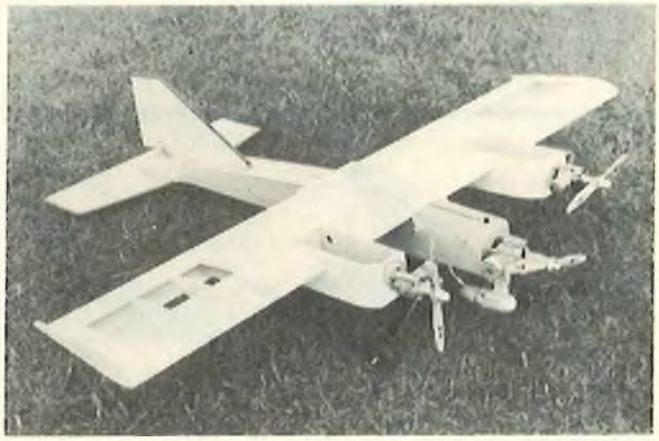
The tape Bob uses is called Hair Set tape made by the 3M Company. It is quite thin, has serrated edges, and is 1/2" wide. It has adhesive on one side and is somewhat transparent and porous. It will go around large radii or over round, and rolled edges. The only drawback I can see is that it must be painted. For those of you who like to paint this is no problem. Anyway, I think the Hair Set tape is pretty neat stuff and will add a lot of realism to your covering job. You can most likely pick up a roll from a drug or department store. The price is approximately $1.30 for a 1/2" wide by 350" roll. It is a very special kind of tape created especially for hair styling. Little do they know how well it looks on a model --- airplane that is! □

CUNNINGHAM ON R/C

Chuck Cunningham



Triple — one .40, two .25's, 6 lbs. — wow!



Don Proctor's Big Triple — one .90, two .40's, 10½ lbs. — triple wow!

Okay, someone please tell me where oh where 1981 disappeared to? Here's hoping that you have a Merry Christmas. Hope that your dropping big broad hints about what you want under your tree on Christmas morning pays off. Speaking of that, I never did get around to telling you about a gift that I got last year from my wife. When I received it, I kinda turned up my nose at it, but later discovered that it is a pretty neat little tool. It is a Black & Decker "Dust Buster" --- a small, hand held, vacuum cleaner that runs on nicads. I like to do the building part of modeling in our den, while the rest of the family is around. Can keep up with a bit of TV, and also with what's happening with my mob. Jan has always been super understanding about letting me mess up our house this way. No matter how careful you are, you still create a bit of balsa dust and other mess. The Dust Buster whisks it away in no time, and you will keep a much neater working area. Also, the opening is small enough to stick down into the innards of your model's fuselage to vacuum up all of the balsa dust before you install your radio equipment. You do that, don't you? Sure helps the servos last longer.

Speaking of keeping clean, there are several ways that you can help extend the life of your radio equipment which merit consideration. First, remove all of the dust and accumulated junk from the inside of the fuselage prior to installing the radio equipment. Also be sure that some wandering metal screw hasn't attached itself to the side of a servo case, attracted there by the servo motor magnets. Next, make sure that you have done the best that you can to reduce engine vibration as much as possible. Mount the servos and receiver and battery as per the manufacturer's directions. A nice soft nest of foam for the receiver is the best — not tightly wrapped, just nesting in a complete surround of foam. Treat the battery the same way but, over the foam, wrap a layer of plastic wrap, or plastic bag, to keep any fuel seepage from getting to the battery.

With the radio equipment softly mounted, make sure that exhaust residue is not allowed to seep inside of the radio compartment. Always locate both the switch and the antenna on the side away from the engine exhaust. Seal the gap between the fuselage and wing with either sealing tape or silicone rubber. You can purchase weather stripping tape at the corner hardware store to seal this gap, or cover the wing with plastic wrap. Spread a bead of silicone rubber on the wing saddle, then fasten the wing in place on the fuselage and let the rubber cure overnight. The next morning you can remove the wing, unwrap the plastic wrap and you have a fuel sealing joint.

Run the throttle pushrod through a piece of plastic tube from the servo out through the firewall. If you use the inner piece of a NyRod assembly for this, the chance of fuel finding this small path inside your aircraft is rather slight, and what fuel does get into the tube actually makes for a bit of lubrication. Clean it out once in a while, and you will not need to worry about the servos becoming fuel soaked. While you are doing all of this, fuelproof the inside of the tank compartment with a good grade of dope or polyurethane clear varnish.

Dr. Dick Bartlett's Great Lakes, Wankel powered, 3½ lbs.

Lazy Ace 2 by Henk & Cees Kaijim, Holland. O.S. 1.2 four stroke engine.

O.S. 1.2 four cycle twin in the nose of modified Lazy Ace — from Holland.

One last step in the preservation of your radio equipment --- always take the time to balance the prop. Engine vibration accounts for most of the wear on servos. A lot of this vibration can be minimized by taking the time to balance the prop prior to installation on the engine. There are a number of balancers on the market. It's a good idea to balance each prop as soon as you bring it home from the hobby shop. That way, you always have a balanced prop handy for use. It's much easier to balance at home in your work shop than it is at the flying field with a breeze blowing.

★

Participation in modeling events has taken an interesting turn in the past several years. Generally the events that seem to be gaining the most widespread popularity are both fun fly events and the fly-in concept. Organized competitive events such as pattern, scale, racing, etc., still draw the cream of the crop to each event, but the numbers seem to be diminishing as well since the same names always seem to appear in the winner's circle. It's awfully hard for a newcomer to break into the win column.

Most of us engaged in RC flying really don't have the time or the money to compete in a determined way, so we have found that local fun flys and fly-ins are a natural outlet. The fly-in concept will be growing. It's an extension of the Sunday afternoon flying session, but each fly-in is aimed at a special interest group. The advent of large models really brought the fly-in concept to the fore, and has proven to be great. The West Coast has a very popular scale fly-in each year (the Scale Squadron calls it an Uncontest), and this idea is going to be repeated in Texas with a scale fly-in. Soaring fly-ins will be making themselves heard, and I feel that an Antique/Old Timer fly-in would be great.

In the Metroplex area (that's a trick name for the "Dallas, Fort Worth, North Texas" metropolitan area), inventive Thunderbird John (Knob) Eddyhausen set out to establish a series of fun fly events, one each month, hosted by a different club each month. Each host club made up its own fun fly rules, established its own entry fees and prizes, and ran its own contest. Scores were kept with the winner receiving points based upon the number of entrants in that contest. As an example, if there were 25 entrants the first place winner would receive 25 points, second place would receive 24 points, on down to last place at 1 point. The format has proven to be very successful, with most contests attracting well over 30 entrants. The scores from each contest are tallied and the top ten or fifteen will meet in the Fun Fly Finals to be held by the Fort Worth Thunderbirds in the latter part of the year. Each host club has been able to add at least a hundred bucks to its treasury, as prizes have been kept low. The idea has been to promote fun. The events at each fly-in have been different, decided upon by the host club.

The purpose of these many types of get-togethers is for the enjoyment of the participants. You really can't get much more low key than a fly-in, unless, of course, you have several thousand spectators, but the normal fly-in doesn't attract this large of a crowd, nor does a fun fly. But, both are great places to exchange ideas and learn from the other guy.

★

I have received a number of letters in reply to my request for submissions about customized kits or original designs. Many that have been received have enclosed color prints or slides, and these cannot be used in RCM. We can use only black and white snap shots (generally not polaroid type) that are clear, with good contrast. This does present a problem, I know, as most film processers kinda frown on black and white. If you send me a picture that you feel others would like to see, please send only a black and white.

Don Proctor sent along some pictures and bit of information about his tri-motor aircraft. The small one is powered by one O.S. .40 plus two O.S. .25s. It has a wing area of 670 square inches, weight 6 lbs., and goes straight up. Out of sight, I'll bet. The larger one isn't finished yet, but it will be powered by an O.S. .90 in the nose and two K & B .40 pumpers mounted out on the wings. It has a wing area of 1000 square inches and projected weight of 10.5 lbs. Boy, bet Don's fuel bill is tremendous.

Another interesting project is by Dr. Dick Bartlett. Dick sent along a picture of his modified Flyline Great Lakes, based upon the front cover of "Air Classics" Winter 1973 issue. Power is by a Wankel engine, model weight ready to fly is 3.5 lbs. "It has a MonoKote finish, uses a Heath transmitter and Litco receiver and servos, flies very fast and is very maneuverable and, yet, has good slow flight characteristics and is easy to land. --- The oleo struts are functional, by virtue of old ballpoint pen springs."

Received a letter from my good friend in Holland, Cees Kaijim with pictures of his Lazy Ace 2. Lots of interesting information in Cess' letter so I'll pass it along to you.

Dear Chuck:

It has been a long time since you heard from me, but here we are again. The photographs you will find enclosed show the Lazy Ace 2, built by my brother Henk. He used the fuselage and all the basic moments of your design, altered the shape of the vertical and horizontal stabilizers (flat plate now) and used an 11.5% semi-symmetrical profile for the two wings. The wing span is now: upper wing 80" and lower wing 68". The engine is the fantastic O.S. 1.2 cu. inch four stroke twin cylinder, turning a 16/6 prop. The result is a very aerobatic biplane, with still very good slow flying capability. By the way, the settings of the wings versus the stabilizer and thrust line are: stab and lower wing zero degrees, top wing minus 1 degree. This works out very well, especially during landings, because the upper wing stalls always after the lower wing, and the airplane will stay stable, hanging under the still lifting wing.

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POWER BOATING

Howard Power

Magazine deadlines being what they are, I find myself sitting here (in July) writing a column that will appear around the end of this year. We are anxiously looking forward to attending both model boat nationals this year and meeting many new friends as well as re-establishing old relationships. The coverage of the two nationals will have been presented before you read this. (*Ed. note: Nov. 1981 issue.*) It's very hard to believe that I have been writing this boating column for a whole year. Model boating has grown up considerably even since I first became interested in it some seven or eight years ago. I'm sure that the "old timers" have seen even more dramatic growth. The model boating product market has expanded considerably but there are several holes that I think could be filled in by some enterprising manufacturing types.

The first item that all of us could use is an electric fuel pump that works for more than a few months. It seems that our high nitro fuel plays havoc with every one of the pumps I have tried. The most popular of these pumps is guaranteed to work for a long time but you need three pumps to be sure that you always have one that works: One that is working, one on its way getting repaired, and a spare in case the one that is working stops before the repaired one gets back to you. The only pump that I have had any luck with is the hand cranked Six Shooter pump that Dave Brown Products now manufactures. If someone out there can develop a high nitro electric fuel pump that lasts at least a year, all modelers would benefit.

Another item that every modeler that owns or buys a deep vee or monoplane hull could use is a good turnbuckle kit for cavitation plates. Most manufacturers use bent sheet metal plates that are unsupported. In my opinion, it is most desirable to be able to firmly fix the position of these plates and at the same time be able to accurately adjust them as water conditions change. Turnbuckles that attach to the sheet metal plates and to the boat transom are one of the best ways to accomplish this. The molded plastic cavitation plates made by Aeromarine Enterprises are the only adjustable plates that I know of that are commercially available. These plates are a step in the right direction and work well but I am not satisfied with the size of the turnbuckles and with the amount of up and down movement that exists at a fixed turnbuckle adjustment. Their product would be super if the turnbuckles had at least a 6-32 size end screw for greater rigidity. They might also consider making a larger sized plate for boats that are bound to be available using the 90 and chain saw type engines.

Speaking of large engine boating applications also brings to mind that there are currently no large pitch props available to the modeler. We will need to develop this type of prop if the full potential of these high torque, low rpm powerplants is to be realized.

The use of tuned pipes on our boats, and more recently by the airplane fliers, has opened up many product development possibilities. Every modeler who wants to use a tuned pipe properly should have access to an audio tachometer. There is only one manufacturer of such a device at the present time. This is a fine device but it is unnecessarily high priced because it includes a speed measuring capability that I believe is too complicated for all but the most dedicated and technically minded modeler. We need a simple, low-cost (under $50) audio tach.

Pipe shape development is still in its infancy compared to the designs that are used in motorcycle and go-cart racing. We could realize much better performance by using multiple angled diffuser and convergent cone designs. Just think of the performance gain possible if a model sized pipe had servo controlled variable geometry. A sizable speed increase would be available if we could control by servo the head pipe length or stinger length. For example, by lengthening the head pipe we could pull very large props off the beach, get up on the pipe, and shorten it as we accelerate. I see this development as the most promising way to jump the speeds of present straight-away records to over 100 mph. This variable head pipe length feature would also allow us to generate much better acceleration out of the corners during multiple boat circle racing. The R/C airplane guys could use similar equipment to increase climb and idle performance when using pipes. We also need to develop pipes that are quieter but do not sacrifice power. Internal stinger design looks promising here. To sum all this up: If you can design a better pipe, you will sell a bunch.

Another thing boaters have needed for a good many years is a radio system suitable for boats. For years we have had to put up with using radios designed for aircraft. About five years ago the Futaba Corporation made a step in the right direction by realizing that boats require high torque servo mechanisms and designed the watertight F-7 servo. Boaters responded by making the Futaba radio their favorite for use in competition. If you check the impound table at any large boat race you will find 90% of the competitors using Futaba! Other manufacturers finally followed suit but Futaba had already established itself. If any of you manufacturers out there want to capture the boating radio market from Futaba you will have to design the radio system that boaters have been wanting for many years.

In my opinion, a boating radio should have all components but the transmitter in a waterproof enclosure. We have been forced to build watertight radio boxes and/or compartments in our boats to protect the electronics of those airplane radios. This aspect of the hobby has caused more trouble for beginners and experts alike. It should be relatively easy to enclose battery, switch, receiver, and servos in a "brick" type enclosure much the same as Kraft did when they designed their old style two channel brick radio. The enclosure should be 3⅞" wide so that it fits between the motor mounting rails of deep vee hulls and smaller width hydro designs. The length should be no more than 5 to 6 inches and the height should be as thin as possible so that the radio box will not interfere with the normal mounting position of the tuned pipe. Inside this waterproof case should be 600 mah nicads to power the throttle servo which should have approximately 40 in.-oz. of torque, a steering servo (at least 100 in.-oz. of torque), and the receiver with changeable crystals. The switch should be built in and charging receptacles should be provided so that the boater can charge the battery without lifting the lid. The servo ball

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BIG IS BEAUTIFUL

Dick Phillips

Every modeler has his own specialty. By that I mean, each of us has his own favorite part of this hobby. With some, it's the time spent at the building board which appeals most, others find finishing to be the most enjoyable, and still others would rather design than build or finish. It goes without saying that we all enjoy the flying or we'd be doing something else!

The opposite of the above statements is also true, we all have a part of the building and flying of models that we are not all that keyed up about, and if it were possible to do so, we'd omit it altogether. I happen to like building and I dislike finishing, or at least did until earlier this evening.

One of the problems with building large models is the painting of them. There's so darn **much** of the things to be painted and if painting isn't your favorite pastime, then it's even worse if you are building **big.** The small hobby guns are just not large enough to do the basic paint job as it takes so long to cover a large model with the smaller spray outfits that are quite adequate to the smaller model. A large automotive type spray outfit is a bit too much for the job and the cost of a good one can be in the hundreds of dollars which is a bit of a discouragement.

I have been hunting for something in-between the two extremes for some time now. I tried one of the electric spray guns and was not impressed, they just don't do the same job as an air spray. I have an expensive Wagner electric and it leaked paint which ruined a couple of spray jobs I was doing and nothing looks worse that a paint job that has had to be sanded too heavily to eliminate the paint spots that have spilled on it.

The Badger spray gun that I use is quite adequate for the use intended but it just doesn't have it when it comes to painting a Quarter Scale biplane, there's just too much area to cover and using one of them amounts to doing a Quarter Scale paint job. That is to say, it's the same thing, and takes about the same length of time as painting a full sized aircraft with a full sized spray gun and you don't get that done in an evening's work!

Anyway, what brought all this up was the fact that this afternoon I found about the sweetest little spray gun I have seen. It's made by Webster Air Equipment Ltd., and marketed by them in Canada. They are a subsidiary of Canadian Curtiss Wright Ltd., so the gun may well be available in the US as well. Cost is under 35 bucks in Canada so it is certainly priced economically. It's called a Model 118 Syphon gun and it works really well. I painted both wings of the Super Stearman tonight with it in less than half an hour (one side only), and the spray job is just great. It uses a Mason type jar as a paint pot, so replacements are readily available if you happen to break one. The bottle that comes with it is about 5 or 6 inches in height so it holds enough paint to last a while. They list eight Canadian cities as having Sales Offices, so the company is not a fly-by-night operation, by any means.

It is a gun which uses air, and I have found it will spray well right down to about 10 pounds of air, although I normally use 20 pounds. My air supply is a small diaphragm compressor which starts to struggle at a bit over forty pounds and I use a small volume tank made from a Freon tank. The volume tank is fitted with a gauge indicating the pressure in the tank and with a small regulator which holds the output pressure wherever I set it, regardless of the pressure in the tank. I find that the volume tank will permit the relatively small diaphragm compressor to keep up with the demand of the gun and the whole set-up is certainly the answer to the quandry about what sort of equipment to use for spray painting the larger model.

The spray gun is simplicity itself as the total number of parts involved, including the jar and cap, is 17 and the accompanying parts list identifies them all leading me to believe they are all pretty readily available.

If, like me, you have been laboring long and late getting a coat of paint sprayed on your large model with one of the hobby guns, get one of these Webster guns, you'll be glad you did. For further information, contact Webster Air Equipment Ltd., P.O. Box 5425, London, Ontario, Canada N6A 5A4 (Telex 064-7228, Phone 519-455-9130).

I have used the gun to spray lacquer, enamel and primer, both red and grey, and while the primers need to be thinned a bit, the paints spray right out of the can.

★

Some of you have phoned me to ask if I had moved again as your letters had been returned to you saying something like, "Not accepted." Let me explain that back in July, we had a postal strike here in Canada, and mail from outside the country was not being accepted for delivery, therefore, some of you got letters back and wondered why that Phillips character wasn't accepting any mail. Rest assured, it wasn't my fault. Please don't give up if your letter was returned, write me again, and I'll answer your letters as before!

★

Last month, I talked about a covering method I have been using for some time now and find to be quick, easy and good. It's not an original idea as it has been used in full scale construction for years. It's application to models is not as yet widely used. Simply stated, it is the use of an 'envelope' to cover a fuselage or wing. The method was described fully in last month's column and this month, I'd like to carry on with the method I have been using to finish the covered assemblies.

I have found through some experimentation, that the use of automotive type primers and paints works well on the larger model and it does cut down a bit on the costs of finishing the larger model. The wide variety of paints, both enamels and lacquers available, provides for any color you'd like and the finishes are as good looking as anything you could want.

I have used both sanding and non-sanding primers and prefer the sanding type. They are a little messier than the non-sanding, but they seem to provide a better surface for painting and they do not add as much weight.

Once the Dacron material has been applied to the structure, shrunk to a snug fit, there is not much preparation required before applying the primer. Remember, however, that the surface is not going to be any better than what was there before you covered it. You must do the sanding on the structure before covering, as any flaws in it will show through the covering, and there is not much chance of getting rid of

Pit area at Bawlf Fun Fly, note the "putting green" quality of the pits, the runways were as good or better. Trees in the background helped cut the effect of 80 degree weather late in the afternoon.

Fun Fly at Bawlf, Alberta Canada, brought out these three fine models from the Byron Line, Pitts is by Wilf Blackwell, Mig by Bill Gillespe and unfortunately the builder of the YF 16 was not identified.

any problem areas after the covering has been done.

Assuming that you have done the preparatory work properly, applied the covering layer of Dacron tightly, you are ready to start painting. I have been using the old standby, red oxide primer, and find that it does an excellent job of filling the Dacron in readiness for the finish coats of paint. It can be applied in fairly heavy coats as much of the primer will be sanded off before the finish coats are applied. I have been using one fairly generous coat on the raw Dacron surface, sanding it lightly, and then applying a second coat to assure complete sealing, and then lightly sanding again. That's all the preparation required.

Sanding must be done with a light hand, especially in places where the material passes over a hard edge underneath. Too much sanding, and you can cut right through the Dacron. Unlike some of the other fabrics we have used, the Dacron does not provide any hint that you are getting close to cutting through it. Most fabrics will start to fray along a line where it is getting thin, but the Dacron does not, you'll find you are right through it before you are aware of the fact if you are not careful with the sanding.

Not much sanding is required, just enough to provide a very smooth surface on which to apply the finish coats and to assure sealing of the pores in the Dacron. One advantage of the red oxide primer is its color, if you watch what you are doing, you'll find that the Dacron, which is white, will show through the primer when you are getting close to it. Just stop before you sand through!

Another advantage to using the red oxide primer is that it dries very quickly, and no great length of time is spent waiting for it to dry enough to sand. A half hour is more than enough.

Once you are satisfied that the surface is properly sealed (over planked areas this is usually a one-coat job), then it's a simple matter to apply the final finish. Most automotive finishes will cover in one coat, even if they are drastically thinned, so you can complete your base coat of paint in a single spraying. After that, it's a matter of adding your trim stripes or whatever, and, if you wish, a coat of clear overall to seal in any striping or decals you may have added.

Speaking of striping. I have had some success using the trim stripes from the automotive counters as well. These are self-adhesive materials and go on quite well. As they are intended for outdoor use on cars, they tend to stay where you put them and do not react to the fuels we use in the larger engines. I have used the stripes with glow engines, but the excessive oil in the fuel (or the nitro) tend to cause them to peal off after some flying. This does not seem to be the case with gasoline exhaust. I understand that the adhesive used with these materials is intended to form a very good bond over a period of time and it certainly seems to work fairly well on cars. A coat of clear, after the finish painting and decorating is completed, would certainly seal everything in its place.

As with any material you use, be sure to read the directions (doesn't everyone?) and observe any safety warnings provided. There are many types of automotive finishes available, some of them can be health hazards if they are not used properly and no paint should be sprayed without lung protection. A simple face mask with some filtering capability will prevent the spray which hangs in the air getting into your lungs and no paint should ever be sprayed in anything but a well-ventilated area. If possible,

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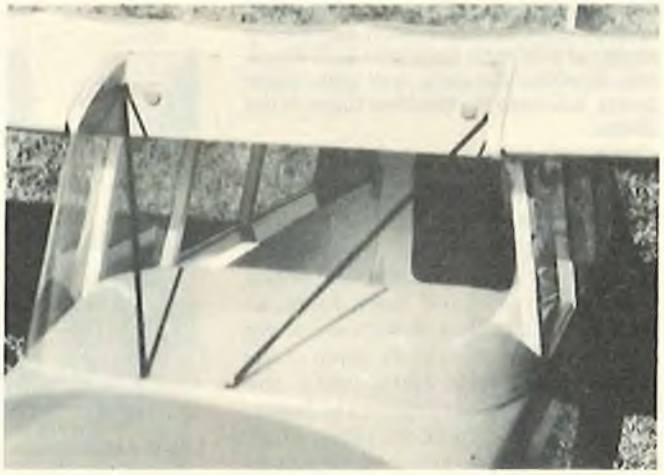
Piper Super Cub by Bill Rose of Dawson Creek, Canada. Model is built almost entirely of foam, mylar covered and flies extremely well. Quadra powered and very aerobatic.



Interior of Rose's Super Cub showing slab type foam construction. Material is quite light and surprisingly durable. Don't you wish your windows would stay that clear and clean?

PIT STOP

Gene Husting

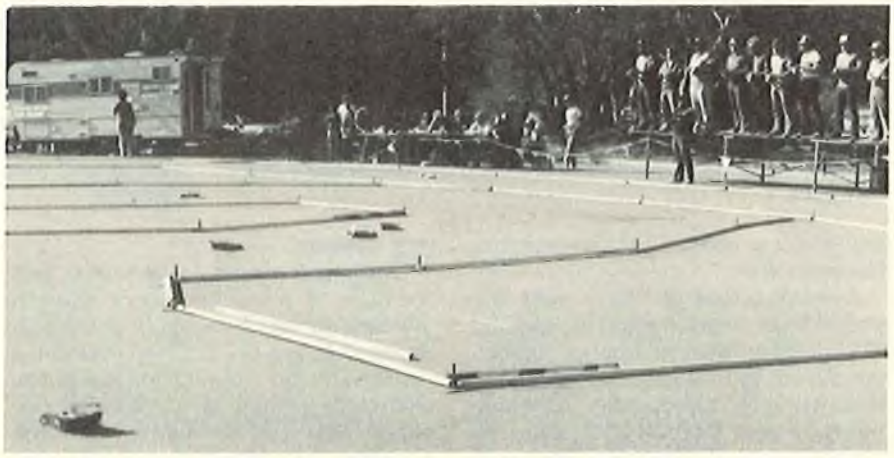
2nd Annual 1981 California 1/12 Championship Series

Last year Southern and Northern California combined their biggest races into a four race Series for points and a California Championship. Each of these four races drew over 200 entries, with the biggest, setting a record at 240 entries. Actually, many more tried to enter, but it was felt that there was only enough daylight time to accommodate 240 entries.

This year, with three races of the 1981 Series already completed, the entries have also totaled over 200 at each of the races. The final race would be held in Monterey, in Northern California. The Monterey area is one of the most beautiful in California, and they have a super track located in the Del Monte Shopping Mall. This would ensure another record list of entries.

Kent Clausen, from Monterey, was the big winner at this race. Kent won both Stock and Modified Classes, and with these points, also won the Modified Class in the Series.

With three races already completed, Mike Lavacot had an unbeatable points lead in the Stock class. When you win three out of three races, as Mike did, it makes it impossible for anyone to beat you. Only three of the four races would count with one throw-out. Another important factor, is that this was the Stock class, which means Mike was racing stock motors which are supplied by the race officials. Even with equal and sometimes less horsepower than the other racers, Mike is able to consistently cut the corners closer. And we all know the quickest way around the track is the shortest way.



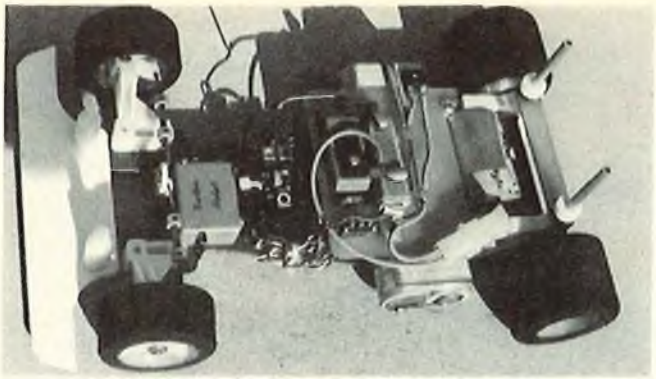
The city of Monterey, in Northern California, was the site of the 4th and final race of the California 1/12 Scale Electric Car Championship Series. This race again had over 200 entries. The track was super smooth, with high traction.

Mike Lavacot was also leading the Modified class, but by only one point over Kent Clausen. The man to beat at the 1st race in Bakersfield was Jim Aguirre. Jim was running a super lightweight RC 12E car with a much lightened graphite chassis plate. And on this fairly smooth Bakersfield track, Jim won the 8 minute Main event quite convincingly. Lavacot came back to win the 2nd race at Sylmar, but the 3rd race at Briggs Cunningham's track belonged to Jerry Case. Jerry just drove absolutely perfect. He cut every corner as close as humanly possible, without making any mistakes, led from start to finish, and even lapped Kent Clausen in 2nd and Lavacot in 3rd. However, their batteries were going dead at the end. Before that, Jerry had a comfortable 1/2 lap lead. Jerry's car was also a very lightweight RC 12E with graphite chassis, similar to Aguirre's.

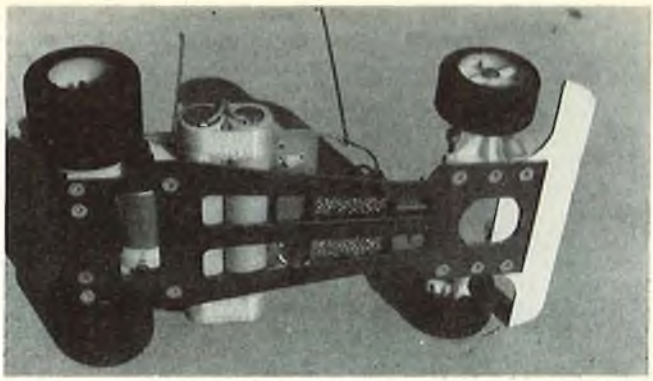
Mike Lavacot won the Stock Class in the Series and finished a close 2nd in the Modified Class. He was leading the Modified Main when he lost a steering servo.

With this many potential winners going into the last race, it promised to be exciting! The track was set up on Friday for open practice, with Saturday scheduled for Stock class and Sunday Modified class. The track was made up of 2 x 2 boards with their ends held together with metal eyelets. The critical corners had some 3 x 3 angle iron laid over the boards. It gave the same effect as if the boards were nailed down. Friday, as everyone was learning the track, you could hear cars hitting the boards all day long. It

Jerry Case won the Modified Class at the big Cunningham Series race in a very convincing manner by lapping both Clausen and Lavacot.



This is a Lavacot "88" type Modified car, featuring Novak servos, Futaba receiver, Reedy motor and graphite chassis and rear axle. Batteries, throttle servo and resistor are suspended on tray. You'll notice the receiver case has been removed to save weight. This is not recommended unless your name is Mike Lavacot.



Graphite "88" chassis has been designed for light weight, and added flexiness while maintaining strength. This car works very well on smooth tracks.

never hurt the boards, but there were a few bumpers, bodies and chassis being replaced. You know you have to cut the corners as close as possible to get a quick time, but when you cut one of these square corners a little too close it's like running into a brick wall.

On Saturday, everyone had to be at the track at 7 a.m. to have their cars tech inspected by Neal McCurdy, the Race Director. At this time, everyone was given their ROAR legal stock motors. At the Nationals, I was running a version of a prototype rear suspension car, which was under development by Roger Curtis and others at Associated. There was no question that this rear suspension was working. Actually, it worked better than we had hoped for. The problem is, it worked so well, that it gave so much traction to the rear end, that the front end now had understeer. After the Nationals a front end suspension was developed and I just finished rebuilding my car with the new suspension, front and rear, without even having a chance to run the car before this race. The car felt incredibly good during Friday practice, but I never got to run with any fast guys. Saturday would tell.

Well, on Saturday, Mike Lavacot was Top Qualifier, which surprised no one, but I was in 2nd spot, which surprised me, and probably everyone else. The car was just super. All the steering I could ask for and more, and the rear end traction was so good I didn't need a wing! The car appeared to have neutral steering, which is an even amount of oversteer and understeer. It was sure a great feeling! Associated should be coming out with a production version of this car, about the time you read this article.

Novice Stock Class

My wife, Midge, has been racing electric cars for about four years now, and in the beginning she was given the nickname "Killer." I'm sure you

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MONTEREY SERIES
RACE RESULTS

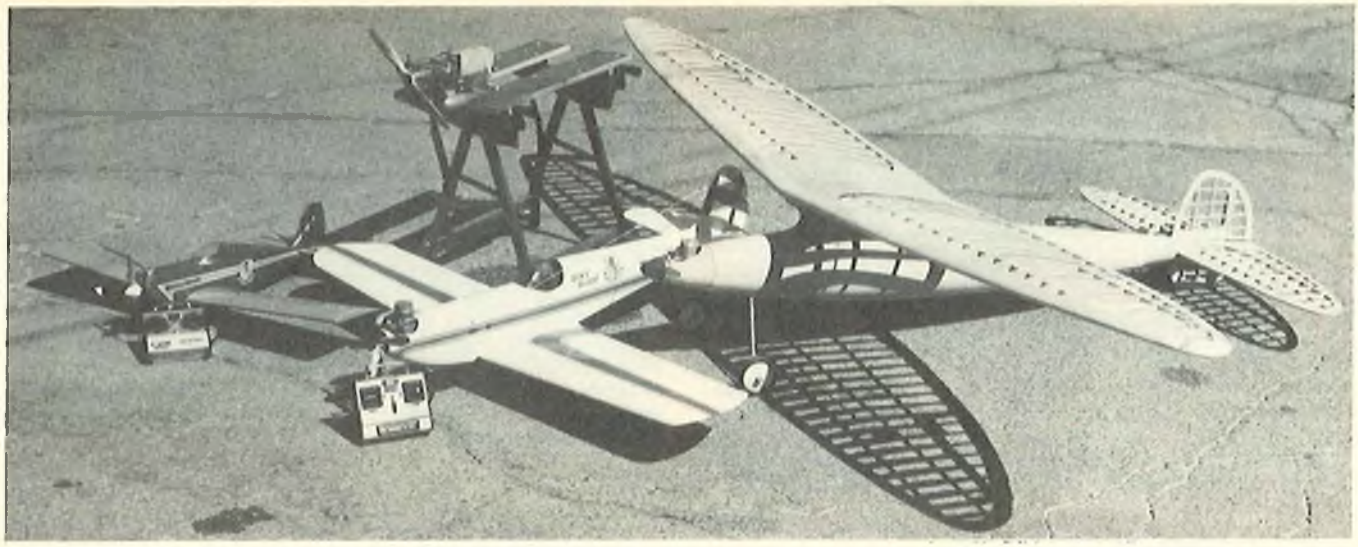
Place	Expert Stock "A" Main Name	Car	Amateur Stock "A" Main	Novice Stock "A" Main
1.	Kent Clausen	Associated	1. Mike Petruzzi	1. Sam Ellis
2.	Mike Lavacot	Associated	2. Randy Tentschert	2. Larry Stevens
3.	Butch Berney	Associated	3. Doug Kott	3. Lee Hall
4.	Ed Janis	MRP	4. Mike Toland	4. Bob Gafford
5.	Steve Hickman	MRP	5. Terry Ballard	5. Ron Souza
6.	Gene Husting	Associated	6. Robert Cavazos	6. Gary Slayton
7.	Tim Neja	Associated	7. Robert Fujioka	7. Sonny Maddison
8.	Roger Curtis	Associated	8. Mike Westfall	8. Bill Gafford
9.	Mike Kimrey	Associated	9. Ken Stephenson	9. Bob Dewald
10.	Jim Aguirre	Associated	10. Greg Borella	10. Mike Beeler

Place	Expert Modified Class Name	Car	Motor	Amateur Modified "A" Main	Novice Modified "A" Main
1.	Kent Clausen	Associated	Reedy	1. Ken Stephenson	1. Larry Stevens
2.	Frank Killam	Leisure	Checkpoint	2. Randy Tentschert	2. Rick Marks
3.	Gene Husting	Associated	Reedy	3. Mike Toland	3. Gary Slayton
4.	Mike Lavacot	Associated	Reedy	4.Larry Krogh	4. Sam Ellis
5.	Jerry Case	Associated	Reedy	5. Robert Cavazos	5. Bob Campbell
6.	Butch Berney	Associated	Reedy	6. Ken Jones	6. Sonny Maddison
7.	Tim Neja	Associated	Reedy	7. Doug Kott	7. Ted Graf
8.	Ed Janis	MRP	Reedy	8. Bob Hayes	8. Don Sallenbach
9.	Mike Wibben	Associated	Reedy	9. Greg Borella	9. Ron Souza
10.	Jim Aguirre	Associated	Reedy	10. Robert Fujioka	10. Killer, Jr.

CALIFORNIA CHAMPION
SERIES RESULTS

Expert Stock Class	Amateur Stock Class	Novice Stock Class
1. Mike Lavacot	1. Doug Kott	1. Larry Stevens
2. Jim Aguirre	2. Ken Stephenson	2. Sam Ellis
3. Kent Clausen	3. Randy Tentschert	3. Wayne Taylor
4. Mike Wibben	4. Mike Toland	4. Kerry Cavazos
5. Frank Killam	5. Mike Westfall	5. Midge Husting
6. Tim Neja	6. Terry Ballard	6. Barry Borin
7. Jerry Case	7. Robert Cavazos	7. Max Bowers
8. Butch Berney	8. Larry Krogh	8. Lee Hall
9. Bruce Hickman	9. Greg Borella	9. Ted Graf
10. Jim Greenemeyer	10. Robert Fujioka	10. Bob Dewald

Expert Modified Class	Amateur Modified Class	Novice Modified Class
1. Kent Clausen	1. Randy Tentschert	1. Sam Ellis
2. Mike Lavacot	2. Ken Stephenson	2. Gary Slayton
3. Jerry Case	3. Mike Toland	3. Larry Stevens
4. Jim Aguirre	4. Doug Kott	4. Sonny Maddison
5. Frank Killam	5. Robert Cavazos	5. Rick Marks
6. Mike Wibben	6. Ken Jones	6. Mike Buffington
7. Bruce Hickman	7. Larry Krogh	7. Ted Graf
8. Butch Berney	8. Dan Golden	8. Julie Husting
9. Tim Neja	9. Rene Cortez	9. Hans Wibben
10. Rich Douglas	10. Bob Hayes	10. Phil Ruggiero



The RCM's Fox Engine exercise. Fox Twin on test stand will be installed in R/C version of Goldberg Valkerie in 1982.

RCM LOOKS AT FOX ENGINES

THE RCM STAFF TRIES OUT THE FOX .15, .61, AND TWIN

After a brief discussion on health and the weather last summer, a phone call from Duke Fox went something like this:

(Fox) Have you flown my Eagle III engine?

(RCM) No Duke, have only seen the Eagle III at Toledo, why?

(Fox) I am real proud of this engine, it has everything that an engine should have. If I send you one will you fly it?

(RCM) Sure, we will be glad to, but, you know we are not into engine testing and technical reports. All we can do is mount it in an airplane, fly it, and comment on it in a personal opinion manner.

(Fox) That's fair enough, I'll send one out. By the way what did you think of our .15 Schnuerle?

(RCM) We mounted it in our Big Bird and it improved the climb a whole bunch, after we learned how to set up the idle needle. Getting the mid-range straightened out took a bit of fiddling around and a few obscene words but it's okay now. In fact, we replaced a .10 size engine with the .15 in a little low wing sport ship that we're developing and it really put some life in that machine. We like it.

(Fox) Is there anything that I can do for you?

(RCM) Yeah, rumor has it that you came up with some mods to your twin that makes life a bit easier, is that true? The twin that we have is a bear to start.

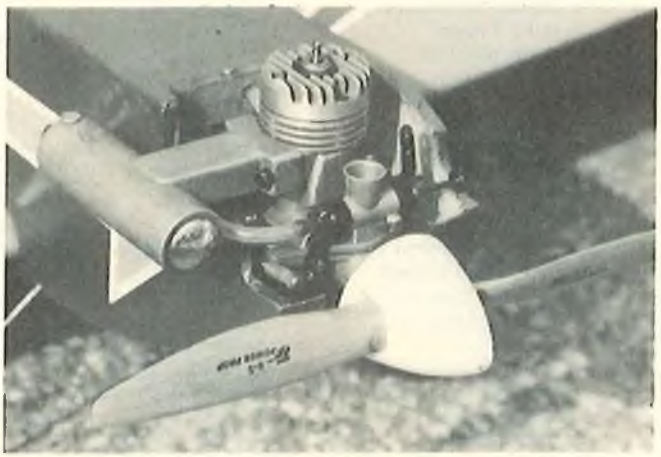
(Fox) That's right, why don't you send yours back and we will update it for you.

(RCM) We will do just that and will stand by to see the Eagle III.

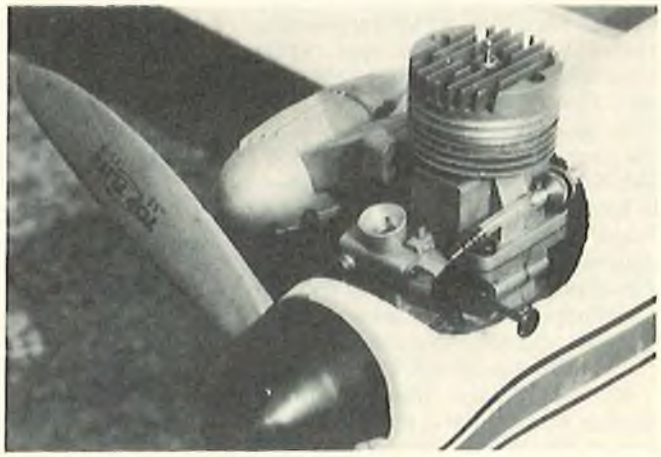
(Fox) Okay, and one more thing, I will send you some of our new fuel to try. It is a sort of FAI type fuel with no nitro but we have another ingredient that helps the combustion. The price of the fuel has gotten out of hand, this is our approach to provide a good fuel at a reasonable price. That's about it, will talk to you later.

(RCM) Take care of yourself Duke, so long.

The Eagle III arrived and it is impressive, a sturdy design in keeping with today's concept for high performance engines. First, we had a problem, not with the engine but with the mounting provisions in the airplane to be used. Considerable



Fox .15 Schnuerle.



Fox Eagle III flew better with 11/7½ prop.

modifications would be required so we asked one of our friends if he would give it a try while we were making a new mounting plate, etc., for our airplane.

Our friend took the Eagle III, mounted it in his Senior Telemaster with a 12/6 prop, and filled the tank with 12% nitro fuel. Both the high speed and low speed needle valves were adjusted per the instruction manual. Further needle adjustments were made when the engine was started, these were made by ear. The high speed needle was tweeked up to near maximum and then backed off a tad. The low end was adjusted to what seemed to be the lowest reliable idle. The tachometer readings at this point were 13,200 rpm and close to 2,000 rpm at idle.

The power in the air was outstanding. His faithful Lee K & B .61 will hold the Telemaster in a steady 20°-25° climb. The Eagle III pulled it up at about 40° — forever! The guys at the field thought that there was a .90 in the plane judging by the way the plane handled in the air.

Ten flights were made with the Telemaster with a new "out of the box" engine. The Fox instruction manual advises to run the engine slightly rich at first as it takes about 1½ hours for everything to loosen up and for the piston ring to set. There was one bit of aggravation in this exercise, that was in the fuel mixture going too rich in the mid-range. The instruction manual suggests two remedies for this condition: (1) rework the taper on the low speed needle or (2) get a Fox low taper needle. Since the engine was to be returned to our office for our use there was no effort made to change the needle configuration by our friend. Our friend has experienced his share of in flight flame-outs before so this was really no big deal.

We mounted the Eagle III in a low wing sport ship that we have used for several years with a Fox Eagle I in the nose. Because the III is much more massive than the I, we had to make a new 3/16" aluminum mounting plate and trim out the fiberglass fuselage to fit, nothing significant, just time consuming.

With an 11/7½ prop, K & B 500 fuel, and a bit of running time on the engine, the rich mid-range situation seemed to have resolved itself. As for the reason, we don't know, but this engine is a powerhouse. The difference between flying our 7½ pound airplane with the Eagle III and the I is unreal, it changes that docile sport ship into a snappy hot-dogger. We haven't stuck a tack on it lately so we can't quote rpm numbers, so what, it just does one heck of a job and we are happy with it.

We feel that Duke Fox accomplished his goal, not only has he developed a powerful high performance .61 engine, he is marketing it at a sport engine price of $125.00 through retail dealers everywhere. Also, don't overlook the dandy Fox line of accessories, all reasonably priced.

The Fox Twin has been returned to us, no comment was made as to what was done to it. It has been mounted on a test stand and cranked up. It started easily and while swinging a 14/6 prop it is frightening, especially after running a .15. The Twin is slated for our R/C version of Carl Goldberg's first gas engine powered model, the Valkerie, planned to be completed in the Spring of 1982. More on the Twin later.

At this writing we have not had an opportunity to try the fuel. Later, also.

Somehow Fox engines haven't enjoyed the recognition that they deserve. Duke Fox has produced quality engines at very reasonable prices for some thirty one continuous years and is one of the two surviving American engine manufacturers. We suggest that when you are in the market for a new engine that you take a good look at the Fox line-up, you will probably be surprised.

□

The .15 powered ship used a JR Spectra Series radio, an Airtronics' XL was used with the Eagle III.

BUCKER JUNGMEISTER

By Gorden E. Whitehead

Ask any pilot of any of the modern full size machines such as Zlins, Pitts, Caps, Akrostars: "Which is the nicest flying aeroplane of them all?" The answer will be: "A Bucker."

In most aviation magazine articles featuring the Jungmeister, one tends to find that the only photos showing the ship upright are those where it's parked on the ground. The rest depict somebody holding his machine in some incredible attitude, such as 3' from the runway in knife-edge flight or passing inverted under a 20' high limbo ribbon! So you might draw the conclusion that here is a machine with promise. And you wouldn't be mistaken!

The model featured here is the 6th in my line of small size classic bipes. With her I've expanded, by aerobatic repertoire, to include such evil sounding maneuvers as the Lomcovak, Chinese Loop, and Avalanche, and the "bestest" snap-roll you ever did see. She'll snap-roll upwards, downwards, upright and inverted and, in this respect, she is very much like the full-size — only she rotates so quickly I have difficulty in stopping her with exact precision. Powered by a .25, she has the usual Whitehead design characteristic of unimpressive vertical climb performance (a feature of the full-size ship, I might add). However, she'll knife-edge with .20 or .25 power.

As with most of my chosen subjects, the Jungmeister has been on my list for years — 20 in fact! What delayed proceedings, apart from radio technology, was a fear of making special radial cowls. The method used produces a composite balsa/fiberglass affair which you can make and finish in a couple of evenings. The model started life with a fully castoring tail wheel, and with that device she became a fully castoring model airplane! I always say that whenever you build a fresh scale model, you learn something new, and the message here is to forget about using castoring tail wheels, unless you love worn wing tips and viscious ground loops. After learning this the hard

way, I read an article in the British "Pilot" magazine by the late Neil Williams, who described Jungmeister ground handling technique; although the tail wheel was of the castoring type, it was lockable for take-off and landing. I had previously thought that only carrier fighters needed this safeguard.

I relocated the front L.G. leg top mounting further forward than scale, to enable it to pivot in the fuselage. The lower wing bands support the rear leg and, because of the forward rake of the L.G., provide a fair amount of shock absorbtion; when you push down on the ship, the wheels swing forward and upward, stretching the bands. Though seemingly crude, this arrangement works well, but you need one wing band either side which doesn't overlap the L.G. leg, in case all the L.G. bands break. I faired the L.G. legs with Solarfilm, employing the solvent for adhesion. I believe that, as with the Pitts S1, the L.G. fairing helps with lift in the knife-edge position.

The nicest feature of the ship, apart from the range of flamboyant colour schemes available, is her docile, smooth and slowish performance. You can trim her to fly free-flight, and no matter what she is doing autorotatively, like snaps or Lomcovaks, as soon as you release the sticks (yes, just let go!) she'll immediately stop rotating, or at least not go more than an extra half-turn. Then if you have the height, you can rescue her! Also, because of her low maximum speed, you can perform all kinds of combination maneuvers and sequences in a small space. A favorite sequence of mine is a half upward roll with stall turn, followed by a 1½ outside snap roll on the way down, leading at full power into a reverse Cuban 8, another stall turn, followed by a slow roll, a climbing 180° turn with a dive into a long, low, knife-edge, then a half-Cuban and a Lomcovak . . . and so on. Phew! Mind you, I'm used to her now, and I find that, compared with my other designs, I tend to keep full power on for a far higher proportion of the flight. This isn't because she's underpowered. In fact, with the HB .25 or Webra Speed .20, she has the same power/weight ratio as the full-size ship. No, it is entirely due to the style of flying, in that you need to keep storing energy in the form of speed or height. As usual, I'll describe trimming and aerobatic performance (with examples) at the end, and will now get to the constructional details.

CONSTRUCTION

Fuselage:

The basic sides are 3/16" sheet back to F4, continuing with a box girder. After adding ply doublers, join the sides with F3, and F5, and the rear cabane supports. Join the rear posts, and add cross braces. Then add F1 and the front cabane support. When dry, add the front 1/4" sheet fairing pieces, clamping as shown in the photos. Bind on the cabane struts, solder them up measuring wing rail angle from the plan to get the correct incidence. Then epoxy the binding. Install the nylon engine mount, and organize the tank position, with tank neck poking through the hole in F1, to one side of the engine. You can seal the gaps round the neck with silicone sealer when ready. Epoxy the front L.G. leg assembly in place. Add the remaining sheet formers, stringers, etc., carving and sanding to shape. Add the tail wheel assembly. The 1/32" ply plate aids covering and can be drilled for antenna exit.

Cowling:

The engine cowling assembly sequence is detailed on the plan. When sheeting, cut four pieces of 4" wide sheet, space them equally round the former, and cut four trapezoidal sections to fill the gaps. Glue well, hold with pins and bands and put in a warm place to dry hard. Repeat the procedure, gluing the second layer in place. I used P.V.A. When sanding the concavity on the blister bottoms, wrap the sandpaper round a curved former, e.g., a soda pop bottle. When fitting brackets, after marking their approximate positions, stand the cowl on its rear face, support the brackets on a 13/16" thick block, and epoxy them in place, reinforcing generously with glass cloth. You will need to make hollows inside the cowl to clear the cylinder head and muffler and drill for plug and needle valve access. The slightly "higher than scale" thrustline helps minimize cut-outs in the cowling. If you regularly fly from a paved runway, fit a 1½" spinner to prevent grazing the cowl following a nose-over. On turf there is no problem. The engine angle aids its concealment within the cowl blisters.

Tail Group:

Because of wing sweep and the fairly long nose, the C.G. is a good distance back and an all-sheet tail group is in order. Watch the weight nevertheless.

Wings:

All four wings are identical. I chose a flat bottomed section because the full-size ship was similarly endowed. Note particularly the various strut hook shapes, needed to retain the struts in their various positions. The center sections differ. The bottom center section is all sheet covered, with a 1/16" ply servo plate, and servo access hole. The 1/8" ply doubler prevents the L.G. cross bar from rebounding through the bottom. The upper center section is sheeted

ABOUT THE AUTHOR

Gordon Whitehead is 36 years old, married, with two young daughters who don't mind his aeromodeling so much now that they have found that modeling tools can be used to make doll house furniture, and that all our plethora of glues can repair anything. Gordon is now serving as an Electrical Engineering Officer in the Royal Air Force.

Gordon started modeling at the age of 11, and since then has always been primarily an O/D (own design) scratch builder. He began with FF and C/L, and started R/C in 1963 with homemade single channel tube radios. He went to full proportional in 1969, flying .40 and .60 powered pattern ships for 3 years, then began to concentrate on his first love which is Stand-Off Scale. Gordon's first O/D scale model appeared in 1961 — a C/L B25 Mitchell which is still flying. After the initial .60 sized scale excursion, he concentrated on .20-.25 size models. This enabled a wide experience on different scale model configurations that could be achieved cheaply and quickly via a dozen different designs, some of which have been published in British model magazines and RCM.

Gordon is now returning to bigger models via ducted fan and Quadras. The reason for the choice of Quadra is that he has a predilection to performing intricate maneuvers, and his ultimate aim is to make a scale ship which will be efficient enough and have powerful, yet slow enough, control responses to execute an inverted falling leaf, besides everything else. (So, if any of you out there have a model which will already perform this maneuver accurately and repeatedly, he wants you to write an article for RCM about it.)

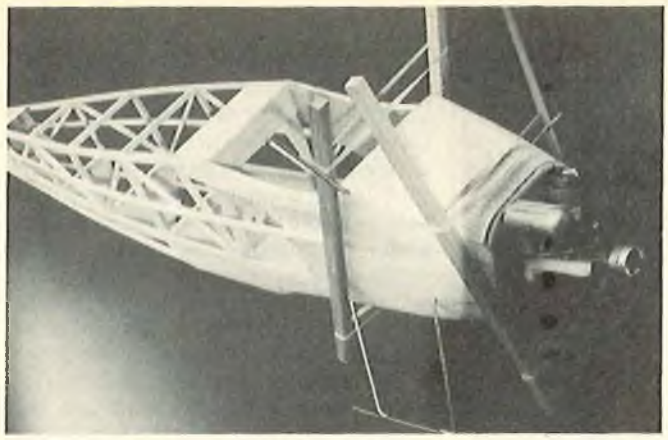
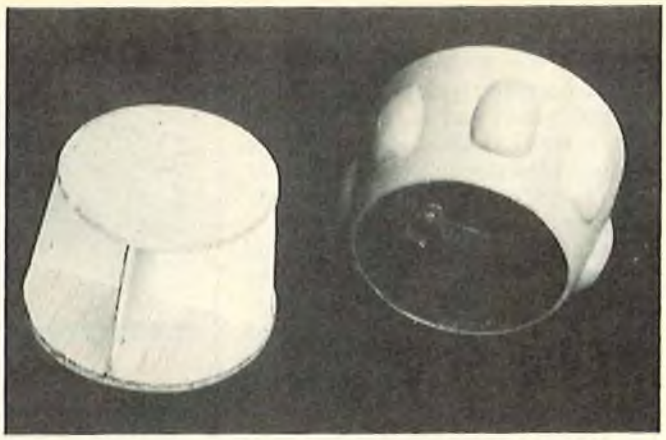
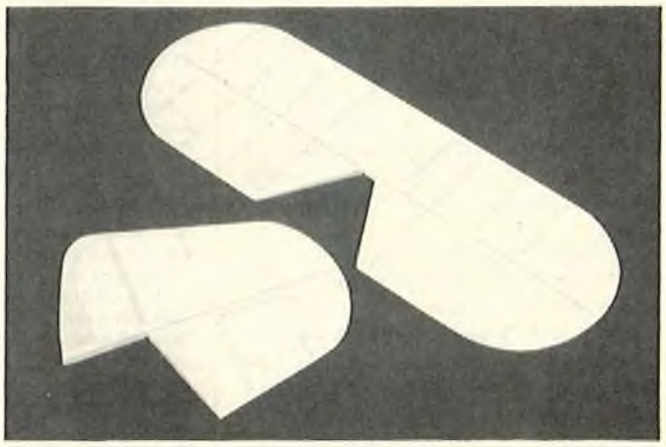


Photo illustrates how 1/4" sheet front doublers are clamped before sanding.

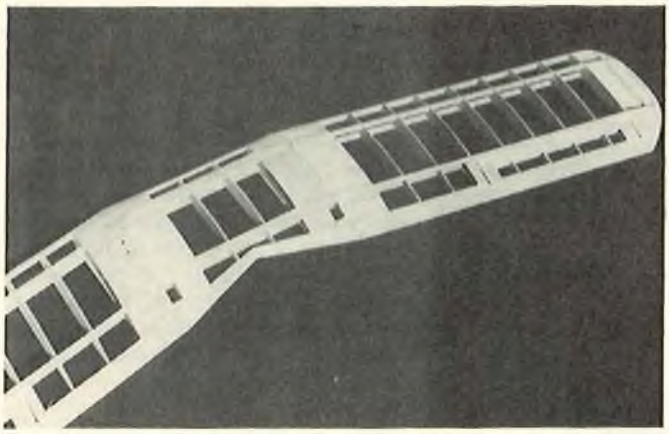


Formers used to construct cowl alongside a completed cowl.

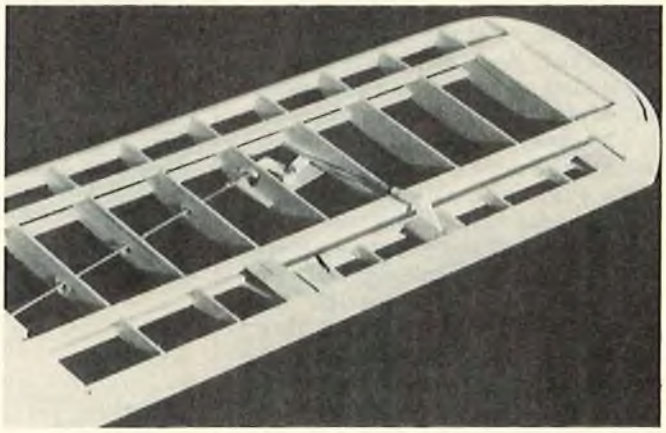
Completed cowl showing brackets for attaching.



Tail surfaces in photo differ from plans. Prototype used center sheet with frame on both sides.



Top wing center section sheeting. Note ailerons not yet cut out but with webs in place.



Lower wing aileron linkage detail. Aileron hasn't been cut free.

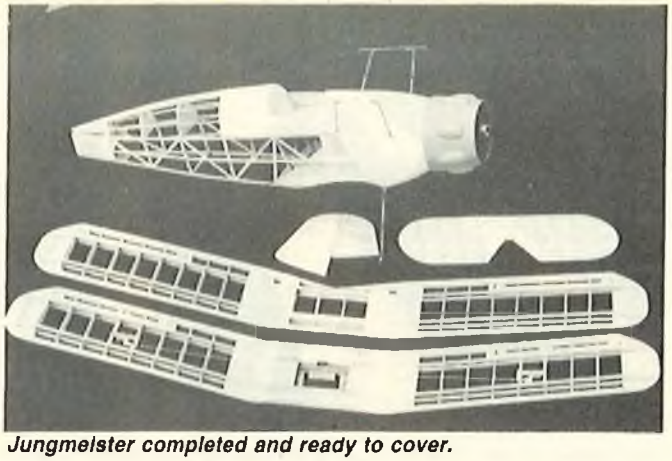
underneath for finger-proofing whilst you're carrying the ship. Neoprene fuel tubing, split and slid onto the cabane runners stops the soldered joints from biting into the underside of the top center section. Build each wing as if without ailerons, then cut the aileron sections off and add the various webs and stiffening sheeting. The spruce struts are easy to adjust to length with the wings banded in place. Also the aileron links can be made slightly too long, and adjusted for length by kinking. The dihedral braces are best made slightly oversize and sanded to blend in with the wing sheeting. When the bottom wing is all complete, band it in place and add the rear L.G. leg, with its associated braces. The middle brace helps to prevent the rear legs from buckling when you taxi at high speeds into rocks!

Radio Installation:

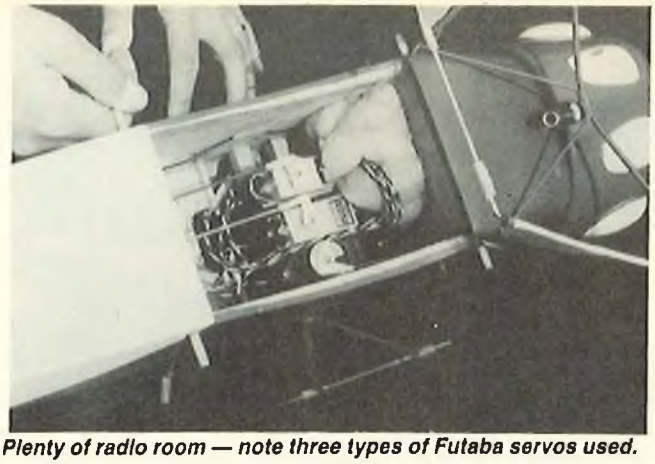
I mounted my servos abreast on mounting clips, employing dowel pushrods. The aileron pushrod is 1/16" music wire. The receiver goes alongside the 4 oz. tank, the battery just in front of the servos. Arrange initial control throws for the trimming values. These were the initial throws I used, by default really, as my new rotary servos have less throw than my old linears.

Covering:

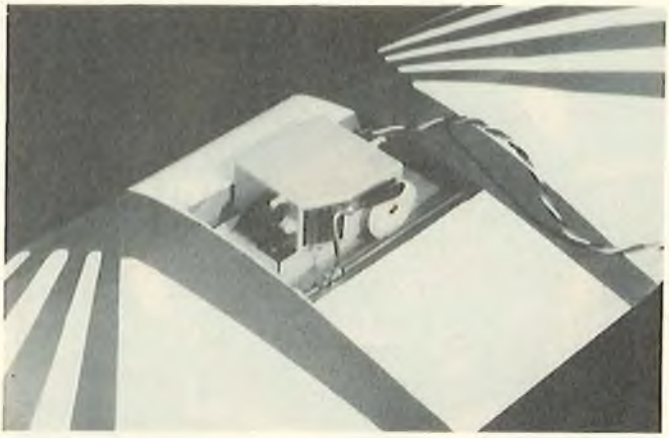
My ship is entirely film covered, except for the cowling which I painted to match. I tinted red enamel with orange to get the correct shade. The top wing sunburst was cut out in one piece as follows: Draw half of the



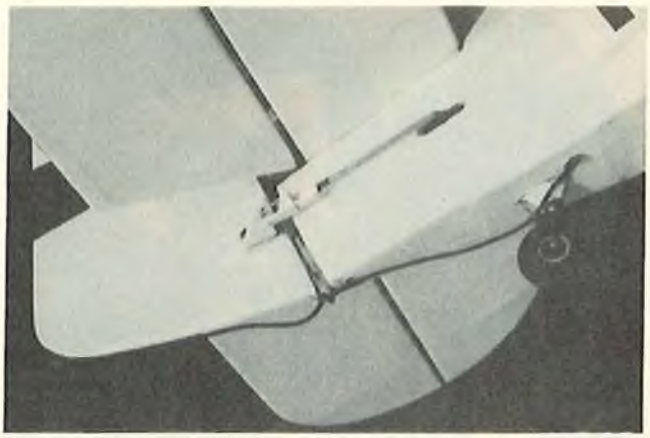
Jungmeister completed and ready to cover.



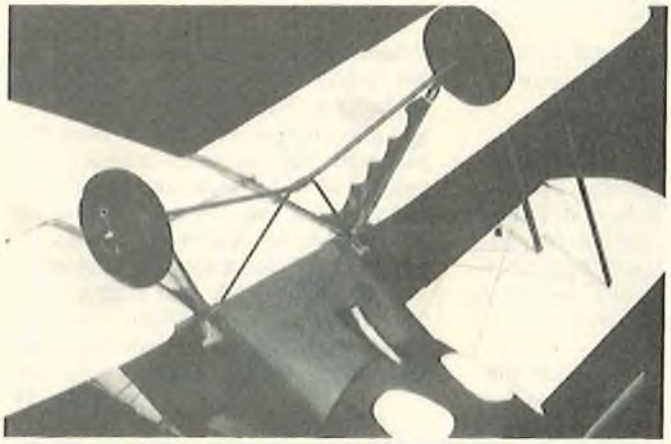
Plenty of radio room — note three types of Futaba servos used.



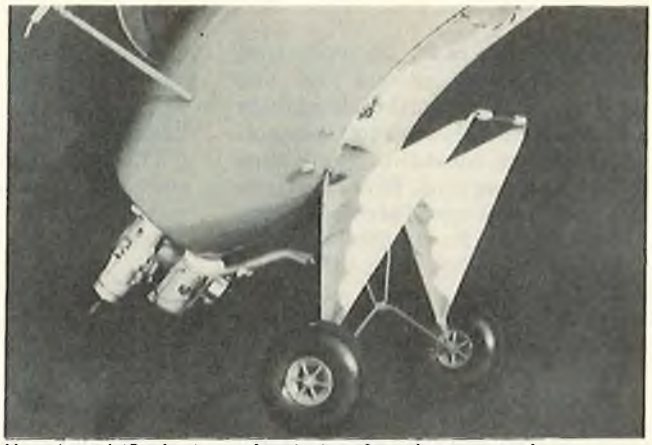
Aileron servo mounting in lower wing.



Looking under the stab at the rudder control horn and linkage. Note receiver antenna.



Lower wing bands also tie down rear L/G strut.



Note how L/G pivots on front strut for wing removal.

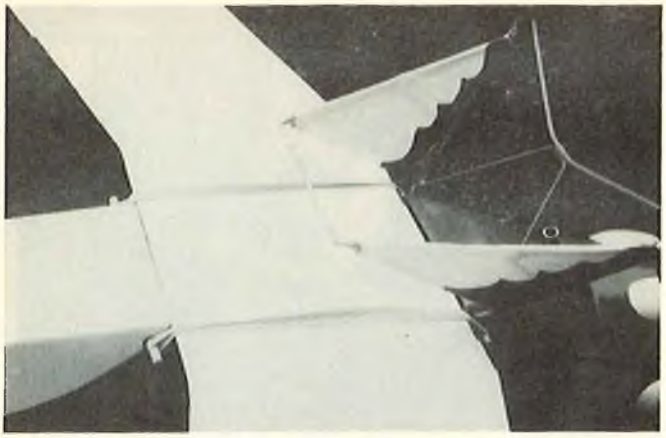
pattern on a sheet of paper, and pin this over the film which is folded double at its center. Using a sharp knife, cut out the pattern, open out the film and there is your sunburst! I ironed the sunburst into place. The lower wing pattern was made using the leftovers from the top wing. I drew the fuselage letters individually on squared paper, pinned each drawing over sufficient layers of film and knife cut them out. I stuck them in place with solvent as I did with the tail decor.

Muffler:

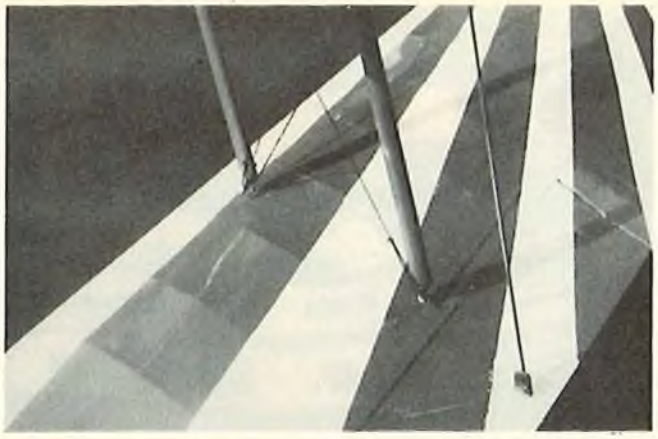
I modified an HB/Veco muffler by cutting off its mounting stub and filed a bevel on the inside of the aperture to seat on the engine exhaust stub. I cut off the back of the expansion chamber, and plugged it with a thick aluminum disk held with P.K. screws and sealed with silicone seal. The exhaust pipe is thin-walled 1/4" I.D. aluminum tube, and is effective in shooting the sludge well away from the ship. About one hours work with a junior hacksaw and needle files did the job.

Flying:

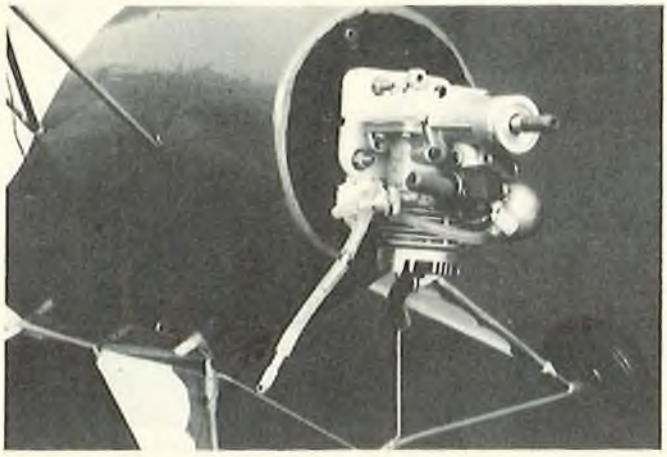
With the tank empty, get the C.G. correct. The first flights were made using H.B. .20, 9/4 Tornado nylon, 5% juice at an all-up weight of 3 lbs. 12 ozs. She needed 3/32" up on the right ailerons. She takes off well in a satisfyingly short distance with no ground looping tendency. A good .20 is required and even then climb rate is slow. She would do all the maneuvers detailed below but needed a dive for speed. The cowl undoubtedly reduces engine thrust and I, therefore,



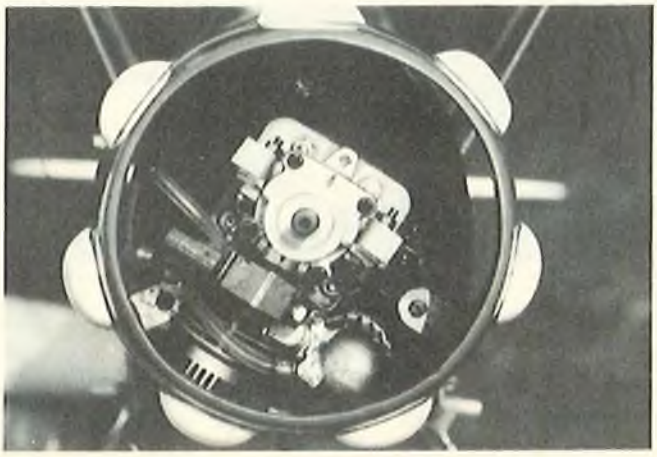
Safety bands on wing before addition of L/G hold-down bands.



Interplane struts showing elastic thread for simulated wires. Note wire linkage to lower aileron.



H.B. .25 mounted in front does a superb job.



Angled engine — note thrust wedges. The modified muffler is described in text.

substituted an H.B. .25 with 10/4 Taipan. Performance was fine, but then the H.B. .25 began breaking little ends and I went through two rods and pistons before substituting a Webra Speed .20. Same prop. Wow! With the H.B. .20 she was a good aerobatic sport job; with the H.B. .25 she became a good aerobatic ship; with the Webra Speed .20 (same muffler as before, with a mild-steel strap to retain it on the engine) she's in the 'hot' aerobatic class.

After familiarization flights, increase control throws and have a ball with some of the maneuvers outlined below.

Stall Turn:

This is easier to the left. Keep full power on all the way up with a touch of right rudder to hold her straight. When the ship stops, flick on full left rudder and she will cartwheel over. Keep power on down hill to build up speed for the next maneuver.

Avalanche:

Practice loops — make them big. Then commence a loop and at ten o'clock apply full up elevator and full left rudder. She'll snap roll at the top of the loop. The snap is more axial if you also employ left aileron. Stop the roll with full opposite rudder and neutral elevator after one revolution and carry on with the loop. You could try an outside snap-roll instead by applying full down elevator and cross aileron rudder! For two snaps, after 1/4 of the roll, neutralize elevator, keeping rudder on, and she'll do two rolls easily. So be ready to stop! For

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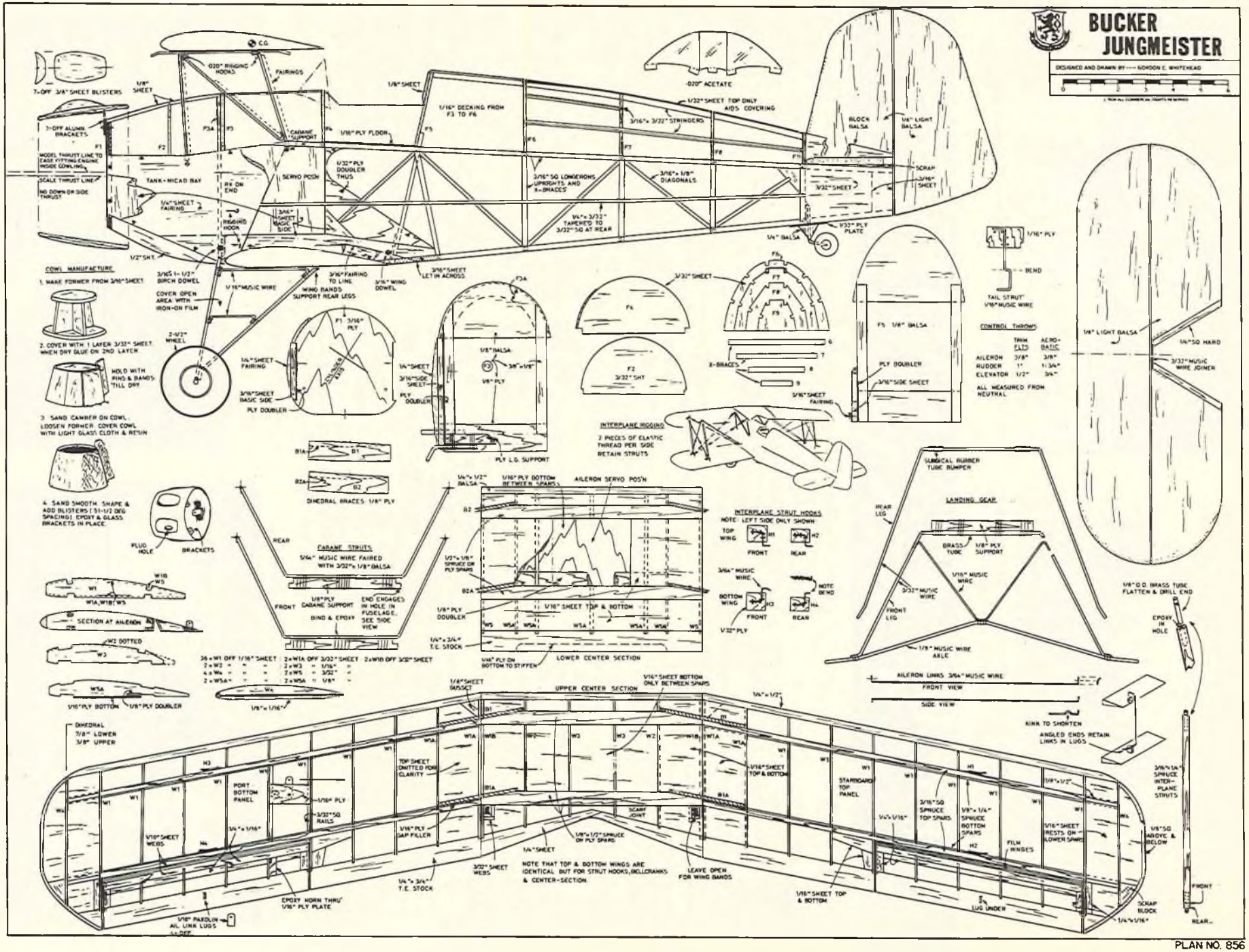
BUCKER JUNGMEISTER
Designed By: Gordon E. Whitehead

TYPE AIRCRAFT
Sport Scale (5/32")
WINGSPAN
40½ Inches
WING CHORD
6 Inches
TOTAL WING AREA
450 Sq. In.
WING LOCATION
Biplane
AIRFOIL
Clark Y
WING PLANFORM
Swept Constant Chord
DIHEDRAL EACH TIP
7/8" Upper — 3/8" Lower
O.A. FUSELAGE LENGTH
36¼ Inches
RADIO COMPARTMENT AREA
(L) 8" x (W) 3½" x (H) 3½"
STABILIZER SPAN
13¼ Inches
STABILIZER CHORD (incl. elev.)
5¼ Inches
STABILIZER AREA
63 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid Fuselage
VERTICAL FIN HEIGHT
7½ Inches
VERTICAL FIN WIDTH (incl. rudder)
7 Inches
REC. ENGINE SIZE
.20-.30 Cu. In.
FUEL TANK SIZE
4-6 Oz.
LANDING GEAR
Conventonal
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Throt. & Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Ply
Wing ..... Balsa & Ply
Empennage ..... Balsa
Wt. Ready To Fly ..... 60 Oz.
Wing Loading ..... 19.2 Oz./Sq. Ft.


BUCKER
JUNGMEISTER
DESIGNED AND DRAWN BY ---- GORDON E. WHITEHEAD
7-OFF 3/8" SHEET BLISTERS
3-OFF ALUMN BRACKETS
MODEL THRUST LINE TO EASE FITTING ENGINE INSIDE COWLING
SCALE THRUST LINE
NO DOWN OR SIDE THRUST
TANK-NOSE BAY
SERVO POSN
CABANE SUPPORT
1/16" PLY FLOOR
1/16" DECKING FROM F3 TO F6
1/32" PLY DOUBLER THUS
3/16"x 3/32" STRINGERS
3/16" SQ LONGERONS UPRIGHTS AND X-BRACES
3/16"x 1/8" DIAGONALS
1/32" SHEET TOP ONLY AIDS COVERING
.020" ACETATE
BLOCK BALSA
1/4" LIGHT BALSA
SCRAP
1/32" PLY PLATE
1/4" BALSA
1/16" PLY
BEND
TAIL STRUT 1/16" MUSIC WIRE
CONTROL THROWS
TRIM FLT
AERO-BATIC
AILERON 3/8" 3/8"
RUDDER 1" 1-3/4"
ELEVATOR 1/2" 3/4"
ALL MEASURED FROM NEUTRAL
1/8" LIGHT BALSA
1/4" SQ HARD
3/32" MUSIC WIRE JOINER
COWL MANUFACTURE
1. MAKE FORMER FROM 3/16" SHEET
2. COVER WITH 1 LAYER 3/32" SHEET WHEN DRY GLUE ON 2ND LAYER
3. SAND CAMBER ON COWL. LOOSEN FORMER. COVER COWL WITH LIGHT GLASS CLOTH & RESIN
4. SAND SMOOTH. SHAPE & ADD BLISTERS (51-1/2 DEG SPACING) EPOXY & GLASS BRACKETS IN PLACE
3/16" DOWEL
3/16" FAIRING TO LINE
WING BANDS SUPPORT REAR LEGS
3/16" SHEET LET IN ACROSS
1/16" MUSIC WIRE
COVER OPEN AREA WITH IRON-ON FILM
2-1/2" WHEEL
HOLD WITH PINS & BANDS TILL DRY
1/4" SHEET FAIRING
3/16" SHEET BASIC SIDE
PLY DOUBLER
3/16" SIDE SHEET
1/8" BALSA
1/8" PLY
PLY L.G. SUPPORT
1/32" SHEET
F4
F2
3/32" SHT
F5
F6
F7
F8
F9
X-BRACES
5
6
7
8
9
1/8" BALSA
PLY DOUBLER
3/16" SIDE SHEET
3/16" SHEET FAIRING
INTERPLANE RIGGING
2 PIECES OF ELASTIC THREAD PER SIDE RETAIN STRUTS
B1A
B1
B2A
B2
DIHEDRAL BRACES 1/8" PLY
PLUG HOLE
BRACKETS
REAR
FRONT
CABANE STRUTS
5/64" MUSIC WIRE FAIRED WITH 3/32"x 1/8" BALSA
1/8" PLY CABANE SUPPORT
BIND & EPOXY
END ENGAGES IN HOLE IN FUSELAGE, SEE SIDE VIEW
1/4"x 1/2" BALSA
1/16" PLY BOTTOM BETWEEN SPARS
AILERON SERVO POS'N
1/2"x 1/8" SPRUCE OR PLY SPARS
1/8" PLY DOUBLER
1/4"x 3/4" T.E. STOCK
1/16" SHEET TOP & BOTTOM
1/16" PLY ON BOTTOM TO STIFFEN
LOWER CENTER SECTION
INTERPLANE STRUT HOOKS
NOTE: LEFT SIDE ONLY SHOWN
TOP WING
BOTTOM WING
FRONT
REAR
3/64" MUSIC WIRE
NOTE BEND
1/32" PLY
SURGICAL RUBBER TUBE BUMPER
LANDING GEAR
REAR LEG
BRASS TUBE
1/8" PLY SUPPORT
1/16" MUSIC WIRE
3/32" MUSIC WIRE
FRONT LEG
1/8" MUSIC WIRE AXLE
1/8" O.D. BRASS TUBE FLATTEN & DRILL END
EPOXY IN HOLE
AILERON LINKS 3/64" MUSIC WIRE
FRONT VIEW
SIDE VIEW
KINK TO SHORTEN
ANGLED ENDS RETAIN LINKS IN LUGS
W1B
W3
W1A, W1B, W3
SECTION AT AILERON
W2 DOTTED
W3
W1
W2
W4
W5
W5A
1/16" PLY BOTTOM
1/8" PLY DOUBLER
1/8"x 1/16"
2 x W1 OFF 1/16" SHEET
2 x W2 " " "
4 x W4 " " "
2 x W5A " " "
2 x W1A OFF 3/32" SHEET
2 x W3 " 1/16" "
2 x W5 " 3/32" "
2 x W5A " 1/8" "
2 x W1B OFF 3/32" SHEET
1/8" SHEET DASSET
UPPER CENTER SECTION
1/16" SHEET BOTTOM ONLY BETWEEN SPARS
1/4"x 1/2"
DIHEDRAL 7/8" LOWER 3/8" UPPER
PORT BOTTOM PANEL
TOP SHEET OMITTED FOR CLARITY
1/16" PLY
3/32" SQ RAILS
1/16" SHEET WEBS
1/16" PLY DAP FILLER
1/4" SHEET
3/32" SHEET WEBS
1/4"x 3/4" T.E. STOCK
EPOXY HORN THRU' 1/16" PLY PLATE
1/8" PAXOLIN AIL LINK LUGS
SCARF JOINT
1/8"x 1/2" SPRUCE ON PLY SPARS
NOTE THAT TOP & BOTTOM WINGS ARE IDENTICAL BUT FOR STRUT HOOKS, BELLCRANKS & CENTER-SECTION.
LEAVE OPEN FOR WING BANDS
STARBOARD TOP PANEL
3/16" SQ SPRUCE TOP SPARS
1/16" SHEET TOP & BOTTOM
1/16"x 1/2"
V/8"x 1/4" SPRUCE BOTTOM SPARS
FILM HINGES
1/16" SHEET RESTS ON LOWER SPARS
1/16" SHEET TOP & BOTTOM
LUG UNDER
3/16"x 1/4" SPRUCE INTER-PLANE STRUTS
1/8" SQ ABOVE & BELOW
SCRAP BLOCK
1/4"x 1/16"
FRONT
REAR

PLAN NO. 856

1981 Scale Masters Sport Scale champions: (L to R) 4th Bob Frey, 2nd Bob Underwood, 1st Tom Cook, 3rd Kent Walters, 5th Clif Tacie.

Kent Walters' Douglas SBD Dauntless on take-off run.

1981 U.S. SCALE MASTERS TOURNAMENT

By Frank Tiano

There's gonna be plenty written about this year's U.S. Scale Masters, but I don't think that any article will be quite the same as this one. Not that this is any better, mind you, but it sure is gonna be a little different. There will be absolutely no suspense, no exciting drama unfolded and no account of the fast paced, head to head action that took place this past August. However, you will read about some unusual and funny happenings, some bad breaks and some interesting statistics. If you'd like an inside look at some of the things that happened at the Masters this year, read on. If not, enjoy the pictures and the captions.

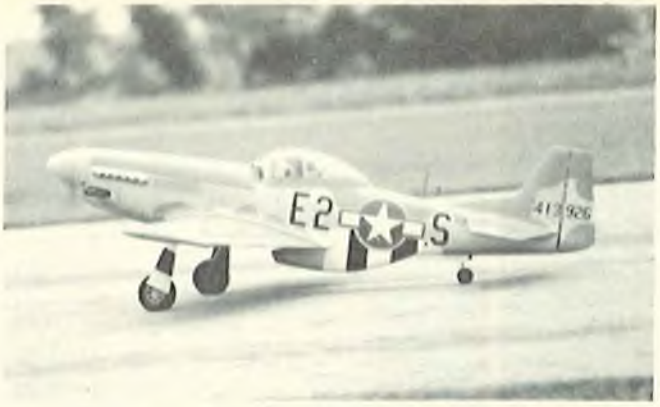
Tom Cook won the Stand-Off Scale category at this year's event, followed by Bob Underwood, Kent Walters, Bob Frey and Clif Tacie. Bob Underwood took the Precision event followed by Burnis Fields and Dan Santich. Of course, congratulations are in order for those who won and also for all those who competed because this was the contest of contests. But many, many things happened this year to help determine the final results. The Louisville Slugfest wasn't any better than the melee at Mile Square last year, just a bit better attended and a little more closely contested.

If a person sat at the gymnasium on Friday morning armed with a notebook and a calculator he could produce some very interesting comparisons. It might take him only five or six hours to compile this information and then he could board his space ship back to Mars. Friday was the day for static judging and the entire day was spent doing just that along with some informal meetings and more than a few general bull sessions. In-between all of that, I somehow found some time to jot down a few hundred pages of notes to bring back home. They, when deciphered, coughed up most of the following information.

At this year's Masters, or should I say Scale Masters, the average weight of a single engined airplane was 11.20 lbs. The multi's averaged out at 16.75 lbs., and there were a few multi-engined models in attendance. In fact, there were six of them. In every case, if the prototype featured a retractable undercarriage, so did the model. Rhom retracts accounted for 90% of the retracts in use. Looking further into the notes we find that an amazing 30% of the ships featured an acrylic lacquer finish and another 30% used some sort of epoxy. 20% of the entrants used RS Perfect paint. Another interesting piece of data; there were three ducted fan models entered and one of these was a twin engined F-4 flown by the eventual winner, Tom Cook. In fact, unless I'm mistaken, a ducted fan aircraft not only won Stand-Off, but also posted the high flight of the meet as well as the high static score. Tom Cook had the high flight with an unbelievable 98 while Larry Wolfe's Kfir had a 96.5 for high static. Quite a showing, don't you think? There were other great flight scores posted by Kent Walters (96), Skip Mast (94), Garland Hamilton (92), Bob Underwood (94), Clif Tacie (91.5), and Dan Parsons, Len McCoy and Tommy Czikk, all with 90 or 90.5. The higher static

Skip Mast cranking his Hercules. It does rolls and loops.

Larry Wolfe with Kfir at weigh-in table, 9½ lbs.



P-51D Mustang from Fliteglas kit by Ralph White.

Dave Platt taxiing his Macchi to take-off position.

scores were posted by Kent Walters (92.5), Tom Cook (93.5), Bob Frey, Frank Tiano and John Workman all with 94, Bill Kinsey (94.5), Bob Underwood (95), Dave Platt (95.5) and the pre-mentioned Larry Wolfe's 96.5

Exactly 50% of the contestants used a Kraft radio and the next highest was Proline with 17%. O.S. accounted for 29% of all the engines used with 21% going to K & B, Webra and HP at 13% and Super Tigre 11%. Of all the aircraft entered, an amazing 73% were models of military airplanes and the balance civilian duplicates. You might say that most every ship entered was unusual in some way or another but a few were rather outstanding in either color, form or size. For instance, Dave Platt's Macchi is one big Mother of an airplane and you wouldn't really expect it to tip the scale at anything less than 16 or 17 pounds but it registered an honest 14.5 right before our very eyes. And who in the world other than Don Srull would enter an airplane called a Schlepp. That's right, a Swiss Schlepp no less. He says that the black and yellow creation is a model of a Swiss target tug. Anyway, the judges bought it. The Crayola colored documentation was rather impressive.

Ted White brought along another MB 5. The MB stands for Mighty Bad or Martin Baker. In any case, he scratch-built the thing from Dan Parsons' plans but chose to fully cowl the engine so that the photographers could tell his ship from Dan's once they developed the prints. Other than the shades of color and the choice of engine location, Dan Parsons' MB 5 could be a mirror image of Ted's. "Cowboy" Kent Walters entered his reliable Dauntless that has more options than the Dallas Cowboys. This 15 pounder uses a Webra .90 to lug it around and uses flaps, dive flaps, dive brakes, retracts and a bomb drop. Kent said that by next year he'll be able to pre-program the SBD to do everything while he's not there. That means that he can just crate the ship up and send it to the Scale Masters. Once started, the Dauntless will perform the entire program from memory. To date, it's flown the same flight plan somewhere around 357 times! Garrie Taylor modified his Royal Bearcat that it looks more like a Bearcat than a Bearcat does. At least that's what he told the judges and when you're 7' tall who's to argue?

Bill Kinsey must have the honor of entering the most unusual looking airplane other than the Schlepp. His Dornier 335 is the meanest looking ship this writer has seen in a long time. The push-pull German fighter appears to be going 600 miles an hour while it's standing still. Ed Couch, on the other hand, brought a Spirit of St. Louis that looks as if it's standing still while it's honking along at 45 mph. Tommy Czikk drove all the way from Long Island, New York, with an almost stock Pica FW 190D-9. An unfortunate accident with his Jemco SBD forced the completion of this model in exactly nine days! Another kit, this one from Ohio Super Star, was entered by Dale Cordes. Dale chose the Zlin Z-50L. The fine flying aircraft uses an O.S. .90 for motivating its 13.5 pounds. Bob Frey, who eventually took 4th place in Stand-Off, should have been awarded a medal for just thinking of his subject. Seems that Bobby took an **old** Sterling kit of the famous Spitfire and changed a few things to make it into a competitive performer. Slimline provided the scale exhausts, Perfect supplied the paint and Bob did the work. I must admit that it looked absolutely terrific.

Bob Underwood, who scratch-builds in his sleep, entered the PE-2 Russian bomber that he's had for a couple of years. It flew great on two HP .40's. An almost stock Aero Commander Shrike was entered by Roger Geers. This ship featured rotating beacon lights, landing lights, wing lights and Winston Lights. (Just seeing if you were paying attention!) The good looking P-47 that you saw on the cover of RCM a while back, was entered by

Bob Underwood's Hiperbipe, 1st in Precision Scale.

Bob Underwood placed 2nd in Sport Scale with Russian PE-2.

Here's how to get a perfect painted finish... without a drop of paint.

COVERITE's fabulous GEE BEE SPORTSTER. 56" wing span; 39" long; 5-6 lbs; .40 power. Surprisingly stable in the air, only 8-10 hours to build complete airframe. It's recommended as the "tail dragger trainer." Winner "Best Combined Performance" at Rhinebeck. Kit has been constantly upgraded since its introduction in 1980, and now ranks with the very best in materials & workmanship.

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Throw away your brushes and sprayers, and start using the new PERMAGLOSS COVERITE. It's the only fabric covering that comes with 4 perfect coats of paint, baked on tough at our factory.

To get a finish like the one on our Gee Bee Sportster, all you need is a sharp knife and a hot iron. The Gee Bee is covered entirely with Permagloss. Not a drop of paint anywhere except on the plastic cowl & spats. First we ironed down the Cream colored Permagloss (a new color for 1982), and then we put the Blue down over the Cream. To make it easy, we lowered the temperature to 250 degrees F. when we ironed down the Blue over the Cream. You should see the way Permagloss sticks to Permagloss.

But how about that authentic fabric finish! You could knock yourself out with a fancy spray job and not get it as perfect as we can in the factory. And nothing, simply nothing will stand up to fuel and bumpy landings like our Permagloss paint.

Permagloss is now available in 14 colors: Dark Red, Brite Red, Lemon Yellow, Cub Yellow, Lite Blue, Dark Blue, Orange, Olive, Aluminum, Black, White, Sunglow Yellow, Sunglow Orange & new Cream. And 3 sizes: regular 38" x 43", large 43" x 15 feet and 5" x 38" trim sheets that iron on. Ask your dealer to show you NEW PERMAGLOSS. It's Lighter! Tighter! And Brighter!

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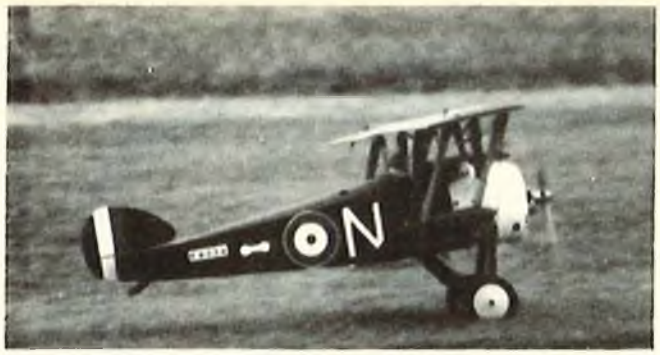

Sopwith Camel from VK kit was 2nd in Precision Scale for Burnis Fields.

Aero Commander Shrike, Bridi kit, by Roger Geers.

Bill Kinsey's unique Dornier DO 335 A-12.

Frank Tiano loves to shake 'em up. FW-190A-8, bright red, U.S. markings.

Charlie Chamber's Cougar, Jet Hangar kit.

Mr. & Mrs. Burnis Fields were a neat team.

Brian O'Meara. Tree Top Airlines had lost Brian's airplane and baggage the day before but found it in time for the first round of competition. Fortunately, they found his wife, Jody, before sundown. In case anybody is wondering, I brought along an airplane, too. Since nobody cared for my Kelly green Mustang last year, I figured I'd dazzle them with footwork this year and bring a new Focke Wulf 190A-8. The ship scored a very respectable 94 static points despite its bright red color scheme and U.S. Army Air Corps markings. Larry Wolfe needs no introduction. Just ask him. His clipped wing Mirage, better known as a Kfir, looked good enough to get high static. For those of you who don't follow the modern jets, the Kfir was actually originally named something else. But a rearrangement of letters was in order because the original name did not depict speed and brutality. Larry says that the Firk just didn't have any pizazz!

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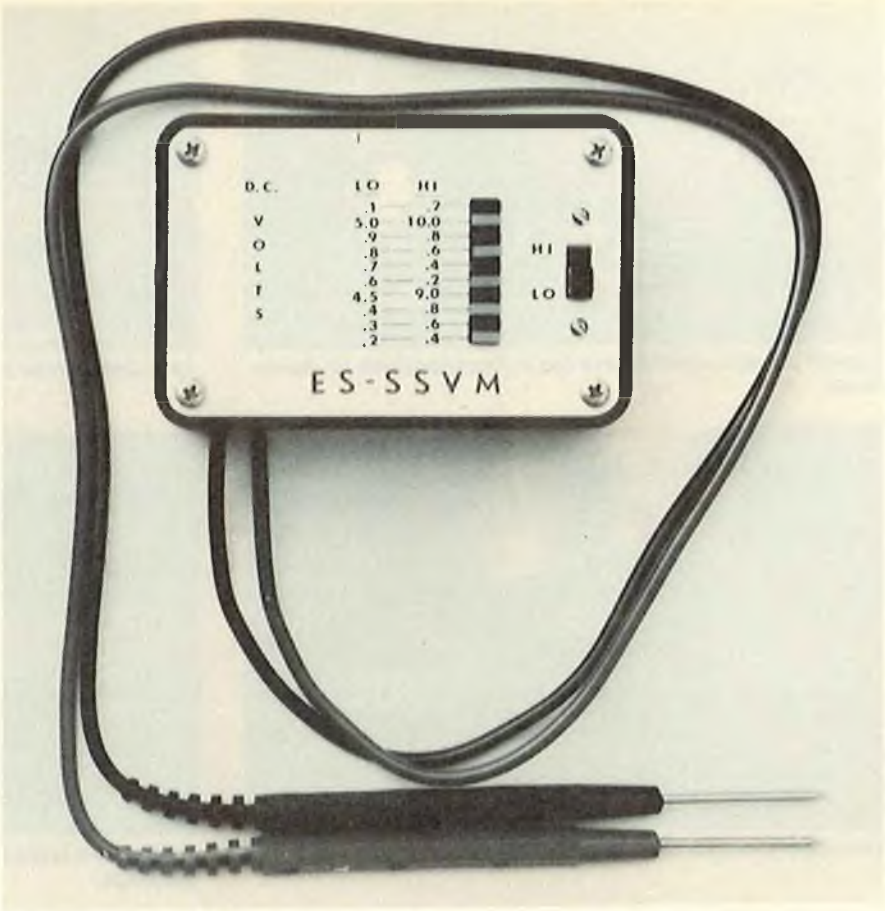
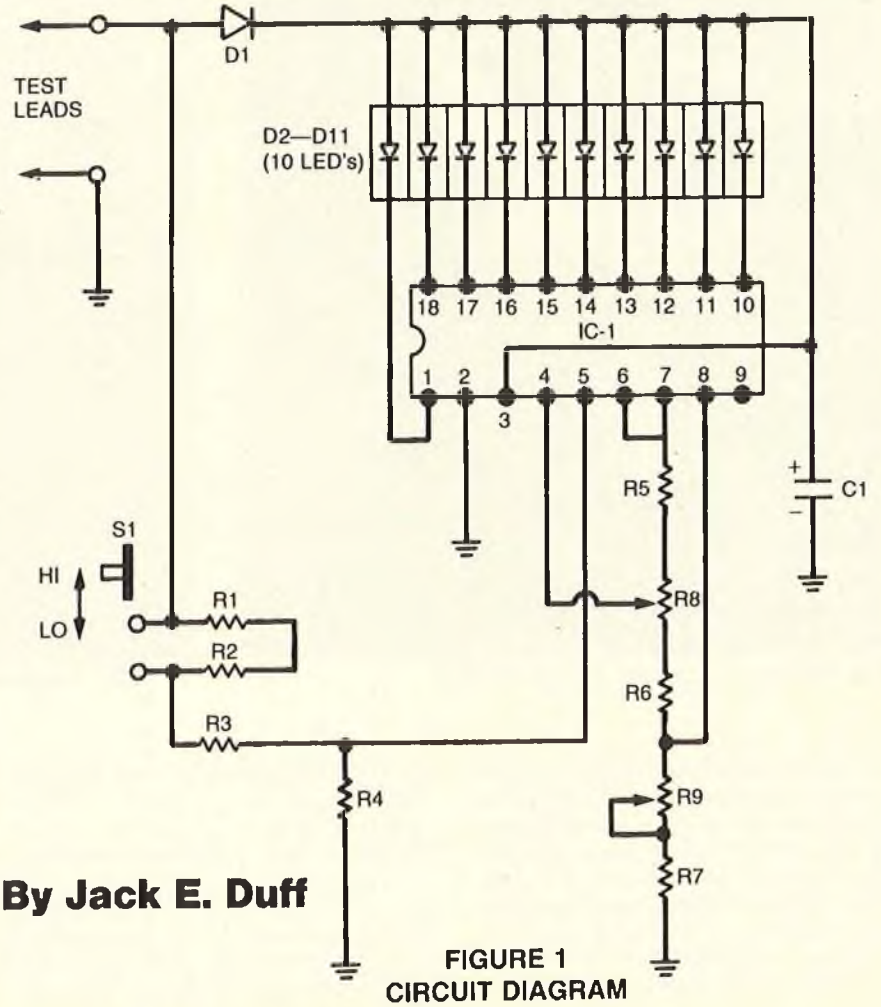
EXPANDED SCALE SOLID-STATE VOLTMETER





By Jack E. Duff

FIGURE 1
CIRCUIT DIAGRAM

TABLE 1

Parts List

Item	Radio Shack Part No.
Box	270-230
Test Leads	278-740
P.C. Board kit	276-1576
Socket (18 pin)	276-1992
S-1 Switch	275-406
C-1 3.3 Mfd. Cap.	272-1024
IC-1 Dot Driver Chip LM-3914	276-1707
R1,2,3,4 4.7 K 1/4 W Resistors	271-1330
R5 270 1/4 W Resistor	271-1314
R6 470 1/4 W Resistor	271-1317
R7 1000 1/4 W Resistor	271-1321
R8,9 500 Pot.	271-226
D1 1N34A Diode	276-1123
D2,3,4,5,6,7,8,9,10,11 Rectang. LED's	276-070

Anyone involved in the hobby of R/C whether it be airplanes, boats, cars, helicopters, or whatever, knows how important his nicad batteries are and how essential it is to be able to monitor their condition. An expanded scale voltmeter which allows us to read voltages very precisely, is ideal for this purpose but, unfortunately, most ESV's are rather fragile and don't survive too well knocking around in your field box. Here then is a solid state version of the ESV which is not only very rugged, it is also easy to build and when you pull it out to check your batteries at the field or track, everybody is going to ask — What is that thing? That's your cue to expand your chest, pop a few buttons and say — Oh, that's just my new Expanded Scale — Solid State Voltmeter that I just built!

What's that? You say you've never built a solid state gadget? Never etched a circuit board? Then this is a very good project for you to start on. Who knows, you too may become a Jim Oddino with a little effort.

If you do decide to take a crack at it, Step 1 is to assemble a kit of parts and you need look no further than your friendly Radio Shack store to do this. You'll find all the parts you need there (including soldering iron and rosin core solder if you don't have them on your workbench). Unfortunately some of the components come in packages of several items (the printed circuit kit will make 8 of the circuit boards) so perhaps you'll want to get together with some of your buddies to build several rather than just one of the meters.

But let's get started. Fig. 1 shows the circuit diagram of our Expanded Scale — Solid State Voltmeter and Table 1 lists all the parts we'll need together with their Radio Shack part numbers for your convenience. IC-1 is the key unit. It's a solid state circuit — all on one chip, which includes 10 comparator circuits connected in a chain. Without going into all of the technical details, each comparator acts like a simple switch, closing when the voltage applied to it reaches a certain level and since all ten are connected in series, as the voltage applied to the circuit rises, each comparator trips in its turn, turning on the light emitting diode (LED) connected to its output. Thus indicating the presence of a certain level of voltage at the input.

As we touch the unit's test leads to a battery being checked, the voltage is fed into the circuit through diode D1. This diode protects the circuit in case we goof and get the test leads reversed. Note, too, that the voltage being tested is connected to terminals 2 and 3 of the chip IC-1 where it provides the operating power for the circuit. Thus no batteries are needed to run our ES-SSV and consequently we have no batteries to replace as in most electronic gear! Neat eh?

The resistor chain of R5, 6, 7, 8 and 9, from terminals 6 and 7 to ground, determine the range of the voltmeter. We'll get into it in somewhat more detail later but potentiometers R8 and R9 allow us to set the top and bottom of the expanded scale of the voltmeter.

Resistors R1, 2, 3 and 4, together with switch S1, provide the two scales we'll want in the meter. The values shown allow us to check the four cell pack used in most receivers (with S1 set to LO) while the HI switch setting doubles the range to accommodate eight cell (transmitter) battery packs. Other ranges can, of course, be added if needed for your particular use. Note that the four resistors, R1, 2, 3 and 4, are all shown to be equal in value. Actually, however, commercial resistors normally vary in value by as much as ± 10%. Therefore you should get a few extra resistors and select them out so that R1 + R2 = R3 + R4. The precise value of each will not affect accuracy in the least but the two sums of R1 + R2 and R3 + R4 must be made as close as possible if the meter is to be accurate on both scales.

The 10 LED's which are used in our ES-SSV are relatively new in the Radio Shack catalogue. They are available in red, green, or yellow. I alternated red and yellow in my meter to give a little more contrast and facilitate reading the voltage indicated, but all red, all green, or any other combination will work just fine. Note, too, that the LED's specified are rectangular in shape rather than round. This allows for easy stacking in a nice linear array — just ideal for a linear meter scale.

Now that we have our kit of parts purchased, a few jobs need doing before we can begin to assemble things. First the LED's are slightly thicker than we can use, so each must be filed gently on the two sides of the base to thin it down to a thickness of less than .10". Fortunately, they are made of an acrylic plastic which files readily and their final dimension is not too critical — just get it down to less than .10" so that ten of them will pack into a one inch stack. Next the LED leads must be bent out at right angles to the base and as close to the base as possible, then trimmed to 3/16" in length. Fig. 2 shows these details.

Note, also, that the cathode lead of each LED must be identified and

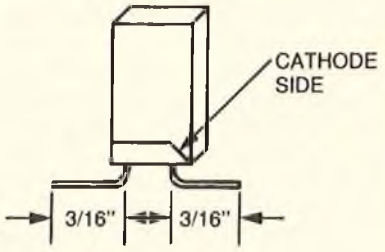


FIGURE 2
LED DETAILS

marked at this time as it must be connected to the appropriate terminal of the chip. Getting a LED connected backwards will keep it from working — not as catastrophic as reversing an aileron servo perhaps but bad enough, so make sure you identify it with a little dab of paint on the lower corner of the LED for reference when you begin wiring.

Our next job will be the preparation of the printed circuit board. If you have purchased the Radio Shack PC board kit, spend a few minutes reading the included instructions — can't hurt and will help supplement these directions. First, cut out a piece of circuit board 1½" x 2¼" having copper foil on one side. Clean the copper side of any oxide by polishing

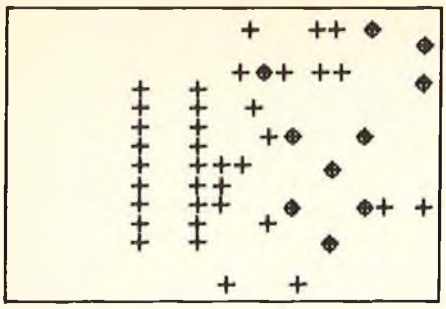


FIGURE 3
1:1 LAYOUT OF HOLE PATTERN

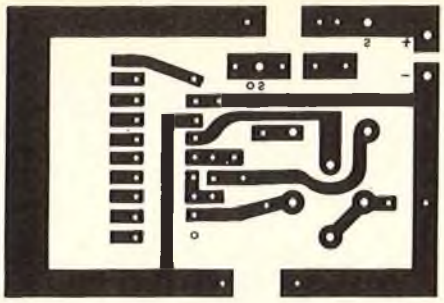


FIGURE 5
1:1 LAYOUT OF P/C BOARD

FIGURE 4
PHOTO OF DRILLED BOARD

lightly with steel wool or #400 grit sandpaper. This will make soldering easier later on. Next, cut out Fig. 3 which locates all the holes to be drilled. Tape Fig. 3 to the copper side of the board and prick punch all 46 holes precisely as shown. Note ten of these holes are marked with small circles — after punching, drill these holes with a 1/16" drill. All of the others are drilled with a #60 drill. Clean up any burrs at this time. Fig. 4 is a photo of what it should look like, all drilled and ready for masking.

Masking is done to protect the copper in those areas where we will need it for circuit connections. All the rest of the copper will be chemically removed by the etchant provided in the kit. The easiest way to do this masking is with the tape provided in the kit. Follow the pattern shown in Fig. 5 to apply the tape. Make sure the tape is pressed firmly to the surface of the copper and when one piece of tape laps over another, use a fingernail to press the top tape down tightly over the other at the lap. The application of the tape is not critical dimensionally — just make darn sure that the tape connects the proper holes together and that there is at least 1/32" spacing of all tapes so that the etchant can remove the copper from between the various circuit connections.

After masking, the board is ready for etching. Pour enough etchant into a shallow glass or plastic bowl to cover the board. Gently agitate for about 20 minutes or until all the visible copper is removed. Following etching, rinse the board in running water for at least two minutes to remove all traces of the etchant. Failure to do this may result in corrosion later on. Now, dry the board, remove all masking tape and set it aside until needed later.

Next, the voltmeter panel is to be finished. Fig. 6 details the necessary dimensions of the cut-outs for the switch and the LED's. These can be cut and filed to shape by first drilling out a few holes inside the rectangular opening. This is pretty simple — finishing the panel is another thing, however. Just like the last plane you built, finishing it neatly won't make it work any better, but a good job will really make a difference in its professional appearance.

I did mine by starting off with three coats of white fuelproof lacquer as a base. Then I used rub-on letters and numbers (available in most art shops and really great for models too). Refer to the picture of the finished meter for the details. Of course you can hand letter if you wish, the meter will still function okay. Finally, finish by dusting on 2 or 3 very light coats of clear lacquer (if you use the wax rub-ons a flowing coat of lacquer will dissolve the numbers and they will run). So work carefully and keep that first coat of clear very light and dry.

Next, drill two 1/8" holes 1/2" apart in the right rear side of the case (for the test leads) and trim the test leads to 3 ft. in length — discarding the pin end. That completes the preparation of our kit of parts and we can now begin assembling.

We'll begin first with the mounting of the LED's as they are the only elements to mount on the foil side of the board. Keep them lined up carefully so that they'll fit in the panel slot. Make sure, too, that each LED is mounted with its cathode lead connected to a chip terminal and that solder doesn't bridge between adjacent leads. Fig. 7 shows what this side of the board should look like when completed.

FIGURE 7
COMPLETED BOARD (BOTTOM SIDE)

After the LED's are mounted, turn the board over and begin mounting the other elements as shown in Fig. 8. Note that some resistors mount on end while others lie flat against the board. As each piece is mounted in place, its leads are soldered to the copper side of the board. After soldering, clip off the excess lead as close to the board as possible. Things may look tight but actually there is plenty of room. Work slowly and carefully, always checking to avoid solder shorts between the adjacent joints. Only the switch S1 and the chip are not mounted to the board. Use a pair of 2½" long leads to connect the switch and the chip which

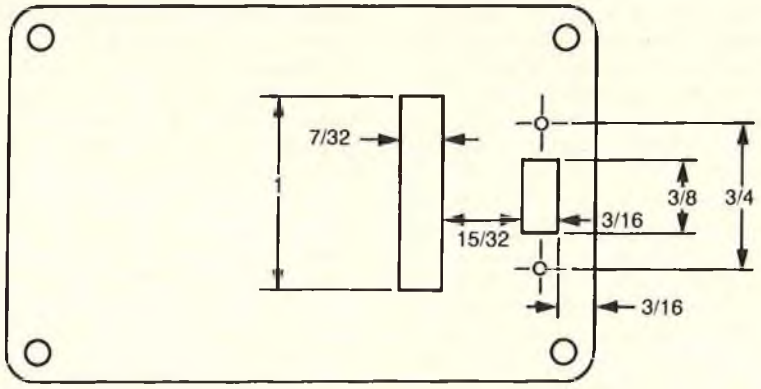


FIGURE 6
PANEL DETAILS

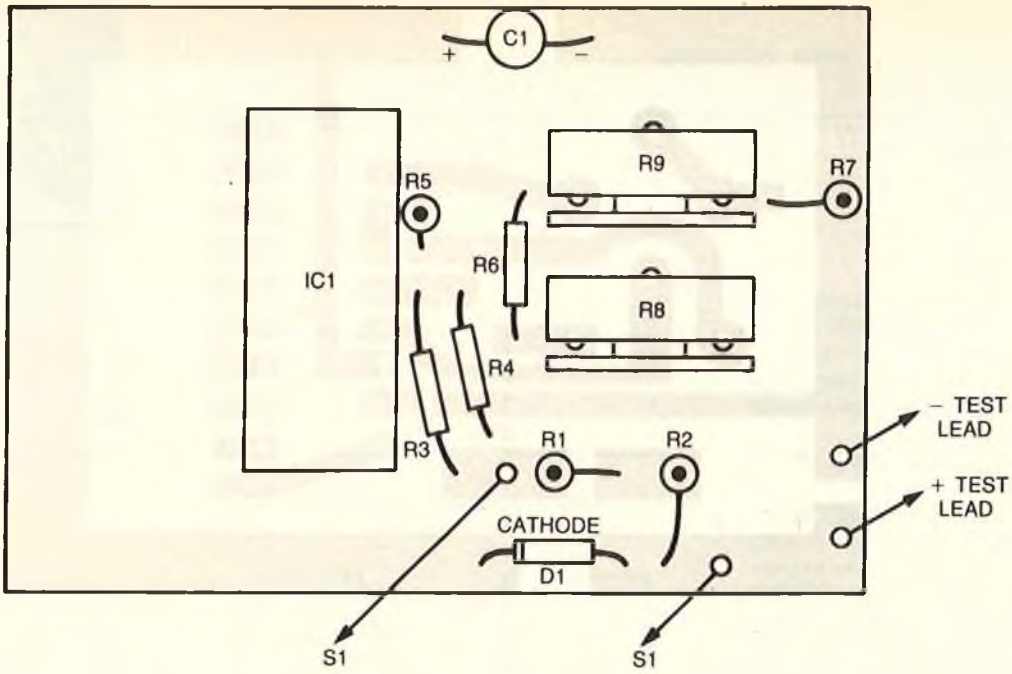


FIGURE 8
COMPONENT OVERLAY
(2X SIZE)

will plug into its socket later.

Now, pull the test leads through the 1/8" holes in the case and solder them in place in the appropriate circuit board holes (solder the red lead to the + terminal and the black lead to the – one). Leave some slack in the test leads to allow further assembly operations, we'll pull this out later. Finally, the chip is plugged into its socket. Note it can go in either of two ways **but only one is correct**. Holding the board with the socket facing you and on the left, the #1 pin goes in the lower right hand socket hole. The #1 pin can be identified by a mark on the end of the chip (see instructions on back of chip pack). Be careful in plugging the chip in, make sure not only that you have the #1 pin in the right spot, but that each of the other seventeen pins slips into its appropriate socket hole.

That finishes all the circuit work and the panel may now be applied. Hot Stuff a piece of soft 1/4" balsa cut 1" x 1¾" to the copper foil side of the board (it will be necessary to force it down onto the board because of the clipped lead ends). Then, carefully, position the panel over the LED's and Hot Stuff it to the balsa thus making a sandwich anchoring the circuit board to the panel with the LED's sticking through by about 1/8" (not critical). Screw S1 in place and we're done.

Done, that is, with the building effort, but we have now arrived at the next to the last step in the construction of the ES-SSV and undoubtedly its most critical one. This is its calibration and is something this article can't help you with very much. I'll bet, however, there's at least one Ham (radio amateur) or TV repairman in your club and either of them should have a digital voltmeter that they'll help you use to calibrate your ES-SSV. Having located one, calibrate the meter first at the high end (a simple 1000 ohm pot across your starting battery will give you a variable source of voltage) using R9 and then at the low end using R8. It may be necessary to repeat this step once or twice as there is a small amount of interaction between these two controls. S1 will allow you to switch from the HI to the LO range (if you mounted it in the panel reversed now is the time to change it). Work carefully and remember the usefulness of the meter is truly dependent on the accuracy of its calibration.

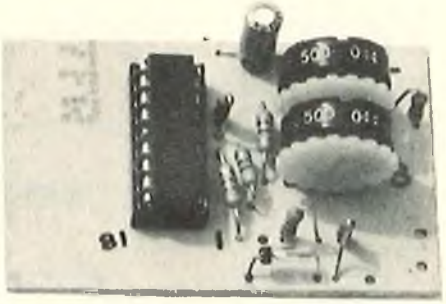


FIGURE 9
COMPLETED BOARD
(TOP SIDE)

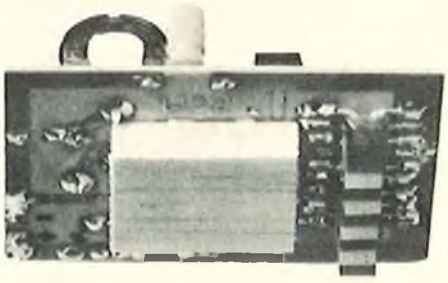


FIGURE 10
BALSA BLOCK GLUED
TO BOTTOM SIDE

Finally, assemble the panel and circuit board assembly to the case, pulling the slack out in the process and Voila! You're all done and have just achieved Level 1 in your effort to become an electronic's expert.

One final word in using the meter to check your R/C batteries; you'll learn that hot off charging, the transmitter pack should read 10.0 volts or above and your receiver pack 5.0 volts or more. When they read below 9.2 and 4.1 volts respectively, the batteries are flat and in need of recharging. Well that's it — good luck and good flying, just remember though, good luck can be enhanced by being sure your equipment is in top shape. □

SUNDAY FLIER

Ken Willard

Aloha!

Okay, so I'd better get that "aloha spirit" out of the way and get back to what I promised you --- more on seaplane and float design. But I sure did have a good time in Hawaii.

In the October issue some of the aspects (some designers like to call them "secrets") of seaplane and flying boat design were discussed --- step location, transverse steps versus boattail, alignment of wing incidence with the floats, and thrust line of the pod mounted engine. As I said, they were, and are, aspects of design, and different designers went different routes in solving their own problems. What worked for one would be pooh-poohed by another. There are no secrets in float design --- only solutions.

For example, let's look at the cross-section view of various float designs. Figure 1 depicts some of the various cross-sections which have been used by float designers. Which do you think would be the best for an original design R/C sport model --- one that you want to float well when at rest, make a smooth transition from "displacement" mode through "maximum spray" and up on the step to "planing" model? Disregarding the shape of the upper surfaces --- square (no "tumble-home" angle --- see Fig. 1 in the October column); slanted, or simicircular, you have six basic bottom designs. The proponents of each will argue heatedly about the advantages --- how the "V" bottom cuts through the water and sends the spray outwards, or how the "cruiser" bottom imparts angular acceleration to the spray. And the "tunnel" bottom traps a good part of the spray, sending it aft under the hull aiding the planing action, the "sister keelson" design breaks up the spray, and the "cathedral" bottom splits the spray and improves tracking for a straight take-off run. It's true --- each design does what its advocates claim.

Note that I didn't go into the advantages of the flat bottom design. Until now. That's because I happen to like the flat bottom best, when it comes to sport R/C seaplanes or flying boats, for several reasons. Here are some of them:

1. Maximum flotation capability at minimum depth.
2. Maximum lateral stability at

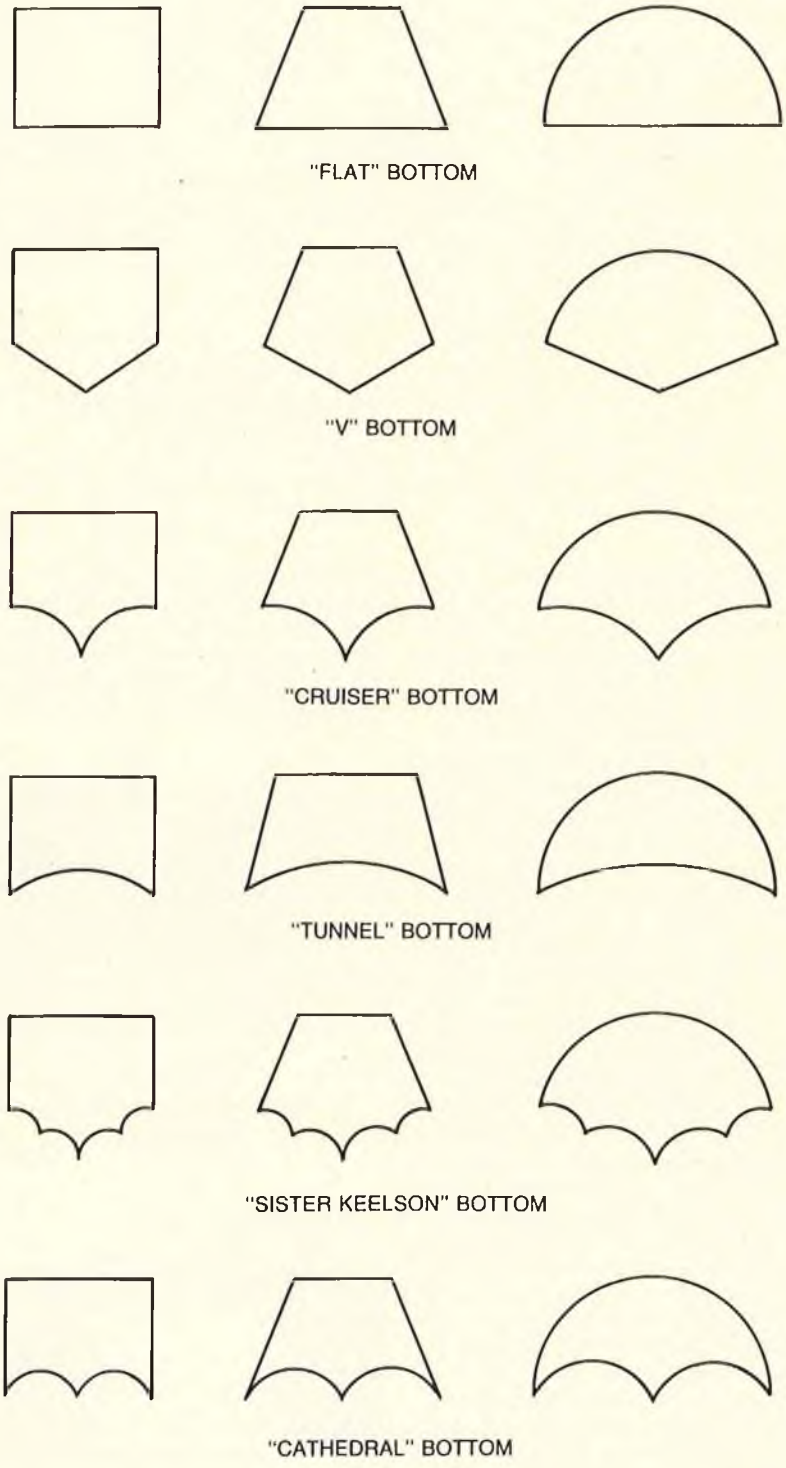


FIGURE 1
FLOAT CROSS-SECTIONS

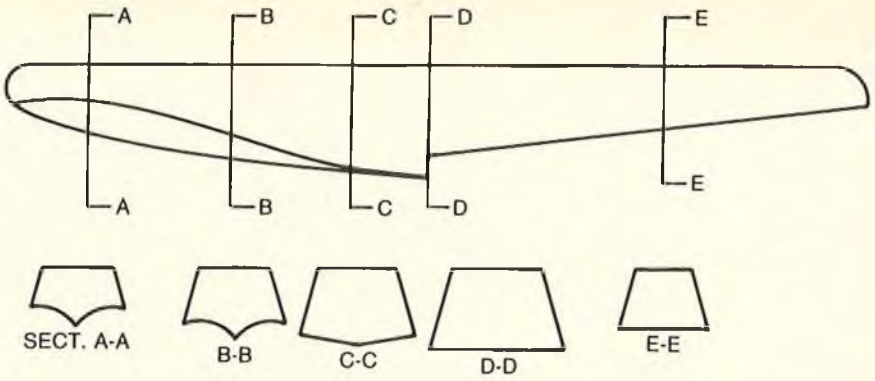


FIGURE 2

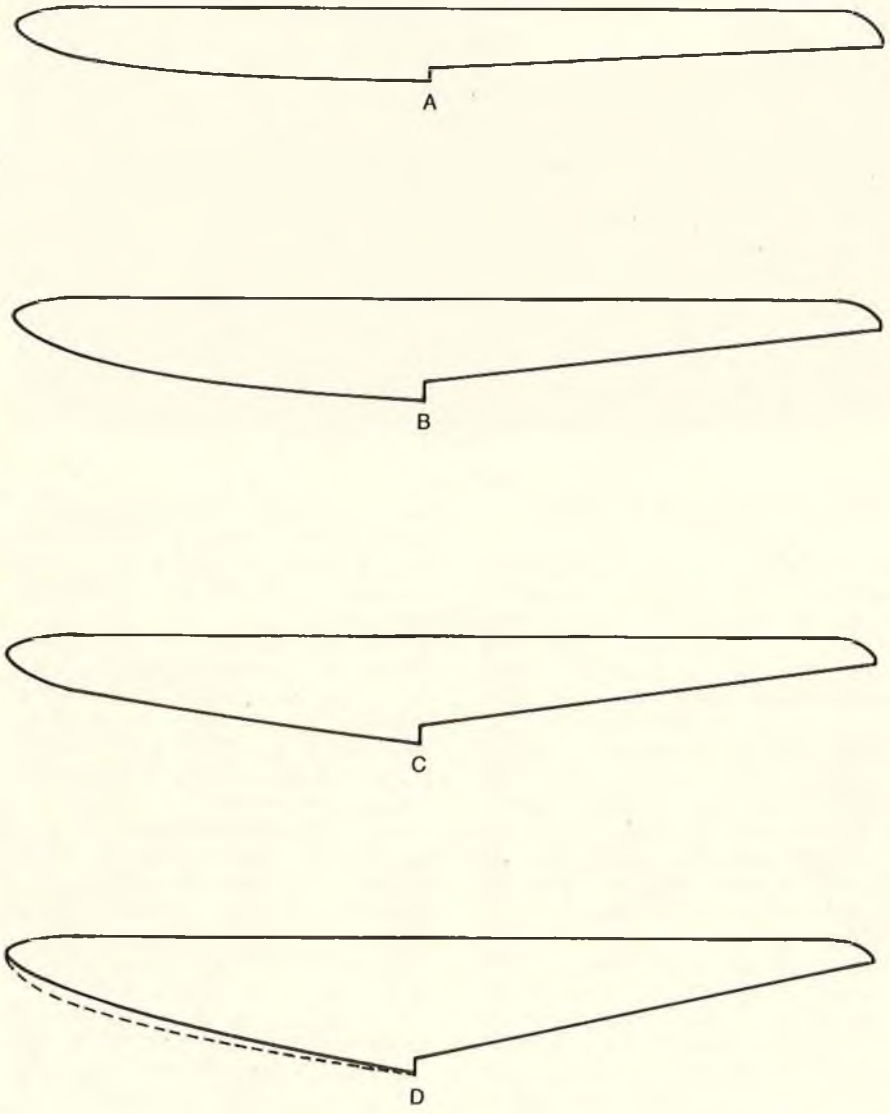


FIGURE 3

rest, during transition through spray mode and up on to the step, and while planing.

3. Simplest and therefore easiest to build, and repair.

4. Sends spray outward almost horizontally.

So, you ask, if the flat bottom is so great, why isn't it in wider use in full scale aircraft? The answer to that is pretty straightforward. Early float designs were flat bottomed, and worked quite well --- as long as the airplane didn't have a high wing loading. As wing loadings went up, more and more floats were bashed in by the onrushing water during take-offs and landings. To prevent this, the "V" bottom design was developed. With this design, the water hit the bottom surface at an angle instead of straight on, and was deflected rather than displaced. That was an improvement, structurally, but introduced another problem; the spray was deflected outward and upward, and would go back into the propeller arc. The "cruiser" bottom had the advantage of deflecting the water, and at the same time giving it an angular acceleration which continued out beyond the float sides and made the spray tend to curve back downwards.

The theory of the "tunnel" bottom held that the spray would be split, some going out the side, the rest deflected inwards; then, as the inward deflected spray from either side met in the middle, it further broke up and was deflected backwards, increasing the bouyancy of the hull as it planed and providing an assist to the wings in lifting the flying machine out of the water.

Finally, the "sister keelson" and "catherdral" bottoms were variations on the theme of spray dispersal. I never was quite sure of all the reasons; I think it has to do with multiple spray dispersal angles, with take-off tracking as a secondary factor. Perhaps some of you readers can enlighten the rest of us, if you know the answers.

In any event, the variations in float bottom design away from the simple flat bottom, were largely developed to reduce the impact loads on the bottom when the wing loading is high. This is not a serious factor in most sport R/C designs although as the models keep getting larger --- like Wally Rinker's Supermarine Schneider Cup racer model, at sixty pounds --- the use of the more complex bottom designs begins to make sense.

There is a very effective type of float bottom, both for full scale aircraft and R/C models, which combines the advantages of the "cruiser" and "V" bottoms with those of the flat bottom. Very simply, it is this: See Fig. 2.

The variation from the nose to the step of the float in the shape of the bottoms gives good transition from displacement mode to planing mode. As the plane gathers speed, at first the cruiser bottom deflects the spray with angular acceleration, so that transition from displacement to planing mode is accomplished with minimum spray, then, when on the step, minimum hydrodynamic drag is obtained. In full scale aircraft,

to page 124

PELICAN

The Pelican, which even looks like an airplane, is a good, solid little trainer. Builds into a super little sport ship also . . .

By Charlie Parker

In the August '80 issue of this publication appeared a construction article for a rather radical electric powered sailplane. In that same article I made the statement, "I think sailplane designs are boring." In the time from then 'til now it appears as though I **did** step on a lot of toes, the repercussions of which I am still getting. **But**, the one thing that surprised me was that those repercussions were all positive. So . . . I said to myself . . . self!, we must be on the right track, modelers **really are** tired of the same old 'new' thing. Now in light of this, I'm gonna do it again (sorry I just can't help myself), "trainers are all basically the same and there hasn't been any major changes for at least a decade, possibly two decades."

Now you are probably thinking . . . okay 'whiz kid' what did ya come up with this time? Well I'm **not** gonna tell you I've come up with a whole new concept or that I have this neat little 'crash proof' trainer. The simple fact of the matter is that there are no 'crash proof' trainers and probably never will be. If you fly a model, trainer or otherwise, into the ground, it's gonna break and that's all there is to it.

What I have come up with is an improvement. Not a big one, but at least it's a step in the right direction. The Pelican, is a good, solid little trainer. I have eliminated a couple of items that seem to always annoy beginners (and myself). The first being over-responsive turning. Many trainers are three channel and when the rudder is deflected, even slightly, the tail kicks out and the ensuing turn is usually a borderline spin. The student's response to this is usually some sort of panic and he screams, "But I only moved it a little." Have you ever watched a beginner move the stick a "little?" Stop to stop every time. Now as long as we can't slow the beginner down, why not slow down the model instead? Let's make it so that no matter how much stick travel he gives it, it will just slowly roll into the turn, like a sailplane, but slower. Hummmmm . . . that works pretty good, how'd we do that? Simple. Give it a sailplane wing, only shorter, and put it on the bottom. Now we can place the main gear tread about half the wingspan, presto, a trainer that can't be driven on two wheels and a wing tip!

While we're at it let's give it some sort of canopy so it at least looks like an airplane. Only let's make the canopy a 'pop top' so you don't have to take the wing off to make adjustments or to turn on the radio. Just think, you don't have to remove anything! Just lift it up, make the adjustment, and set it back on even with the engine running.

For a limited time a semi-kit for Pelican will be offered. It will consist of a canopy and rib set. Cost is $10.00 plus $1.00 postage. Parker R/C Planes, Box 8195, Van Nuys, California 91409. Thank you. Now let's start building!

CONSTRUCTION

Start by cutting fuselage sides, formers, vertical fin and rudder, stabilizer and elevator, and all ribs as indicated. Order of assembly will be; fuselage, empennage, wing, landing gear, engine, fuel system, and radio.

The Pelican can be completely assembled using the 'fast' glues such as Jet or Hot Stuff. If you feel the need for epoxy, feel free. However, epoxy is somewhat of an overkill.

Fuselage and Empennage:

Lay out the two sides (left and right). Mark the 3/16" wide slots for formers F-1, F-2, F-3 and the location of the 3/16" sq. vertical braces aft of former F-3. Cut and glue in place the upper and lower longerons and the vertical braces aft of F-3.

Cut and fit the 3/32" vertical grain sheet doubler between formers F-1 and F-3. Proper spacing for the

formers can be obtained using the former to check fit during assembly. Install formers F-2 and F-3 to the right half of the fuselage.

Turn the right half with formers installed upside-down and locate and glue left half of fuselage in place. Check against the plans for squareness.

The front of the fuselage where F-1 locates is a little narrower than the center of the fuselage. Pull the front inwards and glue F-1 in place. Check assembly against plan. The rear of the fuselage can now be pulled together and glued. Install all upper and lower rear cross braces.

Install the cross-grain sheeting in the upper portion of the fuselage between former F-3 and rear of fuselage. Be sure to omit sheeting in the area where the stabilizer is located (see photo).

The NyRod (or equivalent) casing for rudder and elevator can now be installed. The casing should exit the rear of the fuselage, aproximately 3" from the fuselage tail post. The front of the casing should exit through former F-3 approximately 1/2" from top of the fuselage.

The remaining lower rear sheeting can now be glued in place. Also install the lower 1/4" cross-grain sheet between formers F-1 and F-2.

The 1/2" sheet nose blocks located forward of F-1 should be cut to the side profile shown on the plan. Make two (2). Install left and right blocks as shown on top view.

The top 3/16" nose block sheet can now be secured in place forward of F-1.

PELICAN
Designed By: Charlie Parker
TYPE AIRCRAFT
Trainer
WINGSPAN
50 Inches
WING CHORD
8 Inches
TOTAL WING AREA
395 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
POLYHEDRAL, EACH TIP
3 Inches
O.A. FUSELAGE LENGTH
31½ Inches
RADIO COMPARTMENT AREA
(L) 8" x (W) 3½" x (H) 2½"
STABILIZER SPAN
16 Inches
STABILIZER CHORD (Incl. elev.)
5 Inches (Avg.)
STABILIZER AREA
80 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
6 Inches
VERTICAL FIN WIDTH (Incl. rudder)
5 Inches
REC. ENGINE SIZE
.09-.10
FUEL TANK SIZE
2 Oz.
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
3
CONTROL FUNCTIONS
Rud., Elev., Throttle
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Ply
Wing ..... Balsa & Ply
Empennage ..... Balsa
Wt. Ready To Fly ..... 32-44 Oz.
Wing Loading @ 40 Oz. .... 14.6 Oz./Sq. Ft.

Install 1/2" triangle stock to the rear of F-1 as shown. The 1/4" top sheet between F-1 and F-2 is a hatch cover from which you will have access to the fuel tank and nose gear steering. This sheet should only be **tack glued** in place. Do not remove this cover until final sanding is completed.

The fuselage can now be rough and final sanded. Check cross section for amount of wood to be sanded off. Do not round off corners in the area where the canopy mounts.

Remove the forward hatch cover and install the 1/8" x 1/4" spruce hatch cover blocks as shown on plan. Again place hatch cover on fuselage and drill screw holes in hatch cover and spruce blocks. (Use 1/16" drill bit.) Remove hatch cover.

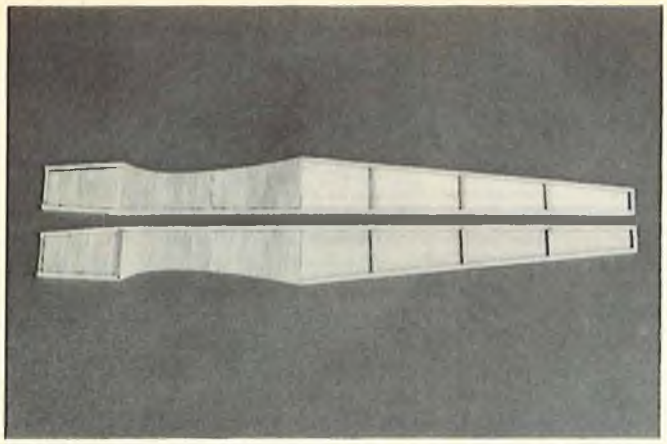
Drill 1/4" holes for wing hold-down dowel in fuselage as shown on plan.

Install wing hold-down dowels. Note: dowel(s) should protrude through fuselage sides approximately 1/2" to 3/4".

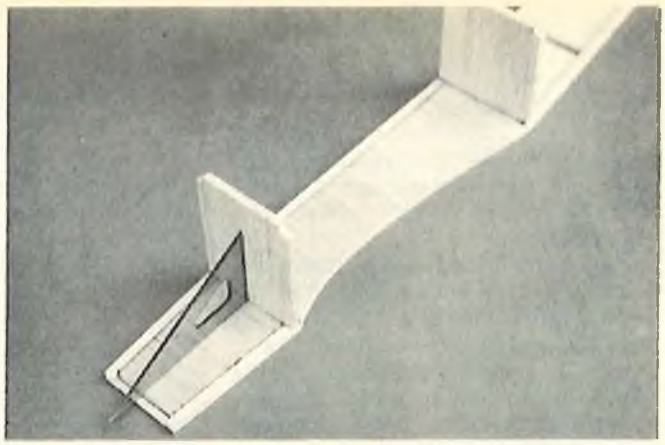
Locate stabilizer and draw a centerline (front to rear). Place the stabilizer on the fuselage and tack glue in place. Check for alignment and squareness against fuselage side. Mark the fuselage/stabilizer and remove stabilizer. Apply glue and reinstall stabilizer, holding in position until glue sets up. Assemble left and right elevator halves over plan.

Install vertical fin on stabilizer centerline. Cut and glue the 3/16" fin supports in place as shown.

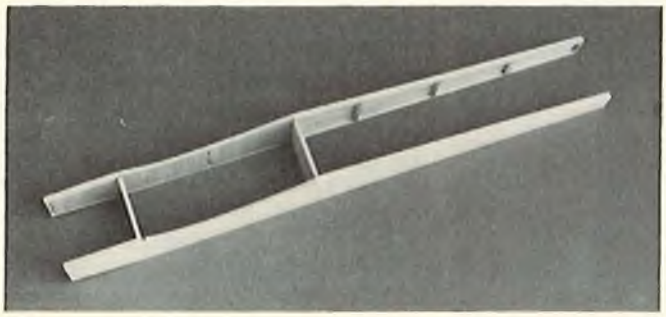
Locate and glue 3/16" ply fuselage/canopy blocks in place forward of F-3 and aft of F-2 as shown



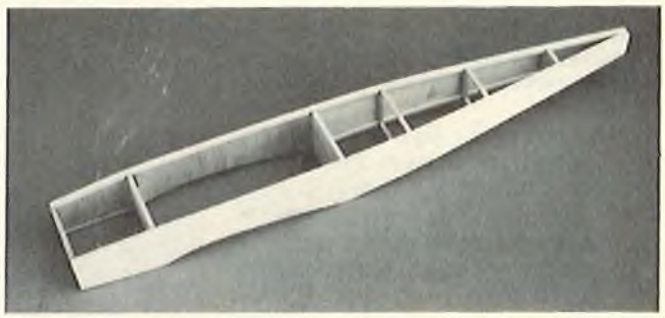
Fuselage side assemblies. Note spacing of front doubler for first two formers.



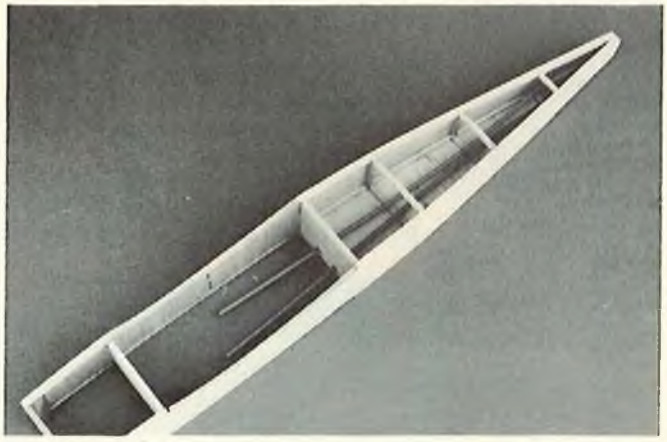
F-2 and F3 must be installed squarely.



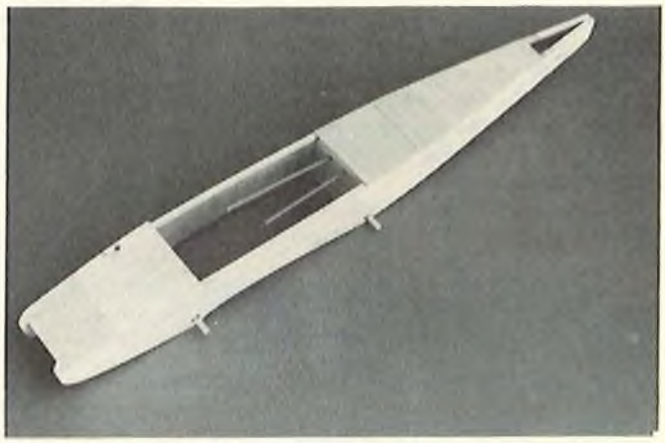
Left and right sides assembled to F-2 and F-3.



Basic fuselage assembly.



Outer pushrod tubes installed and rear top sheeting attached.



Top sheeting completed and wing dowels installed.

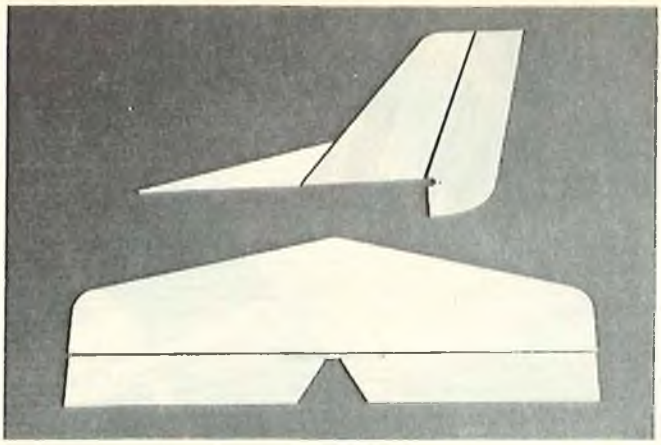
on plan. Note: Depending on the wood you have selected, the fuselage may be 'bowed' between formers F-2 and F-3. When installing the ply canopy blocks use rubberbands to hold fuselage square until blocks are secure. The fuselage sides may be wet with water to bring back to square. Leave the rubberbands in place until dry.

The canopy frame is built up on the fuselage. Cover the top of the fuselage with wax paper or plastic wrap. Cut and pin the two 3/16" x 3/8" side rails in place. Cut, pin and glue the two 3/16" x 3/4" forward and aft blocks in place. (The canopy is approximately .030" thick and the side rails should be trimmed so the canopy is flush with the fuselage sides when fitted.)

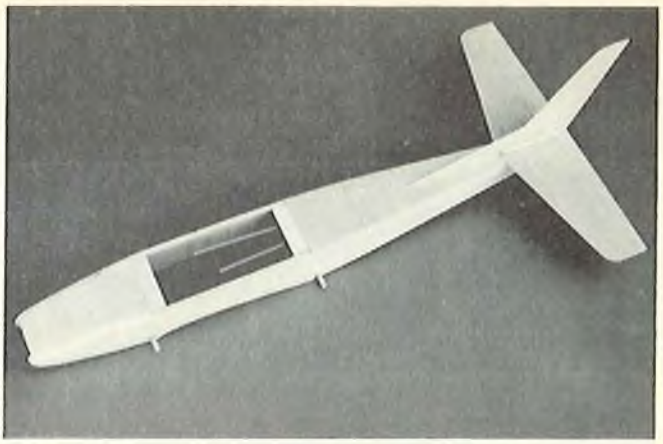
Locate and glue C-1 in place as shown. The small canopy retainer hook is made from 1/16" music wire and can be epoxied in place. Cut and install 3/32" gussets in canopy corners as shown.

The placement of four 3/16" dowel pins is not critical other than it must be a four point attach. Drill all four 3/16" holes while canopy is still pinned in place. Canopy frame can now be removed and four 3/16" x 1/2" pins installed in frame. The 3/16" holes in the fuselage should be filed slightly to provide an easy fit, but not tight. Paint the frame black when complete. Trim and install canopy to frame. Please note that the rear of the canopy must be notched to clear the top 1/16" fuselage sheeting. The canopy is secured to the fuselage with two rubberbands wrapped around a piece of 3/16" dowel that is glued to fuselage sides just above the wing saddle and on center with canopy retainer hook.

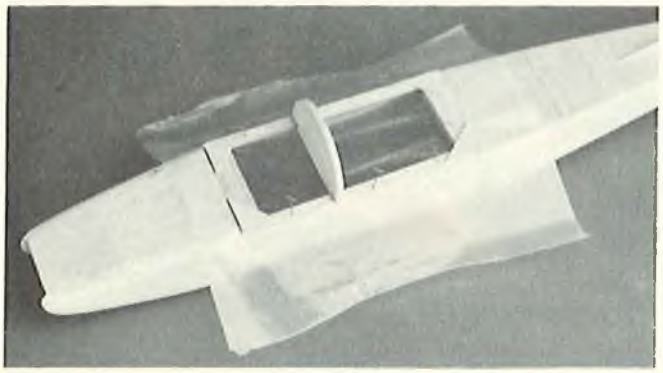
Install the 3/16" x 3/4" x 3/4" ply nose gear blocks. The bottom block is secured to former F-1 and the bottom fuselage sheeting. The top block is approximately 3/4" higher and secured to F-1 also. Drill 1/8" hole through bottom side of fuselage and both blocks. Remove bottom sheet to accept lower 1/8" wheel collar (hole in sheet will be about 3/8" diameter). Steering arm placement is top side of lower block. Nose gear may be



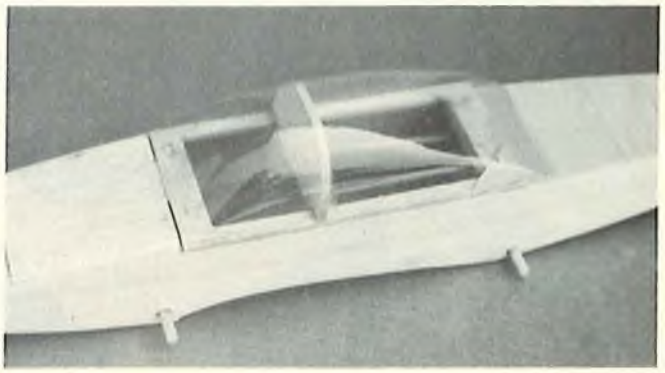
Tail surface components.



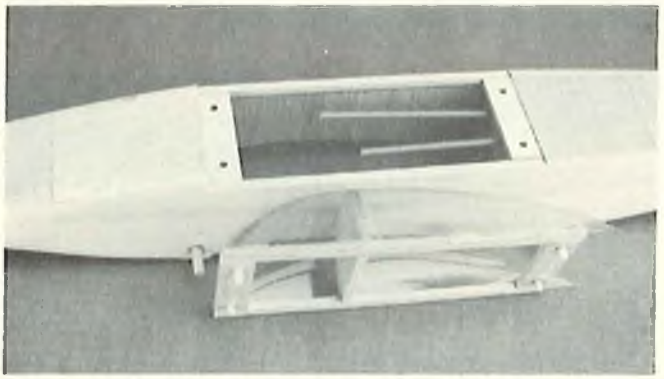
Horizontal and vertical stabilizers installed.



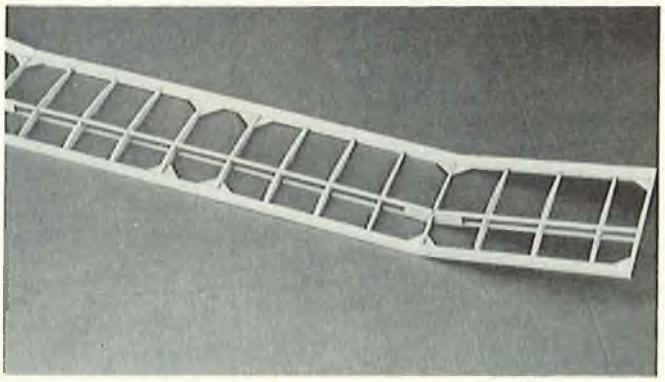
Wax paper separates fuselage and canopy build-up.



Completed pop top canopy.



Bottom view of canopy showing locating dowels.



Basic wing structure.

installed now or after covering.

Wing:

The wing center section is built-up as one piece (section between the two W-4 ribs). Start by pinning the lower 1/8" x 1/4" spruce spar in place over the plan (be sure to cover plan with wax paper or plastic wrap). Place and glue all W-1, W-2, and W-3 ribs to lower spar. Secure upper spar in place. Cut and secure the 3/8" x 1/2" leading edge in place. Cut and secure the 1/4" x 1" trailing edge stock in place.

The wing tips for Pelican are of the polyhedral type. Without going into a lengthy explanation, they are the type of tip used on sailplanes quite frequently and provide tremendous stability.

Wing tips are assembled in the same manner as the wing center section. Cut and pin the lower 1/8" x 1/4" spruce spar(s) in place. Glue the remaining W-3 ribs in place. The top spar is 1/4" shorter on the inboard side of the panel. When you secure the top spar in place you should have a 1/4" gap where it meets the center section of the wing. This gap will close when you tilt the panel up to set the polyhedral.

Cut and pin the leading and trailing edges in place. Note that the inboard side of the leading and trailing edge should be beveled slightly to match the amount of polyhedral.

Cut and glue all 3/32" vertical grain sheer webbing. **Do not** install webbing in the bays on either side of the W-4 rib at this time.

Unpin the outboard panels and block the tips up to the required 3". Check alignment of upper and lower spar, leading, and trailing edges. Glue the two (2) WW-1 polyhedral braces to the spar as shown and fill remaining gap between braces and ribs with 3/32" balsa webbing.

The basic wing is now complete. Unpin entire assembly from plan. Add all 3/32" gussets as shown. Secure tip blocks in place. The center bay has 3/32" sheeting which is flush with the bottom of the ribs — install this sheeting now.

Cut and glue the 1/16" x 1" ply gear

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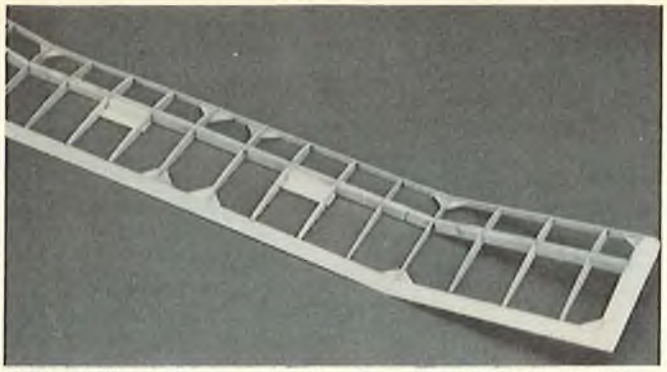
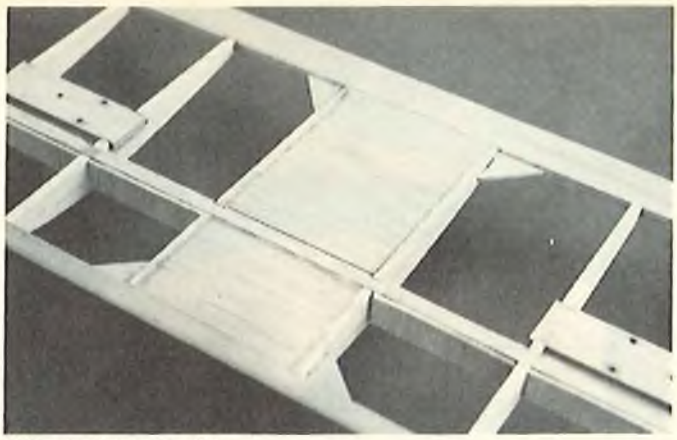
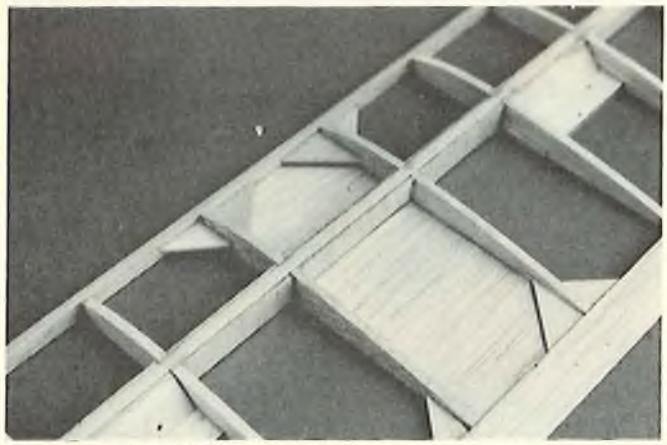


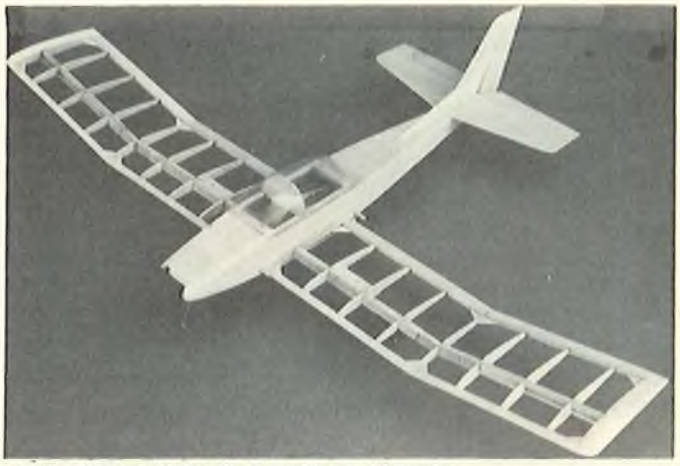
Wing with landing gear supports, spar webbing, and tips installed.



Wing bottom sheeting.

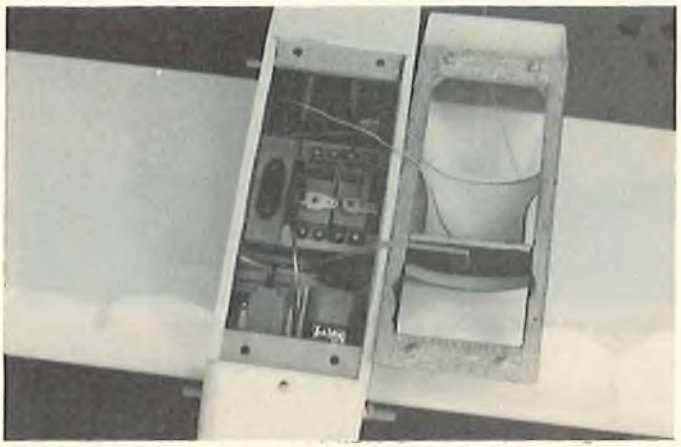


Center section details.

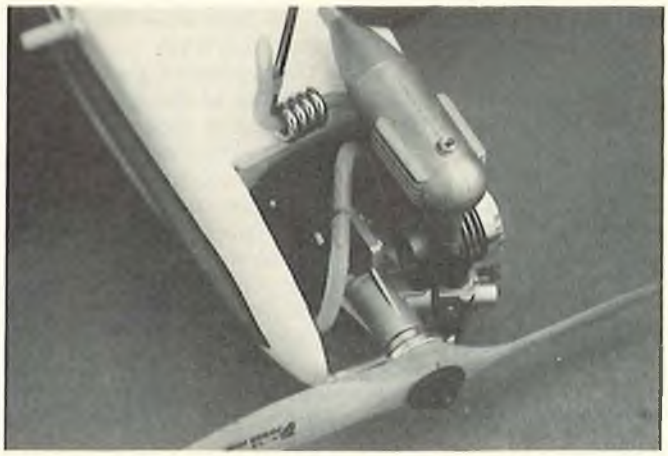


A little hangar flying is in order at this point.

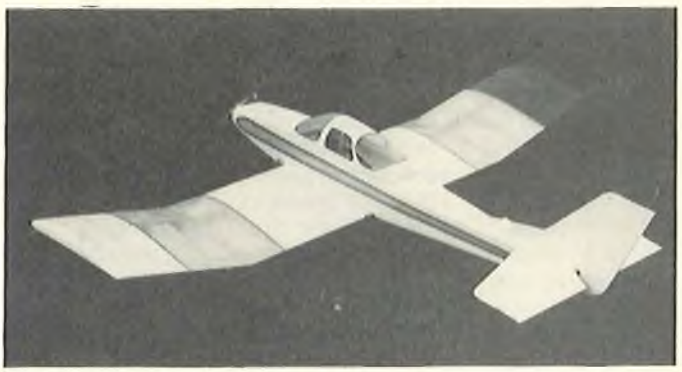
Fuel tank and nose steering installation.



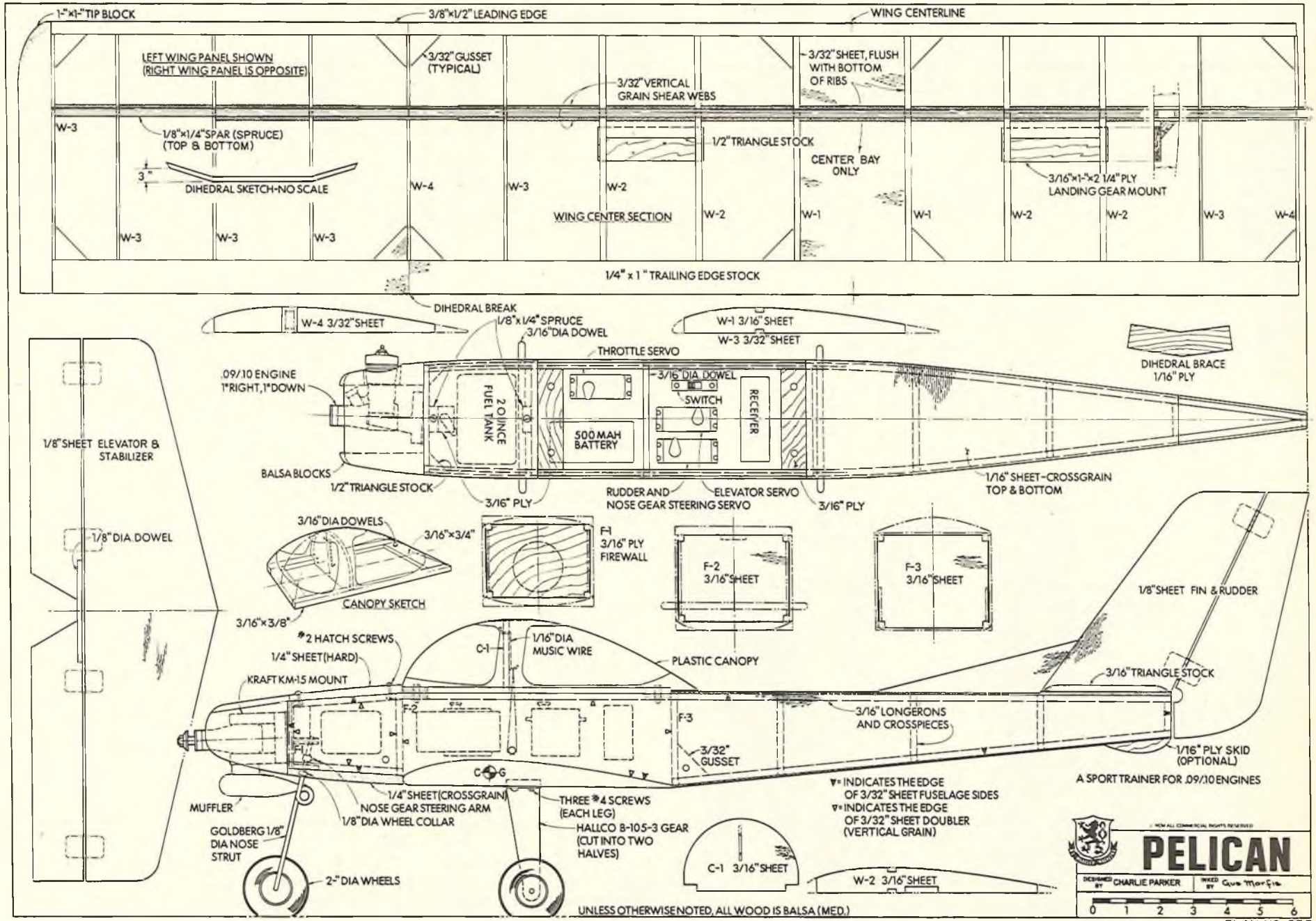
Radio compartment is accessible beneath canopy. Note radio component locations.



Bottom view of engine installation.



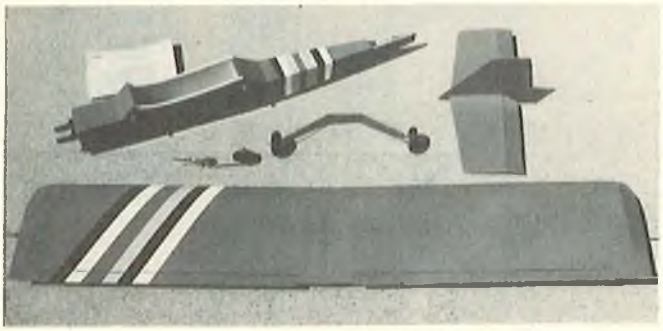
All finished out and ready to take to the sky.

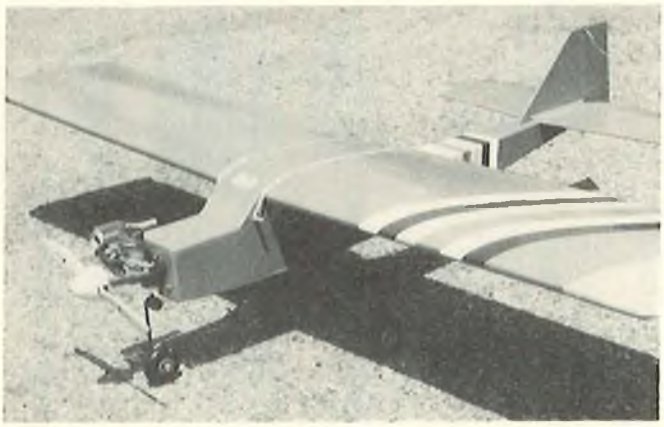

1-"x1-"TIP BLOCK
3/8"x1/2" LEADING EDGE
WING CENTERLINE
LEFT WING PANEL SHOWN
(RIGHT WING PANEL IS OPPOSITE)
3/32" GUSSET
(TYPICAL)
3/32" VERTICAL
GRAIN SHEAR WEBS
3/32" SHEET, FLUSH
WITH BOTTOM
OF RIBS
W-3
1/8"x1/4" SPAR (SPRUCE)
(TOP & BOTTOM)
1/2" TRIANGLE STOCK
CENTER BAY
ONLY
3"
DIHEDRAL SKETCH-NO SCALE
W-4
W-3
W-2
3/16"x1-"x2 1/4" PLY
LANDING GEAR MOUNT
WING CENTER SECTION
W-2
W-1
W-1
W-2
W-2
W-3
W-4
W-3
W-3
W-3
1/4" x 1 " TRAILING EDGE STOCK
DIHEDRAL BREAK
W-4 3/32" SHEET
1/8"x1/4" SPRUCE
3/16"DIA DOWEL
THROTTLE SERVO
W-1 3/16" SHEET
W-3 3/32" SHEET
DIHEDRAL BRACE
1/16" PLY
.09/10 ENGINE
1"RIGHT, 1"DOWN
20 OUNCE
FUEL TANK
500 MAH
BATTERY
3/16 DIA DOWEL
SWITCH
RECEIVER
1/8" SHEET ELEVATOR &
STABILIZER
BALSA BLOCKS
1/2" TRIANGLE STOCK
3/16" PLY
RUDDER AND
NOSE GEAR STEERING SERVO
ELEVATOR SERVO
3/16" PLY
1/16" SHEET-CROSSGRAIN
TOP & BOTTOM
3/16"DIA DOWELS
3/16"x3/4"
1/8" DIA DOWEL
F-1
3/16" PLY
FIREWALL
F-2
3/16" SHEET
F-3
3/16" SHEET
CANOPY SKETCH
3/16"x3/8"
#2 HATCH SCREWS
1/4" SHEET(HARD)
C-1
1/16" DIA
MUSIC WIRE
PLASTIC CANOPY
1/8" SHEET FIN & RUDDER
KRAFT KM-1.5 MOUNT
3/16" TRIANGLE STOCK
F-2
F-3
3/16" LONGERONS
AND CROSSPIECES
3/32"
GUSSET
1/16" PLY SKID
(OPTIONAL)
C G
A SPORT TRAINER FOR .09/10 ENGINES
MUFFLER
1/4" SHEET(CROSSGRAIN)
NOSE GEAR STEERING ARM
1/8" DIA WHEEL COLLAR
THREE #4 SCREWS
(EACH LEG)
HALLCO B-10.5-3 GEAR
(CUT INTO TWO
HALVES)
▼= INDICATES THE EDGE
OF 3/32" SHEET FUSELAGE SIDES
▽= INDICATES THE EDGE
OF 3/32" SHEET DOUBLER
(VERTICAL GRAIN)
GOLDBERG 1/8"
DIA NOSE
STRUT
2-" DIA WHEELS
C-1 3/16" SHEET
W-2 3/16" SHEET
UNLESS OTHERWISE NOTED, ALL WOOD IS BALSA (MED.)
PELICAN
DESIGNED BY CHARLIE PARKER
INKED BY Gus Morfis
0 1 2 3 4 5 6

PLAN NO. 855

RCM PRODUCT REVIEW

Columbia Model Crafts EZ-FLI 2





The EZ Fli from Columbia Model Crafts comes available in four different ways to suit your preference. The EZ 1 is completely assembled with hinges installed (not glued) and includes dural landing gear, steerable nose gear with arm and glass filled engine mount. All balsa and plywood construction with foam wing. You just add the covering, wheels, engine, tank and radio, and you're ready to fly. EZ 1 is priced at $99.00.

EZ 2, which is the model RCM received to do the review and testing on, is completely covered with orange Solarfilm and trimmed in blue. This is the only colors these aircraft are finished in except on special order. More on this model later on.

EZ 3 is the same as EZ 2 with the addition of the propulsion system. This model comes with either an O.S. Max .35 or a H.B. .25 installed. Included also, is a prop, Du-Bro spinner and fuel tank. EZ 3 retails at $189.00.

EZ 4 is complete and ready to go with a 4 channel Futaba radio installed. Take it out of the box, charge the transmitter and receiver batteries and go fly. Retail price is $429.00. Check with manufacturer for other radios available.

Construction:

Back to the EZ 2 that we received at RCM. This model is completely built and covered, needing only to mount your engine, fuel tank and radio. Tools required were: screwdriver, Allen wrench and drill for engine mounting. Our model needed the aileron torque rods bent forward to clear the bulkhead. This was an oversite on our model we learned after talking to Columbia Model Crafts. The complete tail assembly is keyed to the fuselage so the only alignment necessary when gluing this assembly on is to check the stab with the wing mounted in place.

Engine:

Two engine sizes were utilized for this test and evaluation. Both engines used mufflers and burned 10% fuel. First engine used was a Super Tigre G.20/.23 and, second was an O.S. Max .30. Both engines fit the supplied mount and the C.G. was kept constant by shifting the receiver battery pack. We used a 4 oz. fuel tank for both set-ups.

Radio:

A RS 4 channel radio was installed. Using a 500 ma receiver battery under the fuel tank, there was ample room for foam packing. The servo and receiver area is enormous for any of the radios. The aileron servo is completely buried in the wing with only the output wheel protruding past the wing skin. This keeps things out of reach of the rest of the servos when the wing is in place.

Flying:

With the fully symmetrical wing on the EZ Fli, you want good flying speed before lifting off. Too quick of lift off will almost guarantee a stall and into the ground.

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SPECIFICATIONS

Name	EZ-FLI 2
Aircraft Type	Sport
Manufactured By	Columbia Model Crafts 9366 Sharp Antler Columbia, Maryland 21045
Mfg. Suggested Retail Price	$129.00
Available From	Both Mfg. and Retail
Wingspan	51 Inches
Wing Chord	10 Inches
Total Wing Area	510 Square Inches
Fuselage Length	33 Inches
Stabilizer Span	18 Inches
Total Stab Area	108 Square Inches
Mfg. Rec. Engine Range	.19-.40
Recommended Fuel Tank Size	4-6
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa & Ply
Wing	Foam w/hardwood spars
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (8 pages)
Construction Photos	No

RCM PROTOTYPE

Radio Used	RS 4 channel
Engine Make & Displacement	S. Tigre G.20/.23-O.S. Max .30
Tank Size Used	4 Oz.
Weight, Ready to Fly	40 Oz.
Wing Loading	11.5 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Good construction and covering. Instructions very complete with do's and don'ts. High quality throughout.

WE DIDN'T LIKE THE:

L/G mount with steel screws, engine mount screws too long — manufacturer has corrected all faults.

R/C SAILPLANE DESIGN

Part 2

By Ed Slobod

The FAI tasks are:

1. Speed over a 300-meter long course consisting of one lap up for 150 meters, a sharp turn and 150 meters back.

2. Six-minute duration with precision landing.

3. Twelve-lap (150 meters/lap) course to be accomplished in four minutes measured from time of entering course with 8 minutes maximum time in the air, after launch, allowed.

Task #2 requires no modifications of our basic R/C sailplane design goals. Task #3 could be also managed without modification of the basic goals, but we can see that a high L/D would improve our chances of completing the 12-lap task.

It's Task #1 that demands special attention. The question then becomes: How do we go fast with the ability to turn sharply while carrying a lot of ballast and still not degrade the ability to satisfy the requirements of Tasks 2 and 3?

It appears that if we are able to reduce the drag we will not only be able to go faster but will improve the L/D ratio and will benefit in all areas. So what's so hard about that? To answer that question we have to take a good hard look at what it is and where it comes from.

The medium in which our models operate is air. Air is a fluid, just as water is a fluid; but air, of course, is much less dense. If you were to move your hand through water you would feel a resistance to the motion. Air exhibits this same characteristic to a much lesser degree, of course, but it is there just the same and this resistance when encountered by objects in motion relative to the body of air that they are in is called **pressure drag.**

Another form of drag encountered by objects in motion in air is **skin friction drag.*** (*See *Airplane Aerodynamics* — Dommash, Sherby & Connolly, for detailed description.)

The third form of drag with which we must concern ourselves is the drag that results from the production of lift. This is called **induced drag.**

The other form of drag that needs to be considered is **interference drag.** This is the type of drag that may be produced by the mixing of air flows past bodies that are either attached to or close to one another -- wing to fuselage, etc.

To further confuse you, wing drag consists of **pressure drag, skin friction drag,** and induced drag. Pressure drag and **skin friction drag** is called **profile drag.** In addition, all drag that tends to retard motion and is not formed in producing lift is called **parasite drag.**

Okay, so now we know a little about drag. What can we do to reduce it? One way to get rid of the drag of the fuselage and tail would be to make a sailplane that consists of a wing only. To date, no one has been able to come up with a flying wing suitable for FAI tasks, but that may be because very little, if any, serious attempts have been made to do so. Our model will have all the conventional components. What should we do to minimize drag? Putting the wing aside for the moment, we know that we can reduce fuselage pressure drag by presenting a minimum cross section to the wind. Streamlining the fuselage, reducing the fuselage aft of the wing to resemble a tail boom will reduce wetted area, hence skin friction. The horizontal and vertical tail areas will be determined by stability and handling considerations so we cannot do much about changing their surface areas but we can construct them to be streamlined for some drag reduction.

Data is available for reduction of interference drag of full size sailplanes, but there seems to be some differences of opinion even among the experts. There is little doubt that smooth fairings will help and of course gaps between mating components should be minimized and/or sealed. If you are able to make a molded fuselage, so much the better. If you are limited to conventional construction methods it is still possible to make a satisfactory low drag fuselage. Attention to detail regarding protuberances, pushrod ends, etc., can help here, too.

The biggest source of drag is the wing and here we have a problem. Precise information for wing airfoil sections at the speeds and sizes that we use is just not available. Information about full scale airfoil sections exists in abundance, and it would be easy for me to reproduce it. However, after a number of pages of charts, diagrams, and formulas, etc., most of which would be more confusing than enlightening, I would have to state that the data available for full scale airfoil sections is not directly applicable to our model size sections. For those of you whose curiosity has been piqued and want to know why this is so, I suggest that you read Chapters 19, 20, and 21 of *Radio Control Soaring.*

For our purposes, it would be worthwhile to list the characteristics of airfoil sections that we know to be true regardless of scale, and then to list what we assume to be true, in general, for model sections.

The primary characteristics of wing sections are:

1. The height of the mean camber line (expressed in percentage of chord).

2. The location of the highest point on the camber line (given in percentage of chord aft of the leading edge).

3. The thickness of the airfoil (maximum distance from top to bottom).

Figure III shows a typical airfoil section. Note that the Datum line is a

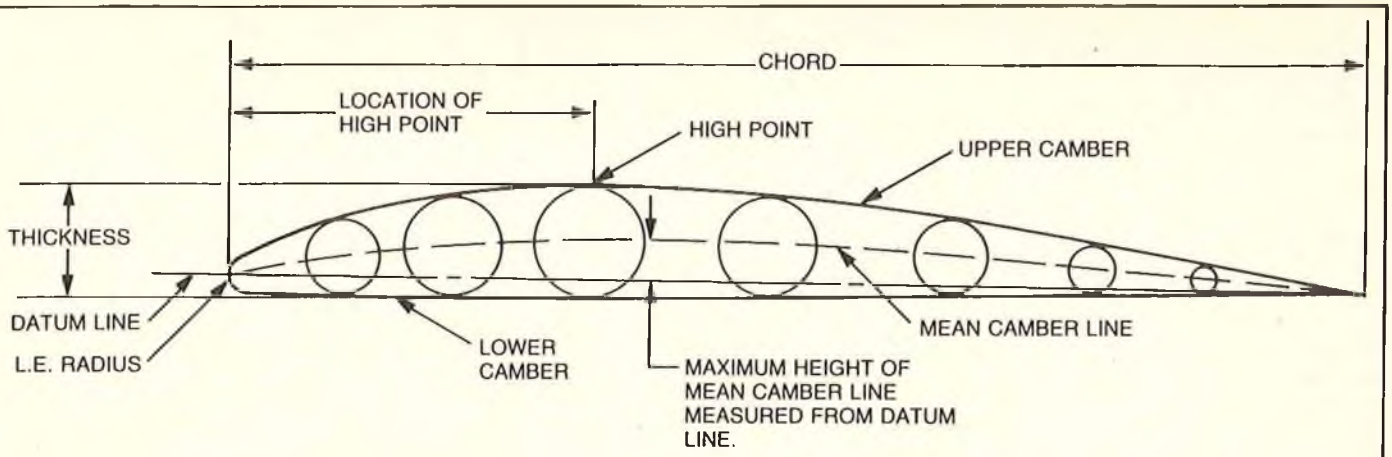

FIGURE 3

straight line running from the leading edge to the trailing edge. For a fully symmetrical section the datum line would be the centerline. The mean camber line is a smooth curve that runs from the leading edge to the trailing edge and lies midway between the upper camber line and the lower camber line.

The thickness is the maximum distance between the upper and lower camber lines measured perpendicular to the datum line. The height of the mean camber line is the maximum distance between it and the datum line.

All quantities are expressed in terms of percent of chord. For example, if the chord is 10" and the high point is located 4" aft of the leading edge, it would be:

$$\frac{4}{10} \quad (100) = 40\%$$

If the mean camber has a maximum height of .375, it would be expressed as:

$$\frac{.375}{10} \quad (100) = 3.75\%$$

and if the thickness were 1.25":

$$\frac{1.25}{10} \quad (100) = 12.5\%$$

Now, what do we feel to be true about model-scale wing sections? Frankly, not much. As in full scale, both lift and induced drag are related to the mean camber line. As the percentage increases, so does both the lift and the drag. Unfortunately, we have no way to measure quantitatively and so we can only say that a safe place to be for a thermal sailplane is between 3 to 4%. If the section has a mean camber line much below 3% it will fly faster -- and sink faster unless very light. If the MCL is much above 4%, penetration will be poor at wing loadings below 7 oz./sq. ft. In other words, places for ballast should be built in.

With any given section, wing drag is reduced when aspect ratio is increased. Here again we cannot put in any numbers. And while we would like to take advantage of this, there are limits to the aspect ratios that are practical for models. Long, slender wings are more difficult to make strong, stiff, and light, and it is much more difficult to make models with high aspect ratio wings turn in tight circles.

"To date, no one has been able to come up with a flying wing suitable for FAI tasks . . ."

Increasing wing thickness (but not changing the mean camber line) allows us to make much stronger wings with only a slight increase in profile drag. (There is some belief that all other things being equal, the thicker wing helps in obtaining higher launches. This may be so, but the jury is still out on this one.) Successful sailplane kits on the market today use from 8 to 12½% section thicknesses.

The leading edge radius affects section drag and stall characteristics. Relatively sharp (small L.E. Radius) leading edges have less drag but are less tolerant of pitch altitude variations (they stall easier). Blunt sections if not carried to extremes, are the opposite.

The position of the high point of a section can be quite important and full scale people tell us that further aft is better but models use high point locations anywhere from 28% to 40% of wing chord and it is pretty difficult to watch a model in flight and accurately assess the location of the section high point.

A few words about turbulation. At least I hope to keep it to a minimum. Turbulators are devices that are placed on or built into the upper 1/3 of the wing surface. Their purpose is to trip the flow over the surface to the degree that the supposed laminar flow is changed to turbulent flow. Laminar flow, while normally desirable in full scale, is virtually impossible to achieve at model scale and tends to separate sooner than turbulent flow. The textbooks tell us that separation results in an area of reduced pressure and high drag eddies and vortices. And that is all I am going to say about that! It is often possible to "fix" a poorly performing wing by adding turbulators. Turbulators do increase skin friction. Not too important for slow flying sailplanes, but should be avoided if possible for sailplanes designed to go fast. Turbulated wings seem to be more stall resistant and appear to give steeper launch angles. We cannot at this point in time determine if a wing section will require turbulation; and if we decide it does, we can only guess where to put them.

Well, after all this, what have we learned about drag reduction? With regards to parasite drag, we should minimize cross section area, reduce wetted area, eliminate protrusions, make the model smooth with gradual shape changes, seal gaps, etc. Heck, we knew or sensed that before we started! What we don't know is how much we gain for all the extra work we have to do. With regards to the wing, the principal source of drag, we only know that making it smooth will reduce skin friction drag, that induced drag is reduced as a function of aspect ratio, and since lift and drag are inter-related we can reduce the drag

by reducing the lift. In our terms, that really means reducing the mean camber line height. Once again we are unable to assign quantitative values, and have to rely on our experience for guidance.

Now, at long last, we are able to start assigning numbers to our FAI design. You may recall that the FAI tasks include an all-out speed and a precision thermal task. Since the qualities that would satisfy the requirements for one would be, in many cases, opposite to those required for the other, it is obvious that our design will be tempered by compromises based on conflicting design requirements. In order to determine where the compromises need to be made we will need to list the design requirements, as follows:

1. Low sinking speed.
2. High L/D.
3. Good handling.
4. High launch capability.
5. Ability to be landed safely and with precision.
6. High speed capability with ballast.
7. Sharp turn capability at high speed.

In addition to the performance goals listed above, I would add:

1. Ease of fabrication, repair, assembly and service.
2. Convenient break-down for transport and/or shipping.

Now that we know where we want to go, we must carefully examine all the information that is available to us that would be useful in realizing our goals. Up to now we have talked about sailplane design in general terms, but since we are now contemplating the design of a specialized type of sailplane, we will profit greatly if we examine the results of the two previous FAI sailplane contests.

The models that were used in the FAI Finals were the product of a great deal of thought and experimentation and we are the beneficiaries. Our challenge is to, if possible, design something better.

We know now that the Austrian style machine was easily the fastest, but that they were relatively small with high, empty weight wing loadings and fairly thin wings and that they were marginal in the thermal events. The others were, for the greater part, cleaned up and thinned out thermal sailplane derived machines that were larger and lighter. They did better in the thermal events but were at least several seconds slower than the Austrians in the speed event. It is important to note here that where the "speed" machines could, if they got good air, max the thermal and distance events, there was no way that chance could aid the "thermal" machines and they were committed to give up a sizeable number of points at each speed event. What this tells me is that our proposed new design must be directed towards speed at some sacrifice of thermal ability. Based on the point loss per second in the speed event I would judge that I could not be slower by more than 2 seconds, and assuming that the fastest machines will average 10 seconds, my speed goal then becomes 12 seconds, minimum.

Thermal derived sailplanes were in the neighborhood of 13 seconds, so we have to do better. It looks like we want something that is in-between the two. Since the speed ships were about 80" in span and the thermal ships at about 120" span, I will choose 100" as the span. Now, since I do not want my empty wing loading to exceed 7 oz./sq. ft. I can set the wing loading at 7, select a weight that I think I can build a strong model to, and work backwards to determine wing area.

$$\frac{\text{Wt}}{\text{Sq. Ft.}} = \text{wing loading;}$$

$$\text{or} \quad \frac{\text{Wt}}{\text{W/L}} = \text{Area}$$

$$\frac{40 \text{ Oz}}{7} = 5.714 \text{ Sq. Ft.}$$

$$\text{and } 5.714(144) = 822.8 \text{ in}^2$$

$$\frac{822.8}{100} = 8.23\text{" Ave Chord}$$

$$\text{and Aspect Ratio} = 12.15$$

Since I prefer four-panel polyhedral wings with tapered tips, I will probably use 9" constant chord main panels with tapered tips.

Now the choice of the planform was based on my feeling that it would provide good handling for the thermal events without too much penalty for a slightly slower turn in the speed event. Others may prefer a different planform. Perhaps "V" dihedral, straight taper, aileron equipped. There is nothing wrong with using "V" dihedral, so long as the amount is correct. The ailerons could be coupled to the rudder for the speed turn and then uncoupled and locked for the thermal tasks. Aspect ratio would be a little higher and concentration of wing weight would be closer to the center of the model. I suspect that this approach is better than the one I have chosen but it does involve more effort.

For the tapered wing, if we choose 10" as the root chord and 6" as the tip chord, the area would be:

$$\frac{10 + 6}{2} (50)^2 = 800 \text{ sq. in.}$$

If we increase the span to 105 the area becomes:

$$\frac{10 + 6}{2} (52.5)^2 = 840 \text{ sq. in.}$$

The aspect ratio is then:

$$\frac{105}{\frac{10 + 6}{2}} = 13.125$$

Aerodynamics people like to define aspect ratio as:

$$\frac{(\text{span})^2}{\text{Area}} = \frac{(105)^2}{840} = 13.125$$

The tapered wing approach looks attractive and it wouldn't be a bad idea to continue the analysis for both until some point is reached where one shows a definite advantage.

So far we have made the following decisions:

1. Wing Span — 100 or 105.
2. Wing Area — 823 or 840.
3. Design max empty weight — 40 oz.
4. Design max empty wing loading — 7 oz./sq. ft.

The next step is to select a wing airfoil section. The most crucial part of the section selection is the determination of the mean camber line (%). I personally have had poor results from sections less than 3% and although flatter mean camber lines have been used by others, to their satisfaction, I am not willing to take that chance. The next decision to make concerns thickness. Here I would be more influenced by structural considerations than aerodynamic. Based on the data from the FAI contest results it is my judgment (guess) that a wing loading of 15 oz./sq. ft.[2] would be needed for a competitive speed time. For a model of 823 sq. in. or:

$$\frac{823}{144} = 5.715 \text{ sq. ft.}$$

the gross weight would have to be 5.715(15) = 85.73 oz. or 5.358 pounds. (This works out to 85.73 − 40 = 45.73 or 2.86 pounds of ballast.) As you can imagine, making a sharp turn at high speed with a heavy model puts a heck of a load on the wing and I would be apprehensive about using less than a 12% thickness even though I know that a thinner section will be slightly faster. The faint-hearted can skip this part.

Why, you ask, are thick wings, assuming identical construction, stronger than thin wings? You did ask, didn't you? Even if you didn't, I'm

going to tell you anyhow, as it is important.

First, let's imagine a typical sailplane viewed from the front. See Figure 4.

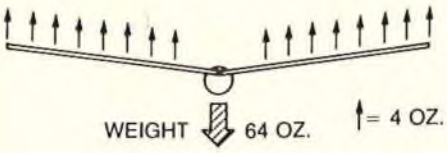

FIGURE 4

We are assuming a constant chord wing without tip loss and each little arrow on top of the wing represents the lift from a given unit of wing span. Let's say each arrow represents 4 oz. So, the total lift = 16 x 4 = 64 oz. The weight, of course, must also equal 64 oz.

Now for simplicity. Since the model is symmetrical let us look at one half the model and we will remove the dihedral.

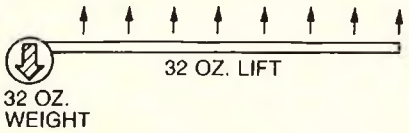

FIGURE 5

What we have here is a representation of a cantilever beam (fixed at one end only) with an equally distributed load.

For static equilibrium, all forces must be balanced. The forces going up must equal the forces going down. The forces to the left must equal the forces going to the right (we don't have any of these) and any forces tending to rotate the model clockwise must be opposed by equal forces tending to rotate the model counterclockwise.

In engineering terms, this is:

$EF_X = 0$, $EF_Y = 0$, $EM = 0$

As you can see, the lift and weight forces (EF_Y) are balanced but the lift forces are tending to rotate the model counterclockwise -- and no one is doing anything about it. Not true! These forces are being opposed internally by the structure, and we represent it diagramatically by drawing an arrow like this ↺, or to complete the picture.

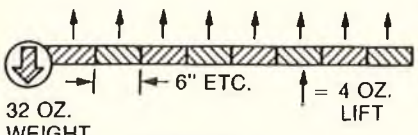

FIGURE 6

The magnitude of M ↺ is equal to the sum of the forces times their respective distances to the place where M ↺ is being investigated.

If the distance between the lift vectors is 6" the moment of the first vector is 6 x 4 = 24 in. oz., and the moment from the second vector = 12 x 4 = 48 in. oz., etc. Now if we add them all up we find that the opposing moment (↻M) must equal 768 in. oz. or 48 in.# Nearly all wings are composite structures and very few of us (including me) are capable of doing an exact analysis. Well, we don't need to. If we use one main spar and design it to be strong enough we won't have to worry about the rest of the wing.

Let's now suppose that our wing looks like this in cross section.

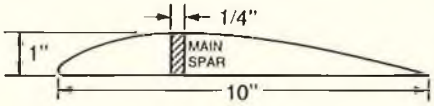

FIGURE 7

Engineering textbooks tell us that the stress in a beam may be determined using the "flexure formula" which is:

$$f_b = \frac{MC}{I}$$

f_b = bending stress
M = Moment (remember ↻M ?)
C = half the height of the beam and
I = the moment of inertia of the section; and don't you worry about this one. I'll handle it.

For the rectangular beam shown, the moment of inertia is given by:

$$\frac{bh^3}{12}$$

where b (base) = .25
and h (height) = 1.0

$$\text{So } I = \frac{.25(1)^3}{12} = .0208 \text{ in}^4$$

and the stress in the spar at the place where it joins the fuselage =

$$\frac{MC}{I} = \frac{48(.5)}{.0208} = 1153.4 \text{ PSI}$$

(PSI means pounds per square inch.)

Since we were smart enough to make the spar out of spruce, we are okay; but just barely, as the allowable stress for spruce in bending is 1,200 PSI.

Since most model sailplanes use an "I" or box beam with the spar caps made of spruce, let's analyze a typical spar and assume the caps take all the load. The caps are 1/8" x 3/8" spruce.

$$I = \frac{b}{12}(H^3-h^3)$$

$$I = \frac{.375}{12}(1-.421)$$

$I = .018$
$H = 1.0$
$h = .75$
$b = .375$

$$f_b = \frac{MC}{I} = \frac{48(.5)}{.018} = 1{,}333 \text{ PSI}$$

A little over max. allowance, but we have ignored all the other wing structure, so it's okay.

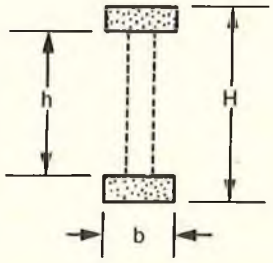

FIGURE 8

What happens if we increase the wing thickness to 15%?

$$I = \frac{.375}{12}(1.5^3-1.25^3) =$$

$$.0312(3.375-1.953) = .04436$$

$$f_b = \frac{48(.75)}{.04436} = 811.5 \text{ PSI}$$

Let's see how much M we have gained:

$$f_b = \frac{MC}{I} \quad \text{or:} \quad M = \frac{f_b I}{C} =$$

$$\frac{1{,}333 \times .04436}{.75} = 78.84\#$$

So, we see that by increasing the spar cap spacing (and hence, wing thickness) to 15%, we can increase our load carrying capacity from 48# to 79#.

As it happens, recent developments, primarily by members of the SFVSF, have indicated that thick sections can be used, and to advantage, providing the mean camber line is kept at 3% or less and that the section is biconvex (semi-symmetrical). This is a most pleasant surprise!

Usually Mother Nature contrives to give with one hand and take with the other. True, we do lose some C_l, but if the wing loading is kept reasonable, the increase in sinking speed is only slight and is easily offset by the other gains. This is especially true for an F3B model which needs to be designed to go fast and be highly stressed.

It just so happens that the most recent Gemini wing very nicely satisfies our F3B design

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GIVE IT A WHIRL

John Gorham

At take-off your heli can become 'squirrely.'

Just after a successful liftoff — phew!

Last month I promised that we would discuss some of the problems of setting-up the tail rotor system for an R/C model helicopter. So — you'll find it towards the end of this column.

First of all, though, there's a couple of new volunteers who are willing to help people in their learning efforts. The first one has been submitted by Ron McKonly who is obviously overseas somewhere in the direction of Japan. Ron says that he has become friends with a local hobby shop owner named Reizi Iwasa who has been flying for over twenty years. Reizi has approved his name being published as a helper, so here it is: Reizi Iwasa, 3-9 Sakae-Machi, Sasebo City, 857 Japan. Phone: 23-6294.

Thanks, Ron, for the letter. And, by the way, Ron also talks highly of Bruce Loughridge and his father who are also stationed overseas. Bruce and his father have been in model flying "... ever since they used radios that weighed a million pounds!"

Our next volunteer for this month is Joseph Gomez of Hicksville, New York. Joe says he is an R/C helicopter fan and he started with the original "Du-Bro 505." (For you newcomers, the "505" was one of the first kitted R/C choppers! The main rotor blades were driven by an engine mounted right there on top of the main rotor shaft with a normal sized airplane propeller pointing up and driving the main rotors and shaft by the reaction torque from the engine. Nobody, but nobody, could **really** fly the "505" except Dave Gray, the "Du-Bro" designer.) Since then, Joseph says, he has flown about every helicopter he could get his hands on. He suggests that I include in the article some advice from him to the beginner in R/C choppers. Joseph says that perhaps the most important ingredient in helicopter flying is **patience**. "It should be stressed that helicopters, unlike fixed wings, cannot be 'horsed' off and the best R/C helicopter pilot simply cannot fly a 'marginal' or a 'good enough' machine. Patience in set-up, trimming and early training is well-worth it. Take it from someone who learned the hard way. A sloppy or 'rushed' machine will not fly well, if at all. Every item should be neat and 'slop' free, especially pushrods and linkages. You'd be surprised what beginners in helis try to get away with."

Joseph also says that he would be happy to assist any new R/C heli flier in the Long Island, New York, area. His phone number is: (516) 681-2345. Well, thanks Joseph, and I certainly agree with your comments. It cannot be stressed too much that there is a minimum standard of neatness and correctness of setting-up in a helicopter below which the machine just simply won't work. So, if you're not naturally neat and tidy, or at least prepared to try hard to be, then maybe you should leave R/C helis alone. Anyway, those of you who are determined to try the R/C helicopter game, please take note of what an old

'Coming in.'

Helis and ducks do mix — at least for a while.

veteran of seven years flying has to say. Thanks a lot, Joseph, for your letter and wise comments.

Tom Gibbins of Summerville, South Carolina, also wrote a very long and interesting letter discussing his early experiences in 'chopper' flying. Tom will help anyone in his area. His phone number is: (803) 873-9113.

Now, we'd like to share with you one of the funniest letters I've had from a reader in a long time. It's from Dave Willis, who lives in Sevierville, Tennessee.

Dave attended the recent R/C helicopter meet held at Statesville, North Carolina, on October 4th, 1981 and, he took his "Cricket" with him. Before you read further you should probably know that Dave is a real beginner and had not yet really learned to fly. Here is some of Dave's letter for you to read and I hope, as I did, chuckle over:

"I met Jim Duckworth from Georgia and he volunteered to get my 'Cricket' trimmed out and help me hover. After balancing and adjusting the rotor head we cranked up the motor and everything ran real smooth. After about 15 seconds my motor servo linkage came unhooked and my motor went to full throttle (and stayed). Before we could find someone who was good on a two stick radio, the chopper was about 400' high. Everybody had an idea on how to get it down: Some wanted to fly it into the trees, others wanted to ditch it and even one had a quilt that he was going to hold up and let my 'Cricket' fly into. Finally the best thing that we could come up with was to keep it low and let it run out of gas, then keep it as level as possible and let it fall. In the midst of the excitement, several other pilots were impressed with how well my helicopter flew. Even my wife (fully unaware of what was happening) walked up and said: 'Boy, that thing really flies good. That's the best it's ever flown.' And I have to admit it really looked good.

"I cannot decide what was going through my mind — 'what my helicopter's going to look like afterwards' or, 'how good it was flying.' At one point I just turned my back and said, 'It's gone.' But, I was really happy with how well it was flying. Well, it finally ran out of gas and fell about 30'. We all walked up and I was really surprised at the small amount of damage. It didn't even break the rotor blades."

Dave says that the canopy was ruined but the rest of the helicopter was easily fixed — oh, that we should all be so lucky. Thanks, Dave, for sharing this experience with us. Why don't some more of you write in to me and describe some of your experiences which we can share with our readers.

Even with the limited spare time which is available to me, I do occasionally get out to fly and just recently I have been playing around with one of my R/C helicopters fitted with floats. It really is an experience — provided that you can take-off, land, and fly around, even if only in left hand circles (in front of you of course, unless you can walk on water or have a boat). You'll have a great deal of fun and satisfaction in flying from water. We are publishing some photographs this month showing you what it looks like and, you'll notice that even the ducks don't seem to mind too much. Of course, this particular helicopter is powered by a .25 engine and so the noise level is very low. This was important, I think, in flying in the area that we did since, as you can see from the photos, it is populated. Landing and taking-off is a little more difficult than on land because the low friction of the landing gear on the water means that you need a fast response on your tail rotor control. And, of course, your landings have got to be reasonably gentle otherwise the helicopter will get wet, at the best. (Floating upside-down, at the worst!) Floats, of course, can also be used on snow and they are very useful in this respect, as they are on grass. We all know the problem the beginner has of trying to take-off (or land) on grass when the skids get caught in the grass. So, I hope this little dissertation and the photos will entice some of you to try R/C helicopters on floats. Best wait until you can at least fly around a bit and land gently, though.

Now to get to the setting-up of tail rotor control which we promised you. I believe one of the most important factors in setting-up tail rotor controls is that there is a certain sequence in which the adjustments should be made. If they are made out of this sequence, you will finish up with a system which may run out of authority or out of control either in one direction or the other, or a system which has too little or too much tail control. Also, one of the major problems which beginners seem to have is finding out what the neutral setting should be. And, even though I can give some suggestions, this final adjustment is always a matter of compromise since it is dependent, very greatly, on the pitch and speed of the main rotor blades. In the case of a collective pitch helicopter, where there is "compensation," this compensation can be set experimentally and then re-adjusted after some flight testing. Basically, "compensation" just means that as the collective pitch of the main blades is increased, so the pitch of the tail rotor blades will be increased also to handle or compensate for the increase in torque reaction. The amount of increased pitch which the tail rotor needs is usually quite small, a matter of perhaps 5 degrees for the full amount of main blade collective travel. Here, again, it is a matter of experimentation. Of course, when using one of the new 'helicopter' radios, this tail rotor compensation is carried out electronically and can be adjusted by a control on the transmitter (even when the helicopter is in flight, if you wish!).

Well, in order to return to basics and describe the really very simple adjustments of a non-collective pitch helicopter, I would like to present to you a series of sketches which were originally published in one of the "Cricket" service bulletins. These bulletins are intended to assist in resolving any problems which owners are having in building or flying their machines. Since this tail rotor set-up bulletin was so well received, we hope that it can help the owners of many of other makes of helicopters which are available today. Even though some of the sketches will show you the total movement available as being restricted by a slot in the case of the "Cricket" tail gearbox, you can relate this same full travel mechanical limit to your own helicopter's mechanical arrangement. There will always be a mechanical limit on the total travel or movement on the tail control and it is this maximum movement which you should take as a datum when you center the control adjustments. So here are the stages which, as we said, should be done in sequence.

(1) Set the rudder servo arm at neutral position and, at this setting, the control rod from the rudder servo to the tail control lever should be adjusted in **length** until the **pin** in the gearbox **slot** is **centered:**

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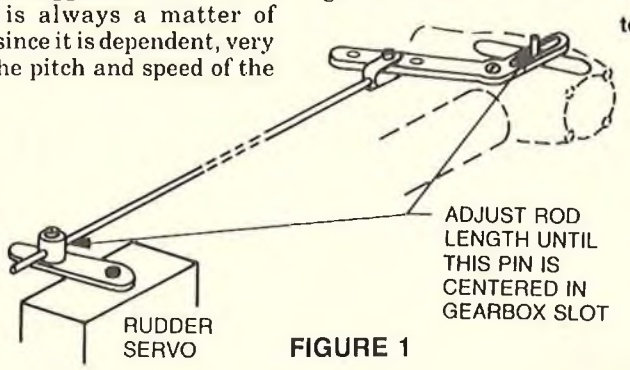
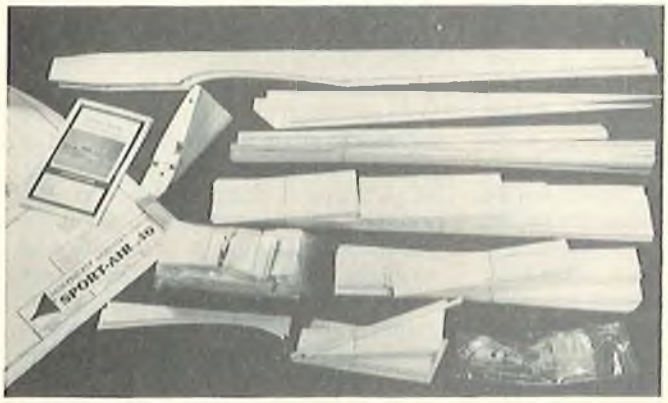


FIGURE 1

RCM PRODUCT REVIEW

Northeast Aerodynamics SPORT-AIR .40



SPECIFICATIONS

Name	SPORT-AIR .40
Aircraft Type	Sport
Manufactured By	Northeast Aerodynamics 568 Main Street Haverhill, Massachusetts 01830
Mfg. Suggested Retail Price	$63.95
Available From	Both Mfg. and Retail
Wingspan	58 Inches
Wing Chord	10.8 Inches
Total Wing Area	625 Square Inches
Fuselage Length	42+ Inches
Stabilizer Span	18 Inches
Total Slab Area	144 Square Inches
Mfg. Rec. Engine Range	Non-schnuerle .40
Recommended Fuel Tank Size	8 Oz.
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa & Ply
Wing	Balsa
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (25 pages)
Construction Photos	Yes

RCM PROTOTYPE

Radio Used	Ace Silver Seven
Engine Make & Displacement	K & B .40 w/muffler
Tank Size Used	8 Oz.
Weight, Ready to Fly	78 Oz.
Wing Loading	18 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

(1) Flight performance. (2) Design and appearance. (3) Quality and fit of parts. (4) Detailed instructions and photographs.

WE DIDN'T LIKE THE:

(1) Restricted aileron throw, see text for correction. (2) Small wing bolts.

With its clean lines and close resemblance to several of the light aircraft, such as the Piper Cherokee, the Sport-Air .40 by Northeast Aerodynamics of 568 Main St., Haverhill, MA 01830, is one of the better looking entries into the .40 size market. According to the product releases it is a quick building, rugged airplane with full aerobatic capabilities while still being easy to handle. When you add to this the fact that it is designed to perform with a non-schnuerle engine it makes quite a package in one airplane. At 625 square inches of wing area it is also one of the largest in its class.

The Sport-Air is of all balsa construction with just a few plywood parts and has such niceties as fuselage sides that are notched for the bulkheads, 3/16" main gear, and machine cut parts. It all comes packaged in a 44" x 9" x 3½" box. Opening the kit is somewhat of a surprise, there is a lot of extra space filled with crumpled paper. There is a reason for the empty space, all of the parts are pre-cut and shaped. The small wood parts are neatly bagged to keep them from getting lost. A hardware package is also included and contains the control horns, hinges, nose gear block, gear legs, and just about everything else that is needed.

Construction:

A very complete 25 page instruction book provides step-by-step information on building the Sport-Air and the numerous pictures cover any part that is even faintly tricky. The actual building is done on the two plan sheets, each 24" x 48". This is a convenient size to work with and will fit virtually any building board. Overall, the wood quality is very good, one piece of aileron stock had a couple of soft spots but even this was of above average quality. We checked a couple of Sport-Air kits in a local hobby shop and all were at least as good if not better than the one we received. It is nice to know that the kit we are testing is typical and not specially selected.

The wing is designed for strength and has sheer web between the spars and also between the trailing edge sheeting. The result is a very strong structure but without any major weight increase. There is a choice when it comes to building the wing, the ribs are drilled for use with a wing jig if desired but the semi-symmetrical airfoil is flat on the bottom from the spar to the trailing edge for ease in building on the plans. We elected to build on the plans, and pinned all the sheeting and cap strips in place. Just be sure to mark the rib locations since the center section sheet will cover the plans. Once the lower sheeting is in place the ribs, spars and other parts are glued down. The parts fit is excellent and it all goes together beautifully. We've gotten used to the instant gratification of the cyanoacrylate glues and used Satellite City's Hot Stuff and Hot Stuff Super T for almost everything. The gap filling and slightly delayed

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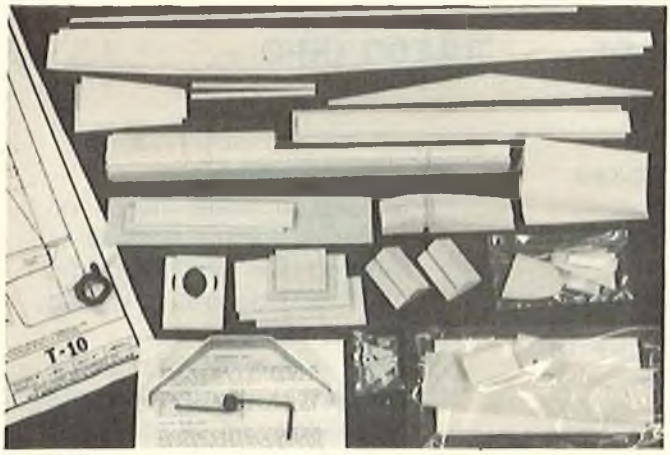
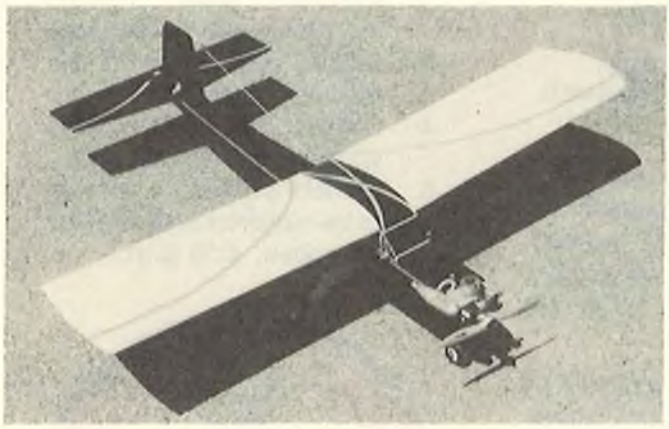
RCM PRODUCT REVIEW

Bridi Hobby TRAINER 10





SPECIFICATIONS

Name	TRAINER 10
Aircraft Type	Trainer/Sport
Manufactured By	Bridi Hobby Enterprises P.O. Box 1802 Champaign, Illinois 61820
Mfg. Suggested Retail Price	$27.95
Available From	Retail Outlets
Wingspan	36¾ Inches
Wing Chord	7 Inches
Total Wing Area	255 Square Inches
Fuselage Length	31½ Inches
Stabilizer Span	15 Inches
Total Stab Area	56¼ Square Inches
Mfg. Rec. Engine Range	.09-.15
Recommended Fuel Tank Size	4-6 Oz.
Recommended No. of Channels	3
Rec. Control Functions	Rud., Elev., Throt.
Basic Materials Used In Construction:	
Fuselage	Balsa sheet
Wing	Balsa
Tail Surfaces	Balsa sheet
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (4 pages)
Construction Photos	No

RCM PROTOTYPE

Radio Used	Kraft
Engine Make & Displacement	O.S. Max .10
Tank Size Used	6 Oz. muffler pressure
Weight, Ready to Fly	33 Ounces
Wing Loading	18.6 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

(1) Machine cut and sanded parts that fit properly. (2) Easy to read plans. (3) Simple, relatively quick construction.

WE DIDN'T LIKE THE:

Nothing we didn't like. Everything was as expected.

The Trainer 10 is the 10 size version of the well-known Trainer .60. Unlike the .60, .40, and .20 sizes of this model, the 10 has a flat-bottom airfoil. And, this one may also be built as a more jazzy looking low wing model if the builder wants to do so. All parts for either the typical high wing or the low wing aircraft are included in the kit. Instructions are also included that describe the necessary, though minimal, modifications. Parts for the wing and fuselage are neatly elastic banded together with small hardwood parts and hardware contained in plastic bags.

Construction:

Using the single page of plans, the construction goes relatively easy. We say relatively easy because we encountered no problems whatsoever and uses all familiar, no-tricks construction. Because only one wing panel (the right one) is shown on the plans, we just sprayed some WD-40 on the back side of the wing plans to make the paper transparent, turned the plans over, covered them with a plastic kitchen wrap, and built the left panel. Super Jet, Carl Goldberg's new thicker consistency cyanoacrylate adhesive was used for all of the assembly except joining the wing panels to the center wedge-shaped rib, for the firewall, and the ply landing gear plate. All of the machine cut and sanded parts fit without even a touch with the sanding block. The only modification we made was to reduce the dihedral shown on the plans by half (by sanding down the center wedge-shaped rib a bit) to minimize the "hunting" typically experienced with high wing models with lots of built-in stability. Celastic was used to reinforce the wing center section.

Covering:

Since we were building this model primarily as a sport flier and weren't concerned about a flawless finish, we took the easy way out by spraying some Ditzler primer on the fuselage and tail assembly, sanded it smooth, and finished the job with a couple of coats of black Aerogloss dope. The wing was covered with the new cream colored MonoKote plastic iron-on covering material. Bridi striping tape was used to add some color to the job. And we're quite pleased with the way the job turned out. We also used this plane as a test bed for Bill Evans' new X hinge material. By following the instructions that came with this material, the rudder and elevator were quickly and effectively hinged — with no air gap. A neat product.

Engine:

As we mentioned earlier, we wanted this model for sport flying; a plane to goof around with. So, we installed one of the new O.S. Max Schnuerle port engines with their muffler. Because the case of this engine is somewhat larger than the usual 10's, we had to replace the 10 size engine mount provided in the kit with one intended for a .19. The engine fit quite easily with no problems.

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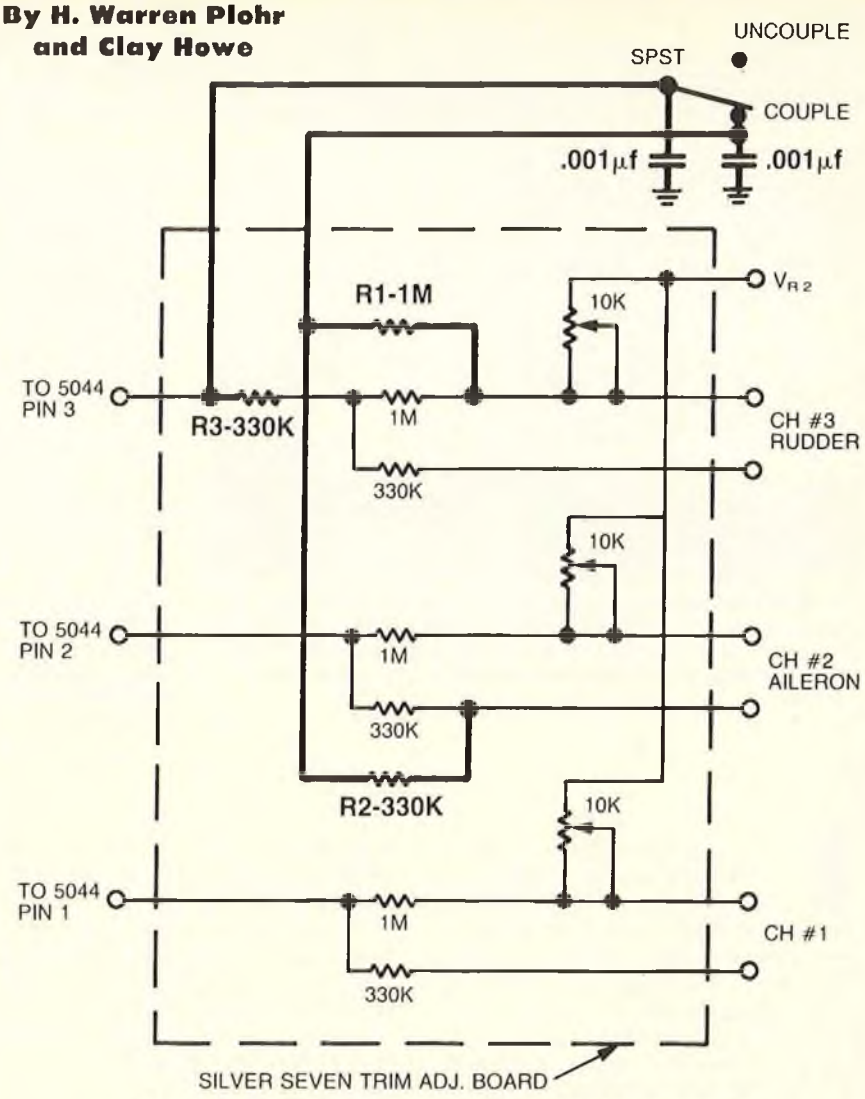
CAR FOR THE SILVER SEVEN

By H. Warren Plohr and Clay Howe

The Signetics NE5044 is a new integrated circuit (IC) that encodes control signals in an R/C transmitter. The design of the IC is such that external components are used to tailor the basic circuit to the R/C system and the desired control configuration. One of the first commercially available R/C transmitters to use this IC is the Ace R/C Silver Seven designed by Fred Marks. This kit-built transmitter can be adapted to a wide variety of control arrangements by the average R/C modeler. Some control functions can be made by adjustments inside the transmitter, some by plug-in modules, others by circuit modification. This article describes a circuit modification to the Silver Seven Transmitter that permits coupling of rudder servo control to aileron stick command. This is commonly called Coupled Aileron Rudder (CAR).

An optional plug-in mixer board is available for the Silver Seven. This Mixer Option can provide CAR, but not the way I like it. When this option is wired to provide "unidirectional mixing" of aileron and rudder, both the aileron stick and trim control the rudder servo. Also, the rudder trim authority is reduced. This coupling of the trim function may be desirable in some applications, but did not meet my needs. In particular, in-flight switching between coupled and uncoupled control is accompanied by rudder trim shift. This is an undesired control response. For these reasons the Ace Mixer Option was not used.

CAR was added to the Ace Silver Seven by modification of a transmitter made from the basic kit without options. All circuit changes were restricted to the plug-in Trim Adjust Board (TAB). The TAB is provided with the basic kit and is normally used unless an option board is installed.



CAR MODIFICATIONS SHOWN IN HEAVY PRINT

Dual rate control is not affected by this modification. The dual rate switch will still attenuate the

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R3 VALUE	FULL THROW OF CH 2 STICK MOVES:		FULL THROW OF CH 3 STICK MOVES:
	CH 2 SERVO	CH 3 SERVO	CH 3 SERVO
JUMPER	100%	50%	50%
150K	100%	62%	38%
240K	100%	66%	34%
330K	100%	70%	30%

FIGURE 1

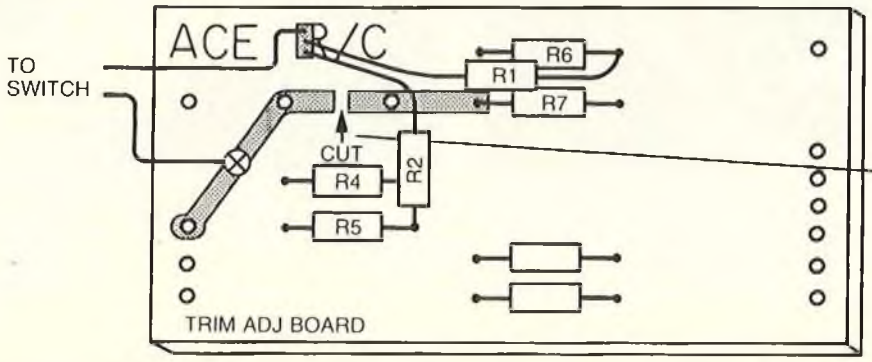
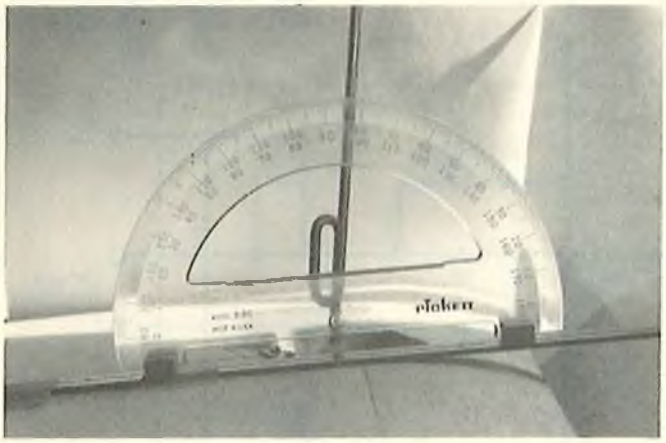


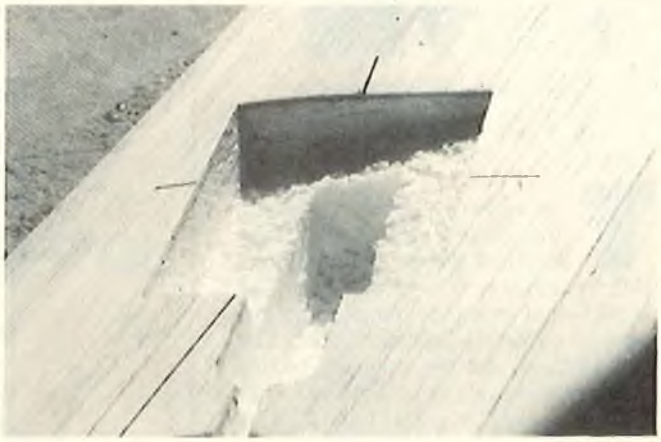
FIGURE 2

WHERE DO THE RETRACTS GO?

By Col. John A. de Vries



The forward rake of the scale landing gear is measured with this simple set-up. Steel ruler is taped to the lower wing surface and a protractor is steadied by four blocks of hardwood. The 7° rake, measured here, plus 8° that the ruler is tilted, add up to the scale 15° rake.



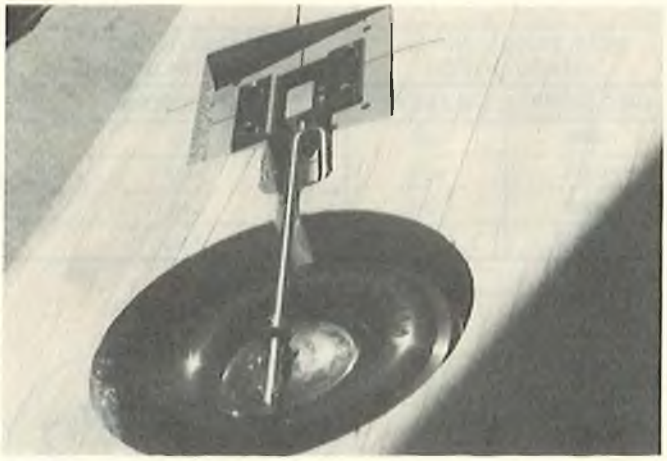
The retract's pivot line, drawn on the wing's balsa sheeting, runs from side to side in this photo of the finished mounting hole. The slant of the mounting hole sets the forward rake of the landing gear when it's extended. It's achieved by "picking" foam beads, a bead at a time, and "trying" the mounted gear until the proper angle is achieved. Note the clearance for the retract mechanism.

It can be a **very** sticky problem, installing model retraction mechanisms in a **scale** R/C model! Certainly, full-scale airplane designers don't consider model builders when they locate fold-up gears. As a result, we modelers are faced with some pretty exotic landing gear angles that we're forced to duplicate if we're to score at the scale contests. And, we're stuck with machinery that only works in one plane --- in the geometric sense of the word.

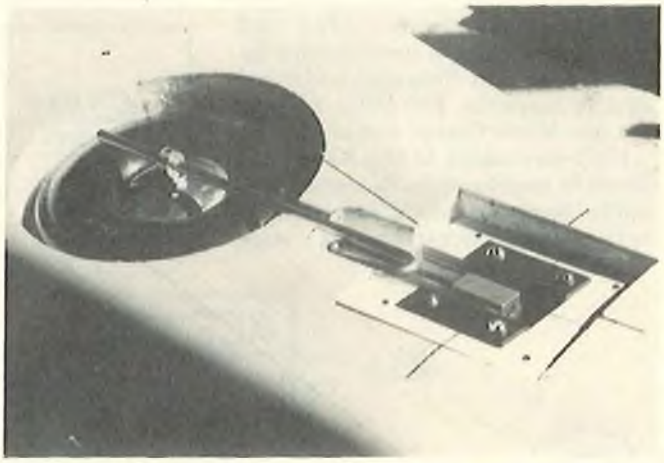
With the exception of an old Dave Platt column here in RCM, there's been little written on how to "locate" model retract mechanisms in order to copy scale retraction angles. Even the instruction sheets that come with the RhomAires, Sonics and Goldbergs (and other available retracts) don't say anything about how to install "the product" in scale birds. They do show how to bolt the retracts in a pattern model or a sport R/C --- where everything is, essentially, straight up and down. But, when it comes to aligning the retracts in a Spitfire, BF 109E or Mustang, they're strangely silent!

Have faith! I think we've developed a practical system for handling the weird angles built into scale designs. This article shows the technique as it's applied to foam wings as well as built-up structures into which retracts must be built. Most of our experience has been with relatively thick wings and gears with thick wheels. Thin wings with narrow wheels may pose some clearance problems that we haven't encountered yet. But, the principles should apply --- after all, if there's enough room **in** the wing for the retract mechanism, there should be space for the wheel and landing

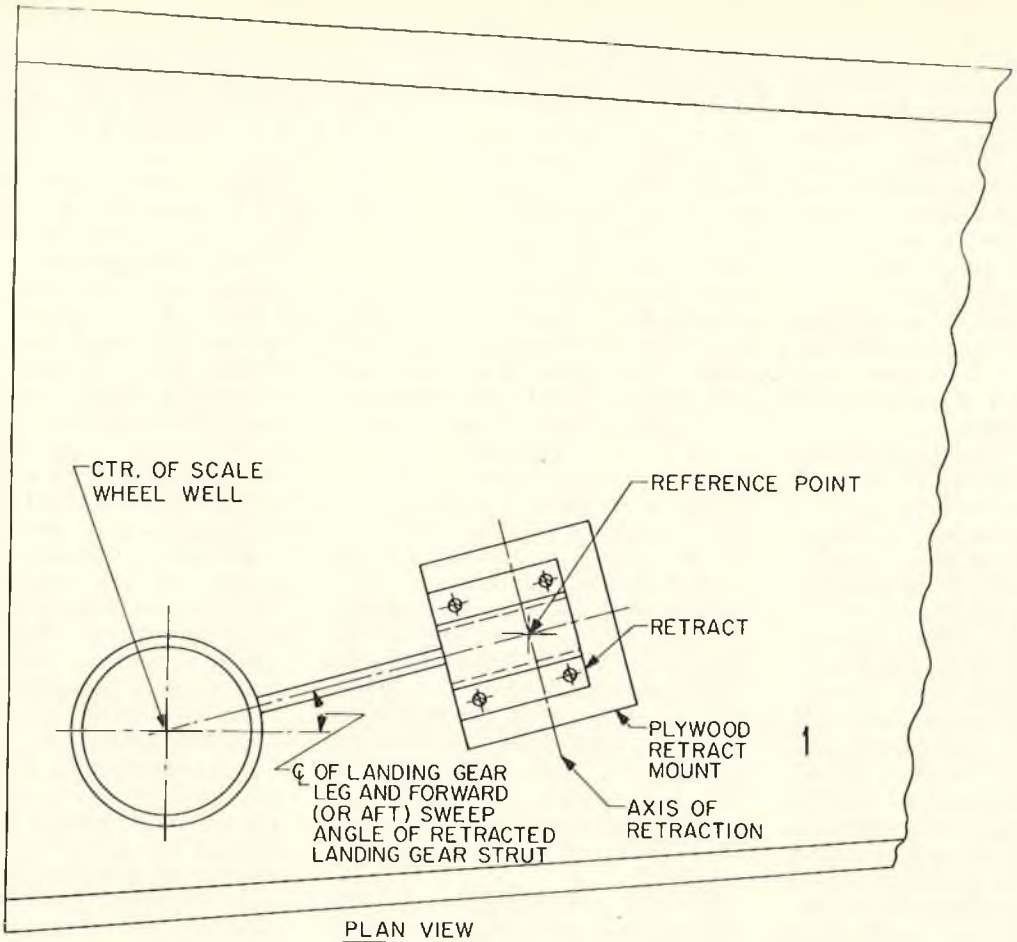
text to page 70



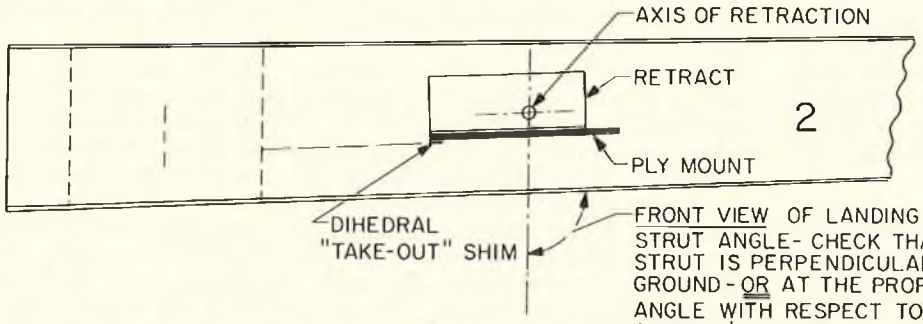
Looking outboard at the scale retract installation. Note that the rear of the ply mechanism mount is flush with the wing's sheeting. The specific installation shown in these photographs was a particularly difficult one. When retracted, the landing gear strut is 15° aft of a span-wise line, yet the extended gear had to rake forward 15°!

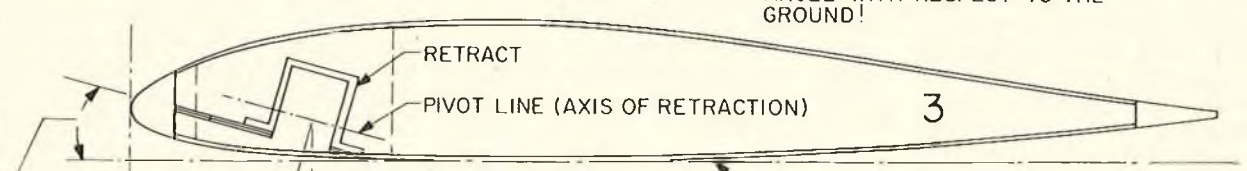


Rhom Air retract ready to be epoxied into scale foam wing. Mechanism is bolted to ply mount, with blind nuts on its underside.



PLAN VIEW



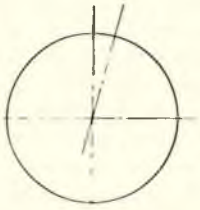


SIDE VIEW

MOUNT TILT ANGLE CUT INTO WING FOAM OR ADJUSTED BY TILTING RETRACT MOUNT IN COVENTIONAL RIB & STICK WINGS.

FORWARD (OR AFT) SPLAY OF LANDING GEAR STRUT - SET BY TILTING RETRACT & ITS MOUNT

ARBITRARY REFERENCE LINE DRAWN TO ESTABLISH SCALE FORWARD (OR AFT) "RAKE" OF LANDING GEAR LEG. AIRFOIL IS AN RAF 34 - USED FOR ILLUSTRATIVE PURPOSES ONLY



INSTALLATION DRAWINGS FOR RETRACTS IN SCALE MODELS

BY JOHN A. deVRIES, COL., USAF(RET'D)

NO SCALE

gear strut.

Before we head for the shop, there are some things we **must** know about the landing gear on the "real" airplane. First, we have to know **where** the landing gear leg intersects with the bottom surface of the wing. Second, we have to know the location of the center of the wheel well in the wing and its interior diameter. Third, we must have the retracts we're going to use as well as the wheels and **adjustable axles** that will be employed --- so that we can measure them. The wheels, of course, will have to fit into the scale wheel wells. And, we may want to **line** the wheel wells with balsa or thin plywood --- so the wells may have to be enlarged (from true scale) to account for the lining.

We have to measure the retracts, themselves, to determine a couple of things. We'll have to make a set of mechanism mounts (1/4" plywood, in the case of RhomAires) and the mounting templates in the instruction sheet might not fit our machinery, exactly. As important to our installation, is the **exact** location of the axis of rotation of the landing gear leg **in** our retracts. In other words, where does the landing gear leg **pivot** inside the mechanism? It's important to locate the retraction axis in "plan view" (it's usually perpendicular to the wire landing gear leg) and in "side view" --- because it's somewhere **above** the mounting flanges. Accurately **scribe** the retraction axis on the retracts' mounting flanges and write down how far the pivot is above (or below) the mounting flange. Measure to either surface of the flange, note the measurement and **how** you made it.

Now, we're going to make some assumptions. First, that we're working with a foam wing and, second, that the wing is already sheeted, but not fiberglassed or resined. Let's install some retracts!

Using a steel ruler, a drawing compass, and our collected information, we first locate the center of the wheel well on the lower surface of the wing and then **draw** the well onto the balsa sheeting. Second, we must carefully locate the point where the landing gear leg enters the lower surface of the wing --- and mark that point. Connect the center of the wheel well and the "entry point" --- and we've located the axis of the **retracted** landing gear strut. Be very careful, if you're using Goldberg retracts with their offset wire struts. We're only concerned, so far, with the position of things when the gear is "up."

Next, draw a line, perpendicular to the line we've just drawn, **through** the gear entry point. This new line represents the axis of rotation of the retract. In other words, this is the line you scribed on the retract mounting flange, earlier. With the mounting plate bolted to the retract, mark the axis of rotation onto the plywood. With the greatest of care, and with the wheel on an adjustable axle on the retract leg, orient the assembly directly over the lines you've drawn on the bottom of the model's wing. Of course, the retract is in the "up" position. Align the strut with the line between wheel well center and entry point and set the pivot line (axis of retraction) exactly above the perpendicular through the entry point. Trace around the plywood retract mount when everything is aligned. Important — a felt tip pen is recommended for these under-wing markings, rather than a pencil. If you goof, a bit of sanding will remove the inked line, but a pencil tends to scar the balsa sheeting. See Diagram #1 for the appearance of the bottom of the wing at this point in the proceedings.

Before we start cutting into the wing, it's a good idea to mark the other wing panel and then compare marks to make sure we've done everything in a symmetrical manner. Don't chuckle! The first time we tried this procedure, we wrecked a pair of sheeted foam cores by digging the wheel well two whole inches too far outboard in one panel!

So --- let's cut out the wheel wells. To do a neat job of it, slice through the sheeting with a No. 11 X-Acto blade and, before you peel the sheeting off, go around the whole circle to the depth of the blade. Since foam wings derive most of their strength from the sheeting, we're inclined to run the wheel wells all the way through to the underside of the top sheeting. This becomes a tad easier if you work your way down through the hole, using a long bladed X-Acto carving blade to define the outer edges of the well, cleanly. Removing the large mass of foam beads is a scraping action --- we use a small woodworking chisel to clean out the wheel well foam. It comes out in chunks.

Now, let's cut on the lines around the retract mount --- that we traced earlier. In this case, however, we'll only clean out the hole to the depth of the wood mount. We've found that the best method of doing this is to slice through the sheeting, carefully remove the balsa inside the cut line, and then begin removing the foam, a tiny bead at a time. The best tool we've found to use is the backside of the point of a No. 11 blade. You can pick out a foam bead easily, and work your way, layer by layer, to the proper depth in short order. We're working at establishing the minimum depth necessary to align the retract mount flush with the surface of the sheeting.

Dig a hole in the foam to clear the retract mechanism but avoid the areas where the plywood will butt against the foam. Temporarily, inset the assembled retract, mount and wheel, and mark both sides of the landing gear leg for the slot it will occupy when the installation is completed. Include clearance for the spring coils on the landing gear leg --- and, then, slice out the foam between mount and wheel well. The depth of this slot isn't critical. And you can always dig it deeper, later, if necessary.

Now comes the time when we build-in the forward (or aft) rake of the landing gear strut when it's in the **extended** position. This is the second important angle we have to deal with and we'll measure it on the **side view** of our construction drawings. Ideally, we'd measure the angle of the strut with relation to an internal chord line --- but, we can't find our way into the midst of the foam for the measurement. Practically as accurate is to lay a line, chordwise, on the bottom wing surface and measure the angle between it and the landing gear strut. Drawing #3 makes this measurement a tad clearer.

It is important to realize that we'll achieve the forward thrust or rake of the extended landing gear strut by **tilting** the retract mount a like number of degrees. Looking at the wing from the tip, with X-ray eyes, we'd see the retract mount tilted "up" at its front, thus thrusting the landing gear leg forward with relation to the wing's airfoil.

We're now ready for the most delicate part of our retract installation. From now on, we'll be engaged in a cut-and-try effort, so, extend the gear leg on the retract and have at it! What we'll be doing is removing foam from the retract mount area that will allow the forward edge of the mount to "sink" into the wing. When we, ultimately, epoxy the retract mount to the foam, we'll want complete contact --- for maximum strength. Orient the wing panel with its leading edge toward you and begin picking beads. The mount hole will get deeper as you "pick" toward the wing's leading edge. Actually, you don't have to remove much foam within a 1/16" of the rear of the well since the mount will be flush with the sheeting.

Test-fit the retracts from time to time to see how the angle is coming. We lay a thick steel ruler on the bottom surface of the wing and use a protractor --- sighting from the wing tip to check the progress in developing the proper angle.

When you've achieved the slanted hole in the foam and the mount fits it flat and snug, there's only one more consideration --- "taking-out" the wing's dihedral angle. This only

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3/4 view of T-28 95% complete. Cowl numbers to be painted, wing walks to install and away we go.

LIQUID MASKING FILM

By Gerald R. Festa

The final appearance of any model is due mostly to two major factors: quality of craftsmanship, and the paint scheme. It goes without saying a poor paint job and/or scheme can detract from any well-built model. The purpose of this article, therefore, is to demonstrate a method of enabling you, the average builder, to complete an original (and very complex, if you desire) paint scheme, or to make your own "decals."

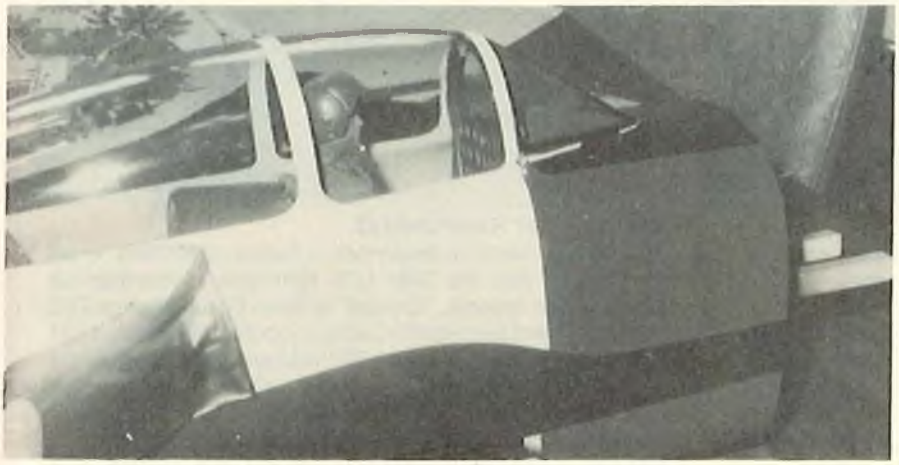
To demonstrate this method, a Stand-Off Scale project was used — a Platt T-28. This particular paint scheme was found in a magazine and there was no desire to use commercially purchased decals for the numbers or the word "Marines." Two reasons for this decision were: (1) Decals have a clear "film" between the individual letters or numbers, and this detracts greatly from the appearance. One can cut each letter out and place it individually on the plane, but they usually end up crooked or spaced improperly! (2) It is a shame to see all of Platt's T-28's with the same numbers (VT-5) or all of Top Flite's P-51 with VF-T, etc.

Numbers, word "Marines" cut out; color documentation and outline proof of scale seen below. Vertical stab covered with paper as per "shortcut" described near end of article.

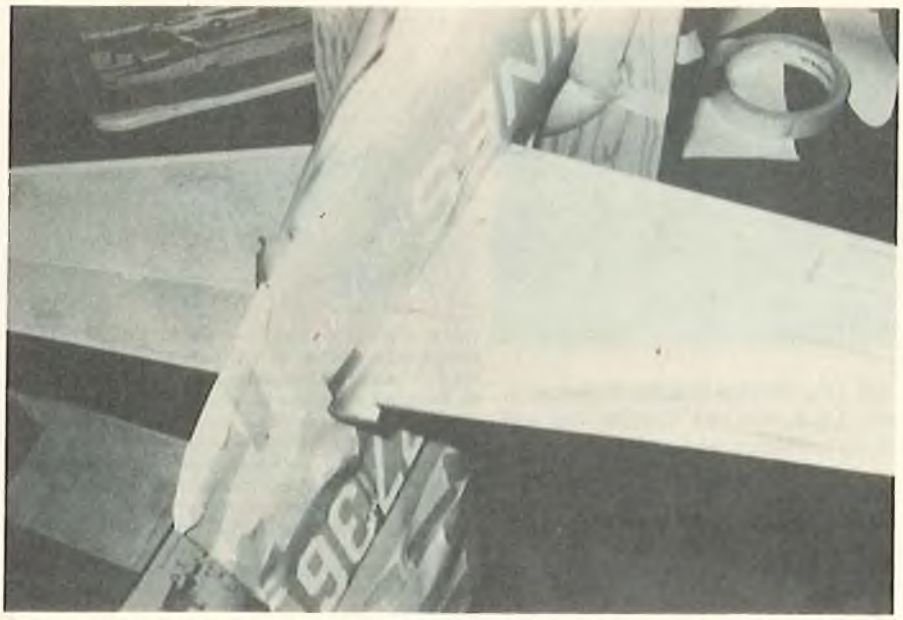
The time and the trouble it takes to make decals for your own branch of the service, as well as the numbers, seems to discourage most modelers. Perhaps it is time you consider using Liquid Masking Film by Fliteglas Models and paint on your "decals!" If you are interested — let's start — right after a commercial. I spray Hobbypoxy paint, and use their products for finishing. I like it, but the choice of paint is yours. To get my balsa sheeting grain-free, I use two coats of 50/50 HP Thinner/Filler, wet-sanding almost all off. Then I spray on the base color (usually the lightest color). Remember your **final** appearance is only as good as your basic wood, so do a good job there. I believe many modelers get into trouble by thinking that the paint will cover up a mistake, bad joint, etc. Instead, think of the paint as accentuating your flaws. With this philosophy, your base finish should be above average. Do to this base color what you wish, just have it in its "final" form before proceeding. There should be no sanding on the base coat prior to applying LMF. Any sanding causes LMF to become very difficult to remove.

Spray on one coat of LMF. You may brush it, but this doesn't work as well — but it works! Be sure you spray this **everywhere** — if in doubt, **spray it!** There are no serious ill effects of over-spraying. Runs may occur but these only add slightly to the drying time and are of no serious consequence (bet you never thought you would ever hear that!). The thicker the coat, the easier it is to peel off — so keep that in mind. Be sure you coat everything, especially leading and trailing edges of wings, elevators, etc. Do cover the pin area of a hinge if the hinge is already mounted. Over-spray is difficult to remove, so **coat everything.** If too thin a coat has been sprayed on and you find it difficult to remove, lacquer thinner can be used only if your paint is epoxy. For best results if you have never used LMF, is to practice on an old wing or fuselage. This coating will be a translucent green color. While it is drying (from one hour to overnight), get out your drafting board and pencil. Now, exactly draw your desired letters, numbers, pattern or what have you. For our purpose here we will use as an example the word "Marines" and the exhaust fairing on the fuselage. Put your pattern — properly spaced — on a

Peeling up LMF. Area to be painted flat black.



Peeling off all LMF reveals clean, sharp lines.



Left side of Stab/elevator sprayed. Right side of Stab/elevator brushed.

heavy paper, and cut out using an X-Acto knife.

By now your plane is a greenish, dry, runny, ugly mess, but here is where the fun starts! Take a felt tip pen and trace the stencil onto the plane. If you make a mistake, retrace using a different color pen (see Photo #1). Note: you may use a ballpoint pen, pencil, or anything else that writes, but on uncovered balsa some of those writing instruments might make an indentation in the wood — therefore, the felt tip pen is safer. If you are painting a fiberglass fuselage the choice of writing instrument is of no concern. Pencil is erasable, but somewhat difficult to see.

Take your time positioning your stencil as this is most critical. After all your stencils have been drawn, you may position other "decals" you wish to use assuring yourself of enough room, proper spacing, correct angle, etc. After you have all of the lines drawn, lettering outlined, numbers in position, etc., pick any one color you wish to paint and cut out the numbers, or letters, lines, etc. Cutting is surprisingly easy. Using a new #11 X-Acto blade or new razor blade and with the aid of a straightedge (this is a **must**), cut out the pattern or letters, desired, one at a time. Don't be cheap — use a sharp blade, it's worth it! Gently cut through the LMF. There is little danger of cutting into the balsa (again, fiberglass is no problem) except maybe when you cut with the grain on uncovered balsa. A good rule of thumb is this: if you feel the knife drag, you're too deep! That's simple enough. Make all cuts as straight and/or smooth as possible since this will be the size, shape and quality of the final product. Peel up the individual numbers, or pattern and throw them away. If a corner does not get cut cleanly you will peel up some of the part you want to stay down. Don't fear, just finish the cut, and press down the raised corner! (See photo #2.)

After all of the desired pattern of a single color is cut out, you are almost ready for spraying. First, cover all the other lines, letters, or numbers, of the other colors (if there are any). You can use regular notebook paper and masking tape. Spray on your color. When it dries, you may wish to re-spray this same area with more LMF. After that dries, remove your "covered-up" areas and you are ready to cut out your second colored pattern. Follow this same procedure for as may colors as you wish.

By now (if using three or four colors), you ought to be somewhat anxious to see what you have done and how the final effort looks — so pick any place where you painted last and

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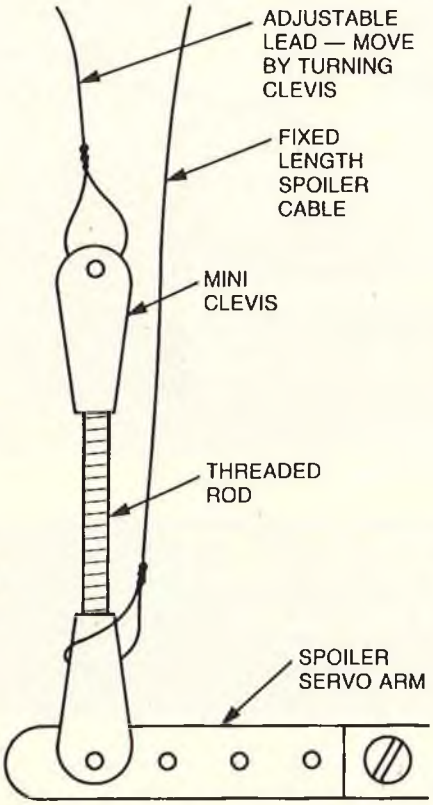
FOR WHAT IT'S WORTH

Gene Engelskirger from Brookpark, Ohio, has been fighting the uneven spoiler syndrome on his RC sailplanes for years. On his latest machine he installed a turnbuckle to adjust one cable while the other one remains fixed. As shown in the sketch it works fine, and now with just a twist of the clevis both spoilers open at the same time.

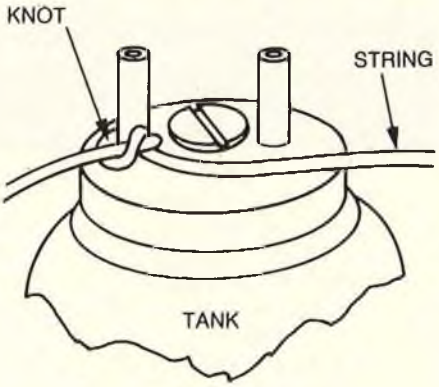


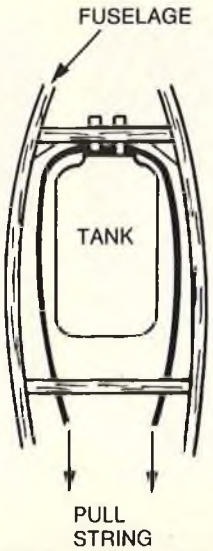
OPEN BOTH CLEVIS AND SLIP LOOPS ON: ADJUST FOR PROPER SPOILER OPENING

This little money saver was submitted by Jonathan Young, Dover, Deleware. Use automotive pin striping and decals on glider and electric powered planes where fuelproofing is not required. Jon's local hobby shop only carries TF Hot Stripes, but he found a wide variety of auto striping colors, widths, and brands at most local department stores. And, unlike our R/C striping, these auto striping rolls and kits often go on sale. Jon finds the Calcustom brand very suitable.

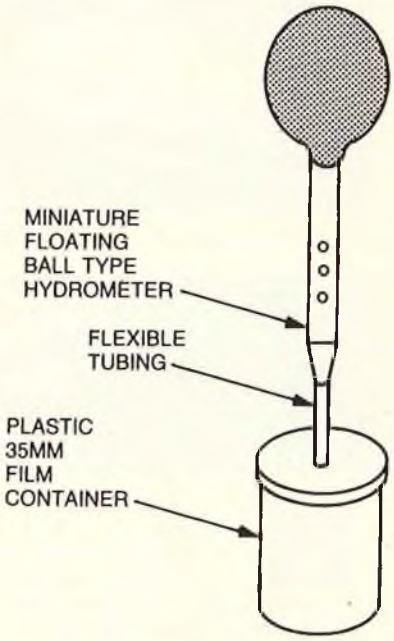
Paul Hubert, Bayshore, New York, eliminated an aggravation in the following manner. When using Hot Stuff, Jet, or similar adhesive, Paul discovered that by forming some children's modeling clay around the nozzle and at the tip of the thin tube, the glue doesn't dry up. Also, keeping it refrigerated or in a cold place to lengthen the shelf life.

How many times have you placed a fuel tank down one of those long dark holes in fuselages and wondered how you would ever remove it without probing around with wires, in some cases even removing the engine to get at the tank? Try this, first tie a single length of kite string to one of the tank tubes with a knot and let the ends hand down each side of the tank. Cut off about 6" past the end of the tank. Now insert tank into fuselage keeping the string 180° opposite each other and tuck ends of string under some foam rubber. To remove tank, just grab both strings and pull. The fuel tank will neatly back itself out of the tank cavity. See sketches. This idea was submitted by Ed Heiser of Livonia, Michigan.





Seth Sterling of Brooklyn, New York, uses an inexpensive miniature (6", $1.50) hydrometer (available at any auto supply department) for checking the state of charge of his 12 volt starter battery. The following tip keeps the acid from dripping on the floor and automatically encloses the tester for safe, clean storage. As shown in the accompanying sketch, make a hole in the snap-on plastic top of a 35 mm film container just large enough to be able to force the hose of the hydrometer through it permanently. To use the hydrometer, just snap the top off the container leaving the top on the hydrometer hose while testing your battery.



James M. Durrell Jr., Columbus, Ohio, has found this economical source for a much used item. He has found another source of glass cloth that you might be interested in. This glass cloth can be purchased in boat stores and is ideal for fiberglassing the center sections of wings as it is hemmed on both sides and will not fray. The cloth comes in 2", 3", 4" and 6" widths and is sold by the roll or by the yard. Jim has been using this cloth for two years now with very good results. □

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.

RCM's Asst. Editor Dick Tichenor designed and built our corporate jet, a Sport Scale Cessna Citation.

THE RCM CORPORATE JET

We Finally Get The Citation Airborne

By RCM Staff

How about tomorrow morning at 9:00 o'clock? An exciting question for a few people in mid-October, 1981. For nearly five years the Sport Scale Citation ducted fan model project had been repeatedly delayed by other priorities. Finally, a specific time for the first flight attempt.

Only modelers can understand the excitement associated with preparing a different type original design with a multitude of unknowns for its maiden flight. Then there is the indescribable thrill of seeing the creation performing, not only successfully but exceeding any expectations. Such it was with the Citation.

The Citation was conceived as a departure from the usual jet fighter concept. The goal was to produce a medium performance transport type craft with an appealing personality. It has personality but the performance

The engine nacelles were omitted until we found out if the Citation would really fly.

This was the climb out angle right up to altitude.

Climb out from low pass at half throttle.

got out of hand.

We had the structure completed except for the nacelles and the fairings between the fuselage and nacelles. The radio and engine installations had been accomplished and primer applied to the wing and part of the fuselage. The project was stagnant in this condition for about six months before we decided to recruit some assistance to prevent the noble bird from becoming a dinosaur. The House of Balsa team agreed to take over the project, bring it to a flyable state, and to find out if it would fly. Steve Korney would complete the primer coating and make the final assembly and installations. Mr. Cool, Joe Zdankiewicz, would be the pilot and Don Dombroski would direct traffic and add to the confusion.

After several taxi runs and a few minor adjustments, came the moment of truth. To lessen the chances of a flame-out on take-off, the ship was held on the runway, engines revved up to full throttle, and then released. The acceleration was awesome with rotation occurring approximately a hundred feet after release. A slight touch of up elevator resulted in about a 40° nose up attitude; pucker time! The unbelievable was happening, it climbed out like a bullet at that angle to about 200' before Joe leveled it out. The dual rate switches were pushed to low throw and a cautious flight response exercise began. Everything looked good and then came the rolls and consecutive loops.

Joe had enough of the high altitude maneuvers so he yelled that he was setting up for a low level pass. When the bird flew by him at a 20 foot altitude he really found out how fast it was moving, his better judgement prompted him to cut back to half throttle and he still made a big jet climb out. Back up to altitude and more rolls and loops at half throttle.

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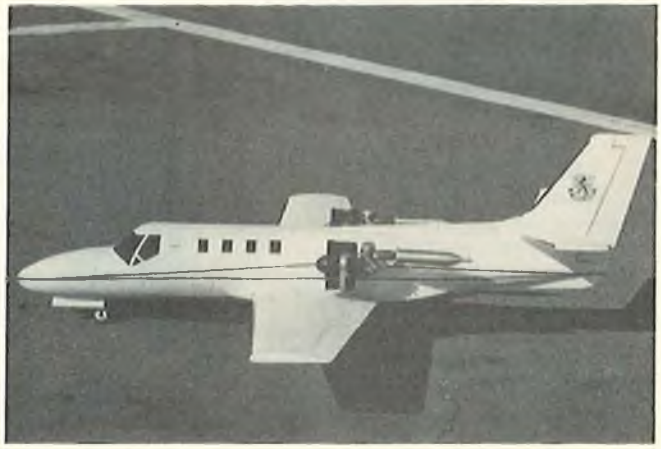
Steve Korney and Joe Zdankiewicz in midst of pre-flight servicing.



Wouldn't it have been nice if we had the nacelle fairing?

from page 80/78

(3) Uses regular or unleaded gas. (4) No oily mess. (5) No plugs to burn out. (6) Good idle characteristics. All these features are yours with the 'Fabtronics C.D.I. pointless system', and no points gap to worry about either. The initial cost of the system ($59.95) is offset by the many features described above. For the modeler who would like to convert his favorite engine, complete instruction comes with each unit. Unit operates from 3.6v to 4.8v, weight is 1.5 ozs., size is 2" x 2" x .75". All that is needed to complete the system is an ignition coil, spark plug and an on/off switch, all of which are available separately. For additional information, write or phone Fabtronics, 15860 Via Rivera, San Lorenzo, California 94580. Tel. (415) 276-8848. These units are sold factory direct only and carry a 90 day warranty.

NEW FROM RHOM

90 Degree Rotation Main Gear: Perfect for P-40, F4U and Shrike Commander. Even though Rhom has made a very successful 90 Degree Rotation System for many years, this great system has been improved, with an All New Rotation Link Mechanism. This new rotation system is stronger, smoother operating and will out last its older counterpart. Two New 90 Degree Unit Kits are available as accessory items: 90 Degree Rotation Unit Kit "A", complete with all parts to convert Standard Mains to 90 Degree Rotation. 90 Degree Rotation Unit Kit "B", complete with all parts to convert Flat Mount Nose Gear to 90 Degree Rotation. 90 Degree Rotation Main Gear System, complete Order System — #2001. 90 Degree Rotation Mains with Flat Mount Nose Gear, complete Order System — #2000. Available from your local hobby dealer or order direct. For additional information contact: Rhom Products Manufacturing Corp., 924 65th Street, Brooklyn, New York 11219.

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This fast charge adapter plugs directly into your 12 volt cigarette lighter found in most cars, and will charge the Ni-Starter® in 30 to 45 minutes. Use it when you forget to plug the Ni-Starter into its charger or as a top-off from extensive use without recharging on the wall charger, or as a primary source for charging quickly. Charges at 1.2 amps, 1.45 volts. Fused for protection. See your dealer, or order direct from McDaniel R/C Service, 1202 Bryan Ave., Bellevue, Nebraska 68005. Phone (402) 291-4287. $8.95 plus $1.50 shipping and handling. Bank cards accepted, C.O.D. okay.

1/4 SCALE CIVILIAN PILOT

Dave Platt's latest offering should please all Giant Scale fans. It's a 1/4 Scale Civilian Pilot (full figure), and represents a typical weekend flier with his leather jacket, blue jeans and open necked shirt. (Could it be he was originally made for Dave's 1/4 Scale Great Lakes that we saw at Toledo in prototype form?)

The pilot is made of hand-laid polyester and comes with painting instructions. Price is $30.00. Allow time for delivery; as we said, each pilot is hand-made. All Dave Platt products are available direct only. Contact: Dave Platt Models Inc., 6951 N.W., 15 Ave., Ft. Lauderdale, Florida 33309.

#3772 CHARGER

The Associated Ni-cd Fast Charger #3772, priced at $34.00, is designed to charge or discharge 4 or 6 cell Sub C Ni-cd packs as used on the Associated RC12E 1/12 scale race car, and other brands of cars, if the Ni-cd packs are designed to accept fast charging, and are 4, 5, or 6 cells, Sub C, arranged in series connection. The Charger's Switch determines 4 or 6 cell charge rate, and a discharge position for 4 and 6 cell batteries. The Timer Switch is used to set length of charging up to 15 minutes, with automatic shut-off. In the shut-off position, the charger automatically goes to trickle charge, when the switch is in the 4 or 6 cell position. The Ammeter gauge indicates amount of amperes rate in charging or discharging, up to 5 amps. The the right side of gauge indicates charging and the left indicates discharging. An input cable is supplied with the charger with plier type battery clips to connect to your automotive 12 volt battery. The output cable is fitted with a 2 pin connector to match your RC12E battery connector. Accessories: #3780 voltmeter tap $2.50, this wire harness plugs into the output cable and allows you to plug your voltmeter into the circuit so you can monitor the voltage and turn off the timer switch when your Ni-cd batteries reach peak voltage. Available from your retail hobby outlet or direct from Associated Electrics, Inc., 1928 E. Edinger, Santa Ana, California 92705, phone (714) 547-4986. □

RCM CORPORATE JET

from page 77/76

Almost the same action as with full throttle.

After the landing came the chatter, no one could believe what they had witnessed. There were rougly 20 to 25 fellows at the field that day and most of them had seen ducted fan flights before. Everyone that voiced an opinion felt that this was the fastest fan powered flight they had ever seen. Estimates ran from 110 mph to 130 mph.

The foregoing account takes on a different complexion when the aircraft is described. The Citation has a 72" wingspan and is 72" long. The dry weight was an even 20 pounds (including 16 ounces of Prather lead weights in the nose cone). Wing loading came to a horrible 63 oz./sq. ft. There just ain't no way that toad could fly but it didn't know that and flew anyway!

Two early model Turbax fans from Bob Violett (with updating by Jet Hangar Hobbies) were powered by K & B 7.5 ducted fan engines. Experimental tuned pipe mufflers from Mac's Mufflers were fitted to the engines. A Futaba Contest Seven radio performed a faultless task of making things work. Hooray for Futaba! A B & D pneumatic retract system fitted with Kraft wheels supported the heavy weight. Accessories came from Du-Bro, Goldberg and Robart. Glass cloth, resin and primer were by K & B. Every bit and piece contributed to the success.

Our sincere thanks to Steve, Joe and Don for their help — that flight was our thrill of the year. **RCM does not have drawings, plans, or data of any kind available on this model. Sorry.** □

LIQUID MASKING FILM

from page 73/72

gently slide the point of an X-Acto blade under it and pick it up! Keep peeling this off until the entire plane has all the LMF off. (see Photo #3). Before you will be the most beautiful paint scheme, with the cleanest lines, you have ever painted! There will be a slight "bump" or edge to the lines, but knock them down with 600 grid sandpaper and spray a coat of clear and most edges will be non-existent. One word of caution: the thicker you spray your colors, the thicker will be the edge — so keep this in mind as you paint.

There is a short cut if you are using colors which **do not** cross. After you cut out one color pattern and paint that area, lay a piece of paper (thick) over that area and tape it down securely. Now cut the next pattern, paint, cover, etc. This method eliminates the need for re-spraying LMF after each coat and waiting for it to dry before continuing (see photo #1 & A).

As you can see from the photos, the T-28 used LMF to form the individual numbers and letters as well as the paint scheme. A color line can go anywhere without the worry of paint seepage or "bleeding." Much more complex paint schemes are possible — even to the extreme of not using any decals! It is disheartening to see any scale ship lose half of a letter or number from fuel, or see an air bubble inside an insignia! There is no limit to what you can do with LMF, only your imagination. Remember there are very few short cuts to a good light finish --- only patience and a desire to do well!

Liquid Masking Film by Fliteglas Models is available from your local hobby shop. It is also available direct from Fliteglas Models, RR 1, Box 392, Neoga, Illinois 62447. □

WHERE DO THE RETRACTS GO?

from page 70

applies to those installations where the landing gear leg must be perpendicular to the ground line (when viewed from the front of the model). Some "real airplanes" orient their gears square with the lower surface of the wing. If this is the case in the model you're duplicating, there'll be no more beads to pick.

If you're stuck with having to set the gear legs perpendicular to the ground line, it isn't a big deal because we're dealing with angles from 2° to 5° (the usual dihedral of prototypes). We take out positive dihedral by slipping a thin balsa shim (about 1/16" in most cases) under the **inboard** edge of the gear mount --- between it and the foam bed. See Drawing #2. This will square the gear leg with the ground --- and will probably screw up the forward thrust angle a degree or two. Removing a few more beads of foam from the forward edge of the mount hole will restore the "set" of the gear.

Finishing the installation is a piece of cake! We usually unbolt the retract from the mount, cover it with Handi-Wrap (or other plastic wrap) and then rebolt it in place. Then, we lavishly coat the mount area **of the foam** with slow drying epoxy and "squish" the mount in place. Certainly, we block up the wings so that things can't rock around and we have steel ruler and protractor at-the-ready to check the installation before the epoxy hardens. When it does, we drill a few 1/16" holes through the plywood, insert reinforcing toothpicks into the foam with epoxy and then go off and have a Coors because we want everything to set-up solid as a rock.

When it is set-up there are two more simple tasks to perform. The first is aligning the wheels, fore and aft. Remember our earlier comment about thick wings? Using this technique, you'll find that the wheels will be "cocked" in the wheel wells. When the gear's retracted, the front edge of the wheel will be higher than the aft edge --- so a deep wheel well keeps all of the wheel below the bottom surface of the wing (inside where it belongs). On tail dragger installations, the desirable toe-in of the main wheels helps minimize the wheel tilt situation. But, you can see the importance of adjustable wheel axles in a scale retract set-up. With the gear extended, twist the axle around the leg until the wheel is oriented properly fore and aft. Check that the gear retracts and that the wheel fits into the well and then solder the adjustable axle to the landing gear strut. We use silver solder, because it's strongest, but a good soft solder joint between adjustable axle and strut will work.

Finally, to make things smooth and scale-like, we have to fill the retract mount well with balsa after we've installed either the pneumatic lines or servo pushrod linkages. Certainly, we'll remove the plastic wrap before blocking-in the well.

If your retract installation is to be made in a framed-up wing, there are only a few differences in technique that you should consider. As with the foam wing, the retracted position of the gear is set first, the extended angle with a tilt of the gear mount, second, and the dihedral angle taken out last. It's a good idea to laminate a 1/16" plywood rib to the inside surfaces of both ribs that will form the retract bay before sheeting a built-up wing. After you've done that, measure and cut a couple of retract mounts from 1/4" plywood --- sized to completely fill the rib bay from rib to rib and (usually) from leading edge to main spar. Trim the plywood, span-wise, to a good, friction fit between the ribs, and a tad wider than the distance between leading edge and spar (when it's tilted, it'll fit).

Sheet the wing panels, top and bottom, and then draw in the gear's retracted geometry as we indicated for foam wings. With stick and rib wings, we have to do the drawing bit twice. The second time will be a duplicate of the first --- except it'll be on the plywood retract mount. Chances are good that the retract will be "canted" in the rib bay and, therefore, the ply will have to be cut out at an angle to install the retract mechanism properly. It is a good idea, too, to line the wheel well as soon as you've cut the circle out of the bottom sheeting. It stabilizes the structure.

Cut out all of the sheeting covering the bottom of the rib-bay into which the retracts will be installed. Test fit the plywood mount into the hole and check that the leg retract line is

continued, straight and true, on the retract mount and the pivot line perpendicular lines up as well. When it does, cut the plywood mount to clear the mechanism and bolt the retract in place. Installation now becomes a sand and fit process, to achieve the gear down angle. The technique described for foam wing pertains except that the angle is achieved by tilting the plywood mount between the appropriate wing ribs. It may mean that a bit of plywood will have to be sanded off the front (or rear) of the mount so that it'll fit between leading edge and spar. If you have one of those sporty, small bench sanders, you can achieve a perfect fit by chamfering the front of the mount to the proper tilt angle. Hand sanding will fit things, too.

When the forward rake of the extended gear is set, we take out the dihedral angle by **tapping** the inboard end of the retract mount. The snug, friction fit of the mount helps here --- no shims will be needed. But, as in the case of foam wings, we'll have to reset the forward rake a bit to get it exactly right. With things set, tack plywood mount to ribs and spars with cyanoacrylate glue (Hot Stuff, Zap, etc.) and then epoxy the mount in place. The installation will be stronger if you use triangular balsa stock to increase the gluing surface between ribs and mounts.

Strip out the landing gear leg slot to the proper depth, fix the wheels to track, install pneumatic lines or pushrods and solder the adjustable axle in place. Use balsa sheet or blocks to cover the retract bay and the job is complete!

So --- if you've got a "problem gear installation," give our technique a try. We **know** it works on BF 109's (we did it for the Royal kit when we wrote the instruction book) and on the aft-retracting gears on our Lockheed Altair (see the photos). It will work for you! □

CAR FOR THE SILVER SEVEN

from page 67

associated control function. This CAR modification cannot be implemented when the Silver Seven Option Boards are installed. The CAR modification is completely disabled when the TAB is unplugged.

With this CAR modification installed, the rudder servo will respond to both aileron and rudder stick commands when the CAR switch is in the Couple position. Part of the rudder servo throw is controlled by the aileron stick, part by the rudder stick.

The total servo throw is the same as that commanded by the rudder stick when the CAR Switch is in the Uncoupled position. The amount of servo control authority assigned to each stick is fixed by circuit constants selected when the modification is made. A choice can be made between 50/50, 70/30, or anything between. With 70/30, the aileron stick controls 70% of the rudder servo throw and the rudder stick 30%. Both rudder and aileron trims control their respective servos only. Authority remains the same with and without coupling.

One limitation of this simple circuit is that full rudder throw cannot be commanded by just one stick while in the coupled mode. If you need more coupled rudder throw than this circuit provides, try the Ace Mixer Option. The amplifiers in the Ace circuit can be adjusted for more servo throw, but care must be taken to avoid servo over-travel when both aileron and rudder sticks are moved simultaneously.

The CAR modification shown is made to Silver Seven Channels #2 and #3; Channel #2 being Aileron and #3 Rudder. The same coupling modification can be applied to any of the first three channels appearing on the TAB if your configuration is different. It cannot be applied to any other channel circuit.

A schematic diagram of the TAB showing the additional circuitry for CAR is detailed in the accompanying figure. R1, R2, and R3 are added to the TAB circuit adjacent to existing resistors. The junction of R1 and R2 can be soldered to an "Ace R/C" etched copper logo to anchor the components. An etched circuit copper conductor will have to be cut to install R3. You might consider using Ace Mini Sockets for installation of R3 so it can be adjusted to set control authority ratio. If R3 is 330K, control will be 70/30. If R3 is reduced to zero ohms, control will be 50/50. The switch can be located anywhere, but try to keep the wires between the TAB and the CAR Switch away from the RF board. While none were used on the transmitter used to test this CAR circuit, it is good practice to include the .001 microfared RF bypass capacitors shown in the diagram. These ceramic disc capacitors should be mounted and grounded at the switch in a fashion similar to other Silver Seven switch installations.

Ace R/C "Silver Seven Transmitter Coupled Aileron/Rudder — Trim Adjust Board Modification

The modification requires adding components only, no parts are to be removed from the existing circuit. Trims, dual rates, and servo reversing remain normal with this modification.

Parts List:

1 — SPDT switch
1 — 330K 1/4W resistor
1 — 1 MEG 1/4W resistor
1 ea. — 150K, 240K, 330K 1/4W resistor for coupling ratio (R3)
2 — .001 disc cap
2 — Mini-sockets
1 — 2 pin Deans set

Modification Instructions:

1. On trim adjust board, drill three holes in "R" of "Ace R/C" (see Figure 1). These will be the soldering points for two resistors and one wire.
2. Cut P.C. land between left end of R7 and Ch 3 minipin at location indicated in drawing.
3. Drill holes for mini-sockets on both sides of cut land. This is where different values of R3 are installed for coupling ratio. R3 lays down as shown in Figure 2.
4. Solder mini-sockets in two holes just drilled.
5. Solder 330K from right end of R5 to bottom hole in "R." This is R2.
6. Solder 1 Meg from right end of R6 to center hole in "R." This is R1.
7. Solder two wires (4" ea.), one to top hole in "R" (insert wire from underside of board — solder on top), the other wire is soldered to place indicated by ⊗.
8. Mount switch in area of your preference. (Mine is located on top of Tx case, above rudder [left] stick. When switch is thrown to left, rudder is coupled, when to the right it is not.)
9. Solder .001 disc cap from each used switch terminal to ground — ground is Tx case.
10. Put a two pin deans connector in wires from coupling switch to trim adjust board — polarity not important! Now T.A.B. can be removed easily to utilize other boards (mixer, expo).
11. Install jumper or resistor at R3, plug board into mainframe board, hook up switch . . . you are now ready to fly with coupled aileron/rudder! □

TRAINER 10

from page 65

Radio:

To keep this plane as light as possible we installed a Royal 4-channel receiver (tuned to our Kraft Sport Series transmitter) with three of the new, tiny size Futaba FP-S20 servos and the small Kraft 200 mah battery pack. Because of the added weight of the engine up front, the receiver, battery pack, and servos are all installed in the servo compartment — for the recommended CG. The

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TRAINER 10

from page 88/65

battery pack is located directly over the main landing gear in our set-up.

Flying:

When the rudder and elevator pushrods were attached to the servo output arms in the next to last hole, we found that we had 1/4" up and down movement on the elevator and 3/4" right and left movement (3/4" in each direction) on the rudder. Since that seemed about right, we taxied out on the runway, opened up the throttle and off it went. The ground handling was straight — as you'd expect with a trike gear model. With the brand new engine running on the slobbering rich side, the model lifted off easily and flew straight out with only a minor correction for torque just after the lift-off. The first flights were non-eventful. Up it went, we flew it around to break in the new engine, and the landings were nice and smooth — just like the big ones. Incidentally, because we were lucky to get a straight wing (which isn't difficult with a flat bottom airfoil), the plane took-off and flew with only very minimal trim adjustments. Once the engine came in, the real fun began. It will do all kinds of great gyrations up there when you want it to, including flying inverted and doing the quickest snap roll in the west. (Want to see that again?)

Conclusion:

While we don't usually recommend small models for the beginner (we usually suggest that the beginner get started with a .40 or .60 size Trainer), we feel that the T10 is one of those planes the beginner could build and fly. The ground handling is very good

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TRAINER 10

from page 96/65

and it is exceptionally stable in the air with no tip stall tendencies. Of course, no matter what plane the beginner flies, he or she should have the help of an experienced R/C pilot for those first flights, if only for the safety of the people and property nearby. For the more experienced pilot who wants a fun flying machine, the T10 will do its thing first class. While we haven't flown the low wing version ourself, we've seen it fly. That's as much, if not more fun, than the high wing version. We're thinking seriously about getting a fuselage kit from Bridi Hobby (since the wing is the same) and putting together our own low wing version of the T10. □

SPORT-AIR .40

from page 62

.... bonding properties of the Super T make it outstanding for this type of building especially when it comes to sheeting and cap strips.

Usually the fuselage of a low wing cabin type airplane requires quite a bit of shaping to get the top panels to fit the sides. On the Sport-Air, this is done for you, the top fuselage sides are beveled to exactly the right angle. The sides are notched at the bulkheads and the whole thing literally fits together like building blocks. Once the sides are complete you do have to do a little sanding before installing the top sheet. An option is offered for the fuel tank hatch, it can either be removable or fixed, the parts for both are included. We opted for the fixed hatch version, it makes the nose gear and tank installation just a bit more

difficult but it eliminates any possible fuel seepage.

When it came to the final assembly we found that the aileron travel was limited to about 1/4" of down. The cause was traced to the wing bolt block. The 1/4" of throw is enough to meet the recommended settings, but we prefer to have the option of more travel if desired. The cure is simply a matter of filing a notch in the block to allow the aileron horns more freedom. The only other change we made was in the wing bolts. The 10 x 32 nylon bolts supplied with the kit are undoubtedly strong enough but 1/4 x 20 bolts are much more common and give a bit more "meat" on the threads. It's just a matter of drilling the right size hole.

Covering:

We covered the Sport-Air using Top Flite Super MonoKote for all surfaces and did the trim with a contrasting color of the same material. One of the simplest methods of cutting identical trim pieces is to fold the MonoKote over with the backing in and stick it together with one of the pencil type glue sticks. Once the pattern is cut, just peel the MonoKote off and iron it on. We put the trim on by first using a lower than normal iron setting, just barely enough to make it stick, then once it is in place turn the iron back up and seal everything.

Engine:

A non-schnuerle .40 is recommended, we picked K & B's #8011 with the bolt-on muffler. We've put a lot of time on this engine and it continues to be an excellent performer. A Kraft KM-40 mount was used and the package fits nicely in the nose with only a small amount of clearance needed for the needle valve and muffler. Since we used the fixed hatch option the Sullivan SS-8 tank was installed through the wing saddle, no problem at all, there is plenty of room.

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SPORT-AIR .40

from page 112/62

Radio:

Since we had just finished building an Ace R/C Silver Seven radio system, we had to try it out and the Sport-Air made an obvious choice. The Bantam Midget servos look almost lost, there is plenty of room for any of the current systems and even a few extras. With the servos located as shown on the plans and the battery pack under the fuel tank, the CG came out in the center of the recommended range. Sullivan cable type pushrods were used for both the throttle and nose gear control. The ease of setting up the control throws with the Silver Seven is great, just get the servos in place and flip the switches until things move the right way.

Flying:

The manufacturer recommends somewhat moderate control throws, 3/16" each way on the ailerons and 7/16" on the elevator. For the first flights we set the controls at the recommended levels and kept the CG in the center range, take-off was absolutely straight and just a touch of down trim was needed. After a few flights we noticed a slight tendency to balloon at full power and added one degree of down thrust using Sterling Model's thrust wedges, handy little devils. The difference is only noticeable if you are using the throttle a lot but it does make for smoother flying. Aileron response at the recommended control level results in very gentle turns and a scale-like roll rate.

When it comes to aerobatics, the Sport-Air lives up to the claims. While not in the class of a pattern bird for precision, it will do virtually anything you want to try and make it look good. Several intrepid pilots tried all the maneuvers they knew and some that nobody knew. Ever try a 1¼ snap roll into knife edge followed by a 1¼ snap to inverted? It took a while but we managed to pull it off and as a result can definitely state that the Sport-Air is a forgiving airplane. The only thing we changed was to increase the aileron throw by about double and the elevator just a little. Even with the controls stepped up for aerobatics, landings are a real strong point. The stability is excellent and the heavy duty gear will take a lot of abuse.

Conclusion:

The Sport-Air is an excellent all around sport airplane and its good looks will attract many favorable comments at the flying field. In the air it will handle just about anything from gentle flight to playful aerobatics. The kit is well-designed and easy to build, making the time from the kit to the field quite short and very rewarding. We've added the Sport-Air as a regular on our trips to

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SPORT-AIR .40

from page 114/62

the flying field, it's competitively priced and would make a very good choice as that first low wing or for the more advanced sport types. □

GIVE IT A WHIRL

from page 61/60

(2) Now, don't touch the adjustments made in (1) again but do the following: adjust the **length** of the rudder **servo arm** (the distance from the pivot point that the tail wire is fixed):

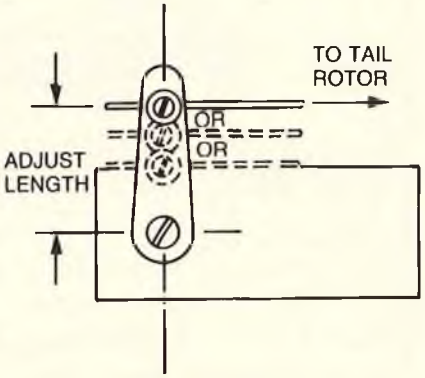

FIGURE 2A

so that, with full left to right rudder stick movement (including the additional movement added by the trim lever also), the pin moves **nearly** (say, 80% of) the full amount of the movement that the slot will permit:

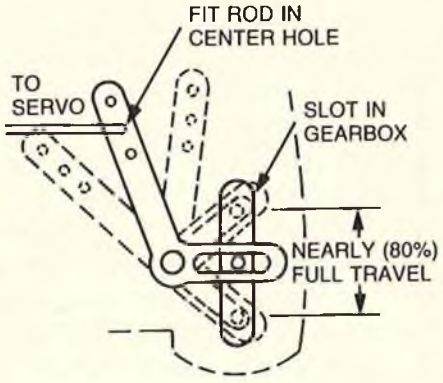

FIGURE 2B

(3) **Now**, don't touch (1) and (2) again. Set the collars which position the pitch control plate on the pitch control wire so that, with **full left** stick on the transmitter, the flat surface of the tail blades are approximately parallel to the line of flight:

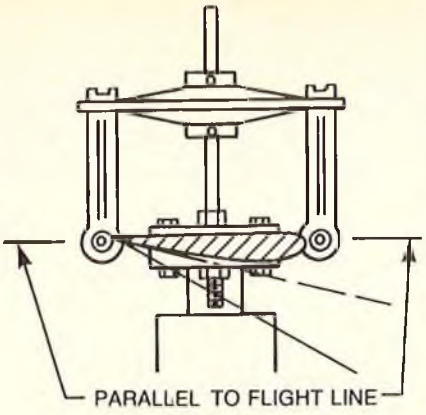

FIGURE 3

(4) **Now**, when the rudder stick is **neutralized**, the blades will look like this:

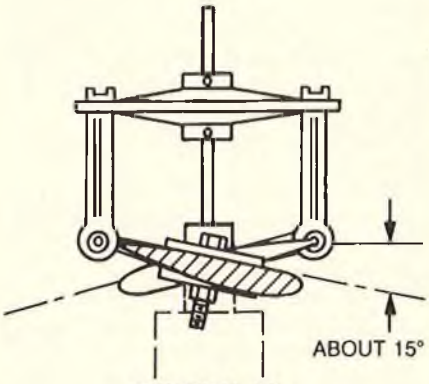

FIGURE 4A

and, when the rudder stick is full **right**, the blades will look like this:

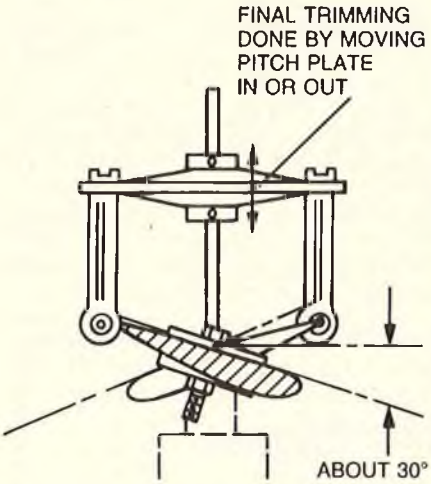

FIGURE 4B

I hope that the above sketches and text will help you understand tail setting better and don't forget that all of these pieces of advice that are given here and in other places are made as general comments. Each specific helicopter will have its own variations. The important thing to notice from the above is that there is a sequence which should be kept to and,

if you will do it this way, you will finish up with a much more effective and well-working tail rotor system.

Since this column will appear just before Christmas, I'll wish you a super new heli as a Christmas gift and lots of successful flights over the Christmas vacation. See you next year! □

R/C SAILPLANE DESIGN

from page 59/56

requirements. The wing section is a 15% thick 2.5% MCL semi symmetrical section worked up by Mike Bame.

The wing itself is my usual 4 panel poly with removable tip panels. The L.E. is sheeted. Area is 930 and "empty" flying weight is 41 oz. for a wing loading of 6.34 oz./sq. ft.^{2}

It does pretty much what it is supposed to do though it has not yet been tested in F3B speed runs.

Gary Ittner has a similar wing of 16% thickness which was flown at a quite satisfactory speed of 10.5 seconds. It launches very well and climbs in lift equally well, so it appears that this approach, at least with regard to the wing, is a viable one. □

EZ-FLI 2

from page 54

The G.20/.23 gave us acceptable ground speed in which the aircraft tracked beautifully on the hard grass surface. Once airborne, it became a real problem. The complete flight was on the verge of stalling at any moment. Although this engine fell within the guidelines of the manufacturers' specs, it was just too small of a displacement.

Back to the shop for an engine change. This time, the O.S. .30 was bolted in place with a very slight change required to the throttle linkage. This engine turned the stalling nervous flight characteristics into a very responsive aircraft. From Lift off to Touch down, it was a pleasure to fly. The instructions do not call out any control surface deflections. We started with minimum 1/4" aileron, 3/8" elevator and 1/2" on rudder. We found this very satisfactory, as the response is fast for snap rolls, loops and spins.

With the fully symmetrical wing, the EZ Fli is not a sailplane when the power is shut down. Keep the nose down slightly when landing and for sure, keep up good air speed. Learn to flair out very close to the ground and you can three point it every time. We were caught several times running out of fuel. It's best to time your flight so as to have some power for your approaches.

No engine offset was used or needed.

Conclusion:

The EZ 2 will get you in the air with only one evening of work. If you're relatively new in the hobby, maybe two evenings.

This model should not be considered as a first time airplane unless a good instructor is available. The instruction book is geared to the novice. The complete aircraft is well-constructed and built with quality wood and accessories. This is the ideal ship for the Sunday flier who wants to practice the various maneuvers and also for the pattern flier who wants some fun without using their contest ship.

Price of this EZ 2 covered model is only $129.00. For the modeler who likes to fly and doesn't have time to build, this is definitely the answer. Available from hobby outlets or direct from Columbia Model Crafts, 9366 Sharp Antler, Columbia, Maryland 21045. Phone (301) 596-0134. □

PELICAN

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blocks and 1/2" triangle stock in place as shown. The main gear for Pelican is a Hallco #B105-3 dural type. The gear must be cut in half and bent to match the height of the nose gear. The gear is secured in place, after covering, with three (3) #4 x 1/2" sheet metal screws on each side. Rough sand leading edge of wing and tip blocks. Finish sand wing. The wing assembly is now complete. Round off the corners of the tail surfaces and finsh sand.

Engine/Tank Installation:

Pelican is designed for a .09 or .10 size engine. Anything larger will produce flying speeds that will be less than controllable. The engine mount used is a Kraft type #KM-15. Mark and drill mounting holes so that mount is about center of the firewall. Also drill fuel feed and vent holes in the upper right and left hand corners of the firewall and drill throttle rod hole.

Fitting the engine to the model is somewhat of a cut 'n fit — try to allow about 1/8" clearance around entire engine.

Once fitting is complete, fuel proof engine and fuel tank compartments. Thrust line can be set by either beveling rear of engine mount or adding shims to rear of mount. Engine should not be permanently installed until model is covered and/or painted.

Radio Installation:

The radio used in the prototype Pelican was a three channel Futaba. Please follow the radio manufacturer's instructions for mounting. Trays are usually provided for mounting and require only hardwood or plywood rails to be glued into the fuselage. Total deflection for controls are as follows: Rudder — 5/8" left and 5/8" right; Elevator — 1/4" up and 1/4" down; Throttle — as required. **Do not**, under any circumstances, exceed the control throws listed above.

Placement of radio components should be as noted on the plans. The C.G. location will be very close to correct with this radio configuration requiring only minor adjustment, if any.

Covering And Finish:

To speed completion of Pelican it is suggested you use one of the heat shrink type covering materials. Again, follow the manufacturer's instructions for covering.

There is one item often overlooked in the completion of trainers such as this, orientation. If you cover the Pelican in a symmetrical color scheme it will be difficult to tell left from right when the model is flying at some distance from you. It is to your advantage to cover a wing tip with a different and distinctive color. There is nothing worse than being unable to tell which way the model is going, and this can have disastrous results! So, mark a wing tip!

Rudder and elevator can be hinged in several ways, one being with small nylon hinges. This requires cutting slots in the tail surfaces prior to covering. After covering, the nylon hinges are inserted and several small pin holes are made through the area where the hinge is. Apply several drops of cyanoacrylate adhesive into these holes to secure the hinges. Be careful not to get the CA into the hinge line as you will end up with a non-moveable surface.

Covering film can also be used as a hinging material. Before covering the tail surfaces, sand a 60° bevel on both surfaces of the stabilizer and elevator (bottom side) and also on rudder and fin. Iron the material into the groove on each side until the material adheres to itself. This makes a very strong and flexible gapless hinge.

When wing covering is complete, add tip washout of 1/2". This is accomplished by simply twisting the wing tip, trailing edge up, leading edge down, while applying heat. Hold the wing tip until covering cools. Be sure both sides have the same amount of twist.

The canopy can be painted to match the fuselage. On the prototype we used Pactra's Polyurethane spray. There is no particular window scheme for Pelican so mask off the windows to your liking. When the paint is dry (about 24 hours) run some 1/16" striping tape around the windows, this will add the 'finished look.' Canopy can now be installed on fuselage. Install as noted earlier.

Once covering is complete the engine may be permanently installed. Hook up the throttle control. Final throttle adjustment is made during test run-ups.

The recommended fuel tank is a Sullivan 2 oz. slant type mounted sideways. Pad the tank lightly with foam rubber and be sure to clear steering and throttle rods. Install hatch cover with two (2) #2 x 3/8" sheet metal screws and washers. Install main gear and all wheels.

The wing is secured with four to six rubberbands. Do not exceed eight bands as you could crush the wing. If you have not charged your radio batteries, do so now.

Flying:

(Editor's Note: It is highly recommended that any beginner in R/C before attempting to fly for the first time, obtain the help of an experienced R/C pilot. If this is not possible, then follow the outline listed below).

Before you load up Pelican and head to your favorite flying site, check the C.G. of your model. Add weight as necessary on nose or tail to make it balance as shown on the plans. Run-up the engine, checking to be sure it idles reliably and give it one last thorough shake down! Be sure everything is the way it should be before even leaving the house. Nothing is more frustrating than to get to the field and find that you have hooked up the elevator backwards or that the steering works opposite the rudder. You should arrive at the field with a model that is ready to go. Anything short of this type of

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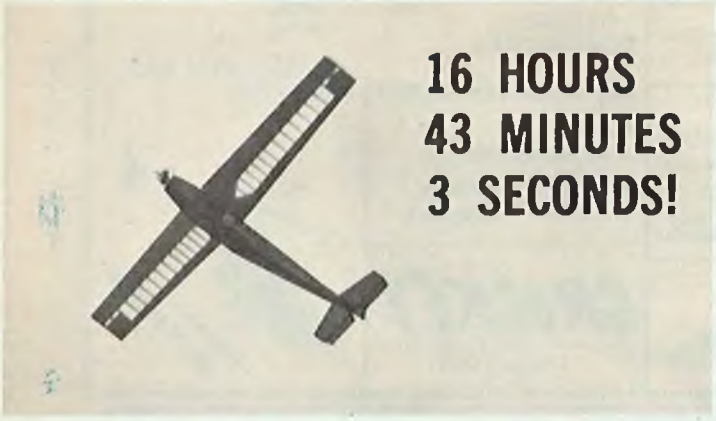
CEDAR RAPIDS SKYHAWKS TEAM SETS WORLD RECORD



16 HOURS 43 MINUTES 3 SECONDS!

Jack Finn conserved his energy during the long session of piloting by taking it easy in a chair, with snacks handy and transmitter on a stand.

An Iowa project that spanned four years of tests and experimentation came to a successful conclusion on August 29th when the World FAI piston engine endurance record was broken. A club effort, led and funded by Dr. Plenny Bates, the model was flown during the entire flight by Jack Finn. Powered by an O.S. Max .60 specially modified by Glen Die and using a custom made capacitor discharge ignition system, the engine was still running when the landing was made after midnight.

Needless to say, the requirements for keeping a model in the air for so long a time are very stringent. The structure must be as light as possible, yet strong enough to carry the heavy load of fuel. So we at Sig were proud our products played in the attack on the world record. The Cedar Rapids group feels that they can stay up even longer and will attempt to do so next spring, aiming at a 24 hour mark. We wish them luck !

Right: Tired but happy! From left, Dr. Plenny Bates, Emil Svercl (who designed and built the ignition system), and the pilot Jack Finn.

Photos by Dr. Plenny Bates and Ed Cocciola

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PELICAN

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preparation is only asking for trouble, and if you don't believe that, ask an experienced modeler.

Once you have made it to the field, fuel up and start the engine. The only adjustments that should be required at this point is a final mixture setting. Immediately start your taxi to the departing runway. While taxiing, get the feel for the steering and mentally prepare yourself for take-off. Arrival at the runway will consist of a quick run-up to clear the engine and your roll out to the runway centerline. 'Hit it' and go. Pelican will become airborne, depending on wind, in about 20 to 40 feet. Make an easy climb to get some altitude before attempting trim adjustments. You will note that turning response is slow which will give you time to react. For the first few minutes of flight make some nice wide oval turns and maybe a Figure 8 or two to get accustomed to control response. Now reduce the throttle to about half, let the plane slow down, and give it some up trim to maintain level flight. Try a few more turns and notice the same response in slow flight as with full throttle.

All you have to concentrate on is up and down, left or right, and slow or fast. Flying too slow will produce a stall. If this occurs it will be a very gently one. In a stall the Pelican will be in a mild sink with the nose trying to lower itself. The wings should remain level unless you do something like push on the rudder. Stall recovery consists of no more than releasing the elevator and adding a little throttle.

Landings with Pelican are so easy it's almost boring. All you do is turn

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PELICAN

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downwind and reduce the throttle to about half. Turn base leg and then final. As soon as you turn on final, reduce throttle to just above idle. Pelican is a floater and once on final, you will be more or less flying a small sailplane. Let it come down to the runway. At about 2' above the runway very slowly start giving it up elevator. Ya know what? You just landed. Bet you never flew one that easy before! Taxi back to the pits, stop the engine, and turn off the radio. While your at it, give yourself a pat on the back, you earned it!

Now do it again .... Happy flying! □

SUNDAY FLIER

from page 47/46

especially if the wing loading is heavy, the step cross-section will still have at least a slight "V" bottom, but with R/C models, the flat bottom at the step will work very well. The only problem with this type of bottom is making it. The intricate curves involved virtually dictate that the float be made in a mold. The "Wavemaster" hull, which was molded in ABS plastic, used this type of bottom, but with a boattail step in lieu of transverse --- mostly for appearance.

It should be fairly obvious that, in order for a seaplane to take-off, the wing has to be able to assume a lifting angle of attack. At what speed should this condition exist --- slow taxi, maximum spray, or at planing speed? The answer would appear to be planing speed --- but that is not necessarily true. Why? Because some airplanes will come up to planing mode well before the airplane has reached minimum stall speed, then, when you apply a touch of up elevator, the tail of the plane is depressed so far that the rear end of the floats digs down and won't let the speed build up to safe take-off speed --- or alternatively, the model lifts clear of the water due to "ground" effect --- in this case, "water" effect --- rises a few inches until the ground compression effect is lost, so the model stalls and plops back on the water. On the opposite end of the action, you put in a touch of down elevator just to be sure the model doesn't lift off and stall, then the nose of the floats dig in and you either flip or water loop.

So what is the answer? Ask five "experts" and you'll get five opinions.

For what it is worth, here's mine. First, the float design should provide enough latitude so that it is not critical whether the wing is at the perfect lift-off angle at one planing speed. A well-designed float will permit lift-off with as much as ten degrees latitude in attitude. There are at least two float designs currently available commercially which do just that --- Balsa USA and GB. There may be others, but these two designs are the most versatile that I know of. And what makes them work? The right contours and angles. Take a look at Fig. 3 to see what I mean.

The profile depicted in 3A works, but is very sensitive to the relative angle of attack which the wing has when planing. Too little, and the model won't rotate far enough; too much, and the drag created when rotation is introduced can result in no take-off, or take-off and immediate stall. The profile is also critical when the water surface is calm, due to surface tension over a large portion of the bottom and when waves get high, which make the nose dig in.

Profile B is excellent. It provides a wide latitude for both planing and rotation, and has another desirable feature in that the curved shape forward of the step will compensate for those landings in which the "flare" is insufficient and the nose of the floats might dig in. The curve makes the floats tend to "skip" rather than dig.

Profile C is also good. It actually gives a slightly wider latitude for rotation on take-off, but conversely, it does not compensate as well as profile "B" for unflared landings.

Profile "D" is intended for rough water and big waves. Even an R/C model should have a "V" bottom if this shape is used, since it is a real "basher" as it goes through the water. The SP-5B flying boat, used by the Navy for submarine patrol prior to the P-3C, used this hull shape, and could operate from very rough seas. (See Photo #1.)

Next month (unless I get another one of those fantastic chances to go visit faraway places) we'll delve deeper into the aspects (secrets) of wing tip floats, planing angles, take-off techniques, water rudder "drag compensators" and fineness ratios (length to width).

Also, by that time, I'll probably have some irate letters complaining about the first installment, which will run something like this --- "Hey, dummy. You said (fill in your own subject), and you're wrong. This is the right way." To which I'll just have to say "Well, I didn't say there's only one way to make seaplanes work. All I can say is that what I've done works for me."

So keep 'em floating, get 'em going, get 'em up, and keep 'em flying! □

U.S. SCALE MASTERS TOURNAMENT

from page 41/38

A slick MonoKote job on John Workman's Laser 200F brought in a 94 static score and the reliable smoke system hooked to the O.S. .61 FSR helped him to a 15th place. Garland Hamilton's Corsair needs no introduction. It's a superb looking ship and Garland flies it so aggressively that he always scores well with it. This year was no exception but his little caper between rounds caused the Corsair to go groundhog hunting. More about that later. Tom Weemes put in a couple of great flights with his scratch-built Gee Bee powered by a Webra .91 but a glitch caused Tom to bring his flying career at the Masters to an abrupt end. Tom Cook (remember him?), had the Phantom looking real good for a two year old airplane with hundreds of flights. He's using two Jet Hangar fans and a couple of K & B 7.5's for power and the 17 pound ship flies like a pattern ship. Phil Sibille did so many mods to his Pica Spitfire that Pica wants to bring it out as a Precision Scale kit. This ship features B & D retracts and a centerline bomb drop. The largest plane there was Skip Mast's big Hercules in Coast Guard markings. Four K & B .21's hauled the bird around like a big Eagle. Besides the Fowler flaps, the ship featured homemade retracts and a spectacular cargo drop (when it worked).

Larry Wolfe somehow contracted Charlie Chambers to build and enter a Jet Hangar Cougar and good old Charlie came and showed Larry how to fly the thing. Larry mumbled something about clipping the wing a few inches and renaming it the

Grauco. Says he has documentation from the Honduras Air Force. Probably does. Another weird looking bird was entered by Len McCoy, a Dornier 23G. This is a twin engined bomber from the late 30's I would guess. Regardless of how unusual the design was, it sure flew well on the two O.S. .40's. Hal Perenti blew the Mr. Congeniality award when he blew his cool when he was asked for the 93rd time if his Bearcat was from a Top Flite kit! We all know it's a scratch-built plane and that Top Flite used the perimeters for their kit, don't we? Anyway, Hal flew it to a 7th place. Ralph White read the article in RCM about certain P-51 Mustangs being green instead of a particular blue and decided to paint his blue anyway. His documentation shows blue, so blue it was. Dan Santich brought his Baby Bullet to the contest and finished the lettering in his motel room. Bob Underwood's Hiperbipe grabbed high static in Precision and Burnis Fields entered a rather stock VK Camel. That's the extent of Precision, three airplanes. Bob's Hiperbipe took first place, Burnis grabbed a second place and trouble plagued Danny Boy had to settle for third. But that's not all. You've got to know about all the strange things that happened that may seem humorous to us now but borderlined on being a tragedy then. Some were a tragedy then as well as now!

Dave Platt had a very good chance to grab a place among the top five and maybe even win the Scale Masters. His Macchi performed almost flawlessly almost all of the time. However, when things go wrong, they just go wrong. David's biggest problem was that his engine would quit after about seven maneuvers. And, it always happened when he had a string of nine's working for himself. And then to make matters worse, he'd miss the field on his forced landing. Now, I

ask you the same question everybody else asked David at the buffet dinner Saturday night. How the hell do you miss a field the size of an aircraft carrier from an altitude of 4,000 feet? Or, how about the very clever Phil Sibille suggesting to Ted White, Tom Czikk and Garland Hamilton that they fly a combat demonstration between the 4th and 5th rounds. All four ships screamed into the air and started chasing each other around the field. After a while Phil called for a formation fly-by and all four ships, the Spitfire, Focke Wulf, Corsair and Martin Baker, came screaming across the deck at less than 30'. "Once again," yelled Phil and the other three followed the Spit around the pattern for one more high speed, low pass. Only this time, Mr. Hamilton decided that he didn't care for the inverted gull wing so pronounced on the Corsair and proceeded to roll it over on its back about halfway down the chute while being chased by Ted's warp 6 Martin Baker. I guess that the guys had planned to do a bomb burst maneuver similar to the one performed by the Blue Angels and the Thunderbirds because Ted reached the end of the field and pulled straight up, Phil broke to the right, Tommy to the left and good old Garland broke straight down! I won't say that it was the worst crash in the world, but the largest piece of Corsair I saw laying around was the tail wheel! Garland said that his next one would be even better. Next Corsair that is, not his next crash!

And that ain't all yet. On Saturday a similar crash occurred when Larry Wolfe's Kfir rolled over on its back right after lift-off. Talk about a basket case. There were more parts laying around than would be found in the original kit. After about two hours of constant pleading, Chris Abate and Frank Sandor from Loctite and yours truly, talked El Lobo into at least trying to repair the jet in time for Sunday's flights. Well, to make a long story short, the boys from Loctite and Larry stayed up until the wee hours of the morning and actually put the bird back together. Really, it was a minor miracle. They used up about four bottles of the new Loctite CA glue and not once did the adhesive fail while the fan was screaming away at 23,000 rpm's. Oh yeah, the reason for the crash was finally determined after an autopsy by Mr. Goodwrench. Seems that Larry had a severe case of left turn on right stick. You know, installing the aileron servo and not checking which way it travels! And how about Brian O'Meara? Not only did the airlines lose his airplane and baggage but he had to stay up all night

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to fix the P-47 after they found it. Damaged of course. Next day his engine quit somewhere over Cleveland and the resulting dead stick landing is about 300 yards short of the runway and about 9' below eye level. The only low spot in the whole area and the Jug sniffed it out like a Retriever. Last thing I heard was Jody crying on Bob Frey's shoulder, asking how he could do such a thing to Brian. Guess Bob was the one that suggested the Jug in the first place. I think it's his fault, too. Lot of nerve sucking in a nice kid like that, Bob! Next, we had Skip Mast doing slow rolls with a four engined Hercules. Then came a loop, an inverted pass, and who knows what else. You ain't seen nothing till you see a crate that size doing rolls about 15' off the deck! I was really impressed. From the sound of Dan Parsons' horn, so was he. From the sound of the applause, so was everybody. Even Platt clapped.

Well, it's all history now. The flying is over, our nerves back to normal. But, we can't forget the prizes and trophies. If you didn't win anything I guess it's pretty easy to forget, come to think of it though. Seriously, the trophies were taller than most contestants and very, very nice. Dale said that almost everyone he called for a donation to this year's Masters, was more than cooperative. Along with the numerous smaller awards and financial help, we saw large trophies from Loctite, Sig, Scale Squadron of Southern California, South Indiana R/C Club, Mallory Models, National Association of Scale Aeromodelers, Bob and Faye Bayne and a couple of nice radios from Futaba.

Some ideas are now being tossed around for next year's event and I certainly hope that they are decided upon soon so the various people wishing to compete will have an idea on what to build. I heard that there is a good possibility that Giant Scale models will be able to compete per regular Stand-Off rules with a 40 pound weight limit. Also there has been some talk about selecting the scale team from the Masters instead of the Nats. Time will tell. One thing is for sure — the U.S. Scale Masters is a worthwhile program. Whatever we can do to keep the program working should be done. To compete in a contest of this magnitude provides an exhilarating feeling to say the least. And that's just to compete; think what winning could do for you. □

Keep America Beautiful

The woods, the fields and waters of America don't need a carpet of litter left by inconsiderate persons. Hunting, fishing, camping, or boating, keep America's outdoors clean and green.

BUCKER JUNGMEISTER

from page 36/32

three snaps, don't just neutralize elevator — push in full down!

Snap-Roll:

Perhaps you'd better practice this one before trying the Avalanche! Throttle back to a cruise at 1/4 power, then open up and simultaneously apply full up and full left rudder, keeping ailerons neutral. As soon as she snaps, neutralize elevator to reduce drag — she'll still autorotate — and when 3/4 of the way round, commence recovery using opposite rudder. She snaps faster to the left than to the right. You can get two or three snaps as described above.

Inverted Performance:

This is only fair, but you can fly the tank out inverted. Beware of holding two much top elevator, or she'll lose speed and wallow all over the place. Outside loops are impossible to do because of the low power and lifting section. Inverted pull-outs from a vertical dive are scary.

Chinese Loop:

This is a loop the top half of which is occupied by a roll. An interesting exercise in coordination! Try two rolls!

Knife Edge Flight:

Take her up to about 50', dive at about 10-15° to 25' and you'll have enough speed. Raise the nose slightly above horizontal, roll left, say, and hold her with wings vertical using aileron. At the same time apply about 3/4 right rudder — not too quickly or

she will stall! Once she is stabilized, slowly feed in the rest of the rudder throw as needed to maintain height as speed falls off. Control heading by rolling the wings over or under vertical as the elevator seems ineffective as a rudder. Roll out and neutralize the rudder simultaneously. After flying a short distance level in knife edge flight, she gradually loses height. However, she is genuinely flying all the time, not just hurtling ballistically. The engine starts to labor towards the end.

Lomcovak:

This isn't always a success, but I will describe the entry conditions as you may like to try this maneuver with your existing model. What happens after entry depends upon speed, attitude, sequence of control application, and your lucky star. The ship's reaction can be anything from a torque roll to a tumble about all three axes at once, perhaps finishing by going backwards upwards, before falling into an inverted spin.

Dive at about 30° to a good speed, pull up to a 45° climb, then snap in full left aileron and, as she rolls inverted, add full down elevator followed by full right rudder. Then watch! If you don't see anything impressive develop during the next three or four seconds, pull her out of the inverted spin she will now be doing, climb back up and try again with a different entry speed — slower perhaps, but still greater than maximum horizontal speed. What you are really aiming for is an outside snap roll, followed by a forward loop on the spot while the ship slowly rolls through 90°, followed by a snap into an inverted spin. Experiment with the throttle, e.g., chop the throttle just before the elevator/aileron application and open up when applying rudder. It's fun trying this one! Another nice Lomcovak is to dive to maximum

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speed, pull her up vertical. Roll left one revolution and, while still rolling, add down elevator, whereupon the tail will kick out. Add right rudder and she'll do a 'conic' with the engine at the apex of a cone, the tail describing a circle at the base of the cone. Lomcovaks need stacks of roll input, and I have a dual rate switcher on aileron to increase throw to 1/2" for this maneuver.

Landings:

Approach fast and flat, then when almost touching, ease back the stick and she'll manage a three-pointer. Don't ease back too high or she'll drop like a stone. In strong winds, lay her on in a wheeler. She runs nice and true, the "springing" absorbs bumps nicely, but be ready with the rudder at the end of the run since the forward wheel position can initiate a ground loop once air flow over the tail surface is low.

General:

If set up as described, she will appear a trifle nose-heavy; the power of the controls overcome this feel in maneuvers. For instance, when spinning to the left she will continue to autorotate even if you neutralize the elevator. In fact . . . no! I shouldn't . . . er . . . or well, okay, I'll tell you! Enter a left spin on low throttle. Slowly feed in right aileron followed by full throttle, then feed in **down** elevator! She will wind up in that spin like a Catherine Wheel! If you throttle back and neutralize controls she will exit all by herself but can take up to four turns, the last two pointing vertically downwards (in a normal spin she stops like now!). So remember, the most useless commodity in aerobatics is the amount of sky above you, and we don't want lots of Jungmeisters denting the landscape. Using the above technique, I've achieved over 100 consecutive spins in one vertical drop without crashing.

Remember, also, that this is a Bucker, not a Pitts. The spectacular Pitts has over twice the power/weight ratio of the Bucker and, therefore, has a fantastic vertical performance. I reckon that a .25 powered Pitts would need to be about 30" span so as to reduce drag and weight to an acceptable figure — you'd be carrying at least 1½ lbs. of engine and radio and you could not afford more than 16 oz. for the airframe. Such a ship would be too small to see and control comfortably.

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BUCKER JUNGMEISTER

from page 138/32

The Jungmeister handles very much like a trainer and she has no vicious habits at all. She'll fly acceptably well on a 'normal' .20, but a .25 gives that edge needed for maintaining height during aerobatic sequences. She may even handle a .35 wearing an 11/4. The best props to date are the Tornado 9/4, on the H.B. .20 and a Taipan 10/4 on the H.B. .25 or Webra Speed .20. Under-powering will lead to disappointment.

Conclusion:

If your current model will not do all of the above mentioned maneuvers and you can still resist this super ship, then . . . I'm speechless! ☐

PIT STOP

from page 29/28

understand why. Well, our 16 year old daughter, Julie, has just recently started racing, and she adopted the nickname "Killer, Jr." As a matter of fact, they are both driving quite well now and I told them their nicknames don't apply anymore, but they decided to keep them. They both qualified for the "B" Main, which Julie won with Lee Comito a close 2nd, Dale Gibson 3rd, and Midge 4th. luckily they were never both on the same spot on the track.

Sam Ellis had won the Sylmar race earlier and now he won the Monterey race, with some very good driving. But right behind Sam was Larry Stevens,

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PIT STOP

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who had won the Bakersfield race and now had the points lead in the Series. Lee Hall grabbed 3rd spot.

Amateur Stock Class

Young Mike Petruzzi drove the best race of his career to win the "A" Main, with a fast charging Randy Tentschert taking 2nd and Doug Kott finishing 3rd. But 3rd place points was good enough to give Doug Kott 1st place in the points standings with Ken Stephenson taking 2nd and Randy Tentschert finishing 3rd.

Expert Stock Class

Time for the Expert Main event. The ten cars filled up the whole starting line, and I ended up on the far outside when the race started, and I was immediately knocked into the wall. Kent Clausen got a great start from the inside and took the lead with Butch Berney in hot pursuit. Kent continued to lead with Butch trying to keep pace. Lavacot had gotten bumped around at the start, but now he was passing cars. I had gotten out of the boards at the start and managed to pass a few cars, but a couple of crashes took care of any of my chances. Lavacot finally caught and passed Butch to finish in 2nd place with Clausen taking the win.

Lavacot had the Series won with his three straight wins, but I'm sure he wouldn't have minded winning four straight. Jim Aguirre finished 2nd in the Series with Kent Clausen taking 3rd.

Modified Class

Top Qualifier honors went to Mike Lavacot again, with Kent Clausen in 2nd and I was just two seconds behind Kent in 3rd. Now, if I could just get a better start in the Main.

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ERRATA

On Plan No. 851 (Hooker), the C.G. was shown incorrect. It should be 6½" back from the point of the wing leading edge.

PIT STOP

from page 144/28

Novice Modified Class

Larry Stevens had the track all figured out in the Main, as he took 1st place with Rick Marks in 2nd and Gary Slayton 3rd. Sam Ellis took 4th, but those points gave him 1st place in the Series, with Gary Slayton in 2nd and Larry Stevens 3rd overall.

Amateur Modified Class

Ken Stephenson qualified faster than most Experts and took an early lead in the Main event, with Randy Tentschert in pursuit. Three times Randy caught up to Ken, but then Randy would tag the boards. Ken just drove error free to take the win with Randy 2nd and Mike Toland in 3rd. The 2nd place finish, however, gave Randy enough points to win the Series. Ken Stephenson finished 2nd with Mike Toland 3rd. Needless to say there was a bunch of Novices and Amateurs moving up after this series.

Expert Modified Class

This was the feature event of all the races, and it had added interest, because there was a number of drivers that had a chance to win the point Series.

I was lined up in the middle of the starting line this time, hoping for a better start, at least there were two or three cars behind me. Tim Neja got an early lead, but Kent Clausen was only about 2' behind Tim. It took about four laps, then Kent got by to take the lead. A few laps later, Frank Killam passed Tim and took over 2nd. I was passing a few cars and moving up, when along came Lavacot. I could see him getting closer and closer and after about four more laps he was right behind, so I moved over and let him by. We both passed Tim. Then Lavacot passed Killam and took out after Clausen. With about six minutes gone and two to go, he caught Clausen then as Lavacot was going around this left hand corner, his car turned right! He was put back on the track, but he was now having steering problems, which turned out to be a servo. Clausen re-took the lead and went on for the win with Killam in 2nd and myself about 15' back in 3rd.

The servo not only cost Mike the race, but also the Championship. Kent Clausen won the Series, with Lavacot 2nd and Jerry Case taking 3rd.

All in all, a most enjoyable weekend of racing, as it always is in Monterey. ☐

from page 27/26

you should provide for a spray area which is not in your regular shop, and it should have a fan moving air out of it. If you spray in your regular shop, you are going to have a light dusting of paint all over everything, including yourself.

One way to provide for a spray area which requires little construction and does not permanently interfere with your shop area, is to make up a small room in your shop with the plastic vapor barrier. Cut sheets of this material to the appropriate size, and then roll them up on lengths of wooden dowel cut to the correct length. The dowel may be stapled to the plastic sheeting and the free end of the sheeting stapled to the ceiling. When the paint area is in use, the dowels will hold the sheeting close to the floor as an enclosure and, when not in use, the plastic may be rolled up on the dowels and fastened temporarily to the ceiling so the rolled material stays near the ceiling, out of the way. This area should be provided with an exhaust fan to the outside of the shop which will prevent the spray accumulating in the shop and your lungs. If this area is relatively small, the fan required will not need to be very large and a simple arrangement of piping as small as a drier vent pipe may be adequate to exhaust the overspray. This should be so arranged outside so it is clear of your house or shop building in order to prevent the spray from settling back on the outside of your home.

One local modeler was busy last Winter painting a model in red and the furnace coming on periodically picked up the overspray, circulating it through the house, which provided his wife with a washer/dryer set with a faint pink cast, and some areas around the furnace vents upstairs, which showed a slight pinkish cast as well. That's the kind of excitement your wife does not need, and neither do you!

Be sure to observe any warnings on the paint you are using and also be sure to mix properly, using the correct reducer. Some automotive finishes do not have drying reducers in them, and if you spray them as supplied, you'll wait a good long time for them to dry!

I have had my best results with enamels rather than lacquers. The enamels dry fairly quickly, although not as fast as the lacquers, and the problem with some lacquers is that they dry so fast they are drying while

in the air traveling toward the surface you are trying to paint and they end up with a dull, granular kind of finish, which does not look good at all.

Be sure the various primers and finish coats you are using are compatible with one another. It's pretty discouraging to discover, after the fact, that the paint used reacts with the primer to provide you with a wrinkle finish where you wanted a smooth one.

I have also found that if I pull the masking tape off before the paint has dried completely, the demarcation line between the two colors is not as prominent as if I left the masking tape in place until the finish had completely cured. Also, the masking tape does not adhere so completely to the color it's on as to remove paint from those areas already completed.

Once the job is finished to your satisfaction, a coat of automotive wax does wonders for making a completely shiny surface. It will also protect the finish just as it does on your car as well as making it look great.

Selecting the paint to use is something you'll have to do for yourself. Obviously, no one has used them all, and I'm no exception. If you find an enamel which has a plasticizer available for it, use it with the paint as recommended. Some paints will have a tendency to crack or craze when applied to a flexible surface such as the Dacron and the plasticizer will prevent this happening.

If you have an auto body man in your club, or in your circle of friends, pick his brain a bit as he will know better than anyone what will and what won't work for you. He may well have small quantities of paint left over that would be of use to you as well. There are few jobs he does that use exactly one quart, or one gallon, and there are few body shops around who do not have small quantities of paint lying around that are eventually destined to be thrown away.

Any of you modelers who are also body men, and have experience with the use of automotive finishes who care to make some recommendations, they would be most welcome, both for my own use, and for passing along to others. One of the nicest finishes I have seen in a long time was done by Bill Hunt of Naples, Florida, on the Miles Sparrowhawk he had at Las Vegas last year. Bill is a professional car restorer, and had a body shop for many years. It certainly showed up in the finish he did on the Sparrowhawk. He used a combination of K & B and Imron to achieve the immaculate job he did, and the finish drew a good deal of attention.

For your own safety, be sure you use the epoxy type paints (like Imron, and

others) according to the instructions and warnings on the containers. Some of these materials are capable of doing permanent damage to your lungs and other parts of the body, so use them carefully, if at all. The effects of some of these materials are cumulative and long lasting once they enter the body. Better to settle for a less satisfying finish than to have your modeling career ended prematurely, especially if it happened because you failed to heed a warning label.

★

For those of us who live in the snow belt, another season has passed with all the attendant joys and sorrows they bring us. Many of you will be embarking on a project for the 1982 season, and we'd all like to hear about them. Black and white pictures are always welcome here, and I'll use as many as I can of the interesting ones. If you have come up with a new way to do something, or a new wrinkle on something we have been doing for years, let me know about it, and I'll get the word out.

To those of you who are **not** in the snow belt, and who'll be flying all Winter, while we hibernate . . . good flying and soft landings . . . see you next month. □

ERRATA

In the December 1981 issue, on page 74, there was an error in the FabriKote article. Photo #1 called out FliteKote and should have read FabriKote. RCM apologizes for the error.

POWER BOATING

from page 24

bearing output shaft and output arm should be heavy duty so that they will handle steering loads without damage. These waterborne units should be available with or without transmitters since most competitors will need more than one for all their boats and maybe a spare in case of a radio failure. Well, that's my most wanted list for 1982. If you readers have any other items you just can't wait to buy, drop me a line and we will pass this information on to the manufacturers.

I am very gratified with the number of letters I am getting each month. I am also getting a bit snowed under with the answers so please understand that if I don't answer each one as quickly as I probably should, it's not because I am not trying! Remember to enclose a stamped self addressed envelope or your letter will automatically go into the "later" file.

Dear Howard,

Help! *I'm building my first inboard, a Dumas Quickie 40 with a K & B .61 with Perry Pump and carb. Also, I have purchased all Octura hardware, rather than Dumas hardware, including an Octura "Strudder." My current problem is the stuffing box. I had planned to use the method recommended by Octura, i.e., use a hardened steel 3/16 rod in a 7/32 brass tube for a stuffing box. However, lately I have heard that this is definitely not the way to go. Instead, I have been told to use a K & S brass tube stuffed with 5 needle bearings exactly like the ones used in the Strudder, two on each end and one in the middle of the stuffing box separated by the telescoping tube inside, to keep the bearings apart. Also, I have been advised to use boat trailer wheel bearing grease to pack this stuffing tube arrangement with. Is this the way to go??? Is there a better way? I intend to use this rig primarily for enjoyment on the lake, but I may want to enter it in a local competition or two, although it probably won't keep up with the hot .65's. Also, what kind of speeds would you expect this arrangement to attain? Is there a particular prop you'd recommend trying for this set-up for best*

straight-away speeds? Any advice you can give me would be sincerely appreciated. I have been running a Drag'n Fly Mark II with an outboard for 6 months now and really enjoying it, but wanted something faster, yet still dependable. I read your column in RC Modeler each month. Keep up the good, informative work, it is sure appreciated.

Fred Medel
Coldwater, Michigan

The simplest stuffing box you could use, Fred, is a simple 1/4" O.D. brass tube and a 3/16" flexible drive cable. In the September issue of RCM I outlined such a cable drive system suitable for hydros. Since you have already purchased the Strudder you can use this combination strut and rudder assembly on your boat instead of the parts shown in that article. I would recommend that you use the hydro strut (which has a flat pad on the bottom) instead of the mono strut normally supplied with the Strudder. The other methods you describe will all work but are much more difficult to set up and to maintain properly. They also restrict the amount of strut angle and depth adjustment that you can make. You should use "Sta Lube" waterproof boat trailer wheel bearing grease when you lube the flex shaft.

I'm not sure what performance you should expect with this boat. The K & B 61 is a fine R/C airplane engine but its power output (approximately 1.25 hp) is not comparable to the 3 hp racing 7.5 cc engines that the Quickie 40 could be powered with. A better combination would be using a K & B 40 Sportsman Marine engine in this boat. The weight of the 61 is much greater than the weight of the 40 and its horsepower is comparable to that of the K & B 40 when it is on higher nitro fuel. We have seen a couple of Quickie 40's running with the Sport 40 engine and it is a great beginners hydro. Most fellows are using Octura 1450 or 1455 props on their boats and are achieving approximately 45 mph. If you use your K & B 61 you will probably not exceed this speed because of the lower power to weight ratio. If you power this boat with a hot 7.5 engine on high nitro fuel you will have a bomb on your hands. It is very light and should be capable of 80 mph straight-away speeds using Octura 2.5 or 2.6 propellers. However, I would not expect this light hull to survive many high speed blowoffs at this speed.

Dear Howard,

First let me start this letter by telling you that I am new to RC boating and that I am having a few problems. The boat and engine I have are a Prather Deep Vee 40 with a stock OPS 40 with the tuned pipe that comes with this

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engine. The running hardware on this boat is the hardware Prather sells for the deep vee. The prop is a JG 3-I-22 and the fuel used in the engine has 10% nitro.

The boat was built following Prather's instruction book and I feel everything is as true and square as it can be.

Now for the problems: The boat when running in the water will make a right hand turn without any right rudder being given. When I then put in left rudder to keep the boat going straight, the boat will start to slow down. The fuel tank is mounted in the center of the boat, right behind the engine and the balance of the boat is right on the money.

I would also like to know what I can do with this engine so that I can get more speed out of it. At this time I do not have plans to race the boat, but would like to in the future.

I have not been able to get any help from the local hobby shop on my problems and the people who run boats have been of some help, but the major problem is still the right hand turn.

Thank you for any help you can give me.

Charles Baxa
Addison, Illinois

A deep vee that turns right when the rudder is in neutral is out of trim. I assume from your letter that you have checked the turn fin and strut for alignment and that your cavitation plates are not below the level of the hull bottom. You should also check both sides of the hull bottom for flatness. The hull should be **absolutely** flat and not have any concaved areas. Monoplanes ride on a varying patch of water. The ideal situation is to reduce the size of the wetted area as speed increases until the hull rides on the rear of the hull-trim plate combination. The most efficient (best lift for the least drag) planing surface is a flat surface. If the hull bottom is convex (like a rocking chair runner) the bottom is said to have "rocker." Hulls with rocker tend to ride nose high and if disturbed tend to be unstable and blow off easily. Hulls that have a bottom that is concave are said to have a "hook" in them. The concave bottom produces a suction that tends to keep the hull on the water but produces higher drag. The usual mono set-up uses a flat hull

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bottom in combination with a set of adjustable trim plates that control the attitude of the hull by adjusting the amount of rocker or hook required to make the boat run in a stable, trimmed condition.

If the right side of your hull has more hook than the left side, the boat will suck down on the right side and turn right because of the increased drag on that side. In addition, the propeller torque reaction tends to roll the boat clockwise (when looking at the boat from the rear) causing a right turn at a neutral rudder setting. This torque can be cancelled out by lowering the outside portion of the right trim plate and by raising the outside portion of the left trim plate. This trim plate adjustment produces a torque that tends to roll the hull counter-clockwise and will make the hull track straight with neutral rudder. In this way the trim plates of your boat act like the ailerons that roll an airplane. If you find concave areas, especially aft of the turn fin, you should fill them with a mixture of Hobbypoxy Formula 2 and microballoons. Sand the bottom until it is flat on both sides. The boat should then respond to the suggested trim plate adjustments and run without further problems.

From your description of your set-up I think you can increase the speed of your boat by selecting a smaller propeller if you intend to use low nitro fuel. The 3-I-22 is only suitable if you use 40% nitro or higher. Try a pipe length of 9½" measured from the exhaust port of the cylinder liner to the end of the diverging section of the pipe. Try J.G. H-25 or I-25X propellers if you stay with the 10% fuel. With this set-up your OPS should be running at about 20,000 rpm. Modifying your engine should be attempted only after you have experimented enough to be sure that you have found the best combination of propeller and pipe length in the stock condition. Someone with your experience should not worry about engine "hop-up." The OPS is a good design and it will take a lot of work to increase its performance very much. If you want better performance I would suggest that you buy one of the 7.5 cc (.46 cubic inch) marine racing motors that are currently on the market. The increase in displacement over your 6.5 cc motor will give you more power than you can achieve with all the hop-up techniques applied to your OPS.

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POWER BOATING

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Dear Mr. Power,

I model alone — no boat clubs between St. Louis and Chicago. I've built 6 wood R/C boats so far (Dumas Competition D.V., Hot Shot, etc.). I do enjoy **building** *as well - spend most of my free time doing so.*

I do enjoy designing my own R/C planes and would like to design a "sport" — "kinda fast" hydro. Outrigger is okay — for two Fox .15 Schnuerle BB's. I used one in a Dumas "Lil Rascal" with the Dumas flex-cable drive, JG F-20 prop, and high compression head button. I moved the rudder out one inch from transom and it is centered so that it would turn **both** *ways. Successful boat. Here's what I'd like to know.*

Is it feasible to use two separate drive systems? A gear box is too expensive (and maybe not feasible for .15's?). Two flex drives? Can you recommend a basic kit to use as the hydro's hull? (Enlarge the "Rascal" by 1/3 or 1/2?) On using twin props — is there a minimum distance they should be apart — or away from rear sponsons? Do I need twin rudders? I'm planning on both engines feeding from same tank. One throttle control for both engines. Comment? Any reason not to have engines not running true parrallel — to bring props closer together? Any reason (to save width of boat) **not** *to have engines side by side? Note: I am* **not** *involved in speed competition! Thanks.*

Don Udey
Chatham, Illinois

It is not only feasible, Don, but very practical to use two separate drive lines for a twin engined hydro. You set up each drive line just as you would a single engined boat. Flex drives are

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good because of the ability to adjust strut angle and depth. You could use just about any hydro kit that was designed for 7.5 cc engines. Most of these kits have sufficient hull width to mount twin engines side by side. The twin props should be mounted far enough apart so that the biggest diameter propellers you are likely to use will have about 1" separation between the tips. Most hydros run well with the props mounted a couple of inches aft of the transom in an outdrive configuration. I would recommend using two Octura surface drive strut assemblies mounted on the transom. I would use a single rudder mounted on the centerline of the hull with its leading edge about an inch behind the prop trailing edges. This set-up will give you excellent turning performance to the left as well as to the right. The central mounting location keeps the rudder and its support out of the twin rooster tails which reduces its drag. I would use a separate tank for each engine for simplicity. It will probably be hard to get both engines to feed properly from a single tank and since the single tank would have to be larger than two tanks, it would be more likely to suffer from foaming due to vibration. A single throttle servo would be adequate but care must be taken to syncronize both throttles very accurately so that both engines accelerate together. The engines are usually mounted parallel because most twin motor mounts are machined that way for simplicity. If you use flex drives you can run the drive lines and struts at an angle with respect to the centerline. You should not, however, toe the struts out to bring the props closer. This reduces prop efficiency and makes any asymmetrical thrust tend to turn the boat more than if the struts are toed in. There is no reason for having the engines exactly side by side. In fact, my own twin .65 powered Wing Ding has its engines slightly staggered fore and aft to allow the carburetors to clear each other. If they were mounted side by side the motors would have to be mounted much further apart than is practical. Just make sure that the most powerful engine is mounted behind the weaker one so that it tries even harder to finish the race ahead of that other motor!?

Well, that does it for another month. Send your comments, photos, and

information to the address at the end of the column.

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CUNNINGHAM ON R/C

from page 23/22

Your Lazy Ace is still very popular in Holland, now two years after the article in HB Model & Techniek (the Dutch RC magazine). I am still being phoned for information regarding the airplane! As I am now a very regular contributor to the magazine amongst other things; I write a column on R/C flying called "n tikkie up" (translated: just a touch of up). The Lazy Ace 2 will appear in the magazine with reference to the first article, and the way to order plans from RCM.

It is a pity for us Europeans that the rate of the US dollar is very unfavorable at the moment. In 1979, when you visited Holland, a dollar was worth about 2 Guilders. At the moment we have to pay 2.90 Guilders for the same dollar, and that puts the American exporter to our country in an unfavorable position. At the end of last year Henk and I bought the Byron F-16 and Mig-15 for an extended review for the magazine. We paid Dutch Guilders 1400, in total, which today would be around 2000. Now, because of all of this you might see more European imports in the RC business in your country. Some very good products are made; especially in Germany the kit and accessory business is flourishing.

We still fly at the same field you visited two years ago and, although we are unable to get it very smooth due to the many rabbits who like to dig their holes in our runway, we hope we can stay there in the years to come. Radio-wise, the situation is very good here now. At the moment there are 13 channels on 35 MHz dedicated to RC flying only. A number of channels on 27, 30 and 40 MHz can be used for any form of RC but, as I said, 35 MHz is for flying only, which is an important safety factor. Airplanes over 5kg (about 11 lbs.) must use 35 MHz, according to the current regulations. Maximum airplane weight is 20kg (45 lbs.)now.

If you plan to be in Holland on your next European journey, then please let me know.

Yours sincerely,
Cees

I have several copies of the magazine HB Model & Techniek and it is a very good magazine. The only problem is that I cannot understand a word of what is written. Always

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makes me feel pretty darn dumb to receive a letter in perfect English from someone in Europe when I can't even say "Hello" in his native language. Most American suppliers have suffered a very noticeable drop in their export items due to the change in relation to European currencies during 1981. Of course, for several years prior to this the opposite was true, the European currencies had assumed a very strong position against the dollar, thus causing such things as German made engines to soar in price as the dollar simply wouldn't purchase many Marks. This year the buck has regained its normally strong position, so the price of some imported goods should start to come down. In actual practice, though, it seems that prices are always quick to go up, but very reluctant to come down. Take the case of balsa wood. The price of balsa has been soaring for the past couple of years, even though it has ceased to be the prime insulation used on LNG tankers and, even with the resultant surplus, the price continues to escalate. Economics seem to be all screwed up nowadays.

★

Let's end this month's dissertation by investigating that old bug-a-boo engine starting. Most beginners are not very skillful in engine starting, and many of them really don't regard that spinning prop and running engine with the awe to which it should be treated. So, let's take a look at simplified engine starting and running.

First, let's make a couple of assumptions. Let's assume that you have purchased a new engine, equipped for RC use, complete with throttle, glo plug, etc. Also, that you **have not** been tempted to take apart the engine just to see what is inside. Don't take it apart, and don't fool around with all of the little knobs on the carburetor. Also, let's assume that you have purchased a .60 size engine. Consult the engine spec sheet for the size prop to be used during the break-in period — generally a 12/6 or an 11/7.5 for a sixty. Most modern engines can be flown just about out of the box and, as a matter of fact, most beginners show up at the flying field with their new bird ready to go without running the engine or breaking it in. Let's consider that this is the case.

What we are really driving at is not how to break-in an engine but, rather,

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easy starting at the flying field. Position the prop on the engine shaft so that the prop blade is at the two o'clock position when the engine is just entering into the compression stage. With the prop in this position you can flip the engine over with your fingers with a sharp upward movement that will carry your hand away from the spinning prop should the engine start. (Left handers will have to be content with starting the prop on the down stroke side, learning to pull their hands away with the flipping motion.) Tighten the nut on the engine shaft securely with the proper tool, never with a pair of pliers. Purchase a four-way wrench at a hobby shop for best results. Close the needle valve of the engine (main needle valve only) all the way, then open it four full turns. This applies only to engines that haven't been run before. If your engine has been running, you generally don't need to mess about with the needle valve unless you change fuel brands or fly at a different flying field with a different elevation. Leave the glo plug clip off, open the throttle all of the way, place the finger of your left hand over the intake and choke the engine, pulling the prop through full rotation five or six times. This should draw fuel out of the tank, into the fuel line, into the curburetor, and allow a bit to get up into the cylinder. Remove the choking finger and turn the prop over four or five more times. Close the throttle to about 1/4 open, connect the glo plug clip, then flip the prop very smartly. Generally this type of starting method will result in the engine firing up on the first or second flip. If you need to adjust the needle, make sure that someone is holding the aircraft. Move around behind the engine and slowly turn the needle valve in a clockwise direction to lean out the engine. Don't turn it too far in.

The sound that you want to listen for is the sound that the engine makes just as it moves from a rich setting to a lean setting. You can hear it. Resist the temptation of tweeking the needle just a bit more to get maximum revs, because that bit more tweeking just might ruin a good engine with a too lean run. Trouble shooting and engine problems I'll leave to Clarence Lee, but try to develop good starting habits. Clean fuel, tight fuel lines and connections, a fresh or well charged starting battery, a glo plug in good condition, and proper needle valve setting will all go a long way towards making your engine run smooth and easy.

Nuff for this month, spend some time taking care of your radio equipment and engines, and they will take care of your airplanes for a long, long time. □

from page 13/12

that do not require constant attention. I, however, am coming to believe that the trend is going to be toward higher performance gliders. It is not true that they have to be difficult to fly.

The flier not only needs a herd of equipment, but he needs a herd of people to run it. In a thermal contest, he grabs a timer, and flies. Anybody can time. He can't, however, yell, "Hey Mac, how about setting up my two winches, retrieving the line, and helping me launch." That takes a trained team of non-fliers.

And time — everybody is always standing around waiting — or moving equipment on, or off the field — or something. From a spectator standpoint these meets are a drag to watch. There are so many long periods where nothing is happening.

Writing in the *Silent Flyer*, newsletter of the San Fernando Valley Flyers, California, Club President Jerry Krainock has some thoughts, which are a start in the right direction. I don't have room for the whole bit, which is too bad, as there are other good ideas presented. Anyway — here is the summary:

The basic tasks are good and these are the changes that I would make:

(1) Standardize winches and have them provided by the organizers.

(2) Instead of the current chaos of each competitor lining up his launching device where he thinks it should go, I'd have the CD set the launch direction and only change it as needed. Next, I'd assign winch stations and rotate the fliers each flight.

(3) To eliminate weather luck, I'd adopt man-on-man competition among the flight groups in distance and duration. Relites would be allowed in the case of launch equipment failure, mid-airs, or contest official errors. This change makes the competition tougher and fairer.

(4) To enable a competitor to make up lost ground, distance should be scored for speed among each flight group (again man-on-man). The first distance flight at the recent Champs had over 40 people tied at its conclusion. (Actually 29, Ed.).

So, there's one man's opinion. One sticky area is the organizers providing the winches. After watching some of the wily contestants playing inexperienced American officials like a cello, think what they could do if it was the official's responsibility to get the contestant safely into the air. On m'a vole! But, there has to be a solution to this one. Howzat! □

from page 11

..... to be an odd way of installing the pants since the wheels are no longer accessible once the pant halves are glued together but Coverite is working on a new 4-piece pant system that should make things a lot easier in future kits. Even though the wheel pants do require a little extra work, don't leave them off as they make all the difference in the world when it comes to the looks and class of the Gee Bee. The plans and instructions do show a version of the Gee Bee that had no pants at all if you're dead against working with ABS plastic and a little patience. In any event, the wheel pants are the only area of the kit that requires a bit more attention and experience; the rest can be completed by anyone with minimal experience.

The entire airframe can be constructed with Hot Stuff and the new Hot Stuff Super "T". This is the one reason that the Gee Bee takes only about 10 hours to finish. The parts fit is almost excellent so it is an ideal Hot Stuff airplane. For the 5% of the Gee Bee that we didn't use Hot Stuff, Custom Model Products "Fast Tak" was used with good results.

Covering:

After applying two coats of Coverite's great adhesive, Balsarite, the entire ship was given two light coats of clear dope followed by one light coat of automobile primer. After sanding the primer and tacking the airplane, the yellow color was sprayed on followed by the blue. Since Randolph dope was used on the real Gee Bee, we bought the proper colors from Randolph in acrylic lacquer. The finish is not only authentic but very light. After applying the striping and decals, the entire airplane received two light coats of K & B clear epoxy.

Engine:

The engine compartment is large enough to accommodate any .40 to .60 sized engine with ease. The larger engines will have to be canted to one side, however, to allow proper cooling and ease of maintenance. Regardless of the engine used, the model should require no nose weight to balance and may possibly need a bit of ballast in the tail if a heavy .60 is used. We went overboard in the power department and installed a Super Tigre X-60 up front.

The fuel tank compartment will accept any 8-12 ounce unit with ease. There is enough room left over for a battery pack if needed for balancing.

Radio:

An MRC-775 5 channel radio was installed with ample room. There shouldn't be any space problem with any of the modern day radios. The

total weight of the Gee Bee after installing the MRC-775 radio was exactly 5¾ pounds.

Flying:

There was no reason to be excited or worried before attempting the first flight of the Gee Bee. The ship reacts just like any other tail dragging sport ship. Take-offs require just a bit of right rudder until the tail comes up and very little elevator input is needed to break ground. Since we had gone crazy and installed a Super Tigre X-60 instead of a .40, performance was far above what we had witnessed from other kits. With a .40 the Gee Bee performs admirably but with a .60 under the cowl, it's breathtaking to say the least. All maneuvers associated with sport or scale flying can be done with ease and the ship exhibits no bad habits whatsoever. More than two rolls gets a little sloppy, maybe because of the extra drag created by the wheel pants but everything else looks good. Loops may be performed either tight or very large, stall turns about the same either way, inverted flight easily and knife edge for about 100'. Spins were a little lazy in our ship because of the extra weight up front but .40 sized Gee Bee's spin very well.

Landings are executed the same way with this airplane as with any other. Once again, no bad habits, no tricks in store for us and no tip stalling. Just a tiny bit of throttle and a smidgen of elevator and the Gee Bee settles in for a beautiful three pointer. Wheel landings can also be made easily but these should be reserved for a smooth surfaced runway if you'd like the wheel pants to stay married to the wing for any length of time.

Conclusion:

In both the building and flying categories, this model is recommended for the more experienced modeler. In summary, Art Kramer of Coverite and Henry Haffke, the Gee Bee's designer,

have introduced one of the prettiest models of one of the classiest designs of aviation's Golden Age. The kit is very complete, very competitive and very airworthy. I'd say that Coverite has done an outstanding job for their first effort in the kit business. □

ENGINE CLINIC

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some questions on engines that I haven't been able to find answers to in my books.

(1) I know that an engine's porting will determine the amount of gain when going to a pipe — but which engines are specifically set up for pipe use?

(2) ABC engines seem to be the fad now for increased power on lean runs — but will these engines wear as well as a conventional engine if a sane mixture is used?

(3) I have a Supertigre .46 which was a crash victim. Are there any discount mail order parts houses? Please don't say "see your local hobby shop" because they want an arm and leg.

(4) Is there a practical shelf life for fuel stored in a sealed container until use?

Thank you for the pain and strain your books and articles have saved me.

Yours truly,
Craig Catli
Santa Ana, California

You can use a tuned pipe on any engine. Some will show more gain than others depending on the port timing — the exhaust timing in particular. Engines set up to be run with a pipe are usually designated as such, i.e., Rossi sells a pipe engine, the Webra Speed is a pipe engine, etc.

ABC piston/sleeve engines do not develop more power on lean runs. It is just that on a lean run they will not

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202/4 Oceana House
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seize or stick up due to the sleeve expanding more than the piston. On a lean run, an ABC engine will slow down (actually lose power) if run too lean rather than stick up. As far as wear — they last just as long as a conventional lapped iron piston or ringed engine.

Sorry, but I do not know of any discount parts stores. Parts are usually pretty hard to obtain from the factories so the parts that dealers are able to obtain they are not about to sell at discount prices. Your best bet, when an engine is damaged, is to return it to the manufacturer or importer. They usually will repair an engine for less than you could purchase the individual parts and do it yourself — giving the individual dealers cost on the parts they use plus labor.

Model fuel will have a shelf life of many years if kept tightly capped and stored in a cool place with a constant temperature. If the fuel comes in plastic bottles it should be kept in a dark place as sunlight can deteriorate some of the ingredients. Synthetic oil based fuels will have a longer shelf life than castor oil based fuels. This is due to the fact that castor oil will eventually go rancid. If you open up a container and the fuel looks as if a half a dozen soda crackers have been crumbled up in the fuel, the fuel has gone rancid. A little flaking in cold weather is perfectly normal and should clear up if the fuel is set in the sun. A little flaking can be filtered out of the fuel and it is okay to use. But if the fuel is solid with flakes, then it should be used for weed killer.

Dear Mr. Lee:

I have a K & B .40 #8011 that wears the wrist pin holes in the piston egg shaped after approximately 15 hours of running at full throttle. When this condition exists I put in a new piston, ring, wrist pin, and connection rod. It then runs fine for a while. This has happened to three sets of parts. I have been using a 10/6 Tornado nylon prop on the engine. Everything inside the engine looks fine except for this wear. The only conclusion I can come to is that the piston needs to be of better material or the wrist pin holes need to be bushed. Your comments will be greatly appreciated as I do like this engine and want to find out if this problem can be corrected.

I have other brand engines with many more hours and I have never had this problem with them. I hope you can clear up this mystery.

Kindest regards,
John Bischel
Bartlett, Tennessee

The wrist pin holes in the piston and upper end of the con-rod are weak spots in the K & B .40 front rotor engine. Bronze bushings at these points would eliminate the problem and increase the life expectancy. But, evidently K & B does not feel bushings are necessary.

You did not say what you are using for fuel. Two things will contribute to faster wear — lack of lubrication and lean running. A combination of both will result in very short life expectancy. You are probably running a fuel with synthetic oil. The use of a castor based fuel such as K & B 100 with castor or Duke's and running the engine on the rich side of a two cycle will lengthen the engines's life expectancy considerably.

Dear Mr. Lee,

Recently I have noticed the advertising for scale radial model aircraft engines as well as other multi cylinder scale-like model engines.

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Apparently the scale radial engines are of the 4-cycle variety while the others are either 2 or 4-cycle types. To date I have never seen any rotary type model aircraft engines as were used on some WW I aircraft. Has anything such as this been made for model aircraft?

From what little I have seen of the full size rotary engines, i.e., Gnome or Rhone engines of WW I, they appear to have only one valve per cylinder. Were these engines 2 or 4-cycle or something else? There are, I suspect, some scale oriented modelers reading your column who have wondered about this issue also.

Thank you for your time and for your excellent column in RCM.

Sincerely,
Gary C. Bauer
Walledlake, Michigan

I have seen several homemade rotary multi cylinder engines but nothing has been made commercially as far as I know. In a model engine, that spinning mass of metal at the rpm needed for model use becomes too much of a gyroscope. Any sharp maneuver or sudden change of direction would tend to rip the motor right off the front of the aircraft. This was a real problem with the full size rotaries — terrific gyroscopic precession, etc. A rotary can be either 2 or 4-cycle. The model ones I have seen were 2-cycle and built-up of Cox cylinders. There have been pictures in the model magazines over the years but I cannot tell you a specific issue. I do not keep any records on this sort of thing.

Dear Mr. Lee,

Can you interchange, for example, a 2 bladed 10/6 prop for a 3 bladed 10/6 prop? If so, how would engine and flight performance be affected? Should one select a smaller 3 bladed prop to equal the performance of a larger 2 bladed prop? Do you have any suggested conversion tables?

Thank you,
George H. Ware, Jr.
Clinton, Louisiana

If you add an extra blade of the same diameter and area to your existing two blade propeller, you are increasing the load 33 1/3%. The horsepower of the engine would have to be increased accordingly. You want the rpm to remain the same whether using a two or three blade propeller. This means either smaller blade area, lower pitch, or smaller diameter. Most fellows

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using three bladed propellers opt for a smaller diameter, i.e., a 9/6 three blade in place of a 10/6 two blade. A smaller diameter propeller will not have as much efficiency as a larger two blade however, in model engine sizes.

★

Old time readers of this column will know that from time to time I get a letter from the King of the Hackers, Wings Whiplash. It has been several years since last hearing from Wings, but this month we have been blessed again. We've missed your handy hints, Wings.

Dear Mr. Lee:

Sorry for the long delay in correspondence and I know you have been missing my handy tips but I have been very busy of late getting into the 1/4 Scale phase of our wonderful hobby. Of course some of the time was spent in court over a really silly misunderstanding. Actually the charge was attempted theft and aggravated assault.

It all started when I read in your column that the guys were using leaf blower motors in 1/4 Scale models. I immediately thought of the Oriental gardener who shows up next door every Saturday morning at 7:00 am. (Is Lee an Oriental name?)

Now on Saturday mornings I try to log in a little extra sack time and that noise use to be very irritating until I read your informative article on the leaf blowers. Well the following Saturday morning after reading your column, the gardener shows up as usual and fires up the leaf blower. I woke up and naturally started thinking about what a great powerplant that would make for my 1/4 Scale P-47. I figure that maybe I could borrow the gentleman's leaf blower just long enough to see if it would fit in my framed-up fuselage. Now this old gentleman of Oriental descent, does not speak a word of English, as I found out later. Now that's what really turned an innocent little idea into a great big problem. When I approached this fellow and tried to explain what I wanted to do with his machine (shouting of course to be heard over the roar) he thought I was complaining about the noise. I then proceeded to show him by way of pantomime what I wanted to use his leaf blower for. I guess it did look a little odd to see a full grown man in his "jammies," with his arms stretched out, making motor noises and executing Immelman turns

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on the front lawn. But how else could I explain what I wanted? Well, the old boy thought I was going through some kind of Karate ritual I guess, so he took off the leaf blower to defend himself. I, naturally thinking he understood what I wanted, picked up the leaf blower and headed toward my shop with it. Well, Clarence, that's when he jumped on my back and the next thing you know we're wrestling on the driveway. When the police finally arrived I was fighting for my life! The old boy was in pretty good shape.

Needless to say the whole thing wound up in court. The judge did agree to drop the charges if I would apologize to the gardener and buy my own leaf blower. I did buy one of the commercial models for my very own and the whole thing fits nicely on the front of the "Jug," straps, tank and all.

But here comes the really clever part Clarence — er, Mr. Lee. In order to turn the 36" x 12" prop (I hate to see scale models with undersize props), I took the output pipe of the blower and plugged it back into the carburetor air intake. Voila! Instant supercharging! The top end is fantastic, plenty of power to turn that big club, but the idle is terrible. Do you think a Perry carb will help?

Waiting your reply, I remain as ever,
Your friend,
Wings Whiplash
□

FROM THE SHOP

from page 4

I hope you can make out my handwriting okay, what with the bandages, and all, on my right hand. You see, I grabbed hold of a rose bush and got a handful of thorns. That happened when I climbed through the window. Yeah, you're right . . . I had to leave that way because the door was locked . . . and the key had disappeared! Well, that's it. I'll get this in the mail to you right away, if I can just find that envelope I had stuck a stamp on. Hmm, let's see, it was here just a minute ago.

As always,
Bob

★

Can you believe that we are into 1982 already? I have barely adjusted to dating things 1981 and here we go again. Oh well, we will see ya next month. □