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MODELER

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This month's cover

features "Miss Colorado USA 1978" Linda Potestio showing off Art Chester's "Jeep" built by Morris Shanstrom. The "Jeep" utilizes a Royal Super Sport and is powered by a Super Tigre 46. Photographed by Robert Chinn of Pueblo, Colorado.

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From the Shop

DON DEWEY

At the Edge of the Field . . . That was the title of the editorial that appeared in the first issue of R/C Modeler Magazine published seventeen years ago this month in October, 1963. The last two paragraphs of that editorial read as follows: "We have begun with a challenge --- to bring the finest material together between two covers of a magazine in order to provide you --- the radio control modeler --- with a panorama of the R/C world in a fashion unmatched by any other magazine or media. It is your magazine --- it will be what you want it to become. This is our promissory note to you --- our editorial policy.



"The true riches of any man's life are in the friendships he is privileged to enjoy --- the measure of his success lies in the challenge to be of service to others. In these respects, we consider ourselves among the most fortunate."

I can remember writing those words just as distinctly as if they were written yesterday. And, just as they were true then, they are equally as valid today. Seventeen years ago, however, the model aviation publications of the time thought we were totally insane to devote an entire publication to a facet of model aviation that had previously warranted only a short monthly column and an infrequent feature article. After all, radio control was for the electronic experimenter --- the radio controlled model aircraft **really** didn't have much of a future.

However, there were a number of us who believed that the future of modeling would be in radio control. Even though, at the time, we were arguing the relative merits of the SN versus the compound escapement, we could see beyond the rudder-only aircraft that spent more time on the ground than it did in the air, to a time when R/C would become a reality for the average hobbyist. Today, seventeen years later, the sport and hobby of radio control is larger than all other forms of modeling combined.

Yet, just as RCM is still a "teenager," so is radio control still in its adolescence. Today we enjoy, and routinely accept, that which would have been considered totally impossible only a few years ago. Radio controlled helicopters, Quarter Scale aircraft, R/C motorcycles and boats --- all were "inconceivable" when the first issue of RCM appeared. Yet, we are still standing on the threshold of a whole new frontier in the sport and hobby of R/C. The next few years will see developments we would not have dreamed possible today. Tomorrow will bring the impossible a step closer --- and will have the excitement of new challenges and new concepts in a hobby that is just maturing and just beginning to grow.

We have not seen it all, by any stretch of the imagination. We have only seen the beginning --- the best is yet to come.

★

One of the things that has become evident over the past seventeen years is that, every time a new facet of the hobby is developed, someone deems it "dangerous." There is a certain inherent danger in everything we do. That danger is diminished when we conduct ourselves, and our activities in the hobby, in a responsible fashion. Every major advancement in the hobby --- every step forward --- was declared "dangerous" by one group or another. The latest target are the Quarter Scale models. We would like to present the following few paragraphs by Ken Runestrand of Roseville, California on this very subject:

OCTOBER 1963

R/C modeler

40 CENTS

R-C 1963 NAT'S Coverage	Results Photos Data
STAGGER-BI MULTI-BIPE by Phil Kraft 	 Escapements INCREASING PERFORMANCE
EXODUS 018-030 SINGLE CHANNEL SPORT	

Now Let's Hear It For The "Monster" Flyer!

"Of late, I've heard and read enough of fears regarding the advent of the larger "monster" Quarter-sized models. Persons with no knowledge of the facts surrounding these birds are casting doubts from all directions and apprehensions concerning safety, conflicts with the FAA, and a threat to all modeling.

"If no one challenged a desire, or didn't want something new or different, where would our hobby be?

"I've been modeling for over 30 years, am an active member in AMA, and the local flying club, as well as a member in the Quarter Scale Association of America. I have flown "biggies" in local air shows and fly-ins for years.

"Big" does not automatically mean unsafe. There is more danger in overweight, overpowered scale models, novice fliers, pattern ships flying on power instead of wings, squirrely 1/2A bombs, unorganized flying, etc., etc.

"Think positive! The bigger planes are here to stay. All modeling had a starting point, and changed to its present state of the art evolving by modelers challenging the new and unknown. The Quarter Scale movement isn't any different, just another chance to expand the horizons of modeling, and create new enthusiasm and participants. Everyone wants a model that looks real, so why not one that flies realistically, as well?

"Anyone that invests \$400.00 plus in a giant scale model is not going to endanger that investment by becoming a terror of the skies. Furthermore, the dynamics of these beauties almost totally prevent them from being so. There is no reasonable way that the bigger birds can be made to fly the way that the standard .60 sized pattern or racing ship does --- the dynamics of the birds almost totally prevent it. For example, if the Nosen Mustang were to fly the same as the standard Top Flite Mustang with a .60, it would have to weigh approximately 45 pounds, and be powered by an engine producing **five times** the power of that Schneurle .60! That is, of course, totally ridiculous! The planes like these Nosen Mustangs are going to end up weighing about 25-28 pounds, and meant to be

to page 183

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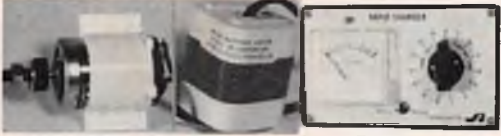
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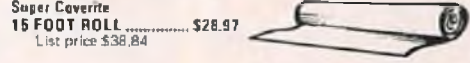
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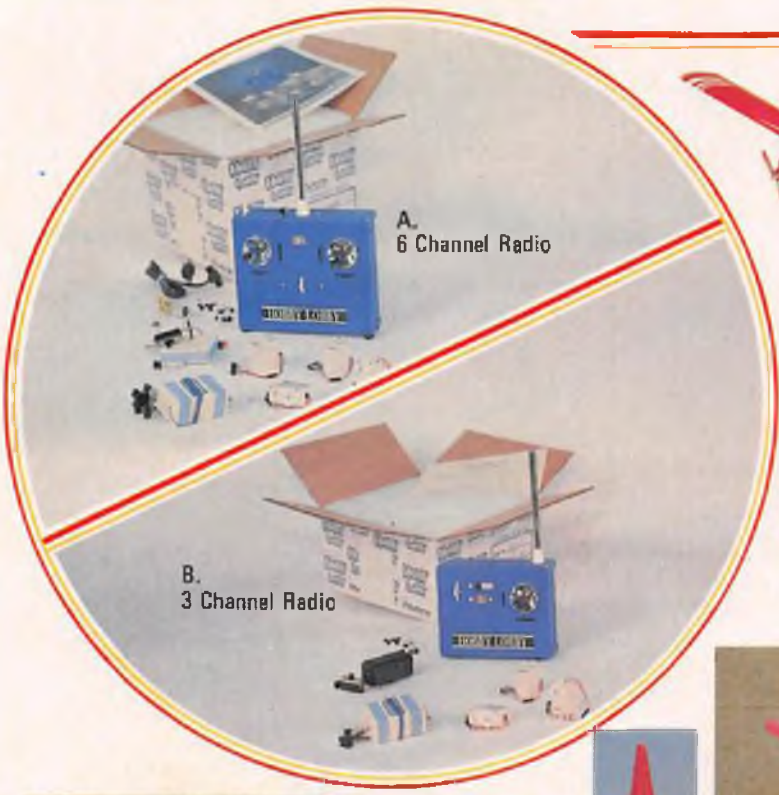
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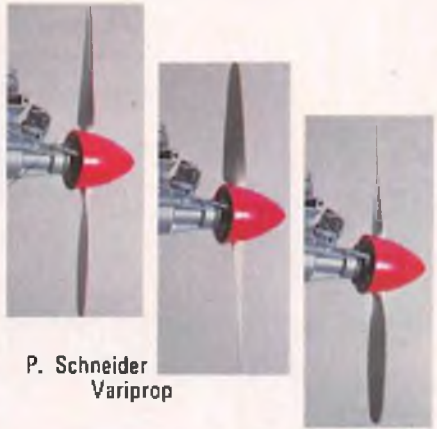
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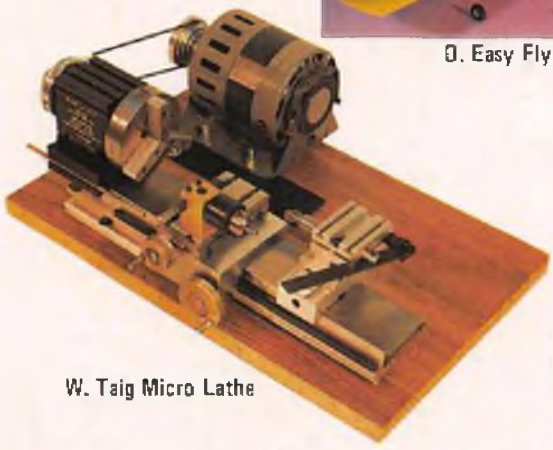
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Now I've heard everything. A few issues ago, I repeated a joke that was told to me by Dr. Ralph Leidener, the well known pattern flier in Florida. It was the story about the Blue Angels flying in close formation, and when they did the "bomb burst" a farmer looked up and said "Dadgummit, son, I told you to be careful or you'd bust that thing up!"

I should have identified that farmer as coming from Michwisota, the mythical agribusiness capital.

Shortly after the article appeared, a phone call got through to Don Dewey from a member of the faculty of a Minnesota educational institution. He bent Don's ear for about thirty minutes on the "derogatory remarks presentation of illiteracy" relating to Minnesota farmers.

Anyway, a couple of weeks ago I went to Florida again. Dr. Leidener was a bit nonplussed by the reaction to his story, but, as always, had a placebo for the occasion.

"Sorry the guy felt that way. Guess he didn't really recognize the difference between stupidity and ignorance. The farmer was a highly skilled agribusinessman, but not informed on aeronautics. Lemme tell you about a friend of mine. He has a son who knows all about aerodynamics --- stall angles, spanwise flow, decalage, sweepback, dihedral, --- you name it, he can identify and explain it. But the kid didn't know anything about nature --- grew up in the

city and had never bothered to learn about country sights.

"So, his dad decided to take action and send him to a boy's camp in Minnesota, where they'd take him on hikes, teach him about flora and fauna, and the wonders of nature. As they drove in the camp, they went past the mess hall. Alongside was the trash pile, which was piled high with Carnation evaporated milk cans.

"Look, dad," said the kid, all excited. "There's a cow's nest!" "

Now I suppose I'll get an irate letter from Florida educators. Don't bother. Send it to Ralph. He'll have an answer. He's one guy who has a story for every occasion.

Speaking of ignorance, here's a letter from one of you sharp eyed readers. Bob Penhale of Calgary, Alberta, writes:

Dear Ken,

I have just finished reading your column in the June '79 issue and I would like to suggest a couple of corrections to you concerning your comments on the Luftwaffe's S3A combination. Instead of the bomber guiding the pilotless fighter, it was the other way around - the pilot flying both aircraft from the fighter, before separation occurred. After separation, the bomber was on its own, controlled only by an automatic pilot and not the fighter's pilot.

The bomber, unlike the fighter, was modified radically for its new role. The entire fuselage forward of the wings

was replaced with a massive tulip shaped fairing, which was tipped with a long conical probe. In this fairing were 3,800 pounds of high explosives. When any of the four fuses tipping the probe were ignited, the main charge was also detonated. The charge burned from the area forward, with its full force directed along the center of the probe. A bulkhead of soft metal sealed off the face of the charge. As this bulkhead was hit by the blast of heat from the explosion behind, it would melt and shoot forward at approximately 12,300 miles per hour. Tests showed that the molten metal was capable of burning through armour plate four times as thick as the diameter of the charge. The charge was six feet across, so it is clear that it could go through 24 feet of armour; in a fraction of a second!

I hope that this information has been of interest to you, and all the best in the future. (Most of the above information came from the January, 1975, issue of Air Classics magazine, which has an excellent article on this very interesting subject.)

Yours sincerely,
Bob Penhale.

Bob's letter was typical of several that I received, correcting my statements on the Mistel 3. In addition, several more pointed out that I incorrectly referred to the shoulder harness on Jim Funduk's cockpit rendition of the P-38 as being

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Before getting to the letters this month I would like to bring to your attention, three new additions to Art Suhr's line of old time model engine booklets. Art has rendered the old time engine buffs a tremendous service by making these booklets available. Art's first booklet, "Antique Gas Model Engines," was composed of 68 pages of manufacturer's ads and illustrations from the pre-WW II and early post war years. It is the best quick reference book available on spark ignition engines. This booklet has been available for several years at a price of \$5.00. Art's follow-up booklet was "Model Engine Reviews" and is composed of over 200 pages of old time engine articles, tests, etc., that were printed in Model Airplane News, Air Trails, and Flying Aces between 1935 and 1955. This booklet was sold out for a while but a limited number are again available for \$15.00. Don't let the price scare you because the book is worth every penny if you are interested in the old time engines. Also available in the past have been reprints of the 1940 Hurlman catalog for \$3.00 — 1940 GHQ catalog for \$3.00 — H & H Motors catalog for \$2.00, and an index and inventory sheet listing all the major and many minor U.S. model magazines for \$2.00. Art has a special package deal of \$10.00 for all of the above mentioned booklets excluding the \$15.00 Model Engine Reviews.

New booklets now available from Art are an 85 page "Glow Plug Model Engines 1950-65" for \$7.00 which is a continuation of the earlier Antique Gas Model Engines — a reprint of the 1940 Bunch engine catalog for \$5.00 which is a must for any Bunch engine buffs, and also a reprint of the 1935 Brown Jr. instruction booklet. The Brown Jr. booklet also includes an authentic reprint of the original box label and gummed motor mount label and sells for \$2.00. The labels can be bought separately for \$1.00. All prices postpaid. The address is, Arthur G. Suhr, W218 N5866 Maclynn Court, Menomonee Falls, WI 53051.

Dear Clarence,

Here is a subject for your great "Engine Clinic" which I hope has not

dealt with before. Four cycle engines-engine reduction drive combination.

I have just received a Dave Platt "Bucker Jungmeister" 1/4 size, and plan to use the above combination. Since Dave Platt's model needs either a powerful .60 or a .90, scale propeller is in the range of a 22" diameter, what is your opinion in regards to this combination?

Seeing a big fan turn so scale-like, plus sound of my O.S. .60FS Four Cycle, and such a beautiful model, it would look great. But, what are your comments in regards to Four Cycle engines being used with prop reduction units, and what can I expect in power? Is it a good idea? Is this project worth taking into consideration?

There is still time. I plan to start construction in a months time. Your prompt reply would help a lot.

Thank you and congratulations for your excellent work.

Best Regards,
Antonio Gil Perez
Madrid, Spain

Although I have run the O.S. four stroke engine and tried several of the prop reduction drive units, I have never tried the O.S. four stroke with a reduction unit. However, I do not think this combination would work out too well due to the rpm's involved. Most of your reduction units run in the 2-1 reduction range. This means that the engine turns in the 13,000-14,000 rpm range in order to turn the propeller 6,500-7,000 rpm. Some fellows are lugging the engines down with larger diameter propellers turning anywhere from 4,000 to 6,000 rpm. The O.S. four stroke is not a high rpm engine and seems to be happiest running in the 8,000 rpm range. The O.S. having the equivalent power of a .45-.50 size engine. However, as you lug the engine down it does have good low speed torque characteristics, and will swing a pretty hefty prop in the 6,000 rpm range. So, running the engine at 6,000 to 8,000 rpm range you would have a prop speed of only 3,000 to 4,000 rpm. Due to the low rpm you would need a higher pitch prop — 8" to 10" pitch. I doubt very much if the engine could handle a 22" diameter 8" prop. And a lesser pitch prop would not give you

sufficient air speed. The diameter would have to be reduced. So, in short, I do not think the O.S. four stroke would be the way to go if you want to stay with the scale 22" diameter prop. I think I would go with a .90 size engine myself, and deviate from scale on the prop size.

And, incidentally, you fellows using the O.S. four stroke in scale ships might be surprised at how large a propeller it will turn when lugged down. Depending on the particular propeller it can turn 16/6's and 18/4's in the 5,000-6,000 rpm range. Better than many .60's with this size prop.

Dear Mr. Lee,

I was wondering if you could help me to track down the origin of an old engine I have in my possession?

It appears to be about .60 cu. in. in size and the name on the casting makes it out be be a KEN. The serial No. is 1099. It is set up to run on glow plug, but the front of the crankcase has a shoulder machined and makes it appear that it might, possibly at one time, have been fitted for ignition. The crankshaft runs in ball bearings.

It is by no means in mint condition and the needle valve is missing, but otherwise it is in real good shape internally with lots of compression, with a lapped piston.

I would also be curious as to what kind of value it might have, although of course I realize, that that is up to me, but as I don't even know how scarce these engines are (maybe there are hundreds sitting around) I wouldn't even know where to begin. If you need any more information, I would take some measurements and some photographs and send them to you.

On another thought, with all the latest craze in big engines and big models and the search for big engines and particularly twin cylinder engines, I often wonder why nobody is using the old system of coupling two engines together inline fashion. Back in the early mid-sixties, an article in RIC Modeler Magazine described this. I tried the system, and coupled an old tired Fox .25 with another old tired O.S. Max .30 and the results were better than anyone could imagine, with the best throttle

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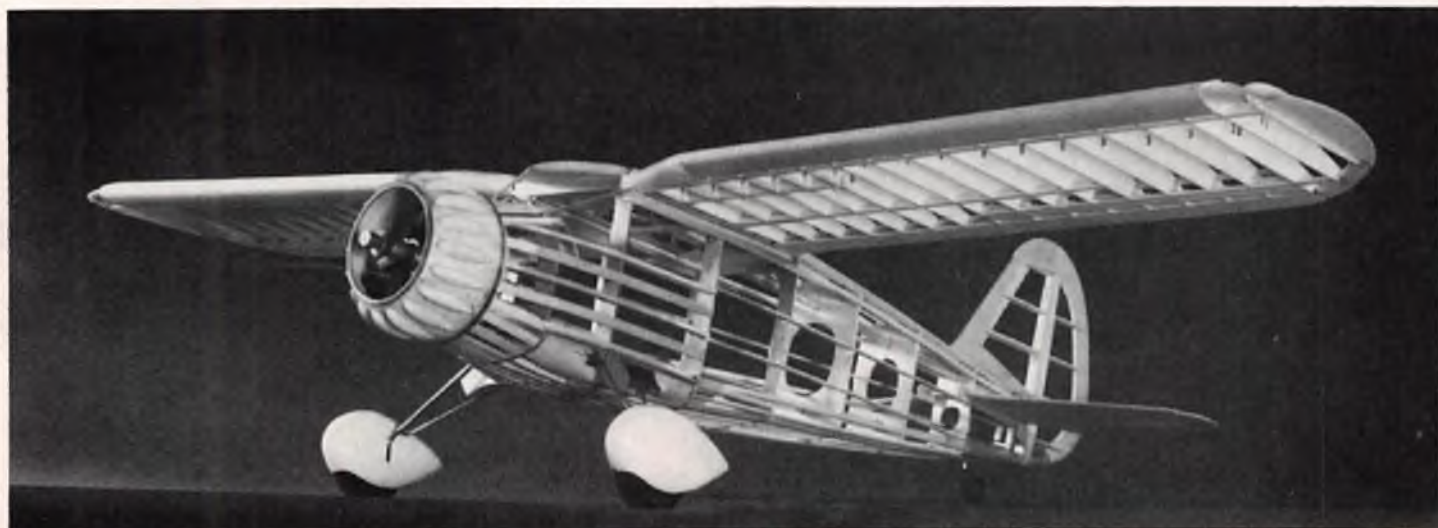
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response I have ever seen. The two engines retain their own carburetors and also only one of the engines are modified, leaving the front engine in stock condition. As for vibration problems, they are non-existent, as the smoothness is unbelievable. The only requirement is that the two engines be of a different size, why, I don't really know.

Thank you for your patience.

Sincerely yours,

J. Nissen

Langley BC, Canada

The KEN .610 (Ken Six Ten) was made locally here in the Los Angeles area in the 1946-47 period. It is one of those engines that I would like to have done an old time engine article on, but just do not have sufficient information. I have several in my own engine collection and have had half a dozen or so pass through my hands in the past few years. The engine spark ignition intended mainly for U-control speed. However, it simply was not competitive with the Hornet, McCoy, and Dooling. The engine featured an unusual intake system in that the crankshaft counter-balance disc was also the rotary intake, i.e., fuel induction was through the crankshaft disc similar to a rear disc rotor induction. This meant crankshaft end play and clearance between the case had to be held very close in order to seal the case. Also featured, was a fan blade in the intake which hindered performance more than any help achieved. Back in the mid-40's when I was heavy into U-control speed, I gave a Ken a try briefly. Removal of the fan blade was good for 500-600 rpm with the engine turning in the 14,000 rpm range. We used to think this was high rpm back in those days.

I do not know how many Kens were made, but judging by the serial numbers I would guess in the neighborhood of 2,000. Most engines I have seen had serial numbers in the 1,000-2,000 range so it is possible that the numbering may have started with 1,000. I have never seen a serial number below 1,000, but this does not say that they do not exist. Up until a few years ago the engines were not too hard to come by here on the West Coast. Lately with the large number of fellows taking up the hobby of old time engine collecting, Ken's are becoming a pretty good collector's item and increasingly harder to obtain. As I have said in past articles on the old time engines, I no longer like to quote cash values as this, in turn, can become a guide. Prices being paid for many of the old time engines are getting out of hand and actually destroying the hobby for many of us who are in it for the

enjoyment. Also making it difficult for fellows new to the hobby to get any kind of collection started. I hate to see the way prices are going for some of the more rare old time engines (not the Ken) but personally do not want any part of establishing a cash value.

I believe the article you refer to regarding joining of two engines inline fashion appeared in American Aircraft Modeler. An operation such as this is generally beyond the capability of most modelers. A lathe, etc., is required which few modelers have. From a production standpoint the cost makes it prohibitive. K & B marketed a series of inline twins in both aircraft and marine versions many years ago. I recall the article you mention, but do not remember why there was any reason for using two engines of different displacement. I see no real reason why this would be necessary. I think it was just a case of using what the author had available. I built several inline twins myself using engines of the same displacement. One problem always encountered was that of the rear cylinder (engine) running hotter than the front. May be engines of unlike displacement helped this respect. A smaller cylinder in the front would allow more airflow to the larger cylinder in the rear, but I do not think it would make that much difference.

Dear Mr. Lee:

After seeing Bob Violett's A4D and Larry Wolfe's Mirage, I have been bitten by the ducted fan bug. But, not being a racing pilot, I have always been a bit apprehensive about operating very high rpm engines --- they always sound like they are trying to tear themselves apart, and I'm afraid I would probably "cook" one or two of them before learning how to tune one to peak power and then back off just the right amount. I have had this happen on my non-pressurized sport engines; probably due to having the engine lean out as the fuel level drops, and not noticing it in time due to the presence of a muffler.

With the above in mind, I felt that I would like to get started with a less ambitious project than the Skyhawk or the Mirage. Therefore, I bought a Midwest Heinkel 162 kit which is supposed to build at about 7 pounds, and plan to use a K & B 6.5 FR at less than the absolute ultimate power levels required by those heavier and faster models. So, I now have acquired a used (traded for) 6.5 FR; it turns a 9/7 Top Flite prop at 16,000 rpm on 12% fuel (w/o muffler) which seems fairly respectable. My questions follow, they may be of general interest for your column, or as indicated, you may wish to quote me prices and descriptions of mods you do on the 6.5 FR if they seem appropriate to my case.

(1) Since the fuel tank on the HE 162

must be about 5" below the carb centerline and the plane is supposed to be aerobatic, pressure is obviously needed. What Perry pump / regulator / carb is used with the 6.5 FR? It would seem that the system for the K & B 40 sport engine (#8011) would be inadequate for the high revs or the 6.5 FR, and the system for the K & B 61 would not fit. Is this the mod I have heard that you do to fit the 61 system to the 6.5 FR? If so, what do you charge for the mod, and do you do it to a presently owned engine such as I have, or is a new engine package only? I also heard that you somehow get the carb inlet into a more favorable position in the Scozzi duct; is this correct? Or, for the "less than fire breathing monster" engine I am contemplating for my first try at a ducted fan, would a Robart pump be acceptable with the stock Perry carb supplied, just to maintain fuel flow through such a large variation of pressure head? I am experimenting with a Robart on my sport engine but have not been able to get consistent operation and unless I do, I would not want to put it on the 6.5 FR.

(2) The engine comes with the transverse muffler which obviously would choke the duct, so a straight exhaust (like the rear rotor 6.5) is indicated. Not knowing anything about tuned pipes I am again at a loss as to whether or not to put such a unit on the engine (or even where to obtain one since I have not seen such advertised except the sideport Fox), and if so, what kind? I have seen the divergent convergent types (Fox) and those that only diverge and then step down sharply to a small outlet (make unknown). But in one of your recent articles you talked about tuning a pipe by cutting off a little at a time until no rpm increase is noted. How is this possible with the types I mentioned above? Or does a constant cross-section tube act as a tunable pipe also? Again I am not interested in getting the max possible power out of the engine, but since I have to channel the gunk (exhaust) down the tailpipe a bit anyway, I may as well take advantage of whatever rpm increase a tuned pipe can provide.

Thank you very much for your time in reading the above.

Sincerely yours,

Dick Kolodziej

Van Nuys, Calif.

Prior to the introduction of the new K & B 7.5 ducted fan engine, I modified quite a few engines for use in Bob Violett's Skyhawk and Larry Wolfe's Mirage; in excess of 150 engines. However, with the introduction of the K & B 7.5 there hasn't been too much call for the modification to the 6.5. I do sell Custom versions of the 7.5 (see ad in classified) but if someone has a 6.5 they want modified, I can still do so.

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We modelers are a strange and contrary bunch. It has been mildly amazing — for several years — the interest and growth in larger models, just when the size of transportation has been shrinking. Half-A sized RC craft are also growing at a rapid rate, but 1978 and 1979 have really been the years of the big model and, as most of you know, I think that this is great. The motto of the Quarter Scale Association, "Big is Beautiful," really expresses it very well. I get a constant flow of letters from the builders and fliers of biggies telling me of their new models and new products. Right now, as I write this month's column, I am getting ready to hold the Second Annual Southwestern Jumbo Fly In, and wondering if the gas shortage will let up enough to enable all who have written, that they are going to attend, to make it. Nothing is more inspiring than to see a whole field covered with the big birds.

Many new products are beginning to reach the market place for those building big models, and many more will be on the way. One of the interesting sidelines of this new interest is the growth of plan sales for big aircraft. Putting out a kit, or a new line of kits for big airplanes, is not an easy task. It takes lots of time and money, but putting out a set of plans for a good flying big airplane is really a very practical idea. Two of these I would like to report to you about now.

The first is a set of plans for a quarter size Super Scale Skybolt by Wendell Hostetler, 1041 Heatherwood Lane, Orrville, Ohio 44667. The span is 76½", weight is 23 lbs., power is 2.0 cu. inch engine, and wing area is 1800 square inches. The plans and instruction manual sell for \$21.50. The plans are very well drawn with much detail information. In Wendell's letter to me he indicated that he is also interested in contacting anyone who would be interested in making fiberglass parts, such as cowl and wheel pants, for the Skybolt, or possibly kitting the entire aircraft. If any are interested, contact Wendell for further information.

The next set of plans that I would like to tell you about is from Don Godfrey, 254 Washington St., Binghamton, New York 13901. Don is a self confessed Stearman nut, and has designed a Quarter Scale Stearman that, from the pictures, looks simply fantastic. By the

way, guys, please send me pictures in black and white so that we can print them in the magazine. The cost of converting color to black and white is so high that we have made a policy of not making these conversions. I know that it is harder to get good developing service from the local print shop on black and white, and that they take a heck of a lot longer to get back, but please send them anyhow. But, back to Don's Stearman. The wing span is 92" top, 88" bottom, chord of 14". Weight is 25 lbs., power is 2.0 cu. in. engine, and the model is equipped with a Harry Higley smoke valve, and secret smoke formula which Don is going to make available soon. All in all, it sounds like a really great aircraft. Don didn't tell me the price of the plans so write to him if you're interested. He also has a cowl, wheel pants and several other parts available.

As mentioned earlier, the plans route may be a really great way to go for the biggies. Most of us have adequate tools to fashion our own parts, be they balsa or hardwood, and it really is tough for a kit manufacturer to assemble all of the items and parts necessary to construct a large aircraft. Shipping is a problem all to itself. For example, the Sky Master kits of the Lazy Ace, Miss Texas, and Eindecker are all too large to ship overseas via air mail or regular mail, and have to be shipped via air express, which is quite costly. The Eindecker kit, tipping the scale at 14 lbs., is really hard to ship, and all of the new large kit manufacturers have the same problem. Perhaps an overseas version of the larger kits should be made, leaving out the sticks and sheet wood, and supplying only the cut-out part, thus making the package much easier to ship. Food for thought for big kit builders.

Don Godfrey mentioned that he was using a Higley smoke valve in his Stearman. I just ordered one the other day, so will be hooking up a smoke tank in the near future. Now, the only real problem is how to spell the words correctly when sky writing, and in the Texas wind that's pretty tough as the words will blow away just as soon as they are out of the pipe.

★

Several months ago I wrote about the Hawker Hurricane fighters (full size) that are being built almost entirely of wood. Well, I've been taken to task by Jim

Newman, Technical Illustrator. Take the floor, Jim.

Dear Chuck,

Just read the opening paragraph in your January column. Oh Boy, either your good self, or author Deighton, really knows how to hurt an old Royal Air Force career man. On this side of the Atlantic I have found it to be a common misconception that the Hurricane was predominantly all wood, so let me put the ki-bosh on that once and for all.

The only wood in the ship were the little formers that held the spruce fairing stringers away from the frame in the fuselage section twixt wing and tailplane. The rest of the ship was all metal. The fuselage was an extremely rugged (massive, even) bolted and braced tubular steel rectangular basic frame, faired as explained. The forward fuselage and around the tail was all quickly detachable metal panels. The tail group was all aluminum, with aluminum skin (Hawker Patented), top and bottom spars joined by heavy web. A truly massive affair. Ribs were duraluminum channel and web, built-up affairs which, after the initial few built, were skinned in aluminum. It's interesting to note that the Hurricane was unique in that it went through WW II with very very few modifications despite being altered to suit deck landings, catapulting, dive bombing, carrying (8) .303, (4) 20mm, (2) 40mm plus (2) .303 or (8) 60 lb. rockets. It just shows how rugged the basic design was. It was capable of absorbing tremendous damage. One Hurricane escaped France with three of its four longerons shot through and a large percentage of its tail surfaces absent. (I could give a three hour lecture on both the Spitfire and the Hurricane but space is scarce.) Even the poor old Spitfire has been accused of being a wooden horse. I have seen it in print in American magazines. Not so. She was a beautifully built, flush riveted, semi-monocue aircraft and the only wood in the ship were the toothpicks in the Skippers pocket. Best wishes, Chuck.

Jim Newman

P.S. To my knowledge, the only wooden front line combat aircraft was the Mosquito by deHavilland. Did you know even the Me 109 from F onwards had

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wooden stabilizers?

Thanks, Jim, for the information and for the picture showing the guts of the Hurricane. So much for the information in Len Deighton's book, "Fighter," still, a very interesting book for those of you fascinated by aircraft doings in WW II.

★
 Received a letter the other day taking me to task for mentioning, a couple of months back, that a flat bottom airfoil tends to balloon when making a turn into the wind. Well, I'll leave all future discussions of such things as downwind turns to my good page neighbor, Ken Willard, but for just this once, I want to get into the act. Sure, I know that the aircraft is flying in a mass of air and, except for gravity, doesn't know what it is doing with relation to air . . . but . . . you show me a model that doesn't fly in air that is turbulent, disturbed by the ground, trees, houses, buildings, etc., and, then, just maybe I'll come around to a purist way of thinking. Most times we fly within a couple of hundred feet of the earth's surface and plenty of turbulence abounds --- the air is never clean and pure, and it's never a perfect medium for the aircraft. Second the RC model is flying with relation to the pilot on the ground, and anything that the aircraft does is in relation to the pilot, not to the air in which it is flying. Try flying an antique model in winds blowing at 25, gusting to 35 as we did in the last Texas Pride Old Timer and Antique Tournament, and you will begin to realize that you're flying that aircraft with relation to you on the ground, and not to the "perfect air mass." I can tell you positively that when you make a turn into the wind, that an aircraft with a flat bottom wing section does "balloon," maybe not in relation to the air mass, but in relation to the pilot on the ground.

Try flying soaring aircraft and find out what the air is really doing. Updrafts from wind blowing over obstructions on the ground, downdrafts from wind blowing over obstructions on the ground, turbulence, thermals, or any number of things are going on in the air, and all with relation to the aircraft, and to the pilot on the ground. How about the bottom of a passing cloud, plenty of updraft there. I thermalled my 9 pound Miss Texas, 84" span, open cockpit pattern type aircraft for over five minutes, with a dead engine, at the bottom of a passing cumulus cloud just a couple of weeks ago. Had to keep diving it to keep from being sucked right up into the base of that cloud. And, guess what, the bottom of that cloud was very dark, almost black. But clouds don't have any color (unless they're full of smog) do they? But from where the pilot was standing, the



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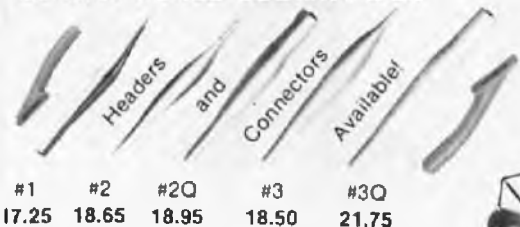
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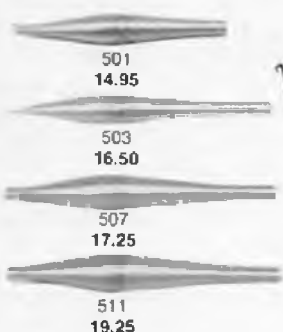
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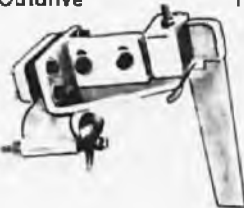
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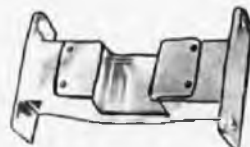
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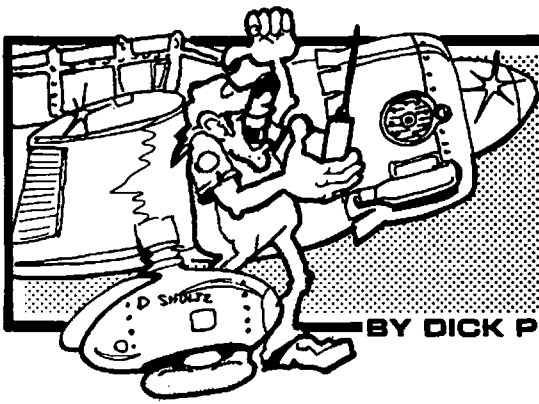
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BY DICK PHILLIPS

Among my correspondents is Giorgio Sotgui who lives in Lunamatrona, Sardinia. We have been writing back and forth for a couple of years now and the Vultee L-5 plan mentioned here a few months ago was sent to me by Giorgio. He has repeated his generosity with another of Giuseppe Fantini's well executed plans. This one is for a large Bucker Jungmeister. (Plan is available for \$10.00 U.S. from Giuseppe Fantini, Via G. Daneo 31/16, 16144 Genova, Italy.)

The dimensions are all metric but if you remember that 1 meter equals about 39", you can make the adjustment to the more familiar measurements we use. Span is 2.3m, fuselage is 2.03m long, weight is 8.6 kilograms (approximately 2.2 pounds to the Kg). The original was flown on a 1.2 HP engine (make unknown) and speeds were: stall 35 kmh, top speed 95 kmh, and cruise in climb 40 kmh. To make the speed conversion, multiply by 6 which gives a top speed of about 57 mph.

Naturally all of the information on the plan is in Italian, my copy has been annotated by Giorgio to help with some of the detail work. His comment on the plan after finishing the translation for me was, "Hope the translation will help, I'm dead tired, get on with it! Learn the Italian language and enjoy yourself!" Be warned, however, if you order the plan, find someone who reads Italian to translate it for you.

The plan is good, with a couple of novel methods of attaching the landing and flying wires shown. It would be quite adequate for the experienced 'scratch' builder to produce a model from and I think it could stand to weigh more if powered by a 2 HP engine such as the Quadra. 8.6 kg equates to just under 19 pounds and the Quadra could handle it well at up to 24-25 pounds. Only one of the four identical (except for location) wing panels is shown and the wings are mounted and are rigged much as was the original, so set-up at the field should not be difficult nor should it be time consuming. The landing gear incorporates a spring loaded shock system which should be good for grass field flying. All of the fuselage joints are shown gusseted which I have

suggested for some time and I'm glad to see it being incorporated into more and more models.

The fuselage is all framed with some balsa covering and some of the material could be larger if a larger engine than 1.2 HP were to be used. The firewall should be beefed up for the larger engine as well, but other than that, I suspect it would be a rather nice model. Regular readers will be aware that I am fond of the Bickers, and especially of the Jungmeister so there is some bias in favor of this model.

It's about 10" longer in the span than Dave Platt's recent kit and would be a bit better suited to the larger engines. Don't get me wrong, I'm not knocking the Platt kit (I have one under construction), but this larger size would be better suited to the larger engines. It is actually 1:2.8 which is a bit less than 1/3 Scale, but a bit larger than Dave's 1/4 Scale Bucker. Anyway, if it turns you on, order one from Giuseppe, but be prepared to wait awhile for it, the one Giorgio sent me took over a month to arrive!

★

Don's Custom Models, 9892 Vicksburg Drive, Huntington Beach, Calif. 92646, has a new 1/4 Scale kit out now. It's a semi-kit of the Piper Tomahawk. Span is 8'4" and flying weight is 18 pounds with Quadra aboard. \$149.94, plus shipping costs which are not detailed, will put you in possession of this new big one which has a detailed epoxy cowling, lightweight epoxy fuselage, landing gear and full sized detailed plans. Coming soon is a full kit with all of the wood and a formed canopy. Sorry guys, I don't have any details on the flying qualities nor any reproducible pictures. Don has other models but this appears to be the first of the Quarter Scale jobs from his stable.

★

At the risk of repeating myself, it sure would be great if those of you coming onto the market with a new item would send me more information. It is hard to describe a new kit, product, or whatever from a minimal brochure page which is okay when the item has been around for awhile and everyone is going to recognize it. When it's a new item, the more information, the better. You may

have noticed there are some Quarter Scale items available on which I have not commented and that often signifies that I haven't used the product and may well have heard poor reports on it elsewhere. Those items I have used and had a chance to test will be so described. Failing such a description, items such as Don's Piper Tomahawk above are taken from advertising material and, naturally, no opinion is possible.

★

I have mentioned a couple of places to get plans enlarged photographically in the past, one place in California and one in New Jersey. I had a note recently from Technical Services of Ohio, Inc., 935 Goodale Blvd., Columbus, Ohio 43212, informing me that they were prepared to take care of the middle of the country as far as enlarging is concerned. One of their company directors (un-named) is another R/C fan who is in the throes of completing a 1/4 Scale Big Fleet.

They, too, will shoot a negative of your original material and blow it up to a max of 40" x 60". Cost is: negative \$4.00, enlargement \$25.00 on paper. Material up to 20" x 30" originals can be used. If exact dimensional stability is required, enlargements onto Mylar are available at \$2.75 per square foot. Mylar would permit reproduction time and time again if required.

Don't forget, if you are enlarging a plan which is the property of someone else, your reproduction of it for profit may well get you into hot water! Expensive hot water!

If the plan you want reproduced will result in a size in excess of the apparently standard 40" x 60" don't despair. Those of us who have been around for awhile recall having to tape, pin, glue or staple plans together in the past in order to obtain a workable drawing. Anyone who has taped a plan together from one of the other model magazines will be familiar with the process. By the same token, if your original is arrangeable, you may be able to sort it out in such a way that most of the parts, etc., can be reproduced on a single sheet and then the fuselage might require two pieces.

Some of the plans I have in my collection end up being upwards of 10'

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long and it's great when they're in one piece when you have them spread out on the living room floor to look at them, but it becomes a bit of a problem when it comes to working on them. Where do you spread out a 10' plan to build on only part of it!

We modelers seem to be a funny lot in some ways. I know guys who would not build on the original of a plan but have a copy made on which to work. They are the same guys who consider model magazines to be almost holy and who would no more cut a coupon out of a magazine than they would desecrate a church. Kind of nice in these days of

instant, disposable almost everything.

★

By the time this column appears in print, we will be crowding the Annual QSAA Rally in Las Vegas. If you haven't arranged yet to be there, you should think about it. Las Vegas is quite a spot if you have never been there and the QSAA Rally is the premier of such an event in the country. Who knows, you might get bitten by the BIG bug and spend the winter building your own Quarter sized monster. At this time of year, at least in the northern parts of the U.S. and Canada, winter is not that far off and the building season approaches

once again. If you like the building aspect of our hobby, choose one of the many models coming into the market for your building project and do that super job on it that you have been promising yourself to do for years. If you don't like building, try it anyway. You'll find that building a large model is not nearly so difficult as some of the smaller ones and when you get a part of a Quarter Scale model finished and off the board, there is something worthwhile to look at. It's hard to lose a part of a Quarter Scale model on your workbench!

Then, next spring, when flying season
to page 164

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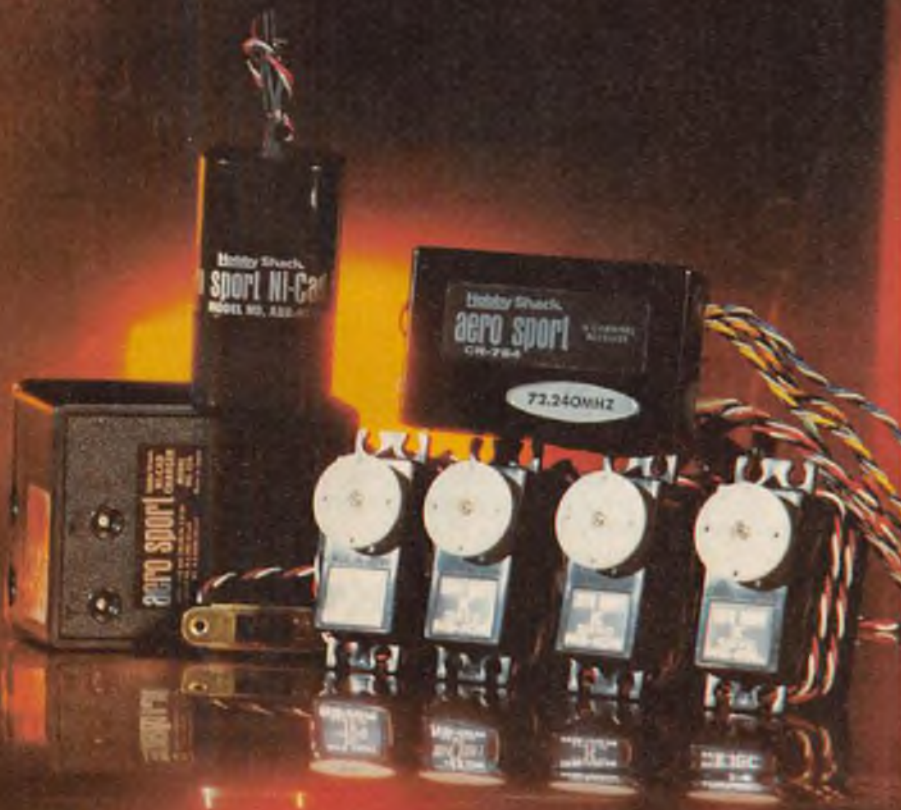
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three **105⁹⁹**

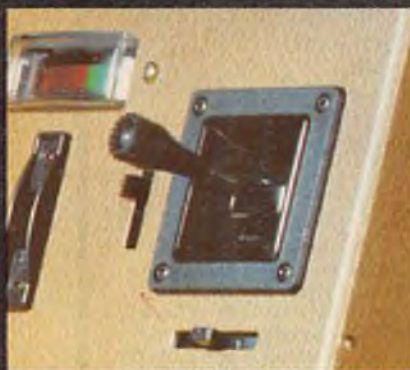
Aero Sport Three Systems Include: 3 channel receiver, 3 channel transmitter, both for AA Alkaline battery operation (batteries not included), two (2) NS-1C servos, dry airborne battery box, switch harness, frequency flag, servo trays and full 180 day warranty. Choice of 72 or 75 mHz.

SYSTEMS FEATURE

- SMOOTH OPEN GIMBAL ACTION WITH CLOSED DUST COVER SHIELDS
- TRIPLE TUNED FRONT END RECEIVERS
- ACCESSORY PACKAGE WITH TRAYS AND EXTRA WHEELS OR ARMS



**DEPENDABLE, BEAUTIFUL, ECONOMICAL,
QUALITY CRAFTSMANSHIP & ELECTRONIC DESIGN**



SMOOTH STICK OPERATION



TRIPLE TUNED RECEIVER

**aero sport
four 169⁹⁹**

Aero Sport Four Systems Include: 4 channel receiver, 4 channel transmitter, all Ni-Cads for both transmitter and receiver airborne, dual charger (charges both batteries at the same time), four (4) NS-IC servos, servo trays, extra servo wheels, instruction book, frequency flag and full 180 day warranty. 72 mHz only.

**aero sport
six 189⁹⁹**

Aero Sport Six Systems Include: 6 channel receiver, 6 channel transmitter, all Ni-Cads for both transmitter & receiver airborne, dual charger (charges both sets of batteries at the same time), four (4) NS-IC servos, servo trays, extra servo wheels, instruction book, frequency flag and full 180 day warranty. 72 mHz only.

Hobby Shack

aero sport

RADIO CONTROL SYSTEMS

Hobby Shack takes particular pleasure in knowing that we are offering the American modeler the finest line-up of radio systems and accessories at real money saving prices. For the past seven years we have been contracting for our radio systems to be manufactured by the best and largest radio maker in Japan. This has allowed us to keep pace with new electronic technology and get quality craftsmanship. For 1979 we have four systems, giving you a choice of four radios to choose from, depending on your needs and progression in the radio control hobby.

As of this writing no one else we know of has a better two channel to offer you than our Aero Sport Two. Our two channel has a vinyl covered aluminum case unlike the others with plastic cases. Only Aero Sport Two offers a triple tuned front end receiver just like our other radio systems. Only Aero Sport Two offers you a choice of three servo types. We think the Aero Sport Two is the best two channel you can buy at any price, and our price is only \$79.99! We have expanded our servo line which now offers you a choice of six types to suit your needs. In fact, all systems are shown in our catalog with several servo options for the initial purchase. We also have introduced our new open gimbal stick assembly which has a dust shield to keep the dirt out.

When you select an Aero Sport system you are getting quality, dependability, up to date engineering design and back-up service & warranty. That is the reason we have always sold so many radio systems each year, and know we have the best for 1979.

For more detailed information on our Aero Sport radio control systems, send \$2.50 for our 1979 Modeler's catalog. This big 192 page catalog has 96 pages in full color. Along with complete information on Aero Sport radio control systems, servo options, parts & accessories, it has everything else the R/C modeler needs!

There's only one place to get it!

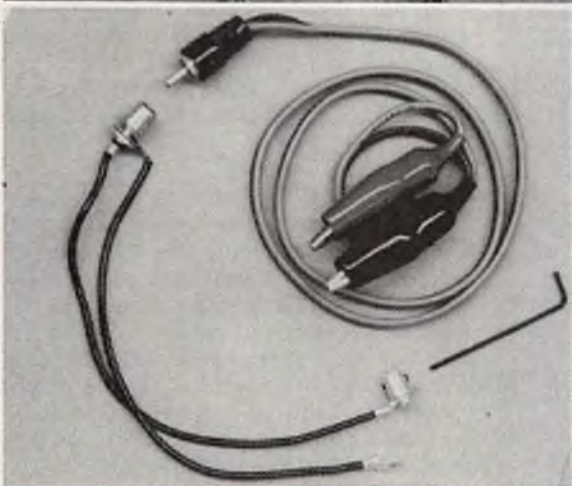
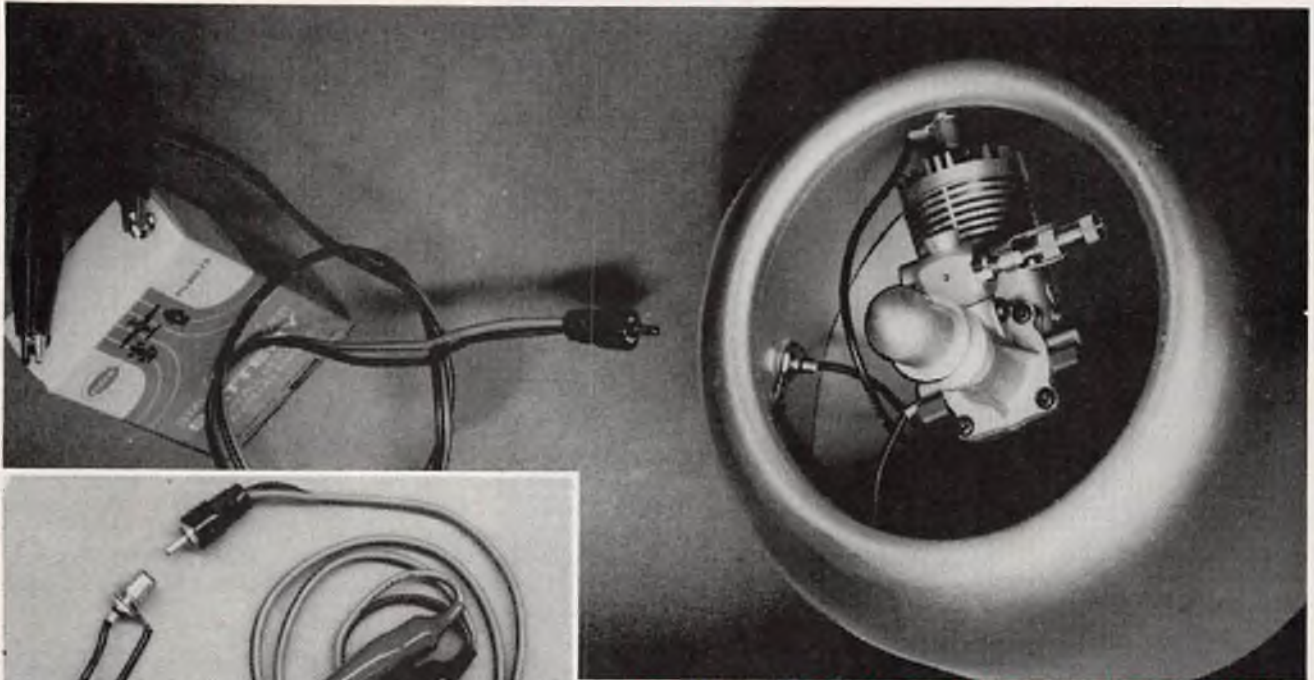
CHARGE IT
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Shack**
18480 BANDILIER CIRCLE
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ORDER BY MAIL
OR CALL US
Area 714
963-9881

Add \$3.00 postage & handling. California residents add 6% state sales tax.

WE'VE GOT INSIDE CONNECTIONS



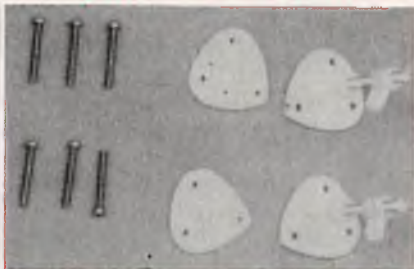
ROYAL'S BUILT-IN GLOW PLUG STARTING HARNESS

With Royal's new built-in starting harness, you don't have to be on the "in" to get your engine started right. As a matter of fact, this handy accessory lets you plug your starting battery into an external jack mounted anywhere on the outside of the aircraft's fuselage. This feature is especially handy for cowled-in or hard-to-get-at engines. In short, for convenience sake, it pays to have the right connections. See it today at your local dealer.

Set includes pre-wired jack, alligator clips, positive glow plug "head gripper" and allen wrench. **\$4.95**

MORE OF THE RIGHT CONNECTIONS FROM ROYAL

THREADED RUDDER HORNS



A unique control horn that is completely adjustable. By simply screwing or unscrewing the nylon clevis, minute control surface settings can be obtained. Each horn comes with threaded back plate and screws.

2 for \$6.99

GLOW PLUG SNAP SOCKET

The Original Starting Socket



This accessory is unique among starting clips. Its socket style design provides a positive locking, clamp-like grip and its six contact points transfer current from the starting battery to your engine's glow plug with maximum efficiency.

\$2.99

FUEL FILTERS



Molded nylon in-line filters with a press fit that will disassemble for easy cleaning
2 for \$9.99

SCALE COCKPIT INTERIORS



Molded with the detail-conscious scale modeler in mind, these new cockpit kits are designed to fit perfectly into Royal (or similar size) scale aircraft. The kit comes complete with gauges, seat, seatbelts, all control features located on the dash, floor, sides and rear of the cockpit. Detailed painting and assembly instructions are included. Molded in fast-to-assemble sections which for a little extra time will give a truly outstanding touch to your scale project. Available at your local dealer.

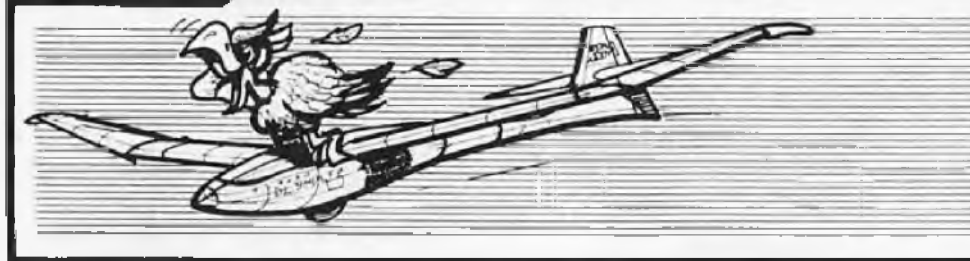
.60-SIZE . . . \$9.95	40-SIZE . . . \$8.95
P-51	FW-190 Corsair Zero
Spitfire Zero	1/4A SIZE . . . \$6.95
Bearcat Corsair	Corsair P-51

More On The Way!



**ROYAL
PRODUCTS CORP.**

790 WEST TENNESSEE
DENVER, CO 80223



We have some good news on a subject that has been mentioned many times in the past. Many of the modelers are asking about where they can obtain carbon fiber wing spars already made. A vast majority of modelers are not equipped to laminate their own, or they just don't have the time.

discontinue production of this particular product. Hi-Flight Model Products has purchased the equipment and materials and will begin production of graphite fiber foam laminate spars for use in model construction and they will be marketed under the same name Flight-Spar.



Bill Mueller holds the laminated plank as it comes out of the press prior to ripping into widths.

Bill Mueller of Hi-Flight Model Products, is about to market a carbon fiber wing spar that is within the price range of the average builder/flyer.

As Bill says, he came across the graphite fiber laminate material he sent me as a result of a telephone conversation with Terry Koplan. Both he and Steve Work are using this material for spars in the sailplanes which they flew at the World Championships in Belgium. The graphite fiber sandwich was originally manufactured as sail battens for sailboats.

Bill contacted the original manufacturer with the intent of possibly acting as a distributor for these laminates to the modeling market. It happened that the gentleman that owned the equipment was diversifying into other areas of carbon fiber manufacturing and had planned to



This is what the finished Flight-Spar cut to width with the various thicknesses will look like.



Lee "Speedy" Renaud as he and Barbara are about to present the very striking sculptured awards.

Up until this time, there have been several graphite and epoxy spars made but they were generally too heavy and presented other problems which eventually limited their market ability. In the case of Flight-Spar, the graphite fiber is purchased in rolls impregnated with epoxy resin and catalyst. The rolls are 12" wide and the material is approximately .006". A layer of the "pre-peg" is placed on a polished aluminum platen, then a layer of high density foam and a second layer of "pre-peg" and another polished aluminum platen. This sandwich is then compressed and heated to 250°F. The



Who says that sailplaning isn't a family affair - the John Daimans of southern Calif. shows us it is.

sandwich is stabilized at this temperature for one hour and then slowly cooled. As the sandwich is being heated, the resin flows from the "pre-peg" into the foam creating an inseparable band. This plank is then cut into the desired spar sizes.

Bill anticipates marketing Flight-Spar in the following sizes: 1/4" x 1/2", 1/4" x 3/8", 1/4" x 1/4", 1/8" x 3/8", and 1/8" x 1/4". All sizes will be available in 35" and 48" lengths. Longer sizes, up to 86" will be available on special order.

It is anticipated that Flight-Spar will be in the hobby shops sometime between Thanksgiving and Christmas.

Bill has done a lot of experimentation with resins, epoxies, and glues, and found that they are all compatible with Flight-Spar. In most cases some roughing of both faces of the spar with 400 paper will achieve an inseparable bond.

If you are not able to find Flight-Spar in your favorite hobby shop, write: Bill Mueller, c/o Hi Flight Model Products, 43225 Whittier Ave., Hemet, Calif. 92343, or call (714) 927-4666.



From Charlie Reed of the Kansas City RC Contacts, comes some good information on the subject of visibility of our sailplanes.

to page 150



FROM THE SIG MAIL BAG

Dear Friends,

We send you a picture on which you can see 3 Kougars built by 3 French modelers in Reims (Champagne Country).

The Kougars is a very pleasant model for aerobatic flying and we are very happy to fly each week-end all together.

It is not very easy to find Sig products in France. We found one kit of Kougars in Great Britain and we built 2 other Kougars with the kit. We use .40 cu. in. engines: 2 Webra .40 Speed, and 1 O.S. .40 FSR.

Good Bye,
P. Perchat

Aero Modele Club Remois

Sioux City, IA 51109

Dear Sir,

Enclosed you will find three pictures of my recently completed Kiwi. As you can see I converted it to two engines. Since it does fly extremely well and is a great crowd pleaser, I just thought I would let you see the completed plane. I have found that it works equally well whether flying on one or two engines. Weight, 7-1/2 pounds, engines, O.S. Max 25's.

The plane will be used exclusively this summer for demonstrations I perform for the Siouxland Air Carnival, Golden Kernals AMA demonstration team.

The wing span of the plane was increased by 3-1/4 inches per wing panel. This was done with the materials provided in the kit, all I did was space the wing ribs further apart when built.

I would also like to take this opportunity to thank you for all you have done for the modeling hobby. I have owned several Sig kits and I have no complaints about any of them. My Kougars is now on its third year and still going strong (I have worn out three .60 engines on it). At the Sig tournament last year it was equipped with an OPS .60 and tuned pipe. The plane was clocked by the city police radar unit last fall at 113 MPH. Not bad for a Kougars.

Sincerely,

Rick Alter

Upper Right: Rick Alter's Twin Kiwi was converted from the popular Sig single-engine Kiwi kit. Lower right: Rick's Kougars zeros in on the target in a "Kill The Kite" fun-fly competition.



FLY ONE OF THESE FLIGHT-PROVEN DESIGNS

RC-35	KOUGAR	\$52.50
RC-42	KIWI	47.50
RC-32	KOMANDER	49.95
RC-31	KADET	43.95

CATALOG & ORDERING INSTRUCTIONS:

See your dealer first! If he does not stock Sig kits, order direct. Orders over \$10 are postpaid. No C.O.D. Send \$2 for latest catalog of kits, accessories and supplies by SIG and other major companies.

Dear Mr. and Mrs. Sig,

I have followed your advice with the "Learn To Fly The Sig Way" training program. I have built your Kadet and am presently flying it.

Enclosed is a few pictures of my Komander. Since I had all winter to build it, I took my time and put some work in for a good finish. I entered it in the junior category and came out with first place.

You proved it was a great plane to build and fly, but it is also a winner at shows. The reason for the tuned pipe is so I can get away with using little or no nitro. The colors are bone white and metallic saffaron.

Bruce Bennett

5 OTHER KITS BEFORE SUCCESS WITH KADET!

Gentlemen,

Last year I started flying RC after building models all my life. I have gone through one each of the following: _____, _____, _____, _____ and _____. None gave me enough flying time to develop any skill at all. Your Kadet is hands-down the best trainer of them all. I have flown my Kadet all summer, (enough time to go through 5 gallons of fuel) and have developed all the basics. I really enjoy RC but might have given up on it if it were not for the Kadet. SUPER PRODUCT!!

Thank You,

Thomas R. Skonie

New!
Glen Sig's **BEECHCRAFT**
Bonanza E33A



Designed by HANK POHLMANN

ENGINE SIZE: 60 Cu. In.
 Wing Span: 64"
 Length: 44"
 Wing Area: Approx. 652 Sq. In.
 Weight: Approx. 7-1/2 lbs.
 Approx. 8-1/2 lbs with Retracts



RC SPORT SCALE
RC SPORT FLYING

KIT FEATURES:

FULL SIZE PLAN LAYOUT FOR RETRACTS

FOAM WING CORES WITH TIP CAMBER AND WASHOUT

The smooth lines of Beech's classic Bonanza are ideal for modeling and since one of the airplanes hangared at Sig Mfg. Co.'s home field is President Glen Sigafoose's E-33A, it was a natural choice for a kit. The Bonanza uses a basic balsa box fuselage and is finished by the addition of a full length formed cabin made of A.B.S. Clear molded windows fit into the inside of the top to provide an authentic, scale-like look. Since the conventionally constructed balsa main fuselage takes the vibration and flight loads, the plastic top is essentially only a decorative fairing and not a structural part. This combination gives excellent appearance without sacrifice of durability.



KIT CONTAINS:

- * Full-Length Formed Plastic Fuselage Top
- * Molded Clear Windshield and Windows
- * Formed Plastic Cowling
- * Precision-Cut Foam Wing Core
- * Handy Printed Fuselage Sides-Build Directly on the Wood
- * Formed Wire Landing Gears
- * Die-Cut Plywood Parts
- * Sig Quality Balsa and Plywood
- * Large Full-Size Plan
- * Decal Sheet
- * Illustrated Step-by-Step Booklet
- * Photos of Full-Size BONANZA
- * Nylon Control Horns
- * Nylon Screws for Bolt-On Wing Attachment
- * Molded Plastic Hinges
- * Tuf-Steel R-C Links
- * Aluminum Motor Mounts
- * Blind Nuts, Screws and Other Small Hardware

SIG MANUFACTURING CO. Montezuma, IA 50171

RCM PRODUCT REVIEW

Hobby Lobby TRUELINE TIGER



The Hobby Lobby Trueline Tiger is designed to be a fast and stable sport plane with the capability of being competitive in fun fly events and in the novice class of pattern.

When the kit was opened, the packaging was very compact and all parts were easy to identify via the plan match. The lack of pre-shaped parts meant that lots of carving and sanding would be necessary. The plan sheet was 30" x 40" and showed drawings of the basic fuselage construction. The plans and parts need to be studied before starting the building. Of course this holds true for any kit.

Construction:

The fuselage is straightforward in construction with only the fin attachment that needs any comment. Here the plans show butt gluing to the top of the fuselage. Two pieces of 1/4" triangle stock on each side of the fin greatly increases its strength. If you desire, you can carve and sand the fuselage to an almost round shape due to the thick top block and large triangle stock used inside.

The control horns can be made to fit inside the fuselage tail section with access to them through a hatch behind the stab on the bottom.

Covering:

The wing is precovered with obechi wood and only needs gluing together and light sanding before covering or painting. Hobby Lobby SuperCote was used on our model to keep it as light as possible. Trim was MonoKote trim sheets and Air Force decals that were supplied in the kit.

Engine:

The engine used was an O.S. Max .40 with Semco flow thru muffler. A Kraft Motor mount was used and is included in the kit. A Sullivan 6 oz. slant tank was used with plenty of room in the long nose.

Radio:

We used a Cox Sanwa 4 ch. radio with standard servos. The

SPECIFICATIONS

Name	TRUELINE TIGER
Aircraft Type	Sport
Manufactured By	Hobby Lobby — Trueline Rt. 3, Franklin Pike Circle Brentwood, TN 37027
Mfg. Suggested Retail Price	\$66.00
Available From	Both Mfg. & Retail Outlets
Wing Span	52 Inches
Wing Chord	10 Inches (Avg.)
Total Wing Area	520 Square Inches
Fuselage Length	41½ Inches
Stabilizer Span	20 Inches
Total Stab Area	100 Square Inches
Mfg. Rec. Engine Range	.40-.45
Recommended Fuel Tank Size	6 Ounce
Recommended No. of Channels	4
Recommended Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa
Wing	Foam & Obechi wood covered
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	Yes
Instruction Manual	No
Construction Photos	No

RCM PROTOTYPE

Radio Used	Cox Sanwa 4 channel
Engine Make & Disp.	O.S. .40
Tank Size Used	6 Oz.
Weight, Ready To Fly	80 Ounces
Wing Loading	22½ Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Wing precovered with obechi wood; long one piece main landing gear; spar combination; snappy performance.

WE DIDN'T LIKE THE:

Lack of more complete instructions; the tremendous amount of carving and shaping on the fuselage.

centering and power of these servos is among the best that we have used. We were pleased with the smoothness and centering of the transmitter sticks.

The radio compartment has lots of length but care must be taken to insure that the aileron servo will clear the rudder and elevator servos.

Flying:

The long nose and short tail moment will tend to make the Tiger a bit nose heavy. If you find that the flare on landing is just a bit hard to get the nose up, then you may want to add a little weight to the tail section. I used 1 oz. of lead in my test model. This seemed to allow a smoother flare that resulted in slower landing.

Take-offs are quick, and vertical climbs are possible just after breaking ground. Knife edge flight is a breeze with only a standard .40 size engine. I believe that climbing knife edge is possible with a good Schneurle engine. Loops, both inside and outside are true and no tracking-out is noticed.

Conclusion:

With 12 years of R/C experience in building and flying, I feel that the Hobby Lobby Tiger is truly a fine flying airplane that will offer the owner many hours of pleasure at any flying site. □

AN OPEN LETTER TO ALL R/C MODELERS FROM BRIDI HOBBY

Dear Friends:

The folks here at Bridi Hobby sincerely want you to enjoy both building and flying our BRIDIKITS. We recognize, though, that no matter how much thought we put into designing and manufacturing our kits or how detailed the construction notes are, it's not unusual for you to run into some problems or questions you'd like answered. Because we build and fly what we sell and want you to enjoy our products as we do, we've set up a special Customer Service Line to answer your questions. All it will cost you is a telephone call to 213/594-4971. So, if you have trouble at the building board or at the flying field, give us a call. Ask for Customer Service. We'd like to help.

Sincerely,


Joe Bridi

Send \$1.00 for a complete set of Bridikit Catalogue Sheets

TAKE A LOOK AT OUR GROWING LINE OF QUALITY R/C KITS

TRAINER BRIDIKITS

		Wing	
	Eng.	Span	Const.
RCM Trainer .60	.60	60"	balsa
RCM Trainer .40	.40	50"	balsa
RCM Trainer .20	.20	45½"	balsa
RCM Trainer .10	.09	36¾"	balsa
RCM Trainer .05	.049	36¾"	balsa
RCM Basic Trainer	.19	50"	balsa

PATTERN BRIDIKITS

Deception	.60	63"	balsa/foam
UFO	.60	64½"	glass/foam
Dirty Birdy	.60	64"	glass/foam
Dirty Birdy	.60	64"	balsa
Super Kaos	.60	58½"	balsa
Kaos	.60	58½"	balsa

STAND-OFF SCALE BRIDIKITS

		Wing	
	Eng.	Span	Const.
Brown Racer	.60	59"	glass/foam
Sirius	.60	64"	glass/foam
Chipmunk	.60	58"	glass/foam
AT-6	.60	68"	glass/foam
P-51	.60	64¾"	glass/foam
T-28D	.60	68"	glass/foam
Kraft Super Fli	.60	60½"	balsa/foam
Shrike	1/40	79½"	glass/foam
Tiger Cat	1/40	65"	glass/foam
Spitfire*	.60	64"	glass/foam
Waco Meteor*	.60	62"	glass/foam

SAILPLANES

Soar Birdy	.049	78"	balsa
Big Birdy		99"	balsa

SPORT FLYER BRIDIKITS

		Wing	
	Eng.	Span	Const.
Tweedy Bird	.19	48¾"	balsa
15-500	.40	51"	balsa
Quickest 500	.40	50¾"	balsa
Quickest 200	.051	31¼"	balsa
Sun Fly 4-20	.19	48¾"	balsa
Super Kaos	.40	52"	balsa
Dirty Birdy	.40	58"	balsa

BOATS

Chubasco	.40-.60	glass
Chubasco	.21 I/O	glass

* Available late '79

CLIPPED WING

Introduction

I met Duane Cole through our mutual friend, Mike Clark, while at the annual Confederate Air Force Airshow two years ago. As I watched Duane's flying I was impressed with his performance and with how easily his plane would adapt to R/C.

The full-size clipped wing Taylorcraft flown by Duane Cole is a 1938 model B-50. It was modified in 1950. The modifications include reducing the wingspan by reshaping the tips and "clipping" the inboard end of each wing panel. Duane chuckled as he told us he bought the plane for \$995.00 and has grossed over \$300,000 with it. He has flown it in all 48 contiguous states and 7 foreign countries including back of the Iron Curtain. With it he has won 2 National championships and was a member of the world acrobatic team.

For this project I obtained a set of 3-views and a brochure on

the current Taylorcraft from Taylorcraft Aviation Corp., 14600 Commerce Ave., N.E., Alliance, Ohio 44601. Then I made a table of dimensions to compare the stock model to the clipped wing version and to the Quarter Scale which I desired. From these comparisons I drew the outline shapes for the model.

Actual construction of the original prototype spanned only eight days from scratch to the model many of you saw at Toledo in 1979! The reason for this is that my wife helped immensely. She did both rough and fine sanding while I glued and carved.

We had originally intended to fly the plane after the Toledo show but we didn't because inclement weather prevented it until too close to time for the Southwest Modelers Show. Being basically lazy I just didn't want to chance it, so I didn't. After the Southwest Modelers Show was over I installed Kraft FM Radio in the plane and headed for the flying field to test hop my creation.

Test Flight Report:

The very first flight on my Quarter Scale clipped wing Taylorcraft was something to behold. I had run and adjusted the engine during the afternoon prior to test flight day. Now I had completely assembled the airplane at home and brought it to the field in my van. I unloaded the bird, fueled it, gave it a walk-around pre-flight and control check and finally pronounced it ready to go.

It was hot, windy, and no shade nearby when we began to "prop" it. Not much hand cranking on a 2.6 cu. in. engine with an 18" prop is necessary before you shut down and check out the problem spots. Since we had primed and choked the

engine our thought was ignition. Remove the spark plug, ground it to the engine, turn prop by hand, reveals no spark, hence no combustion, thus engine wasn't running.

There followed a shut down, tear down and inspection, minor maintenance to restore spark ignition followed by lengthy reassembly --- all in the mid-afternoon sun. The experience gave credence to Kipling's "mad dogs and Englishmen in the noonday sun" theory. The point of my telling you this is twofold: it sets the stage for what follows and it should be a lesson to you. Don't do the same thing I did. If extensive maintenance is required don't try to fly immediately after tiring yourself to the point of being less than **totally** cool and rational.

Now, the engine started quickly once the spark was restored and to say it roared to life is conservative. The jump from piped 60's to the 2.6 cu. in. Super Hustler was almost more than I could absorb. The thrust and vibration levels are immense. As the plane was positioned for take-off I mentally filed the flight plan in my mind to be sure I knew what I wanted to do. Just forward on throttle, right rudder to counteract torque, build speed, back pressure on elevator, climb to 150', turn left and enter a racetrack holding pattern.

What really happened was quite different. When I advanced the throttle the tail was

Designed in Quarter Scale, Duane Cole's famous clipped wing T-Craft makes a natural for the "Big Is Beautiful" crowd. Can be powered from a .91 to a 2.6 cu. in. By Jim Simpson.

TAYLORCRAFT

immediately airborne. Back stick and more right were needed but the "don't snap roll" alarm in my head screamed "easy now, easy, easy . . ." Suddenly its airborne but not smooth — pick up the wing — aileron command shows up the first great problem. The ailerons are so incredibly sensitive that the plane immediately rolls 45° right — correction gets 45° left — Holy Cow, ease up on ailerons, I think, but at nearly the same time I ease up on elevator and discover that nose pitches over too quickly. Oh no, elevator too sensitive as well.

Here's the situation. A 20 pound plane is rapidly disappearing while performing non-symmetrical 3 dimensional oscillations and I'm the only guy who can control it. I wanted the take-off to be hands off like everyone else writes about.

I just looked at the untrimmed plane and thought how nice a fishing trip in the Rockies would be!

Back to reality — I swam the Taylorcraft up to 100 feet altitude and called for full up trim, full right aileron trim, then full right rudder trim in that order. Mike Clark was at my side and put in each trim for me. It's smoother that way. I then flew it around in large circles and figure eights until I was calm enough to plan the approach and landing.

As I throttled back and turned to final approach heading I had to fight a tendency to turn right. No time to wonder about that —

just hold heading, more left, heading, left, descend, left, whoops! What's hanging down between the wheels? Oh no! The 3/16" wire main strut has vibrated loose. Oh well. Continue the landing more left, looking good, 6', 3', 2', wouldja look at that drift, 1' — touchdown.

In the tall grass. Roll-out is real short. Grass hands and grass arms grabbing the landing gear. Nose heavy plane goes up, up, up, and over. Complete stop. On its back. The only damage was to the 18/10 prop. Now I could easily have left out this experience and said it flew hands off. Instead, let us learn together.

All that grief was caused by too much fidelity to scale. I had all the details but didn't need to be so accurate. Only minor changes were necessary, fortunately, and one at a time, here were the adjustments: change prop from 18/10 (scale diameter) to 20/8. Result was much less torque and/or P-factor — aileron trim back to neutral. Change aileron throw from scale movement of 23° each way to less than half that.

Thank goodness, my Kratt KP-7C has rate switches. This was simply a matter of turning a screwdriver. Same thing for the elevator. Moving the Center of Gravity back will cure the noseover. Slight rudder trim is necessary to compensate for the vertical fin being out of alignment.

It takes a while to get used to these big Quarter Scale planes. The rewards for more effort are scale-like speeds and sounds.

By the fourth flight of the model we had the trim just where it should be and the take-off was truly hands off — smooth and graceful. The plane is quick and crisp. It does nice point rolls. Spins like a top (even noseheavy) and for brute power I just pulled the nose up from level flight and when vertical commenced to snap roll. Got 3 complete before it fell over the top into a spin with easy recovery and nice landing. Build it. You will love it.

Preparation:

Before assembly it would be wise to fabricate all the many parts for two reasons. First, by so doing you will become more familiar with the plans and understand the assembly better. Secondly, you won't be held up in the assembly process while you make another part or two!

Beginning at the tail and working forward you can make the tailwheel assembly or buy it ready-made. C.B. Associates, Inc., 21658 Cloud Way, Hayward, Calif. 94545, manufactures such an item. It is Stock No. 5510 HD, called the Heavy Duty Tailwheel Assembly and lists for \$9.95 at this writing. If you choose to make your own, I can't be of much help because I used the C.B. version. In either case you must cut the mount from 3/16" ply, drill the mounting holes and install blind nuts on the top side.

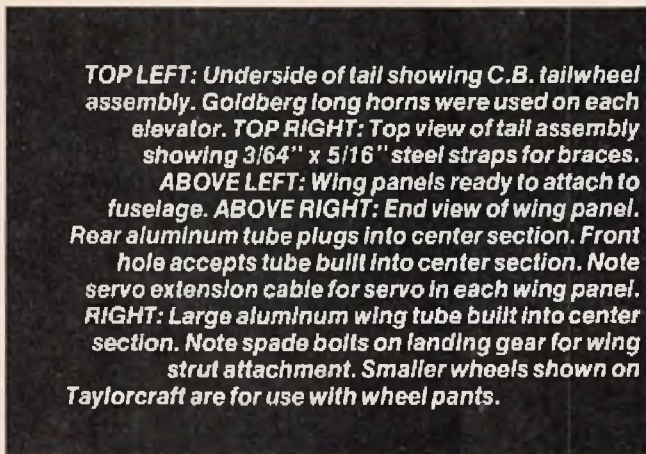
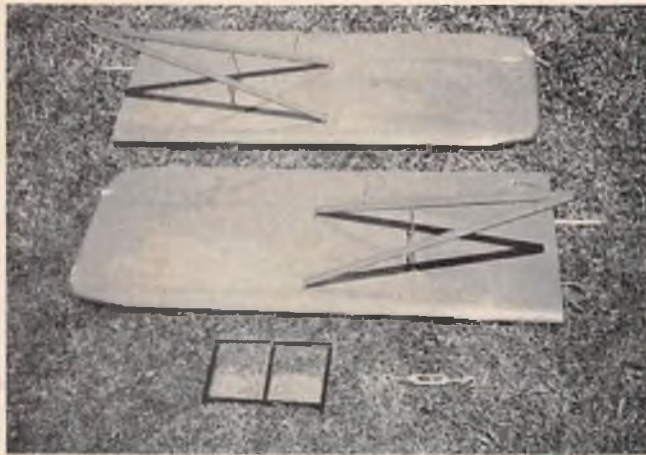
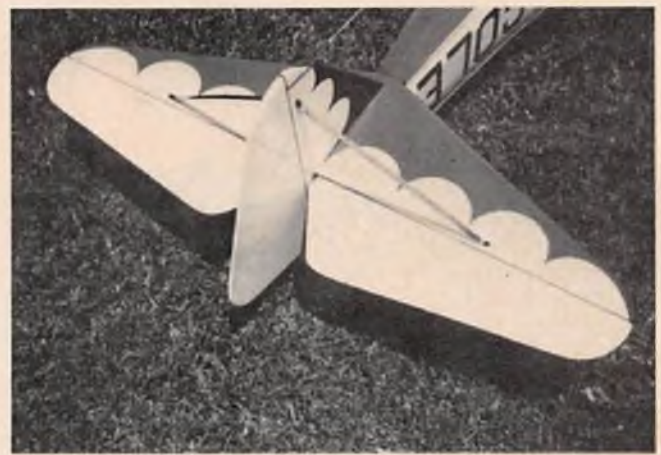
The main landing gear is composed of 3/16" diameter music wire and 1/8" aluminum sheet grade 6061 T6, .125 thick which is 4 1/2" x 27 1/2". The center section is 10" wide and the four mount bolt holes are 1" inboard of the edges so they form the corners of a rectangle 2 1/2" x 8". The amount of taper is shown on the side view and is best cut on a band saw if you don't have access to a larger shear. Sand the edges and round the corners then drill the 3/16" diameter axle holes. Finally, drill the spade bolt hole 1/2" back from the leading edge on the centerline. Bending the gear to shape is best done on a sheet metal brake press. The proper angles are

shown in the front view.

The wheel pants are for looks only and can be made of either fiberglass or balsa plywood. We don't recommend flying with them on unless you have smooth paved runways.

Otherwise, they get nicked or damaged in rough surfaces or they get clogged with grass, dirt, snow, etc. To make them with balsa and plywood, begin by cutting the core pieces of balsa thick enough to clear your tires. Note: we used the Du-Bro 4" tires which have to be pumped up. This makes them wider so be smart and pump up the tires first. If you have trouble finding 1 1/2" balsa it is okay to laminate whatever you have to reach the desired thickness. Next, cut the 1/8" plywood sides (they overlap the wheel openings by 1" front and back), epoxy in place and sand to shape. The top view of the finished pant should resemble a fish with blunt tail. This shape is dictated by the size of the wheel cut-out.

The cowl pieces are shown in the side and top views. Again, if those sizes of wood are unobtainable they can be pieced together. Cut 2 firewalls of 1/4" aircraft grade plywood. They



TOP LEFT: Underside of tail showing C.B. tailwheel assembly. Goldberg long horns were used on each elevator. **TOP RIGHT:** Top view assembly showing 3/64" x 5/16" steel straps for braces. **ABOVE LEFT:** Wing panels ready to attach to fuselage. **ABOVE RIGHT:** End view of wing panel. Rear aluminum tube plugs into center section. Front hole accepts tube built into center section. Note servo extension cable for servo in each wing panel. **RIGHT:** Large aluminum wing tube built into center section. Note spade bolts on landing gear for wing strut attachment. Smaller wheels shown on Taylorcraft are for use with wheel pants.

will be laminated to prevent warps. Cut the landing gear floor of 1/4" aircraft grade plywood. Cut the instrument panel of 1/8" sheet balsa. With the exception of the cabin center section the fabrication of the fuselage and tail is complete.

The cabin center section and the wing parts are fabricated simultaneously. The first step is to make an accurate template (from the fuselage side view) of the wing airfoil. Locate and drill the spar holes. Remember that the center section has a 1/2" tube secondary spar and the wings have 3/8" tube spar holes. If you do not have access to shop equipment you may want to consider cutting and shaping the ribs in 3 sections. That is Left Wing, Right Wing, Center Section. Notice that the wing root ribs are identical to the center section ribs **except** rear spar hole size. Therefore, you cut 4 ply and 2 3/8" balsa ribs and then drill, stack and sand them as one piece. It is wise to use the center section aluminum tube spars as guides. These spars are cut to length by the top view and sanded/deburred by hand.

Cut, sand and deburr the two sets of wing spars. Sanding

removes the oxide and makes a better bonding surface for white glue so use rough sandpaper. There are 13 balsa and 4 plywood ribs in each wing panel. You may wish to cut the blanks to a size of 2" x 14 1/4" drill them, and then stack them as one piece and bandsaw them to shape. Finish sand the ribs to final shape. Cut seven balsa ribs and one plywood rib to accommodate the aileron spar and aileron. Make four more aileron ribs of 1/8" balsa. Cut the 1/4" ply aileron sub spar to shape. Cut the plywood bellcrank and servo mounts and the strut mount pads from 1/8" aircraft grade plywood. That finishes the fabrication process.

Construction:

Before we glue or cut anything, let's pause to reflect on the finished product, or the desired outcome, if you will. If you have not been around Quarter Scale planes you are going to have a tough time comprehending what I am about to say. Nevertheless, believe me. These big engines shake the fool out of everything — so think about that as you make every joint and install every piece during the assembly. I assure you I



TOP LEFT: Wings attached using large turnbuckle. Cover hatch bolts in place which makes easy visual safety inspection. **TOP RIGHT:** Strut ends are bolted between two spade bolts. Be sure to use elastic stop nuts at these points. **ABOVE LEFT:** On its back showing off landing gear and engine opening in cowl. **ABOVE RIGHT:** Original started out with scale size prop (18 x 10) but had to be changed to a 20 x 8 for best results. **LEFT:** You meet the nicest people riding a "Honda."

have changed my thinking in order to develop this plane and from time to time I will share the changes with you.

If you have no experience with full size planes it will be difficult to make this next point, but I will try. This model should be treated like a full size plane. For example, use elastic self locking nuts or lockwashers and safety wire, on the bolts and nuts. Give the plane periodic and pre-flight inspection to be sure everything is secure. Remember this as you build each piece. Those of you who fly real airplanes will readily understand this point. Simply stated — "Build it right because you can't pull over to the roadside for repairs if something goes wrong during flight."

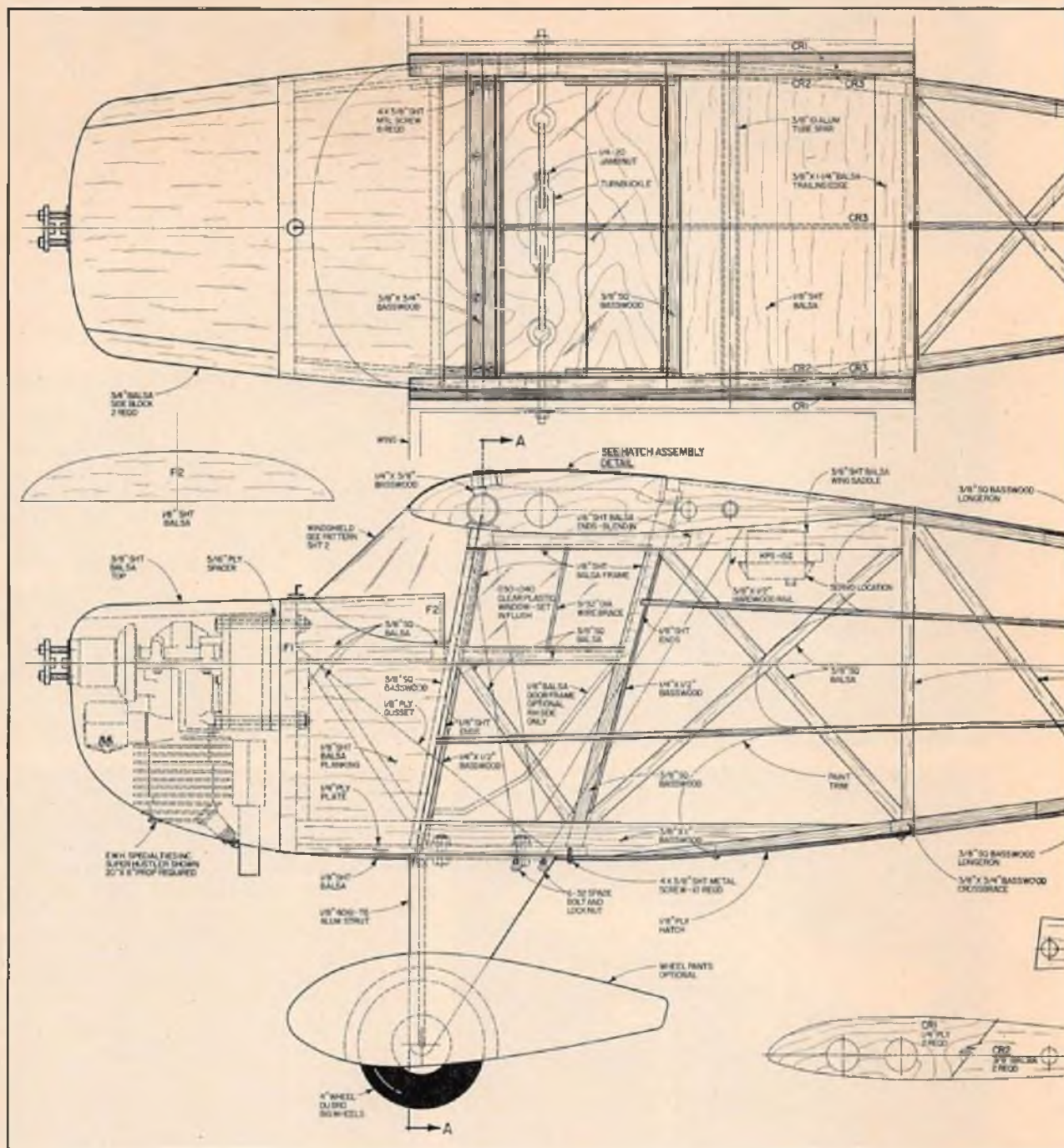
Let's begin with the tail, then do the fuselage and finish with the wings. Cut the 3/8" x 3/4" balsa pieces that outline the elevators and pin in place over the plan which has been covered with waxed paper. If you make accurate cuts (like in a mitre box) you may use either cyanoacrylate or aliphatic resin glue with good results. Carefully cut the 3/8" square cross pieces and glue them in place.

Notice that each elevator is separate and will **not** be interconnected. Each will be independently operated by its own servo and pushrod. The servos are electronically connected with a "Y" cord. This redundancy permits some degree of continued operation if one elevator servo fails. The elevators can be sanded to shape on a belt sander or with a large flat sanding board and the 3/16" music wire provided for the landing gear. Simply tape the wire to the edge of your workbench and with the trailing edge of each elevator next to it sand in the taper.

Build the horizontal stabilizer over the planform. Pin it in place over the plan covered with waxed paper. Make sure all joints are glued and secure.

Pin or tape elevators in place on stab after the glue is set and sand the assembly to shape. Make the edges perfectly round to simulate the real one which is made of aluminum tubing or steel rods.

The rudder is to be built exactly the same as the elevators were built and sanded likewise. Notice that the fin trailing edge



is laminated of two pieces of 3/8" square and that one extends down to the tailskid while the other ends even with the bottom of the horizontal stab. This will help to align the fin at final assembly. The small curved dorsal fairing is carved of scrap 3/8" balsa and fillet after the tail surfaces are joined to the fuselage. Other than that, the fin is assembled and sanded the same as the other surfaces.

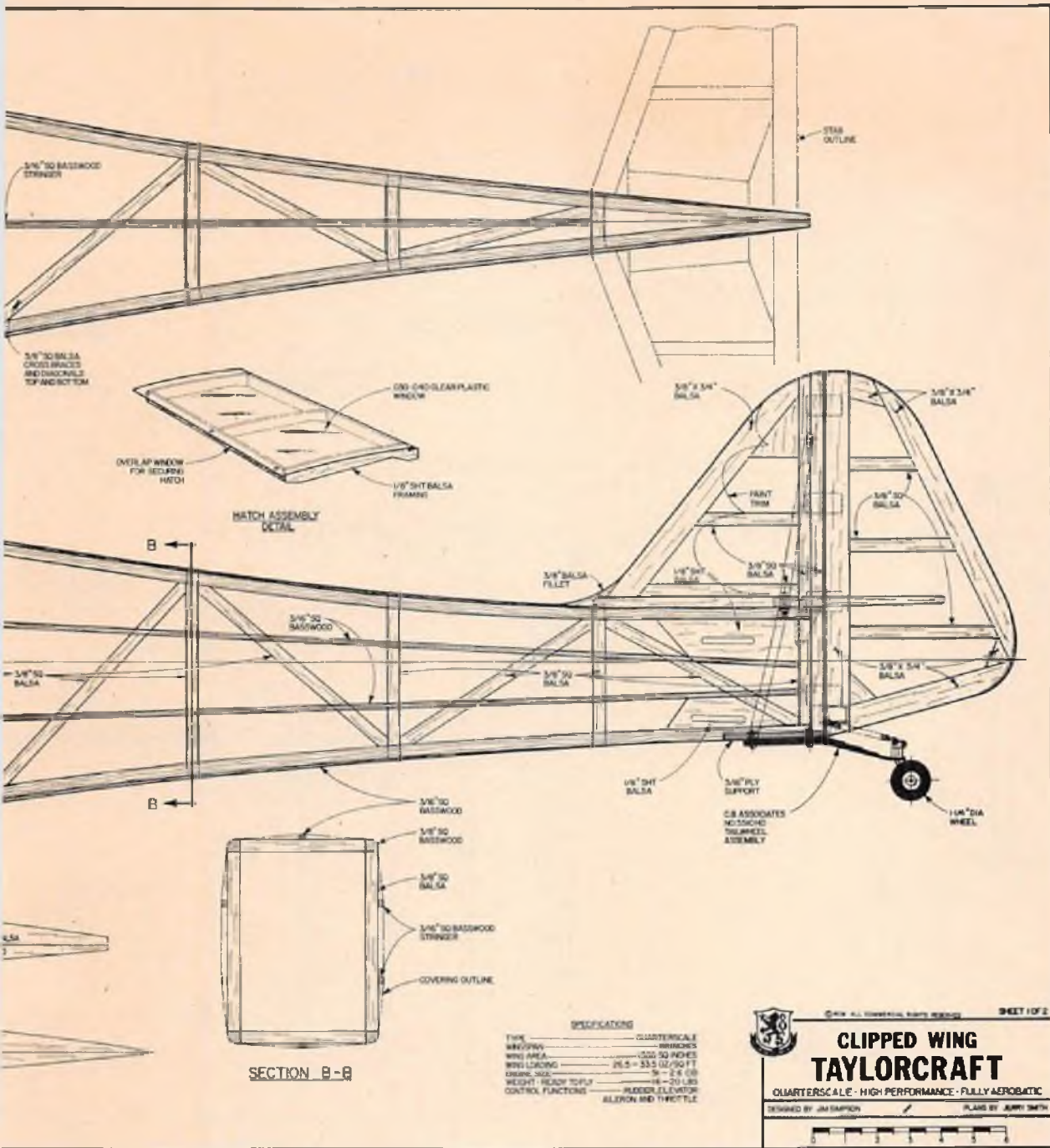
Carefully mark the locations and glue in the 5/16" dowels which will receive the tail brace bolts. Drill holes in the center of each dowel to accept the brace bolts. Install RK-3 hinges at the locations shown by the Figure X. We recommend you remove the hinge pins and substitute the 1/32" piano wire if you prefer to have the surfaces removable.

The fuselage assembly begins with the construction of two identical fuselage sides built over the side-view plan which you have covered with waxed paper. First, cut the two basswood landing gear longerons to the shape shown. Then cut two wing saddles from 3/8" sheet balsa. Use large pins or small nails to secure one of each piece in place. Now cut the top longeron of

3/8" basswood and pin in place to follow the curve as shown.

Do not glue it to the wing saddle piece. That will be glued **after** the cross pieces are installed. Cut the bottom longeron to shape and glue in place. Pin or nail it to conform with the bottom curve. It is not necessary to put the pins/nails through the wood. And last, cut and glue into place the two basswood uprights that connect the landing gear trunion to the wing saddle. Starting at either end add the remaining uprights and diagonals as shown. **Do not** glue the 3/8" balsa upright to the wing saddle. It will be glued after the crosspieces are installed. **Do not** glue the 3/16" square basswood stringers in place until the crosspieces are installed. When completely dry remove this side from the plan and build another side identical to this one. Upon removing the second side from the plans, carve and sand the taper at the aft end into each side. Be careful to make one right and one left side.

Build the wing center section over the plan's top view to be sure of alignment. Glue one 3/8" sheet balsa rib to one 1/4" ply rib. Do it again for the opposite side and make sure of a right



CLIPPING

TYPE	QUARTERSCALE
WINGSPAN	BRICKS
WING AREA	1000 SQ INCHES
WING LOADING	26.5 - 33.5 OZ/SQ FT
CRUISE SPEED	50 - 60 MPH
WEIGHT - READY TO FLY	16 - 20 LBS
CONTROL FUNCTIONS	RUDDER, ELEVATOR, ALERON AND THRUSTLE

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CLIPPED WING TAYLORCRAFT

QUARTERSCALE - HIGH PERFORMANCE - FULLY AEROBATIC

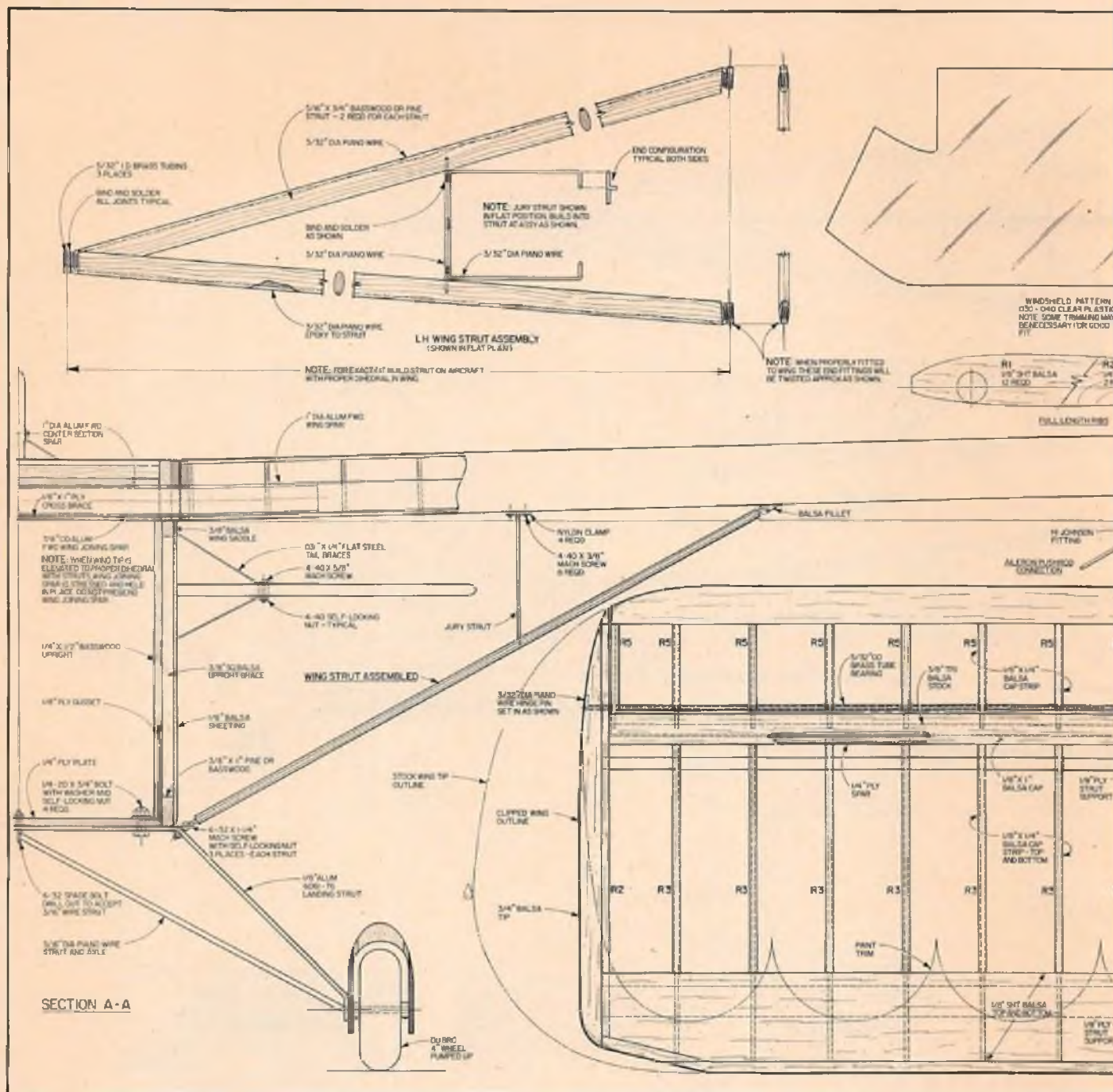
DESIGNED BY JIM SIMPSON PLANS BY JERRY SMITH

PLAN NO. 778

hand and left hand assembly. Mark the location of the trailing edge and then glue the 1/8" sheet ribs to the 3/8" balsa. Now assemble the ribs and spars. Glue the spars in place with white glue. Rotate them to work the glue into the joint. Glue in the trailing edge and crosspieces. Be sure the shim between the main spar and the basswood crosspiece fits flush to both. Add the 1/8" sheet planking between balsa crosspieces and trailing edge at both top and bottom. When it is dry, sand it to shape and set it aside for the moment.

Epoxy the two 1/4" ply firewalls together, align with masking tape and stack books or bricks on them to insure that they remain flat. Next, lay out the plan top view on a flat, true surface and cover with waxed paper. Be sure the 1/4" ply landing gear mount plate is symmetrical then secure it in place over the plan. I used nails for this. Select a basswood scrap 10" long and place it in reach. Epoxy the firewall to the landing gear mount plate and nail the scrap in front to hold the firewall in place. Now epoxy the two sides in place and secure the curve with nails alongside the basswood trunion to hold curve

in place. Add a 3/8" sq. basswood crosspiece at the instrument panel position and glue the panel to it. Epoxy and clamp the triangular 1/8" plywood gussets in place inside the framework between firewall and landing gear plate. Epoxy the 3/8" x 3/4" basswood crosspiece between the sides at the aft end of the bottom hatch. Pause and check to be sure the sides are vertical and aligned. Set the crosspiece at the top aft end of the wing saddle in place but **do not** glue at this time. Notice the sides curve inward between trailing edge of the wing and leading edge of the stab. Use rubber bands or clamps to draw them inward. Glue the tail posts together using a right triangle or square to make sure the tailpost is truly perpendicular. Working from rear to front cut, fit and glue all crosspieces and diagonals in. Notice as you go along that the top corner longerons swing outward over the wing saddle. Now, fill and glue that joint and the crossmember together. Trim the longeron smooth and sand flush with the wing saddle. Cut and glue in place with four basswood uprights that connect the landing gear plate to the wing saddle. It is necessary to notch



the forward uprights to clear the 1/8" ply triangular gussets.

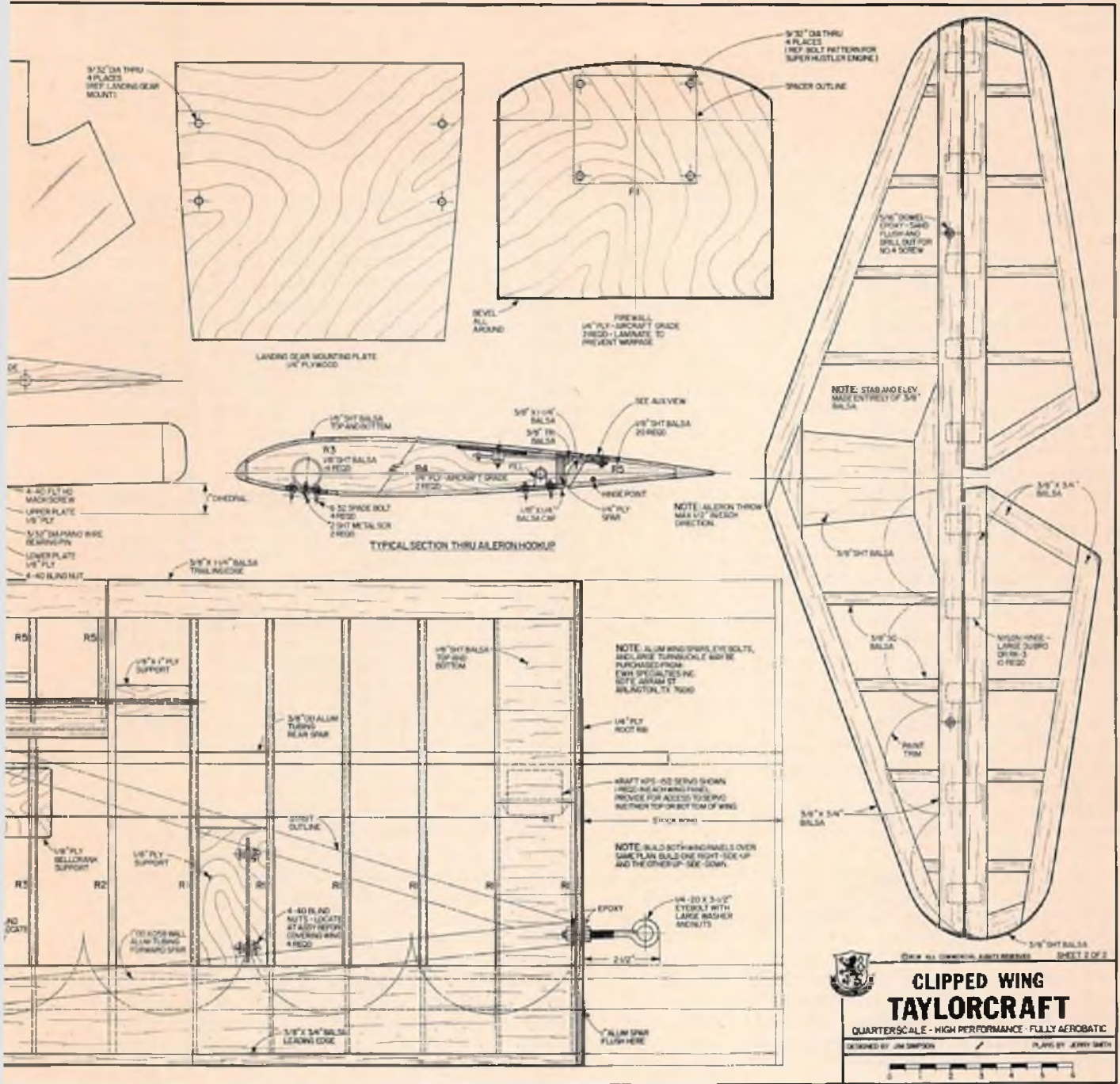
Find the 7/8" aluminum tube and a 3/8" aluminum wing spar and center both in the tubes in the wing center section, then set the center section in place and use the tubes to insure that it is square and true. If necessary, trim the wing saddles to insure a flush fit. When satisfied, epoxy the center section in place, and remove the tubes when dry. Add the 1/8" sheet balsa planking between the firewall and instrument panel. Remove the fuselage from the board and turn it upside down.

Mark the location of the main landing gear holes, drill, and bolt gear in place. Glue the 1/8" sheet balsa in front of the gear. Trim the 1/8" plywood bottom hatch to size and install with sheet metal screws. Add the 1/8" balsa crosspiece aft of the hatch. Glue a 3/16" balsa stringer along the centerline from the balsa cross piece to the tailwheel mount plate which is installed at this time by notching the longerons and then epoxying the mount plate in place.

Turn the fuselage right side up and add the 3/16" square basswood stringer on top of the fuselage. You may notch the

wing center section trailing edge to receive the stringer. Run it down flush with the stab fairing. Now add the 1/8" sheet balsa planking on each side of the fuselage forward end and around the side windows. Notice the window frame's outline is relieved to accept the Lexan glass (approx. 1/16") where it will fair in smoothly with the planking. Now, add the fuselage side stringers by notching them to be flush with the planking. Also, glue them in flush with the tailpost.

The cowling pieces can be glued in place and shaped as shown if you don't want it to be removable. An optional cowling installation would be to mount the engine directly on the firewall. Next, cut an inverted U-shaped 1/16" plywood former to fit flush with the firewall and which would clear the engine when pulled straight forward. Then build the cowl to fit on the plywood, and glue it in place. The 1/16" plywood can then be fastened to the firewall with six #2 sheet metal screws. A word of warning about closing in the front of the cowling, be sure the hole in the bottom is at least 30-50 percent larger than the



DRAW ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED SHEET 2 OF 2

**CLIPPED WING
TAYLORCRAFT**

QUARTER SCALE - HIGH PERFORMANCE - FULLY AEROBATIC

DESIGNED BY JIM SIMPSON PLANS BY JERRY SMITH

PLAN NO. 778

CLIPPED WING TAYLORCRAFT
Designed By : Jim Simpson

TYPE AIRCRAFT
1/4 Stand-Off Scale
WINGSPAN
88 Inches
WING CHORD
15 3/4 Inches
TOTAL WING AREA
1380 Square Inches
WING LOCATION
High Wing
AIRFOIL
NACA 23012
WING PLANFORM
Constant Chord

DIHEDRAL, EACH TIP
1 Inch
OVERALL FUSELAGE LENGTH
64 Inches
RADIO COMPARTMENT AREA
(L) 16" x (W) 10" x (H) 9"
STABILIZER SPAN
30 Inches
STABILIZER CHORD (incl. elev.)
8" Average
STABILIZER AREA
240 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
7 Inches

VERTICAL FIN WIDTH (incl. rud.)
8" Average
REC. ENGINE SIZE
.91-2.6 Cu. In.
FUEL TANK SIZE
33 Ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
5
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail., Choke
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage Balsa, Ply and Basswood
Wing Ply, Alum; Tubing & Balsa
Empennage Balsa
Wt. Ready-To-Fly 14-20 Pounds
Wing Loading 22-23 Oz./Sq. Ft.

intake holes on the front, and that baffles are installed to direct the airflow through and over the finned area of the engine cylinder.

Laminate the 1/8" balsa and 1/4" ply root ribs, then drill holes for servo cable and eyebolts. Install eyebolts and secure with locknuts. Epoxy nuts to rib.

The wing panels can both be built over the same wing plan. To do this you simply build one right side up and one upside down. The plan is an aid to rib location. Cover it with waxed paper. Lay out the ribs in the proper order (ply, balsa, balsa, ply, etc.) and cut as necessary to accommodate the wing spar. Trim the two outboard rib front ends to conform with the length shown on the plan.

Slide the ribs onto the spar in the proper order. Use scrap balsa to support spars such that rib barely touches work surface. Measure distance from spar end to work surface and make sure it is the same for both ends of each spar. Glue the ribs to the spar with **white glue only**. If you're quick you can rotate the spars to work glue into the joint. When dry, add the leading edge, trailing edge, sheeting and planking in that order to the side which is exposed. (**Do not** remove structure from board until this is complete.) Add the capstrips and then remove from board and add remaining sheet and capstrips. Glue the tip in place and sand to shape. Clean out the holes for the aileron hinge wire and install the brass tubing at each end of the wire, with the 3/32" wire in place. Epoxy a piece of 1/8" plywood 1" x 2 1/2" between the ribs, centered above the inboard piece of aileron hinge tubing and epoxy tube to the plywood. Be sure the aileron hinge wire extends all the way into it while you measure, then bend the L or J shape at the outboard end. This will be embedded in the tip block. Glue or bolt it in place when finished with the plane. Don't depend on Scotch tape to hold it in place because it won't.

Secure the wing to a flat building surface with the trailing edge flush. Build the aileron in place using scrap balsa as shim stock to determine placement of end ribs. Carve the leading edge to shape shown on the wing cross section. Glue in the leading edge, ribs, trailing edge and capstrips in that order after arranging on the aileron wire the hinge tubing. Glue the tubing to the ribs with white glue. When dry, sand to match wing contour and such that aileron moves freely up and down in the aileron well.

Tape the aileron to the wing at the trailing edge so that it is rigid and immovable. Study the control system carefully and then install it as follows: First, operate the aileron servos on the Y harness to insure proper direction of movement. Mount the servos in the wing root as shown. Your access hatch may be either top or bottom. (Top is easier.) Cut and bend the 3/32" music wire to shape and then install your favorite adjustable fastener at the servo end. **Caution** — remember the high level of vibration and increased strength required. Don't use a fastener that depends on a screw to hold it in place. Next, cut and bend the pushrod to proper length and assemble both pushrods to the bellcrank and then bolt the bellcrank into position on the 1/8" ply plate. Be sure there is no bind on the system before you glue it in place. The attachment of aileron to pushrod as shown on the plans is close to scale but is very difficult. If you prefer to use standard horns you may epoxy them in place but be sure to use heavy duty components. As shown on the plans, you sand the 2 plywood plates to shape, drill, and install counter-sunk screws. Drill for pushrod bearing at the joint. Cut a U-shaped slot to clear the ball joint, then remove the top piece and epoxy bottom piece in place. Add capstrips and be sure it is secure. Install the bearing, pushrod, and top lock block in that order. Now remove the wing tape and adjust the aileron throw to 1/2" up and 1/2" down as measured at the trailing edge.

Drill the 1/8" ply strut mount pads and install blind nuts and spade bolts. Epoxy in place and when dry drill a hole through pad into each spar and install a #2 sheet metal screw to insure a mechanical connection to the spar. Next, drill and install blind nuts in the jury strut mount pad; glue it in place. Now, do the other wing exactly the same way.

Covering And Final Assembly:

We recommend that you cover the components and then do the final assembly. If you prefer to do it vice versa skip to the later paragraphs but refer to this one. MonoKote is perfectly acceptable; it worked nicely on the original prototype. Because this craft is an open structure, I cannot recommend the other plastic films unless their tensile strength is equal to, or higher than, that of MonoKote. Of course, an iron-on such as Coverite will also do well and when painted would give a very realistic finish.

It is best to cover the larger pieces first and the smaller ones last. The real aircraft is an off-white, almost cream color, with dark red trim. I used white and red MonoKote. Cream and maroon might do as well. Cover the fuselage bottom in red, the sides up to the cabin windows in white and the top in red. Notice the paint outlines are on the plans so in order to cut scallops I placed two pieces of MonoKote face to face, or back to back, under the plans, pinned it all down and cut along the outline with my knife. Result is even scallops cut all at once. Be sure to poke millions of pinholes in the underneath MonoKote before adding the trim color layer. That will minimize trapped air bubbles. The bottom of wings and tail are red and top colors are shown on the plans.

When completely covered/painted the final assembly can begin with bolting the landing gear in place. Set the fuselage upright on the landing gear. Set the stab in place and mark the area that contacts the fuselage. Cut covering away from this area. Set fin in place on stab, mark contact area and remove covering from that also. Now, epoxy all of the tail group to the fuselage.

Insure alignment of the vertical fin by holding a straightedge on each side and comparing the marks at end of straightedge; on top of fuselage they should be centered. Insure stab alignment by measuring from each tip hinge line to a center point on the wing center section trailing edge. Next, measure, cut, and drill the steel strips which form tail bracing. Bolt them in place as shown on plans. Don't forget to use self-locking nuts.

We used a Kraft KP-7C radio and mounted the whole thing on two 3/8" x 3/4" basswood crosspieces which were epoxied onto the wing saddle bottom edge. We mounted the KPS-15 II servos between these rails in Kraft servo mounts. The three servos on the right side were connected to the tail surfaces with pushrods made of 3/32" wire and 3/8" square basswood. The two servos on the left side were connected to the throttle and choke with flex cable pushrods. **Do not** mount the ignition micro switch to the structure without less than 1/2" foam insulation. The solid state ignition is mounted on the cabin floor with plenty of foam insulation. The tank is mounted, centered below the Center of Gravity, inline with the carburetor. The filler tube can be made to come out the fuselage side and the overflow out the bottom.

Insert the 7/8" diameter spar carrythrough and slide wing panels in place. Mark root rib for eyebolt and servo cable holes and re-install panels. Install turnbuckle through top hatch into eyebolts and tighten by hand until panels are snug.

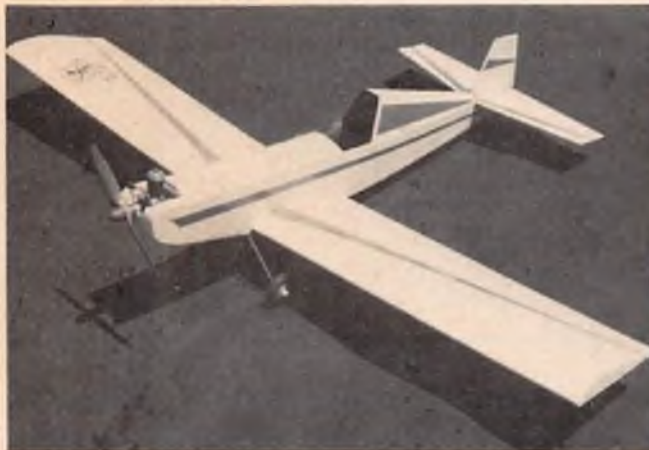
Place a folded towel on your work surface and, carefully turning fuselage over, set the wing center section on this towel. If you're lucky it will be 1" above the work surface. If not, adjust accordingly. Place weights on each wing tip and hold it on work surface. Re-check center section to be sure it's **one** inch above work surface.

Install the spade bolts in the landing gear. Set the brass tubing in place between each of the six pairs of spade bolts and push the 6/32" x 1/4" bolts through spade bolts and tubing. Cut and bend 3/32" music wire struts to shape. Place in position and secure the music wire to the brass tubing with uniform wraps of soft copper wire. Solder each joint with a big iron and good flowable solder. When cool, remove, clean, and re-install the struts. Locate the 3/8" x 3/4" basswood struts with a 3/32" groove in one side. Cut these to shape and glue in place with the 3/32" wire in the groove. This strut construction

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RCM PRODUCT REVIEW

Hoo Inc.
SB-2 SCOUT



SPECIFICATIONS

Name	SB-2 SCOUT
Aircraft Type	1/2A Sport Trainer
Manufactured By	Hoo Inc. 12 Mac Alva Drive Hampton, VA 23669
Mfg. Suggested Retail Price	\$29.95
Available From	Both Mfg. & Retail Outlets
Wing Span	36½ Inches
Wing Chord	6 Inches
Total Wing Area	226 Square Inches
Fuselage Length	28 Inches
Stabilizer Span	13 Inches
Total Stab Area	39 Square Inches
Mfg. Rec. Engine Range .....	.049-.051
Recommended Fuel Tank Size	1 Ounce
Recommended No. of Channels	2
Recommended Control Functions	Elev., & All.
Basic Materials Used In Construction:	
Fuselage	Balsa & Ply
Wing	Balsa & Ply
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (10 Pages)
Construction Photos	No

RCM PROTOTYPE

Radio Used	Kraft
Engine Make & Disp.	Cox TD .049
Tank Size Used	1 Oz.
Weight, Ready To Fly	24 Ounces
Wing Loading	15 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Machine cut parts; parts fit; built in receiver box; wing hold down; plans & parts identification

WE DIDN'T LIKE THE:

No fault noted for this type aircraft.

If you are a novice and have had a little experience building and flying, say single channel and are looking for a 1/2A sport trainer, look no further, this is the plane for your new multi channel gear. Or are you an expert looking for a sweet flying addition to your 1/2A stable, the SB-2 Scout is just the plane you have been looking for.

First thing you will notice when you open the neat box is that every part is machine cut and clearly numbered which coordinates with a materials provided list. The list describes every numbered part by quantity, dimensions and description. It is divided into assemblies such as wing, fuselage, tail and miscellaneous.

Looking further you will find a ten page step-by-step instruction manual. To get you started off on the right foot, the first page lists for you the additional materials you will need to complete the plane so go right out and get everything together. Then step-by-step with checkoff boxes it takes you through the complete building of your SB-2 Scout.

CONSTRUCTION:

The 24" x 30" building plans are very complete, every part is marked by a number which corresponds to the clearly marked number on the part and on the materials provided list. There can be absolutely no mistake as to the identity of a piece. The fitting together of the parts when building is as great as the finish of every part, it was a real pleasure to build. One particular innovation we appreciated was the built-in box for the receiver which was located under and aft of the cockpit. Generally speaking, the majority of kits of this calibre fasten the wing to the fuselage with rubber bands. This kit, however, followed the pattern aircraft by using dowels and a nylon bolt to hold the wing on; this is one of the many features of the kit you experts will appreciate. This type of wing hold-down is

carefully explained in the instructions and the novice should have no trouble at all.

Covering:

The Scout was covered with white Kwik Coté and trimmed in transparent blue.

Engine:

The engine was a Cox TD .049 and we used a Sullivan SS1 1 oz. fuel tank which is located just behind the firewall.

Radio:

We used a Kraft 3 channel using two KPS 12 servos. Using this gear, very little cramping for space was encountered. Should you use some of the newer miniature gear there would be more than enough room.

Flying:

We would strongly recommend that the builder pay attention to the length of the aileron linkage. The hookup can always be shortened when you have more experience with the plane but for starters you need the softness, same goes for the elevator horn, use the outside hole. We also felt the TD .049 is a bit too much engine for the novice, since the Medallion is recommended, the novice should use it. If you already have a TD .049 then have a seasoned pilot around to help with the first few flights.

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STAND-OFF SCALE DESIGN

The reason many of us took up R/C modeling is because we are interested in full size aircraft. The trend toward Stand-Off Scale models, even as fun fly ships, is on the increase. The rapid increase in the number of us building a limited number of kitted Stand-Off Scale ships has resulted in a loss of individuality in our projects. If being one of the crowd does not interest you and the kit projects seem to be getting boring, there is a sure-fire way of making your next project noticed and at the same time broaden your knowledge.

A number of friends have asked how I go about designing my models. This article will try to explain the method I use and should be applicable to any other Stand-Off Scale project. As in many problems, the solution is usually not impossible if enough time and energy go into solving the problem. Many problems are very difficult to solve, but few are impossible. This positive attitude is necessary if you want to succeed.

In many cases, a modeler has a dream ship in mind long before he does any actual sketching. Other modelers may just want something new and/or different. Whichever group you are in, the selection of this new project should be done with some thought. These are some of the things that went through my mind before I made my final decision. How well do I fly? Are my building methods up to the standards set by my choice of aircraft? Can I afford to build this monster? Will I need flying equipment (radio, engines, etc.) that I do not have now? Do I have to buy a trailer to take this monster to the field? How many pieces will it break down to and how will this affect the design? These questions and more should be thought through and written down. If any of you are like me, I forget things and then wonder what I forgot!

My dream ship has been the North American OV-10A Bronco well before my start in radio control. The RCM Twin Trainer was a step to this goal. The questions listed above were answered. Some easily and others not so easily. If you do not have any specific aircraft in mind and want to make a selection, some guidelines should be listed. For example: engine size, number of functions, number of engines, size, etc. A similar list of guidelines is also necessary in my case, but certain things were implied by my initial choice. The guidelines, in my case, dictate the size of the model, accuracy to scale, number of functions, etc. My objectives for the OV-10A were as follows: Purpose, Stand-Off Scale; Power, .40 to .60; Functions, Standard four plus flaps; and

TABLE I				
OV-10A BRONCO				
	Actual	1'-1.5" n-8	1'-1.75" n-6.85	1'-2" n-6
Wingspan	40'	60"	70"	80"
Overall Length	41.6'	62.4"	72.8"	83.2"
Overall Height	15.08'	22.6"	26.4"	30.2"
Wheelbase	11.63'	17.4"	20.4"	23.3"
Track	14.83'	22.3"	26.0"	29.7"
Tailplane Span	14.58'	21.9"	25.5"	29.2"
Prop. Dia.	8.5'	12.8"	14.9"	17.0"
Wing Area	291 ft. ²	655" ²	891" ²	1164" ²

SCALING EQUATIONS	
Scale Factor, n =	$\frac{\text{actual size, feet}}{\text{model size, feet}}$
Linear Dimension:	
Model Dimension (inches) =	$\frac{\text{Actual Dimension (ft.)} \times 12 \text{ in./ft.}}{\text{Scale Factor, n}}$
Linear Dimension, Squared (Areas):	
Model Area (in. sq.) =	$\frac{\text{Actual Area (ft.}^2\text{)} \times 144 \text{"}^2\text{/ft.}^2}{(\text{Scale Factor, n})^2}$

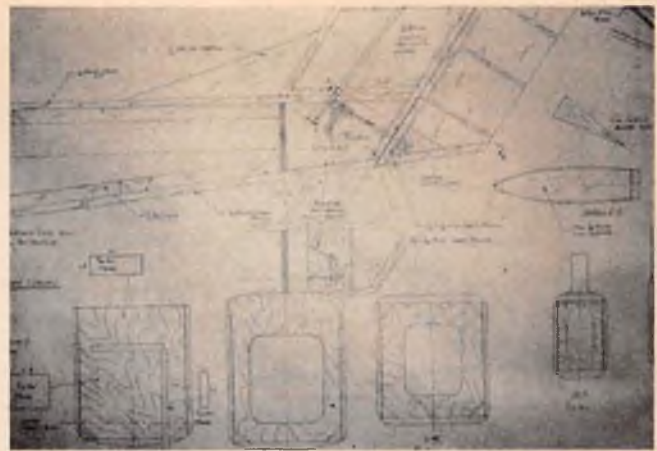
transportable in my Fiesta.

My information search had started earlier because I knew I would, at some time, start this dream project. If you have not been collecting information on your project up to this time, now is the time to start. If you decide to build a Stand-Off Scale ship, and plan to enter it in any contest, documentation is very important. The model can look and fly great but, without proof, it cannot win.

The Bronco had been modeled before, but I could not remember in which magazine. I visited Northrop University's library and their Aviation History Library, both located in Inglewood, California. There was an article in an issue of Model Airplane News, which I copied and filed in my Bronco binder. I also checked other libraries, book stores, magazine shops, and hobby shops. During this search I came across a booklet written in Japanese which had very detailed three-views and a number of excellent color photos. A letter to the Columbus Division of Rockwell International resulted in another three-view with fuselage and boom cross sections and a summary of the flight characteristics. A quick look through Jane's Aircraft volumes resulted in still another three-view and additional information. I also purchased a plastic model of the Bronco. At an open house visit to El Toro Naval Air Station, I took close-up photos

of a Bronco on display. All of this information went into one binder for quick reference. The absolute minimum you would need to design your model is a three-view (top, front and side). If you plan on entering a contest, more information will be required. I, personally, have not entered a contest. Hopefully, I will some day, but before I do I will ask members of the local Scale Squadron how the documentation should be organized.

Next, I had the three-view blown up to 8½x11. Check with your local photo or reproduction lab. This size is large enough for scaling measurements and will fit in a standard size binder. Now that I had my information, including three-view, color photos or plates, and the history of the aircraft, it was time to consider what size to build the model to. Here are some things that are important: overall size, engine size, weight, wing area, tail surface areas, aileron area, prop disc area to boom cross sectional area ratio, fuselage cross sectional area, construction techniques, etc. Please remember, while you go through all of these things, that each is only a part of the whole. All of the above items are interrelated. Of the above items, two were more important than the remainder. First, the wing loading would have to be reasonable. In my case, I consider 38 ounces per square foot the absolute maximum, ready for take-off.



TOP, LEFT: Only the basic drafting tools are required for a proper design job. **TOP, RIGHT:** Completely detailed drawings assure the fit and operation of all components. It also helps you remember how you planned to build the project. **ABOVE, LEFT:** A carefully designed model makes a complex model appear simple. **ABOVE, RIGHT:** Consideration must be given to access for assembly such as the elevator control linkage shown here. **LEFT:** Author's Rockwell OV-10A is an excellent example of a well designed scale model.

Second, was size. I wanted as much visual impact as possible and still be able to transport and store it.

At this point, you should have enough information to start sketching. There is some equipment you will need to design your own ships. If you do not have a calculator, purchase one. A very basic four function calculator will be fine. Next, drop by your local drafting supply store and pick up the following: engineers scale, 30-60-90 triangle, 45-45-90 triangle, compass, dividers, circle template (1/8" to 1" diameter), a mechanical drafting pencil with assorted leads, a sharpener for your pencil, some french curves, a 3' steel straight-edge and a roll of 10x10 grid drafting paper. This will be a bit expensive, but will be useful for the remainder of your

modeling life. A drafting board can be purchased or one made to suit your needs. I prefer a long, narrow board. In other words, a straight, flat door! Slightly damaged doors can be picked up at your builders supply store for a very reasonable price. You will also need a board cover. Your drafting supply store can help you again. I use one side of my board for drafting and one side for building.

The information obtained will list some major specifications, including wing span, lengths, heights, and wing area. Using these dimensions and scaling equations, it is easy to get some idea of what size to build your model to. Make a chart similar to Table 1. Column 1 lists the items of interest such as wing area and overall length. Column 2 should be

the actual measurements of the full size aircraft. Please list all dimensions in decimal form.

For example, 1'3" equals 1.25'. Column 3 and beyond will list dimensions to various scale values. Use the scaling equations in Table 1 to calculate the listed dimensions to various scales. The measurements under the scale factor of 1" equals 1.75' looked very good, but I had to check other dimensions not listed in Table 1. I needed a "measuring stick" to take measurements from the three-view. The procedure is as follows:

Place a piece of tracing paper over your three-view. Draw a line from wingtip to wingtip. Mark the ends of this line at the extreme ends of the wing. Label this line AB. Remove the tracing paper from

the three-view. From point A, draw another line perpendicular to line AB. Label this line AC. Recall from your table which scale you will be investigating and its corresponding model wing span. In my case, it was 1" equals 1.75" with a wing span of about 70". Now find a scale on the engineer's rule that corresponds to your wingspan which is longer than AB. Using this scale at the model wingspan, draw a line from point B to line AC. The model wingspan should be the distance between point B and the intersection of AC and this new line. Label this line CB. CB can now be divided into the same number of units as your model's wingspan. With your triangles, draw lines from the marks on CB down to AB. Each line must be parallel to AC. The ruler you have just made, can now be used to take measurements from your three-view. Please note that each unit on your ruler (AB) is equal to any other unit and represents 1". The above procedure is outlined in your AMA rulebook. Use your ruler to check the measurements you are interested in. In my case, I found no problem areas. You may not be so fortunate. For example, in another design, the cowl diameter scaled up to be too large and would have masked most of the prop. Instead of reducing the nacelle diameter and change the overall appearance of the model, I decided to make another ruler to a smaller scale. With this new scale, I again checked the cowl diameter. It was still a bit large, but now could be reduced slightly without affecting overall appearance. With the reduction to the smaller scale the wing area was less than desired. I increased the wing area by increasing the wing chord by an inch. This increase was not noticeable to the eye, but did increase the wing area to an acceptable number.

If you are satisfied with the basic dimensions you have just checked, the next step is to completely dimension the three-view using the ruler. These dimensions will be used to lay out your construction drawings. Because my model would be Stand-Off Scale, the above dimensions are flexible. For example, if one half of the wing happened to scale out to 36.4", I would list it as 36". The extra work involved in adding .4" to a standard 3' length of balsa would not be worth the effort.

Now that I had all of the dimensions necessary to lay out the construction plans, it was time to consider exactly what type of construction would be used. Possibilities included: foam, balsa, fiberglass, cardboard, or a combination including any or all of them. All have advantages and disadvantages. In my case, I decided to do the following: The wing would be foam instead of built-up

balsa because it's easier to build. The fuselage would be balsa because it has straight sides similar to an RCM 40. This would be light and very easy to frame up. The fuselage nose and tail sections would be fiberglass because of their large size and shape. Polyurethane foam would be carved and sanded to the right shape before being glassed. The foam would then be removed, leaving a light, accurate fiberglass part. The booms, vertical stabs, rudders, elevator, and horizontal stab, would all be built-up balsa. Minimum weight and high strength would be very important.

With this information, it was time to put some of it down on paper. I laid out enough of the 10x10 grid drawing paper to allow drawing the fuselage full size in top and side views. Step one, as in any drawing, is to lay down a reference line. In my case, it was the fuselage centerline in top view and the bottom of the fuselage in side view. Using the dimensioned three-view, I drew in the outline of the fuselage in side and top view, and located the wing root section. The outer limit of the wing leading and trailing edges located bulkheads that would position the wing. The forward bulkhead would be used to key the wing into, therefore it is 3/16" plywood. Two additional bulkheads were positioned between the leading and trailing edge bulkheads to support the wing. The nose gear and wheel were drawn in next. The position was scaled from the three-view. In some aircraft, a bulkhead can be positioned such that the nose gear can be mounted to it. Additional bulkheads were positioned where the canopy frames were shown. Photos and sections of the fuselage showed that the fuselage sides are very straight except for the nose, rear and canopy. The fuselage sides were drawn in the plan; the canopy-fuselage intersection being of the upper edges. At this point the fuselage frame is similar to any simple box fuselage. The fuselage bottom sheets were drawn in next. Since the fuselage was to be framed up on this bottom sheet it was drawn in fairly thick. In this way, the bottom sheet would be marked showing the fuselage centerline, and bulkhead positions. The bulkheads would be glued to the bottom sheet, then the sides added. With all bulkheads positioned in the side view, they were transferred to the top view. I now had the height and width at each bulkhead location. With the photos, three-view, and the plastic model, the plotting of each fuselage cross section requires some measurements and some plain old "eye balling." Additional balsa material and/or strength may be required in the joint between the fuselage sides and bottom. I added a

doubler in this area. I also added 1/4" triangle stock to strengthen each bulkhead joint. A separate mount was drawn in for the nose gear because its position does not allow it to be mounted to any bulkhead. The fuselage drawing should now show the wing position, sides, doublers, lower sheeting, bulkheads, nose gear mounting, nose and tail blocks, and any other items necessary to start construction. In my case, I don't always include all the details at this point. For example, the provisions for mounting the wing is not shown. These type of details can be added later.

Many modelers have a difficult time deciding what airfoil section to use. My method is not very scientific but seems to work. I use an airfoil that looks like it will work. Use an airfoil that you have flown before. Another possible problem area is incidence angle. Here again, I am no expert. I have read of several methods of determining incidence angles knowing the actual full size aircraft numbers. I'm not sure which is the best method. My method is to use what was used on the full size aircraft as long as the difference between the wing and the horizontal stab does not get out of hand. For example, a difference of 5 degrees would worry me. In the case of the Bronco, I did not have any data on incidence angle. In this case I set the horizontal stab at 0 degrees and the wing at plus 2 degrees. I used these numbers on another twin with a similar airfoil with good results.

Drawing the wing was next. Because the wing was a constant chord and had no dihedral, a plan view (top or bottom) would be all that was required. I again laid out some 10x10 grid paper and used the leading edge as one reference line and the fuselage center as the other reference line. As in the fuselage drawing, the first lines are the outline of the wing. I then drew in the boom center lines. If it were a built-up wing, any natural break in the wing would be a rib pair position, for example, the flap-aileron split or the fuselage-flap split. I next drew airfoil sections to detail how the leading and trailing edges would be handled. A quick check showed that leading edge stock of less than 3/16" thickness would result in foam showing through. The leading edge was then drawn in as 1/4" stock. The balsa trailing edge would result in a stiffer more precise wing end than a tapered foam edge.

The booms were next. This drawing was laid over the fuselage drawing to assure correct alignment. Again, I used the three-view to draw the outline of the boom. The wing and horizontal stab incidence angles were checked along

with the other basic boom measurements. Only one of the booms would be drawn but details peculiar to each boom, will be shown. The procedure is the same as the fuselage. The important bulkheads are the engine mount bulkhead, landing gear bulkhead, and boom profile formers. The boom is very straightforward. The vertical stab is built up as a separate unit, then glued to the boom. A problem became apparent --- the radio installation would have to be set down now so details could be included in the drawings.

The plane will have to be broken down for transport and storage. The major assemblies would be the fuselage, wing, and boom-tail surface group. Problem number one: How do you operate the steerable nose gear and two rudders with one servo, and permit disassembly. I finally decided to use two servos in parallel. One servo would be mounted in the fuselage to actuate the nose gear. The other servo would be mounted in one of the booms. The boom rudder servo would actuate the rudder directly behind it. The rudder hinged to the other vertical stab and boom, would be driven by a link through the horizontal stab. The rudder-steerable nose gear servos would use a Y-connector and be patched into the single receiver output. The elevator servo would be mounted into the other boom and actuated by pushrods through the boom and vertical stab. Pushrods instead of a NyRod would be used to reduce the affects of temperature and minimize play. The ailerons would be driven by one servo by pushrods and bellcranks. The flaps would also be driven by one servo. A throttle system which would use two servos was decided on. It would allow driving each throttle directly from each boom mounted throttle servo. The total number of servos is seven. A larger capacity battery pack would be necessary. Before continuing, a visit to Futaba was decided on to check my radio installation. No problems arose from that meeting.

The steerable nosegear servo was not shown in the plans because that installation is straightforward and simple. The servo would be placed as close to the nose gear as possible to minimize link length. The flap and aileron servo installation and linkages were next. These were detailed for my own satisfaction. The flap servo is placed close to the flap --- again, to minimize link length and deflection. A control line flap horn would be used to drive the two inner flap sections as one unit. The two outer flap segments would be driven by the inner flap segments through the booms by 1/8" diameter piano wire couplers. 1/8" piano wire may

seem a bit on the large side, but 3/32" wire was tried on another project and found to be too springy. The flap segments would be hinged on the bottom edge and would be gapless when retracted. The aileron servo installation was a bit more involved. The first bit of information I needed was the servo output in degrees of travel. This information would be used in determining in which hole of the bellcrank each pushrod would be connected. My goal was to have differential throw with a ratio of about 1.5/1, up/down. My aileron system would use 120 degree bellcranks, differential pushrod-bellcrank positions and control horns set to the rear of the aileron hinge line to achieve the 1.5/1 ratio. The servo, linkages and bellcranks were drawn in the wing plan view. A wing cross section at the aileron was also drawn. The servo output can now be used to predict the amount of aileron movement. I tried various bellcrank-pushrod positions, horn-pushrod positions, and servo output arm lengths until I had a combination that resulted in the 1.5/1 ratio I wanted and the amount of aileron movement I thought necessary. A recheck of my layout showed everything to be correct, so the details were drawn in the wing plan view. All of the details necessary to install the system were included -- the servo type, servo direction of rotation, servo output arm distance, 120 degree bellcrank location, pushrod positions, pushrod-bellcrank hole positions, aileron horn position and pushrod-aileron horn position. Any data which would make construction easier should be included in your construction plans. Please note that whenever a horn or coupler is used in the flap or aileron, the area has hard balsa instead of the original foam. Balsa is also used for the hinge surfaces.

With the above information, the boom drawing could be completed. As stated earlier, the rudder servo would be mounted in the left boom. Note that the rudder cannot be driven perpendicular to its hinge line directly from the servo, so a 120 degree bellcrank was mounted in the tail section of the boom, directly below the vertical stab leading edge. The right rudder is driven, through the horizontal stab, with a link connected to the top of each rudder. Stiff NyRod was used with a ball and socket assembly at each end. The above building and construction notes were recorded in my notebook. All of the hardware required for the rudder system was drawn in at this time. Do not forget to lay out how much travel will be possible with all linkage lever arms considered. As in the aileron travel case, it all starts with the

servo angular travel and the servo output arm radius. Some of you may ask why I did not use a NyRod from the rudder servo to the right rudder horn, thereby eliminating the 120 degree bellcrank. I decided against it because I have noticed that the amount of free play at the output end depends on the type of NyRod used and the straightness of the NyRod system. The more flexible and curvy the system is, the greater the free play. It makes a noticeable difference while flying.

The left boom is almost complete. The engine, motor mount, gas tank, landing gear and throttle servo and linkage, should be drawn at this time. When I purchased my K & B engines, the information which came with the engines included a nice three-view. I placed the three-view under my drawing and traced the engine using the prop hub for location. I then measured the motor mounts I would be using and drew them in place. This, in effect, set the position of the engine motor mount bulkhead. It was noted that the engine cylinder head is positioned within the wing leading edge. I decided against inverting the engines and strengthened the wing without the plywood. The plywood in the wing and the engine bulkhead would be used to fasten the forward wing section to the boom.

A bulkhead must be positioned somewhere for the landing gear to fasten to. I tried to duplicate the wild gear system of the real Bronco without much success. It would have been costly, heavy and not very sturdy. It also was apparent, that retracts were not possible due to space limitations. I decided to use a simple piano wire gear. The Bronco gear will be simulated with tubing, etc. Placement of the main gear axles would be as close to the Center of Gravity as possible without detracting from overall appearance. The exact placement of the landing gear bulkhead depends on the placement and size of the gas tank. I decided on ten ounce gas tanks. I drew in the gas tank and then positioned the landing gear bulkhead. The placement and linkage for the throttle servo will complete the left boom plan. The servo was placed on the right side of the boom to allow use of as straight a pushrod as possible. The rudder servo would also be mounted on the same pair of mounting rails to the left of the throttle servo. The left boom drawing can be used for the right boom plan because both are outwardly the same. Details of the elevator mechanics were shown where needed. Everything forward of the wing trailing edge is the same as in the left boom. Because the elevator is high in the vertical stab, a linkage

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"A" Main Event winners (L to R, standing): 1st Place Diane Semler, 2nd Bev Power, 3rd Ellie Tom. (Kneeling): 5th Pat Pottol, 4th Janice Fish, 6th Dot Prather.



"B" Main Event winners (L to R, standing): 1st Place Karon Baptist, 2nd Marilyn Riccio, 3rd Theresa McWayne. (Kneeling): 4th Judy Prigley, 5th Rosie Garcia, 6th Anne Wisniewski.

FIRST ANNUAL LADY BOATERS REGATTA

BY DICK TICHENOR

John Brodbeck felt it was about time to let the wives and girl friends, who patiently support the boat racing guys, show that chauvinistic bunch that the ladies can drive the boats as well as the men can. The ladies not only showed it, but had a heck of a lot of fun in doing so.

The race was held at Legg Lake, South El Monte, California, on June 24, 1979. Boat classes allowed were Mono with inboard or outboard engines, Deep Vee with inboard or outboard, and tunnel hull with outboard only, all of which competed together. Engine size was limited to Class A (3.5 cc).

Twenty five entries were registered (the gasoline crunch in California held it down to some degree). The top six heat point scores were raced in the "A" Main event and the next six ran in the "B" Main event.

As for the boat driving, it was amazing, especially when this was only the first or second race for most of the contestants. It was the second race for the "A" Main event winner Diane Semler. The ladies are to be congratulated for the aptitude and skill they displayed in competitive boat racing. Not only did they show talent, but their enthusiasm and excitement became so contagious that it was a real fun event to watch.

The Regatta was sponsored by K & B Manufacturing, Los Angeles County Department of Parks and Recreation, and Southern California Model Boat Association. Joe Monohan, Prop Nuts

Model Boat Club, was Contest Director. The races were so successful and enjoyable that John Brodbeck emphatically stated that it would definitely be repeated in 1980. □



The reward of sponsorship, John Brodbeck received a big hug and kiss from the ladies when he awarded the trophies.



Bev Wisniewski ran an outboard powered Prather small Deep Vee.



Bev Power drives a speedy Class A mono.



Janice Fish and her mono are a part of the Fish and Chips Team.



Pat Pottol gets a start assist from Charlie.



Dot Prather did well with the new Prather small Deep Vee.



Karon Baptist took 1st Place in the "B" Main Event.



Rosie Garcia was 5th in the "B" Main. This was Rosie's first race.



Linda Garner ran a Dumas Quickie 40.



Theresa McWayne in deep concentration.



Judy Prigley and Karon Baptist are taking that first turn seriously.



Anne Wisniewski did her thing with a Steve Mueller tunnel hull.



Ellie Tom was just plain happy about the whole thing.



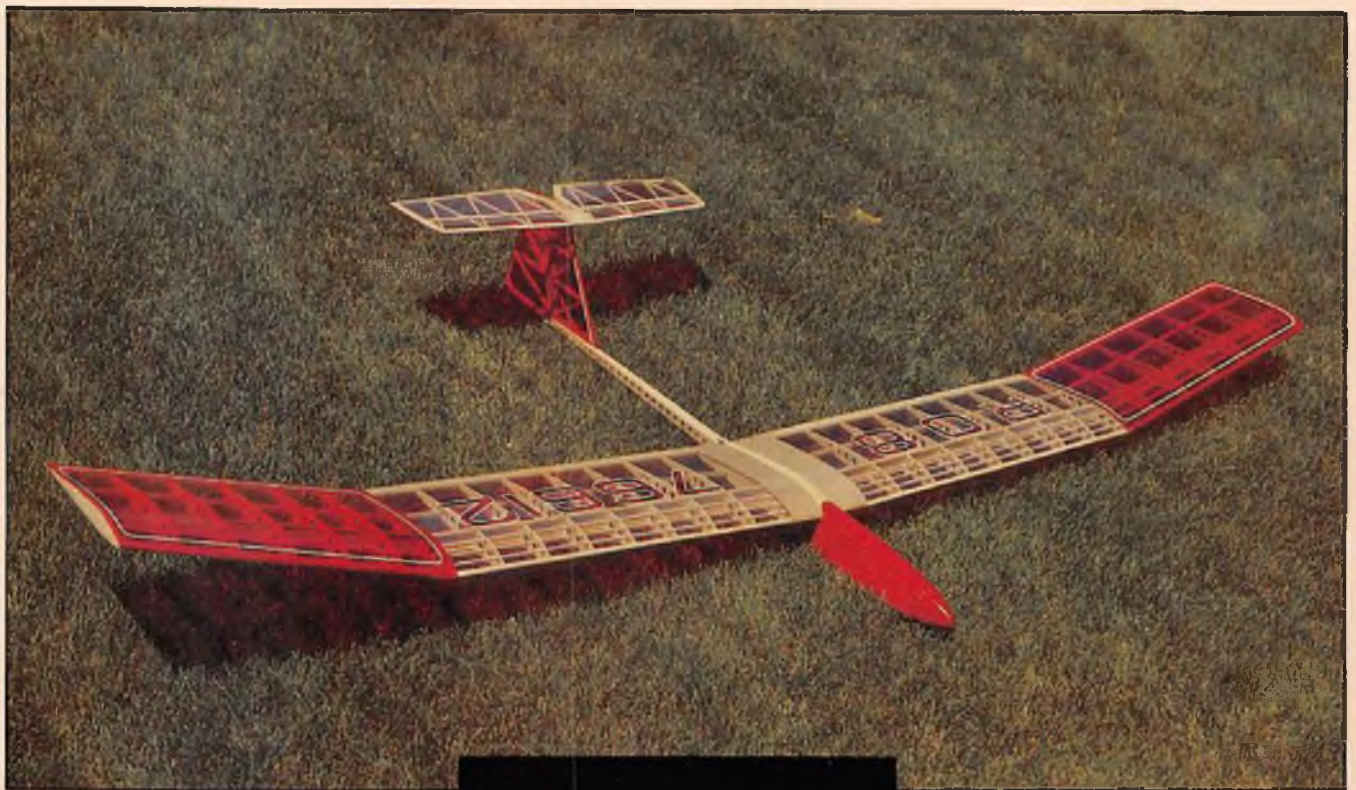
Theresa McWayne made a nice showing with her Pottol Kiampon Kai.



Marilyn Riccio was expertly assisted by Pat Pottol.



Officials and spectators found each heat of the Powder Puff race most interesting.



RO8

RO8

Designed By : Dick Odle

TYPE AIRCRAFT

Two Meter Sailplane

WINGSPAN

78.8 Inches

WING CHORD

8.76 Inches

TOTAL WING AREA

690 Square Inches

WING LOCATION

High Wing

AIRFOIL

12% Semi-symmetrical

WING PLANFORM

Constant Chord Center Panel

Tapered Tips

POLYHEDRAL, EACH TIP

2 1/2" Center Panel, 3 3/4" Tip

OVERALL FUSELAGE LENGTH

36 Inches

RADIO COMPARTMENT AREA

(L) 7 5/8" x (W) 1 1/4" (Max.) x (H) 1 3/4"

STABILIZER SPAN

20.6 Inches

STABILIZER CHORD

5.3" Average

STABILIZER AREA

103 Square Inches

STAB AIRFOIL SECTION

5% Symmetrical

STABILIZER LOCATION

Top of Fin

VERTICAL FIN HEIGHT

6.5 Inches

VERTICAL FIN WIDTH (incl. rud.)

7.0" Average

REC. NO. OF CHANNELS

2

CONTROL FUNCTIONS

Rudder & Flying Stab

BASIC MATERIALS USED IN CONSTRUCTION

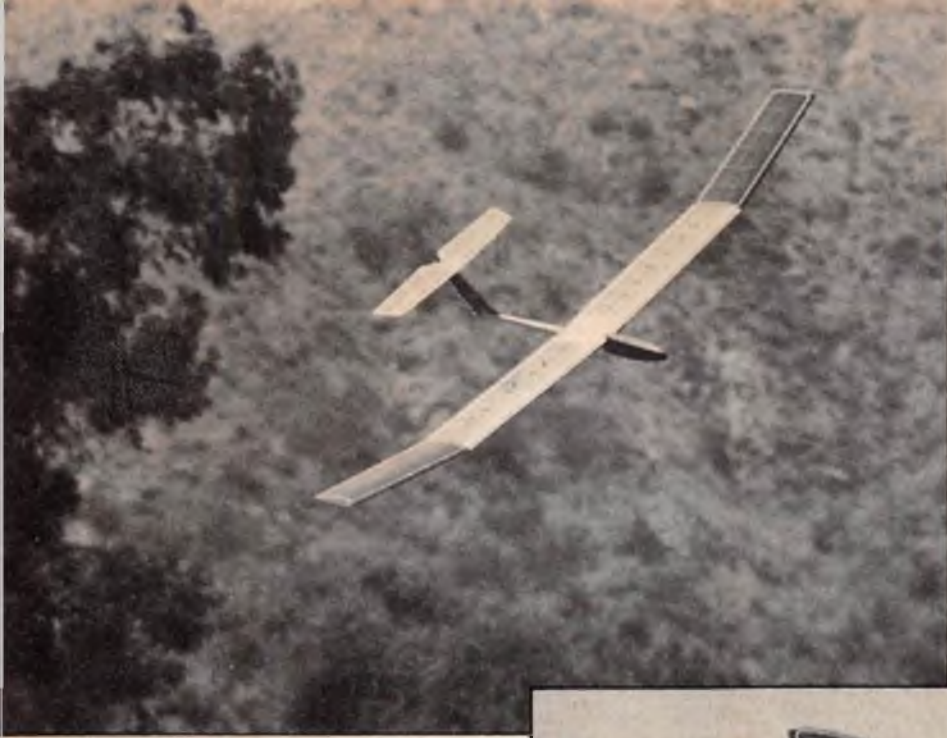
Fuselage	Balsa & Ply
Wing	Balsa & Ply
Empennage	Balsa
Wt. Ready-To-Fly	20 Ounces
Wing Loading	4.2 Oz./Sq. Ft.

The RO8 may not be the utopia of the two meter class, but so far it has yet to finish out of the money.

By Dick Odle

Having long cooked my simple brain by over exposure to the sun while flying sailplanes, I have found it necessary to number each of my designs. You will note that the sailplane presented here is Number 8. To assist in remembering who I am (should someone ask) the number has been preceded by my initials. By placing the above information on my sailplane, and given a little luck, I am usually able to locate the thing in time to launch with my flight group.

The RO8 follows a general design concept started 18 months ago with the RO4, my first two meter design. The RO4 was intended to be light, durable, fast, and easy to fly. With a 5.2 ounce per foot wing loading, it was light. It was durable. It had a 8% thick flat bottom airfoil section and was only fair in the speed department. Even though I managed to place in both contests entered with the RO4, it was not what I wanted and it was not particularly easy



durability to withstand the rigors of competition.

With these objectives fresh in my mind, a blank piece of paper was taped to the drawing board and the RO8 started coming to life. Things such as surface areas, tail volume, moments, etc., were calculated and the design was roughed out on paper. Then came the true stroke of luck. My neighbor walked in to investigate what strange thing I was up to this time. I looked down and there it was, a perfect 12% thick, 2% mean camber, size 11, brown Florsheim shoe. I quickly traced the airfoil as my neighbor stood somewhat precariously upon the drafting table. This once again proves that sailplane design is in fact an exact science.

The truth is that the RO8 looked so promising that construction was started without ever finalizing the plans. Two weeks later the RO8 was given a slight

or fun to fly. Basically, it was not the utopia we all seek and never find.

Before returning "back to the drawing board" I felt that it was necessary to re-examine the design objectives and establish some very basic priorities having to do with why adults are willing to endure extreme hardships for the sake of flying a sailplane. The answer seemed simple! We fly because it is fun --- or should be. So priority one demanded a design that was easy to fly and, therefore, fun to fly.

Priority two tended toward satisfying the desire to create something a little different, a little sexy if you will — a design that might inspire the question "I give up, what is that?"

By nature I tend to be fiercely competitive and so priority three demanded a design which could win any given two meter contest regardless of the tasks involved.

Priority four involved durability and ease of construction. I love to fly and hate to build. Repairing broken sailplanes causes my entire family to suffer unusual punishment, so the design had to be simple to build and very durable.

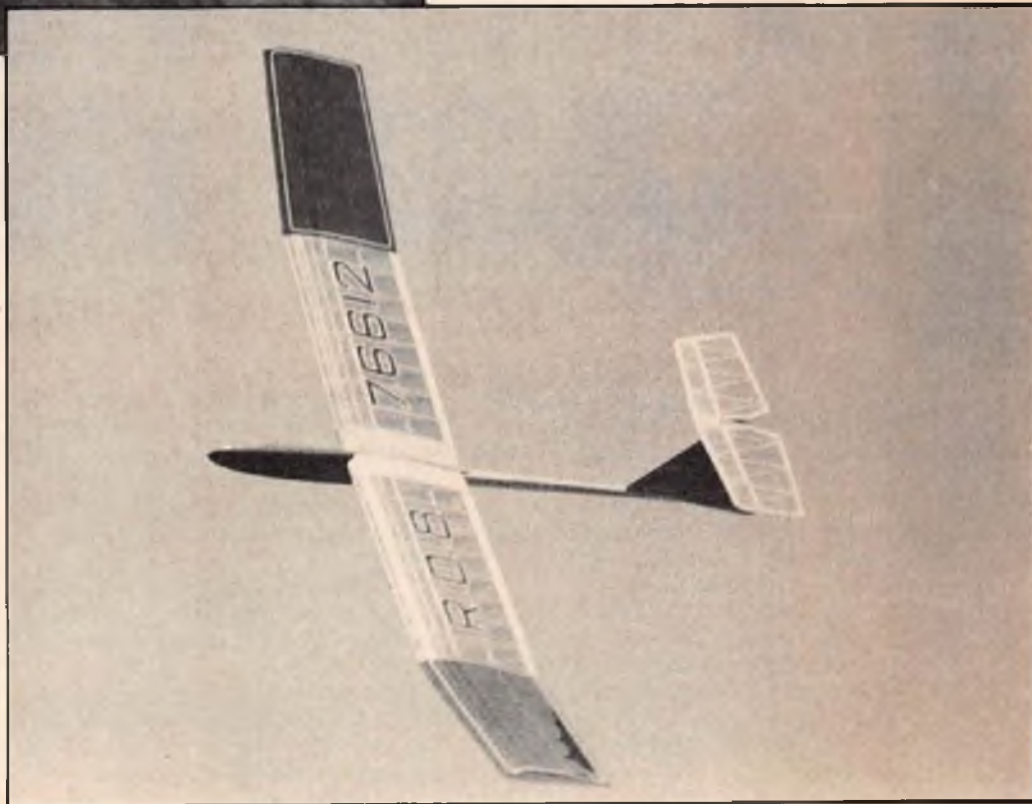
Toward these various goals the following criteria was set forth:

(1) Light wing loading for flying light lift with the limited efficiency available in a small wing.

(2) Semi-symmetrical airfoil section for penetration at a light loading and for speed when loaded up.

(3) A "thick" (12%) airfoil section to provide a wing volume sufficient to make the bird easy and responsive to fly. It also allows for a decent main spar height.

(4) A low mean camber value (2%) to keep the center of lift from wandering all over the place which again makes the



RO8 easy to fly. A side benefit is the aerobatic performance it generates.

(5) A tiny fuselage cross section to reduce parasitic drag.

(6) Symmetrical airfoil sections on the fin and stabilator to reduce drag and make control inputs smooth and progressive.

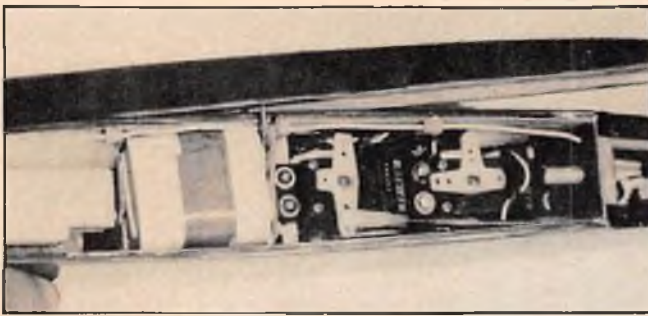
(7) A "Tee" tail configuration to assure the solid effectiveness of the stab and, perhaps, for less drag. A secondary consideration was that of removing the stab from the danger of being wiped out by my head when hand launching.

(8) And lastly, an airframe which is efficient (i.e., high strength to weight ratio), and which is fairly straightforward to build while still maintaining enough

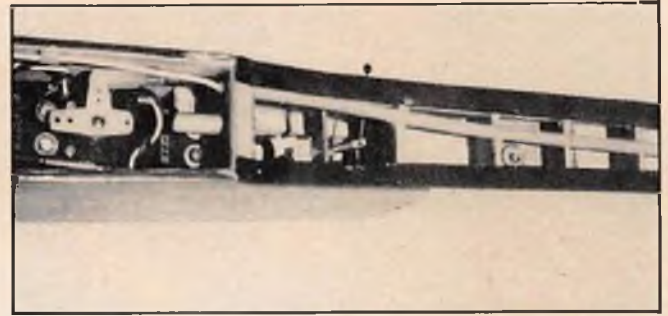
push into the wind and that's when the love affair started. That sailplane was connected to my right thumb --- I mean directly connected. Think turn and it turned right now, think penetration and it moved right out without the sink rate going completely away, think minimum sink and you would easily believe that the wing contained a lot of helium.

Was it fun to fly? Did it meet the number one priority? You bet! Was it sexy? That crowd of people looking at it thought so, and since that first day the RO8 has always had lots of people around to preen its feathers for, and that of course is very satisfying to say the least.

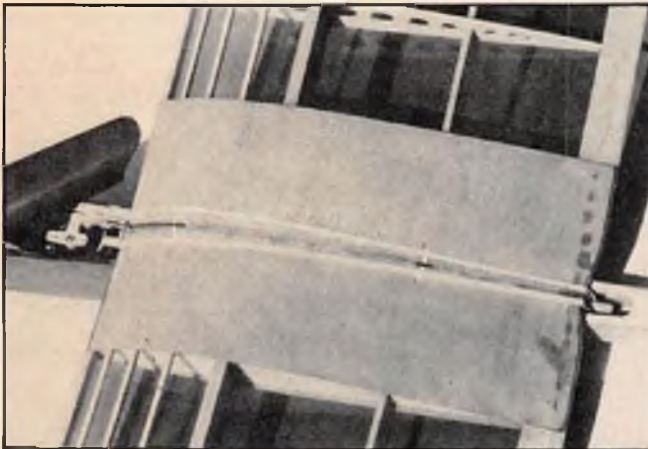
Now to the big question. Would the



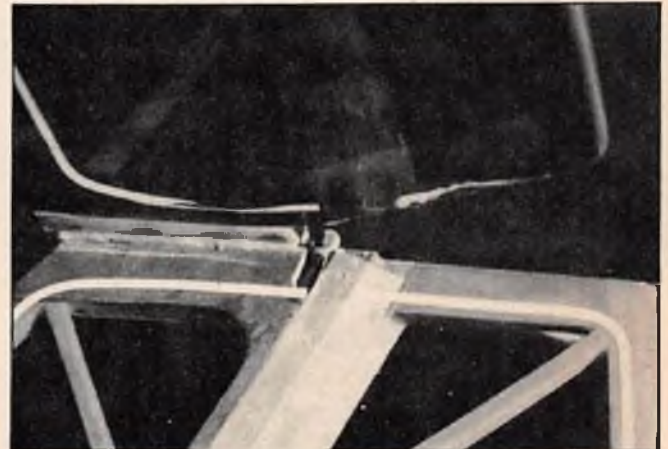
Hatch hold-down system, antenna leads, wiring is run under battery and along the sides of the servos.



Micro switch actuated by round headed pin, ballast control bulkheads.



1/64" ply center section showing holes for the use of "Hot Stuff." Index marks are for wing top ballast location.



Stab mounted on fin with baking soda fillet, stab control clevis, note recess in fin to allow for stab movement.

RO8 satisfy my need for a competitive and durable contest bird? The answer? Yes, it is a winner and I trust that you did not expect to hear anything different. The RO8 has yet to finish out of the money, with the most recent victory coming at the Western R/C Soaring Championships (June, 1979).

The RO8 may not be the utopia of the Two Meter class, but so far it has blown the shorts off every other Two Meter for the pure fun of flying, and the fun of flying should be what our hobby is all about.

CONSTRUCTION NOTES

General:

For adhesives I use Hot Stuff (HS), Wilhold aliphatic resin glue, and Sig slow cure epoxy. Use whatever equivalent you are comfortable with. When constructing the stab, fin, and rudder, I pin down all the parts, dust the joints with baking soda, and apply a small drop of HS. Turn the assembly over, dust joints with baking soda (BS), and apply HS again. For ply to ply joints in wing, fuselage, etc., I tack parts in place with HS, then make small fillets with BS and drop HS along the fillet. For the wing I tack joints with HS for the sake of speed and then follow up with at least two coats of Wilhold on all balsa to balsa and balsa to spruce joints. For laminations and overlays I drill 1/16" diameter holes on 3/8" centers in the plywood. Then dust the underlying balsa with BS sufficiently

to fill the grain. While holding the plywood in place, drop HS through the holes. This method is very quick and has proven to be adequately strong. Where localized stress is anticipated in light balsa, impregnate the area with HS.

Wing:

(1) Make wing rib templates from 1/8" ply. Make two root templates and one tip template, including all spar notches and holes.

(2) Make thirty rib blanks from 1/16" x 4" x 36" medium weight straight grained balsa. Make blanks 1.3" x 9". Each sheet will make twelve blanks.

(3) Make three rib blanks from 1/8" light balsa.

(4) Stack four 1/16" blanks and one 1/8" blank between root templates. Bolt stack with 4-40 or 6-32 bolts, washers and nuts. Shape airfoil to template. (I use belt sander.) Cut notches with fine saw and finish with "swiss" files. **Do not** cut holes in these ribs. Five ribs done! Did you forget the sub spar?

(5) Stack fourteen 1/16" blanks and two 1/18" blanks between root templates. Do same as #4 **but do** cut holes this time. Hog out holes with Dremel Tool or drill. Keep well undersized. Finish holes with coarse, then fine, rat tail files.

(6) Stack six 1/16" blanks between one root template and the tip template. Do same as #5. Note the nasty angles

after shaping. A little hand work with a sandpaper block, "swiss" files on the notches, and a tapered grinding stone on the holes will make the ribs look right.

(7) Mark the leading and trailing edge stock for the rib locations. Notch all rib locations, **except** at the dihedral and polyhedral breaks, with fine hack saw blades taped together. Usually three blades taped together will produce a 1/16" slot.

(8) Pin down trailing edges on plan (use wax paper). Note flat portion of wing rib on bottom, near the trailing edge. Place this flat portion on plan and insert rib into trailing edge notch, keeping rib aligned over plan. Tack each rib as you go with HS. **Do not** install ribs marked (A) on the plan as they would prohibit the installation of the dihedral braces.

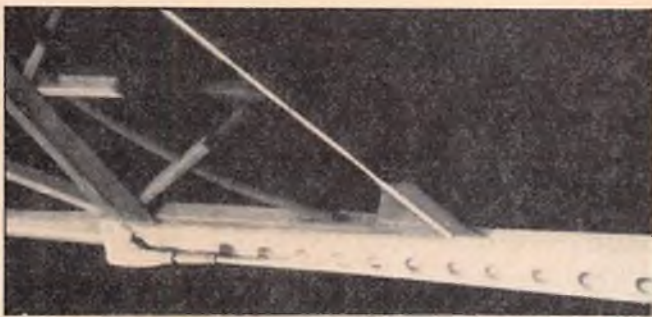
(9) Put on leading edge, tacking with HS. Yes, it is hanging in mid-air.

(10) Slide sub spar through ribs, checking for correct rib alignment again. Tack with HS.

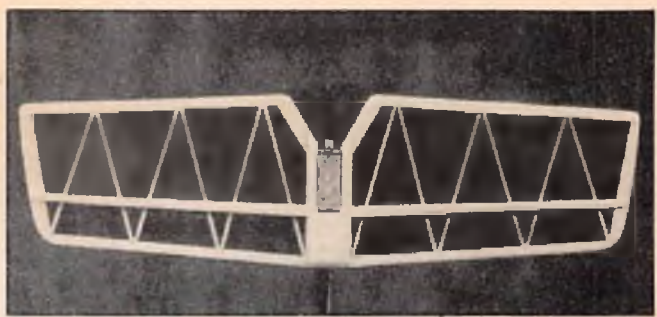
(11) Remove pins from trailing edges. Lift wing panels from plans.

(12) Lay bottom spars (1/8" x 1/8" and 1/8" x 1/4" spruce) on flat surface. Place each wing panel over appropriate spar and tack with HS.

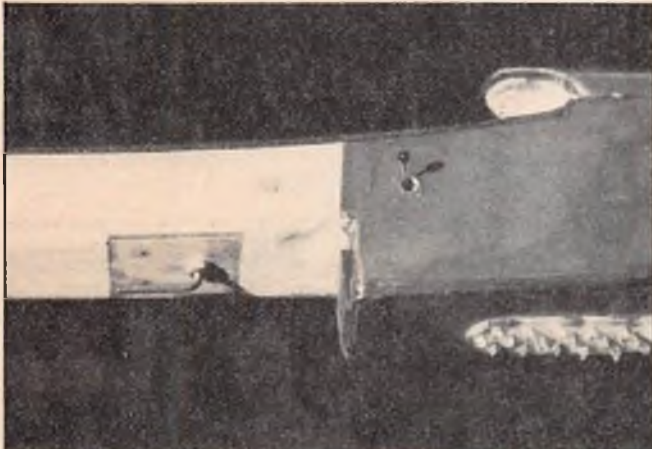
(13) Cut shear webs from 1/16" sheet and tack in place with HS. They must fit right — flush with bottom spar and flush with bottom of top spar notch. Not much



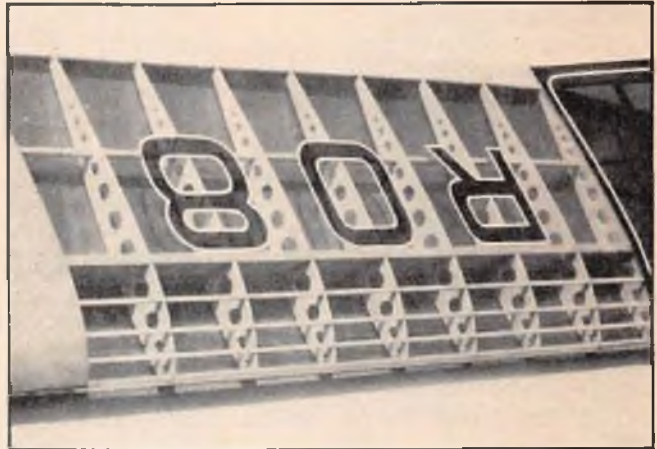
Stab control cable is centered on fin "ribs," note how rudder cable exits fuselage.



Completed stab mounted to fin, note again the holes in the 1/64" ply stab mount which are filled with baking soda and "Hot Stuffed."



Note that the switch has been moved? The plan location as shown is actually the best (trial and error!). Wing seating tape used for no-slip hand launches, skid made from car floor mat.



Wing is simple, strong and light. Holes really stop the traffic if covered with clear MonoKote and do help to keep the wing tips light.

fun. I know, but very important. The shear web grain is vertical, right? I'm sorry, but I had to ask.

(14) Turn the panels over and place over the remaining (top) spars. Tack with HS.

(15) Slide dihedral braces between spars and trim wing panel ends to achieve proper fit of L.E., T.E., and spars when at the correct angle of dihedral. With everything lined up, tack dihedral braces in place with HS. Tack L.E., T.E., and spars with HS.

(16) Cut remaining ribs (marked (A) on plan) to allow for dihedral braces. Cut 1/8" gap between ends of sub spar. Slide remaining ribs over sub spars to proper position. Tack with HS. All the ribs are now in position.

(17) Tack turbulators in place with HS. Tack tip gussets in place.

(18) Glue dihedral braces with baking soda fillets and HS or slow curing epoxy. I prefer the BS & HS method for reasons of speed, strength and weight.

(19) Glue all other joints with a minimum of two coats of Wilhold or equal. Pay particular attention to the shear web/spar joints. They must be slightly better than perfect.

(20) Glue on wing tips (1/4" sheet).

(21) Shape leading edge and tips. It is advisable to use a leading edge template to assure a consistent radius. Keep leading edge fairly blunt.

(22) Overlay the 1/64" ply center section on top of wing. I dust the balsa wood with baking soda, drill 1/16" holes in the 1/64" ply, then drop HS through the holes while holding the overlay in place with my sweaty little fingers. Quick, light, and strong!

(23) Turn wing over and add glue fillets (lots of BS & HS) at the leading edge, trailing edge, and along the three most center ribs. This will provide support for the wing bands and wing top ballast.

(24) Overlay the 1/64" ply center section on bottom of wing. Inlet trailing edge for wing bands.

(25) Finish sand the wing until all is flush and smooth. See covering note found later on.

Fuselage:
(Read caution note on plan — please!)

(1) Cut 1/32" ply fuselage sides. Tack together with rubber cement and cut holes (if you like). I mark center of holes using plan, then draw holes with circle template. Start with drill or Dremel Tool and finish with long tapered grinding stone.

(2) Cut fuselage top and bottom from light but strong 3/16" sheet. Glue the top and bottom to the right fuselage side using epoxy.

(3) Cut the outlet holes for the rudder and stabilator cable leads. Place these

two cable leads through their outlet holes and position them, along with the antenna lead, in place on the fuselage bottom. Leave the cable leads plenty long at this time.

(4) Install 1/16" sheet bulkheads (cable lead retainers) aft of the wing trailing edge.

(5) Install the tow hook doubler on the inside of the fuselage.

(6) Glue the left fuselage side in place with epoxy. Be sure to position antenna lead outlet.

(7) Make up bulkheads 1, 2, 3 and 4, including the wing band dowels. If you cut all the required access holes in the bulkheads at this time you will be a happy person later on.

(8) Slide bulkhead 4 over cable leads and glue in place. Cut wing seats from 3/16" sheet and glue in place.

(9) Glue 3/16" triangle stock to bottom inside of fuselage and box in finger hold area with the same stock.

(10) Slide bulkhead 3 over cable leads and glue in place. Also glue 1/32" ply ballast deck in place if you decide to go that way.

(11) Glue 1/16" ply fuselage doublers in place, followed by bulkheads 2 and then 1.

(12) Decide upon the type of switch you will use and tackle that installation now. I use a micro-toggle switch actuated by a push-pull wire which

hooks through a hole in the end of the toggle handle and exits the fuselage on the side that I can see when launching. A mini slide switch also works well.

(13) Glue 1/32" ply finger hold in place. Sand bottom of fuselage components flush and glue fuselage bottom in place. I use epoxy for this by leaving fuselage bottom oversize and use rubber bands to hold bottom in place while epoxy cures.

(14) Tack 1/2" hatch block in place. Rough size is 1/2" x 1 5/8" x 9" for now. Drill 1/16" hole for hatch pin from front side of bulkhead 1.

(15) Sand front of fuselage flush. Glue on nose block with epoxy.

(16) Inlet fuselage bottom and glue bottom tow hook doubler in place. Install one or more 1/16" sheet bulkheads under wing. Suit yourself. These bulkheads end up being tiny after allowing for the wing seat and various cable leads. Maybe your buddy has smaller fingers. If you use these for ballast control, impregnate each one with HS for strength.

(17) Run this whole mess by the belt sander a time or two and finish with a little hand work. Should look like a fuselage now.

(18) Remove hatch and set aside for now.

Fin And Rudder:

(1) Pin down fin leading edge on 1/32" shims. Pin down all the various 1/4" stuff and glue it. I use BS & HS. Hate to waste time with that contest coming up. If you like, cut holes for stab cable lead as you assemble the "ribs." Note that the fin post extends to fuselage bottom. Glue in leading edge gusset.

(2) Shape the fin right now. Slide fin over stab cable lead and place fin on fuselage. What progress! Mark cable lead 1 1/2" from top of fin. Remove fin. So much for progress. Cut cable lead off at the mark.

(3) Slide fin back over cable lead and position on fuselage. Check cable lead length. Strap something on the wing seat (the wing?) and pin the fin in a "vertical" position relative to the wing. Does everything look right? Glue it!

(4) Apply 1/64" ply overlays on both sides of fin post and ends of fuselage top and bottom. Finish shaping fin and fuselage.

(5) Pin down rudder trailing edge on 1/16" shims over plan. Cut 1/8" sheet lengthwise on a 45° angle to make the rudder leading edge. You need only cut one side at this time to get it pinned down. Cut the various 1/4" stock for the "ribs," top, bottom, etc., and go totally nuts trying to make the compound angles fit properly.

(6) Give up yet? Shape the thing and call it good. Impregnate control horn area with HS.

Stabilator:

(1) Fit and glue 1/8" leading edge, trailing edge, tip piece, and 1/8" x 3/8"

Material List

1/64" ply — 6" x 24", 1 req'd	.....	wing center section, fin post, misc.
1/32" ply — 6" x 36", 1 req'd	.....	..... fuselage, bulkheads
1/16" ply — 3" x 12", 1 req'd	.....	..... doublers, dihedral braces
3/32" ply — 2" x 12", 1 req'd	.....	..... dihedral brace, bulkhead
1/8" ply — 4" x 9", 1 req'd	.....	..... rib templates, misc.
1/8" x 1/8" x 36" spruce, 2 req'd	.....	..... outer wing spars
1/8" x 1/4" x 36" spruce, 4 req'd	.....	..... inner wing spars
1/16" x 3" x 36" med., 1 req'd	.....	..... shear webs, misc.
1/16" x 4" x 36" med., 3 req'd	.....	..... wing ribs
3/32" x 1/8" x 36", 9 req'd	.....	..... turbulators
3/32" x 2" x 36", 1 req'd	.....	..... stab
1/8" x 1/8" x 36" med., 2 req'd	.....	..... stab ribs
1/8" x 1/4" x 36", 4 req'd	.....	..... sub spar, fin ribs
1/8" x 3/8" x 36" hard 1 req'd	.....	..... stab
1/8" x 1/2" x 36", 2 req'd	.....	..... stab, misc.
1/8" x 2" x 36", 1 req'd	.....	..... wing ribs, fin, misc.
3/16" x 3/8" x 36" med., 3 req'd	.....	..... wing and fin L.E.
3/16" x 2" x 36", 1 req'd	.....	..... fuselage, bulkheads, misc.
3/16" x 3/4" x 36", 3 req'd	.....	..... wing T.E.
1/4" x 2" x 36" 1 req'd	.....	..... wing tips, rudder, misc.
1/2" x 2" x 9" 1 req'd	.....	..... hatch
1/2" x 2" x 9" hard 1 req'd	.....	..... laminate for nose block

Various other bits and pieces hopefully found in your scrap bin.

Accessories required:

Control cables — Sullivan #508, 0.058 dia. or equivalent, 2 req'd

Cable housing for antenna lead, 1 req'd

Small control horn, 1 req'd

Small nylon clevis, 3 req'd

Small tow hook, 1 req'd

1/16" music wire

1/16" I.D. brass tube

3/32" I.D. brass tube

Hint — I have been buying bulk quantities of balsa and plywood from Balsa USA as advertised in RCM, etc., and save 50% to 70% on construction costs.

root piece over plan. Fit and glue 1/8" square "ribs" in place. Note that the leading edges join at stab centerline, but **do not glue** this joint yet.

(2) Mark location of 1/16" wires on root pieces. Lift panels from plans and drill 1/16" holes for the wires.

(3) Cut 1/16" music wire to length and slide stab panels onto wire. **Do not glue.**

(4) Pin down stab on plan. Adjust holes if necessary to allow stab to lie flat. **Do not glue wires.**

(5) Fit and glue 1/8" filler, top spars, and 3/32" overlays in place.

(6) Turn stab over. Fit and glue bottom spars and 3/32" overlays in place. **Do not glue wires.**

(7) Make clevis for stab from 1/16" and 3/32" I.D. brass tubes as shown on plan. Solder together.

(8) Make stabilator mount, making sure that there is 1/32" minimum clearance between stab and stab mount. Groove leading edge of stab mount and glue 1/16" I.D. brass tube in place. I use BS & HS, and impregnate the forward portion of the mount with HS. A strong joint here is mandatory or you may suffer the embarrassment of having your RC sailplane "dethermalize" at 60 mph.

(9) Shape and sand the stab and stab mount.

(10) Slide the 1/16" stab wires one way or the other sufficient to clear the stab mount opening for the hinge wire and sufficient to slip on the clevis for the actuating wire. Slip on the clevis and

return that wire to position. Place stab mount in position and slide wire back into position. **Now** glue the wires. Glue the hinge wire only on the outboard side of the 1/8" x 3/8" root pieces and at the 1/8" square "rib." Should you allow the hinge wire and brass tube to become tacked together you will probably kick your dog and nobody needs another vet bill.

Covering And Assembly:

(1) Cover wing with Super MonoKote as the skin is a part of the structure and lots of torsional strength is required to prevent flutter during speed runs. Tack skin on perimeter of wing structure with as few wrinkles as possible. Shrink the skin just enough to remove wrinkles and straighten the wing panels. Now tack the skin to each rib, both top and bottom. Complete the tightening of the skin and straighten wing. I do not use any tip washout and firmly believe that none is necessary or desired with this wing configuration. Suit yourself.

(2) Cover fin and rudder, overlapping skin around trailing edge of fin and leading edge of rudder.

(3) Cover fuselage. Not fun, but lighter than most other finishes. Trim rudder and antenna leads to length. Cover wing seat with foam seating tape.

(4) Hinge rudder to fin with MonoKote or tape and check for rudder movement of 35° each direction.

(5) Cover stabilator and stabilator mount assembly. Check for free

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RCM TAKES A DAY OFF

By Eloy Marez



A few weeks ago I had the pleasure of running into Bob Peck of Peck Polymers, and his charming family, as we were both looking for something to eat. We wound up sharing our dinner and lots of interesting conversation. For those of you who don't know modeling exists outside of R/C, Peck Polymers is a manufacturer of Peanut Scale and other rubber powered kits, with the exception of the .020 R/C "Mini-Bell." During the course of our conversation, Bob mentioned the unbelievable amount of work that goes into a kit before you see it on the dealer's shelf, even the relatively small ones that they produce. He stated

that many of his friends don't believe it, and actually think he has a big machine into which he dials the type and quantity desired, after which it spits out the proper amount, all boxed and even labeled for shipping.

Apparently, from the remarks we get now and then, some of our friends think that we have a similar machine here at RCM, into which we feed a cover photo once a month. Not so gang! Like building a model, putting out RCM once a month is fun, but it is also one heck of a lot of work. We of the editorial staff spend many hours selecting, reviewing, correcting, and sometimes writing what you eventually see. And when we are

through is when the real work begins. That is when our production people take over; our Sue, Barbara, Mary, Mary Ann, Beverly, Dave, etc., etc., spend many more hours with typesetters and paste-ups and layouts before it all goes to the printer.

All this time, Kathy and her office staff have been plugging away at the thousand and one day to day chores that have to be done to keep our company in operation. And very important to you, our reader, Sheila and her subscription girls have been working like beavers to be sure your magazine will be properly addressed when it hits the post office. Already looking ahead, Ray in our plans



RCM's Eloy Marez and Dick Kidd, both kneeling, and glider guider friends, Tim, Hank and Marion Hankinson; Bev Smith, and Carl Goldberg.



Carol Moe, instructor, puts Carl Goldberg through a pre-tow checklist.



Carol Moe running a wingtip at the start of a tow. This is standard procedure until some speed is attained.



Marion Hankinson with glider aerobat Tom Dickinson prior to some sailplane R/C pattern type maneuvers.

department, is making preparations to supply you with plans from the new issue, as well as keeping up the never ending flow of orders for previous plans.

Admittedly, it is satisfying work, and we all enjoy it. But like everyone else, we all like a day off now and then; and we had one in May. At least a couple of us did. The week after the MAC's Show here in California, Dick Kidd and I sneaked off one morning when nobody was looking. What did we do? Why, we went flying, of course.

Flying in this case meant full size sailplane flying, at the invitation of our good friends, Bev Smith of Hobbyoxy, and Hank Hankinson of Sonic-Tronics. The site was Crystalair Sailplane Airport, in Pearblossom (honest!), California, a little oasis in the desert over the mountains and about one hour from our RCM offices.

Also included in the group was Carl Goldberg, well known refugee from Chicago now living here in Southern California, and Hank's wife, Marion and son Tim. Bev and Hank are both

experienced glider pilots; for the rest of us it was our first experience though we've all done plenty of powered flying. Carl recently got his private ticket, while Dick goes back to Navy TBF's, and I spent my first lifetime as a flight radio operator with Uncle. Anyway I must say that we all enjoyed ourselves thoroughly. Dick and I had planned to spend just a couple of hours, but those plans fell by the wayside and it was late in the day when we started back home.

Probably the most enjoyable part of sailplane flying to anyone with engine experience has to be the lack of noise, only the slightest wind sound, and a chatter of sorts when you push the plane into an attitude that it doesn't like. Being able to converse without shouting, or an intercom of any sort, is certainly enjoyable. When previously thinking about glider flying, I had often wondered if I would not miss the four Pratt and Whitney's that I am used to seeing and hearing out on the wings. I didn't even think about them. It's all a matter of airspeed, just like model glider flying.

For the two place Schweizer 233 that we flew, the magic figure is 45. And like a model, anything less and you push the stick forward; the speed comes right up. More airspeed obviously means that you are driving, and that the nose has to be eased up. I was rather surprised that this particular bird requires much more stick movement than I was easing into it, and it took a number of tries before I was able to make a reasonably coordinated turn and stop on a heading that I wanted.

We all had some instructions from Carol Moe or Tom Dickinson, the Crystalair instructors, and some more stick time with Bev or Hank. Later in the day, they pushed out the big iron, a Lark, fully aerobatic and as graceful looking as Jonathon Livingston Seagull. Most of the group got an aerobatic ride, with Tom Dickinson at the controls. He put them through Cuban 8's, slow rolls, loops, wingovers, etc., all beautifully executed. I say that most of the group got an aerobatic ride, as during the last time up, a heavy coil spring all of a

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The Lark on final approach. That is Hank Hankinson in the front.



A Schweizer 233 on the tow. Normal altitude above the ground is 3000 to 3500 feet before you cut loose and start thermal searching.



This vintage aircraft, presented for the Sunday sport flyer, is an all-time favorite. It builds into a beautiful Stand-Off Scale model and flies like it looks.

MINI REARWIN

Designed By : Len Goldberg

TYPE AIRCRAFT

Stand-Off Scale

WINGSPAN

47 1/4 Inches

WING CHORD

8 Inches

TOTAL WING AREA

358 Square Inches

WING LOCATION

High Wing

AIRFOIL

Modified 2412

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

1 1/4 Inches

OVERALL FUSELAGE LENGTH

34 1/2 Inches

RADIO COMPARTMENT AREA

(L) 10" x (W) 2 1/2" x (H) 3"

STABILIZER SPAN

19 Inches

STABILIZER CHORD (incl. elev.)

6" Average

STABILIZER AREA

72 Square Inches

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Mid-Fuselage

VERTICAL FIN HEIGHT

7 Inches

VERTICAL FIN WIDTH (incl. rud.)

6 1/2" Average

REC. ENGINE SIZE

.10-.25 Cu. In.

FUEL TANK SIZE

4 Ounces

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Ail., Throt.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa, Ply
 Wing Balsa & Ply
 Empennage Balsa
 Wt. Ready-To-Fly 48-50 Ounces
 Wing Loading 19-20 Oz./Sq. Ft.



THE MINI- REARWIN M-6000

Photos By Dick Tichenor

Color Photos By Woody Woodward



It was 1944 and I had just come home with my treasure from the local hobby shop. A 30" span Megow Rearwin Speedster with "Motor Hum Device!" (How's that, nostalgia lovers?) I could hardly wait to get out the razor blades and bandaids, and start my new project . . . a plane that only a decade before failed to go into production. (Only 20 Speedsters were ever built.) I didn't care and I liked the looks of the plane and it soon became one of my favorites. The Megow model flew well, and I scratch-built another. (I still have those Megow plans.) Now, my 13 year old son wants to build the Rearwin, but I'm getting ahead of myself.

It wasn't until March of 1967, while looking through a model magazine, that I came upon the Rearwin, magnificently sculptured by Woody Woodward! This 64" span R/C model rekindled a glow I

had 23 years before, and I just had to build the Rearwin again! Out came the razor blades and bandaids. Woody's plane just fit the bill for me, as I had a Super Tigre .46, and a PCS radio, with tin can servos. My son, seeing the model of the Speedster, wanted a small Rearwin, but which version should we build? The 30" span Megow was too small, and the construction was too light for a 1/2A version, and Woody's was too big, and besides that is Dad's plane!

We decided to compromise, and build a 3/4 scale version of Woody's Rearwin, and power it with a K & B .19; RC guided by a Futaba radio.

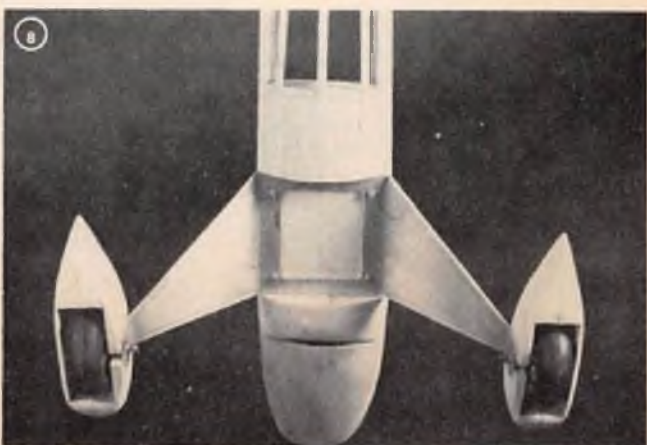
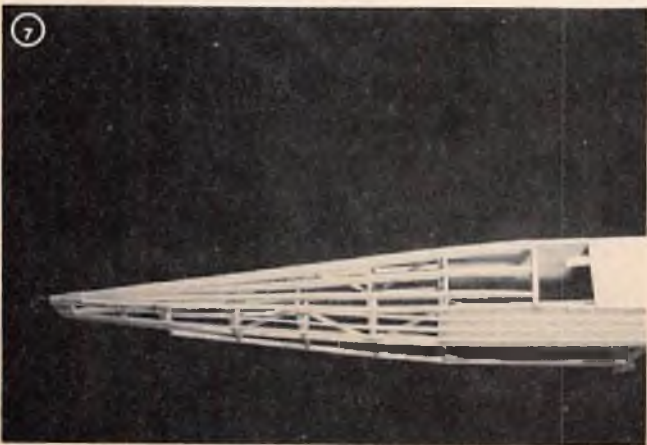
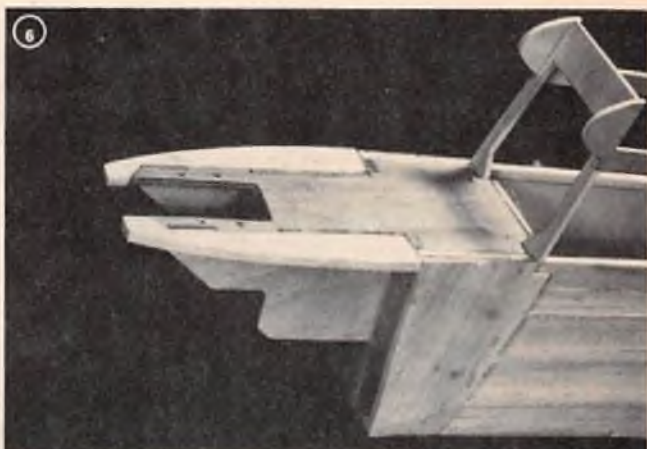
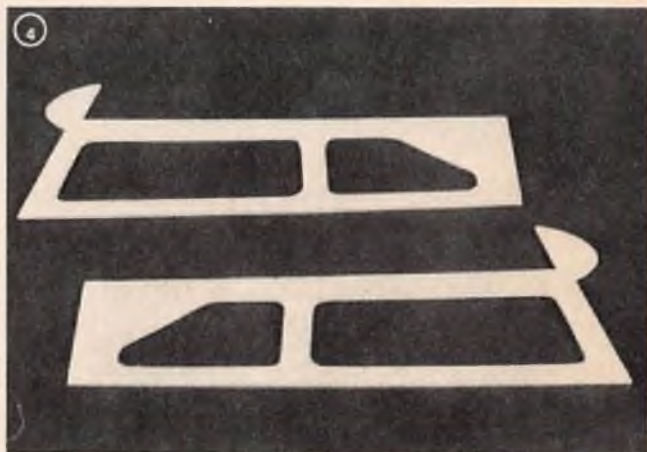
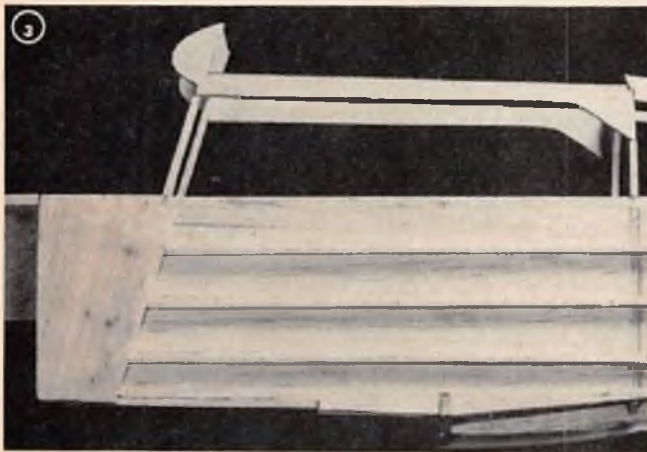
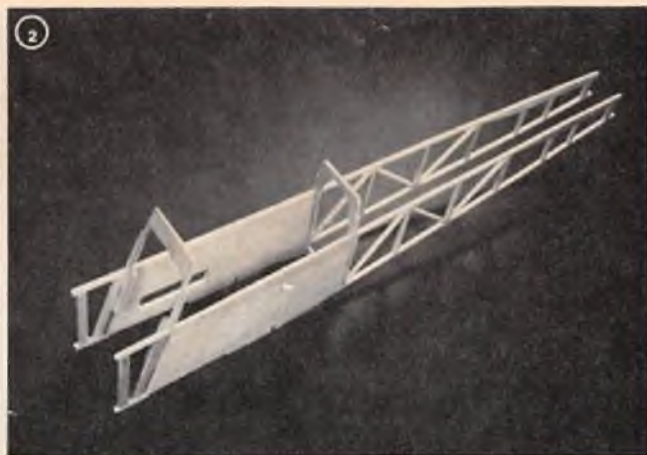
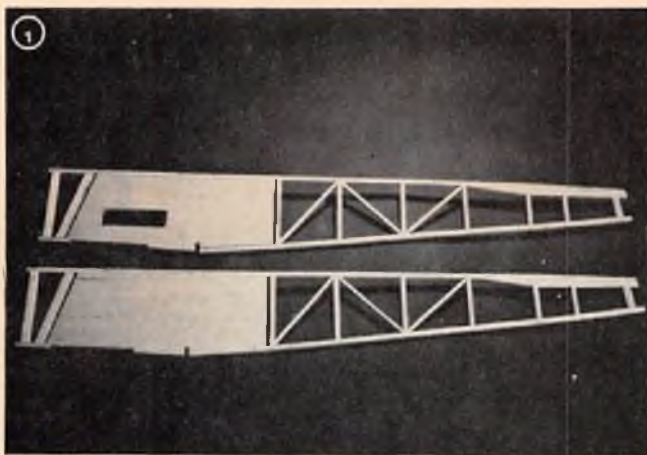
Several weekends at the drawing board yielded another Rearwin Speedster a "Mini Rearwin" with a 47½" span! Again, out came two sets of razor blades and bandaids, and together we started to scratch-build the Rearwin. Scratch-building has always been fun

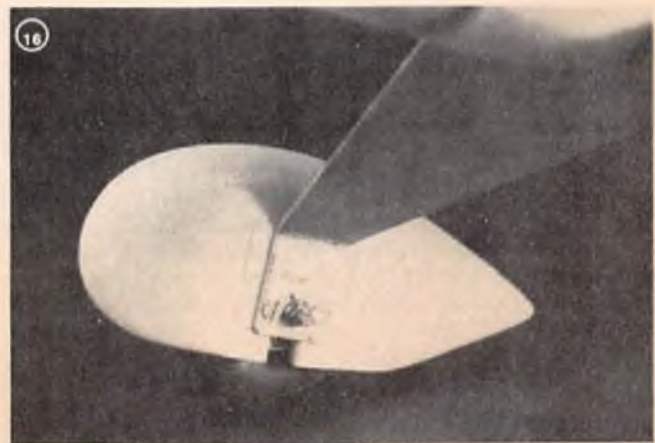
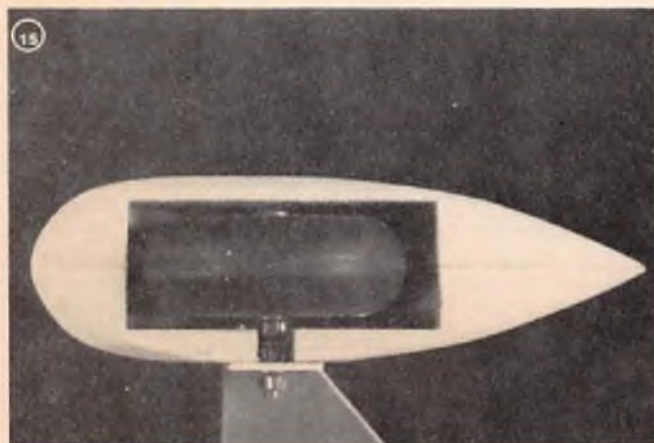
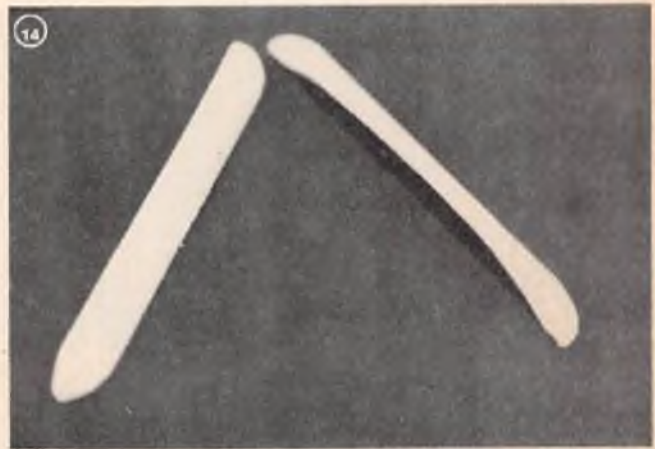
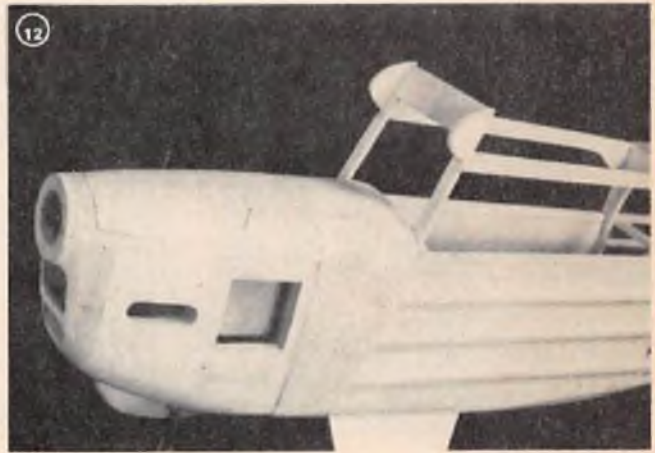
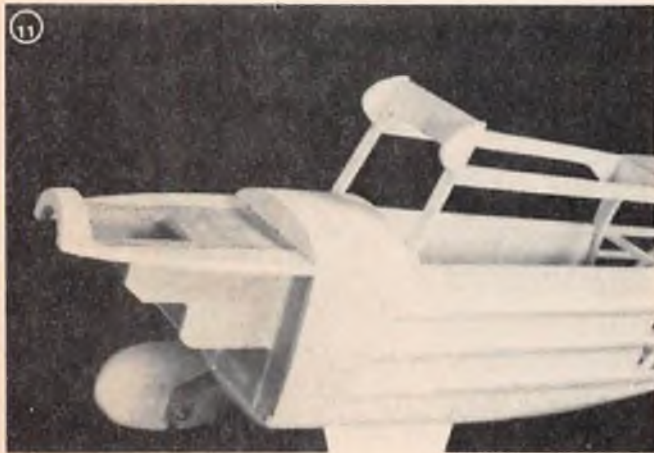
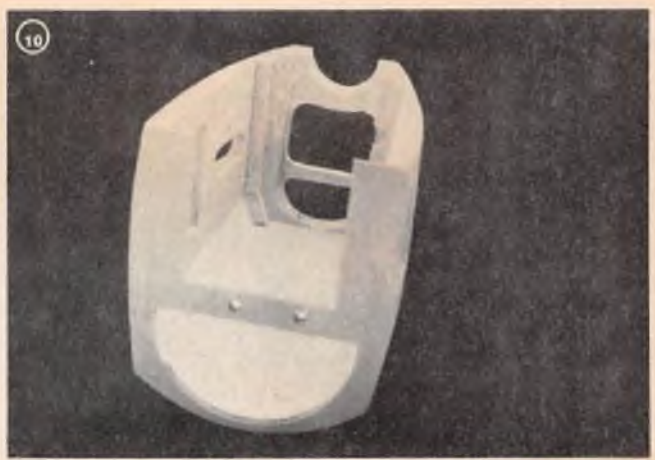
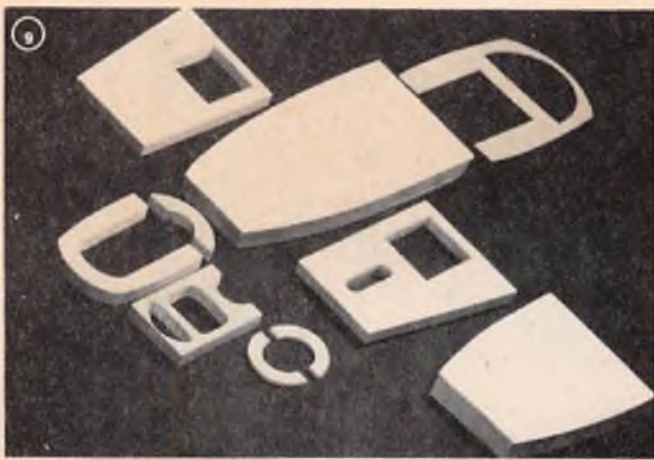
for me, because somehow it seemed less costly to build the plane from scratch than from a kit. With today's balsa prices at the hobby shop, now I wasn't so sure it was less costly. I wondered if balsa could be bought from a lumber company, and if it would be cheaper that way. I found my answer, and it is a resounding **yes**.

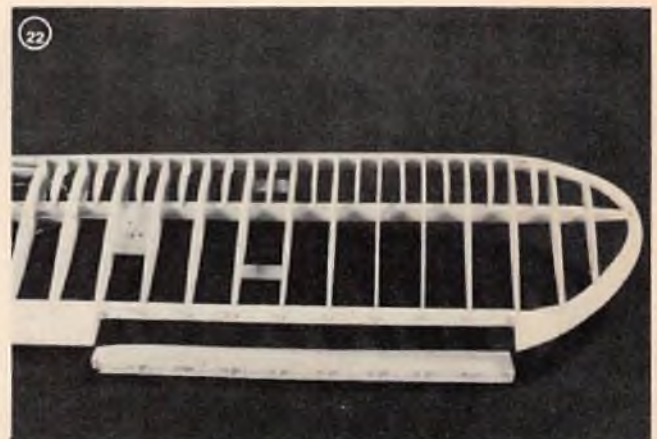
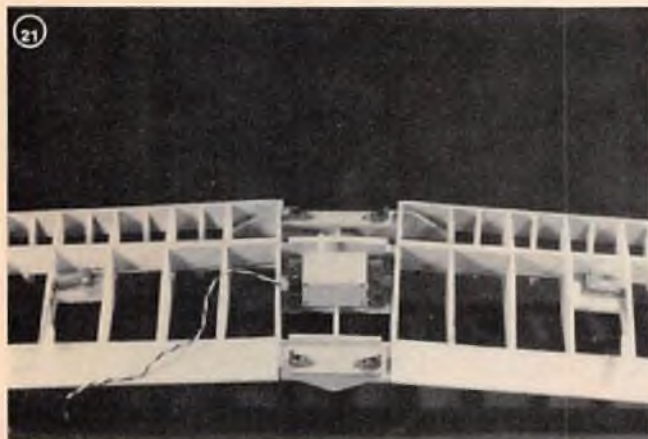
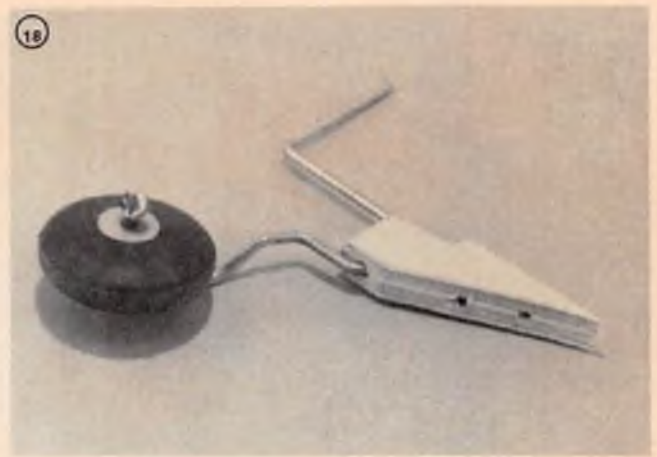
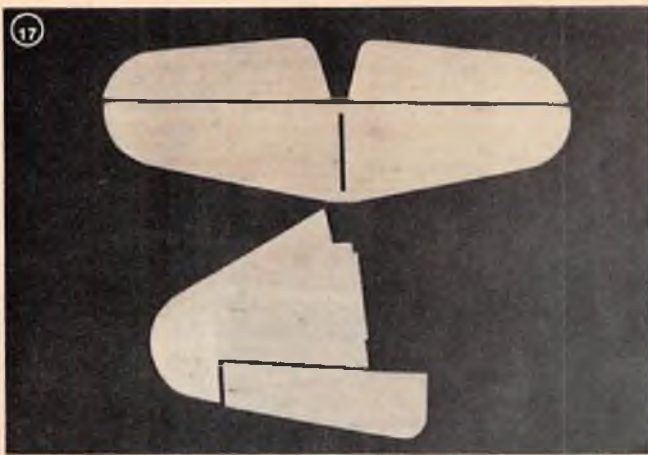
A lumber company near me, called M & M Hardwood, 5344 Vineland Avenue, North Hollywood, Calif. 91601, sells balsa of varying grades at \$2.50 a board foot. Most pieces they have are 3' to 4' long and about 3" by 3" square. (Yes they will mail order, just send them shipping money, or they will ship C.O.D.) I bought a 3' section for about \$5.75 and tried cutting it myself. If you have access to a bandsaw, the task is easy. In about a half hour, I cut most of the wood needed for the Mini Rearwin. Leading and

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trailing edges for the wing are a snap, and the cost is fractional.

The Mini Rearwin was finished in early March, 1978, and I took it down to the local hobby shop to show the plane to the would-be test pilot, Chuck Smith. His comments were glowing, and he summed up the plane in one word, **impressive!** Several guys at the shop identified the plane as a Rearwin Speedster, and all, without hesitation knew it was a scratch-built. Several wondered if it would be kitted, and I said I didn't know . . . maybe.

A Sunday date was set for the first flight, providing the weather was good. We arrived at the Sepulveda Basin, the local flying site at about 10:30 in the morning. A slight 10 mph breeze was

coming out of the south.

I called Woody Woodward the Thursday before, and he brought his camera with him and took some field shots. Woody checked the balance and weight, and guessed it would fly just like his larger version, but a little faster.

The moment of truth finally came, and we fired up the K & B .19 (with Perry carb), and adjusted it for a slightly rich mixture. Charlie checked the idle, we proceeded down the taxiway, and turned onto the main runway. The Rearwin taxied like an obedient pup, and stopped at the north end of the runway, as Charlie throttled back to an idle. I stood at the side of the runway, and through my mind flashed the entire sequence of events leading to this

moment. From the concept on the drawing board, through the construction phase, the final check-out, and now the first flight. Charlie eased the throttle forward. The re-creation of a bygone era moved quickly down the runway, and winged skyward into a left turn. Charlie quickly leveled her out at about 150', and the Mini Rearwin streaked passed us in a straight and level flight.

Charlie grabbed a little more sky, and made a left turn about a quarter mile north of us, and brought the Rearwin around and overhead. The Rearwin flew rock steady, and did not show any attitude change at low throttle. This told me that the 0° down incidence on the engine was okay. Charlie flew a few more laps around the field, and then

throttled back, lining the Rearwin up with the runway. The Rearwin then settled in softly, for a smooth landing.

Charlie's comments were that the plane flew very well, with good, quick response. A slight right correction in the linkage was all that was needed. I provided about a 2° toe-in in the landing gear (thank you Dave Lloyd) as suggested by many who gave me advice during the construction of the Rearwin. This helped the ground handling characteristics of the plane.

The Mini Rearwin has all the stability of Woody's larger version, but the response and flying speed is a little quicker. I agree with Woody --- the Rearwin is the best and most stable high wing scale monoplane I have ever seen!

The Rearwin is not a difficult plane to build, but don't expect to build it in one weekend! The construction is a typical stick and stringer concept, and the fuselage is constructed on a Warren Truss design. No special tools are required, but a table type jig-saw or band-saw would be helpful, as there are quite a few plywood parts. Well enough of this chit-chat, let's build a Mini Rearwin.

THE FUSELAGE

() Cut out laminates F-1 (1/16"ply) and F-2 (1/8" balsa). Make two sets, one left hand, and one right hand.

() Bond the halves together. If you use an aliphatic resin glue, be sure to clamp the halves together between two flat surfaces, and allow to dry for at least 24 hours to prevent warping.

() Cut out F-3 and F-4 from 1/8" ply.

() With the ply on the inside, cut the port for the switch, charging jack, and glow plug jack on the right panel of the F-1 and F-2 laminate.

() Start construction of the right fuselage side with the F-1 and F-2 laminate and 3/16" square medium balsa. See Photo 1.

() Use F-3 and F-4 as a spacer gauge in locating the vertical braces on the side panel. See Photo 2.

() When the right side panel is complete, lay waxpaper on top of the right side panel, and construct the left panel on top of the right panel.

() When both panels are complete, remove from the plans and separate. Sand slight taper on inside surface of side panels at tail, at angle shown on plans.

() Cut out firewall from 3/16" ply.

() Fit firewall, F-3 and F-4 to fuselage sides. Align and glue F-3 and F-4 to sides. Do not glue firewall at this time. Allow sides to dry. See Photo 2.

() Cut out 3/16" cross braces and 1/8" bulkheads F-6, F-7, F-8 and F-9.

() Carefully draw the fuselage sides together, glue and clamp tail end together with clothespins. Shift this joint slightly to be sure the bow on both fuselage halves are equal.

() Install cross braces and

bulkheads. Be sure to set lower cross braces at F-8 and F-9 in from the bottom to fit lower longeron.

() Install 3/16" x 3/8" balsa top longeron, 3/16" square side top stringers, and wedge braces.

() Cut out 1/8" ply F-13 (2 required) and glue to F-3 and F-4. See Photo 3.

() Cut out 1/8" ply landing gear plate. Fit to side laminate cut-outs and double glue in place. (Double gluing is applying glue to both surfaces, working the surfaces together, parting the surfaces, wait a couple minutes, applying more glue, and pressing the parts together. Clean up excess glue.)

() Cut out two F-11 from 3/16" balsa and glue in place.

() Cut out two F-12 1/16" ply window panels. These will be installed later, but will be used in fitting the cowl and wing. Do not cement in place. See Photo 4.

() Cut out F-16 3/16" balsa former and glue in notch in laminate.

() Cut out 5/8" balsa bottom block. This can also be made of 1/4" and 1/8" sheet and laminated. See Photo 5.

() Cut out M-1, M-2, M-3 and M-4, plywood motor mount and tank parts. Carefully fit these parts to the firewall. When all parts fit, double glue the entire assembly to the firewall, and resin coat all surfaces, except the edges of M-1 where F-14 and F-15 will be attached, and edge of firewall which will attach to fuselage. (M-1 shown, fits K & B .19 RC.) See Photo 6.

() Cut out 3/16" balsa F-14 and F-15.

() Drill 3/16" diameter hole in rear corner of tank compartment for engine pushrod.

() Double glue engine mount, F-14 and F-15 to fuselage. See Photo 6. Use rubber bands to insure a tight fit.

() Cut out F-17 and fit to 3/16" x 3/8" bottom longeron. Install by butting up against F-16.

() Install the other two 3/16" x 3/8" bottom longerons. See Photo 7.

() Lightly tack glue 5/8" bottom block to fuselage, up against F-16, and shape to fuselage contour. Fair in longerons at this time. (Tack gluing will allow the bottom block to be removed after shaping.)

() Cut out landing gear from .062 (1/16") aluminum alloy sheet. Drill and form as shown on the plans. Use aluminum T3 or T4.

() Remove the shaped bottom block.

() Line drill the 1/8" ply landing gear mounting plate, using the landing gear as a template.

() Install landing gear using 4-40 screws 5/16" long, and #4 flat washers and 4-40 self locking nuts. Free spinning nuts can be used, but epoxy them in place on final assembly. See Photo 8.

() Relocate bottom block, and cut it into three pieces to fit fore and aft of the landing gear. See Photo 8. Glue the fore and aft piece in place.

() Cut or sand 1/16" off the center

section of the bottom block so it will line up with the fore and aft sections.

() Press the center section lightly into the protruding nuts on the landing gear so as to mark the nut locations.

() Using a 1/4" or 5/16" drill, lightly drill the nut locations on the bottom block for clearance. See Photo 5.

() Cut out a 1/16" plywood plate which will fit in the cut-out in landing gear.

() Position the 1/16" plywood plate in the landing gear cut-out, applying glue to the top side only, and press the center section of the bottom block onto the 1/16" ply plates, and hold for a few minutes.

() Remove the plate and center section, being careful not to shift the plate. See Photo 5.

() Install side stringers and taper to fuselage contour. The side stringers may be tapered prior to installing on the fuselage, if you like.

This completes the basic fuselage construction.

NOSE COWL AND HATCH

() Cut out the nose cowl and hatch parts C-1 through C-10. See Photo 9.

() Hollow out C-9 to clear cut-out in C-6. Rough shape front of C-9. See Photo 10.

() Glue C-4, C-5 and C-8 together and clamp until dry.

() Fit C-4, C-5 and C-8 assembly to C-9, C-1, C-2 and C-6. Check this assembly of balsa blocks to be sure that it fits square to the fuselage. When everything looks okay, glue the block assembly together, but not to the fuselage. Use masking tape, clamps and/or rubber bands to be sure you have good strong joints.

() Rough shape the cowl to the proper contour. Do not finish shape at this time.

() Glue C-3 and C-7 together. Use fuselage for alignment, and hold cowl in place to be sure C-7 and C-8 are flush, then glue C-3 and C-7 to fuselage. See Photo 11.

() Bevel the back of C-10 to form the instrument panel.

() Fit the beveled end of C-10 so that it clears the bulkhead F-3 and fits behind C-3. If you get a little sloppy around F-3, use wood filler to cover up your sins.

() Tack glue C-10 and the lower cowl assembly to the fuselage and sand, shape and carve to the final shape. See Photo 12. When shaped, cut out hatch in C-10.

() Tape window panels F-13 in place and shape F-11 to fit the stringers and cowl. See Photo 13. (Window panel was omitted in this photo.)

() Remove cowl and F-10 and reinforce inside of cowl as shown in Photo 10.

() Install engine and fit cowl to engine.

() Locate engine needle valve on

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Ready to go looking for that Kneivel guy – the "Eleck Rider" is shown sitting on its display stand, also furnished.



By Eloy Marez

KRAFT SYSTEMS ELECK RIDER



Your first view of the Kraft "Eleck Rider." Requires only minor drive and R/C equip. installation, and painting of the body.

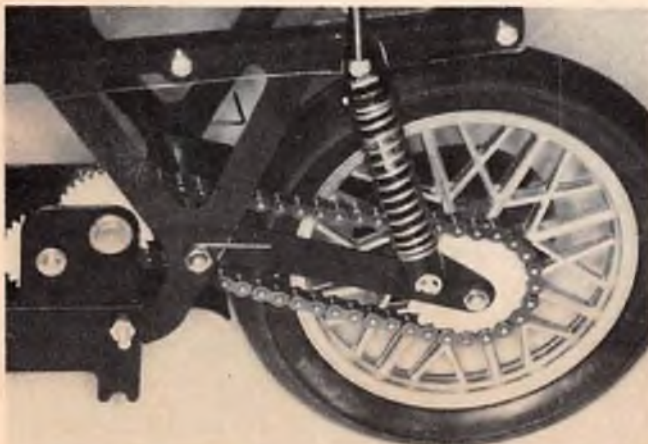
In general, we have found that Formula One fliers are the hardest group to impress, or to interest in, any other phase of the R/C

hobby. There are exceptions of course, such as Jim Kimbro, who is well known and successful in R/C competition as well as in Formula One. But most of the racers find that it takes all of their hobby time and dedication if they expect any degree of success, and we don't often see them sidetracked. So it was an unusual occurrence to be at a Formula One race recently when not one, but two events took place that caused a large number of the fliers to temporarily stop rebuilding engines and carving props to look at other things.

The place was Chula Vista, just south of San Diego. The Chula Vista field is located right across the street from the US/Mexico border, and where you can't fly wide without going international. One thing that caused the gang to stop

dreaming of doing victory rolls and setting a new fast time record was the appearance of Joni Davis, our July cover gal, in costume as on our cover. She was there on the invitation of the club, to further her R/C education and to present trophies to the winners.

The other thing to catch the eye and interest of a large number of those hardened go-like-hell fliers was, of all things, an electric R/C motorcycle. This very realistic looking and operating little two wheeler is an import, manufactured in Japan by the well known Kyosho Corporation and being distributed here in the USA by Kraft Systems. Right, the same Kraft Systems who have been manufacturing those gold colored radios for so long. Said cycle was brought to the race site and



The drive system, showing nylon sprockets and chain drive. The tires are solid, cast metal wheels. Shock absorber actually works.



The secret of the steering mechanism is a cast pivot block that converts servo fore and aft motion into front fork tilt.

demonstrated by Dave Shadel of Kraft, winner of this year's Bakersfield Formula One bash. The success of this rather revolutionary little vehicle is due to the development of a semi-direct steering system and proportional electro brake incorporated in it.

I said realistic, and it is, down to its chain drive, shock absorbing front

suspension and spring type shock absorbers on the rear wheel. It is even equipped with a booted, helmeted and jump suit attired driver hunched over the motor as in full size motorcycle racing events. Overall length and height are 13.6" and 9.5" respectively, to the top of the of the driver's helmet. The width at the engine is 3.25"; a little more at the driver's elbows, which is the widest point. The top speed is claimed as an impressive 30 kilometers per hour, which even converted to mph is still fast: 18.6. It operates like any other two wheeled vehicle, depending on forward motion to maintain balance. If you go around a turn too fast, you skid out; too slow, and you fall! To make a proper turn, you have to slow down, maintain a certain speed while in the turn, and accelerate gradually but smoothly as you come out. The "Eleck Rider" requires a reasonably smooth surface to operate on, though it doesn't have to be glass smooth. Most paved sports fields such as tennis or basketball courts are adequate, as are most parking lots. It is not the actual smoothness of the surface that is important, it's more that it be free of large holes and obstructions that is necessary.

The turning radius can be quite sharp, as little as 20'-25' --- once you get the



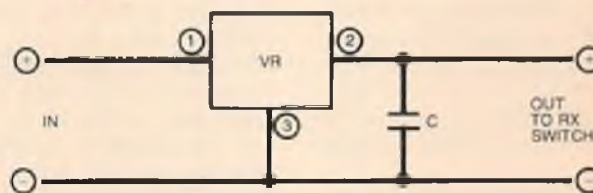
The first thing to remember is to keep your fingers out of the chain drive. Phil Kraft tutors RCM Technical Editor Dick Kidd.



Customizing the "Eleck Rider" is half the fun, limited only by your imagination. Large variety of product decals furnished.

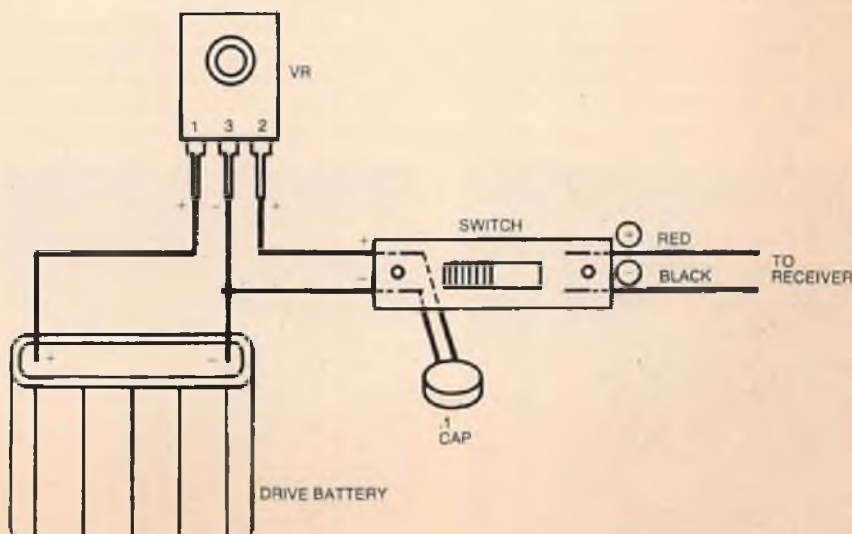
hang of it. But, at first, keep them shallow. It is best to give yourself plenty of room, and look for at least 100' or so to practice in. And don't forget the frequency conflict problem; if there is a flying field anywhere nearby, don't turn on a transmitter.

Part of the appeal and challenge of R/C motorcycling is that it requires a fair degree of skill and coordination to operate successfully, more so than any other non-flying vehicle we've tried. Somewhat like flying a plane, where every successful flight is its own reward, just driving around can be fun. But adding some chore, such as driving through a plastic container obstacle



VR 7805C
HEP C-6110P
RADIO SHACK 7805

C .1 UF CERAMIC CAPACITOR. CAN BE
SOLDERED TO SWITCH TERMINALS



PICTORIAL DIAGRAM OF
VOLTAGE REGULATOR. INSULATE VR
TERMINALS WITH SHRINK
TUBING



Quick charge auto charger is similar in operation to those seen for electric car and plane use. Battery & charger sold separate.



The R/C motorcycle has enough stability on the straights so that one person launches are easy and always successful.

course adds a lot of enjoyment and pleasure. And there is little doubt in my mind that any time two or more "Eleck Riders" get together, there will be a race going. And before too long, there are bound to be formal races, with regulation courses, rules, etc. The question now is, will they come under ROAR, or something new to be called ROMR, ROCR, or maybe RCHA?

Seriously, this is a competition machine by nature, and it is bound to evolve as did the electric cars into different lap events, and probably even with different size cell packs for power. The little motor is difficult enough to drive so that until they have been around long enough for us to get more experience with them, a simple enduro of time without falling over while going around a simple large course would be enough of a contest.

Some more of the specs of the "Eleck Rider" are a wheel base of 9.35", with a 4.5" diameter front wheel and a rear wheel of 4.33". The drive motor is a Mabuchi RS-308S driving a two gear transmission that, in turn, chain drives a rear wheel mounted sprocket. Three motor gears are furnished, with 10, 12, and 15 teeth, for increasingly higher top speeds as your driving skills improve. It is strongly recommended that you stick to the 10 tooth gear until you get the



And it's off . . . at top speed, the cycle is claimed to be going about 18 mph, good scale speed and fast enough to be fun.

hang of driving and cornering. Electric power is furnished by a 6-cell 600 mah hi-rate charge nicad pack. It gives approximately 30 minutes of driving pleasure and can be re-vitalized in 15 minutes with the optional 12 volt auto plug-in charger.

The main frame of the motorcycle is made of heavy gauge steel stampings, realistically finished in a black corrosion proof coating. Most of it is .035 thick, with reinforcing angles throughout for extra strength and rigidity. Thicker material, .062, is used at strategic locations, such as the rear wheel support. The wheels and front fork control mechanism are made of very cleanly done metal castings, either an aluminum or magnesium alloys. Both are accurately drilled and bushed on all axis. The nut and bolt hardware is cadmium plated; front fork is either nickle or chromium plated. The rubber tires are solid, with a rather high angle molded into the outside circumference, apparently for the maximum ground contact necessary for those short fast turns. In all, the "Eleck Rider" is well engineered and constructed.

It is not a kit — though it isn't quite ready to run. It requires the installation of the R/C system, the motor/gear module, which comes already assembled, and your own personal customizing touches



Off the ramp. The "Eleck Rider" has no problem going up steep inclines. We've been practicing coming off 6" ramp.

to the body. The latter is molded of clear plastic, similar to those used on R/C race cars, and can be painted in the same manner.

For those of you not familiar with that process, it is done from the inside, leaving the harder shiny surface on the outside. Of course this means that you have to mask and paint backwards, such as numbers first, if they are to be painted, with the colors on afterwards and over them. If you use any of the metallics or candy apple colors available, you first apply the color, or colors, then spray the base over them, instead of the other way around. For paint types, you can use any of the plastic paints available in small spray cans from Pactra or Testors, or any enamel paints such as Krylon can be used. Do not use dope, or any acetate base finishes, as they will melt the plastic. In doubt, sliver off a piece some place and test it first.

Plenty of sticky backed decals are furnished so you can further customize your "Eleck Rider" with racing numbers and names of your favorite products.

The rubber tires should be secured to the wheels with one of the cyanoacrylate glues. A complete illustrated parts list is furnished, and all spares will be readily available from Kraft Systems. A set of training skids is now under development



And it's airborne, both wheels still spinning and the motor revving up realistically. Should be great competition event.



The landing, for all the world like the full scale ones. Complete control is regained the instant both wheels are on the ground.



You've got to expect losses, and bruises. Good reason for wearing a helmet, as poor "Eleck Ed" is headed for the asphalt.

and will be available about the time you are reading this.

The ready to roll cycle weighs 3 lbs. 3 oz., which is not too great a load for the Mabuchi to move at the speeds mentioned with the voltage being applied. As you might expect, two channels of R/C are required, one for throttle in this case being a servo operated variable resistor, with proportional electric brakes which operate as the stick is pulled back. The other channel is steering — which is the first question asked after the oohs, ahs, and other expletives are over. Very tricky! The whole front end assembly tilts, pivoting at a point just under the handle bars. In this manner, the whole weight and C.G. relationship is maintained for up to 45 degrees, again assuming that the speed is kept in the proper range. In actual operation, we found all the steering, throttle and brakes function very smoothly, with no perceptible lag or serious over control

tendencies. To start, you hold the rear wheel off the ground, advance the throttle about half-way, shove it gently, and you are off.

The servos are mounted within the body of the cycle. The rear one, on a clever built-in expanding mount, that accommodates most brands and sizes, is for motor/brake. The front one, attached with double sided tape, controls the steering. Complete instructions are included detailing the installation and adjustment of throws. The receiver installation requires a transplant, being located in the driver's gut, but even so, he is still Pepsi-Cola slim, with no sign of a beer belly. The R/C system battery is located inside at what would be the gas tank location on the full size motor, while the antenna is threaded into a spring supported rear mounted nylon tube.

As packaged, this tube retains a curved look, which to me adds to the realism of speed as it sways backwards.

But if you have to have it straight, slip it over a piece of 1/16" piano wire, and stick it in a 250 degree oven for a few minutes. When cool, it will be arrow shaft straight.

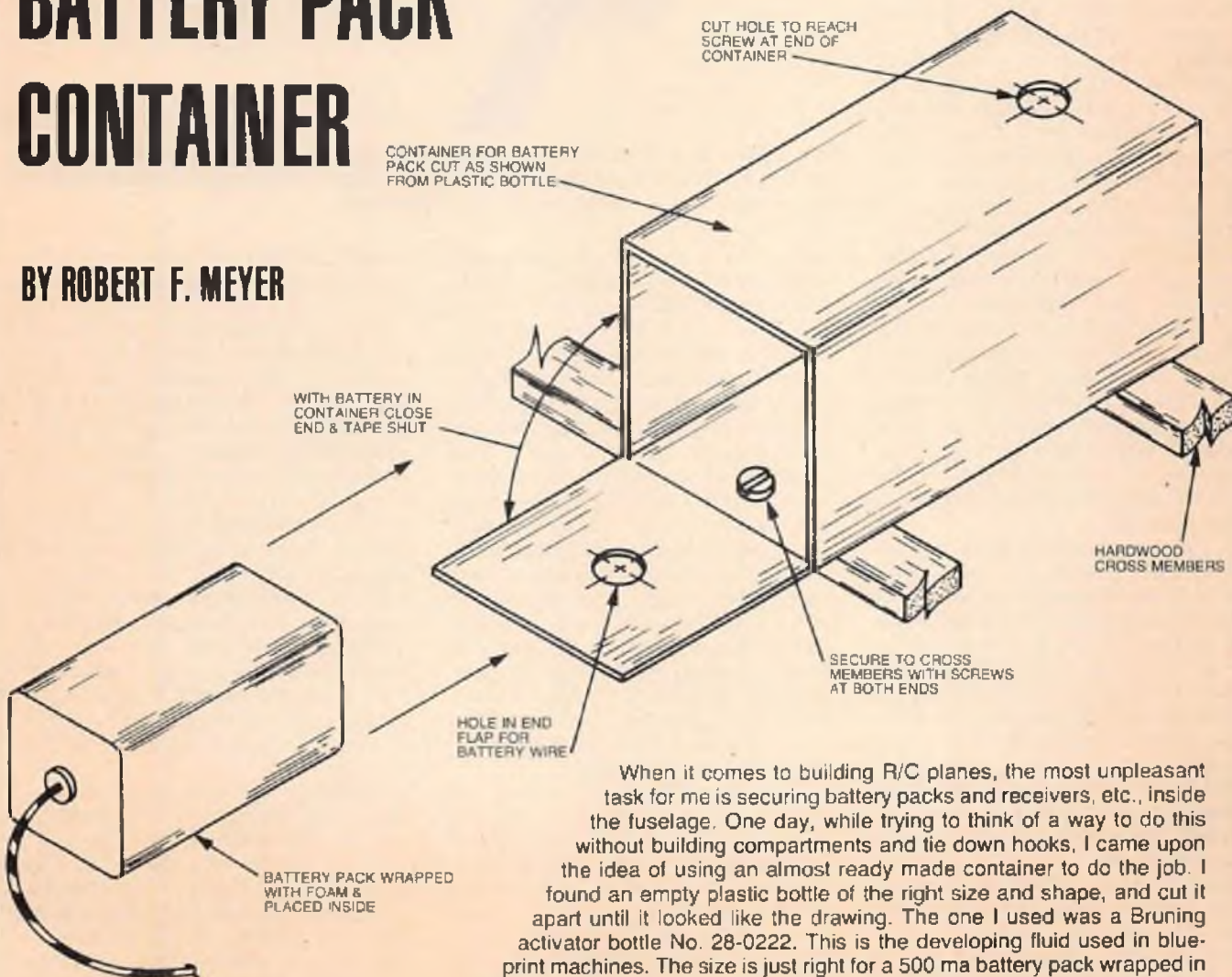
This one of ours is R/C'd with a two channel Kraft KPT-2A, with KPS-14 servos, but any system of like physical proportions can be used. The price of the basic "Eleck Rider" is \$79.95 complete, less the R/C system and drive nicads. The 6-cell 600 mah pack available is priced at \$24.95, as is the companion 12 volt DC charger.

Obviously, if you are already into electrics with either a car or plane, you may be able to use the batteries and/or the charger you already own. Any four to six cell fiat pack should power your cycle successfully, the speed and operating time varying with battery voltage and capacity. The only physical requirement for the battery is that it fit into the 3 3/4" x 2" battery compartment located

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BATTERY PACK CONTAINER

BY ROBERT F. MEYER



When it comes to building R/C planes, the most unpleasant task for me is securing battery packs and receivers, etc., inside the fuselage. One day, while trying to think of a way to do this without building compartments and tie down hooks, I came upon the idea of using an almost ready made container to do the job. I found an empty plastic bottle of the right size and shape, and cut it apart until it looked like the drawing. The one I used was a Bruning activator bottle No. 28-0222. This is the developing fluid used in blue-print machines. The size is just right for a 500 ma battery pack wrapped in foam. It turned out very well --- simple, fast, and neat --- and it might help in crash security also.

HERE'S HOW

As many large R/C aircraft appear on the market, and plans appear in model magazines, more modelers are becoming interested in trying their hand at one of these monsters. Believe me they are fun and, to be sure, have a completely different set of flight characteristics than their smaller counterpart. However, this larger generation of aircraft is not without problems.

One problem that seems quite bothersome is the long servo extension leads we are using. It is only natural to mount the servo nearer the control surface in order to simplify the pushrod hook-up. In doing so, we run servo extension leads to the receiver some distance away. With this arrangement, and depending on how tolerant your radio is with respect to your particular installation, it might work solid or you could have a few nervous servos.

In case you happen to run into trouble there are a number of things you can do to improve conditions. First, take a good look at the servo extension lead arrangement. Keep them as far as possible from the antenna, and at right angles to it. If necessary, re-route the antenna wire. It is possible that the long servo extensions that run parallel to the antenna will act as a reflector. Check your servos. A noisy battery pack could cause you trouble. A dirty commutator or flashing on the brushes in the motor will cause arcing and set up RF noise, glitching your system. Retuning the system in your airplane is another possibility. A faulty battery pack with low voltage could seriously affect the receiver sensitivity. Longer leads add resistance to the system thus creating a little less torque in the servo. Going to a larger wire size would help this situation. There are many things to look for and think about when trouble-shooting, if you have a problem.

If you have carefully gone through your system and still have that same bunch of nervous servos, don't despair, I have something else for you to try but, first, let's take a look at an idea sent to me by my very good friend Bob Aberle. Many of you have read Bob's superb articles in *Flying Models*. He is one of the most prolific writers in his field, in this country, and pursues it with great intensity. I have never met Bob, however, I have corresponded with him for many years and found him one great guy to work with.

Let's focus in on Bob's scheme as seen in the accompanying sketch. The main idea, of course, is to plug in the glider wings and automatically hook-up the servos that operate the spoilers. Sound great? With a small servo, such as the D-5, KPS 18 and others, it would



We have finally arrived! Eastcraft's unitized "on-board" starter system complete with engine. Transferable from airplane to airplane. Four engine mounting bolts and a simple wiring hookup - you're in business.

be no trick at all to mount one in each wing allowing for a short and easy hook-up to the spoiler. Keep in mind that the servo must be removable for servicing. The servo extension lead is routed and soldered to the brass tubing in each wing half. You might say that this is the female portion of a giant electrical connector. For the male portion, Bob chose to use the existing wing support wires. Normally only two of these wires are used in a typical wing mounting set-up. However, because a third lead is required, it is necessary to add an extra support wire. Make sure these wing wires fit the brass tubing in a "snug" condition. It will also be necessary to keep the support wires clean for good electrical conductivity. No need to worry about the connector polarity, that is, unless you are in the habit of flying with your wings on backwards!

From the wing support wires, run another extension lead to the 3rd channel on the receiver. Be sure to maintain proper polarity and twist the leads as called for in the sketch. Make sure of good solder joints when connecting to the wing support wires. When everything is completely wired, try out your radio. Are your servos solid? In most cases they should and will be. Especially if you have routed the

antenna straight out to the vertical fin which puts the servo extension leads 90° to it.

Okay, so your servos are not solid and you have tried all the other things I have mentioned. Here is another suggestion you might try --- the one I promised to tell you about later. **Only if you are experiencing trouble**, insert a 22 mh choke in the voltage plus and negative lines (red and black) as close as possible to the servo connector. Do not install a choke in the signal wire. Bob suggests trying Radio Shack Part No. 273-101. These chokes will act as RF decouplers and improve your jittery condition. Cover them with shrink fit tubing. Remember use the chokes only if you encounter difficulty. If you still have trouble, I can only suggest that you write to your radio manufacturer for his advice.

In looking at Bob's super idea, a couple of things come to mind. Suppose you signaled for spoilers and they didn't work or one did and one didn't. The worst that could happen is the loss of a few points if you were flying competition. At least you wouldn't lose the sailplane. Suppose you happen to leave your radio receiver on after removing the wings. The wing support wires would be "live"

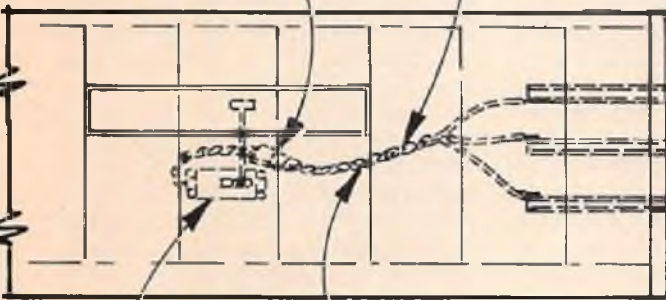
to page 117

SERVO DIRECT HOOKUP TO SPOILER

THANKS TO - BOB ABERLE
HAUPPAUGE, NY

MAKE UP A THREE WIRE CABLE WITH CONNECTOR TO SERVO - WING SUPPORT WIRES THEN ACT AS CONNECTORS FOR SERVO CIRCUIT.

CONNECTOR



TWIST LEADS

SMALL SERVO (D-5 or KPS 18) IN EACH WING PANEL TO OPERATE SPOILER - SIMPLE HOOKUP

ADVANTAGES

- SPOILERS REQUIRE NO SPECIAL MECHANICAL LINKAGE FOR EASE OF HOOKUP.
- SPOILERS ARE AUTOMATICALLY CONNECTED WHEN WING IS PLUGGED INTO FUSELAGE.

DISADVANTAGES

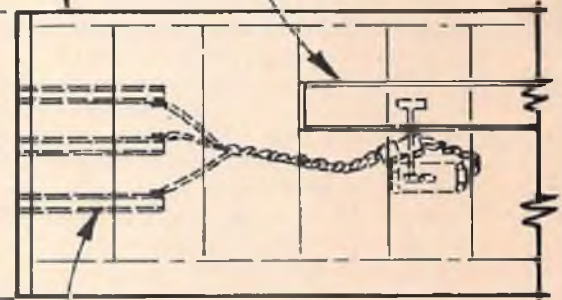
- WING SUPPORT WIRES MUST BE KEPT CLEAN FOR GOOD ELECTRICAL CONDUCTIVITY.
- THIS SCHEME MAY NOT WORK SOLID WITH ALL RECEIVERS.

3 WIRE CABLE TO SPOILER CONTROL (3rd CHANNEL) ON RECEIVER.

TYPICAL WING SUPPORT WIRES USE THREE AS SHOWN.

WING

SPOILER OUTLINE



BRASS TUBES TO FIT WING SUPPORT WIRES "SNUG" LONG TUBING MUST PROVIDE GOOD ELECTRICAL CONTACT AT ALLTIMES.

ADD 22mh CHOKES IN RED AND BLACK WIRES ONLY AS CLOSE AS POSSIBLE TO CONNECTOR. ONLY IF REQUIRED FOR SOLID OPERATION.

SERVO CONNECTOR TO RECEIVER 3rd CHANNEL

SHRINK TUBING

TWIST LEADS

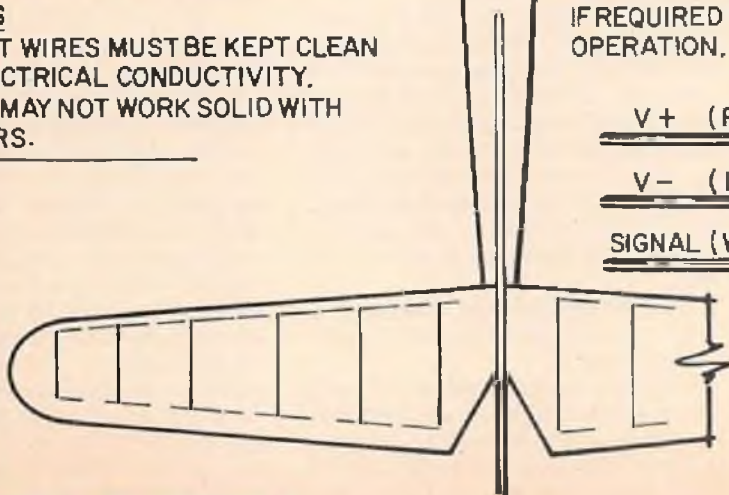
V+ (RED)

V- (BLACK)

SIGNAL (WHITE)

SOLDER LEADS TO WING SUPPORT WIRES

FUSE OUTLINE



NOTE: SERVOS SHOULD BE REMOVABLE FROM WING FOR SERVICING.

TOP VIEW OF GLIDER



1979 Masters Tournament

The country's top fliers met at Celina, Ohio on June 23 and 24, to decide who would represent the USA at the World Championships later this year. If you want to be well informed about what is going on in R/C, it is smart to keep tabs on this bunch of guys. I think it is safe to say that just having the right equipment will not guarantee you a spot amongst the Masters, but you can say that you won't make the World Championships if your equipment doesn't meet some minimum standards. So you can pretty well figure that if an R/C system is good enough for a Master class flier, it will probably meet your needs. It has got to be reliable because a Master must fly many, many flights to be ready for this kind of competition. He can't be switching airplanes every 100 flights and starting all over. It also must be a top performer; good neutrals, no drift, good response and no glitches. It also must be well proven. You won't see many "new" products here. The guys want something they know will work and that usually means they have used it for six months or more.

I think the results bear out the old saying, "It is not what you got, but how you use it."

The top three flyers used three different brands and three different stick modes. Dave Brown in First uses World Engines' Expert mode II system. Mark Radcliff flew a Kraft single stick and Dean Koger a Proline mode I. So there is hope for all of us. There were no crashes, I heard of no one getting glitched and with the exception of a couple of servo problems, it was a good weekend for the R/C manufacturers. Probably the biggest news was the final emergence of a Japanese manufactured system in a Masters competition. In the past, a few guys flew Futaba airborne equipment but this time there were a number of the new Futaba J Series systems including transmitter. While they didn't break into the top three, it didn't seem to bother Steve Helms on his way to Fourth Place. Just about everyone uses rate switches and there were a number of roll buttons and snap switches. I was kind of happy to see that someone actually built the snap roll circuit I printed in this column a couple of

years ago. It is set up to preset the length of time that the controls are commanded. Bill Fuori had a dog house on the back of his transmitter with all the necessary integrated circuits and pots to provide both left and right snaps.

The results were exceptionally good. In fact, I saw some of his snaps that were better than some of those performed by more famous fliers. There were relatively few people flying on six meters and I believe I was the only one using FM. I don't know if anyone was using exponential functions, but I'm pretty sure they will as they get more experience with that kind of control response.

I wish that I had more time to talk to each of the guys and discuss their equipment and how they use it. I assume Dave Brown is using the servos that World Engines was showing at Toledo. They feature the Signetics NE 544 amp with an external bridge and sealed Clarostat conductive plastic pot. I built up a similar servo with some sample pots from World Engines and I am very pleased with the results. I suspect that this combination is as good as anything you can buy at any price. World Engines equipment has not been real popular with the Master fliers but they have continually been upgrading it to the point where it is very competitive.

I believe Mark Radcliff was flying a standard Kraft Signature which has proven itself in many competitions. Likewise, Dean Koger's Proline. I understand Dean does use a three pole switch to command aileron, rudder and elevator simultaneously for snap rolls. However, it is not automatically timed. He must get on and off the switch at precisely the right time to get a good snap.

Well, you're probably thinking, "So what? Tell us something new. How can we get an edge?"

One thing that occurred to me during the competition is the fact you need total concentration on the maneuvers. Before the flight starts you should consider the wind direction, sun position and visualize in your mind how you are going to do each maneuver. Once you get in the air you go through the same thing you just did in your mind. What you don't want to do is worry about the engine idle, airplane trim or who the judges are.

Now I don't care what kind of radio

control system you've got you must be capable of trimming it before you do your first maneuver, knowing it is okay and then forgetting it. Or, if you know your trim changes with fuel consumed, be capable of adjusting the trim without distracting your mind from the task at hand. The same goes for rate switches. You should be able to flip them without even thinking about it.

I think the single stick guys are in pretty good shape to accomplish this, because they essentially have their left hand free at all times. What I would like to see is a mode II transmitter where all the trims, rate switches, and roll buttons, etc., are convenient to the left hand! Guess I'll have to build my own one of these days. Don't know what the solution is for the mode I fliers.

I had a couple of guys come up and put in their vote for Geizendanner pot wipers. And once again, if Master Class flyers say something works, and that they are satisfied, you can pretty well believe it.

The contest site was great. The weather was better than I expected, but most of all I sure enjoy visiting with the guys from all over the country. Wish one could do it a couple of times a year.

Ace Digipace

Dear Jim,

I read your *Radio Spectrum* every month and enjoy it very much. In the July issue you had a comment on the Ace Digipace battery cycler and I thought maybe you would be interested in some outside comments. First of all, let me say that I'm in the Air Force and stationed in Holland and I work in PMEL, which by the way is the base calibration lab. Therefore, I'm no dummie when it comes to electronics (only spelling), but then I'm a long way from being a double E. However, to get back to the point, a friend and I ordered a kit when the unit first came out, but we were informed that the kit hadn't been released yet because of a problem in the calibration of it. It requires some test equipment that they felt would not be available to the average person. However, this friend of mine went back to the states on leave and stopped by Ace just to talk to them and he just happened to have a friend in PMEL that had access to all of the equipment that was needed to calibrate this thing. Low

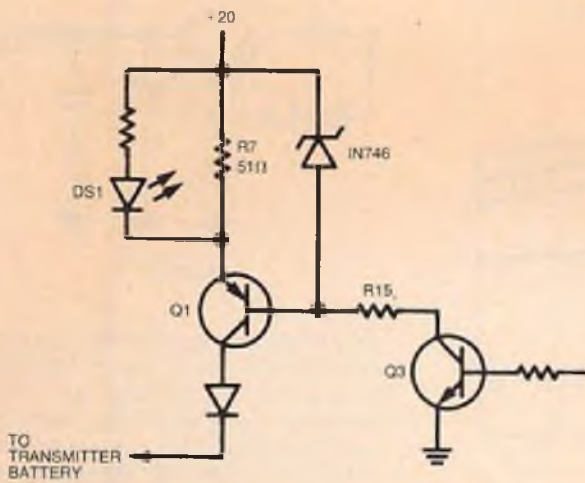


FIGURE 1

and behold when he returned to Holland he had a Digipace kit sitting here waiting for him. He offered to let me have it (for a small nominal fee), and I opened the box and was quite surprised to find that their instructions were quite limited (a Heathkit it ain't). It did have a schematic and a parts layout, so undaunted, I started to put this thing together. I was a little upset when I found two R4's, but it only took me a couple of minutes to figure out which was R4 and which was R14. Anyway, I finally got it put together and calibrated and it works fine. I've had it for almost a year now and have had no problems with it at all. Since I've had it, I've found two batteries in my flight pack that were bad and one in my transmitter. I'm sure that it's paid for itself already in the planes that it has saved. I'm really happy with it and I feel that this is one of the best investments I have ever made. It's a long way from being just a gimmick or a toy. This is a very useful tool and one that I wouldn't be without now that I have used it. Anyway, I thought you may like hearing from someone who has used one for awhile.

Sincerely,
Ed Broberg
APO, New York

My normal reaction to a letter like this, which praises a product I didn't invent, or thought was unnecessary would be to toss it in the circular file. Why should we buy a fancy piece of equipment when all we need is a resistor, a voltmeter and a clock, or simpler yet, an ESV battery tester and a clock? But I got to thinking. Over the past four years I've preached that cycling nickle cadmium batteries every few months is a good practice, but I bet I didn't cycle mine once a year. Like most people, I just never take the time to do what I know is right.

Well, I had a couple of requests to review the Digipace and Ace was nice enough to send one over, and you won't believe how much I use it. It is like everything else in this modern world. Once you get spoiled you never want to

go back to what was good enough. I don't even like to ride in 727's after flying in wide body jets. The bottom line is this: Things like the Digipace that we might consider as convenience tools, are really almost necessities unless we have super willpower. They make it easy to do what is right, and is in our long term best interest. I'm sure you can make a case for it paying for itself if not in saving airplanes just in saving that day at the contest when you find your batteries giving up in the middle of your fourth flight. Enough preaching to the choir. I'm sure most of you understand the reason the Digipace exists. For those who don't know what it does or how it does it, here goes.

The Digipace automatically discharges your batteries, measures their capacity, and then charges them up again, to put them in a condition ready to fly. You don't have to sit and watch but can go about your business and even forget all about it. When you return the Digipace will tell you if you have trouble or not.

It is a very sophisticated piece of equipment with little if any compromises. The discharge circuits are constant current instead of a simple resistor in which the current will vary with the battery voltage. The cut-off circuits use operational amplifier comparators and are very accurate. By using a digital readout there are essentially no moving parts to wear out so it should last a long, long time.

The unique thing about the Digipace when compared to other units designed for the same purpose, is its flexibility. It is usable with 12V, 9.6V or 6 volt transmitters and of course any of these switch positions could be changed to another value if someone comes out with another size transmitter battery pack. I believe Sanwa was using 9 cells for 10.8 volts, for instance.

On the receiver end, you can charge at 50 milliamps, or 20 ma if you are using smaller cells. Another feature is the fact that it is backed by a company that has

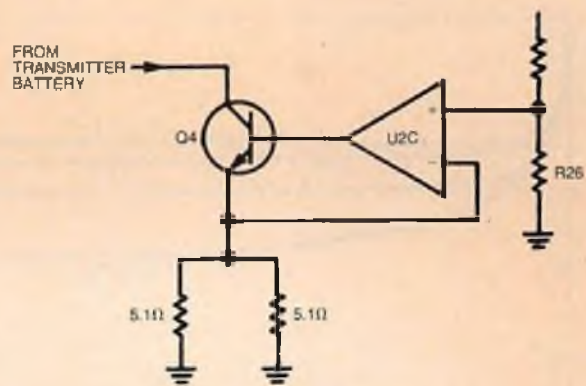


FIGURE 2

been in business for more than twenty-five years and will probably be around when you and I are gone. This is something I bet the owners of the Super Cycle had considered.

I'm not going to explain all the circuitry but I thought I'd show some basics just to show the quality of the unit. The transmitter charge circuit is shown in Figure 1.

In the charge mode, Q3 is turned on grounding R15. Current flows through the Zener diode (IN 746) putting a constant voltage (≈ 3.3 volts) across the Q1 (base emitter) - R7 combination. With a base emitter drop of .7 volts this leaves 2.6 volts across 51 ohms for a charge current of 50 ma. This current is independent of the number of cells in the transmitter pack (up to 10 cells) and therefore can be used on all of the modern transmitter batteries.

The discharge circuit is shown in Figure 2.

During discharge, R26 is set to have .765 volts across it. This causes the output of OP amp U2C to go positive turning on Q4. Current will flow through Q4 and the two parallel load resistors until the negative input of the OP amp reaches .765 volts at which time the circuit stabilizes. With .765 volts across the two resistors, the discharge current will be .765 divided by 2.55 or 300 milliamps. Again this will be constant independent of the number of cells in the transmitter.

There are many clever circuits in the unit, especially the switching circuits that allow you to read out the discharge time for two packs with one display.

If you think you'd like to build your own, my advice is buy the kit. There was a lot of engineering that went into this and unless you have lots of time, pay a few dollars and save yourself a lot of headaches.

Let's talk about using it. First of all, I do not recommend using it after every flying session (unless you only fly six times a year). It is pretty well documented that nicad batteries will last longer if you don't discharge them too deep too often. On the other hand, if you never discharge them some funny things happen. The discharge plateau will drop to a lower

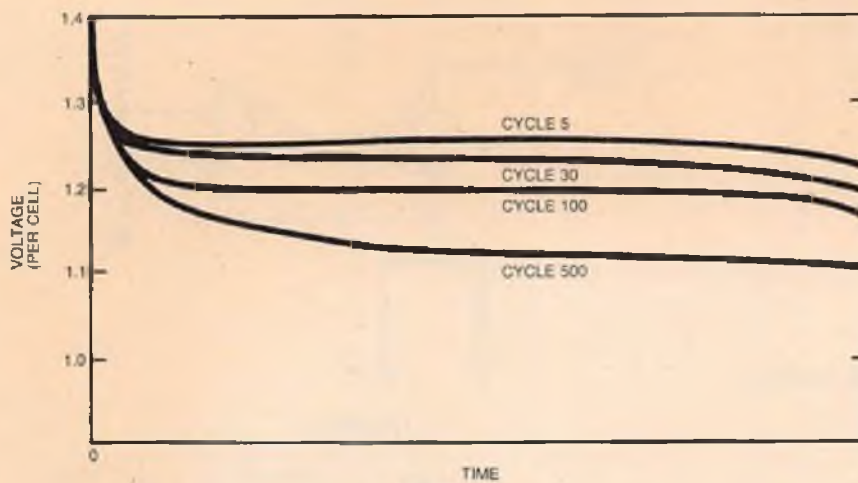


FIGURE 3

voltage as shown in Figure 3.

The figure shows what you could expect if you repeatedly discharged the battery only 20% of its capacity. After a few hundred such cycles it would indicate a low voltage after a very short discharge and you might be tempted to throw the pack away. Here is where the Digipace can save you some money. A few cycles on the Digipace will usually bring it right up. If it doesn't you can go one step further and try to cycle each cell individually but this is usually not necessary. When in doubt replace your batteries, but try to get some expert help before you throw them away. Quite often they can be revived. Definitely a piece of equipment every serious R/C modeler should have.

Voltage Regulator

The other day I was chasing an interaction problem in a system that uses a simple Zener diode voltage regulator in the receiver. I could observe sizeable fluctuations in the regulated voltage when the servos were exercised due to the fluctuations in the input voltage. The circuit is shown in Figure 4.

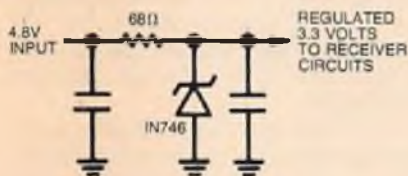


FIGURE 4

We would like to think a Zener always has a constant voltage across it, but it is actually quite dependent on the current through it. If the 4.8 volt input fluctuates, the current through the 68 ohms varies and the regulated voltage varies.

I remembered looking at a circuit Bob Elliott put in the EK Super-Pro and sure enough it was aimed at exactly this problem. See Figure 5.

Here again is our constant current circuit. There will be a relatively constant voltage across the two diodes which will put a constant voltage across the 22

ohm resistor. Constant voltage across a fixed resistor means constant current through the Zener. I put it together and installed it in the receiver and was amazed. I couldn't see any ripple on the regulated line. Unfortunately that wasn't the problem causing the servo interaction but I thought it might be useful in other applications where you need a stable low voltage. Then again, if Bob thought enough to put it in his receiver, maybe some other receivers could use it.

True Digital System — Part II

Last month we described Dennis Knowlton's Pulse Code Modulation System Transmitter. I'm sure you've all built one up and are dying to get started on the receiver.

I shouldn't be wisening-off, because I seriously hope some of you are able to get something out of these descriptions that will get us a step closer to having a true digital system with all the good things that result. I realize that there is a lot of work left but I'm confident someone out there is hard at it.

This stuff is pretty deep, but here goes. Remember last month Dennis stated that a scheme called correlation detection is used. I'll let him pick up the description:

The implementation of correlation includes integration and multiplication of the signal with a reference which is time related to the signal. In a practical sense, integration is taking the average value of the signal for some time interval, namely one bit. If the signal has noise added to it, its average value (1 or -1) can be statistically determined depending upon the amount and type of the noise. The types of noise we are concerned with are easily identifiable. (1st) random or white noise --- this type has an average value of zero and appears as fuzz on the signal. This has a high statistical probability of being averaged or integrated out. The second type of noise is associated with other

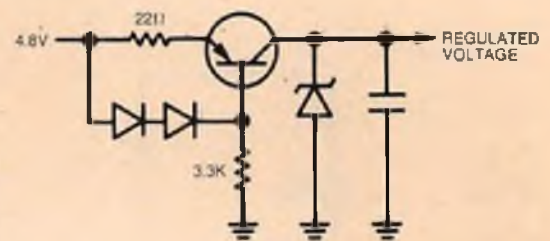


FIGURE 5

subcarriers on the same RF frequency. This noise tends to be of the same amplitude as the signal. It has frequency components at nearly the same frequency as our correlation rate, but by definition, not exactly (unique subcarrier frequency). Therefore, this noise has an average value of zero, but unfortunately a higher statistical probability of giving us an error. What are the consequences of such an error? Let's say the frames are transmitted at 60 times/second. If an error occurred in the most significant bit of the code representing a control stick position, its effect would be felt for 1/60 of a second and be immediately corrected 1/60 of a second later, much faster than the response time of our model aircraft.

Also, by using simple error detection techniques, the processor would simply ignore the bad code for one frame, thus further reducing the effect of an error.

It is possible that the statistical errors can become large enough to render the system unusable. It has been determined that greater than five users on the same RF frequency standing side by side can still control their own aircraft without noticeable interference. While on this subject, it is interesting to note that standard RF modulation techniques (pulsed AM and FM) fall into the random noise category and therefore pose little or no interference problems. Implementation of this system with AM or FM, however, would cause considerable interference with present systems which have little noise rejection capability to signals on the same RF frequency.

Enough about noise, back to the signal processing. Refer to Figure #6. The signal comes from the RF section (detected signal). Because of Xtal mis-matches, etc., a DC level restorer is used (high pass filter). From here the signal takes two paths --- one leads to the pll through the full wave bridge where the basic subcarrier frequency and reference frequency is regenerated in the receiver. The sync detector informs the pll when it is exactly locked onto the reference signal generated in the transmitter. The sync detector looks for fifteen ones in a row and checks that the last bit in every word is zero.

The second path that the signal takes is to the integrator or averager. The time interval over which the signal is averaged is determined by the pll. Refer

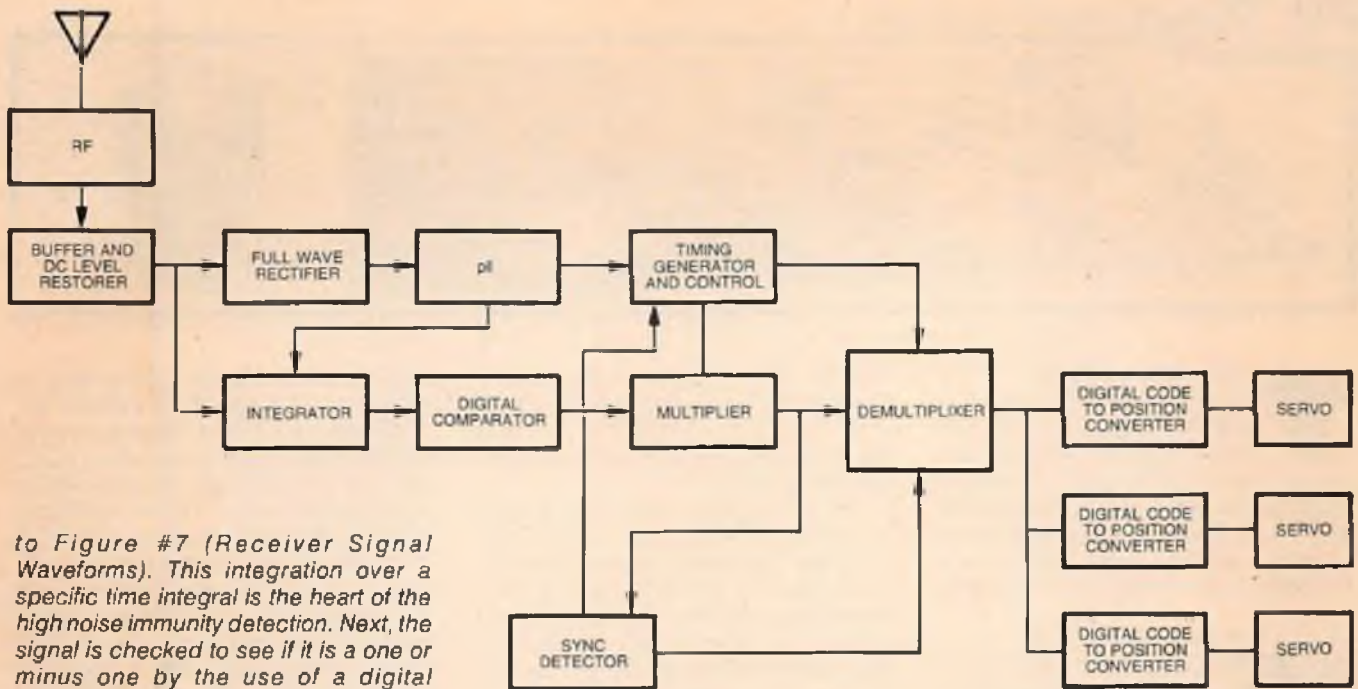


FIGURE 6
RECEIVER BLOCK DIAGRAM

to Figure #7 (Receiver Signal Waveforms). This integration over a specific time integral is the heart of the high noise immunity detection. Next, the signal is checked to see if it is a one or minus one by the use of a digital comparator. Now the digital signal (+1 or -1) is multiplied by the reference signal yielding the serial data string generated originally in the transmitter. The demultiplexer with help from the sync detector sorts out the individual words representing particular shaft positions and routes these digital signals to the appropriate servos.

Servos --- here like in the transmitter the digital to shaft position mechanism can take two forms. The first and most "pure" would be to drive a stepping motor with a shaft encoder feedback for comparison. This technique yields servos as large or larger than the old Digimite. At the present state of the art, a separate D/A converter and linear feedback control seems to be most practical.

I mentioned earlier that size was the elusive requirement. Shaft encoders are power hungry and large necessitating the use of pots with their inherent problems. This is the same problem in the transmitter as in the servos. Stepping motors are large

compared to the tiny servo motors we use in present day servos. This necessitates using D/A converters and losing the inherent accuracy of a purely digital system. Microprocessors at present are much larger than would easily fit into state of the art receivers, so until some custom circuits are developed specifically for this application to our hobby, the receiver section suffers from the extra bulk of the processor. The new CMOS microprocessor has, however, rescued the power consumption aspect of all this signal processing.

Dennis Knowlton
Research Engineer
Dept. of Atmospheric Science
University of Wyoming
Laramie, Wyoming

Even if you don't understand everything he is talking about, I'm sure you can understand the merits of being

able to fly with someone using the same channel standing right next to you. I believe a system like this will do just that and we will eventually have such a system. The guy who can put one on the market first will make a lot of money. I think this step will be as significant in the R/C industry as going from reeds to proportional. So get to work all you smart guys.

Correction

Charles Bush sent a note concerning his glow plug driver circuit which we published in the July 1979 issue. The schematic called for a 100 μ h choke which is accurate, but the note describing its construction should be corrected to read #18 Bell wire. You could use #18 Enameled wire but the number of turns to yield 100 μ h would not be 175. The bottom line is to get a 100 μ h choke that can handle 5 amps peak.

See you next month. □

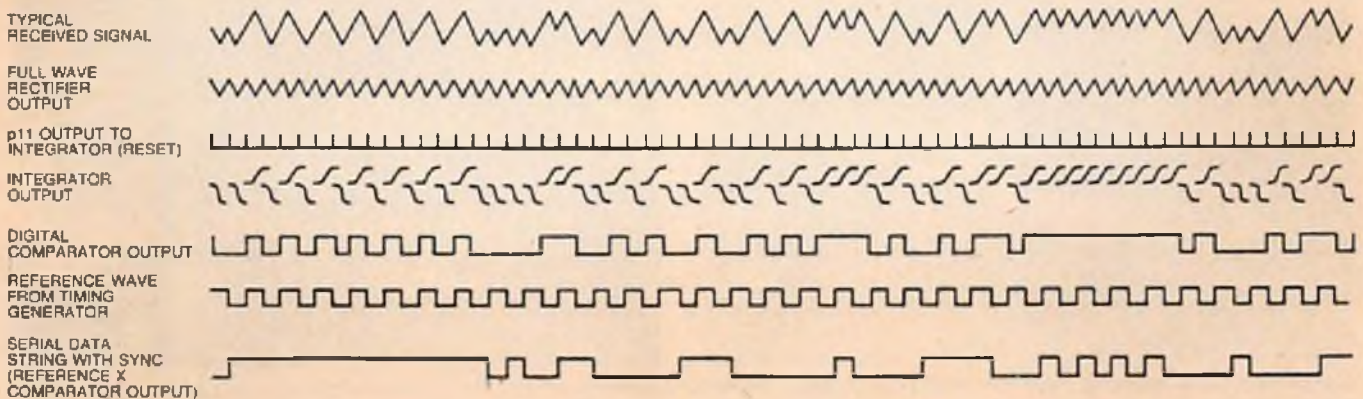


FIGURE 7
RECEIVER SIGNAL WAVEFORM



The annual McCoy race has been the largest So. Calif. 1/8 Scale race for the past few years, and the 112 entries for this race, attest to the popularity of Dick McCoy and Thorp Raceway. Dick McCoy, as most of you know, has designed and manufactured contest winning model



A record breaking 112 racers showed up for the Annual McCoy race held at Thorp Raceway in Pomona, Calif.

engines for over 40 years. For the past 6 years he has devoted his talents strictly to the R/C car market, and his engine products and his popularity has grown with the racers. To show his appreciation, he sponsors this annual race, which all the racers take pleasure in participating in. Racers came as far as Steve Stifel from Iowa, Mike Queller and

Charlie Green from Texas, Chuck Phelps and the Grossenbachers from Arizona. The MRP Team from Washington, as well as Northern California racers.

There was one racer who worked extremely hard for this race, Dana Smeltzer. Dana has been running an Associated RC200 car with a differential, and the first few days of practice, he was the man to beat. You could judge how fast you were going, by how much Dana beat you.

The MRP Team was really serious about this race, coming down early to have Wednesday, Thursday, and Friday for practice. It was also evident they had some time to do some designing during the winter. Bob Welch not only had his newest MRP designed car, but it was also a "ground effects" car, a la the 1/1 scale Formula 1 cars. He had bodywork designed underneath the car, so that air underneath the body helped to create a vacuum to hold the car down to the track better. Bob's car seemed to work very well, but he said he wasn't exactly sure how effective his "ground effects" was working. It sure wasn't hurting. Gary Kyes has the fastest MRP, with the help of a tuned pipe and super driving skill.

We went to practice on Thursday, figuring Friday would be too crowded. It worked out fine, with about 30 racers there, 65° weather, which I told Debbie Preston we had ordered this English weather just for her. We were very

impressed with Debbie's OPS powered differential equipped RC200 at the Mini-World race in San Diego two weeks before, but that was on a bumpy track, and we were anxious to see what it would do at Thorps. Without question, it's the fastest OPS I've ever seen. Part of it's due to the 45% nitro fuel with special oil, and the other part is due to the special silencer (can) that Debbie's father, Dave, designed. It's evident Dave also had some time to do some testing during the winter, and it sure paid off. I can tell, because Debbie had a spare silencer that she offered to let me use, and it turned an otherwise average K & B engine into one of the fastest motors on the track! And it was also the quietest car there.

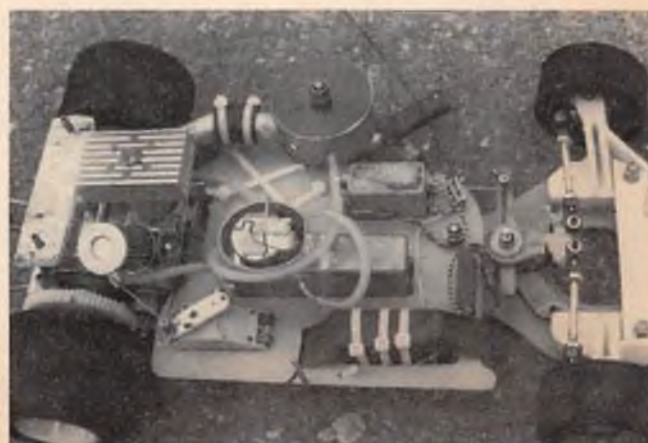
Debbie was also getting around the track extremely fast on Thursday. My own car had a little too much oversteer, but I left it alone because I knew the bite would be better later. Bill Jianas and Rich Lee were also going extremely fast, racing side by side for many laps.

When we came back on Saturday, we were in the middle of a 105° heat wave. But that didn't deter the enthusiasm of the 112 racers. We got 2 rounds of practice on Saturday and then 1 qualifying heat. During practice everyone looked fast due to the increased traction on the track.

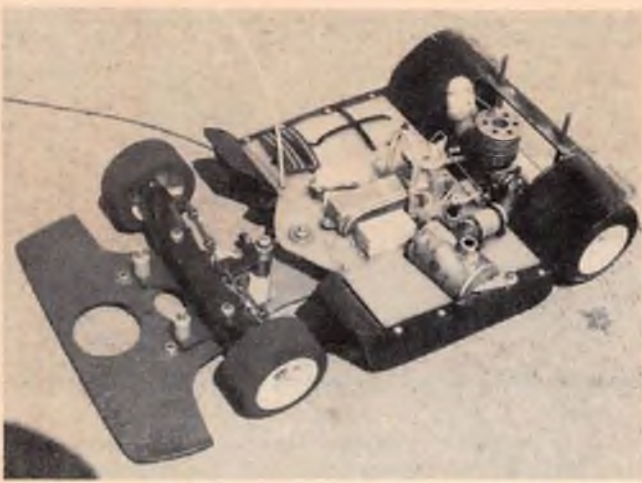
Jeff Rold gave everyone something to shoot for in the first round, turning a super fast, smooth 3:24.78, which broke



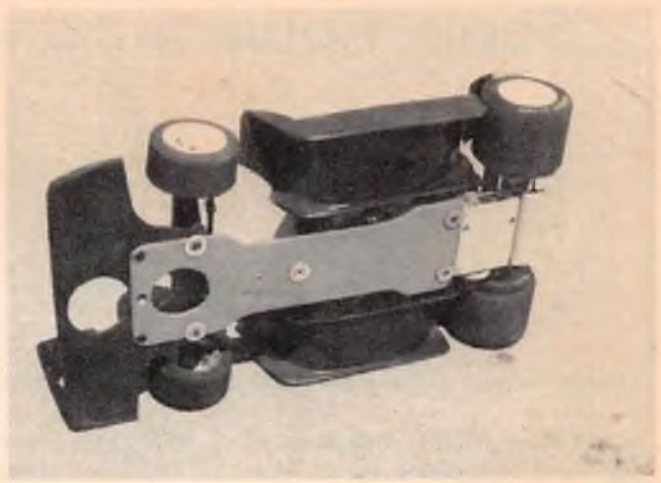
Gary Kyes' race winning MRP car with tuned pipe. There were only 2 or 3 cars with tuned pipes but one was on the right car.



Gene Husting's 2nd place finishing car is actually set up to run counter-clockwise for the Geneva track, but it still ran very well turning clockwise.



Bob Welch's MRP car featured "Ground Effects" bodywork.



Underside of Bob's car showing bodywork used to create vacuum underneath the car to aid in cornering.



This car did not win Concours. It didn't even finish 2nd or 3rd. Chuck August did this beautiful painting for Bill Jianas.



This car did win Concours. This is Chuck August's car. The body was painted by Chuck in various shades of blue metallic and was really exceptional. He also raced it, as did Bill.



The amazingly incredible Rich Lee has performed miracles in his last 4 races and topped it off by being Top Qualifier at the McCoy race and setting a new track record at Thorp Raceway.



Dick McCoy, on the right, presents the first place trophy to Main Event winner Gary Kyes.

the Thorp track record for the extended course. This lasted for 2 more heats, until Bill Jianas put on one more of his infamous qualifying drives and broke the record again, with a 3:22.62.

Sunday the temperature went up to 110°, but the bite on the track also went up. Jeff couldn't better his time, but Gary Kyes lowered his to a very fast 3:23.37,

but the fastest and most exciting heat was just coming up. Debbie Preston and Rich Lee put on one of the most incredible qualifying races I've ever seen. Debbie got the lead, but Rich was two feet behind her. They stayed that way for 3 laps, when Debbie hit the brakes too hard, spun out and Rich slipped by. Debbie had to change her

braking style due to the high traction, and she just hadn't become accustomed to the new technique. Nevertheless, she started to make up ground on Rich, and got right behind him and then spun out again. Rich went on to set a new track record of 3:21.55, with Debbie less than 3 seconds back at 3:24.47.

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IMAC --- HOW IT WORKS

Like many new concepts in model competition the International Model Aerobatic Club idea of flying scale-like biplanes and monoplanes in the same manner as full-size aerobatic contests, has become very popular in some sections of the country but in others it is almost unknown. So for those readers who haven't had a chance to see an IMAC meet, here's a brief summary of the requirements:

(1) Any biplane may enter, but scale biplanes can get a 10% bonus on their flight score. Monoplanes must be a sport scale version of an aerobatic type. Biplanes can enter Monoplane events but Monoplanes cannot fly in a Biplane event. In actual practice, separate events for biplanes and monos are the usual procedure and are approved by participants as the best way. When separate events are held, interchanging is not permitted.

(2) Three different flight patterns of progressively greater difficulty are used:

Sportsman, Advanced, and Unlimited. The idea is that the novice to IMAC flying begins in Sportsman, then moves up to the higher classes as skill levels increase. As yet there are no rules determining which class the flier may enter, it's a matter of choice.

(3) An aerobatic "box" in front of the judges is defined by flags. Maneuvers must be performed in an upwind-downwind sequence within this zone, including turnarounds. Passing outside the box results in presentation score reductions.

(4) A major feature is a continuous flow of airplanes before the judges. The flight line director keeps a steady flow of models taking off and holding in the air off-stage. As soon as an entrant completes his flight pattern, he leaves the box and an airborne model is immediately called in to replace him.

The result is a fast moving spectacular that finds favor with both spectators and contestants. It can be flown in a compact area, with two sets of judges operating simultaneously from a single site. Clubs

which have developed IMAC activity find that the entry totals go up every year at a time when the regular pattern and pylon racing events seemed to have declined in interest.

To get in on this growing activity that combines some of the best features of scale and pattern, send \$5.00 to Glenn Carter, Sec., Treas., Ed., IMAC, 2020 Gill Port Lane, Walnut Creek, CA 94598. A year's membership includes a license card, IMAC decals, contest operation information, and a newsletter subscription.

5TH Annual Sig IMAC Championships

I have heard that some early 1979 season contests had drops in attendance because of the gasoline situation. The week prior to the June 16-17 weekend was a classic example of the tightening fuel crisis, reaching near panic by Friday. Pipeline terminals had been shut down by the independent trucker's pickets and the gas station dealer's association was calling for

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Looks real, but it's Jewel Ness's Byron Originals.



Pete Frankenthal's Sig Miniplane.



Vernon Kramer tries out the idle on his Sig Skybolt.



Maurice Rossi modified his Nosen Cub into a Clipped Wing version.



Unusual entry by David Goulet, a Beechcraft Staggerwing.



A full size air show was put on at noon on Sunday by Glen and Hazel Sig and Maxey Hester. Here, Glen Sig does a roll in his red Pitts Special.



Kraft Super-Fli by Beno Echerd climbs out after take-off. What else but Kraft .60 power?



Norm Cassella helps Model Airplane News' Art Schroeder with his Cass Skybolt.



Part of the busy frequency separated ready lines.



Don Fuller's Sig Skybolt taking off to join the holding pattern.



Larry Stroufa revs up his 2nd place Sig Skybolt on the ready line.



Larry Scott's original Super-Fli is 80" span, weighs 15 lbs. and is powered by a Rossi .60 on a prop driver.



Short story: (1) Pete Frankenthal goes out with his Nosen Citabria . . .



(2) . . . takes off and begins to perform the pattern . . .



(3) . . . when a strut comes loose, the wing pins fall and instant rekitting. Moral: 1/4 Scale puts extra loads on models.



Bud Hall flew a Sig Citabria in Sportsman Monoplane.



Larry Skiles cranks up his Sig Super Chipmunk.



Len McCoy's Webra .90 powered Platt Jungmeister.



Norm Casella's Cass Super Skybolt rockets up. That big prop is being turned by Norm's new Super Drive unit --- twin .40's on a belt reduction.



Part of the Mammoth entry. The P-51, though painted in Bob Hoover's colors, does not qualify as a "box" aerobatic entry, did not fly in the contest.



Maurice Rossi's Mammoth Cub on take-off run.

RC FLYING AND THE LAW

Part XI

Safety Instructions, Warnings and Directions

Our society, and thus our life, have become increasingly complex. Perhaps, at least in part, we participate in R/C modeling to escape from the pressures and complexities of our everyday life and this confusing world. Yet it cannot be denied that our participation in R/C modeling is itself getting more complicated and demanding.

Over the past few years this series has been devoted to explaining how the law, our court system and the factor of insurance all impinge on our participation in this great avocation. The basic message in all of this has been that **we are responsible for what we do with our models** because we can do serious injury to persons and property with an operating model and to examine the all-important insurance scene in terms of the availability and coverage of insurance in the event of such injuries or property damage.

But there is yet another area that must be of concern to every active R/C modeler and this article in this continuing series will examine that aspect. An officer of an R/C club raised this with me in a recent letter; he wrote:

Your March, 1979 issue article in RCM concludes with the advice: "It's not what is flown, but how that counts." It is given in the context that the AMA Safety Code must be carefully adhered to if an R/C modeler wants to minimize his exposure in case of a liability suit.

I'd like to raise a similar question --- "How about the safety codes beginning to be published by manufacturers?" Must a modeler give them equal respect in order to minimize his exposure under liability law?

I hope your answer is "no," but I suspect it is wishful thinking on my part, because it is certainly my impression that if you operate something contrary to the manufacturer's instruction, and injury or property damage occurs, maybe that helps keep the manufacturer off the hook, but it places you in sort of double jeopardy. You have



By Arthur J. Sabin
Prof. of Law

the complainant coming at you from one side, and the manufacturer on the other side saying "it wouldn't have happened if he did it my way."

There are really two points involved in what is raised. The first is that indeed the failure of an R/C pilot (or operator of any R/C model) must fly the model with due care for the safety of all other persons and property. To fail to do so is negligence for which the pilot is liable and ultimately, can be sued. That's why every operator of an R/C model should have insurance, currently available only through membership in the Academy of Model Aeronautics. Part of determining whether the R/C pilot was at fault (that is, negligent) **may be** determined by whether the modeler obeyed the safety instructions, warnings and directions of the manufacturer or supplier of component involved in that flight.

For example, we all know how important it is to build our models strong enough to withstand the vibrations and stresses of an operating engine and flying; that an engine must be securely fastened; that the Center of Gravity be observed, etc. In fact, from the time you open the kit or begin to scratch-build your model, to the point where you shut down the engine and turn off the radio after a flight, you are responsible for having reasonably complied with the safety instructions, warnings and directions given by the manufacturer or supplier of every component used. Put another way, your **failure** to abide by the instructions given may be **evidence** that you were indeed negligent.

Another example may be in order: Every manufacturer of R/C radios gives instructions and directions with regard to range testing your radio prior to use in operating the model --- every time you fly it. If the evidence establishes that you

failed to range check the radio and that the model went out of control and hit someone, with further evidence that while there was a defect in the radio it could have been determined by you through having performed a simple range test, there is evidence that may constitute a clear indication that you are negligent. What it boils down to is that it is **your responsibility** to have properly built the model, following the instructions in that construction, properly equipped the model with the correct components, properly tested those components prior to use and properly flown the model. As to that latter point, it would be negligence to fly a model under conditions where a reasonable person would not have flown it. For example, flying a model that is beyond the capacity of the pilot in terms of skill and training, flying the model under such adverse weather conditions that is unreasonable to do so or failing to fly the model in a safe manner in terms of keeping all flights away from spectator areas, all may be indicative of negligence.

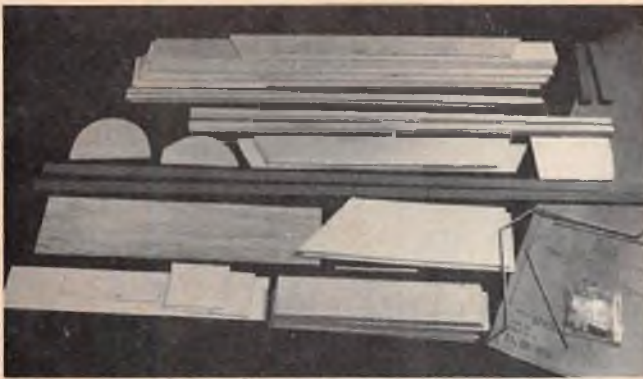
It must also be kept in mind that none of these requirements are anything more than behaving in a reasonable fashion given the circumstances of piloting or operating a model which you must know can do harm if you behave unreasonably with regard to any of these good-sense requirements.

Therefore in answer to the first question put, indeed the failure to abide by the safety instructions, warnings and directions of the manufacturer or supplier of any component part may yield evidence of your negligence. It isn't really "double jeopardy" because there is only one single jeopardy . . . that you will be liable to anyone who is injured or whose property is damaged because

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RCM PRODUCT REVIEW

Balsa USA SWIZZLE STICK



There are several adjectives that could be used to describe the Swizzle Stick and sleek would not be one of them. However, Balsa USA wasn't out for a beauty contest entry when they designed the newest of the "Sticks." What they do have is a really incredible kit that is the fastest building, easiest to construct and absolutely the easiest to fly that I have had the pleasure of flying.

Balsa USA have placed the remarkable price tag of \$13.99 on this little wonder.

Construction:

Using cyanoacrylate when possible, the wing panels can be framed in about 1 hour. With a little time for sanding and carving the leading edge, you are ready for covering. Don't forget the wing center section reinforcement, preferably some fiberglass cloth. Material for ailerons is not included in the kit, but I strongly suggest a journey to your local balsa emporium for the necessary items to add strip ailerons as ailerons will greatly increase the pleasure of flying the Swizzle Stick.

The fuselage is really an easy to build part of the airplane. There is a grand total of ten parts of redwood and plywood to the entire fuselage. Two 5/16 by 3/4 redwood pieces play the part of the foundation for the 1/2 by 3/4 motor mounts, also redwood. The radio cabin is of plywood (four pieces) and there are two 1/8 plywood tail pieces to hold the ends together. Using 5-minute epoxy throughout, I built the fuselage in about 90 minutes, with most of this time spent waiting for epoxy to cure (actually doing other things in the meantime). The tank rubber bands in front of the cabin using wood screws in the redwood beams to hook the bands. Slight cutting of the motor mounts was necessary to fit the particular engine but that was a minor task. The main landing gear is screwed to the redwood beam and soldered to a bracing wire to create a sturdy and wide spaced unit. Some method, not mentioned in the instructions, needs to be used to get the pushrods back to the tail feathers as the rear cabin bulkhead is solid ply. I simply cut a large "U" shaped section out of the plywood so the pushrods and aileron hardware had sufficient room for movement. This caused no apparent structural weakness that I can observe.

SPECIFICATIONS

Name	SWIZZLE STICK
Aircraft Type	Sport
Manufactured By	Balsa U.S.A. P.O. Box 164 Marinette, Wisc. 54143
Mfg. Suggested Retail Price	\$13.99
Available From	Direct from Mfg.
Wing Span	60 Inches
Wing Chord	10 Inches
Total Wing Area	600 Square Inches
Fuselage Length	41 Inches
Stabilizer Span	17 1/2 Inches
Total Stab Area	118 Square Inches
Mfg. Rec. Engine Range	30-45
Recommended Fuel Tank Size	8 Ounce
Recommended No. of Channels	3 or 4
Recommended Control Functions	Rud., Elev., Throt., All. (opt.)
Basic Materials Used In Construction:	
Fuselage	Redwood & Ply
Wing	Balsa
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (1 page)
Construction Photos	No

RCM PROTOTYPE

Radio Used	Futaba 4 channel
Engine Make & Disp.	O.S. 40
Tank Size Used	6 Oz.
Weight, Ready To Fly	79 Ounces
Wing Loading	19 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Ease of construction; good flight performance; low price.

WE DIDN'T LIKE THE:

No fault found for this type aircraft.

Tail feathers are 3/16" sheet balsa and are shaped in a fashion not unlike an Ugly Stick. For tail reinforcement, 1/4 triangle is included in the fin-stabilizer joint.

Hardware includes landing gear of 5/32 and 1/8 wire, hinges, two control horns, mounting screws for tank and gear, and wire for a tail skid. A steerable tailwheel is not in the design nor is it necessary, although it could be easily added.

Covering:

Since the construction was so simple, it seemed natural to go with a simple finishing job. The wing received a layer of cream MonoKote over Balsarite with the same treatment given the tail surfaces. Red Perfect Paint was mixed with a little orange to match the red MonoKote used for trim. This paint was used to cover the fuselage after two coats of Glaskote. Overall, this is about the easiest way to go for a finish that is attractive and lightweight.

Engine:

An O.S. 40 with an O.S. muffler was anchored in the nose and a six ounce fuel tank was strapped on with rubber bands.

Radio:

Installing the Futaba radio was easy with generous cabin space. As mentioned above, we elected to add ailerons which require a total of four servos.

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BUD NOSEN MODELS

INCORPORATED

BOX 105, TWO HARBORS, MINNESOTA 55616

All kits feature all wood construction, fast assembly, huge rolled plans, assembly instructions, machine and die cut parts, all necessary hardware and much, much more. Designed for .60 engines on up. Write for our illustrated catalog—50¢.

9' PIPER J-3 CUB



Standoff Scale
Formed ABS
cowling Kit -

\$119.95

3 or 4 Channels
Flies like a
trainer Kit -

\$99.95

9' CHAMPION CITABRIA



9' AERONCA "CHAMP"



1/4 size Standoff
scale 3 or 4
Channels Kit -

\$99.95

3 or 4 Channels
No foam or
plastic Kit -

\$79.95

102" BUD NOSEN TRAINER



8½' BIG STICK



NEW!

Big airplane fun—
Quadra economy

\$129.95

1/3 size Standoff
scale 4 Channels
required Kit -

\$129.95

8' 1933 GERE SPORT



9' "MR. MULLIGAN"



1/4 size Standoff
scale 3 or 4
Channels Kit -

\$139.95

1/4 size Standoff
scale Molded
cowling Kit -

\$169.95

10' CESSNA 310 TWIN



AUSTRALIA
EK Logictrol Australia
44 Macquarie Road
Earlwood 2206
Sydney, Australia

SWITZERLAND
Blue Max
Modellflug-Technik AG
Alte Landstrasse 122
CH-8800 Thalwil Switzerland

**OVERSEAS
DISTRIBUTORS**

SOUTH AFRICA
Radio Control World
202/4 Oceana House
Lower Burg St.
Capetown 8001 So. Africa

CANADA
John Klassen Hobby Central
400 Cuyler Street
Thunder Bay, Ontario

Bud Nosen's spectacular

102" P-51 D

KIT \$169⁹⁵

- Stand-off Scale
- 2.75" equals 1'
- 102" Span
- 16.5# flying wt.
- 1800 sq. in. wing
- 26 1/4" chord at root

- 4 channel radios required
- Designed for .60 engines with prop driver
- Very stable flyer
- Proof of scale 3 views
- Kit includes 21" canopy

- No foam or plastic
- 6" spinner is not included available direct only \$16.95
- Huge rolled Plans
- Machine and die-cut parts
- Decals not included



BUD NOSEN MODELS, INC.

Box 105

Two Harbors, MN 55616

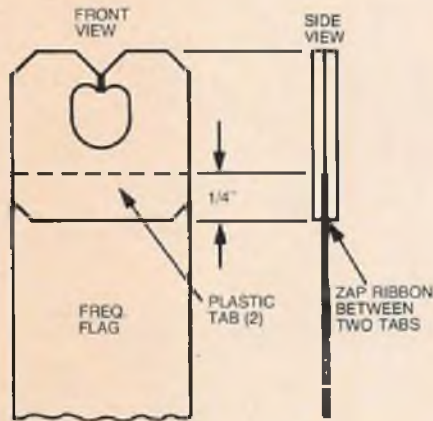
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FOR WHAT IT'S WORTH

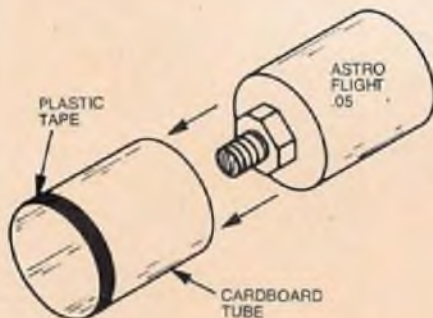
This idea called a "Frequency Flag Holder" was sent to us by Val N. Cairao of Warren, Rhode Island.

Two or three holders with flags can be made for pennies. The materials required are 2 yards of frequency color ribbon (depends on what frequency you have), 1 yard of each color and plastic tab(s) from bread wrapper(s). (Some bakeries tie their bread wrapper ends with a plastic tab.)

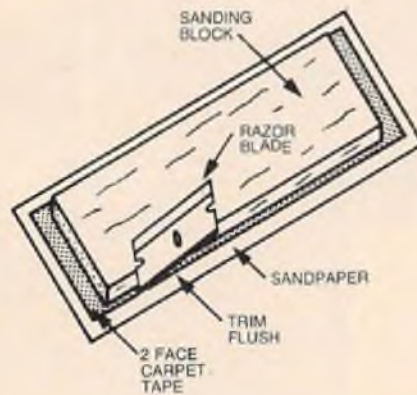
Cut color ribbons (whatever frequency you have) into 10" or 12" lengths and then glue or Zap the cut ends between the bread wrapper tabs. The open end of the tab can then be clipped to the end of the transmitter antenna. The accompanying sketch should be self-explanatory.



Do you like to build electric powered models but hate the hassle of trying to roll plywood for the motor tube? If so, then read on. This was the way Jim Boyce of Harlingen, Texas, felt so he found this following solution. After checking different types and brands of kitchen foil and wrapping plastic, Jim found that the cardboard tubes used by Saran Wrap (Dow Chemical Co.) turned out to be the perfect size for the Astro 05. It offers plenty of friction to hold the motor in place and a piece of plastic electrician's tape can be wrapped around the front to keep the motor secure during those hard knocks. It also serves as a vibration damper and shock absorber. See accompanying sketch.



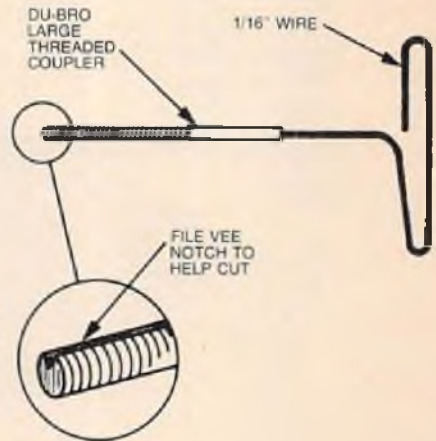
Harland W. Hansen of Muskegon, Michigan, submitted the following suggestion for attaching sandpaper to a sanding block. Harland found the 2-face indoor-outdoor carpet tape to be a very handy item to have around the shop. The cost (about \$1.00) will buy 42', 1 1/2" wide and may be purchased from your local department store or carpet dealer. It was found to be superior to glue for holding sandpaper to a sanding block. Because it is simpler, faster, and neater — use it to hold sandpaper to a wood dowel or bottles of varying sizes for those inside curve sanding jobs. Also he uses this 2-face tape to mount a strip of sandpaper 1 1/2" wide by 36" long directly to his bench top. This is great for sanding straight edges on sheets for perfect glue joints. See accompanying sketch.



While covering foam wings with sheet balsa, using one of the water base latex contact cements, Carl W. Holland of West Palm Beach, Florida, has been using the following method with great success. When this cement is painted onto the balsa sheeting, it has a natural desire to curl and warp due to the water base. Carl has found that by applying one coat of Balsarite first, this eliminated any trace of warping. This balsa conditioner dries in ten minutes and seems to cause the cement to adhere far better. Since using this method, Carl has never seen a blister even under the hot Florida sun.

This suggestion is not new, however, there may be many modelers who are not aware of this easy method to help see through plans when working from the reverse side. When only one wing panel or half a stab is shown, place wax paper over the back of the plans and iron it onto the plans for a short time. Lift the wax paper and you'll discover how much better you can see through the back side of your plans. This suggestion was sent to us by Frank Wiltse of Newport Beach, California.

If you have had difficulties in threading your nylon pushrods, this handy tool by Lawrence Eads of Carrollton, Texas, will help solve your problem. Simply purchase a Du-Bro threaded brass coupler and solder a "Tee" handle into the open end. Make the handle from 1/16" wire. By filing a small "Vee" notch along the threads, the cutting action will be increased (see sketch). This small handy tool can now be used as a tap to thread the inner nylon pushrod before trying to install the threaded rod.



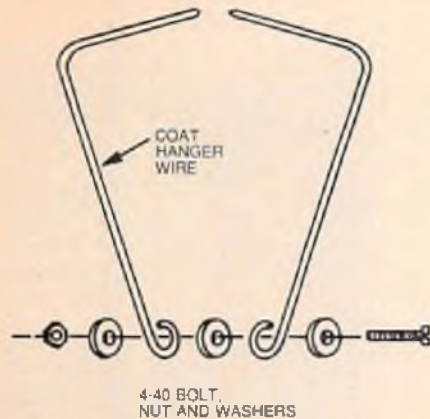
When covering a plane with any of the plastic type covering materials available, there seems to be a problem with the colored adhesive sticking to the surface of your iron. This adhesive then transfers to the model causing an unsightly smear — especially when it's a different color. In the past, Nicholas R. Stevens of Holly Hill, Florida, had always used a cloth or paper towel to clean off the iron. Many times this required considerable time, not to mention the elbow grease involved. Quite by accident, Nick discovered that a piece of ordinary foam rubber will remove the adhesive quickly and easily from any iron. It doesn't matter whether the iron is hot or cold; also the foam rubber will not scratch the Teflon coating. Try it, it really works!

If you have ever tried to transfer a mark from the inside of a fuselage wall to the outside for drilling purposes and found that your eyeball technique was off by 1/4", here's a simple tool you'll appreciate. Take two pieces of wire coat hanger and bend them to a shape similar to the one shown in the sketch. (Shape and size can vary with need.)

Place a washer between the wires and on each side; tighten a 4-40 nut and bolt to where the wires just move; adjust wire until the tips touch. Now you have an outside marking device for exact

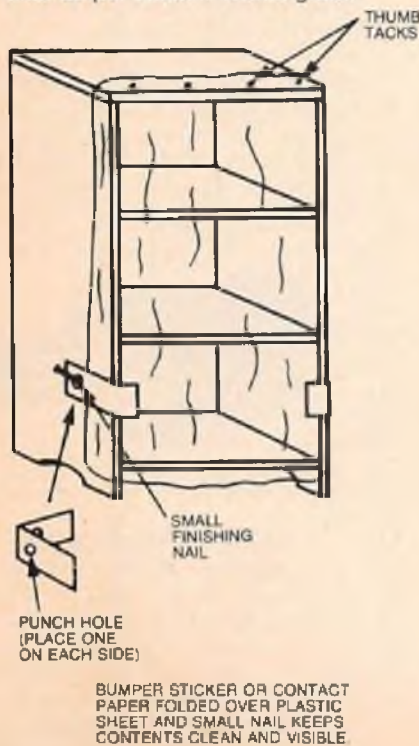
FOR WHAT IT'S WORTH

transfers, for glow plug holes in cowls, switch pushrods, etc. Total time — 5 minutes. This idea was submitted by Steven R. Harris, D.M.D., of West Palm Beach, Florida.



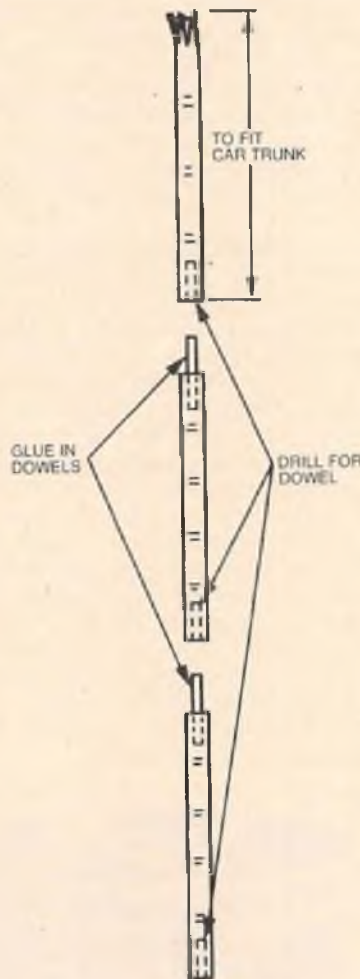
Melvin C. Meade of Toledo, Ohio, who is a member of the Toledo Weak Signals Club, sent in these two handy hints that many of our readers should find very helpful.

If you have any cabinets without doors and would like to keep the contents dust free, a piece of clear plastic tacked at the top of the cabinet and attached on each side as per sketch. Works great.

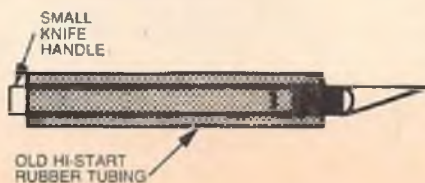


If you have ever had one of your models land in a tree, which most of us have at one time or another, this handy retriever can be a most useful part of your field equipment. It is made up from

a bamboo rug or fishing pole and cut to lengths that will conveniently fit into your car. The end can be split and bent out to a fan shape similar to the accompanying sketch. This works well for trees too small to climb and too high to reach.

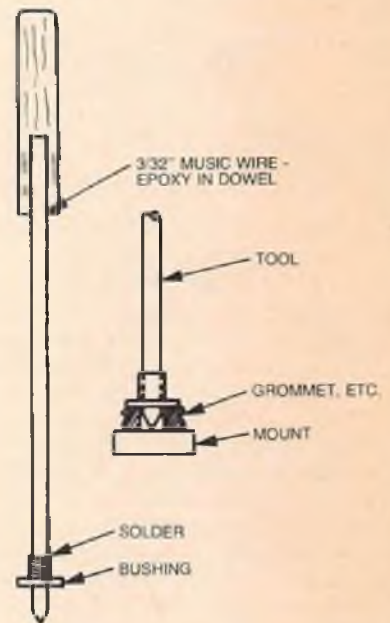


The next time you or a friend throw away some old high-start rubber tubing, save a foot or so of it. You can make a fine cushion grip for the small X-Acto or similar type knife handles. Simply cut to length desired, wet the handle a little and push on the rubber tubing. It makes a very good cushion grip. This idea and accompanying sketch was submitted by L. Williams of Monrovia, California.



If you're looking for a neat tool for servo grommet installation and also as a center locator for drilling servo mounting holes, then this is a tool for you. The

double purpose tool is easily made from workshop scraps. It allows quick installation of grommet bushings and later can locate the drill centers for the servo mounting screw holes. The accompanying sketch is self-explanatory. This idea was submitted by Arthur W. Schmitz of Vermilion, Ohio.



If you're looking for a very inexpensive and easy method to repair worn out hardwood or nylon tailwheel brackets, you might try the following suggestion by Don Rayfield of Newnan, Georgia. When his bracket got so worn that the tailwheel wobbled from side to side, he repaired it in this way: First, clean the bracket with K 2R spot remover to remove all the old oil and dirt. Next, apply a small amount of Vaseline on one end of the wire and heat the other end so the Vaseline runs into the hole in the bracket. Next, mix a small amount of 5-minute epoxy and, when the wire has cooled off, put the epoxy into the hole in the bracket. Fill the hole completely full and let it set up. The epoxy makes a perfect bushing for the wire, and the entire job can be done without removing the bracket from the aircraft.

The above method can also be used to make aileron torque rod bushings. Simply cut out the groove on the wing trailing edge where the torque will be placed. Coat the wire with Vaseline and fill the groove full of epoxy. Place the wire in position and add the trailing edge stock which is also filled with epoxy. Remove excess epoxy and let it set-up. The epoxy not only makes an excellent bushing, but also glues on the trailing edge stock as well. □

showcase '79

All items appearing in Showcase '79 are press releases supplied by the manufacturer of the product and/or their advertising agency unless otherwise specified. Note: The review or discussion of any product by Radio Control Modeler Magazine does not constitute an endorsement of that product nor any assurance as to its safety or performance by RCM.



TOP FLITE MODELS CONTENDER 40

Top Flite models all new R/C Contender 40, an easily built versatile adaptation of the original Contender, and choice of Col. Al Betkey and his Flying Circus is now available. Described as the ideal low wing trainer, the Contender 40 flies on a virtually stall free wing, with a span of 47" and an approximate weight of 4½ lbs. It is 43¾" long, and has a wing area of 564 sq. in. Four channel R/C is required, though more channels can be used for the operation of flaps and retract landing gear if desired. The Contender 40 offers a number of interesting options, such as a straight or bent wing, upright or inverted engine, all with minimum building time. The kit includes machined leading edges, one piece fuselage sides, precision cut balsa and hardwood parts, and pre-formed wire parts. Also included are die-cut balsa and plywood sheets, canopy, nylon and metal fittings, and a steerable nosegear assembly. Full size plans, diagrams, and R/C installation details are also furnished. Available at all leading hobby stores, the Contender 40 is brought to us by Top Flite Models, Inc., 1901 N. Narragansett Ave., Chicago, IL 60639.

ELECTRONIC COUPLED AILERON-RUDDER SYSTEM

Those big airplanes turn better with a bit of rudder cranked in along with the ailerons, which is a bit difficult to do with the seat of the pants feeling which only comes from being in the machine. The whole thing has all of a sudden become easier and more consistent with the introduction of an electronic coupling system, now under production by Jomar Products, 723 Wild Horse Valley Rd., Katy, TX 77450. This device plugs into your airborne system between the receiver and rudder/aileron servos, and

operates both the latter when the aileron stick is moved. Obviously, the percentage of throw from one to the other can be adjusted mechanically as desired. When maneuvers requiring the use of rudder only, such as ground handling or wingovers are made, the rudder is operated normally, with the rudder control, at which time the system electronically uncouples for normal operation. The electronics are fully encapsulated for maximum protection, and require only the addition of wires and plugs to match your system. It is available direct only from Jomar Products, and is priced at \$59.95.

HOBBY BARN'S MINARE

Hanno Prettnr's world famous and world beating "Curare" has been redesigned by him down to a .40 to .50 size, renamed the "Minare" and made available in glass and foam by Arizona's Hobby Barn. The "Minare" kit is available in two versions, a basic kit consisting of an epoxyglass fuselage, foam wing and stab, plans and instructions, for \$49.99. A deluxe version is also being manufactured which contains all of the above, plus a complete hardware package and all the wood necessary to complete the model. Price of this one is \$76.99. Both from Hobby Barn, P.O. Box 17865, Tucson, AZ 85710. Postage to the amount of \$3.50 for the basic and \$3.95 for the deluxe kits is requested.



KLOTZ SUPER 2-CYCLE RACING OIL

For home brewers only — the famous Klotz Super 2-Cycle Racing Oil is now available directly from the manufacturer,

Klotz Special Formula Products, Inc., P.O. Box 1343, Ft. Wayne, IN 46801. Designated as KL-100, Klotz oil blends with either alcohol or nitro, and is available in 55 gallon drums or one quart cans. By the quart, it is priced at \$4.05 per quart. For larger quantity price and shipping information, inquire direct from the address above.



MRC/TAMIYA R/C CAR GUIDEBOOK

MRC/Tamiya's new 10" x 10½", 36 page catalog is one of the most complete R/C car guides we know of. It describes the basics of R/C cars and their operation, and goes on to suggest how to set up race courses. It offers do's and don'ts of R/C car kit running, and many tips on performance and contests. It thoroughly describes all MRC/Tamiya car kits, including color photos of most. Even a trouble-shooting guide is included, for maximum driving fun with minimum fuss. Only \$1.50 from Model Rectifier Corp., (MRC) 2500 Woodbridge Ave., Edison, NJ 08817.



JARMAC DISC SANDER

Anyone who has ever assembled a model with the aid of a power disc sander will never again do so without one. Don't take our word for it — ask the man who owns one. With it, you can form accurate clean angles that not only look better but actually make stronger joints, remove burrs and rough edges on wood and plastic parts, duplicate 90 degree or any other angles with the adjustable mitre gauge; actually the possibilities are limited only by your experience and imagination. Jarmac, Inc., offers a miniature disc sander, in addition to

other fine small power tools. It is designed for heavy duty, professional production work, has a 4" diameter disc, and a 4" x 5" table. It is made completely of metal, comes complete with adjustable mitre guide. It features a self-adhesive sanding disc, which is available in fine and coarse grades. There is also a foot operated variable speed control available. The price is \$59.50, plus \$2.00 for postage and handling. Sandpaper discs are \$2.95 for a package of three, in either grade, and the foot control is \$18.50. For orders or information, write Jarmac Inc., Box 2785 Springfield, IL 62708.



PARMA INTERNATIONAL INC.

Parma Int'l., well known makers of model car racing products, have just introduced a number of new items of interest to that class of modelers. Included are two new 1/12 scale bodies, one for the "Kroll" in the CanAm Class, and the other is for the Capri that has been raced so successfully in Germany for the past year. Both are in Lexan, available clear for \$9.95, and painted for \$14.00. In the accessory line, they have a new line of soft to medium grade tires called "Grabbers," at \$2.75 for the front and \$3.00 for the rear. And there is an assortment of power resistors, available in 1/2, 3/4, 1, and 1 1/4 ohm values, and featuring adjustable dynamic braking. For more information on any of these new, or any of the many previously introduced products, contact Parma Int'l. Inc., 13927 Progress Parkway, North Royalton, OH 44133.

particular the .40, .50, and .61's will be glad to learn of a new feature available that will not only increase the already high performance of these engines, but will allow greater freedom in fuel tank location. This feature is the inclusion for the renowned Perry Fuel Pumps and Pump Carburetors with the above mentioned engines. Included are an adjusting wrench, and complete easy-to-understand instructions on engine operation with the pump. Available also is the Perry Air Cleaner, as pictured for use with any Pump Carburetor for increased engine life. For additional information, inquire at your local hobby store, or write Bavarian Precision Products, P.O. Box 6, New Canaan, CT 06840.



DREMEL 6-PIECE HIGH SPEED CUTTER SET

Never ones to rest on their laurels, Dremel once again has a new goodie for us. It is a set of high speed cutters, designed for any model of the Moto-Tool. The set includes No's 114, 124, 125, 191, 192, and 194, each made of high quality steel and having a 1/8" shank. These are the most common and most useful cutters for shaping or hollowing most metals, plastics, wood, or fiberglass. The set comes in a plastic storage pouch that can be used to keep the bits in and to protect those sharp edges. Price is \$15.00, available at the many places where Dremel tools are sold. From Dremel, Div. of Emerson Electric Co., 4915 21st St., Racine, WI 53406.

MORE GOOD NEWS FROM DREMEL

In order to provide better and faster

service to its many customers west of the Mississippi, a new service center has been established in Southern California. This new service operation will be piloted by Mr. Robert Dremel, son of one of the original founders of the Dremel organization. Any and all Dremel products from out here in the west that require service, warranty or not, should now go to this new center, that promises speedy personalized 24 hour turnaround service. All parts used will be original equipment parts, and the same UL approval as on the originally manufactured item will apply. The address of this new operation is Dremel Service Center, 1345 Calle de Maria, Palm Springs, CA 92262. Phone: (714) 327-3003.



DON'S CUSTOM MODELS PIPER "TOMAHAWK"

Quarter Scalars — front and center! Don's Custom Models, 9892 Vickburg Dr., Huntington Beach, CA 92646, introduces its 1/4 Scale Piper trainer, "Tomahawk" for the Quadra and similar engines, and 5 channel R/C systems. The "Tomahawk" features an epoxy glass fuselage and cowl, with standard built-up wing and horizontal stabilizer. Included also is a vacuum formed windshield, complete plans and instructions. This beautiful Mel Santmyers design spans 100", with a constant 12" chord wing, and weighs around 19 pounds ready to fly, depending on engine, radio, and finish. The fifth channel mentioned is for flap operation, recommended for scale operation but not absolutely necessary for sport flying as the aircraft flies and lands well without them. The price is \$225.00, plus shipping, and it is available direct only from the above address. If you can't wait and must call, the number is (714) 848-6244.

THE PIPELINE'S "SPIN-A-PROP" TIRE BALANCER

Who wants to run around with unbalanced tires? Well, certainly no competition 1/12th scale R/C car driver does. For him, The Pipeline has its precision wheel and tire balancer, called the "Spin-A-Prop." This little device can be used anywhere, in the shop or out at the track, and will help you balance any wheel and tire combination for best



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running and improved tire life. It can be used with any wheel having up to 1/4" diameter hole through its rotational axis. Complete instructions on how to balance your wheels and tires are included with each "Spin-A-Prop," at

\$22.50 and which can be ordered from The Pipeline, P.O. Box 1868, Fremont, CA 94538. Don't forget sales tax, if you are in California, and shipping charges, wherever you are.

SURE FLITE PRODUCTS "SPORT FIRE"

Sure Flite Products Inc., P.O. Box 4683, Riverside, CA 92514 has released a new injection molded all-foam kit of its "Sport Fire," for four channel radios and .29 to .40 engines. It comes complete with molded cheek cowlings, engine cover headrest, windscreen, and wheel pants. It also includes all the necessary preformed wire and hardwood pieces.



The new "Sport Fire" is available at all retail hobby suppliers, or write to Sure Flite Products for information.



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- Adjustable independent front suspension w/Ackerman steering.
- .05 ROAR legal stock motor.
- Cycolac molded body, no painting or trimming necessary.
- Molded long wearing front tires & sponge rear tires.
- Heavy duty hex rear axle.
- 6 sealed fast charge G.E. Nicad batteries wired & dip protected.
- Mylar decal sheet.
- 2 cell disconnect for 4 cell operation.
- Speed: 30 MPH 50 KPH

#264 SCHKEE 6 CELL ASSEMBLED ELECTRIC R/C RACE CAR LESS RADIO WITH RACING SPEED CONTROLLER

Designed as a full race top of the line ROAR legal modified race car for those who have their own radio.

Complete with #486 proportional race speed control, modified 05 race motor, 6 Nicad batteries, battery charge cord, Lexan Jerobee chassis.

Many accessories and bodies available

Features Include:

- Motor mounts in front or behind axle.
- #740 mounting plate for radio servos, speed control, battery, antenna, and switch.
- National winning #486 race proportional speed control with adjustable dynamic brake and 24 amp high torque adjustable output.
- Lexan control flex chassis complete with bumper.
- Assembled charge cord for 15 minute fast charge (works from 12 volt source).
- Adjustable independent front suspension w/Ackerman steering.
- Modified rewind (32 turns of 22 gauge) .05 motor balanced and epoxied for maximum speed and reliability — ROAR modified legal.
- Painted Lexan Schkee Can Am body.
- #603 foam rear tires full legal 1 1/2" wide and set screw wheels.
- Heavy duty hardened round rear axle.
- 6 sealed fast charge G.E. Nicad batteries wired and dip protected.
- #621 ball bearing front wheels and #605 foam front tires.
- Rear axle ball bearing.
- Mylar decal sheet.
- 2 cells disconnect for 4 cell operation.
- Speed: 34 MPH 56 KPH



ELECTRIC R/C CAR SPEED CONTROLLERS

The JoMac 487 and 486 fully proportional modular forward speed controls have been designed to control the speed of electric motor driven model cars, boats, airplanes and similar models. The power for the motor can be 3-7 series connected 1.2 volt Nicad battery cells. These controllers are made to plug in and operate with most positive pulse radio control systems. Versatile battery power arrangement allows your complete system to be powered from one battery pack if desired.



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Control Circuitry Supply: 4 Series

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#487 Modular Electronic Speed Controller 12 Amp Output. This unit is similar to the controller on JoMac #407 radio system.

#486 Modular Electronic Speed Controller 24 Amp Output w/Adjustable torque and brake. This unit is similar to the controller on JoMac #406 radio system that has won five (5) national championship electric races.

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F86D Sabre		43"	47"	14.50
F8 Crusader		38"	53"	12.50
U2 Spyplane		103"	52.5"	12.50
F86L Sabre		37"	32.5"	12.50
F4 Phantom		37"	51.5"	14.50

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SWIZZLE STICK

from page 79

Flying:

Initial flights proved as easy and predictable as any new airplane has ever been. With a little rudder held on take-off run, maintaining a reasonably straight line down the runway was no problem. The Swizzle Stick is gracefully aerobatic, has relatively slow ailerons, and is a true joy on landing. Wheel landings are best and are very pretty with the craft. It is a floater so keep the speed down on a short final approach.

Conclusion:

This reviewer heartily recommends the Swizzle Stick for a taildragger trainer, sport ship, or just something to have that is a little different. If one of these hasn't shown at your field yet then be ready for a lot of questions, such as, "What is it?"

Previous product reviews have described the excellent price value of Balsa USA kits on today's market and the Swizzle Stick continues that approach. □

R/C FLYING AND THE LAW

from page 78

you didn't abide by those safety instructions, warnings and directions that you had available to you. Perhaps the only way it can be considered a "double jeopardy" is that if the manufacturer was sued along with you (which has happened) then the manufacturer may have a cause of action against you (which normally will occur in the same litigation) for your failure to abide by their safety instructions, warnings and directions. In effect, the manufacturer will be saying, "because you failed to comply with our safety instructions, warnings and directions, if we are found liable, we look to you as the ultimate party responsible for the injuries or property damage sustained by the plaintiff" (the person suing).

The jeopardy is essentially one — that which arises from your failure to behave as a reasonable person would have under the circumstances. In this case, that of flying or otherwise operating an R/C model.

The other aspect of what is raised deserves some exploration and explanation. Manufacturers in the hobby industry are concerned with the safety of those who buy and use their products; they are also aware that those products are going to be used under circumstances where injuries could result to others. Therefore, it certainly makes good sense for them to want their products to be used correctly and safely to page 90

New Aquila Grandé
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R/C FLYING AND THE LAW

from page 88/78

by the modeler in the building and operation of their model.

Obviously, the only way that they can help a modeler to do the right thing in terms of using their product is to advise the modeler on how to use the product correctly and safely. This is no easy task since the manufacturer or distributor has little control over the age, experience and maturity of the purchaser. After all, if the customer has the money to buy it,

there is nothing to prevent the purchase being made. Keep in mind that there is nothing inherently dangerous about any modeling component if it is used with common sense and some basic information on its proper and safe use.

Having represented a number of major manufacturers and distributors of R/C equipment over a number of years, I can tell you that these people are sincere in their desire to make R/C modeling the fun experience it can and should be and are deeply concerned about the safe use of their products. Certainly they want to avoid suits against them, but they are genuinely interested in doing everything they can

to supply the modeler with a safe product together with instructions, warnings and directions that will insure its proper and safe use. Most manufacturing and distributing companies are run by and even owned by dedicated and involved modelers. They are not in it "just for the buck." Take a look at the AMA Hall of Fame and you will recognize names of people like Phil Kraft and Carl Goldberg who are not only major contributors to the technology of modeling and avid modelers themselves but also head companies that produce R/C modeling components.

to page 94



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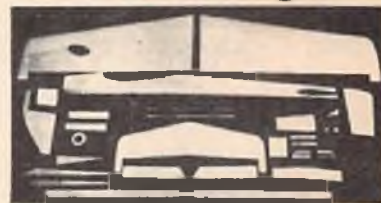
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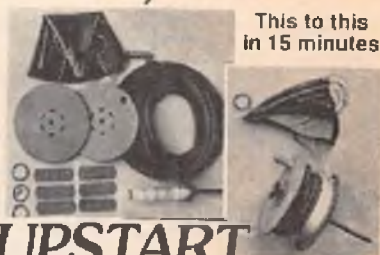
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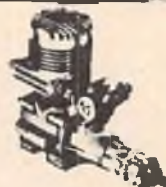
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Model Merchant

60-size
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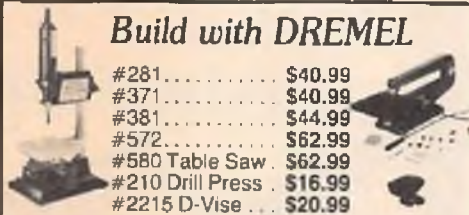
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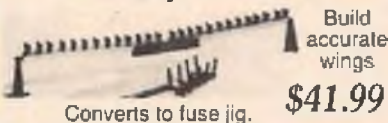


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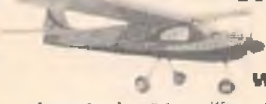
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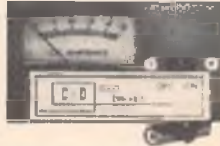
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THE HOBBY MARKET

from page 90/78

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The number of man hours that are spent in working out sensible, usable and meaningful safety instructions, warnings and directions constitute a very substantial investment of time, effort and talent, all dedicated to the single goal of making R/C modeling a safe avocation. Nothing is more disheartening than to learn that some modeler injured himself or someone else with an R/C model or a component such as an engine or propeller. It becomes doubly unfortunate and tragic when the indications are so clear that if the modeler had obeyed the instructions, warnings and directions given, the mishap would not have taken place.

Obviously there is a self-serving element when the manufacturer or distributor includes such safety instructions, warnings and directions with their product since violation of what the modeler has been told may indeed constitute a defense in the event of litigation against the company. But the point to be emphasized is that most of these manufacturers and distributors are themselves modelers who truly want what's best for the entire hobby and not just put forth methods of defending themselves.

From my viewpoint, the real problem is not the existence of so many safety instructions, warnings and directions but rather that **they are not followed or obeyed!** In fact, I would argue that even more in the way of such safety warnings, instructions and directions should be prepared and put out with the ever increasing number of R/C products, devices and components.

What has to be overcome, precisely because it leads to injuries and property damage, is the attitude that since this is an avocation, a "fun-involvement," therefore you can ignore warnings and safety instructions. It is that kind of mentality which manufacturers and distributors are attempting to overcome. If you have before you reports of how individuals had injured themselves or others, you would be amazed at the plain stupidity so often involved, reflective of this mental attitude that, since it's a hobby, "I can forget to act like a reasonable person with common sense."

In forthcoming parts of this series, I am going to reproduce and comment upon some of those safety instructions, warnings and directions currently being used. Meanwhile, what about **your** mental attitude? Do you take seriously the safety instructions, warnings and directions that are given so that you keep the hobby what it should be --- an intriguing, thrilling and satisfying avocation?

I always enjoy reading your comments and suggestions, so please write to me at: 315 South Plymouth Court, Chicago, Ill. 60604. □

SCALE VIEWS

from page 76

closing down completely to protest the situation. So it was somewhat of a surprise to have 93 entries (a nice gain over 1978) turn up in Montezuma, Iowa, from 9 states and Canada. This is either a tribute to the interest aroused by the IMAC type of competition or to the "never say die" spirit of model builders when it comes to getting to a contest. As it turned out, things were not too bad. The visitors were all able to fill-up at local stations and get far enough away to find re-fills along the way home.

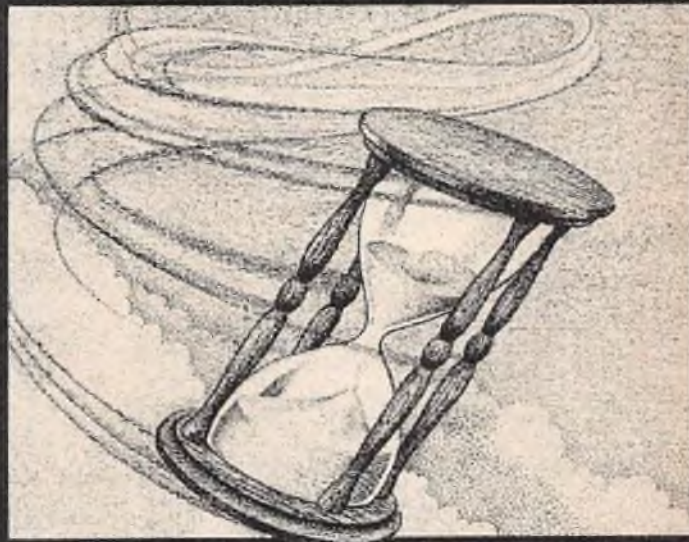
If the energy crisis keeps on its present course, modelers may have to try to run their cars on glow fuel. Ray Arden, who popularized the use of glow plugs in model engines, sent a car equipped with glow plugs on a nation-wide tour to convince dealers, distributors, and other skeptics that they were practical. So far at least, there doesn't seem to be any shortage of alcohol. But since nitromethane has recently gone up about 40%, maybe we'd best try FAI mix!

The Sig Championships was again operated by an enthusiastic group from the Des Moines Modelairs, who kept the flight lines moving, the scores awarded, and paperwork accomplished. They had accumulated expertise from previous years, but added to that expertise by holding a judge's training school on a half dozen occasions prior to the meet. Some of the judges were also AMA accredited. The frequency ready line method first tried in 1978 worked beautifully. (See Scale Views in the October, 1978, issue of RCM for full details.)

While IMAC events are pilot-oriented competitions, it is of interest to see the types of airplanes they have chosen to fly. In the Biplane Events the recorded entries were 23 Sig Skybolts, 6 Sig Miniplanes, 5 Aeromasters, 3 Pulsars, 2 Cass Skybolts, 2 Midwest Pitts Specials, 2 Knight Twisters (Bill Heger design), 2 Acro Stars and 1 each of PT-17, Beachcraft Staggerwing, Ace All Star, Fleet, Phaeton, Hiperbipe and Tigre Bipes (Brent Reusch Design), plus some other originals. Monoplane turned out 9 Sig Super Chipmunks, 4 Sig Cessna 150's, 4 Super-Flies (2 Bridi, 2 M.A.N.) 3 Sig Clipped Wing Cubs, 1 Sig Citabria, 1 Akromaster and 1 Stafford Chipmunk. Mammoth Scale had 3 Nosen Citabrias, 1 Nosen Cub, 1 Nosen Champ, 1 Cass Super Skybolt, 1 Platt

to page 98

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5

The model airplane engine pictured at the bottom is the new OS 61 VF. One of these was awarded each Master's Tournament entry at Celina this year by World Engines and OS.



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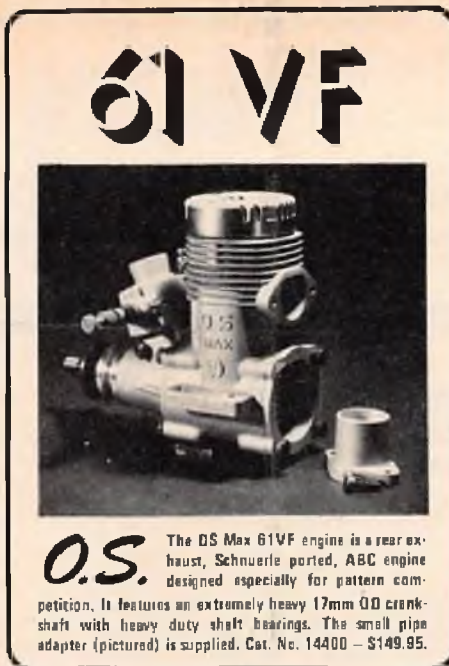
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O.S. The OS Max 61VF engine is a rear exhaust, Schnuerle ported, ABC engine designed especially for pattern competition. It features an extremely heavy 17mm OD crankshaft with heavy duty shaft bearings. The small pipe adapter (pictured) is supplied. Cat. No. 14400 - \$149.95.

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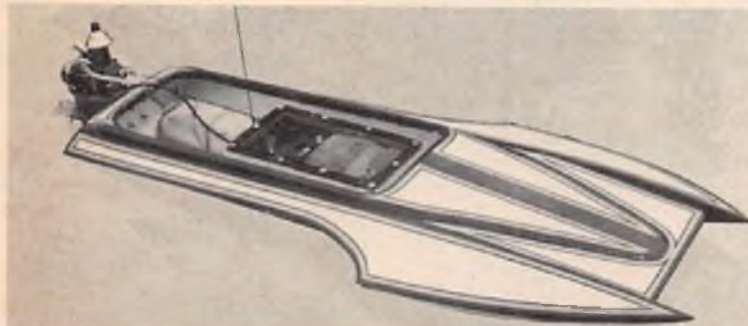
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SCALE VIEWS

from page 94/76

Jungmeister, 1 Byron Originals Pitts, 1 Fokker Eindecker and 1 Super-Fli (original design by Larry Scott).

The First Place winners were: Sportsman Biplane, Darrell Gideon, Norwalk, Iowa (Sig Miniplane); Sportsman Monoplane, Darrell Gideon, (Sig Super Chipmunk); Advanced Biplane, Norm Casella, Rutherford, NJ, (Cass Skybolt); Advanced Monoplane, Doug Brueshaber, Minneapolis, MN, (Sig Super Chipmunk); Mammoth, Leonard McCoy, Grandview, MS (Platt Jungmeister).

The theme of the contest was no pressure, no rush, and at times, it really seemed more like a large "fly for fun" affair. It seems to me that the IMAC program is almost guaranteed to grow and prosper once it has been started. If your club wants to do something different and hasn't tried this type of contest, get one organized and join the trend to scale-like aerobatics.



Bud Atkinson tells Len McCoy to fly it right. Len did, won 1st with Bucker Jungmeister. Peggy McCoy at left.



Darrell Gideon took first in Sportsman Monoplane with a .60 powered Sig Miniplane.



Ray Graniczny's Eindecker, 9 ft. 22 lbs., comes in to land. Note that he is feeding in some rudder too, often needed with Mammoths.

to page 100



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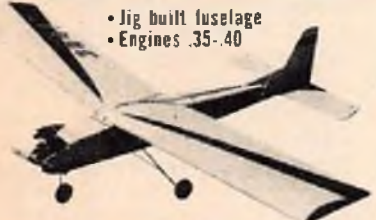
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SCALE VIEWS

from page 98/76

The Monsters Multiply

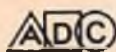
Reflecting the current popularity of "really big" models, the entries in the experimental large-size aerobatic event at Montezuma jumped to 12, compared to 2 when it was first tried last year. The Quarter Scale Association of America has adopted a resolutely "no formal competition" stance. Since it has prospered and created a great low-pressure fun-fly atmosphere for

affairs like the Las Vegas get-together, this seems to be the proper course for them to take as an organization. However, some of their members and prospective members are very interested in competition. The current considerations of the Scale Contest Board is setting up regulations for a Sport Scale type of contest for giant models has created a lot of interest and I think I can safely predict that an event will be created for 1980.

The AMA recently asked the QSAA for advice on size limitations for large models. In replying, they reiterated their reluctance to become involved in

competition rules hassle. But they did suggest a 40 lb. weight limit and a 4 horsepower maximum engine restriction. The AMA Executive Council accepted the 40 lb. recommendation but, when no practical way of enforcing a 4 hp limit could be found, the matter of engine size was deferred for the present on the theory that the total weight limit would, in effect, also pose an engine size limit. Eventually I'm sure there will be a rule on this to keep somebody from going over the deep end. If we don't regulate our own activities and keep them within the realm of common sense

to page 112



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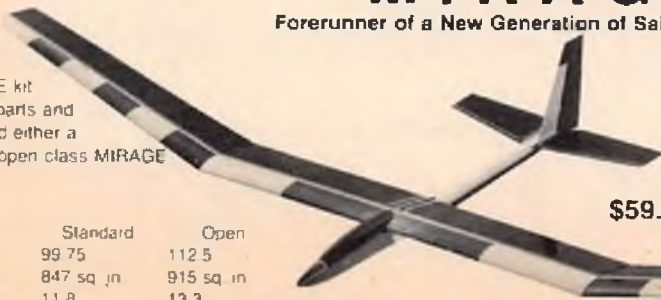
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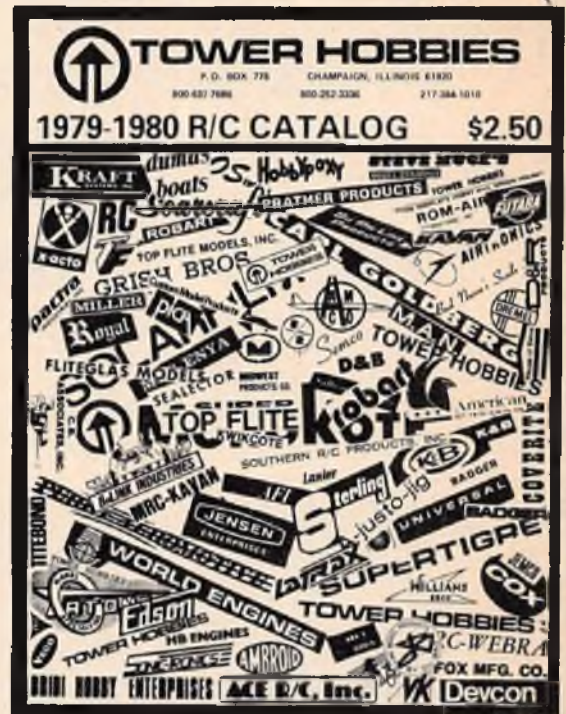
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Features the new Cox RC BEE .049 engine with throttle and muffler, 41" span. Requires a 3 channel radio. All foam construction.

RETAIL \$74.95
NOW ONLY \$52.48
RCM304

DREMEL No.730 DISC-BELT SANDER

**30%
OFF**



Sands, shapes, polishes, cleans, and sharpens. Uses 1" wide by 30" long endless sanding belt and a 5" diameter sanding disc with adhesive backing. Features fixed table for belt sanding, tilting table for disc sanding, miter gauge, 3" throat depth for internal belt sanding, and front-mounted on/off switch. Comes with 4 screws for easy mounting to work bench.

RETAIL \$89.95
NOW ONLY \$59.98
RCM305



TOWER

P.O. BOX 778
CHAMPAIGN, ILLINOIS 61820

These specials are good until the 15th of the month of this issue, only. All special prices are subject to change if retail prices change during sale period.

TOWER SIX CHANNEL — \$149.95!

NOW YOU CAN OWN A TOP QUALITY TOWER HOBBIES SIX CHANNEL SYSTEM WITH KPS-1411 SERVOS FOR AS LOW AS \$149.95! PERFECT FOR PEOPLE WHO WANT A 2 OR 3 CHANNEL SYSTEM NOW AND WANT TO ADD MORE FUNCTIONS TO THEIR SYSTEM IN THE FUTURE!

TOWER HOBBIES SIX CHANNEL W/2 KPS-1411 SERVOS	\$149.95	RCM293
TOWER HOBBIES SIX CHANNEL W/3 KPS-1411 SERVOS	174.95	RCM294
TOWER HOBBIES SIX CHANNEL W/4 KPS-1411 SERVOS	199.95	RCM205
TOWER HOBBIES KPS-1411 SERVO	25.00	RCM206

THIS SPECIAL IS NOT RETROACTIVE

EVERYTHING YOU WANT!

TOWER IS DEDICATED TO OFFERING YOU THE VERY BEST VALUE AND SERVICE THAT IS POSSIBLE! IN KEEPING WITH THIS PHILOSOPHY, WE HAVE RESEARCHED THE INDUSTRY WITH PAIN-TAKING CARE TO FIND OUT EXACTLY WHAT YOU WANT IN A RADIO CONTROL SYSTEM.

YOU WANT QUALITY! That's why we took our Radio Control System Formulas exclusively to Kraft Systems, Inc., of California to be manufactured to our exact specifications. Kraft quality is absolutely unparalleled by anyone else in the world. Kraft's outstanding success is attributed to their experience, high standards for materials and production, and quality control systems. Kraft means quality in every detail. For example, our rugged servos are made of tough ABS plastic which helps them live longer. Our sockets are gold plated beryllium copper, crimp connected to machine-cut and stripped wire to assure you reliable conductivity. The plastic plug body extends over the wiring insulation to prevent stress at the junction between the pin and the wire. Not only is this wiring method inherently more reliable than soldered connections, it also insures uniform quality. Tower Hobbies is the most reputable RC distributor in the business. Tower Hobbies and Kraft Systems make an unbeatable combination! Just ask any one of the thousands of modelers who own one of our fine digital proportional radio control systems!

YOU WANT VALUE! Tower Hobbies radios give you absolutely the maximum amount of radio for the least amount of money -- and that's value! There is nothing cheap about a Tower radio. The design is the latest, the manufacturer is the finest, the quality is peerless, and the service is second to none. So how then can the price be the lowest in the industry? Simple. Tower's tremendous buying power allows us to create economies due to volume -- and there are no middlemen between us and the manufacturer to artificially jack up the price. You're paying the bottom dollar price for the top of the line product.

YOU WANT PRECISE, TOTAL CONTROL! All of our receivers have double tuned R.F. sections to minimize harmonic type interference and all have special noise rejection circuitry permitting their operation even under the most adverse conditions. Both Tower systems feature a dual function meter that allows you to check RF and absolute battery voltage. This allows you to monitor your flying time and to check for possible cell malfunction. This deluxe feature is usually found only on systems in the \$500.00 price range. All of our servos use an integrated circuit amplifier to produce centering and tracking accuracy better than 1/2%, virtually zero drift with changes in temperature and voltage, uniform duty cycle in both directions, smoothness, and excellent damping characteristics. The reference potentiometer element is driven directly from the output drive. This is extremely important for servo accuracy! Our control sticks give you a true, accurate feel for precision flying, and the popular closed gimbal configuration protects the transmitter from the elements for a longer life. We were thinking about your desire for precise, total control when we designed our powerful, yet light weight airborne systems! This gives you greater maneuverability, and faster climbing, acceleration, and top speed.

YOU WANT PRESTIGE! Radio control Modelers represent an artistic breed of people who demand quality detailing, and can appreciate the most subtle esthetic appeals. Tower radios were designed with this in mind, of course. There is just something very elegant about that rich ivory color accented with black trim pieces. That's in keeping with the total quality feel of Tower radios -- that first class feeling. With Tower Hobbies radio control systems you go first class in quality, performance, and appearance. When you show up at the field with a Tower radio, everyone will know that you're a person who demands only the finest value. Your choice of a Tower radio shows you're a smart shopper!

YOU WANT FLEXIBILITY! Tower radios will give you the widest range of applications and the greatest performance that you could possibly ask for. The top of the line Tower 6 channel system is perfect for all radio control applications from 1/2A to pattern ships. The top of the line Tower 3 channel system is perfect for small aircraft, gliders, boats, and cars; light weight, yet very rugged. The Tower 6 and Tower 3 components are fully compatible with the previous Tower 5 model as well as the entire line of Kraft Systems radios (except for the "A" Series). This gives you the greatest accessory and feature availability in the industry -- interchange flight packs, servos, trays, output arms, or almost anything else from the Kraft line-up of outstanding products.

YOU WANT ASSURANCE! Even in consideration of the meticulous care that goes into every Tower radio, you know that nothing on Earth is truly perfect. Our Tower radio control systems are warranted against defects in materials and workmanship for 180 days from the date of purchase. There are six Tower Hobbies Service Centers across the United States authorized to perform warranty repair work. If you should need repair work after the warranty period, any one of dozens of Authorized Kraft Service Centers can perform such work for you.

ORDER NOW! Both systems are in stock for immediate delivery on the 72 MHz frequency of your choice. Call Toll Free right now for immediate COD delivery, or send your order in the mail along with the purchase amount plus for postage, handling, and insurance. If you are not 100% satisfied with your Tower radio after receiving it, then simply send it back in original condition within 10 days for a full refund.

HOBBIES

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ILLINOIS TOLL FREE: 800-252-3336
CONTINENTAL UNITED STATES TOLL FREE: 800-637-7686

WOW!
LOOK AT THIS!

TOWER SIX CHANNEL RADIO

\$149.95

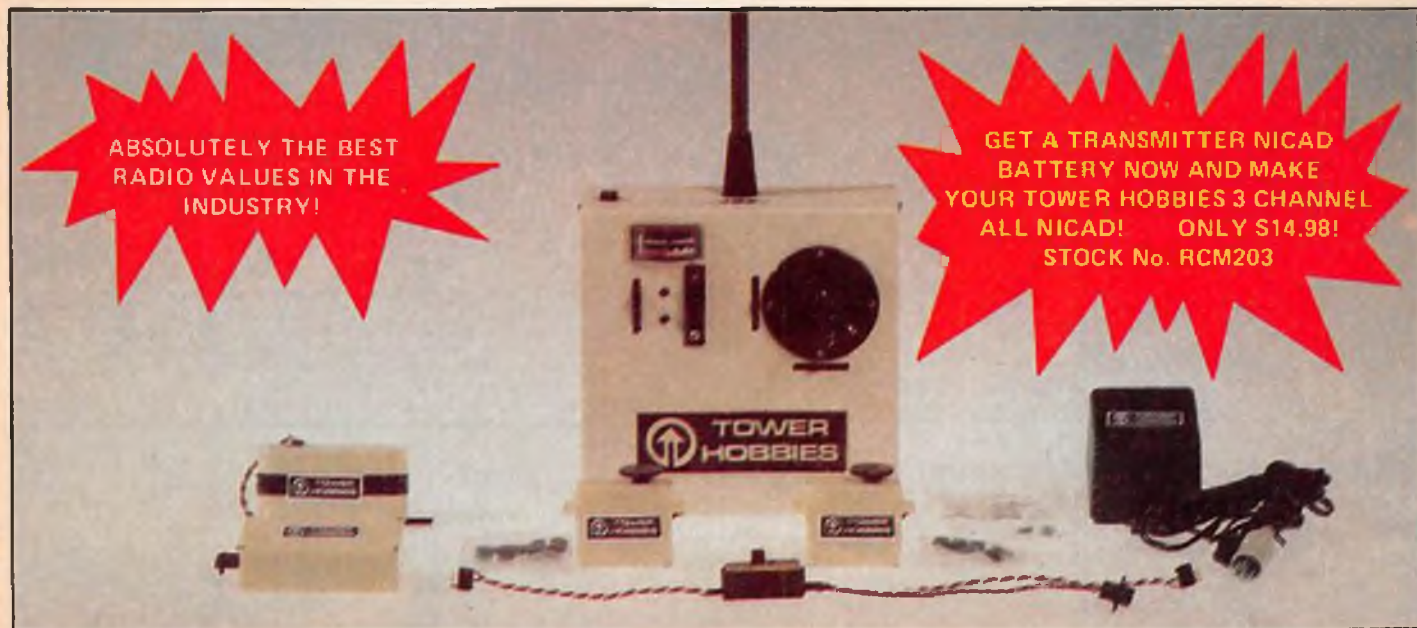
WITH 2 KPS-14II SERVOS



TOWER SIX CHANNEL SYSTEM - The Tower 6 channel transmitter comes in the popular 2 stick closed gimbal configuration. Standard equipment includes a fully proportional fifth channel; toggle switch sixth channel; choice of 2, 3, or 4 KPS-14II servos, or 4 KPS-15II servos; lightweight slimline high range receiver which is very convenient to install; nicad transmitter battery pack; powerful 550 MAH nicad receiver battery pack; charger; switch harness with external receptacle for charging convenience; servo trays; full servo accessories, and a dual function meter that indicates both RF and absolute battery voltage. The Tower 6 channel system has an airborne pack weight of only 11.9 ounces with 4 KPS-14II servos, and 13.5 ounces with 4 KPS-15II servos.
WITH 4 KPS-15II SERVOS - NOW ONLY \$209.95 - STOCK NO. RCM121

ABSOLUTELY THE BEST
RADIO VALUES IN THE
INDUSTRY!

GET A TRANSMITTER NICAD
BATTERY NOW AND MAKE
YOUR TOWER HOBBIES 3 CHANNEL
ALL NICAD! ONLY \$14.98!
STOCK No. RCM203



TOWER THREE CHANNEL SYSTEM - The Tower 3 channel transmitter comes in the popular single stick closed gimbal configuration. Standard equipment includes a fully proportional third channel, two KPS-14 servos, lightweight slimline high range receiver which is very convenient to install, powerful 450 MAH nicad receiver battery pack, charger, switch harness with external receptacle for charging convenience, servo accessories, and a dual function meter that indicates both RF and absolute battery voltage. The dry cell transmitter (battery not included) can easily be converted to nicad operation by adding a nicad pack. The Tower 3 channel system has an airborne pack weight of only 7.9 ounces.

STOCK No. RCM204

RETAIL \$210.00

NOW ONLY \$119.95



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HOT STUFF 30% OFF

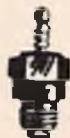


Hot Stuff is an instant bonding cyanoacrylate super adhesive that is a must for modelers. Stock up now at this super price. .5 oz.

RETAIL \$3.95 NOW ONLY \$2.78 RCM007

TOWER HOBBIES 48% OFF
R/C LONG GLOW PLUGS

These excellent glow plugs feature an idle bar. Made by the world's finest plug manufacturer especially for Tower. 6 plugs per package. The best buy anywhere!



RETAIL \$8.94 NOW ONLY \$4.68 RCM002

COX READY TO FLY SPORTAVIA 30% OFF
THE PERFECT TRAINER



This ready-to-fly foam design has been acclaimed by many flyers to be undoubtedly the best trainer ever for the first-flight beginner. Its 70" span, slow flight, and unbelievable stability make it a beginner's dream. It comes complete with a Cox .049 engine and all hardware installed. Molded cavities inside the fuselage are designed so the Sanwa No. 8020 2 channel radio drops right into place. With very little change any 2 channel works great. Factory finished in gleaming white with pressure sensitive decals. No building required. Be in the air in less than 1 hour. Radio not included.

RETAIL \$89.95 NOW ONLY \$62.98 RCM014

L.R. TAYLOR 22% OFF
SUPER POWER PANEL

NEW

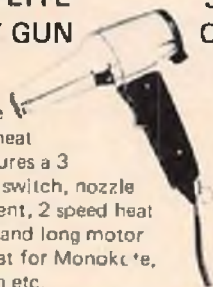


Designed to provide the ultimate in an RC field power system. Includes glow driver, expanded scale voltmeter, safe quick charger, fuel pump switch, and starter jacks. Uses any 12 v. wet or gel cell.

RETAIL \$89.95 NOW ONLY \$69.98 RCM333

TOP FLITE 33% OFF
HEAT GUN

This fine quality heat gun features a 3 position switch, nozzle attachment, 2 speed heat control, and long motor life. Great for Monokote, Solarfilm etc.



RETAIL \$29.95 NOW ONLY \$19.98 RCM005

COX/SANWA No. 8020 2 CHANNEL RADIO 30% OFF



30% OFF

This 2 channel favorite comes with 2 micro servos which will fit into the smallest airplanes, gliders, cars, or boats. It is designed to drop right into the Sportavia and Centurion. 12 pencil batteries are required.

RETAIL \$99.95 NOW ONLY \$69.98 RCM105

FUTABA 35% OFF
FP-2GS 2 CHAN. RADIO



35% OFF

One of the least expensive 2 channels available anywhere. It comes with 2 servos and is ideal for cars, boats, small planes, or gliders. Great in the Centurion or Sportavia. Requires 11 pencil batteries.

RETAIL \$109.95 NOW ONLY \$71.98 RCM091

DUMAS 35% OFF
HOT SHOT 21



This fiberglass tunnel hull with pickle fork bow is 27" long and is very competitive. Add the K&B .21 outboard engine and a 2 ch. radio and go!

RETAIL \$70.00 NOW ONLY \$45.48 RCM008

K&B .21 38% OFF
OUTBOARD

This water cooled 3.5cc competition engine is the ultimate in outboard engines. It offers the superior control characteristics of outboard drive.



RETAIL \$107.00 NOW ONLY \$65.98 RCM152

COX 30% OFF
READY TO FLY CESSNA CENTURION

30% OFF

Like the Sportavia, this all molded foam scale Centurion with 36" span comes complete with a Cox .049 engine, prop, push rods, horns, and all other fittings already installed. The Sanwa No. 8020 radio drops right into place, but with very slight modification any 2 channel radio will fit easily into this kit. Great for the beginner who wants the most airplane for the least amount of money. Radio not included.

RETAIL \$69.95 NOW ONLY \$48.98 RCM001

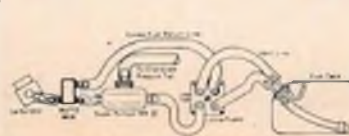
K&B .61 RC 40% OFF
W/MUFFLER No. 6525



Features a new crankshaft that eliminates the necessity of enlarging the hole in propellers. A top performing pattern engine that competes with the best.

RETAIL \$96.50 NOW ONLY \$57.88 RCM012

ROBART 25% OFF
AUTO MIX



This device actually reads fuel pump delivery and engine fuel requirements and routes excess fuel back to the tank via the overflow line. Works on all displacement type fuel pumps.

RETAIL \$9.95 NOW ONLY \$7.48 RCM255

DU-BRO 36% OFF
KWIK FILL FUEL PUMP

36% OFF

RETAIL \$10.95 NOW ONLY \$6.98 RCM010



HOUSE OF BALSA 39% OFF
P-51D (.29-.40)



This outstanding all balsa sport, stand-off scale ship is beautiful. 49" span. Requires a .29-.40 size engine and a 4 channel radio.

RETAIL \$64.95 NOW ONLY \$39.98 RCM011

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TOP FLITE 30%
SEALING IRON OFF



This sealing iron is great for covering with Monokote, Solarfilm, etc. It features adjustable temperature, teflon shoe, and a handy shape. Excellent quality.

RETAIL NOW ONLY \$13.98
\$19.95 RCM202

DREMEL 37%
MODEL 381 OFF
MOTO-TOOL
WITH FULL
ACCESSORIES



The Model 381 is the ultimate in hand grinders. It features variable speed control, ball bearings, and full accessories.

RETAIL NOW ONLY \$46.98
\$74.95 RCM015

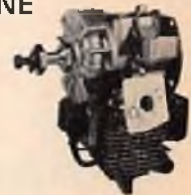
MILLER No.2017 40%
SPRAY SET OFF



Complete set includes a precision built genuine piston type air compressor, 12 ft. air hose, 16G siphon type spray gun & 14G air brush both with open & fine spray nozzles.

RETAIL NOW ONLY \$48.98
\$81.95 RCM016

QUADRA 2 CU. IN. 29%
ENGINE OFF



Develops 2 horsepower! An engine suitable for large models with its scale-like sound and realistic performance. Comes with muffler, mount, and Tillitson pump/carb.

RETAIL NOW ONLY \$99.98
\$139.95 RCM017

DEVCON 36%
5 MINUTE OFF
EPOXY IN
ECONOMY
9 OZ. SIZE



Now in squeeze bottles for your convenience. Limit of 3 per order.

RETAIL NOW ONLY \$3.98
\$6.25 RCM018

DREMEL 572 37%
MOTO SHOP OFF



This deluxe saw features a complete accessory set of blades, discs, etc. and flexible shaft.

RETAIL NOW ONLY \$62.98
\$99.95 RCM019

GOLDBERG 40%
FALCON 56 MK II OFF



This all time best seller is now redesigned with ailerons, 56" span. Uses a .30-.40 engine, all balsa construction. An excellent trainer.

RETAIL NOW ONLY \$28.78
\$47.98 RCM020

K&B .40 RC ENGINE 40%
No. 8011 OFF



THE MOST
POPULAR RC
ENGINE EVER
MADE!!

Features a unique design for high power; and a Perry carburetor for excellent throttle response and easy adjustment - from a slow smooth idle to a roaring top speed.

RETAIL NOW ONLY \$43.48
\$72.50 RCM009

POWER PACER 22%
BATTERY OFF
TESTER



A new ni-cad battery tester, cycler, and charger. Works great!

RETAIL NOW ONLY \$46.98
\$59.95

RCM023 9.6 volt
RCM024 6 volt

GOLDBERG 40%
SKYLARK 56 OFF
MK II



Fun to fly sport airplane with pattern capabilities. 56" span. .30 to .40 size engine, all balsa construction. New improved design!

RETAIL NOW ONLY \$29.98
\$49.95 RCM025

SULLIVAN ELECTRIC
STARTERS



Hi-torque, hi-rpm 12 v. starters. These heavy duty, long life starters develop more torque and rpm's than any other starters!

RETAIL NOW ONLY \$24.98
\$38.95 RCM026

Dix. model has V-groove in drive cone for starter belt. Starts copters, airplanes, boats, and cars.
RETAIL NOW ONLY \$27.28
\$41.95 RCM182

BOLINK
ELECTRIC CAR



This 2 ch. 1/12 scale electric car comes already assembled with .05 motor, nicads, & charger. Goes over 25 miles per hour!

RETAIL NOW ONLY \$79.98
\$99.95 RCM027

Bolink kit for above car - must be assembled. BLX-155.
RETAIL NOW ONLY \$59.98
\$79.95 RCM280

CRAFT-AIR 33%
FIELD BOX OFF



It's ready to use, not a kit, made of lightweight indestructible polyethylene. 22" long & holds everything. A SUPER BUY!

RETAIL NOW ONLY \$19.98
\$29.95 RCM028

CRAFT-AIR 34%
HI-START OFF
HEAVY DUTY

Features reel, tubing, towline, parachute, stake, tow ring, and strong construction. For sailplanes of 100" wingspan and larger.



RETAIL NOW ONLY \$32.98
\$49.95 RCM029

CRAFT-AIR 30%
DRIFTER II OFF



Would you believe? A competition sailplane for only \$13.98! It isn't just a trainer, it's a contest winner!

7 1/2" span. Uses a 2 channel radio.
RETAIL NOW ONLY \$13.98
\$19.95 RCM214

S & O BATTERY 33%
TESTER OFF



Tests 8 cell transmitter and 4 cell receiver nicad packs under load. Extremely accurate scales. Detects bad cells and/or abnormal current drain.

RETAIL NOW ONLY \$19.98
\$29.95 RCM031



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**FOX .40 RC
SCHNEURLE** 38%
OFF



No.24000

The economical Fox .40 RC Schneurle features a restyled exterior, steel thrust washer, improved carb suction, and lightweight pistons. Very good power!

RETAIL NOW ONLY \$28.48
\$45.95 RCM136

**BRIDI RCM
TRAINER 40** 32%
OFF



This popular all balsa trainer has a 52" span. Requires a .35 to .49 size engine and a 4 ch. radio. A high quality kit!

RETAIL NOW ONLY \$37.38
\$54.95 RCM034

**COX TD .049
STD. ENGINE** 40%
OFF



A super hot 1/8A engine ideal for free flight, control line, 1/8A RC, and more.

RETAIL NOW ONLY \$74.98
\$24.95 RCM035

**CRAFT AIR
UPSTART** 30%
OFF



Designed for launching 2 meter and standard class sailplanes in limited space. The kit assembles in about 15 minutes. Includes surgical latex tubing, nylon line, steel stake, parachute, plywood reel, hardware and instructions.

RETAIL NOW ONLY \$12.58
\$17.95 RCM300

**12 VOLT
MOTORCYCLE
BATTERY** 50%
OFF



These are high quality, heavy duty motorcycle batteries that are perfect for all electric starters. Brand new.

Electrolyte not included

RETAIL NOW ONLY \$12.98
\$25.95 RCM037

**AFI
6 & 12 VOLT
BATTERY
CHARGER**

This high quality charger is designed to charge 6 or 12 volt wet or gel cell batteries. It works very well with the battery at left. Charges overnight from a 110 volt wall outlet. It's safe and easy to use. These chargers are tested twice before they leave the factory.

RETAIL NOW ONLY \$6.98
\$8.95 RCM038

**MONOGRAM RC
LEOPARD TANK** 40%
OFF



Radio included! This 1/32 scale tank is 8 1/2" long. It comes completely ready to run except for three "C" batteries and two 9 v. batteries which are not included. Four pylons are included. Climbs up steep grades.

RETAIL NOW ONLY \$29.98
\$49.95 RCM302

**ANDREWS
AEROMASTER** 39%
OFF



The world's most popular RC biplane! This balsa kit has a 52 1/2" span. Uses a .60 - .78 size engine and a 4 channel radio.

RETAIL NOW ONLY \$51.98
\$84.95 RCM065

**DA ENTERPRISES
SERIES IV
POWER PANEL** 36%
OFF



The all-in-one power panel!

This quality panel distributes power from your 12 v. battery to starters, plugs, pumps, etc. & allows you to fast charge your radio at the field.

RETAIL NOW ONLY \$24.98
\$38.95 RCM033

**K&B .61 RC W/PERRY
PUMP & CARB & MUFF** 40%
OFF



Equipped with a Perry Pump/Regulator and a larger Perry Carburetor specifically designed to be used with the Pump/Regulator system. Easy to start. Number 6535

RETAIL NOW ONLY \$74.98
\$125.00 RCM042

**BRIDI RCM
TRAINER 60** 32%
OFF



This popular all balsa trainer has a 58" span. Requires a .40 to .60 size engine and a 4 ch. radio. It makes a great trainer.

RETAIL NOW ONLY \$42.78
\$62.95 RCM043

**FOX .45 RC
BALL-BEARING
SCHNEURLE
NO.24600** 38%
OFF



Tests show this to be one of the most powerful .45's on the market. Puts out over one horse. Starts easily - idles well - extremely durable.

RETAIL NOW ONLY \$39.98
\$64.95 RCM044

**HB .61 RC PDP
BALL BEARING** 27%
OFF
No.6300



This powerful, high quality ball bearing engine comes with a Perry carb and features Perry Directional Porting for increased power.

RETAIL NOW ONLY \$87.68
\$119.26 RCM143

**SIG KADET
WITH AILERONS** 28%
OFF



An excellent trainer! This balsa kit has been improved to include ailerons! 57" span. Requires a 3-4 ch. radio and a .19 - .35 size engine. Easy to follow plans and aileron accessories included.

RETAIL NOW ONLY \$28.78
\$39.95 RCM256

**LANIER
COMET II** 37%
OFF



This popular trainer comes almost-ready-to-fly. 63" span. Designed for a 4 ch. radio and a .50 - .61 engine. The Comet II makes a great trainer!

RETAIL NOW ONLY \$40.98
\$64.95 RCM047

**ASSOCIATED
RC 200 KIT** 39%
OFF



22" body length. Features ball bearings for rear axle & clutch, glass chassis, disc brakes. Kit comes complete less engine, body, & radio. Best gas car anywhere!

RETAIL NOW ONLY \$119.98
\$195.00 RCM048
NEW!! RC 300 Kit 32% OFF
RETAIL NOW ONLY \$129.98
\$190.00 RCM301

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<p>K&B .40 RC W/ PERRY PUMP & CARB NO. 8360</p> <p>40% OFF</p>  <p>Features Perry Pump/Regulator and a larger Perry Carb specifically designed to be used with the Pump/Regulator system. Adds 1000 RPM's!</p> <p>RETAIL NOW ONLY \$62.98 \$105.00 RCM049</p>	<p>ASSOCIATED 6 CELL ELECTRIC CAR KIT</p> <p>30% OFF</p> <p>No. 3012</p>  <p>This is the 1/4 scale electric race car that was the winner of the first 4 places at the 1977 ROAR Nationals! Body and radio (requires a 2 ch. radio) are not included. Fiberglass chassis.</p> <p>RETAIL NOW ONLY \$69.98 \$102.00 RCM246 ASSEMBLED CAR 31% OFF RETAIL NOW ONLY \$82.98 \$119.50 RCM 338</p>	<p>GOLDBERG P-6E CURTISS HAWK BIPE</p> <p>33% OFF</p>  <p>Span 41 1/2". Requires a .19 to .35 engine & a 3 to 4 channel radio. Includes molded foam wings, cowl & wheel pants, decals, pre-bent wire cabane parts, maingear, instructions and 3 ch. hardware.</p> <p>RETAIL NOW ONLY \$29.98 \$44.95 RCM296</p>	<p>TOP FLITE TRIM SEAL TOOL</p> <p>27% OFF</p>  <p>NEW</p> <p>Stripe, seal, and cover with the finishing trim touch! Two specially designed tips (one for fillets and curves, another for flat surfaces, hard to reach corners and pin stripping). High and low heat settings.</p> <p>RETAIL NOW ONLY \$10.98 \$14.95 RCM336</p>
<p>L&L TACHOMETER</p> <p>25% OFF</p>  <p>NEW</p> <p>Liquid crystal display with the advantages of digital accuracy. Only one range, with no buttons or switches - 30 to 90,000 RPM. Optical pick-up provides easy operation. Compact enough to fit in shirt pocket. Ready to use.</p> <p>RETAIL NOW ONLY \$44.98 \$59.95 RCM334</p>	<p>MIDWEST ATTACKER</p> <p>36% OFF</p>  <p>This all molded styrofoam kit builds fast and flies great. 48" span. Uses a .19-.35 engine. Very popular.</p> <p>RETAIL NOW ONLY \$28.98 \$44.95 RCM054</p>	<p>A-JUSTO-JIG</p> <p>30% OFF</p>  <p>This complete wing & fuse jig holds alignment within .1%. Allows you to make up to a 6 foot wing. Fuse jig fits on without tearing down your wing jig.</p> <p>RETAIL NOW ONLY \$41.98 \$59.95 RCM055</p>	<p>DREMEL 580 TABLE SAW</p> <p>37% OFF</p>  <p>CUTS UP TO 1" THICKNESS!</p> <p>Multi-purpose table saw especially designed for hobbyists. Rips, cross cuts, miters, straight cuts, dadoes.</p> <p>RETAIL NOW ONLY \$62.98 \$99.95 RCM056</p>
<p>MIDWEST CARDINAL A.R.F.</p> <p>35% OFF</p>  <p>This all foam trainer has a 46" span. Uses a 2-3 ch. radio, & a .049 to .15 size engine. Rugged and flies great.</p> <p>RETAIL NOW ONLY \$21.38 \$32.95 RCM057</p>	<p>SIG BEEHCRAFT BONANZA</p> <p>25% OFF</p> <p>NEW</p>  <p>Perfect for RC sport scale and sport flying. Requires .60 size engine. 64" span, 44" length. Kit features full size plan layout for retracts and foam wing cores with tip chamber and washout. Also included are documentation photos and hardware.</p> <p>RETAIL NOW ONLY \$52.48 \$69.95 RCM335</p>	<p>AIRTRONICS OLYMPIC II</p> <p>30% OFF</p>  <p>This 99.9" span trainer is capable of contest competition. All balsa with pre-cut parts. An excellent quality sailplane.</p> <p>RETAIL NOW ONLY \$34.98 \$49.95 RCM030</p>	<p>DUNE BUGGY</p> <p>18% OFF</p>  <p>This unbelievably rugged kit can tackle the roughest course imaginable. Uses a 2 ch. radio and a .19 size RC engine. 17" length.</p> <p>RETAIL NOW ONLY \$163.98 \$199.95 RCM036</p>
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SCALE VIEWS

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and safety, then the FAA will see to it for us.

The difficulties of cubic inches versus horsepower regulations were dramatized for me when a local 1/4 Scale Cub was first flown with a 2 cu. in. Quadra and, then, because of radio vibration trouble, was equipped with a Fox 1.2 cu. in. Twin. The smaller engine, only 60% of the displacement of the Quadra, pepped up the performance of the model considerably and obviously had more power. So horsepower would be a more equitable method of limiting size than displacement. The question is, how can official figures be arrived at and kept current?

The Fox Twin is actually eligible for the present "small" Sport Scale event under the 1.25 maximum displacement rule. It would be unfair to set a low displacement limit for 1/4 Scale on the basis of the high power that a nitro-fueled Schneurle ported model engine can deliver and freeze out development of economical gas-fueled engines of equivalent power.

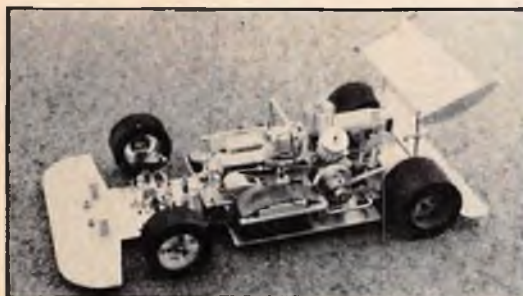
Grass Roots Opinions

There were mixed emotions on the presence of large types in the IMAC contest picture. They take up a lot of sky doing "box" maneuvers. The Sig meet uses an extra-wide 120 degree aerobic zone (compared to the little-used 90 degree zone specified in the current rule book, or the 112 degrees proposed for the next rule book) and the biggies managed to stay within the boundaries fairly well, sometimes by moving farther out where the zone was wider. But it was evident that part of the entries were too low powered to do the IMAC maneuvers properly, however, some thought the performances were "realistic."

A survey form was distributed to all of the contestants asking their opinions on the proposed rule changes for IMAC events now being considered by the RC Contest Board. One of the questions was whether larger models than the present .60 cu. in., 11 lb. official IMAC specs should be allowed. The vote of returned ballots was 16 in favor of larger models, 24 opposed to them. The opposition probably stems from the fact that the AMA rule change proposal does not envision a separate large class but, instead, integrates them into the standard size. One voter remarked that the biggies could never be competitive with the standard size and this would retard their popularity. I doubt that there would be as much opposition to a separate larger class, such as was operated at the Montezuma contest.

to page 114

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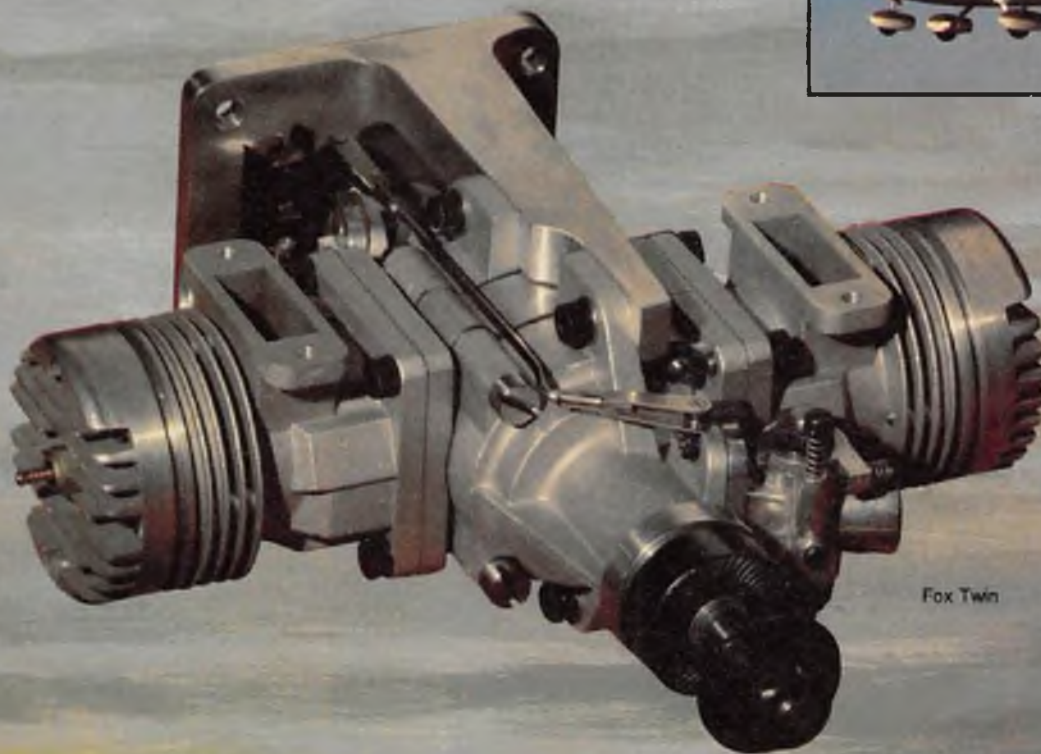
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The two cylinder opposed simultaneous firing configuration was selected because equal and opposite piston motions cancel each other out vibration wise and produces a smoother running configuration than the alternate firing in line motor. In addition, the opposed cylinder configuration cools better and fits most scale models better.

The cylinder configuration is of the most modern and advanced schneurle porting, featuring Fox exclusive angle side flow bypasses.

The cylinder is glass hard and the pistons are made of the hardest piston alloy available. The crankshaft is of hardened steel, and extremely massive compared to any other motor you have seen. The massive crankshaft construction was necessary because the terrific power of the engine twisted earlier experimental crankshafts in half. The dual carburation makes possible adjusting each cylinder for maximum power, a failing of most earlier twins, where a single

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Each Fox Twin is factory run at full power, assuring you that when you buy this and put it in your model, you can fly. The carburetor has been adjusted and synchronized for atmospheric conditions at the factory. Unless you are at a rather high altitude, no further adjustments should be necessary.

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The "Flight Box" is made for those who want everything in one unit. It folds down to a nice suitcase package - 21 1/2" x 9 1/2" x 18" overall. The Power Module fits nicely in the unit with 12 volt battery & starter in place. Take the "Flight Box" to the flying field, lower legs, raise fuselage holders, lock fuselage in place and now you can put on wing, run engine or make repairs. It's like having a third hand. The unit will hold a one gallon fuel can & transmitta, plus has two drawers for parts. B of A/Visa and Master Charge Welcome.

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SCALE VIEWS

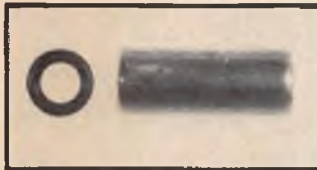
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There wasn't much doubt what the entrants thought about the "official" 90 degree aerobatic box. Only one lone contestant voted for it while 38 indicated their approval of the 112 degree zone proposed for the 1980 AMA rules. In addition, 29 said that they preferred the 120 degree zone used at the Sig meet over either 90 or 112 degrees. The 120 degree zone is not up for Contest Board vote, so it can't be considered on this cycle. The problem with a narrow zone is that, to stay within it, the fliers move out farther away from the spectators and judges, an unsatisfactory condition for all. The 120 degree zone has been used at the Sig meet for four years.

The question as to whether a separate Monoplane Event should be added to the schedule went over resoundingly also, with 35 voting in favor and only 4 opposed. Results of the balloting will be forwarded to the RC Contest Board.

Bolt-On Stab

Brent Rusche flew in from Canada for the contest and the tail on his Tigre Biplane design had a handy feature that enabled it to be knocked down so as to take up a minimum amount of space in the baggage compartment. The stabilizer was fastened to the fuselage on small 90 degree angle brackets. As you can see from the photo, these are integrated into the ink-lined scale panel markings. In fact, there are some full scale aircraft whose stabilizers are held to the fuselage in much the same way. The tail brace strut is hinged at the stabilizer end



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Bolt on tail on Brent Reusch's Tigre Biplane.

to page 116



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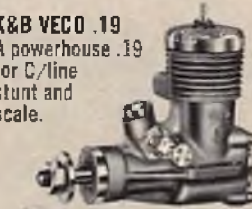


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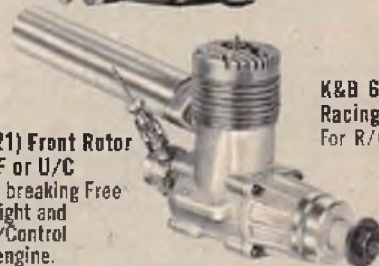


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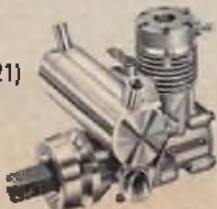
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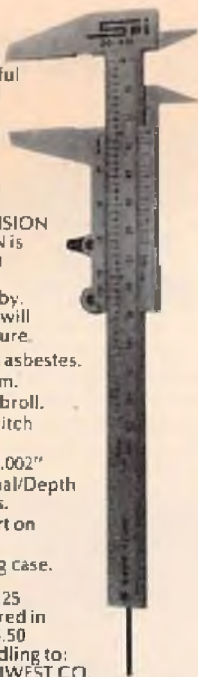
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because he was holding me up, if you can believe that! He had put more steering in his car for the Main, but he didn't get to run in the warm-up so he wasn't used to the combination yet. I didn't know whether to pass him or follow him, but seeing as following Jianas is safer, I stayed tucked in behind him for about 5 laps, then he started gaining about 10 feet a lap on me. Within 20 laps he had closed on the leader Kyes, but then Jianas ran out of fuel! That put Kyes in first with me in second.

Rich Lee had started 2 laps down, but had worked his way all the way back up to 3rd Place. I wasn't gaining any on Gary, but then about the 50th lap, Gary had a longer than normal pit stop, and I took over the lead. I had the lead for about 5 laps with Gary slowly catching up. We were side by side for 3 laps, then Gary passed me for the lead and 2 laps later the win, with my car 30 feet back in 2nd and Rich Lee taking 3rd. This is the second McCoy race that Gary has won. □

HERE'S HOW

from page 68

and subject to shorting out your batteries. They would go absolutely flat! Chances are, that if you forgot to turn off your receiver normally, your batteries would go just as flat. Of course not as fast! The wing support wires could be insulated when wings are not plugged in to prevent this from occurring. One other suggestion, if you are thinking of trying Bob's idea, try it first on a sailplane. It should have a reasonable chance of working without vibration. Hang a "vibrator" up front and it may be a different story. Why not give it a try. Just think — plug in your wings and the spoilers are ready to flip and flop.

While at Toldeo this year I saw a number of new products. The one that really caused me to "turn on" was Eastcraft's new Lectra-Starter Engine Combination billed as the world's first and I do believe it is just that. We have finally arrived!

If I sound excited about this new product it's because I am. Imagine the thrill of watching your engine crank over, and start just by flipping a switch. I was amazed at the compact size of these starter units. Eastcraft has done a fantastic job of putting together two systems. System 100 with K & B .40 and System 200 with K & B .61. Each system comes assembled and tested which includes engine mount, engine, starter motor, ni-cads and charger. One lightweight starting battery cranks the engine and heats the glow plug at the same time.

One convenient aspect of these units is that they can be transferred from plane to plane. Just four bolts mount the

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engine and a wiring harness (available soon) with connector and the starter can be moved easily without fuss. Presently both systems are available with K & B engines only. Because of a necessary crankshaft modification in front, however, according to Eastcraft, other engines for these units will be available in 1980. These "on board" starters should appeal to both scale and sport pilots because of their quick and easy installation.

Presently Eastcraft plans to market the System 100 w/K & B .40 including all necessary electrical components for \$172.50 (with pump \$199.50). The

System 200 w/K & B .61 will sell for \$196.50 (with pump \$225.00). Admittedly, prices do sound a bit salty, however, keep in mind that you are getting a new engine with each starting unit. For more information on these products and others, write to Eastcraft Specialty Products, Inc., P.O. Box 25, Irwin, PA 15642, phone (412) 864-4959. Tell them you saw it first in RCM! □

ELECK RIDER

from page 67/64

at the very bottom of the cycle between the wheels.

Would you like a weight saving hint? If so, read on. Use a kraft 2-channel system; the receiver uses internal voltage regulation and can be operated directly off the motor drive battery, even the 6-cell types. Not all receivers have this feature and, in fact, some may even be damaged by the application of a voltage over the normal 4.8 volts. But fear not, if you already own another type of radio that you'd like to install, you can still use it with the drive battery by connecting it through a simple voltage regulator as shown. Mount it directly to the chassis in the space normally

to page 122



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(3" = 1 FOOT)



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Dubro Flex Cable 20"	1.49	.98
Dubro H-203 Kwik — Switch Mount	1.75	1.28
Dubro Prop Drive Unit	99.95	89.95
Dubro Kwik Fill Fuel Pump	10.95	6.98
Nylon Steel Con Rod Assem. #102	1.48	1.06
Strip Aileron Horn #103	.79	.56
Strip Aileron Bearing #104	.69	.66
Lg. Nylon Horn #105	.49	.36
Kwik Link #108	.49	.30
Coupling Sleeve #110	.30	.23
Threaded Coupling #111	.40	.30
Nylon Bearing #124	.75	.57
Mtg. & Blind Nuts 2/56 #125	.50	.38
Mtg. & Blind Nuts 3/48 #126	.50	.38
Mtg. & Blind Nuts 4/40 #127	.55	.41
Mtg. & Blind Nuts 6/32 #128	.55	.41
Socket Head & Blind Nut 4/40 #129	1.10	.83
Socket Head & Blind Nut 6/32 #130	1.10	.83
2 Ball Tip Wrench #132	4.25	3.19
Blind Nuts 2/56 #133	.35	.27
Blind Nuts 3/48 #134	.35	.27
Blind Nuts 4/40 #135	.35	.27
Blind Nuts 6/32 #136	.40	.30
1/16 Collars #137	.80	.60
3/32 Collars #138	.80	.60
Wingball Set #159	1.25	.94
Prop Balancer #160	2.95	2.22
Filter #162	1.75	1.32
Lock Nuts 2/56 #168	1.10	.83
Lg. Steering Arm #166	.75	.57
Bulk Full Line Med. #197	25.00	14.99

DREMEL		
ITEM	LIST PRICE	East End PRICE
Dremel #271 Moto Tool Kit	54.95	36.95
Dremel #281 Moto Tool Kit	64.95	43.95
Dremel #331 Moto Tool Kit	74.95	46.95
Dremel #572 Deluxe Moto Shop	99.95	85.95
Dremel #232 Moto Flex	79.95	54.95
Dremel #571 Moto Shop	79.95	54.95
Dremel #580 Table Saw	99.95	69.95
Dremel Engraver #290	15.95	10.99
Dremel Moto Kit #261	54.95	36.99
Dremel Moto Lathe #700	54.95	39.99
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Zinger 10 x 6 (6)	8.40	5.48
Sullivan Standard Starter	38.95	27.95
Top File 10 x 6 (12) Super Maple	16.20	10.49
Top File 11 x 7 (12) Super Maple	18.60	11.79
Xacto #11 Blades (5)	.79	.59
Xacto #5076	13.95	10.39
Xacto #5086	22.95	17.19
Badger 250-1	11.00	7.29
Badger 250-3	13.50	9.99
Badger 350-1F	21.95	16.99
Miller Spray Gun & Compressor #2115	82.95	53.99
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Midwest RK-40 AXIFLO	49.95	35.95
Midwest RK-049 AXIFLO	40.95	29.50
Hot Stuff 1/2 oz.	3.95	2.38
Monokote Opaque 3 Rolls	27.00	15.95
Monokote Trans 3 Rolls	27.00	15.95
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KVO B-36 Bomber 112" Wingspan U-Control or R/C		159.99
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CAP P-47 Thunderbolt R/C 62" Wingspan 40 to 80 Engine		119.95

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ITEM	LIST PRICE	East End PRICE
Bridi Chubasco Deep V 48-60	96.95	77.29
Midwest Klompon Kay	49.99	35.99
Futuraglass 1204 Hydro 40-60	79.98	64.98
1201 Deepvee 20	74.95	60.79
1202 Deepvee 40	89.95	71.99
1203 Deepvee 60	99.95	78.99
1301 Flexible Cable Outdrive - DV20	44.00	34.99
1302 Flexible Cable Outdrive - DV40	44.00	34.99
1303 Flexible Cable Outdrive - DV60	49.00	38.99
1304 Flexible Cable Outdrive - Hydro 40-60	47.00	36.99
Cox Hydro Blaster W/Radio	111.00	77.98
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KPS-1411A Servo	39.95	27.98
KPS-1511A Servo	39.95	27.98
Kraft Transmitter Module	24.95	19.99
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Kraft Receiver KPS-5C	48.95	39.95
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1020 61 RC		100.98
1034 40 RC FI		89.98
1024 61 FI SR		124.98
1026 61 RI SR		129.98
1023 40 RC Marine		94.98
1035 40 RC SR Marine		104.98
1020 61 RC Marine		129.98
1025 61 RC FI Marine SR		139.98
1037 91 RC		139.98
1039 91 RC Marine		159.98

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ITEM	LIST PRICE	East End PRICE
.09 RC HDTV	42.98	24.99
.15 RC IV TV	48.88	29.89
.19 RC VITV	53.98	31.99
.35 RC BHITV	62.98	37.99
.40 RC TV	106.98	57.99
.60 RC BHITV	137.98	78.99

COX R-T-F PLANES R/C		
ITEM	LIST PRICE	East End PRICE
CUB Trainer w/Radio	99.95	62.99

COX ENGINES		
ITEM	LIST PRICE	East End PRICE
Tea Dee 020	20.95	13.99
Tea Dee 049	20.95	13.99
Tea Dee 051	20.95	13.99
Tea Dee .09	24.95	17.50
QRC .049	14.95	10.35
Medallion .049 W/T	18.95	12.50
Black Widow 049 #150	13.85	10.49
Golden Bee 049 #120	12.95	9.79

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ITEM	LIST PRICE	East End PRICE
Glowheads 049 302-1	1.75	1.32
Glowheads 049 HC #1702	2.00	1.49
Glowheads 020 # 1032	1.50	1.13
Cox 5 x 3P Props #894	1.00	.75
6 x 3 Props #244	.75	.57
5 1/2 x 4 #243	.75	.57
Waterproof Servo #803060	49.95	29.95
Sail Winch #803810	59.95	46.99

GRAUMPER R/C		
ITEM	LIST PRICE	East End PRICE
Harbor Tug Bugler	199.98	159.98
Motor Yacht Commodore	126.98	101.98
Bell 212 Helicopter with HB51 Engine & Mechanic	1050.00	559.98
Bell 47G Helicopter	498.98	299.99
Bell 47G Float Gear	32.50	21.98
Bell 47G Canopy & Tanks	39.98	29.98
Gorch Fock — Noh Sailing	66.95	39.98

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ITEM	LIST PRICE	East End PRICE
5 1/2 Williams Wheels #145	11.95	8.78
5 Williams Wheels #133	9.85	7.88
4 1/2 Williams Wheels #144	9.85	7.99
3 1/2 Williams Wheels #143	7.10	5.89
3 1/2 Williams Wheels #142	5.25	4.35
Golden Age 3 1/2 #152	5.20	4.28
Golden Age 3 1/2 #153	6.85	5.65
4 1/2 #154	8.20	6.19
5 1/2 #155	8.85	7.39



R/C TANKS		
ITEM	LIST PRICE	East End PRICE
Leopard 1602	174.98	137.98
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RT1603 Flakpanzer - Gepard		199.95



Quick-Build Exact Scale

Less than one year ago, Byron Originals introduced its Pitts Special with optional Byro-Drive reduction unit. We made some pretty strong product claims and were more than ready to back them up. We have since learned, from actual applications by customers both in this country and overseas, that the Pitts and drive unit have far exceeded our own ratings. Whether it be packaging, overall parts fit, ease of assembly, fidelity to scale, flight performance, materials quality, overall appeal or completeness, these firsts from Byron Originals have firmly established a new standard of excellence for the entire modeling industry.

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RR-11-	.61 & .65 Rossi, rear valve
RF-12-	.61 & .65 Rossi, front valve
WFR-14-	.61 speed Webra, frt. & r. valve
TFR-13-	X.60 Supertigre, frt. valve, r. exhaust
KF-15-	.61 Kraft
HPFR-16-	Silver Star or Gold Cup, frt. & r. valve
OPSR-17-	OPS .60 Speed, rear valve

\$188.00

Factory Direct Price



Unique engine mount offers wide range of positions for locating engine and exhaust equipment beneath cowling.

Precision pulleys designed and matched for peak performance

Precision 4" driven pulley ensures vibration-free service

Complete Byro-Drive, w/prop & spinner, only 2 1/2 lbs.

Belt tightener offers easy adjustment for optimum performance and extended belt life

20 x 8 maple prop and 3 1/2" spinner included with Byro-Drive.

Tensiometer indicates exact recommended belt tension for peak performance and belt longevity.

Poly-Flex V-belts-proven after years of test shop applications requiring up to 20,000 rpms.

\$89.95

Factory Direct Price

Prop. & Spinner Inc.

Wing Span: 68"
Wing Area: 1400 sq. in.
Length: 62"

Send me _____ Pitts Kit(s) at \$188.00 ea. plus \$8.00 shipping
 _____ Fiberglassing kit(s) at \$36.00 ea. plus \$2.50 shipping
 _____ Byro-Drive(s) Model No. _____ (See chart at left) at \$69.95 ea. plus \$2.50 shipping.
 _____ Mig-15 kit(s) at \$158.00 ea. plus \$8.00 shipping
 _____ Fiberglassing kit(s) at \$22.50 ea. plus \$2.50 shipping (Iowa residents add 3% sales tax.)

Foreign Inquiries contact:
Exportations, Ltd.
17835 Sky Park Circle
Suite E
Irvine, Calif. 92714
U.S.A.

Name _____
 Address _____
 City _____ State _____ Zip _____

I have enclosed check or money order for \$ _____
 Please charge to Master Charge or Visa Account.

Master Charge # _____ Expires _____ Visa# _____ Expires _____
 (Prices subject to change without notice)
 Send to: Byron Originals, P.O. Box 279, Ida Grove, Iowa 51445. Ph. 712-364-3165



Weight: ready-to-fly, 1 lb. fuel.
 * Under 15 lbs. with Econokote finish.
 * Under 17 lbs. with Epoxy/Fiberglass finish.

Kits... Includes ALL ITEMS to complete models as shown!

Engine, radio, and final paint not included



MiG-15

Wing Span - 57"
Length - 55"
Ready-to-fly wt. - 8½ lbs.
Wing area - 600 sq. inches
For .60 size engines and 4 channel radio

The First Practical Approach to Realistic Jet Performance That:

- Is designed for the average R/C enthusiasts.
- Allows short grass strip take-offs
- Offers fast and easy starting without having to remove and assemble hatches.
- Eliminates complicated belt-start procedures
- Readily accepts most standard .60 size engines
- Does not require high nitro fuel for satisfactory performance
- Arrives factory installed (standard equipment) and ready for engine.
- Produces up to 8½ lbs. of static thrust with Schnuerle .60 and low nitro fuel.

Quick Assembly

Scale Accuracy

Easy Access to Radio and Engine



Unlike other quick-build kits that often sacrifice authentic detail for fast assembly, Byron Originals has kept both authenticity and simplicity high on the priority list. All die-cut wood parts and 11 foam components needed for completion are designed with quick assembly, scale accuracy and minimized weight in mind. All foam modules consist of light-weight yet impact resistant injection molded polystyrene.

Fuselage consists of hand-layed fiberglass and arrives with fan unit, thrust tube, radio compartment and push rods already installed. All decals and color scheme templates also included.

All control surfaces utilize center point hinging requiring standard servos. Every last item, except radio, engine and final paint are included in kit. No shaping or carving required. No guesswork involved. Only quick, accurate and enjoyable building.

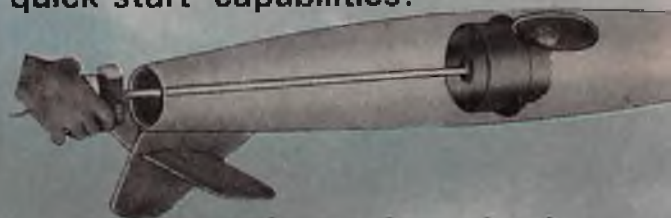
Optional epoxy/fiberglass kit for glassing wings and tail surfaces available for \$22.50.

With factory installed

BYRON ORIGINALS
Byrojet
Ducted Fan



The ducted fan with exclusive quick-start capabilities.



Starter extension provided with kit.

Add \$8.00 for shipping to any U.S. address. Items shipped by United Parcel Service.

\$168.00

Factory Direct Price



EWH Specialties SUPER HUSTLER power by HOMELITE™

SUPER HUSTLER SPECIFICATIONS

	SAE	METRIC
Displacement	2.6 cc in.	42.6 cc
Bore x Stroke	1.5625 x 1.375 in.	39.66 x 34.92 mm
Weight	104.02	2.95 Kg
Thrust (2800-7100 rpm)		
20 x 8 Hustler prop	25.24 lbs	
Fuel	20 to 1 Regular Gas/Oil Mix	

Price \$199.55

EWH Specialties and the Homelite Division of Textron have joined together to create the best 1/4 and 1/2 size miniature aircraft engine - the Super Hustler.

The Super Hustler has:

- Built in choke for easy starting (even when engine is fully cooled)
- Heat treated, black oxidized, 8 bolt prop. hub (for fine adjustment of prop arch)
- No magneto ignition to reduce weight and vibration
- Sulfur/Expansion chamber with each engine
- Aluminum engine mount with each engine
- Two ring piston with roller bearings front and rear main; and both ends of connecting rod
- Loop scavenging and hemi-head (for exceptional power, smooth idle, and high reliability)

Super Hustler is second to none in power, reliability, and durability.

RADIOS
Call for special prices on radios (with speciality for 1/4 or 1/2 size air craft)

PROPS
Hustler 20 x 8 - for Super Hustler 7.55
Hustler 18 x 8 - for Quadra 6.95
*Note: All EWH props are precision 10/10 (our 8 bolt prop hubs. Please specify if you don't want them drilled.)

SPARK PLUGS
RCR 1.95
RCR7 (a short plug for close coil) 1.95
RCR 1.95

Quadra Package: includes a ball hub servo plus two drops (hustler link, exhaust tube, six 1/2 fuel line, & C.B. mount) 149.95

Quadra 90.00

KITS
Pump \$249.95

HEAVY DUTY SERVO (Specifically designed to stand the shock of 1/4 and 1/2 size aircraft) 29.95
EXTRA AMP BOX 30
BALL BEARING HEAD FOR H.D. SERVO 6.95

EWH TANK KIT - 25 cc. tank with filter 3.95
FUEL LINE - Special neoprene that will not swell 11.95

NEW EWH ALLERON HINGE KIT
Glass - filled nylon 8.95

BUILDING MATERIALS: basswood, aluminum tubing, duralite plywood.

CALL FOR AVAILABILITY OF NEW KITS

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SELL WHAT WE FLY & SERVICE WHAT WE SELL!
CAN ANSWER YOUR QUESTIONS ABOUT MINATURE AIRCRAFT!
HAVE A SPECIAL POOP SHEET - CALL - GET ON OUR MAILING LIST!
DEPEND ON YOUR FEEDBACK FOR CONTINUOUS PRODUCT IMPROVEMENT & DEVELOPEMENT!
SPECIALIZE IN QUARTER SIZE!

Prepaid shipping charge \$2.00
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EWH Specialties Inc.
607 East Abram St.
Arlington, Texas 76010
817/461-1274

prices subject to change
without notice

**Dealer Inquiries
Welcomed**

BankAmericard Master Charge

ELECK RIDER

from page 118/64

occupied by the receiver battery. Be sure to observe all polarities indicated.

Incidentally, the same circuit can also be used for cars and boats, but is not recommended for airplanes. With this one, there is no battery reserve that keeps the radio operational for a time after the battery gets too far gone to power the motor. With this one, when the battery goes, everything goes. But, it's inexpensive!

It's also planned to have the "Eleck

Rider" available completely ready to run: assembled, painted, and with a Japanese built 2-channel R/C system installed, all for under \$200.00. Great for those who are lacking time, spare radios, or as a present for someone you are thinking of being nice to, because we all feel very strongly that the "Eleck Rider" is going to bring in a complete new crop of hobbyists not previously involved in R/C in any form. Again, it is not difficult to drive, but is demanding enough to keep you on your toes.

Which reminds me, our friend Joni was readily able to drive the R/C car with which she is pictured, and didn't experience any control difficulties even

when driving in towards herself. Unfortunately, she didn't get to try the "Eleck Rider" and it would be interesting to report just how she adapted to it. This means that one of us here will have to volunteer to spend a day with Joni and teach her to drive R/C motorcycles. We here at RCM wonder if you readers really appreciate all the sacrifices we make in your behalf...

In summary, I must state with all honesty that I am not selling any of my airplanes. But I thoroughly enjoyed driving the Kraft "Eleck Rider," much more than I ever expected to, and I am looking forward to some friendly

to page 128



Andre' Bouchard up and coming young Master Flyer placed 13th at the 1978 Nat's.



GIEZENDANNER USA

MODELING PRODUCTS INC

P. O. BOX 818

POTTSTOWN, PA 19464

DEPT. B

Dick Penrod
Giezendanner - USA

Dear Dick:

Just a note to tell you that Giezendanner Products are the best. Your Electric Retracts and Servo Pot Wipers are the greatest.

Sincerely,
Andre' Bouchard

GIEZENDANNER WIPERS REGULAR or HEAVY DUTY ELECTRIC RETRACTS FLYING STAB UNIT TONE GLO PLUG STARTER UNIT

WRITE FOR PRODUCT INFORMATION AND PRICE LIST

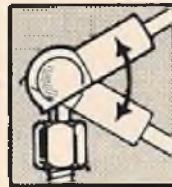
DU-BRO "SNAP-ON" BALL LINKS



(2-56 THREADED COUPLER INCL)

BOLT-ON LINK

This 3-piece ball link set (No. 180) is a must for all helicopters and is readily adaptable for many linkage hook-ups on R/C planes, boats or cars. Ball joint action eliminates binding and is neat and clean in appearance. Only 85¢



- THREADED FOR 4-40 ROD OR BOLT
- TOUGH NYLON LINK SNAPS-ON AND HOLDS TIGHT



NO PLAY
SUPER
PRECISION

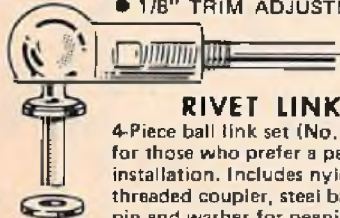


THREADED LINK

5-Piece ball link set (No. 181) is excellent for off-set steering, throttle and servo hookups. Includes steel ball assembly with 2-56 thread, washer, nut, threaded coupler and nylon ball link. Easily adjustable. Only 85¢



- AIRCRAFT QUALITY HIGH STRENGTH STEEL
- 1/8" TRIM ADJUSTMENT



RIVET LINK

4-Piece ball link set (No. 192) for those who prefer a permanent installation. Includes nylon link, threaded coupler, steel ball with pin and washer for peening on. Absolutely no linkage play when ball links are used. Nylon link helps reduce vibration and looks good too! Only 85¢

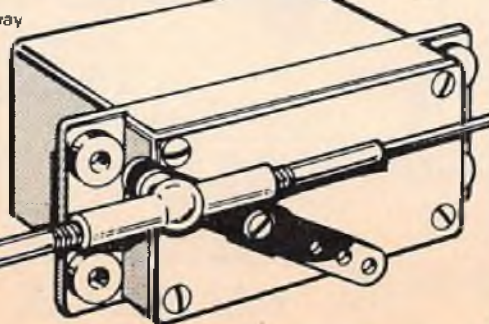


MAKES
THROTTLE
HOOK-UPS
EASY!

TAKES CARE OF ANY
MISALIGNMENT.

AILERON CONNECTOR & DUAL TAKE-OFF BALL LINK

5-Piece set (No. 183) includes 2-way nylon link, 2 threaded couplers, and 1 threaded ball link. Easily adjustable. For fast equal trim adjustments just "snap-off" nylon link, twist in desired direction and "snap" back on. EASY! Also great for rudder-nosewheel and elevator-brake hook-ups. Only \$1.00

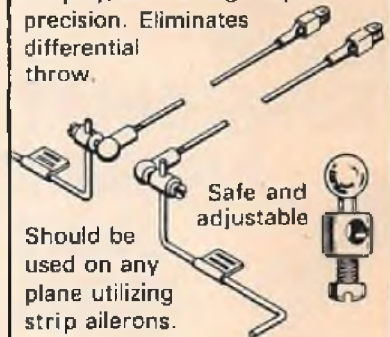


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INCORPORATED**

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STRIP AILERON BALL LINK LINKAGE HOOK-UP

Fully adjustable 16 pc. aileron hook-up complete as shown. No play, no binding, super precision. Eliminates differential throw.



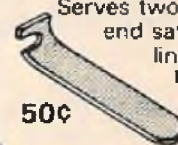
Safe and
adjustable

Should be
used on any
plane utilizing
strip ailerons.

No. 186 \$2.95

BALL LINK TOOL

Serves two uses. The curved end safely separates ball links and fits the 1/16" threaded ball link nut.



50¢

No. 187

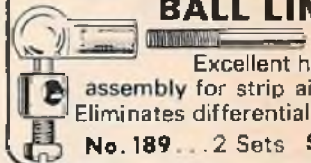
BALL LINK SOCKETS

Extra nylon sockets - Fits all styles of Du-bro ball links.



No. 188 4 Each \$1.00

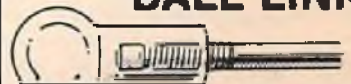
AILERON HORN WIRE BALL LINKS



Excellent hook up
assembly for strip ailerons.
Eliminates differential throw

No. 189 ... 2 Sets \$1.75

1/16" THREADED BALL LINK



This new 4 piece threaded ball link set fits perfectly in servo arm holes, bellcranks, nylon horns and throttle arms. Strong and easy to hook up -

No. 190 Just bolt it on! 85¢

Hobby Shack®

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QUESTION? How can modelers beat inflation?

ANSWER! By shopping Hobby Shack Super Values for extra savings!



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**THUNDERBOLT
R/C LONG
GLOW
PLUGS**

\$9.00
VALUE

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BRIDI RCM



TRAINER 60

Span: 60 in.
Area: 672 sq.in.
Engine: 4 - .60
Radio: 4 ch.

RETAIL
\$62.95

REG. \$49.99
\$41⁹⁹



THEY ARE
THE BEST!!!

**ZINGER
PROPELLERS**

**BUY 4 AND GET
2 FREE!**

Size	Eq. price	You pay	2 FREE!
7 x 4	1.20	4.80	2.40
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**FALCON HELICOPTER &
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NEW FIRST RELEASE & SPECIAL SALE

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**HIGH POWER &
PERFORMANCE**

**.40SS
ABC-IBS**
INNER BYPASS
SCHNEURLE



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HOBBY SHACK - PILOT

Q.B. 15H

QUICK-BUILT
KIT

Span: 49 1/2 in.
Area: 409 sq.in.
Engine: .15
Radio: 2 - 3 ch.

RETAIL
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Bonus

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**PACEMAKER &
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RETAIL
\$189.90

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COX TD

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SURE FLITE

J-3 CUB & T.T.

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\$75.94

REG. \$54.98
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SALE SAVE AN EXTRA \$6

FUJI

.15 IVS

R/C



RETAIL \$44.95

REG. \$35.99
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HOBBY SHACK

CESSNA 180 KIT

RETAIL
\$29.95

REG. \$22.99
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SALE 40% OFF

HOBBY SHACK

**INJECTION MOLDED ALL FOAM
STAGGERWING**

REG. \$29.99

RETAIL \$39.99

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ASSOCIATED

**#3012-6 R/C
ELECTRIC CAR**

6 CELL ELECTRIC CAR
KIT MINUS BODY

1/12 SCALE R/C CAR KIT
Complete except for the
radio system.

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MILLER

**SPRAY
SET**



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\$81.95

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- OR SEND 25¢

Inflation Fighter SUPER VALUE

HOBBY SHACK
-PILOT
TRYSTAR 15 ARF

Span: 49.2 in.
Area: 403 sq.in.
Engine: .15
Radio: 3 channel

REG. **\$52⁷⁷**

RETAIL \$79.95

Inflation Fighter SUPER VALUE

MARKS
WANDERER 72"

BEAUTIFUL ALL Balsa
R/C GLIDER KIT

SPAN: 72 in.
AREA: 563 sq.in.

REG. **\$12⁷⁶**

RETAIL \$19.95

Inflation Fighter SUPER VALUE

HOBBY SHACK
12V, 4.5 AMP SEALED CELL BATTERY

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RETAIL \$34.95

Charger for sealed battery. No.1200 12V, 600Ma, 110V - ADD **\$6.99**

NEW HOBBY SHACK - PILOT
Q.B. ACROMASTER-20

SPAN: 39 in.
AREA: 418.5 sq.in.
ENGINE: .19 - .25
RADIO: 4 channel

REG. **\$34⁹⁹**

RETAIL \$44.95

Bonus
If you want the Thunder Tiger .25 R/C (Retail \$37.95) - ADD **\$15.00**

NEW FIRST RELEASE & SPECIAL SALE
R/C THERMAL GLIDER ALMOST READY TO FLY
HOBBY SHACK PILOT
AURORA 1600

Span: 63 in.
Area: 395 1/4 sq.in.
Length: 33 in.
Weight: 1.54 lbs.
Radio: 2 channel

- ABS plastic fuselage with shock absorbing rubber nose
- Wings hand built from spruce and balsa
- Wings factory film covered
- Stab & rudder built and covered

REG. **\$44⁹⁹**

RETAIL \$67.95

NEW HOBBY SHACK - PILOT
CESSNA 177 ARF

Span: 46 in.
Area: 310 sq.in.
Engine: .10
Radio: 3 channel

REG. **\$49⁹⁹**

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Bonus
If you want the Speedie .10 R/C with the Cessna - ADD **\$12.99**

COMBO SALE PLANE & ENGINE
HOBBY SHACK
CESSNA 150 & INJECTION MOLDED FOAM T.T. .15 R/C

Both
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SALE HOBBY SHACK
KWIKCOTE

Choice of -----
• OPAQUE

LIGHT RED, DARK RED, ORANGE, YELLOW, LIGHT BLUE, MEDIUM BLUE, DARK BLUE, WHITE, BLACK AND CLEAR

Sale **\$3³³** /roll

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HOBBY SHACK-PILOT
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Both
REG. **\$99⁹⁸**

RETAIL \$169.90

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HEAT GUN

REG. \$16.99

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SALE 40% OFF SURE FLITE
CESSNA SKYLANE

REG. **\$23⁹⁷**

RETAIL 39.95

COMBO SALE PLANE & ENGINE
HOBBY SHACK - PILOT
QB 10H & SPEEDIE .10 R/C

Both
REG. **\$34⁹⁸**

RETAIL \$57.90

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.21SS ABC R/C

\$59⁹⁹

RETAIL \$79.99

SALE HOBBY SHACK
THUNDER TIGER
.20 R/C

REG. \$26.99

\$22⁷⁷

RETAIL \$37.95

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QUESTION: What does Hobby Shack have besides low prices?
ANSWER: Dependable, friendly, fast service - plus we can send you a catalog like no one else can!

Inflation Fighter
SUPER VALUE



J-3 CUB
WITH COX/SANWA
1 CHANNEL RADIO

• Complete with Cox/Sanwa 1 channel radio system installed • Cox .020 gas engine factory installed • No gluing or building for you • 28 inch wing span

RETAIL VALUE \$100.00

\$64⁹⁹

Inflation Fighter
SUPER VALUE

HOBBY SHACK
-PILOT

CESSNA 150 ARF
(20 ENGINE)

RETAIL \$99.95

REG. \$79.99
\$71⁸⁸

Inflation Fighter
SUPER VALUE

HOBBY SHACK

GLOW STARTER
2V, 4.5 A

REG. \$8.99
RETAIL \$11.95
\$6⁹⁹

Charger for glow starter No. 500. Add. . . . **\$6.99**

NEW HOBBY SHACK-PILOT
Q.B. SLOPE-16



SPAN: 63 in.
AREA: 496 sq.in.
WEIGHT: 1.98 lbs.
RADIO: 2 - 3 channel

'IT'S A SNAP TO BUILD'

RETAIL \$49.99

\$39⁹⁹

NEW FIRST RELEASE & SPECIAL SALE
HOBBY SHACK
SEALING IRON



RETAIL \$19.95

REG. \$14.99
\$12⁹⁹

HOBBY SHACK-PILOT
Q.B. CESSNA 20



SPAN: 53 1/2 in.
AREA: 427.8 sq.in.
ENGINE: .20
RADIO: 3 - 4 channel

RETAIL \$44.95

\$34⁹⁹

Bonus

If you want the Thunder Tiger .20 R/C - ADD **\$13.50**

COMBO SALE
PLANE & ENGINE

BRIDI RCM

TRAINER 40 & FUJI .40SS ABC R/C

Both

REG. \$122.98
\$99⁹⁸

RETAIL \$154.90

SALE



FUJI .255 R/C

REG. \$43.99
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COMBO SALE
PLANE & ENGINE

HOBBY SHACK-PILOT

AERONCA CHAMPION & T.T..20 R/C

Both

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HOBBY SHACK

12V, 5.5A WET CELL & CHARGER



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SALE HOBBY SHACK-PILOT
SS-4 STARTER



REG. \$36.95
\$24⁹⁹

SALE 40% OFF
DU-BRO KWIK-FILL FUEL PUMP



REG. \$10.95
REG. \$8.96
\$6⁵⁷

A NEW CONCEPT IN FUEL PUMPS - ONLY ONE MOVING PART - NOTHING TO BREAK OR WEAR OUT.

- LIGHT, COMPACT AND RUGGED
- ONLY 1/2" WIDE AND 1 1/2" HIGH
- HAND OPERATED AND REVER. ONLY - PUMPS IN AND OUT.
- FUEL FLOWING TUBE.
- PLASTIC BODY AND METAL HOUSING ON BALL BEARING SHAFT. EASY INSTALLATION.

SALE HOBBY SHACK-PILOT
FUEL FILTER



REG. \$2.95
\$1⁹⁹

High efficiency fuel filter which removes dirt and water from your fuel.

SALE 35% OFF
DRIFTER-II

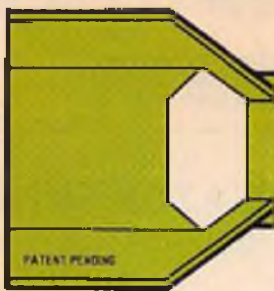


REG. \$15.99
\$12⁷⁶

RETAIL \$19.95

BOMB AND DROP TANK
RELEASE MECHANISM

\$4⁹⁸



RELEASE AND BOMB SHOWN FULL SIZE

REUSABLE SIMULATED
EXPLODING BOMB

SEPARATES ON IMPACT TO
DISCHARGE A PAYLOAD OF
CHALK OR FLOUR

\$9⁹⁸

2 PER
PKG.

\$5.98 EACH

SEE YOUR DEALER

FEATURES
• POSITIVE LOCK
• LOADS INSTANTLY

VORTAC MFG. CO.
P.O. BOX 469 OAK LAWN, ILL. 60453

ELECK RIDER

from page 122/64

competition in the near future. And I hope soon to be able to tell you about our first races here in Southern California, and about any proposed competition rules as they develop. □

MINI REARWIN

from page 61/56

cowl by projecting lines from the top and front.

- () Drill needle valve clearance hole.
- () Check prop spinner for about

1/16" clearance and fair in nose cowl to follow spinner contour.

() Cut out louvers from 3/8" doweling. Cut in 1/4 sections and shape as shown in Photo 14. These are functional louvers for engine cooling. Glue louvers in place.

THE WHEELS AND WHEEL PANTS

() Attach the 2 1/4 wheels to the landing gear, using 8-32 screws 1 1/4 long as the axle and three 8-32 lock nuts. See Photo 15.

() Cut out (two sets) WP-1 (1/16" ply) and WP-2 (1/2" balsa), but do not cut out wheel socket. Clamp glue these pieces together. When dry, cut out wheel socket. Save the cut out part.

() Cut out two pairs of WP-3 from 1/8" balsa. Cut out 1/8" x 1 1/8" ply insert. Fit insert into WP-3 as shown and clamp and glue. When dry cut out clearance notch for axle nuts.

() Cut out WP-4 from 1/4" balsa. Clamp and glue WP-1 and WP-2 to WP-3 and WP-4. Insert cut out plug from WP-1 and WP-2 into cavity to provide support during clamp and gluing.

() When wheel pants are dry, remove plugs and cut approximately 1/4 wedge from each side of plug, and glue this wedge into corners on the inside of the wheel pants for backup. See plans.

() Shape wheel pants to final form.

to page 132

When you buy

the Dieter Schluter
'HELI-BOY'

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JUST AN RC HELICOPTER —

YOU JOIN THE CONSTANTLY EXPANDING FAMILY OF THE WORLD'S FINEST RC HELICOPTERS

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- An aerobatic head
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- A four bladed head

YOUR 'HELI-BOY' IS BACKED BY

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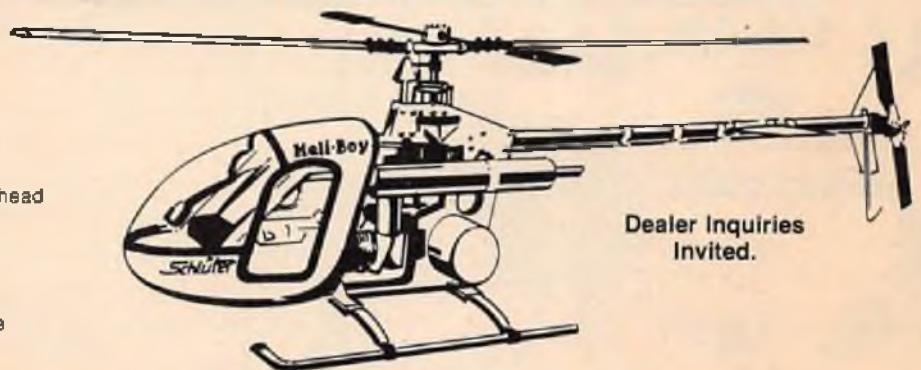
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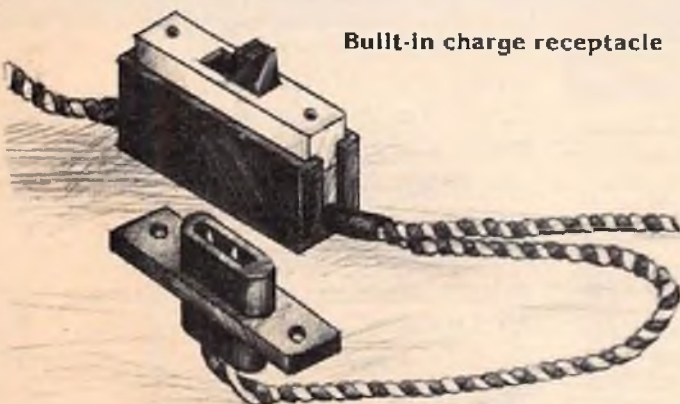


If you are considering the purchase of a Kraft radio control system, you may be impressed with our obvious quality and superior performance. However, you may not be aware of the many little features of our systems that make a big difference in their utility, convenience, and accuracy.



Crimped wire connectors

For example, we manufacture our own connectors which feature gold-plated beryllium copper pins and sockets for long life and corrosion and vibration resistance. Wires are crimp connected rather than soldered to minimize wire lead breakage.



Built-in charge receptacle

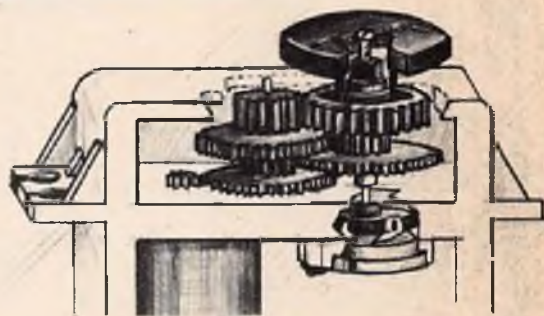
A charge receptacle is wired into our switch harness so that you may charge your model without the inconvenience of disassembly. Other systems require that the battery pack must be disconnected from the receiver and be connected directly to the charger.

Plug-in receiver antennas



A plug-in receiver antenna is standard with all receivers. This means that you may mount the antenna permanently in your model. Extra antennas are available in standard and special RF loaded short lengths. The short antennas are especially convenient for small aircraft, cars, and boats.

Direct drive servo mechanics



Our servos are molded of long wearing rugged nylon rather than the cheaper short life materials used in competitive servos. For accuracy, our servos have their reference potentiometers actuated directly from the output drive rather than indirectly through a gear which, because of gear teeth backlash, adds to centering error.

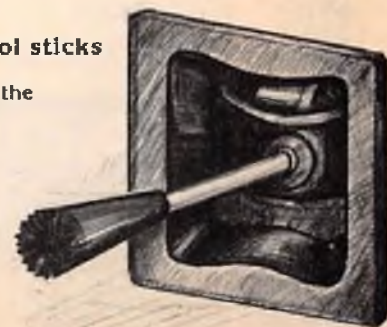


Clockwise and counterclockwise servo rotation

Servos are supplied with four or more channel sets, two rotating clockwise and two counterclockwise. This feature greatly simplifies the radio control installation.

Open gimbal control sticks

Our control sticks are the open gimbal type for better feel and accuracy. Their design eliminates any possibility of centering error and is self compensating for wear.

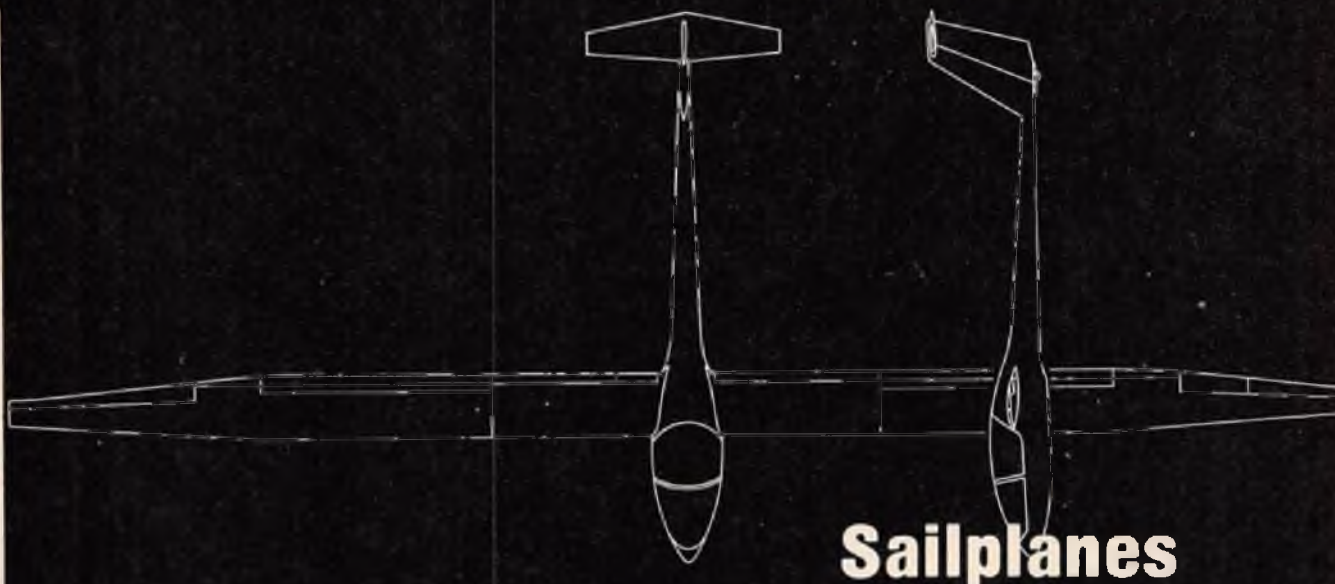


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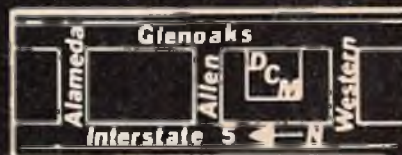
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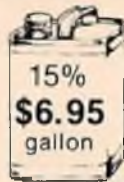
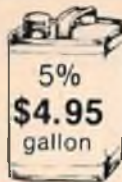
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MINI REARWIN

from page 128/56

() Install wheel pants with #4 woodscrews approximately 1/4" long. Adjust wheel so it is in center of wheel pants. See Photo 16.

THE WINDOWS AND WINDSHIELD

() Paint or MonoKote the cabin area F-3, the instrument panel, the exposed areas of F-13 and window panels F-12. Add 1/8" dowels behind front windshield.

() Cut out front windshield from .015 plastic sheet to pattern shown. Fit windshield to fuselage and trim for proper fit.

() Epoxy front windshield to top of F-3 and partially down top of F-13. Tape or clamp securely and allow it to dry.

() Epoxy side of windshield to side of F-3 and pull tight so no gap is visible on top of cowl. Clamp and hold until dry. No epoxy is necessary to bond windshield to cowl. However, if you feel more secure, epoxy it in place.

() Cut out side windows and epoxy to side window frames F-12. Add 3/32" x 3/16" balsa strip to inside lower edge of F-12. This will act as a stand-off for proper window position.

() Epoxy side window frames to fuselage, and tape in place until dry. Add stringers top and bottom to give side window frames a smooth transition to fuselage side.

THE RUDDER, STABILIZER AND ELEVATOR

() Cut out the rudder, stabilizer and elevator from 3/16" balsa. Glue pieces together and sand to proper contour. See Photo 17.

() Bend 1/16" music wire as shown and install it in pre-drilled hole in elevator. Cut a groove for wire to nest in and epoxy in place. Be sure the elevator is flat before final assembly.

() Cut slots for hinges (four on elevator and three in rudder). Add the third hinge in rudder at end of fuselage. Epoxy in place at final assembly.

() Cut a 1/8" balsa plate to fit under tail assembly. Cut this wedge shaped plate 1/8" oversize, and bevel as a fillet between the fuselage and the stabilizer.

() The tail assembly can be covered or finished at this time, and installed on the fuselage. Epoxy the 1/8" balsa plate to the fuselage and the underside of the stabilizer. Also, insert the rudder, and epoxy to stabilizer. **Caution!** Be sure rudder and stabilizer are in square alignment. If you are using MonoKote, be sure you have bare wood contact at all joints!

() Install tail wheel assembly. See Photo 18.

THE WING

() Cut out the 3/16" x 3/4" hard balsa main wing spar, and 1/8" plywood

doubler W-10. Double glue the spar halves together, and double glue and clamp W-10 to the spar. When dry, cut notches in spar.

() Cut out all 1/8" plywood wing parts WR-1, W-5, W-6, W-7, W-7A, W-8, W-9 and W-11. See Photo 19.

() Fit all the plywood parts together on the fuselage. See Photo 20. Be sure to allow a little clearance so assembly can be removed easily. Use of masking tape as a shim on fuselage is sufficient to provide gap.

() Double glue all plywood parts being careful not to glue it to fuselage.

() Cut out leading and trailing edges from balsa stock specified. Cut angles as shown and notch for ribs.

() Cut out all ribs from 3/32" balsa. The false ribs may be omitted but they do make the plane look nicer. Stack the balsa and cut out all the ribs at one time. Sand and shape, notch for spars and drill 1/4" hole for pushrods.

() Pin down one side of the spar assembly on the plans, and install the ribs, leading and trailing edges. Check that all parts fit and that the leading and trailing edge butts at the correct angle with WR-1. If everything fits, glue the ribs, spars, leading and trailing edges. Glue aileron fillets in place, false ribs and 1/8" ply wing strut supports.

() Repeat the above procedure for the other side.

() Cut out two sets of wing tip parts W-1, W-2 and W-3 from 3/16" balsa. Glue tip part together on plans, not on the wing.

() Carefully slip wing tip assembly through notches in WR-5 and WR-6. Fit tip to leading edge and glue in place. Cut out W-4 (5/8" balsa) and attach to wing tip, and WR-4. Glue in place.

() Cut 1/8" x 3/16" hard balsa rear spars and glue in place.

() Cut top and bottom 1/16" balsa trailing edge sheeting and glue in place.

() Sand and shape leading edge, wing tips, trailing edge and fair in W-4 to wing tip and trailing edge.

() Fit wing onto fuselage and attach 4-40 right angle anchor nuts to 1/8" ply plates. W-5 and W-7A (1/8" ply x 5/8" wide cut to fit.) Locate nuts so they fit close to the inside of F-13. (Esna anchor nut p/n 52LHA227-40 or equivalent purchase from Elastic Stop Nut Corporation, 2330 Vauxhall Road, Union, New Jersey 07083.) See Photo 21.

() Locate anchor nut position on F-12 window panel using line projection method as in cowl construction. Drill 1/8" hole in F-12 both sides. Secure wing with four 4-40 screws 1/2" long.

THE WING STRUTS

() Fabricate two wing struts from 3/32" x 3/8" spruce. Make wing struts 1/2" longer than shown on plans. Shape and sand struts before joining, then double glue pieces together.

() Cut out aluminum gusset plates

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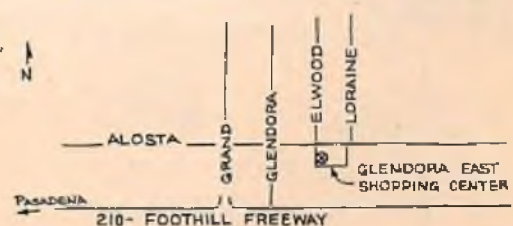
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from .020 aluminum, and epoxy or screw in place.

() Form gusset plate as shown on plans and secure to landing gear with 4-40 screws 1/4" long, 4-40 nuts and #4 lockwashers.

() Trim ends of strut to fit against 1/8" plywood strut supports in the wing.

() Cut plastic hinge in half and drill for 0-80 screws. Locate and drill holes in strut and mounting plate.

() Mount hinge to wing after lower portion of wing is covered, but before you cover top. Use 0-80 locknuts or epoxy nut in place.

THEAILERONS

() Mark the outline of the ailerons on the top surface of the trailing edge sheeting. Locate the ends of the ailerons on the inside surface of ribs noted on plans. The outer edge of the spar can be located by probing through the trailing edge sheeting with a pin.

() Cut the aileron straight, on the marked lines. See Photo 22. A 1/4" drill can be used to change saw blade direction. (At least 3/8" to 1/2" of the aileron will be trimmed off.)

() Cut two pieces of 3/8" square balsa, tapered as shown on the plans, and as long as the ailerons.

() Cut two pieces of 1/8" x 5/8" balsa strips and glue to the edge of the spars on the inside of the aileron cut-outs. Sand flush with sheeting.

() Measure the depth of the aileron cavity and cut aileron, with top side down, so that the aileron plus the 3/8" tapered strip will fit flush in the aileron cavity when viewed from the top.

() Glue tapered strip aileron. Use masking tape to hold tapered strip firmly to aileron. Sand flush when dry.

() Install three hinges per aileron. (Epoxy in place during final assembly.) Notch aileron to provide a snug fit

between the aileron and the wing.

() Cut out 1/8" plywood bellcrank platforms (2) and install bellcrank (bellcrank can be made from 1/16" formica or can be any 1" bellcrank). Locate bellcrank as shown on plans.

() Install pushrods through 1/4" diameter holes in ribs. Pushrods can be made from lightweight (swaged) bicycle spokes with end bent at right angle. Also, form pushrods from bellcrank to aileron horn. See Photo 21.

() Draw a straight line from the bellcrank to the aileron. Locate the 1/8" plywood plate previously glued in aileron and temporarily mount aileron horn with #2 woodscrews 1/4" long.

() Connect the linkage together and find the proper angle for the bellcrank plate. Glue plate in place and back up with 3/16" square balsa on the backside of the plate.

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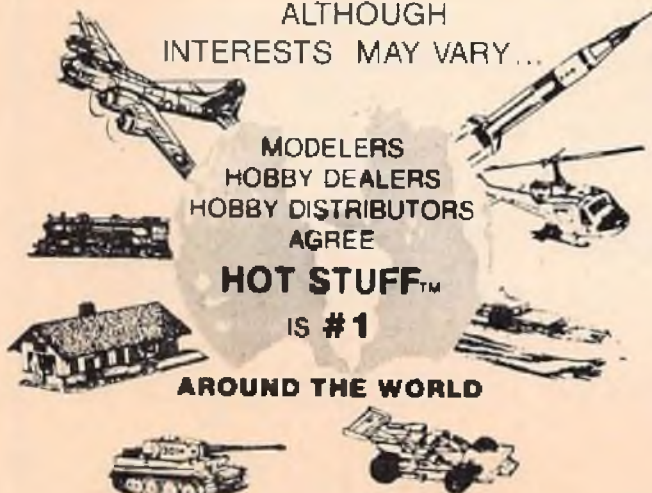
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MINI REARWIN

from page 134/56

() Cut 1/16" ply exit plates and cut 3/16" wide slot for pushrod exit. Locate and glue plates in place.

() Check all linkage movement and be sure there is no binding. **Important!** Check with servo installed. Left stick should produce left aileron up!

() Install 1/16" balsa sheeting to top center section of wing. Sheeting is installed on top of W-9 and flush with WR-1.

This completes the basic construction of the Rearwin.

COVERING

() The Mini Rearwin is strong enough so that any of the plastic iron-on covering materials can be used. Follow the manufacturer's instructions accompanying the material you use. If you use silk, silkspan or Silray, be sure you seal the balsa with two or three coats of dope first, sand it thoroughly, then apply the covering material. The cowl and wheel pants are painted. Seal the wood with two coats of sanding sealer and three coats (minimum) of clear dope. Sand with 600 sandpaper between coats. Then apply two coats of color and trim as desired.

BALANCE

() With the airplane complete, engine installed, and wheels and wheel pants on, place the battery pack at the rear of the cabin, above the servos. Then lay the servos and receiver inside the fuselage. Move the servos (mounted to servo tray) fore and aft until the desired balance point is found. (See the plans for the recommended Center of Gravity.) Mount the servos inside the fuselage at the position that gives you the desired C.G. If a change in C.G. is found necessary after the first flight, weight can be added to the nose or the tail. Prather Products has some lead bar weights, mounted on double stick tape which are useful for this purpose.

Good Luck!! I hope you find your Mini Rearwin is as much fun as mine. □

RCM TAKES A DAY OFF

from page 55/54

sudden appeared floating around inside the canopy. No one knew where it came from, though the feeling was that it fell out of a parts pouch inside the cockpit. Anyway, Tom wisely decided to cancel all further flying until the machine was checked out and the source of the spring was definitely settled. So Carl and I were left disappointed! But there is always next year, when Bev and Hank will be with us in California again. We'll be due for another day off and, if invited, you can bet your boots that we'll spend it with our glider flying friends at Crystallaire! □



Can you handle it?

This Porsche can creep like a snail, go like a bat and stop on a dime! It won't lean on a curve or wander on a straight. And response is instant to every command.

Think you can handle it?

It's Pro-Cision's fabulous 15 inch $\frac{1}{12}$ scale replica of the Porsche 935 Turbo. And it is completely radio-controlled!

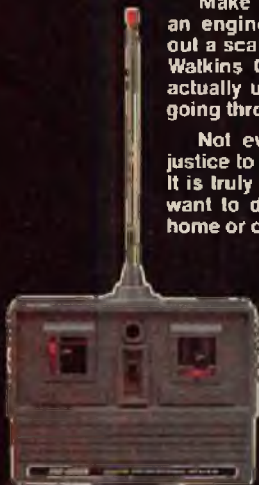
Make no mistake, this is not a toy. It is an engineering masterpiece. In fact, lay out a scaled-down version of the course at Watkins Glen or at Sebring and you can actually use this car to plot your best line going through a curve!

Not even the above photograph does justice to the exquisite detailing of this car. It is truly beautiful. When not in use you'll want to display it on your coffee table at home or on your desk in the office.

But what makes this car truly exceptional is what's underneath that glamorous exterior. Super-heterodyne circuitry of the highest order. The state of the art in solid state electronics.

The driver's seat

The dual stick transmitter which comes with your Porsche is your "driver's seat." It signals your every command to the car for instantaneous response. The stick on the left can be moved forward for "go" and back for "reverse." How far you move it determines exactly how fast you go. Beneath the stick is a trim adjustment to make sure the car stands still in neutral.



On the right is your steering stick. Move it right or left—a little or a lot. Steering is precise. This stick, too, has a trim adjustment so that when the stick is untouched the car will run straight and true.

Three different frequencies

Pro-Cision makes three versions of the Porsche—each on a different frequency. This means all three Porsches can race together. Great for car clubs or for you and a buddy or two to learn who is the best driver.

Extras

Each Porsche comes with an extra high-speed gear so that once you've learned how to handle your car you can change the gear ratio for even faster performance. Full instructions are included.

As an optional extra, Pro-Cision offers a charger that plugs right into the car. With this charger and a set of Ni-Cad batteries you'll probably never have to buy car batteries again.

There are many radio-controlled cars on the market. Most of them are toys. If you want the real thing...if you want true quality and lasting satisfaction, look for the name Pro-Cision—the industry leader. Pro-Cision's quality control, research and famous service center are your assurance of lasting quality.

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plus ordering information.

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Length: 27"
Eng. Req.: 3.5cc

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Sr. Falcon



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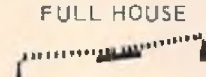
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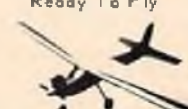
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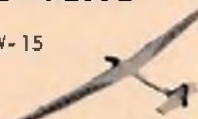


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Epoxy

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9511 adjust. tow-hook assem.	1.75

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231 seating tape 1/8x3/8x36"	.76
236 mounting tape 1/8x3/8x36"	.85
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253 filtered fuel can pick-up	1.65
252 big shot 8 oz. bulb pump	2.95
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167 servo wheels-std. servo	2.25
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161 serv. tray-aileron, micro serv.	.70
162 serv. tray-dual, micro serv.	2.25
163 serv. tray-2 1/2 micro serv.	2.25
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RC-31 kadet	27.98
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RC-20 freshman trainer	28.75
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7 4,5,6,7	5.19	.96
7 1/2 4,5,6,7	5.19	.96
8 4,5,6,7	5.62	1.04
8 1/2 4,5,6,7	5.62	1.04
9 4,5,6,7	5.62	1.04
10 4,5,6,7	5.99	1.12
11 5,6,6W,7,7W,7 1/2,8	6.91	1.28

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Super Maple	6/box	each
9 x 6,7	5.25	1.00
10 x 6,7,8	5.67	1.08
11 x 6,7,7 1/2,7 3/4,8	6.51	1.24
12 x 4,5,6,8	7.56	1.44

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3.2 oz. tube	1.22

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4 oz.	1.15
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2004 6 volt motor	16.99
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6 volt 4 ampere wet cell	8.99
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Vantacraft's speed & direction controller-solid state	46.99

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from page 52/48

SERVO REVERSE



This little piece of electronic wizardry quickly and easily reverses the direction of servo travel when plugged in between the receiver and the servo. It will work with positive pulse servos only; three or four wire. Connectors are NOT furnished. Available in unassembled kit form or assembled and tested.

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Basic Kit: \$84.95
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BASIC KIT INCLUDES: Fiberglass fuselage with built-in motor and motor in fin, foam wing and stab control, L.G. struts and wires, nose gear wire, 4" fiberglass tail, plans and instructions.

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movement of stab on hinge. Trim covering away on top of fin and bottom center of stab mount.

(6) Solder stab cable into stab clevis and check for free rotation of clevis on wire.

(7) Slide stab cable into cable lead and position stab on top of fin. Check for free movement of stab by use of servo end of cable. Everything okay? Strap on wing, align stab and glue it. Again, I use BS & HS.

(8) Leave wing in place. Go find the hatch (which is by now buried under a huge pile of scraps) and cut the aft portion to clear the wing and wing bands. Hollow the hatch (optional) and install the hatch pin and hatch hook. Impregnate the hatch front end grain with HS. Impregnate the hook area with the same. The hatch/hatch hook joint should be ultra strong if you like your radio gear much at all and fly a little crazy like I do.

(9) Glue on 1/16" ply hatch tabs on bottom rear of hatch. They key into the inside of the fuselage. Hit the hatch with a little sandpaper and cover it.

(10) Install servo mounts of your choice. I use that strangely shaped front mount for the hatch hold-down bands. It is light and simple.

(11) In mounting the servos, I bolt the servos together in the middle and mount them only at the extreme ends. Suit yourself.

(12) Install a tow hook and nose skid of your choice.

(13) Hook up all of the electrics and control stuff and let's fly the thing.

Flying:

(1) Set up rudder for 35° deflection in each direction (about 2 5/8" measured at bottom part of rudder). Set stab for minimum travel.

(2) Align stab parallel with top of fuselage at neutral trim. This produces fast flat flite.

(3) Balance sailplane within C.G. range shown on plan. The prototype balanced at the aft location without the addition of any weight.

(4) Balance the sailplane laterally by addition of weight to the light wing tip.

(5) Check for freedom of control movement, clevis snapped closed, radio stuff packed in so it will stay put, battery charge level, etc., and head for the field.

(6) Turn on radio, trim rudder to neutral, and trim stab up one half way toward full up trim. Wipe the sweat from your palms and have at it.

(7) For hand launching, speed, and other games, I prefer the C.G. at the aft location. For windy weather thermalling you may want to move the C.G. forward to improve pitch stability. The C.G. is not

to page 144

Take it on singlehanded. .

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72" wing span.
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Dura-lene fuselage guaranteed unbreakable one year. High-performance, two-channel operation.



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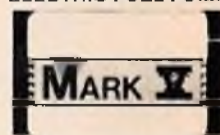
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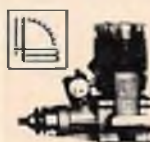


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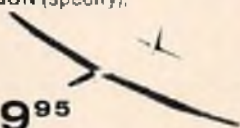
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Introducing the most advanced design electric fuel pump ever available to you!
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	List Price	Our Price	Nicad	Service
2 Channel Single stick				
Cox 8022	139.95	93.	2	no
Logictrol Nimbus	141.75	103.	2	no
2 Channel Dual stick				
Cox 8020	99.95	70.	2	no
Futaba FP-20S	109.99	77.	2	no
Futaba FP-2E	149.95	100.	2	no
Futaba FP-2E 518	134.95	91.	2	no
MRC 772	119.95	84.	2	no
2 Channel Wheel				
Cox 8021	139.95	93.	2	no
Futaba FP-2P	149.95	100.	2	no
Futaba FP-2P 518	134.95	91.	2	no
3 Channel Single stick				
Cox 8031	139.95	104.	2	no
Futaba FP-3S	169.95	113.	2	no
Futaba FP-3S 518	144.99	97.	2	no
Logictrol LRB-3	166.95	105.	2	no
Logictrol Ranger	187.99	119.	2	no
3 Channel Dual stick				
Futaba FP-3FN	219.95	145.	2	yes
4 Channel				
Cox 8040	299.95	189.	4	yes
Cox 8044	279.95	178.	4	yes
Cox 8048	449.95	285.	4	yes
Futaba FP-4N	319.95	203.	4	yes
Futaba FP-4FN 518	289.95	186.	4	yes
Logictrol Nimbus	329.50	197.	4	yes
MRC 774	279.95	189.	4	yes
5 Channel Dual stick				
Cox 8054	299.95	190.	4	yes
Futaba FP-5FN	359.95	229.	4	yes
Logictrol LRB 2-5	209.25	148.	4	Really
Logictrol Champion	388.50	237.	4	yes
MRC 775	379.95	251.	4	yes
5 Channel Single stick				
Logictrol LRB 1-5	375.50	207.	4	Really
6 Channel				
Cox 8060	369.95	230.	4	yes
Cox 8068	479.95	305.	4	yes
Futaba FP-6FN	369.95	234.	4	yes
Futaba FP-6FN 518	339.95	216.	4	yes
7 Channel Dual stick				
Futaba FP-7G	579.99	385.	4	yes
Logictrol Super Pvn	440.95	268.	4	yes
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Cox Tradewinds Sailboat
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Ferrari 512 B B Electric Race Car
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T D 051	25.00	15.00
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Q R C 049	15.00	9.00
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MASTERCHARGE & VISA ACCEPTED

RO8

from page 142/48

too critical as the airfoil only has a 2% mean cambar which keeps the center of lift fairly stationary.

(8) Once you become familiar with the little beast, set up the rudder and stab deflections to suit your style. I do not ballast the RO8 for thermalling until the wind velocity exceeds about 6 mph, but trial and error will find the most comfortable weight for your local conditions. In any event, the RO8 will provide a maximum of flexibility for the various soaring tasks while maintaining a reasonable amount of durability. Where is the next contest? Good luck and most important of all — Have Fun! □

STAND-OFF SCALE DESIGN

from page 45/42

system that would run through the vertical stab and back to the elevator would be necessary. This system would have to be precise and rigid. By this I mean, aerodynamic loads should not deflect the elevator and linkage. Also, return to neutral elevator should be repeatable within 1/16" at the rear edge of the elevator. NyRod was examined but discarded because of the above requirements. A cable system was laid out but discarded because of problems in building and adjusting. I finally decided on a stiff fiberglass arrow shaft pushrod from the elevator servo to a 120 degree bellcrank at the junction of the boom and the vertical stab. A very rigid NyRod would transmit this movement to another 120 degree bellcrank at the same elevation as the horizontal stab and elevator. The final segment would be a short section of piano wire. The elevator system is completely enclosed.

A plywood plate was drawn in at the top of each vertical stab. Each ends of the horizontal stab would include a plywood key. These parts would allow construction assembly of the booms and horizontal stab to be easy and straight. The horizontal stab-elevator unit will not be separated from the boom after final construction is complete. With the boom and vertical stab drawing almost complete, the horizontal stab and elevator can be laid out.

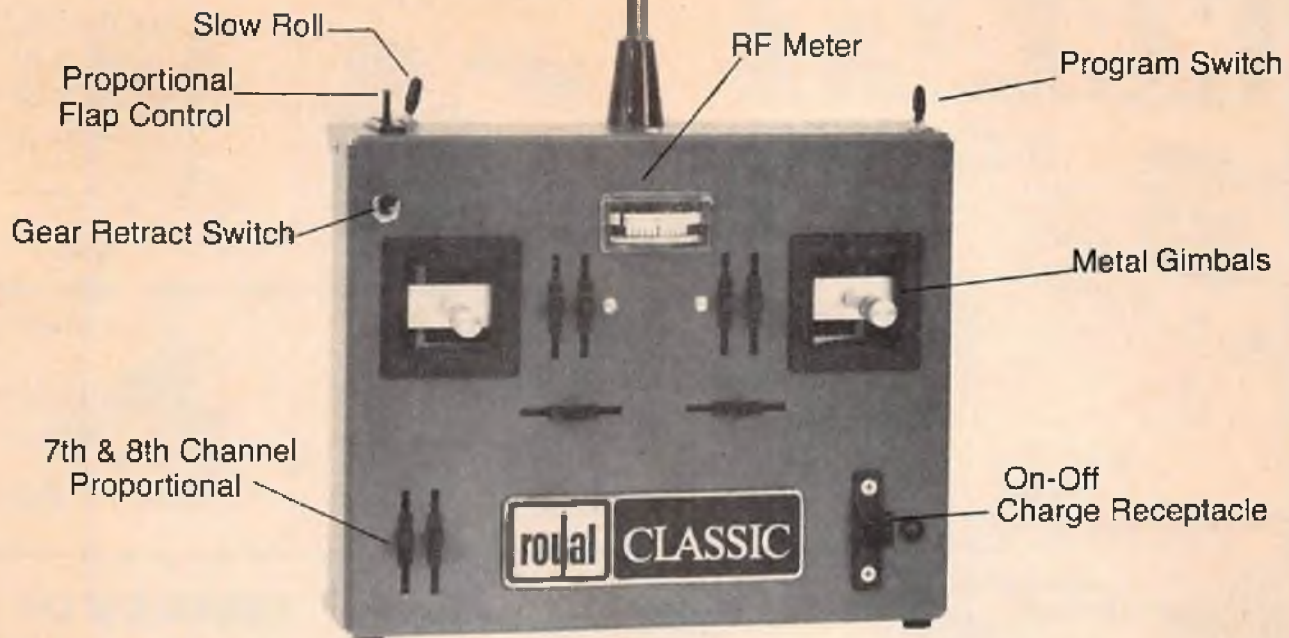
The critical dimension in this case is the boom or vertical stab separation distance. I used the boom separation distance, centerline, as a starting point. As in the case of all of the other parts, the outline of the stab and elevator was first. Because weight is critical, I decided to use a built up stab and elevator. The ribs would be 1/8" balsa, covered with a

to page 151

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TRANSMITTER FEATURES

• Programming Switch:

This switch controls servo travel and sensitivity of the Aileron, Elevator, and Rudder Channels. The programming switch has three positions, full travel linear, half travel linear, full travel non-linear, and simultaneously affects the three flight controls. When the switch is in the front position, servo travel is full ($\pm 50^\circ$) and linear. When in the center position, servo travel is one half normal throw and linear. When in the back position servo travel is full and non-linear.

In the non-linear position, 2/3 stick travel produces approximately 1/2 servo travel and the last 1/3 of the stick travel produces the other 1/2 of the servo travel. This means you have very insensitive control around neutral but you can still get full servo travel when you need it.

• Slow Roll Switch:

When the switch handle is toward the center of the transmitter case, maximum Aileron travel and sensitivity is controlled by the programming switch. When the slow roll switch is toward the outside edge of the transmitter case, maximum Aileron travel is controlled by the linear slide pot. In actual operation, you set the linear slide pot to produce the correct roll rate for your airplane when the stick is held full over.

• Servo Reversing:

The four main flight controls plus gear retract and flap servo travel can be reversed in the back of the transmitter case. Each control is on a three pin plug. To reverse the servo, you unplug the corresponding control and rotate the plug 180° and plug it back in. The trims are also reversed by rotating the appropriate three pin plug.

• Linear Trim Controls:

Our linear trim control gives an expanded resolution feel on the trims and provides an excellent visual indication of trim position. Your transmitter can be set up with cross trim or standard trim and is determined by where the trim control is plugged in.

*OPTIONAL FEATURES:

• Low Speed Throttle Trim:

The throttle trim lever only affects the throttle servo position when the throttle control is in or near the idle position. The throttle trim lever has no effect on the full throttle servo position. When this feature is installed you cannot reverse the throttle trim control in the Transmitter.

• Twin Engine Throttle:

Channel 3 and channel 8 respond to the throttle stick position allowing separate servos for each engine. Independent throttle trims are also provided.

AIRBORNE FEATURES

• Receiver:

Double tuned Front End F.E.T. Mixer; Low current drain.

• Servos:

RS-4; RS-5; RS150; KPS-14; **KPS-15II; ***Chevron.

• Dual Charger:

Provides separate or simultaneous charging overnight (14 hours)

• Airborne Pack:

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*Adder Option

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F9F-8 Cougar



Cougar kit consists of a lightweight epoxy glass fuselage, a three-piece epoxy inlet ducting system, engine cover cap clear plastic canopy and full sized plans with all templates shown for the built-up construction.

Hobby Barn Price **\$139.95.**



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.40 to .45 Size

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The 840 sq. in. model is all-balsa, with projected weight in the 7 1/2-8 1/2 lb. range. Turb-Ax I or Midwest Axiflow fans recommended

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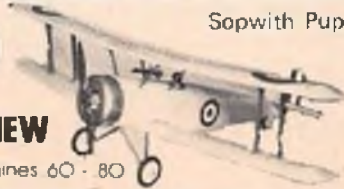


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1/3-SCALE PILOT FOR GIANT SCALE MODELS



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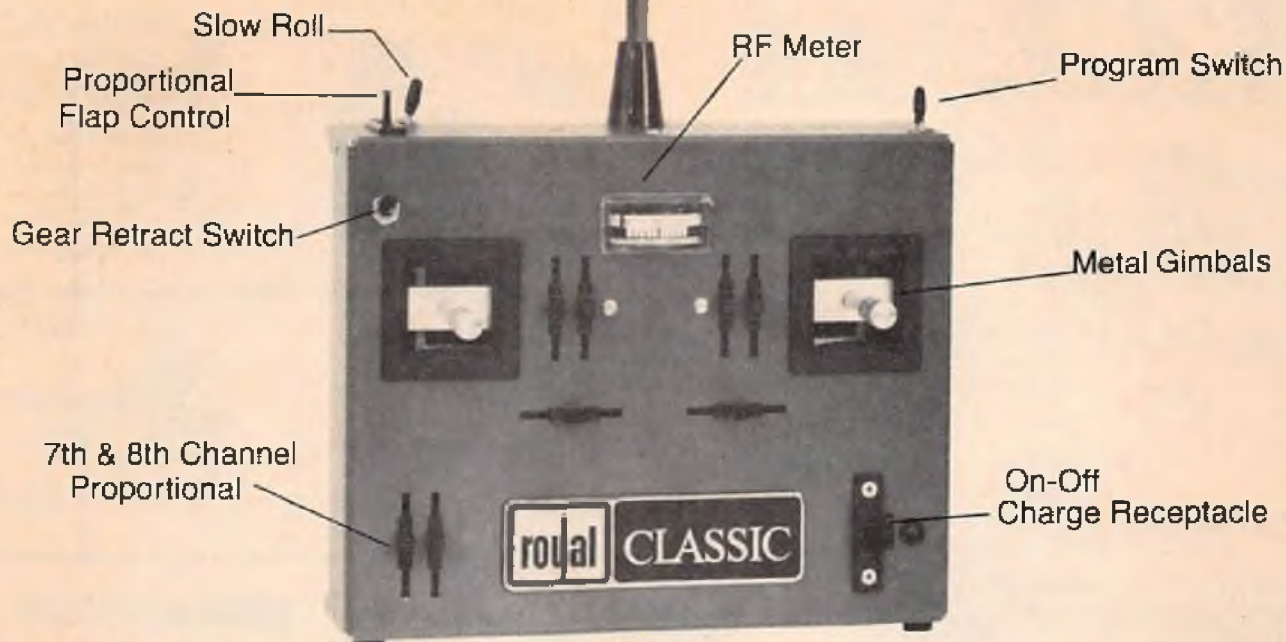
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• Dual Charger:

Provides separate or simultaneous charging overnight (14 hours)

• Airborne Pack:

500 Flat; 500 Square; 550 Flat;

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FREE!! with the purchase of the 5 channel system
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*Free servos are Kraft KPS 14 II or KPS 15 II, your choice.

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the finest glow plug connector available
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- 11" x 7"/11" x 7 1/2"
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\$43.99

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Hobby Barn Price \$139.95.



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.40 to .45 Size

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glass construction.
.40 to .65 size

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Hatch Cover \$13.99

OS Max 61VF engine

List 149.95



\$ 99.99

FOKKER D VII



Engines 60 - 80
Wing span 72"
Wing area 1488 sq. in.

\$69.99

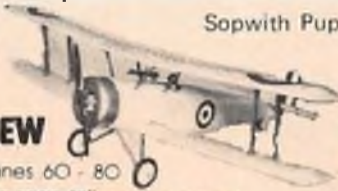


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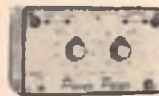
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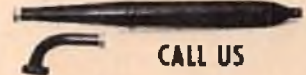
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KRAFT		
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ST .23 RC	44.95	34.99
X .29 ABC	79.95	56.99
ST .35 RC	49.95	38.99
X .40 ABC	94.95	72.99
ST .40 RC	72.95	54.99
X .45 RC	84.95	63.99
ST .46 RC	74.95	54.99
ST .60 RC F1	84.95	63.99
STG .60 RC PP	99.95	78.99
X .60 RC F1	125.00	93.99
STG .71 RC F1	99.95	79.99

WEBRA		
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.40 RC Speed	117.50	89.99
.40 Pylon	117.50	89.99
.40 RC Copter	117.50	89.99
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.61 RC Speed	164.95	119.99
.61 RC Copter	164.95	119.99
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.90 RC	225.00	155.99

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3 CH Bantam	119.95	104.99
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5 CH Tx. conv.	21.95	18.99
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Two micro servo kits with battery	59.95	52.99
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w/2 servos	94.95	84.99
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Bantam Servo	23.95	20.99
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Retract Servo	24.95	21.99
Midget Servo	26.95	23.99
Assembled Servos Add 5.00 each		

1-8 Receiver Kit	37.95	33.99
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Digipace Assembled	94.95	82.99

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4 CH	324.49	194.99
5 CH	388.49	236.99
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Kraft		
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KP-7CS	529.95	379.99
Signature Series Signature Single Stick	749.95	680.99

WORLD EXPERT SERIES		
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7 ch. Expert (with 5 servos)	464.95	284.99
For single stick add		15.00

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DUMAS PRODUCTS		
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Star Class 45"	115.00	85.99

Fiberglass Kits		
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.45 (7.5) Marine	120.00	89.99

HB MARINE		
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HB .25 RC	69.44	56.99
HB .40 PDP	91.50	72.99
HB .61 PDP	120.90	96.99

O.P.S. MARINE		
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#779 \$4.75

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PRODUCTS



CUSTOM-CRAFTED MODEL AIRCRAFT AND R/C PRODUCTS

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Big H ray	31.00	45.00
BRIDI		
RCM-40	39.00	54.00
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Trim (solid)	1.19	1.00
Trim (checks) & Glo	1.59	1.30
Super Coverite	8.20	6.00
Super Cov. 15'	38.34	28.95

RADIOS

LOGICTRON	LIST	REDCO
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Champion 2-5	388.49	243.50
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REDCO PRODUCTS
2401 CAREY LANE
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BRIDI		
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Tweedy Bird	39.95	30.25
Dirty Birdy 40	59.95	41.50
Dirty Birdy 60	84.95	59.95
Dirty Birdy 50(G)	124.95	85.00
Kaoss 60	66.95	46.50
Super Kaoss 40	55.95	40.00
Super Kaoss 60	69.95	48.00
UFO (G)	129.95	96.00
GOLDBERG		
Skytark 56 II	49.95	31.75
STAFFORD		
EAA Acro Sport	64.95	46.50
EAA Acro Sport Foam Wing	69.95	49.95

R/C ENGINES

FOX (all w/ MUFF)	RETAIL	REDCO
40 STD SCHN	45.95	30.95
40 BB SCHN	64.95	42.95
45 BB SCHN	64.95	42.95
60 BB Eagle	64.95	42.95
Other sizes in stock		
P O R		
K & B		
7.5CC Fan	160.00	97.50
40 Series 75	72.50	42.50
40 w/Pump	105.00	65.00
61 Series 75 w/Mull	96.50	58.00
61 Ser. 75 w/Pump w/Mull	125.00	70.50
7.5CC Tuned Pipe	30.00	21.50

O.S. MAX		
25 FSR w/Mull	61.95	41.50
60 FSR w/Mull	129.95	93.50
60 FSR Pump w/Mull	159.95	110.00
90 FSR w/Mull	225.00	149.95
KRAFT		
.61 w/Mull	99.95	81.00
SUPERTIGRE		
X60 SE SCHN	125.00	87.50
X60 Tuned Pipe	34.45	29.95
X60 Reg. Mull		14.95

WEBRA - CHECK AVAILABILITY
EK RADIO SPECIAL
Super Pro 2-7 \$255.00
limited Supply

FAST SERVICE

ORDERING INFORMATION

ADD \$2.50 (+ \$1.00 for C.O.D.) to all orders for shipping and handling costs except for oversized kits (a Bridi Glass Kits, which require \$6.00 + \$1.00 Shipping excess will be refunded in cash. Credit card customers please include card number and exp. date. Some items in limited quantity and all are subject to availability. Prices may change if retail prices change.

SCALE KITS

BRIDI Glass kits & Concept kits in stock check availability	LIST	REDCO
JEMCO		
FW190D9	64.95	45.95
P51	64.95	45.95
ME109	64.95	45.95
T 6	64.95	45.95
F4U	79.95	52.95
ZERO	79.95	52.95
F8F	84.95	56.95
P47	89.95	58.50
JET HANGAR		
MIRAGE	129.95	114.95
F8F-8 Cougar	139.95	119.95
HOUSE OF Balsa		
P51 1.40i	54.95	39.00
Bonanza 40	—	—
Pitts 40	—	—
P 51 40 Glass	99.95	74.95
BUD NOSEN		
P51	169.95	120.50
Calabria	99.95	74.95
Mulligan	139.95	99.95
PICA		
T28 or Spitfire	79.95	54.95
FW190 D9 or WACO	79.95	54.95
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ROYAL		
F4U 60	94.95	78.50
F4U 60 w/cockpit	104.95	85.95
F4U 40	74.95	62.95
Zero SR	94.95	78.50
Zero 40	79.95	65.95
F4U 60 cockpit	9.95	8.00

KIT SPECIALS LIMITED SUPPLY

JEMCO	LIST	REDCO
P51, ME109, FW190	64.95	41.95
ROYAL		
P51-60 or F8F 60	94.95	77.50
Oscar 60 or Hein 60	89.95	73.00
Sig Ryan Sla	73.50	62.95

R/C Aircraft Ready to Fly
CALL OR WRITE FOR PLANES IN STOCK

BIG DEALS

LIST	REDCO
EWB Super Hustler	199.95
Super Hustler 20 x 8 props	7.95
EWB fuel tank kits & HDW in stock	
60 Maximizer	85.00 61.50
Extra belts (each)	2.00
20X10 Grish Props	8.00 6.95
Quadra Engine	139.95 96.50
20X6 or 20X8 T/F props	7.95 6.95

RETRACTS

RHOM	LIST	REDCO
2 Gear Mains	87.00	58.75
2 Gear FW-190	89.50	60.50
2 Gear 90"	114.95	76.99
3 Gear F/W or Belly)	125.00	81.50
ROBART		
90" (2)	49.95	34.95
Ret. Tailwheel (Reg or Mini)	9.95	7.50
KICK THE CAN		
Sonic Supchg II	11.95	8.95
Sonic Monitors	6.95	5.45

WHEELS		
Universal Scale	LIST	REDCO
2" 2 1/2" 3" per/pair		4.50
3 1/2"	5.79	4.50
3 1/4"	7.49	5.79
3 1/2"		5.98
4" Diamond	8.99	7.50
4" Straight	8.49	7.25

Other diamonds in stock
Kraft Hayes - Dubro also in stock

MISC	LIST	REDCO
Robart Sup Pump	17.95	12.95
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STAND-OFF SCALE DESIGN

from page 144/42

1/16" balsa skin. The leading edges would be 1" x 1/4" balsa. The stab trailing edge would also be 1" x 1/4" balsa. Notice I have no trailing edge for the elevator. It is not necessary. Using the three-view, I determined the thickness of the vertical stab. An airfoil for the complete horizontal surface was drawn (this includes the stab and elevator as one unit). The leading edges, trailing edge, skin and hinges were then added. The airfoil was semi-symmetrical, with a maximum

thickness at about 30% of the chord. The stab and elevator were made slightly longer than I thought necessary to allow trimming on final assembly. Note that the ribs are placed to allow cutting of the skin, leading and trailing edges for the final assembly.

I now had a set of drawings of each of the major parts of my Bronco: wing, booms, vertical and horizontal stabs, elevator, rudders, and fuselage. The drawings included notes about material, thicknesses, grain direction, etc. Do not forget, these are construction drawings, include as much information as is required to make construction clear and easy.

Now that I had my construction

drawings, I had them reproduced and started the actual construction, as you will soon discover, problems will come up. When they do, write down the problem in your binder. After you have solved the problem, write the answer down and make revisions to your original drawing. One more hint: Write down a construction sequence. I usually make my checklist very detailed. Include a list of hardware required for each sub-assembly. This will force you to think through each step and may bring up some trouble areas. Do not let problems discourage you. Put the drawings away for a couple of days and start again when you are fresh.

to page 154



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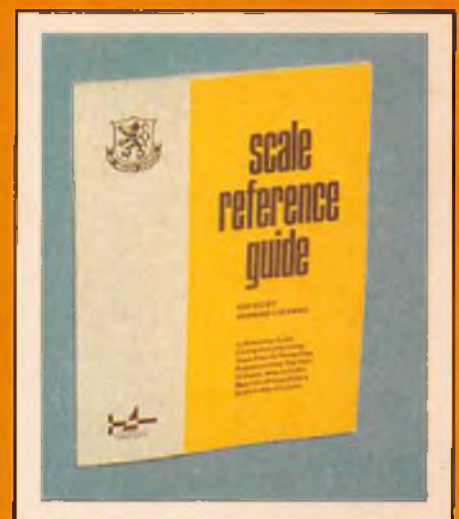
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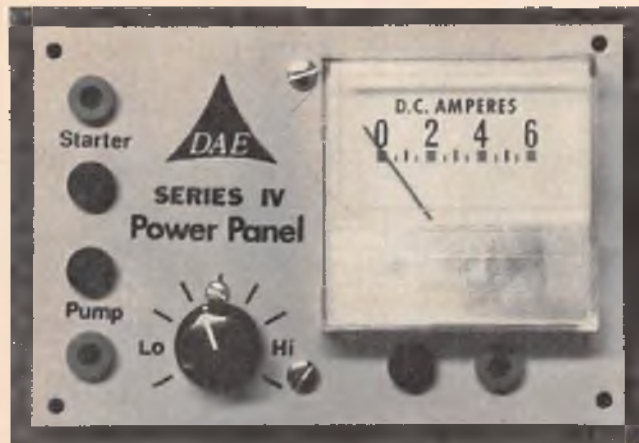
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STAND-OFF SCALE DESIGN

from page 151/42

Any modeler who has flown his own design will tell you how good it feels. It takes more time and effort, but the final outcome is always worth it. A model that looks different will draw comments and you will meet many more people. Once hooked on building your own designs, kits are not the same.

I have tried to explain how I design my own models. Some of what I have said may not go with the true model designer but that does not bother me. There are no classes in "Aero Design, Models." The only way to learn is to try. If I can help in any way, please feel free to write. Brendan Wong, 16761 Viewpoint Lane, Apt. 320, Huntington Beach, California 92647. □

SB-2 SCOUT

from page 41

Conclusion:

We found absolutely no faults when flying, we used a hand launch and she had a beautiful glide when the engine quit, more than enough time to find the field and get lined up for a sweet landing. The SB-2 Scout was engineered as a sport trainer and we highly concur, it is a plane that the novice or expert alike would be proud to own. □

CLIPPED WING TAYLORCRAFT

from page 40/32

assures both tension and compression resistance.

With struts in place drill a 3/32" hole in each basswood piece to receive the jury strut crosspiece. Set it in place. Bend the jury struts to shape and attach with the wire clips and bolts as shown on the plans. Solder the jury struts to the crosspieces. After they cool, clean and paint the struts.

Set the airplane upright and check the dihedral. It should be 1" under each tip. If so, drill holes for safety wire on the turnbuckle and remember always to safety wire it so it won't loosen in flight. Remove wings and set aircraft on workbench.

Cut windshield and side windows to patterns and glue in place. Secure with masking tape. When dry, cut narrow strips of MonoKote and cover edges of windshield and windows. Build the top window framework of 1/8" sheet balsa. Paint it all black, then trim top window to shape and glue it to the framework. The top window is held in place with #2 wood screws.

to page 156

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3. All tail and control surfaces sheeted, sanded to match, ready to finish.



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- Includes:
1. Balsa sheeted, Monocote covered wing panels with matched, hinged and covered ailerons.
 2. Balsa fuselage, Monocote covered with removable access hatch.
 3. Tail surfaces streamlined, Monocote covered with matched, hinged control surfaces.



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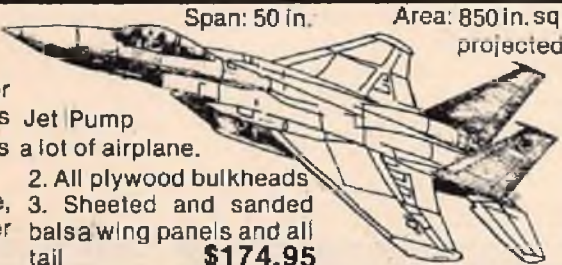
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CLIPPED WING TAYLORCRAFT

from page 154/32

Finish assembly with as much detail work as you like, such as instruments on panel, seat, pilot, etc.

Flying:

Before flying be sure Center of Gravity is within range shown on plan sideview. Be sure tires are inflated, all servos move surfaces freely and in proper direction, and that movements do not exceed 1/2" plus or minus for ailerons

measured at the trailing edge or 3/4" plus or minus for the elevator (less if C.G. is at aft limit). The rudder may swing 1" to 1 1/2" plus or minus.

Double check that all surfaces are true, and not warped. Make sure the strut bolts are secure with locknuts. Same with tail braces. Be sure all hinge pins are secure and won't vibrate loose.

Start the engine. Let it warm up in idle. While it is warming up check hinge pins and strut bolts. Advance throttle to high. Recheck hinge pins and bolts. Operate radio to be sure surfaces are smooth and free. When satisfied with the above, taxi to the runway and prepare to take-off. Check approaches and traffic

pattern. When clear taxi into position.

Take-off by advancing the throttle smoothly and feeding rudder control to assure a straight take-off roll. Let it build speed and as end of runway approaches feed up elevator to achieve lift-off and smooth climb-out to 150' altitude. Remember that in order to turn one of these biggies you must use both aileron and rudder plus elevator as necessary. Fly a few racetrack patterns and as soon as practical land. Take the plane home or to a shady area to relax and check every last detail. Look for loose bolts on prop hub, engine mounting, servos, struts braces, landing gear and tail

to page 160

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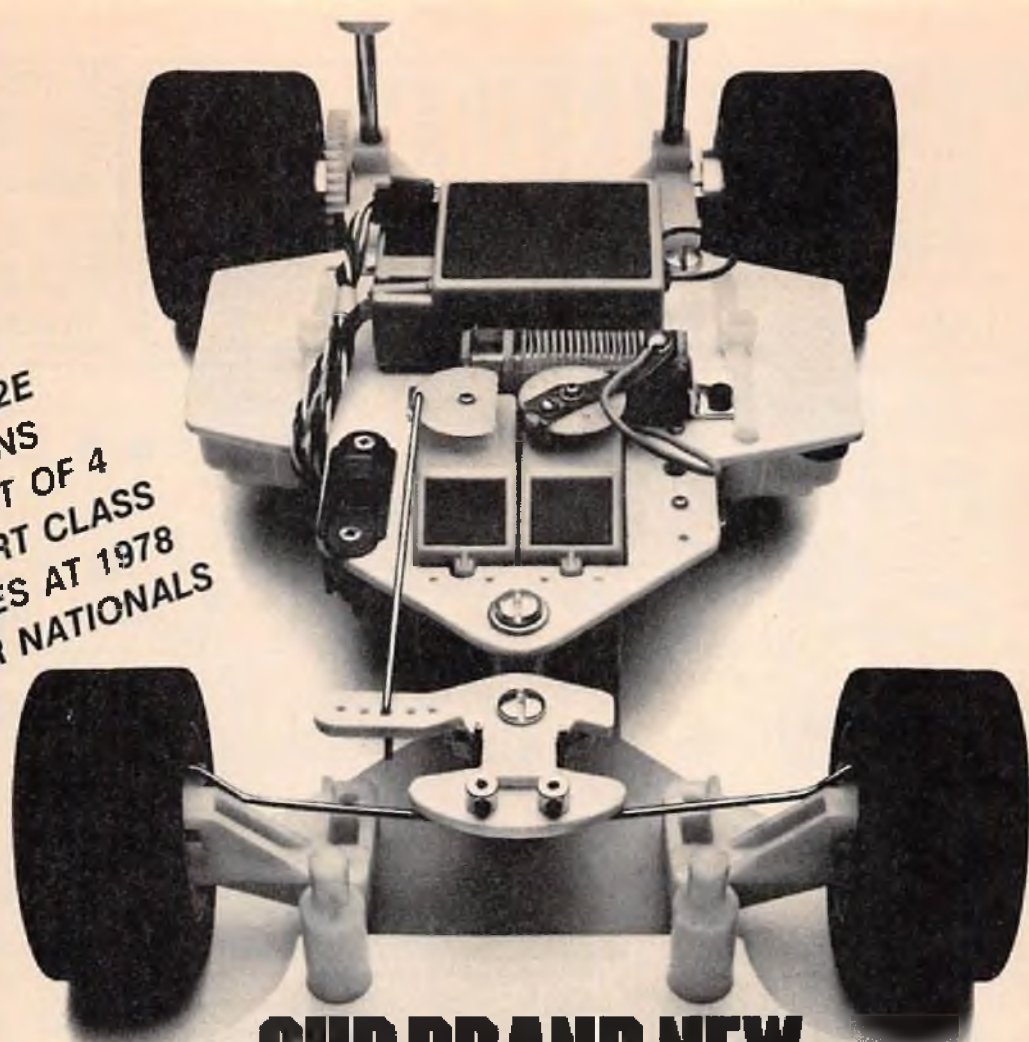
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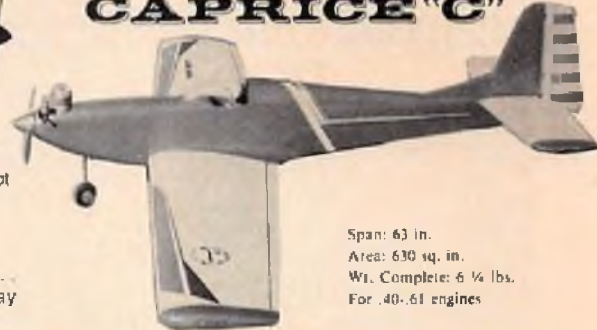
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from page 156/32

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SOARING

from page 27

Half the battle in flying well is being able to see our sailplanes clearly. All of us, at sometime or another, have experienced the frustration of bringing a new, smartly finished sailplane out to the

field only to find, that in flight, it was darned near invisible. The color scheme that looked so good on the ground was terrible in the air, blending so well with the sky that orientation was a big problem. A recent study by the German Air Force came up with some surprising results concerning color visibility. These tests were made with full size airplanes flying at distances of up to five kilometers from the observers.

The colors were rated on a scale of 0-Totally invisible to 100-Totally visible. Here are the results: White-88, Yellow-70, Orange-47, Pastel Grey-43, Pastel Blue-43, Medium Red-23, Blue-8, Black-8, Dark Blue-8.

Look how poorly red scored compared with white or yellow. These test were done against a variety of background skies from bright, sunny to overcast, cloudy, dull. The colors came out in the same order each time. You'll

notice that this test did not include any of the transparent mylar colors we use. The yellow and green transparent colors stand out very clearly for a long distance, which tends to verify the yellow as one of the best for visibility. No matter which color or combination you choose, a good way to track your sailplane on distance runs or high thermalling, is to iron on a 3/8" wide strip of silver MonoKote on the entire length of the leading edge. At every turn or change of direction a distinctive flash can clearly be seen.

Prince George RC Club newsletter editor, Bill Rouch, has a method of bending balsa that I have been using for years but which he will pass on to the newcomer who is still splitting and breaking balsa. Use this method and your breaking days are over. Soak the balsa for bending in an ammonia and to page 162



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IN MEMORIAL

MATTHEW A. SULLIVAN
1911-1979



Matthew A. Sullivan, 68, pioneer inventor in model aviation, died August 10, 1979. A resident of Jenkintown, Pennsylvania, he was born and raised in the Philadelphia area and was highly respected in the hobby industry internationally. He was Chairman of Sullivan Products, Inc., a hobby accessory manufacturing company which he founded in 1941 and also Chairman of Sullifoam Inc., a plastics manufacturing firm founded in 1955. His many lifetime honors included the Hobby Industry Association of American Meritorious Award of Honor, the Distinguished Service Award as director of HIAA, Distinguished Recognition Award of Delaware Valley Federation Model Airplane Clubs, the Walter Billet Award and most recently was inducted into the Model Aviation Hall of Fame. Mr. Sullivan was founder of the Academy of Model Aeronautic's Scholarship Fund and a former AMA National Director and a Fellow of the AMA. He held Charter Membership in the Eight-ball Association, the Hobby Industry Association of America and the Hobby Industry Association of Delaware Valley.

As a member of the Eight-ball Association, Matty held the honorary rank of Admiral, East Coast Command. The Eight-ball organization was formed to raise funds to cover the annual deficit under which the AMA operated in its early years. It was through the efforts of Matty, and the rest of the Eight-ball'ers, that the AMA was able to survive and grow to its current status.

Matty Sullivan started his modeling career in the mid-1930's with gas powered tethered race cars and switched to control line aircraft with the advent of Jim Walker's Fireball. World War II brought about shortages of various metal products causing control line models to be flown on strings. Matty was able to locate a huge spool of small diameter wire which he cut to appropriate lengths, packaged, and sold off the back of his truck. Such was the beginning of a highly successful model accessory business for a bricklayer who attended contests clad in bib overalls.

Seeking out modeling problems and solving them with products that would make the sport happier and easier for the modeler was one of Matty's goals. Nearly 60 patents have been issued to him and most of his inventions were years ahead of their time. He was a pioneer in the use of plastics for model accessories, most notable being his molded nylon bellcranks. He was the first to develop techniques for injection molding nylon which was quite a revelation to the DuPont Company and the modelers.

For many years, Matty was an active participant in the trade shows. His trade mark was his suitcase hidden beneath the table from which he extracted prototypes for all sorts of future products, many of which had to wait several years before production. An example is his fuel tanks which now have a market volume of 12,000 per week or his ribbed plastic pushrods with weekly shipments of 15,000 per week.

We at RCM have had the utmost admiration and respect for Matty Sullivan as a person as well as a businessman for many years. He was often outspoken in both his criticism and his praise of our publication and, regardless of the subject, it was always directed toward the welfare of the hobby. Whether he chewed us out or patted us on the back, he always left us with warmth in our hearts and a smile on our faces. Modeling has lost a great man and we have lost a dear friend. We will all miss Matty Sullivan.

He is survived by his wife, Margaret, two children, Robert M. Sullivan, and Carol S. Rose, seven grandchildren, three brothers, and one sister. □

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SOARING

from page 160/27

water solution (aqua-ammonia is best) for 15 minutes to no longer than 45 minutes. What happens within the balsa wood structure? The orderly assembly arrangement of the microscopic elongated hollow cellulose tubes, which are held together by a natural adhesive called lignin, are temporarily distorted when the ammonia solution is applied. The balsa wood is then bent into its new shape, and the lignin returns to its original strength. The solution of water and ammonia evaporates leaving no

residue and the cellulose tubes are then locked into their newly stressed formed shape. You'll want to work in a well ventilated area and you will require supports or forms to hold this bent balsa wood in its new shape for a significant period of time until the ammonia water solution is completely evaporated. No loss of strength will occur by using this process.

I recently flew in the Western RC Soaring Championships at Mile Square Park in Fountain Valley, Calif. which was held to raise funds to support our Soaring Team that went to Belgium. Over one hundred sailplaners

participated in trying for one of the twenty-five beautifully hand crafted sculptures. Lee Renaud was the Contest Director and he maintained a rapid pace for the two day affair with the seventh round completed by 3:45 p.m. on the second day.

Many new ships made an appearance, especially in the Two Meter Class.

One pilot caught my eye. John Dalman had his whole family on the flight line. Mama did the timing and John did the baby sitting. Throughout his whole flight, John was bouncing up and down to passify the little guy.

Good Lift. □

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BIG IS BEAUTIFUL

from page 23/22

comes along, you'll find a revelation in store for you.

★

Had a note and some photos recently from Ken Morss of Galesburg, Illinois, where they recently held a Big Bird Fun Fest. Ken tells me they were a bit disappointed with the turnout as only ten big birds turned up but also says the quality of the models and the flying was super as was the interest shown by the public. The local TV outlet did some filming which was shown on the evening news in Galesburg and radio coverage was provided throughout the two day event.



Jerry Gardner, Fort Smith, Arkansas, and Quadra powered Byron Originals Pitts at Galesburg.



Guy Fulton, Athens, Illinois, and his Nosen 310. Two ABC S.T. .60's, MRC gear and 26# of impressive looking twin.



Frank Graber and the Dave Platt Jungmeister, O.S. .90 power at the Galesburg, Illinois Fun Fly for the larger models. Bucker doesn't look big enough to be Quarter Scale but it is.

to page 166

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You might want to read the RCM REPORT written by Ben Strasser page 73 in the July Issue. He really puts this saw to work and explains all the features.

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WE'RE FIGHTING FOR YOUR LIFE

BIG IS BEAUTIFUL

from page 164/22

Jerry Gardner of Fort Smith, Arkansas, took a first place in a modified pattern event flown on Sunday of the two day event. He also took a cash prize for driving the greatest distance to be present and, on top of all that, he and his 6 year old son, Darin, put on a show with Darin flying Dad's Byron Originals Pitts Special via a buddy box. Darin has got to be just about the youngest Quarter Scale pilot around.

I am sure we are going to see more and more of these monster fun flies around the country as more and more modelers get into the big bird class. It seems that most of us who are into the BIG scene have been involved in some competitive aspect of the hobby at one time or another and have rejected the highly competitive arena for a little more relaxing and enjoyment of the hobby. Some, of course, have never gone the competition route and are quite content to pass it by and just enjoy themselves.

Six of the ten models shown at Galesburg were Quadra powered, including a scratch-built Hiper Bipe built by Rich Atkinson which is apparently a really super flyer. I'll be looking forward to Ikon Northwest producing a kit of a Quarter Scale Hiper Bipe --- if it flies half as well as the full scale, it'll be a dandy!

Ken Moss is currently flying a Quadra powered Ugly Stick and has a Concept Fleet Bipe in the works along with another Hiper Bipe. Sounds as if he is a pretty dedicated Quarter Scaler.

Anyone out there who is planning a rally or Fun Fly including Quarter Scale models ... please be sure to include me in the mailing list far enough in advance to get the work out to others. I need the information about four months in advance of the event and would also appreciate a report and pictures afterwards, if at all possible. You might be surprised who'll turn up when there is enough advance information available.

Holy Cow, got to the end of another one of these columns and still lots to say ... see you next month? ☐

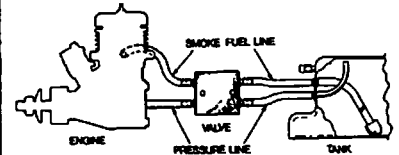
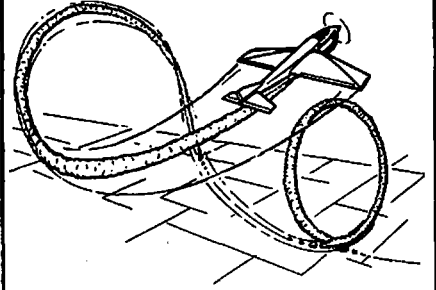
CUNNINGHAM ON R/C

from page 18/16

bottom of the cloud was black. So much for the soap box, you can have the ball from now on, Ken. Anyone who wants to write and argue about a pure air mass, please direct your letter to Ken, not to me. I don't want to get into a word battle, my only reply is to go out and fly, and see what is happening to the aircraft and to you.

★

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From the soap box, let's take a big jump over to the black board, and consider the lesson for this month. And, that lesson is simply this, **seal the gaps at the aileron and elevator hinge points.** Got that --- try it one more time --- **seal the gaps.** I am as guilty as anyone else when it comes to making sloppy hinge joints. Quite often I wind up with a new bird that has a gap at the ailerons and the elevator of about 1/8". This gap doesn't seem to make as much difference to a smaller model as it does to a larger model but, perhaps, it does. I haven't gone back to seal the sloppy gaps on some of my smaller aircraft --- guess that I'd better do this just to see.

The best way to seal the gap is to build a hinge joint that seals itself. By that I mean that you construct the joint so that the hinges are slightly buried in the joint itself. The other way, and one that works just great for the lazy builder that I am, is to seal the gap with a strip of MonoKote. I always cover my aircraft with Super MonoKote, because I like it, though other films are great to use too... let's say that I always cover with plastic films because they give a super finish, with no painting, sanding, etc., and with a minimum of time and trouble. If you like to paint, do it, many of the finishes that I have seen make my mouth water, but as old Unkie Donnie said a long time ago,



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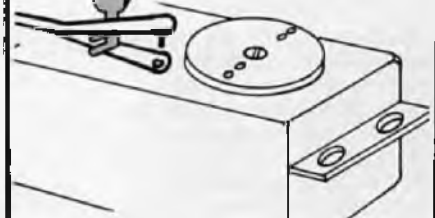


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WE WILL NOT BE UNDERSOLD ...YOU WILL NEVER BE DISSATISFIED

If you can show us that a product we advertised in this magazine appears elsewhere in "this" issue at a lower price, we'll match it. That's a promise. And of course, if any product is not exactly as represented when you receive it, ...send it back within 14 days. No questions asked... as long as it's in resaleable condition and packed in the original box.

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Watch for our monthly ads. Keep your eye on Consumers Hobby Corp. We're more than a mail order service, we believe in the future of R/C modeling, we believe it should grow and be affordable to everyone. And to do that we're going to offer values that will let you get the most enjoyment out of your hobby, the most value for your dollar.



RADIOS		COX/SANWA		MRC	
FUTABA	LIST	CHC	8020 2Ch. 2 ST	LIST	CHC
FP-2GS	\$109.95	\$ 72.98	MRC	\$ 99.95	\$ 69.98
FP-2F-F7	149.95	98.98	772-10	119.95	69.98
FP-3S-S20	169.95	109.98	774-10-4	279.98	188.98
FP-4FN-S18	289.95	180.98	775-42	379.95	229.98

SPECIAL INTRODUCTORY OFFER CHC-2 2 Channel, 2 Stick RADIO SYSTEM ONLY \$64.99

Great for Planes, Cars, Boats

- Sticks Rotate 90°, Ideal for cars, boats and planes.
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- Complete 2 Ch., 2 Stick Transmitter (each stick with trim adj.) takes BAA dry batteries (not included)
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- 2 Servos, Switch harness, all gramminets & mounting hardware.
- Available in all 72 MHZ Frequencies



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- 1/7.5 Scale with superbly detailed fiberglass body, Collective Pitch, Special Hand Pull Starter built-in, Long-life Ball Bearing Construction
- 53" Main Rotor
- 47 1/2" Fuselage
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- For 40-55 Engine, 4 Ch.

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- Full Equipped Weight: 10.36 Lbs.
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- for Precision & Speed \$ 29.95 \$ 19.98
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- CHC
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- 6 Channel Receiver 35.00

SPECIFY TRANSMITTER MAKE AND 72 MHZ Frequency Desired When Ordering.

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WING SPAN 46" FOR .15 - .25 ENGINE
WING AREA 340 sq. in. 2-3 Channel Radio



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1.5 RC SCHNEURLE
WITH MUFFLER**

List \$296.95
CHC \$149.98

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	LIST	CHC		LIST	CHC
.09 RC	\$ 42.98	\$ 24.98	.60RC BB GB	\$144.98	\$ 70.98
.15 RC	48.98	29.98	.19RCX Sch. w/Muffl.	104.98	65.98
.19 RC	53.98	27.98	.26RCX Sch. w/Muffl.	109.98	68.98
.29 RC	59.98	33.98	.40RCX Sch. w/Muffl.	149.98	93.98
.35 RC	62.98	34.98	.45RCX Sch. w/Muffl.	159.98	99.98
.40 RC	106.98	55.98	.49RCX Sch. w/Muffl.	155.98	97.98
.45 RC	106.98	55.98	.60RCX Sch. w/Muffl.	234.98	119.98
.60B II RC	137.98	68.98			

FOX ENGINES

	LIST	CHC
.15 RC Sch.	\$ 37.95	\$ 22.98
.19 RC	36.95	22.98
.25 RC	36.95	22.98
.29 RC	39.95	24.98
.36 RC	39.95	24.98
.60 EAGLE	69.95	39.98
1.2 Opp. TWIN	250.00	184.98

K&B ENGINES

	LIST	CHC
.40 RC	\$ 72.50	\$ 45.98
.40 RC Press.	105.00	67.98
.19 RC	50.00	32.98
.51 RC	96.50	60.98
.51 RC Press.	125.00	80.98
.21 Out Marine	107.00	64.98
.21 In Marine	74.00	44.98

DS ENGINES With Muffler

	LIST	CHC
.15 RC	\$ 40.95	\$ 30.95
.20 RC	43.95	32.95
.25 RC	46.95	34.95
.30 RC	50.95	35.95
.40 RC	76.95	53.95

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	LIST	CHC
.40 RC	\$134.65	\$ 70.98
.61 RC	181.30	94.98
.20 RC FR Sch.	117.25	72.98
.40 RC FR Sch.	156.30	81.98
.61 RC FR Sch.	217.20	113.98
.91 RC FR Sch.	253.65	132.98

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With Foam Wing Cores & Balsa Sheeting**

List \$140.98

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WING AREA 570 sq. in. 3-4 Channel Radio



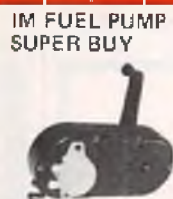
TAMIYA R/C CARS

	LIST	CHC		LIST	CHC
RA1201 Porsche 934	\$74.98	\$48.98	RA1206 Porsche 935	\$68.98	\$39.98
RA1202 Porsche 935	77.98	54.98	RA1207 Lam. Cheeah	89.98	61.98
RA1003 Tyrrell P34	77.98	55.98	RA1208 Countach	84.98	59.98
RA1204 XR311 Combat	84.98	59.98	RA1209 Toyota Cel.	84.98	59.98
RA1205 Lamborghini	77.98	42.98	RA1210 Ligier	74.98	41.98



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List \$19.98
**CHC SPECIAL
\$12.98**

Uses famous Signetics IC544
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3 Wire Servo w/Deans 3-pin Conn. Set
Standard & Triangle Arms supplied
L. 1-1/2" x W. 3/4" x H. 1-7/16"



IM FUEL PUMP SUPER BUY

List \$11.50
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\$4.98**

- Non-Slip Grip Knob Rotates for effortless cranking
- Fuel Exit and Inlet
- Clip slips easily onto fuel can
- Adjustable Pump Head

IM ACCESSORY DEAL

LIST VALUE \$21.95
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Includes 1 each
Fuel Tank (6 oz.) Shut Off Clamp
Pkg. Silicon Tubing Smoked Canopy
Motor Mount 29-40 Size

IM DELUXE MOTOR MOUNTS

All metal, no drilling needed.
Complete w/clamp & mounting hardware.

.15 - .25	\$3.95
.29 - .40	4.50
.45 - .60	4.95



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	LIST	CHC
Trainer 40	\$54.95	\$36.98
Super Kaos 40	55.95	37.98
Dirty Birdy 40	59.95	40.98
Kaos 60	66.95	43.98
Super Kaos 60	69.95	47.98
Basic Trainer	39.95	26.98
Sportster	39.95	26.98
T-20 Trainer	34.95	23.98
Quickest 500	42.95	28.98

LANIER



	LIST	CHC
Cessna	\$48.50	\$30.98
Transit	46.50	29.98
Pinto	48.50	30.98
Comet II	62.50	39.98
Caprice	73.50	47.98
Jester	73.50	47.98

M.E.N.

	LIST	CHC
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Buzzard		
Bombshell	53.95	37.98

P I C A

	LIST	CHC
Spitfire	\$89.95	\$64.98
T-28-B	89.95	54.98
FW 190	89.95	54.98
WACO	89.95	54.98
Dualist	99.95	62.98
Cessna 182	99.95	62.98

MRC RTF

	LIST	CHC
Cessna 177 w/En. .35 & Muffler Installed	\$449.95	\$259.98
Cherokee w/En. .40 & Muffler Installed	499.95	309.98
Hawk Trainer w/En. .15 & Muffler Installed	98.00	74.98
Electra Hawk	199.98	112.98

MRC R/C TANKS

	LIST	CHC
Sherman RT1601	\$156.98	\$107.98
Leopard RT1602	199.98	137.98
Gepard RT1603	249.95	172.98
RC-11 Batt/Chgr.	29.95	24.98

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CUNNINGHAM ON R/C

from page 167/16

before plastic films hit the market, "Cunningham, your models look like they were painted with liquid fertilizer." And he was right . . . but no more now that I iron it on.

So, back to the sealing bit. If you have constructed your bird with tender loving care, and the aileron still remains about 1/8" away from the trailing edge of the wing, don't despair, get out some plastic film of the same color as the wing and aileron, cut a strip about 1" wide and the

length of each wing panel. Turn the wing upside down, disconnect the aileron pushrods, flex one aileron to the full up position, and iron on the 1" strip of plastic film, sealing the entire length. Repeat with the other wing panel. Be sure to iron on the strip of plastic film with the aileron fully flexed in the up position. Now, when you're finished, move the aileron up and down several times to listen to the fancy sound that it makes, crackling and popping. But if, it has enough flex, you won't notice this because, normally, the ailerons are not distended a long way. Do the same for the elevator hinge line.

When you're done, reconnect all of

the pushrods, and take your bird out to fly. If it is a new bird, you won't be able to tell the difference because you haven't flown it before, but if it is a well flown bird, you will instantly realize that you have far better aileron control, a much smoother roll rate, and all with much less load on the servo. The same for the elevator control. Loops should be smoother and easier and the aircraft flies through the air much cleaner. An added plus for the larger aircraft is that the sealed aileron gap tends to reduce flutter at the ailerons. Flutter rarely plagues the smaller models, but does present problems to larger models. Flutter is

to page 172

The Oshawa Radio Control Club's

HOBBY '79

October 26-28, 1979

International Centre, Toronto, Ontario

MODEL RAILROADING: 50' x 50' model railroad working display showing the various gauges - demo of live steam. **R/C BOATS:** 20' x 50' boat pond. Regular performances, R/C electric power, sail, high speed balloon bursting, rocket launching ship, "Willie the Whale" and scale ships. **PLASTICS:** Best in Canada plastics display prepared and presented by the Canadian Plastic Modellers's Society. **R/C AIRCRAFT:** Stand-Off Scale contest will feature the winners of the "Warbirds" contest. **R/C CARS AND TANKS:** 50' x 50' course made up of three separate tracks.

SLOT CARS: Simulation of a Grand Prix.

For further information, contact:

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Available from Litco's approved servicing dealer. See Litco ad for prices. Prompt C.O.D. shipment on all phone and mail orders.

Also available: reverse servo, add \$1.00; servo with Kraft, Futaba, W.E., MRC, etc. Connectors, add \$2.50; connector adapters, add \$3.50; six meter crystals for Litco receivers, add \$8.00.

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Add an exciting new dimension - SKYHAWK II aileron wings to your SKYHAWK I at your dealers Kit #29.95

- Wing 48" span 43 1/2" in area. Semi-symmetrical.
- Engine .15 to .25 cu. in.
- Flying weight approx. 3 lbs.
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- No finishing required. Simply add string.
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- Build and fly in one weekend.
- Complete instructions for fast and easy construction.
- Fully covered wing and tail surfaces. Stressed skin construction. No spar. No balsa. Tested at 10G at 3.5 lbs. airplane weight.
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Litco flite paks or components can be purchased assembled or in kit form. Assembled units are pretuned and ready to use with transmitter specified below. All units use Deans connectors. Servos are supplied with extra female Deans connector to simplify installation.

Litco Systems has pioneered the concept of fully assembled flite paks custom matched to various transmitters. Our servos are electrically adapted to match the transmitter specified. Please order from table below.

PLEASE CIRCLE THE MAKE OF YOUR TRANSMITTER: **KRAFT EK ROYAL FUTABA WORLD MRC RS ORBIT HEATH ACE UNICOM CANNON (PRO LINE COMPLETE FLITE PAK ONLY) SANWA CIRBUS MICROAVIONICS KRAFT KP4A**

REGULAR COMPONENTS



MICRO COMPONENTS



SERVOS

- Double sided PC boards, 544 AA IC
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- 8 mA drain
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- Double sided PC boards
 - Double tuned front end
 - 1.5 μ V, AGC on 4 stages
 - Gold plated Deans connectors
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 - Gold plated Deans connectors
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 - Gold plated Deans connectors
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- Noble high quality switch
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- Nylon protective cover
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WRITE: We answer inquiries immediately. We ship rapidly when paid by money order or cash.

New! BANTAM MIDGET AT LOW PRICE

The newest addition to our tremendously popular 544 servo line is the Bantam Midget. It features beautifully engineered D&R mechanics and a new powerful motor. It is capable of controlling airplanes from 1/2A to 60 pattern. It is lighter, stronger and faster than anything in its size range. The electronics is the same as in all our 544 servos and it is the best money can buy: the newest highly advanced 544AA IC offering internally regulated power supply, dynamic braking, linear ramp timing and the need for very few external components. Parts are mounted on the most sophisticated PC board in the industry — double sided,

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ATTENTION KIT BUILDERS: REGULAR BANTAM D&R SERVO KIT STILL ONLY \$17.00!

NAME		ADDRESS			ZIP CODE
QUANTITY	CAT. NO.	DESCRIPTION	PRICE	TOTAL	
	S5441	Rotary D&R Bantam servo, assembled	(For precision and speed)	20.00	
	S5442	Rotary Dunham servo, assembled	(For power and strength)	23.00	
	S5443	Rotary Dunham micro servo, assembled	(For size and weight)	31.00	
	S5445	Rotary D&R Bantam Midget servo, assembled	(For weight and strength)	25.00	
	R2000	Receiver regular, assembled	Frequency _____	36.00	
	R2001	Receiver micro, assembled	Frequency _____	39.00	
	B1000	Battery regular, assembled		13.00	
	B1002	Battery micro, assembled		14.00	
	H1001	Switch harness, assembled		5.00	
	S5441K	Kit of S5441 servo		17.00	
	S5442K	Kit of S5442 servo		19.00	
	S5443K	Kit of S5443 servo		27.00	
	S5445K	Kit of S5445 servo		20.00	
	R2000K	Kit of R2000 receiver	Frequency _____	30.00	
	H2010	5 male and 5 female Deans 3 pin connectors & assortment of wire		8.00	
	S2000	Trays for all regular servos and S5445, 5 pcs.		5.00	
	S2000A	Single snap on tray for S5443		1.25	
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On personal checks delay of up to 3 weeks. N.J. res. add 5% sales tax. Foreign orders add 10% of the total.			1.50		
			TOTAL		

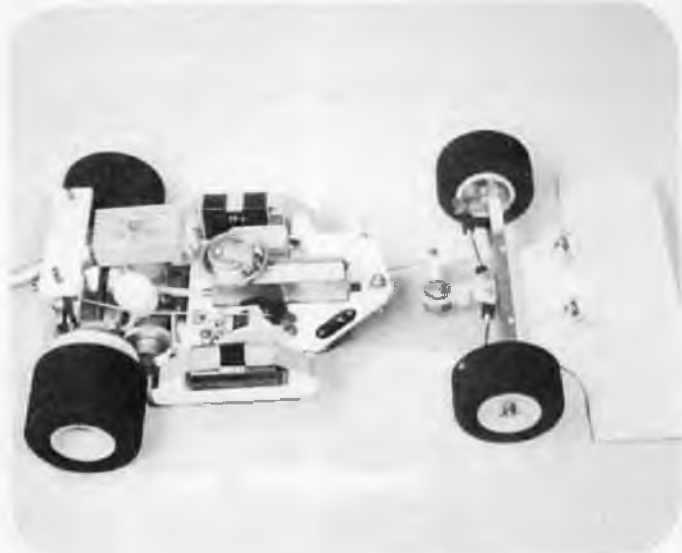
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CUNNINGHAM ON R/C

from page 170/16

caused by many things: large ailerons, unsealed gaps, pushrods that are too small or servos that cannot hold the aileron still. Flutter can be controlled by cutting down the aileron throw, eliminating the gap at the hinge line, cutting down the size of the ailerons, using larger wire for pushrods, or a combination pushrod (just like we use for elevator pushrods) balancing the area of the movable surface by putting some of the area ahead of the hinge line, or adding a weight to the surface, protruding forward of the hinge line. But, in all cases, sealing the hinge line will be the first step in eliminating flutter, and in giving you a better flying aircraft.

I have used the complete MonoKote hinge shown in the drawings for my Lazy

Ace for over two years and have never had a sign of hinge failure. Whatever hinge method you use, seal the gap, your aircraft will be happy that you did. □

ENGINE CLINIC

from page 15/10

However I only accept new engines for the rework. I will not quote prices here as it depends on the particular front rotor 6.5 (free-flight or R/C — latest or earlier model, etc.). Anyone interested can write to me for prices. I answered Mr. Kolodziej separately on this matter.

Prior to the introduction of the new 7.5 we had to use the pump used on the K & B .40. As this did not extend deep enough into the 6.5 case it was necessary to machine approximately 3/16" off the back of the case. However,

with the introduction of the 7.5 and the 7.5 Perry pump the new 7.5 pump will fit the 6.5 without alteration. As far as differences between the .61 and .40 pumps, there is none. The pump units are the same. Only the die cast housing to fit the different makes of engines is different.

When using the Scozzi mount (now being produced by Larry Wolfe) it is necessary to raise the carburetor approximately 11/32" to clear the mount. In the past I made adapters to do this. But, again, with the introduction of the K & B 7.5, the 7.5 carburetor adapter (riser) can be used on the 6.5 also. When using the Perry pump the Perry large bore pump carburetor is also used for maximum rpm. As you are not after maximum power the standard .60 size Perry carburetor as supplied with the 6.5 R/C engine can be used. If you use the Perry 7.5 pump you will need the Robart



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Auto-mix to bleed off excess pressure back to the tank so the engine will not load through the mid-range. A Robart Super Pumper may also be used in place of the Perry pump, but we have had better success with the Perry pump in this application. However, if you are not after maximum power output the Robart pump will work okay. The 5" fuel draw might be a bit marginal, however, and the Perry pump the better choice in this case. When using the Perry pump it is also best to use muffler or pipe pressure to pressurize the tank. This assures adequate fuel delivery at high rpm. If the Perry pump picks up an air bubble it takes a moment for the pump to recharge itself and there is a possibility of a flame out. When used in conjunction with low tank pressure this problem is eliminated.

The 6.5 comes in two versions --- U-control / free flight and R/C --- The R/C

with Perry carburetor. The U-control / free flight engine comes with a straight through venturi and the same sleeve timing as used on the Formula 1 racing engine, i.e., pipe timing. So although a pipe can be used on the R/C version you will not see as much gain as you will with the U-control / free flight engine. For your application you will not need a pipe and I suggest using the short K & B 4" mini-pipe. This plus the pipe adapter used on the U-control / free flight version will fit the R/C engine also when you remove the muffler.

Full length tuned pipes are tuned by cutting the neck of the pipe as I have covered several times in past articles. The 4" mini-pipe will not need any cutting. At higher rpm it could be an 1/8"-1/4" shorter and at lower rpm slightly longer but this is not critical for your applications. If you were flying a Skyhawk or Mirage then you would

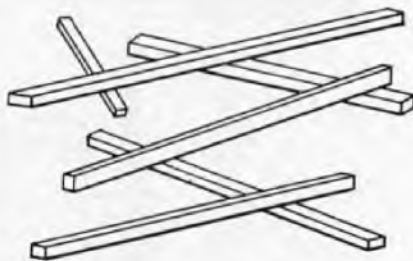
definitely want a full length tuned pipe in turn tuned for maximum rpm.

I realize the above answer has almost been an article in itself but I have received many letters in the past few months asking similar questions so figure this reply would cover those most often asked.

Dear Sir,

I have a K & B 3.5 marine engine and I want to know if it is possible to reverse the position of the exhaust port from front to rear without problems. Also is it possible to rotate the front part of the crankcase 90° so that I may put a Perry carb instead of the other, and do away with the exhaust baffle, without altering timing? Maybe just leave the Perry carb on the side?

*Sincerely,
Scott Neal
Dallas, Texas
to page 176*



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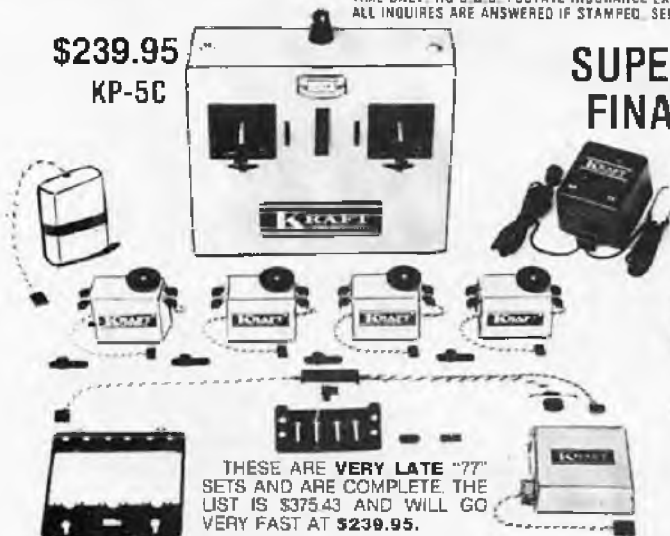
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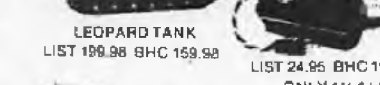
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ENGINE CLINIC

from page 173/10

You can turn the case around on the K & B 3.5 without any problems. This is the way the 3.5 aircraft engine comes from the factory and the same case is used on both engines. You cannot rotate the front plate 90°. To do so would reverse the direction of rotation of the engine. If you want to run a Perry carburetor in an upright position you will have to purchase the 3.5 aircraft crankshaft which has correct port timing for use with the upright front plate position. The front plate, bearings, etc.,

are the same on both engines so only the crankshaft would have to be replaced. You can always leave the intake on the side and still install the Perry carburetor if you want to go that route.

Dear Mr. Lee,

I have been following your column in RCM magazine since September 1976. Only now have I felt compelled to ask what I feel are basic questions concerning the O.S. 60 Front Rotor Blackhead engine.

Assume that an adjustment is made to slightly rich each time:

(1) Does 15% nitro fuel make the

engine run hotter than 5% nitro?

(2) How can the DAMO engine run without lube when mine can run for 10 seconds?

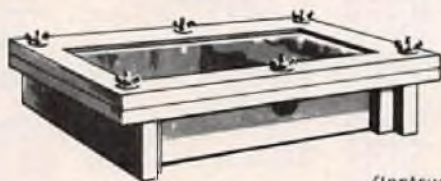
(3) Have you found that the direction of the glow plug idle bar will alter the performance?

(4) Would you break in a new engine on synthetic lube fuel like Magnum 5?

As you may have guessed, I am really hung up. With regard to fuel, why would only Blackheads not run well on the Club fuel? Supposedly it is 20% castor oil and 10% Nitro according to the label. K & B 61's work great on it. But, the Blackheads shut down after a short run.

to page 178

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ENGINE CLINIC

from page 176/10

I have had 10 dead sticks in 12 flights (high throttle or low). Can't get it to sound lean either.

The needle valve has to be 9 turns out to get any run at all. At 10 turns out, the needle valve falls out!

On one flight with 6 turns out, we tried the corner off the piston baffle (approx. 3/16"). That's some hot!

Much later --- using K & B 100 or Magnum 5% --- it's a whole new engine. It really peaks out and 2 1/2 to 3 turns out it idles well. It flies well, and that's what counts. Would you take time to comment please?

*Thank You,
Fred Meichner
Long Island, New York*

When you increase the nitro content of the fuel you in turn increase the power the engine develops. Power is a function of heat. So, the more nitro the hotter the engine will run.

The DAMO uses needle bearings throughout which require a minimum of lubrication. Also being of four stroke design there is a combustion firing every other stroke. This allows the piston and other internal parts to "cool off" so to speak. Running at lower rpm also helps. It is a combination of many factors. However, the engine does require a low percentage of oil in the fuel. Without oil the engine does run hotter and lose power as per the review we did on the engine sometime back.

In years past I have done considerable experimentation with idle bar position. There is no effect on top end but occasionally the position of the idle bar will affect idle. The idle bar parallel to the crankshaft will sometimes help the idle in an engine that has marginal idle characteristics to begin with. However, control of the idle bar position is a bit difficult unless you have a supply of different thickness glow plug washers.

There is nothing wrong with using synthetic oil based fuels for break-in as long as you follow normal break-in procedures. If you fire the engine up and let it die lean several times, finding the initial needle valve setting as many fellows do, take-off too lean the first flight, etc., then you can expect trouble. This would be true with castor oil based fuel also but castor does give more protection than the synthetics. It never hurts to add a little castor oil to any fuel during the break-in period. An ounce or two to a gallon is usually sufficient.

I don't think you gave me the complete story regarding problems with the Webra Blackhead. The Webra Blackhead being made in Europe is intended to be run on low nitro fuel. The K & B has been designed to be run on

fuel in the 10%-15% range. Using more nitro in the Webra Blackhead can cause it to run hotter. However, it should not be as critical as you say. If you found it necessary to open the needle valve to the point where it was falling out then you had another problem as well. Hole in your fuel line, dirt in the carburetor, etc. Changing to K & B 100 or Magnum 5 at a later date with the needle valve closed down to 2½-3 turns probably occurred after the dirt, hole, etc., was corrected. It is normal to turn the needle valve in when using Magnum but not from 9 to 3 turns.

And, incidentally, 20% lubrication is not enough for a pattern engine. You should be using 22%. That extra 2% may not seem like much but it makes a big difference on a lean run or when you point the nose up and start making the engine work. It is always a puzzle to me why fellows using 20% oil in their fuel and experiencing trouble with the engine running hot, siezing, etc., do not add some more oil to the fuel. There is also the possibility that the K & B's running the fuel were broken-in and the Webra's not. Many variables involved here and I have to sort of read between the lines.

That about does it for another month. Normally I run a few more letters but due to the length of some of my answers this month will cut it short. Keep the letters and ideas coming in. And, as I have said in the past, put it in writing. No phone calls.

SUNDAY FLIER

from page 8

attached to the "ejection seat." The P-38 wasn't equipped with one.

It all goes to show that if you want to find out if anybody's reading your stuff, just get something wrong. Or make a controversial statement. More about that later.

Here's an engine item that will interest a lot of you who enjoy experimenting. Edward F. Ellison, Corona Del Mar, Calif., sent the following report:

Dear Ken:

Some time ago I wrote you about some work I was doing with .049 engines with gear reducers. Since that time I've added a reducer to a .020 engine. The results were good but not as spectacular as the .049. My latest unit is a geared twin. It is really wild. It may be run as a vertical twin or in a horizontal configuration and firing may be arranged as alternate or opposed. The alternate firing seems to be a bit smoother, but both produce the same rpm. An 1117 prop will turn 5500 rpm (engine 13,000 rpm). Tests were run with factory heads, however, I've now



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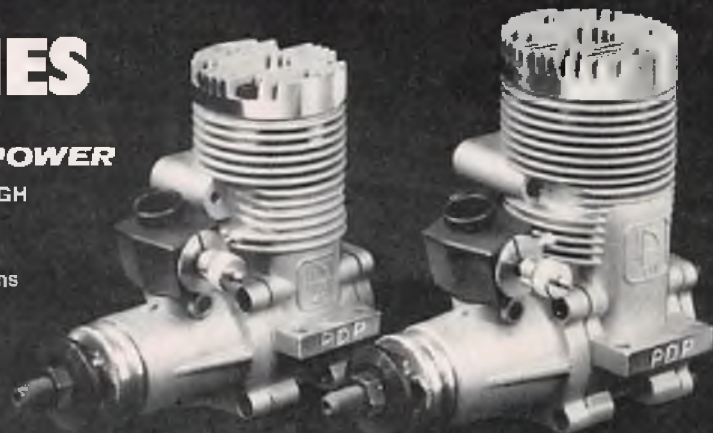
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made special heads which allow me to experiment with different plugs, etc. These can be seen in the pictures I've enclosed.

I'm now designing an airplane to use as a test bed for the twin. It is my belief that the Cox .049 engine is one of the best values on the market and warrants further development such as rear disc rotary carburetor with throttle, improved muffler, heads, gear reducers, etc. I expect to have an engine with these items running within the next three months.

I'm enclosing a recipe for some medicine which will solve all your problems after a hard Sunday flying.

Regards,
Ed Ellison

And here's the recipe which Ed prescribes for "soothing nerves." Specifically restricted to Sunday fliers over 21.

Bombay Tonic for soothing nerves

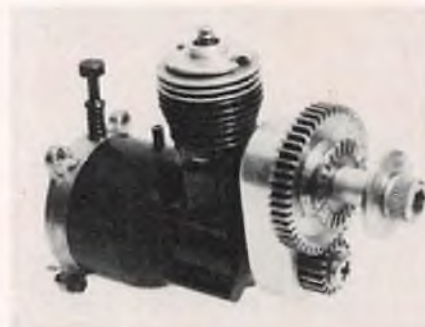
1. Fill martini shaker with ice.
2. Add 5 drops Scotch and stir a bit.
3. Pour 1½ jiggers of Bombay Gin.



4. Gently pour 1/8 jigger Dry Vermouth.

Stir 24½ times so as not to bruise the Bombay. Pour reverently into a previously chilled martini glass. Add olive if desired, lowering it gently into the Bombay.

Now sit down and dream up some new excuses for why your airplane didn't perform as it should.



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I INSTALLED THE AUTO MIX ON MY K&B LEE 6.5CC ENGINE WITH THE PERRY PUMP SYSTEM FOR MY A-4 SKYHAWK. THE ENGINE WORKED FLAWLESSLY WITH GOOD IDLE, TRANSITION, HIGH SPEED AND DID NOT FLOOD OUT. THE AUTO MIX ELIMINATED THE CRITICAL DIMENSIONS OF PUMP SYSTEMS ON HIGH PERFORMANCE AND SPORT ENGINES SO THAT ANYONE CAN USE A PUMP WITH GREAT SUCCESS. I'M PUTTING AUTO MIXERS ON ALL MY PUMP EQUIPPED ENGINES.

ERIC MEYERS



I AM SURE GLAD THAT YOU GOOD FOR MAKE AN AUTO MIX AND SUPER PUMPER WHEN I RECEIVED MY WEBRA 91 WE COULDN'T GET THE ENGINE TO RUN ON HALF THROTTLE. IT SIMPLY WOULD NOT DRAW FUEL AS THE CARBURATOR DIAPHRAGM WAS TOO LARGE. I THEN INSTALLED A SUPER PUMPER AND AUTO MIX AND THE PROBLEM WAS SOLVED. I PLAN ON USING THE WEBRA 91 CARBURATOR ON MY FUTURE PATTERN AIRPLANE NEXT YEAR BECAUSE THE WEBRA 91 CARBURATOR HAS A GOOD MIXTURE CONTROL. AS THE WEBRA CARBURATOR IS UNPRESSURIZED YOU MUST USE THE SUPER PUMPER / AUTO MIX.

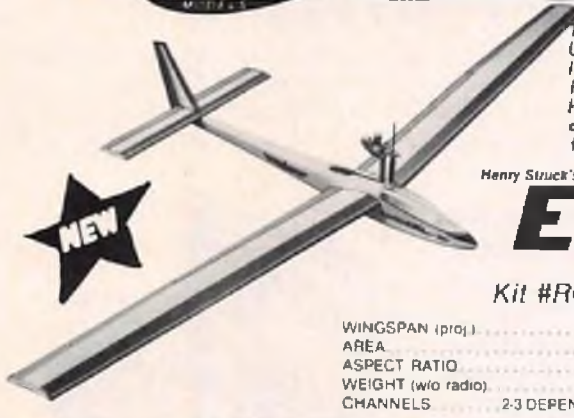
FRED K...



JUST A NOTE TO LET YOU KNOW HOW THE SUPER PUMPER / AUTO MIX COMBINATION IS WORKING OUT. I HAVE INSTALLED IT IN MY LAS VEGAS TOURNAMENT OF FLYING AIRPLANE WHICH USES A 91 ENGINE. THE RESULTS ARE OUTSTANDING. IT WORKS PERFECTLY AT ANY RPM AND IN ANY POSITION AND TRANSITIONS FROM LOW TO HIGH SPEED ARE VERY SMOOTH. I HAVE LOCATED THE FUEL TANK FURTHER REAR AND BELOW THE ENGINE WITHOUT ENCOUNTERING ANY PROBLEMS. IN SUMMARY I AM VERY PLEASED WITH THE TROUBLE FREE PERFORMANCE OF THE SUPER PUMPER / AUTO MIX.

DEAN KOENIG

The **Jetco** Glider with the **RETRACTABLE/REMOVABLE** Engine Pod

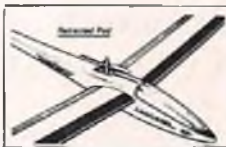
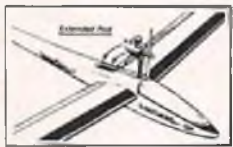


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better students is young Hans King, shown with his two airplanes, a Showmaster and a Sunfli.

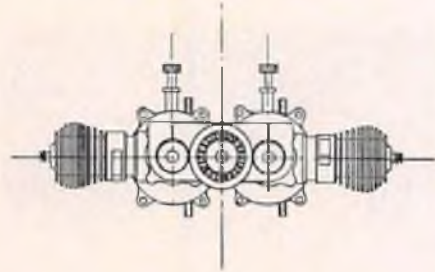


Hans built both planes, with an occasional assist from me. The first was the Showmaster, which he soloed with about two hours of instruction. While

learning to fly it, he was building the Sunfli, which is not exactly a beginner's type design. He persevered --- pestering me almost daily to go flying. Then one day, he soloed it. Standing in the pits, watching the action, was an airline pilot who was also learning to fly R/C. As Hans --- all of thirteen years old --- retrieved his Sunfli following the landing, the airline pilot was heard to say "Beats me. I can grease in a 727, but I'm still having trouble flying my R/C trainer, while that kid flies that hotrod!"

Earlier I said that one way to get letters was to publish something controversial. Well, next month I'll share some of the letters I've received (they're still coming in) on how to avoid tip stall. I never knew how many ways there are.

One guy wrote "Go to the men's room until your companion puts the tip down!"



Not recommended for pre-flight jitters. Only for post-flight debriefings.

And say --- can't you see that opposed .049 twin in a Stand-Off Scale model of the Aeronca C-3? The prop would almost be true scale.

For the past several months I've been having a lot of fun teaching newcomers to the sport of R/C how to fly. One of my

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SECOND PLACE

Joseph S. Cholity
Elk Grove Village, Illinois

Scratch-built from Sid Morgan plans, this PBY-5A Catalina (Sea Yacht conversion) has a 9 ft. wing span, weighs 16 lbs., and is powered by 2 OS 60's swinging a 3 blade 12" diameter props. Finish is a combination of Super MonoKote with DJ's striping tape and R/C Perfect Paint. Landing gear is removable for water operation. A Heath radio provides control.



THIRD PLACE

Gary K. James
Muncie, Indiana

An original design standard class sailplane, Uranus, has 99½" wing span and weighs 52 oz. which results in a 7.5 oz./sq. ft. wing loading. The MonoKote covering was trimmed with DJ's striping tape. Functions are rudder, flying stab, flaps, spoilers and thermal sniffer. A Futaba 6 channel radio is used.



FIRST PLACE

Tony Orsini
Jacksonville, Florida

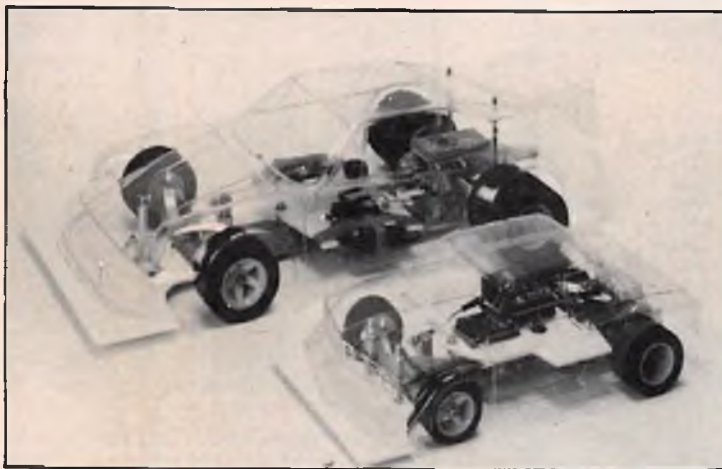
An A-4E built from a Violet semi-kit has a 47½" wing span, is 60" long, weighs 8¾ lbs., and features Rhom retractors fitted with Hydra locks. A K & B 7.5 engine powers a Jet Hangar Hobbies Turbax-I ducted fan unit for propulsion. The model is finished in RS Perfect Paint and uses a Logictrol 6 channel radio.



RULES

- A. Model Aircraft Origin**
1. Any kit — wood, fiberglass, foam, or ARF kit is eligible. Any scratch-built aircraft built from magazine or original plans is also eligible.
- B. Category**
1. All types of radio controlled airplane models.
a. Scale
b. Pattern
c. Racing
d. Fun-To-Fly
e. Original Design
- C. Entrants to submit:**
1. Color photo or slide, size 35 millimeter or larger.
2. Black and white glossy photos (any size) of both sides, top, rear, front, and bottom views.
3. Close-up photos may be submitted on detail work if desired.
4. A short write-up giving dimensions, weight, power, radio, etc.
5. A statement that:
a. The submitter was the sole builder of the model.
b. Parts and/or accessories used were part of the kit or available to all modelers at retail outlets.
c. All non-available or special parts were built by the hands of the submitter.
- D. Judging will be on:**
1. Workmanship
2. Quality of finish
3. Attention to detail
4. Subject of model or difficulty of the project will count in judging.
- E. Judging will be done by RCM Editors Don Dewey and Pat Crews.**
- F. Persons not eligible:**
1. Members and employees of RCM or any other model airplane publication.
2. Members and direct or indirect employees of Dremel Manufacturing Co.
- G. Members and employees of any manufacturer of hobby kits, hardware or supplies.**
- H. Anyone engaged in the wholesale or retail distribution of hobby kits, hardware or supplies as a major source of income.**
- G. Models not eligible for submittal are:**
1. Models that have been submitted for judging of workmanship at any major AMA sanctioned contest and have placed 1st, 2nd, or 3rd in that judging. Flying points as a final standing do not apply.
2. Models that have been built for display purposes only.
3. Models that have been built for manufacturers demonstration purposes.
4. Models that have won a similar award in another publication.
- H. Entrants who have models that qualify under these conditions are eligible to enter. Included with the entry should be the entrant's AMA and FCC numbers, and also, the name of his club, if any.**
- I. Prize Information:**
1. A Dremel 371 Variable Speed Moto-Tool will be awarded to the monthly winner. An illustration and description of the kit will be included each month along with the winner's name, address, club, etc. The second and third place runners-up will be awarded a one year subscription to R/C Modeler Magazine.
2. Dremel Manufacturing Co., of Racine, Wisconsin will be notified of the monthly winner immediately after a decision is reached by the judges so that the kit award can be received by the winner prior to the issue of that month's RCM.
- J. General:**
1. All contest entries must be addressed to RCM Model of the Month Award Program, R/C Modeler Magazine P.O. Box 487, Sierra Madre, California 91024.
2. All photographs and materials submitted by the contestant will become the property of R/C Modeler Magazine and none will be acknowledged or returned.

This contest will be null and void in any state or locality where specifically prohibited by law.



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FROM THE SHOP

from page 2

..... powered with same .60 engines and gear reduction unit. These weight and power figures provide a plane that performs very beautifully, but is as docile and forgiving as most standard trainers. As an extreme example of how these big birds fly, I recently saw a movie of the monster Spitfires and ME-109's flying in England. These birds have carried the "monster theme" far beyond what is attainable to the average flyer. They have 10½' wingspans, weigh 38 lbs., and swing 27" props driven by racing **three cu. in. engines!** One of the shots showed a gear-up, no engine landing. The bird floated through three ballooning porpoises, finally touching down at what looked like about three miles per hour. It didn't skid five feet after touchdown. That is what increased size does to performance. It slows everything down, and makes the whole operation much more controllable. Finally, I know of no monster flyer who is not in a flying club, and an AMA member. He, therefore, is knowledgeable regarding the hazards, and rewards, of flying.

"Big is not unsafe, it is only **different**. They fly bigger, are slower, and easier to see. They are more stable, react much less violently than smaller ships, and are, therefore, easier to fly. My 13 year old son soloed with an 8' Telemaster the first time he flew it. He had flown some before, had made a few take-offs, but had never landed.

"Flying technique with a "biggie" is not so different, either. I learned to fly "both sticks" on sport models, by using coordinated sticks and flying a landing pattern using ailerons only to keep the wings level, and using the rudder to steer. Try landing a snap-rolling dog of a sport model without coming in hot and heavy, and you will see why those wings

should stay level.

"Coordinated stick flying requires only simultaneous movement of rudder and aileron, moving both controls in the same direction. If control surfaces on the model are adjusted to the correct throw, you even move both sticks the same amount.

"After such practice, an accomplished sport flyer can handle a "biggie." Just expect things to react less abruptly and

use good, and safe flying judgement --- a necessity in any flying endeavor.

"A point of fact is, the larger models are only a new facet of our hobby and are no threat or danger in themselves. Safe flying does, and will always, rest on the shoulders of the pilot. Big is beautiful!"

★

We goofed . . .

In our From The Shop column in the



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EMS-15II

Thrust: 38 oz.-in.
Weight: 1.8 oz. (51g)
Transit Time: 0.5 sec./100°
Size (in.): 1.50H x 0.92W x 2.13L
Outputs: rotary wheel & arm
Colors: Gold, Ivory, Grey

Price: \$32.95

- EMS-15II & 14II utilize the CTS pot with Gieszendorfer Carbon Button Wipers.
- EMS Bantam Midget utilizes the Clarostat conductive plastic pot.

EMS-14II

Thrust: 29 oz.-in.
Weight: 1.4 oz. (40g)
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Outputs: rotary wheel & arm
Colors: Gold, Ivory, Grey

Price: \$32.95

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EMS Bantam Midget

Thrust: 21oz/in. Wt: 0.846oz. (24g)
Transit Time: 0.3 sec./100°
Size (in.): 1.125H x 0.7W x 1.43L
Outputs: rotary wheel, long arm, adjustable arm.

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August, 1979 issue, we described a situation relating to a microwave tower near the Toledo Weak Signals Radio Control Club flying field which was causing interference problems.

That report was incorrect. Our information was based on a conversation with one of the Weak Signals members at the Toledo Expo '79 which we have since discovered to be a tongue in cheek put-on. The interference experienced was that occasionally the tower runs across the road and gets in front of an aircraft and knocks it out of the sky. This has even happened to the Expo Co-director, Bob Hisey.

The Weak Signals Club field is located in the Ida Township, Michigan. Several years ago a large corporation submitted an application to the Ida Township City Council for a permit to erect that tower. In consideration of the Weak Signals, the council invited Bob Hisey to attend the hearings. The council was concerned if the tower would cause problems for the modelers and, both the Weak Signals and the corporation were requested to conduct tests to determine if there were any interference problems. The tests concluded that since the tower transmissions were in the Gigahertz range, the two activities are compatible and the permit to erect the tower was issued.

The proceedings described above is an example of how an R/C club can benefit by establishing and maintaining good public relations within their community. Both the Weak Signals Club and the Ida Township are to be commended for their cooperative co-existence.

The Clipped Wings Model Aircraft Club of the Washington State Penitentiary is attempting to develop a side-line project for their members. They are offering to build "Custom Boat Boxes" designed to store and/or ship any model boat made or produced. The club will build them to specific sizes and shapes and also add interior compartments to contain spare parts, engines and radio gear as well. The boxes will be built of high-quality materials and will be lined and padded to provide protection as well. The Clipped Wings Model Aircraft Club figures that they can manufacture them for between \$50.00 to \$75.00 depending upon the specific requirements requested.

Anyone wishing more information can contact the Clipped Wings Model Aircraft Club at P.O. Box 520, Walla Walla, Washington 99362. The club is a non-profit organization within the Washington State Penitentiary and working to build for themselves, and others, to better their future. Address your inquiries to Rob Sebastian, Public Relations Director.

Finally, this month, here is a handy hail on half-cocked ham-handed heretical helpful hints to the hapless helicopter hero submitted for your entertainment by that ubiquitous pop-top puller and part time helicopter nut, Tim J. Peters of Polk, Nebraska:

- (1) **Washer:** What your wife could have bought two of with the money you invested in a helicopter.
- (2) **Locknut:** What is done to many would-be helicopter pilots by their spouses. The nut is usually locked in the closet or the car, to keep them away from the telephone or hobby shop.
- (3) **Ball Joint:** Fancy discoteque.
- (4) **Mixing Lever:** Euphemism for swizzle stick.
- (5) **Fan Housing:** Sturdy shelter for spectators while beginner tries his helicopter out.
- (6) **Cooling Fan:** Spectator whose enthusiasm has waned when he finds all the beginner can do is skid around on the ground.
- (7) **Drive Belt:** A pre-flight cocktail to inspire enthusiasm toward helicopter flying.
- (8) **Stabilizer Bar:** Tavern which consoles helicopter pilots after #11 occurs.
- (9) **Starting Belt:** A quick snort to inspire courage before flying.
- (10) **Shock absorber:** A long pull out of the bottle after #11 or #12.
- (11) **Tail Boom:** Rear end first landing caused by too much aft-cyclic or #7 and #9.
- (12) **Main rotor shaft:** Hole in hover pad caused by inverted landing. Often results from flying while standing on head.
- (13) **Main blade holders:** Volunteers who grasp blades while pilot advances throttle.
- (14) **Canopy:** Could conceivably happen to main blade holders if tail rotor gets too close to their mid-section.
- (15) **See-Saw:** Playground ride to tranquilize beginning helicopter pilot after #11 or #12.
- (16) **Swashplate:** Eating utensil owned by gay helicopter pilot.
- (17) **Anti-Torque-Rod:** Spouse of uncle torque rod.
- (18) **Shroud:** Dark colored blanket reverently placed over helicopter after maneuver #12.
- (19) **Rotor-Head Pin:** Three points scored by helicopter after backing would-be pilot against tree, garage, etc.
- (20) **Collective pitch:** What would-be helicopter owner and his buddies give his spouse to convince her to let him buy one.

★

We'll see you at the field . . . and thanks from the entire staff of RCM for a great seventeen years! Just wait until you see what's coming up in the future! □

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