

RcM



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FEBRUARY 1979

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radio control MODELER

THE WORLD'S LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST



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Freddy's Ready.

FUTABA'S GOT THE SYSTEM FOR READY-TO-FLY RC.



The Futaba "Silly Savage" Trainer, pre-finished and ready-to-fly.



Three powerful little SRS's precisely control our Trainer.



Radio gear by Futaba is what makes these slick new ready-to-go flyers an instant sensation. Our Futaba Trainer is designed perfectly for the novice pilot, pre-finished, assembled and equipped with a gutsy K&B .19 throttle-controlled engine. And you also get the one thing that's missing from every other RTF available... genuine Futaba electronics. Select our 3FN/Trainer combo and you get three-channel, three servo control with full NiCad power, plus the reliability and performance that has made us the leader in radio control.

Futaba gives you a choice of system/plane outfits too, featuring a host of other fine combinations. You might take a liking to our popular 2GS, or new single-stick, three channel 3S systems matched up with an all-foam. Testors .049/Piper Cub.



Boating's your thing? Head out to sea with the latest in pre-built speedboats... Futaba's electric Z-60, it's sure to make waves at the local pond. If you're ready for radio control, then Freddy Futaba is ready for you.

Model	Transmitter	Receiver	Servos	Battery	Price
Trainer K&B .19	3FN	R3F	3 S18	NiCad	429.95
Trainer K&B .19	3S	R3F	3 S18	Dry/NiCad	379.95
Trainer K&B .19	3S	R2F	3 S18	Dry	359.95
Piper Cub Testor .049	3S	R2F	2 S18	Dry	189.95
Piper Cub Testor .049	2GS	R2F	2 S18	Dry	159.95
Z-60 Match	2GS	R2G	2 S18	Dry	TBA

The Futaba Piper Cub



Futaba

Futaba Industries, U.S.A.
630 W. Carol Street
Compton, CA/90220



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This Month's Cover

features part-time model, 6th grade school teacher, professional hula dancer and one-time RC'er, Maria McMurdo showing off Danell Wong's Andrew's Aeromaster Too. This unusual transparency was taken at the Kahala Hilton Hotel in Honolulu by James S. Miura.

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From the Shop

DON DEWEY

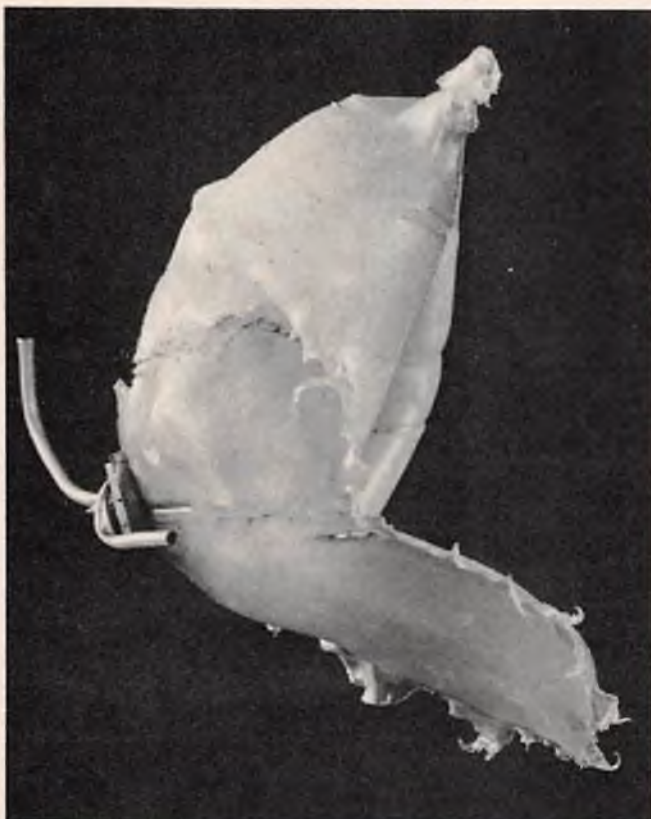
Is There No End?

A standard for the value of your money is the price of gold and the news media constantly reminds us of the gold value on the world market. Even more costly is platinum. At the beginning of 1978, platinum was selling for \$237.00 per troy ounce. By the end of 1978, it had exceeded \$400.00 per ounce. Russia produces 75% of the world's supply of platinum and in mid-1978 had curtailed platinum exports to the United States. An ever-growing usage of platinum in the catalytic converter exhaust systems for automobiles is consuming most of the supply that we now import from Canada and Africa.

So, what does that have to do with R/C? Well, there is a weird little gadget that we screw into the cylinder head of our model engines and call it a glow plug. The heart of the glow plug is a coil of wire that ignites the fuel. That wire is an alloy consisting of more than 80% platinum.

Now, if you consider that the increased cost of steel and labor has caused the glow plug body alone to triple in price in 1978, maybe you are beginning to get the picture. If you think the glow plug is an expensive little item now, just hang on, the upcoming prices will probably be a shocker.

We received the following note from Matty Sullivan, Sullivan Products, along with a ruptured fuel tank shown in our photo:



Dear Don:

Enclosed please find an exciting example of adiabatic compression. Possibly some of your readers would appreciate seeing this Sullivan tank after a bad landing (would you believe crash?).

Actually the customer returned this under our guarantee claiming that it leaked.

Please return it at your convenience, it has a place of honor in our archives.

Regards,
Matty

On page 39 of our November, 1978, issue, a suggestion is made regarding the use of liquid mercury as ballast in the Windfreak sailplane. We do not recommend the use of mercury as ballast. Please use lead shot or rods. There is a potential health hazard associated with mercury if improperly handled and the weight advantage does not justify the risk.

Now that the heavy stuff has been attended to, we wish to pass on a couple of light hearted items. Maybe this is what newsletter editors do when the flying season is over.

In the Hemet Model Masters newsletter, The Barnstormer, Don "Tweedy Bird" Janousek, Editor, we found the following bit of whimsy:

1. Do they have a Fourth of July in England?
2. Can a man living in Hemet, Calif., be buried west of the Colorado River?
3. If you had one match and entered a room in which there was a kerosene lamp, oil heater, and a wood-burning stove, which item would you light first?
4. There are two U.S. coins that total 55¢. One of these is not a nickel. What are the two coins?
5. Take two apples from three apples and what do you have?
6. How much dirt can be removed from a hole 3 ft. deep, 2 ft. wide and 10 ft. long?
7. What is the smallest number of ducks that could swim in this formation? Two ducks in front of a duck, two ducks behind a duck, and a duck between two ducks?
8. What has one head, four legs, and one foot, but cannot move?
9. If you have 17 sheep and all but 9 die, how many do you have left?
10. How many animals of each kind did Moses take on the Ark?

From the Des Moines Modelaires newsletter, The Balsa Buster, Roger E. Bocox, Editor, we giggled over the following item:

Anecdote

While working on an airplane down in the basement, some fuel was spilled on the floor. Paying this no great mind, work was resumed on the model. A few minutes later, the steady sound of sanding on balsa was broken by the chirp of a cricket. He approached the spilled fuel as if drawn to it by some odor that intrigued him. Standing in the middle of the pool he appeared to drink some. Soon he jumped away to wherever crickets go. A few minutes later he came back — jumping erratically, in a trance, drawn back again to the pool. As he drew nearer, his jumps were less decisive, until he finally fell over on his back, kicked his legs a few times, and croaked.

Guess he just ran out of gas!! . . . related to the editor by John Brooner.

to page 185

Hobby Lobby's 4 Channel Beginner's Plane

"... you instructors out there, the next time you are asked to recommend a kit to a beginner, remember the Hobby Lobby Junior Telemaster." (from Flying Models Product Review.)



Hobby Lobby JUNIOR TELEMMASTER **\$33.44**
List price \$42.95

We thought TIGER was only good looking... YOU WOULDN'T BELIEVE HOW WELL IT FLIES!

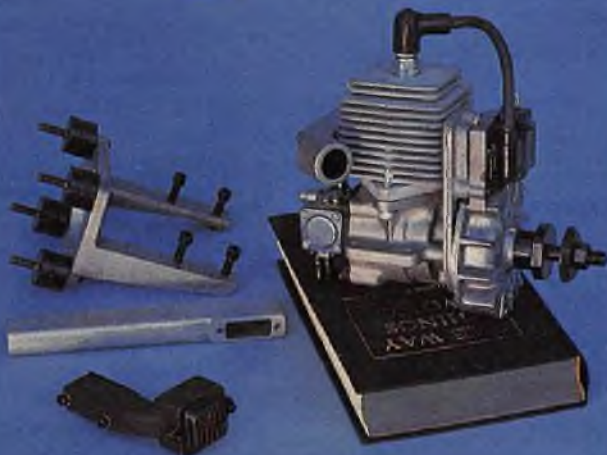


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List price \$89.95

With a K&B 40 and (of all things) a Grish 3 bladed 9-6 nylon prop, our TIGER does victory rolls straight up and out of sight, holds a knife edge attitude as long as you want it to, and then slows down like a trainer for landings. In the air it's the best looking plane we've seen. All this for a kit that includes a fully obechi-sheeted wing and the simplest balsa fuselage construction imaginable.

The engine for giant RC aircraft!

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\$97.50



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Hobby Lobby SENIOR TELEMMASTER .. \$89.88
SPECIAL Until Feb. 28, '79
95" wing span, for .40-.60 engines, 4 channels. Been described as "best kit ever produced", and as "greatest flying RC airplane in history."



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 <p>Bridl SUN FLI 420 \$19.99 List price \$29.95 MINI PATTERN PLANE. 48" span, 4 channels, for .15 to .25 engine.</p>	 <p>Lanier JESTER C \$47.99 List price \$75.50 ALMOST READY TO FLY! Pattern plane. 4 channels, .50 engine, 63" span.</p>	 <p>Midwest SUPER CHIPMUNK A-R-F\$21.88 List price \$33.95 ALL FOAM - ASSEMBLED! 46" span for 3 channels and .10 to .19 engine.</p>	 <p>Sureflite PIPER J-3 CUB FOAM A-R-F\$24.88 List price \$37.95 For .15-.19 engine, 52" span, 442 sq. inch area, 2 to 4 channels. Includes semi-scale engine cylinders, vinyl numbers, stripes, Cub decals, steerable tail wheel.</p>	 <p>Sig COLT \$16.99 List price \$22.95 45" span FOAM WING. 3 channel trainer. For .09 to .15 engine.</p>	 <p>Top Flite HEADMASTER \$17.99 List price \$28.95 48" span, for .09-.35 engines, 3 channels.</p>
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Kwik Fli 4 - 60	\$ 65.00	\$47.45
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Cunningham On RC

CHUCK CUNNINGHAM



Once again, this past October, Jan and I were lucky enough to be able to spend two and a half weeks poking about England and parts of Europe. As part of our trip we always try to look into modeling activity in strange and unusual places. Strange that is for a couple of Texans. This year was no exception as we found model activity just about everywhere that we went.

We found RCM on the newsstand in most major cities that we visited, and it seems to sell well just about everywhere. The one place that we could not find RCM was in Chur, Switzerland, a charming five thousand year old small city in far eastern Switzerland, but more on Chur later. In Paris we did not locate a hobby shop, since we were staying in central Paris and the hobby shops all seemed to be located in the suburbs. But, what we did do in Paris was to visit the Musee de l'Air. Fantastic! This museum is located on the northern edge of Paris and is best reached by the French Railroad. It is open each day from 9 a.m. until 5 p.m. We went on a Sunday and as we walked up the last of at least two dozen hills getting to the museum site, we were told by the guard at the gate that the Museum would be closed in ten minutes for lunch. "Open again at 1?" I asked. Open again at 2 p.m. I found out, a two hour lunch break. So, for a couple of hours we wandered around the small town that housed the museum, finally buying a few items from an open delicatessen for lunch. The only place that we could find for our picnic was on a bench by the railroad tracks, so, here we picnicked. Never could find a restaurant open. Finally, after two hours we again climbed the many hills and came to the museum, and this time our friendly guard let us in. This museum is a must for every lover of antique aircraft. It is jam packed with ancient aircraft, hanging from the ceiling, parked on the floor, dangling from the walls --- fantastic. Santos-Dumont's little Dsmoselle, a Bler A Bleriot XI, and Antoinette VII, a Deperdussin 1913 racing monoplane, and many many other frail, fragile aircraft of early aviation history. Moving on through the museum you come to WWI aircraft such as a BE2c, a Sopwith Pup, a Fokker DVII, an Albatross, and a beautiful Spad parked on the floor,

where you can get an up close look at her. A truly wonderful place to spend the time looking at our aviation past. A sign in the museum indicated that aircraft from the more modern era, after WWI, are housed at Le Breguet Air Field. We were not able to see this display.

After leaving the Museum we made our way back to Paris on the train, then took the Metro to the Montmartre district as Jan was looking for some more small paintings to bring home. When we got there, and this area is on top of a high hill overlooking Paris we discovered that an auto ralle was in progress. All of the automobiles were of the antique variety so, again, we were treated to a glimpse of yesterday. A glimpse was all that we got due to the vast numbers of people crowded into the narrow twisting streets. Beautiful, old restored automobiles pushed their way through the throngs accompanied by band music from a band dressed in 1900 costumes. That night we made the show at the Lido, really an outstanding day, from ancient to modern . . .

We worked our way down to Cannes on the French Riviera and there, again, we found RCM on the newsstands, but I must confess that I didn't do very much investigation of RC modeling in that area. My attention seemed to be taken by the beautiful beach sands, the blue sea, and the charming young ladies taking in the sun with only half a bathing suit. I really hated to leave that place. Got both my tummy and eyeballs sunburned.

Our next stop was Switzerland. We stayed in Montreux, up Lake Geneva, about thirty miles above Geneva. We decided to spend a Saturday going to Zermatt to see the Matterhorn. We took the train all of the way to Zermatt, and it was a beautiful, sunny day. At Zermatt the Matterhorn juts majestically into the sky, her sheer rock faces make you wonder why anyone would ever attempt to climb her. We decided to take the gog railroad that goes from Zermatt to Gornergrat, the top of a mountain peak about 1400 meters below the peak of the Matterhorn. While we were waiting for the gog-rail to get started I looked out the window and there, walking down the platform, were three men dressed in hiking outfits and carrying back packs. Nothing strange about this, but jutting from each pack were the wings and

fuselages of RC gliders. They got on the train, and I wandered down to get acquainted with them. They were going to take the gog-rail about half way up to Gornergrat, then were going to hike down to their slope soaring spot. We talked for a time --- everyone in Switzerland speaks English "a little bit." They got off of the train at Riffelberg while we went on up to the top. When we were coming back down the mountain we could see the sailplanes soaring off into space, tossed off of a cliff that must have been a couple of thousand feet high, with the beautiful, rugged Matterhorn in the background. The most fantastic soaring site that could be imagined. RC'ers are really everywhere.

After several more days in the Montreux area we again took a train through Switzerland, took a side bus trip into Liechtenstein, then back on the train to Chur. In Chur --- really a beautiful little city way off of the main tourist track --- we located a hobby shop that specialized in RC. The owner, who also spoke English "a little bit", was interesting and informative and told us that in his city of 30,000 people, about 200 were RC fliers. After looking at the prices they have to pay, I wondered how anyone could possibly afford the sport. How about 365 Swiss Francs for a model kit. An excellent kit, but translated into U.S. Currency --- \$265.00. Engines and radios were about the same in relation. A couple of hundred bucks for a .60 engine. All of the kits in the store were of German origin except for two Falcon 56 kits. All of the magazines were German, and this was the first place we discovered that had not been penetrated by RCM. We first stopped in a toy store that also sold some RC equipment, and he pointed us to the hobby shop. We spent about thirty minutes visiting with the hobby shop owner. Naturally, I plan to send him a copy of RCM to whet his interest.

In the airport in Zurich, while waiting for our Swissair flight to London, we wandered into the shopping section and there, hanging from the ceiling were a full size Bucker Jungmeister, and a Flying Flea. More pictures for the scrapbook.

In London we again visited Henry Nicholls' super model shop and spent an hour getting acquainted with Henry, a

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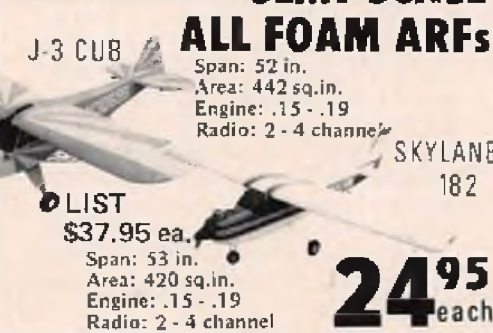
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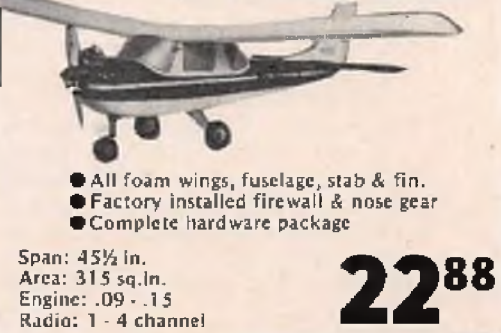
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Length: 115 mm
Width: 70 mm
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Cylinders: 3 Length: 145 mm
Bore: 12 mm Width: 70 mm
Stroke: 12 mm Height: 100 mm

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Stroke: 20 mm
Length: 177 mm
Width: 90 mm
Height: 126 mm

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Width: 75 mm
Height: 125 mm

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Length: 300 mm
Width: 75 mm
Height: 120 mm

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Length: 350 mm
Width: 75 mm
Width: 120 mm

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The past few months I have been receiving a considerable number of letters from fellows who own Ross engines who are looking for replacement parts to repair or overhaul their engines. Pistons, rings, and rods in particular. Unfortunately there was no source of parts for the Ross line of engines.

In the August issue of the Model Engine Collectors Association (M.E.C.A.) Swap Sheet, an ad was placed by Jim Robertson, offering Ross parts and engines for sale. I got a letter off right away to Jim to see if he had an in-depth inventory, if he intended to make the parts available to the modeling public, etc.

Since the initial ad in the M.E.C.A. Swap Sheet, Jim has run ads in the classified section of several modeling publications which some of you may have seen — at least those who bother to read the classified sections of the various model magazines. For those who have not noticed Jim's ad, there is good news for Ross engine owners — parts are available again. Also available are a limited number of complete engines including a new .61 Mark II that MRC intended to market but suspended production without ever doing so. I should imagine this engine will be of most interest to engine collectors due to the limited number being made and no future production being planned.

Following is Jim's return letter to me explaining his involvement with the Ross engines. I thought many of you would be interested in knowing the particulars of how Jim obtained the remainder of the Ross inventory.

Dear Mr. Lee:

Thank you for your letter. I am well aware of your articles in *RIC Modeler* as I have your books and always read the *Engine Clinic* column.

I just read your article on the Morton M-5 in the October issue of *RIC Modeler*. It brought back fond memories as I worked in a hobby shop from 1945-1949 and we had an M-5 on a test stand and would run it for customers. You are also right about collectors and M-5's, as I have one in my collection.

You asked about the Ross Engines. I

think I need to give you some background. In January, I went to Tucson, Arizona, and met Lou Ross, at which time, I bought every engine he had along with all the parts that he had. This starts with the first engine he ever made — a .26 cu. in. engine to his prototype 6 cyl. which was 2.4 cu. in. whereas production models were 1.8 cu. in.

I have enclosed a picture of Lou Ross's first engine — a .26 cu. in., and a Ross V4 Cyl. of which only two were made. Note the V4 has only one intake.



Then I went to MRC in New York City and purchased the rights to the name "Ross Power", and all the molds, dies, and jigs to build Ross Engines. I also bought a few Ross Engines new-in-box and three skids of work in process.

From there, I went to AMT Corporation at Huntington Station, New York, which was the foundry that was doing the Ross Castings. I bought a number of castings from them including 148 Mark II .61 cu. in. singles of which only three prototypes had been made. Note enclosed advertising literature that

was being prepared for this engine.

I also bought, among other castings 5-6 cyl. engines. None of these castings are finished but can and will be finished. As to what I am going to do with the castings and parts of which I have 90% including motor mounts, mufflers, and adaptors, Roger Theobald is assembling all the engines that we have castings for.

At the present time, I have the following engines assembled new-in-box: A few .61 cu. in. single, all black; .60 cu. in. opposed twin, black with gold heads, black heads and silver heads; a few 4 cyl., all black.

We have the following schedule for the rest of the castings: First will be the 148 Mark II .61 cu. in.; second will be the twin in-lines; third, the 4 cyl.; and fourth, the 5-6 cyl.

While I own the rights to the name and all the molds, jigs, and dies, I have not casted any engines nor will there be anymore Ross Castings made.

Now, to the parts. I have lots of parts and I am selling them to anyone who needs them. The parts prices are the same that MRC had used. I will send all catalogue sheets to anyone who asks for them if they will enclose a large envelope, self-addressed and stamped. Requests should be addressed to Ross Power, c/o Jim Robertson, 35 Stonecrest, St. Joseph, Missouri 64506 or phone (816) 279-1127.

Again, thank you for inquiring.

Yours truly,

J.E. Robertson

St. Joseph, Missouri

As mentioned in Jim's letter, Roger Theobald is handling assembly of the engines for Jim. Roger is a well-known name in U-control speed circles being the "T" of the TWA racing engines now being produced by Glen Dye of Performance Model Parts, Inc., in Minneapolis. The full breakdown of TWA being Theobald/Wisniewski Assn. Roger worked for K & B for several years and was responsible for the design of K & B's Schneurle .15 and side exhaust .40S. Roger left K & B to join forces with Kraft Systems to design and set up production of the Kraft .61. Roger has since left Kraft Systems and

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Futaba FP-2G5	99.95	70.	2	no
Futaba FP-2E	149.95	100.	2	no
Futaba FP-2E S17	129.95	87.	2	no
MRC 772	119.95	84.	2	no
2 Channel Wheel				
Cox 8021	139.95	93.	2	no
Futaba FP-2F	149.95	100.	2	no
Futaba FP-2F S17	129.95	87.	2	no
3 Channel Single stick				
Cox 8031	159.95	104.	2	no
Futaba FP-3S	159.95	106.	2	no
Futaba FP-3S S17	139.95	93.	2	no
Logictrol LRB-3	159.00	100.	2	no
Logictrol Ranger	179.00	113.	2	no
3 Channel Dual stick				
Cox 8033	229.95	148.	3	yes
Futaba FP-3FN	209.95	138.	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	309.95	197.	4	yes
Futaba FP-4FN S17	279.95	182.	4	yes
Logictrol Nimbus	309.00	187.	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	225.	4	yes
Logictrol LRB 2-5	285.00	179.	4	Rxonly
Logictrol Champion	369.95	225.	4	yes
MRC 775	379.95	251.	4	yes
5 Channel Single stick				
Logictrol LRB 1-5	310.00	197.	4	Rxonly
6 Channel				
Cox 8060	369.95	230.	4	yes
Cox 8068	479.95	305.	4	yes
Futaba FP-6FN	369.95	234.	4	yes
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Enya .19 VI TV	53.98	32.39
Webra Speed .109		60.34
Webra Speed .20 R/C		63.96
Webra Speed .61 R/C		117.40
Webra Speed .91 R/C		138.40

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ENGINE CLINIC

from page 10

is presently working for Cox. Roger most certainly has the credentials and experience to handle the final machining and assembly of the Ross engines.

Another item for which I have been receiving a number of letters is the BWT Systems Accutac. Fellows in need of service for their Accutac's have not been able to contact Ed Tisdial of T N T Services. Ed was distributor of the tach. Anyone knowing of Ed's address or, if you happen to read this yourself Ed, let us know. I have tried myself and the letter came back with "no forwarding address".

Before getting to the letters this month there is one more item that I would like to bring to your attention. That is an excellent article (one of the best I have read) on tuned pipes by Kevin Lindsey in the October issue of Radio Control & Electronics. This is the English equivalent of R/C Modeler and available in most hobby shops that stock the modeling magazines. Although it is the current issue at the time of this writing, it will be two months old by the time you read this.

Kevin Lindsey is designer and manufacturer of the E.D. Powerpipes — the first person to offer a line of tuned pipes for R/C use some eight or nine years ago. Those interested in "pipe" theory will find Kevin's article most interesting.

Dear Clarence:

I have only been in the RC sport a relatively short time, but in that time I have never read how to correctly "tune" the idle mixture on an engine. I realize that it is set at the factory and should be left alone, but if it is inadvertently altered by some unknowledgeable person (like me, for instance) then it needs re-tuning. My engine specifically is an O.S. .60 Blackhead.

Thanking you for your time.

Sincerely,
Kevin Hughes
Sydney, Australia

Kevin, I sure hate to have to break the news to you, but just like Santa Claus, the Easter Bunny, and the Tooth Fairy, we all have to find out some time. Manufacturers do not set up the idle on the model engines before shipping. This is something that has to be done by the individual after purchasing the engine. The manufacturer only sets any adjustments involved somewhere in the correct range, i.e., if it is known that the engine idles with the mixture adjustment open approximately 1½ turns, then all carburetors are set about 1½ turns open. Same with idle speed — this is set approximately by "eyeballing" the

to page 176

one more from pica



Announcing the Tech R/C Midget Servo Kit

With the New Improved NE544 IC. Yes, we held off offering the NE544 Amp until all problems were eliminated. This IC features complete motor drive, no external transistors are necessary. We supply the CTS Plastic Pot element for competition performance. The Midget works on most positive pulse receivers such as Royal, Kraft, E.K., CANNON, ACE, MRC, FUTABA and provides extremely fast, accurate response.

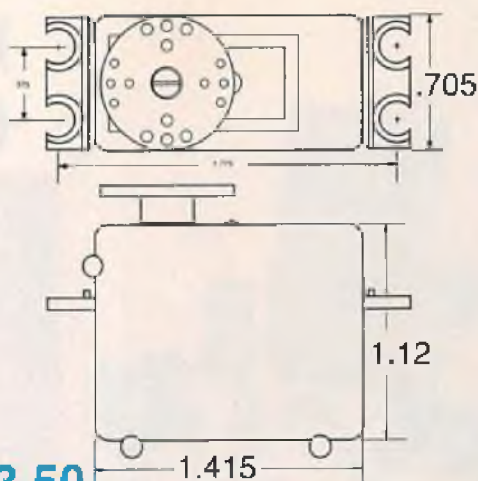
A rotary wheel, long arm, and adjustable length are furnished. Order the proper connector to match your system separately.

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Introductory Price

Thrust: 19 in. oz.

Midget Servo Kit (less connector) — \$23.50



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To compliment the Chevron Mechanics we designed a new Competition amplifier. It features external motor drive transistors (4) for maximum efficiency. The competition amplifier will handle 10 ohm motors for standard speed or 6 ohm motors for increased speed and power.

If you need even more power you can rearrange the gears for a more powerful ratio.

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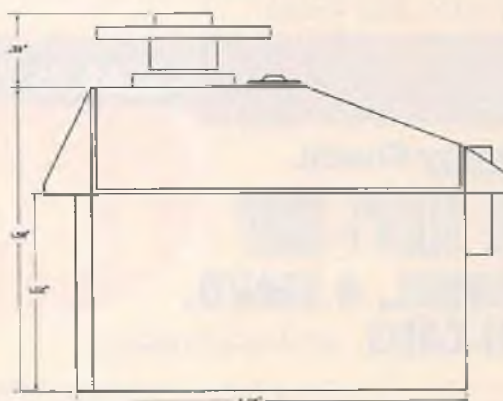
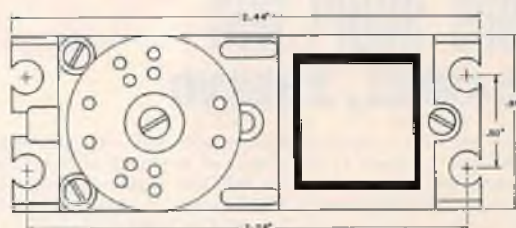
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Instead Of Giving Up Your Dream To Fly Radio Control Perhaps You Should Give Up The Expensive Radio!



There are many people who would like to get into radio control, but one thing more than any other stops them — Price! Also, as a modeler gains in experience and has built many models to fly, he finds that being the owner of several radio systems is desirable. The dream of getting into radio control, or of adding extra systems, may be forgotten by many who feel that purchasing an expensive national brand radio system doesn't make any sense. Now, the Hobby Shack Aero Sport Systems offer thousands of people exactly what they are looking for. Aero Sport has all of the reliability, performance, electronic technology and all of the other advantages of the higher

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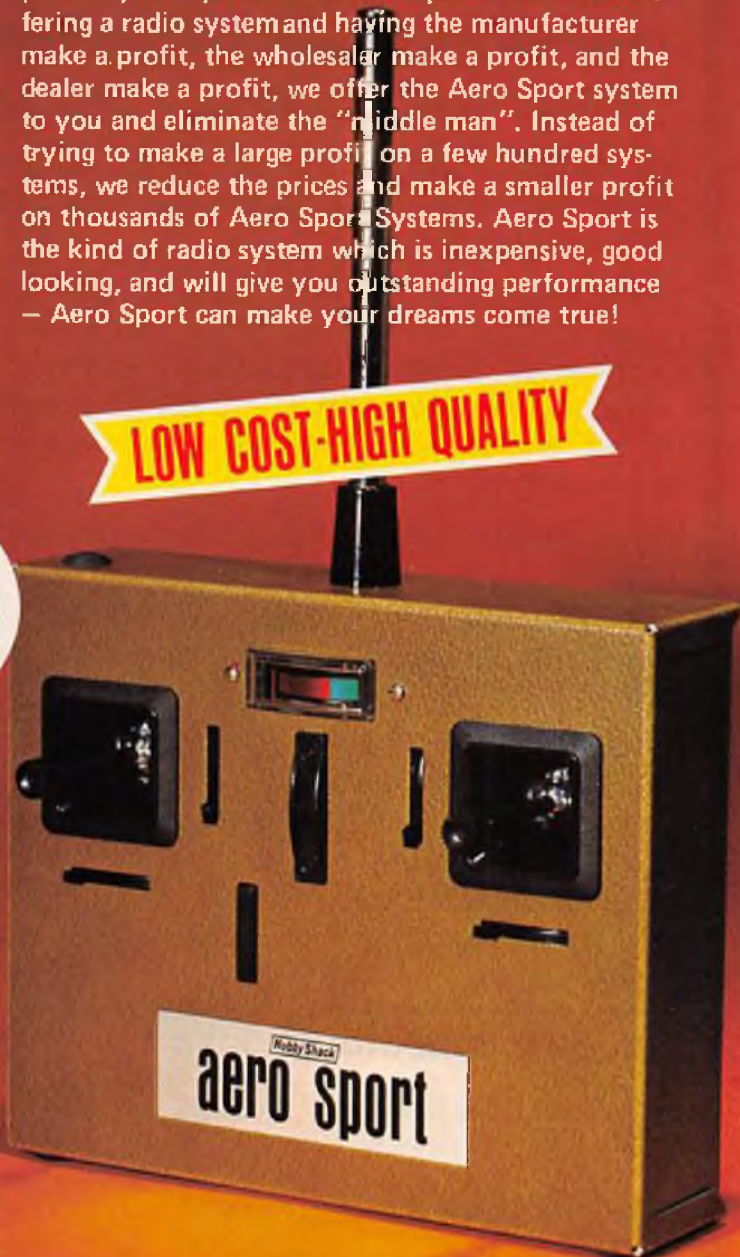
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Sunday Flier KEN WILLARD



"Whence come thee, Sunday Fliers? And whither goest thou, O Backbone of Sport R/C?"

"We come from many backgrounds, O Chief Sunday Flier, and for that very reason, as we progress, we select different objectives in the enjoyment of our sport. But the selection of those objectives is only for the purpose of enhancing our enjoyment of R/C flying."

"Then how can I determine whether you are truly just a Sunday Flier? Is it the size of your airplane, or your reluctance to compete, or the amount of time you can devote to the sport — or what?"

"None of the above — and all of the above, Chief. Just take our word for it, either when we talk to you or when we write and say, 'I'm just a Sunday Flier.' We may be just beginning, or we may have just won our club championship — but we still are Sunday Fliers."

And that, my friends, is why it is hard at times to know just what to write about. The new Sunday Flier is happy to get a successful flight, and appreciates hints on how to select a good design as a starter, and how to build it, check it for alignment, and then control it. The club champion is looking forward to next year's contests, and whether he should select the Clark Y, the NACA 2412, or the Eppler 387 airfoil for his new design.

Even so, there is one common factor that applies to you Sunday Fliers — your total enjoyment of the sport. And, I also believe that you can take the successes, the failures, the "grease job" landings, and the crashes without getting overconfident, or overcome. Yes, I've seen modelers slam their transmitters to the ground in frustration; once at the National Championships, I saw a well-known modeler throw his airplane and radio equipment into the trash can in anger. Understanding fellow modelers retrieved the stuff, and it wasn't long thereafter that that modeler was back in the thick of competition. And he's still a Sunday Flier, and well-known designer. What I'm saying is that you're all entitled to momentary tantrums, else you wouldn't be human. But those of you who love the sport recover, and are all the better fliers for the experience. And those who don't recover just aren't Sunday Fliers.

Here are some pretty good examples of Sunday Fliers, as I see them. I have a young friend, Bobbie Haeckl, fourteen years old, who's just learning to build and fly R/C. As I teach him the elementary aspects of flying — straight and level, turns, and Figure Eights — I have to restrain him at times from pulling up elevator and making the model loop — just for the sheer pleasure of making the model respond to his command. Now tell me honestly; when you first learned how to fly, didn't you want to do the same thing?



The old Chief Sunday Flier gives his teen-age friend, Bobbie Haeckl, a flying lesson. Note the hands, ready to take over in emergency. Photo by Joe Melena, Palo Alto Times.

Bobbie's first attempt at building was a total disaster. And the kit was supposed to be for an absolute beginner. We forget that beginners sometimes are not skilled in reading plans. His second airplane was better, and the third one will be better still. Because he enjoys the challenge.

Ken Runestrand is another Sunday Flier. After the day's work at making a living is done, he builds radio controlled airplanes for fun. He is a skilled workman. Look at the beautiful framing job on his scale Fleet biplane. And then look at the size of it, in the photo where



Beautiful framework of Ken Runestrand's Fleet biplane.



Two Kens — Runestrand and Willard — with their favorite creations. Runestrand's Fleet and Willard's Bluebirds.

he and I are kneeling behind it. I'm holding four airplanes, the Bluebirds formation and, as you can see, the span of the whole formation is about half that of the Fleet. And the Fleet is twice as easy to fly. Big models respond slower, are easier to see, and actually seem to be flying slower because of the scale speed effect. For those reasons, big models are good subjects for newcomers, if they have the ability to build them.

If you do not have the ability to build, and just want an easy flying airplane, there's a new one (comparatively speaking) that I flew recently, and which is about as easy to fly as anything I've ever flown. It's the Sportavia produced by Cox Hobbies. Now it's not foolproof. Nothing is. It does have to be properly balanced, and trimmed out. Once that is done, though, it comes as close to foolproof as any ready-to-fly model that I know of.

Another fine model for beginners — but this time the beginner must be able

to page 19

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A Digital Commander Flite Pack Kit Can Avoid Unnecessary Duplication and Save You Money!

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You can build a flite pack kit, tune it to your existing transmitter, and install it in your plane just as if you had bought a complete new system and at a fraction of the cost. By the same token, if you have some extra servos, no matter what brand, our Digital Commander receiver will operate them. Or, if you want to have servos in all you planes and switch one re-

ceiver from plane to plane, our servos are compatible with your receiver, no matter who made it.



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Following is a list of the Flite Pack options we have available. All of them except the Micro Servo flite packs come less ni-cd batteries and contain connectors and switch. The Micro Servo flite packs have 100 mah ni-cd batteries included also.

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12G28-2R	Double Deck Receiver and Two Bantam Midget Servos	80.95
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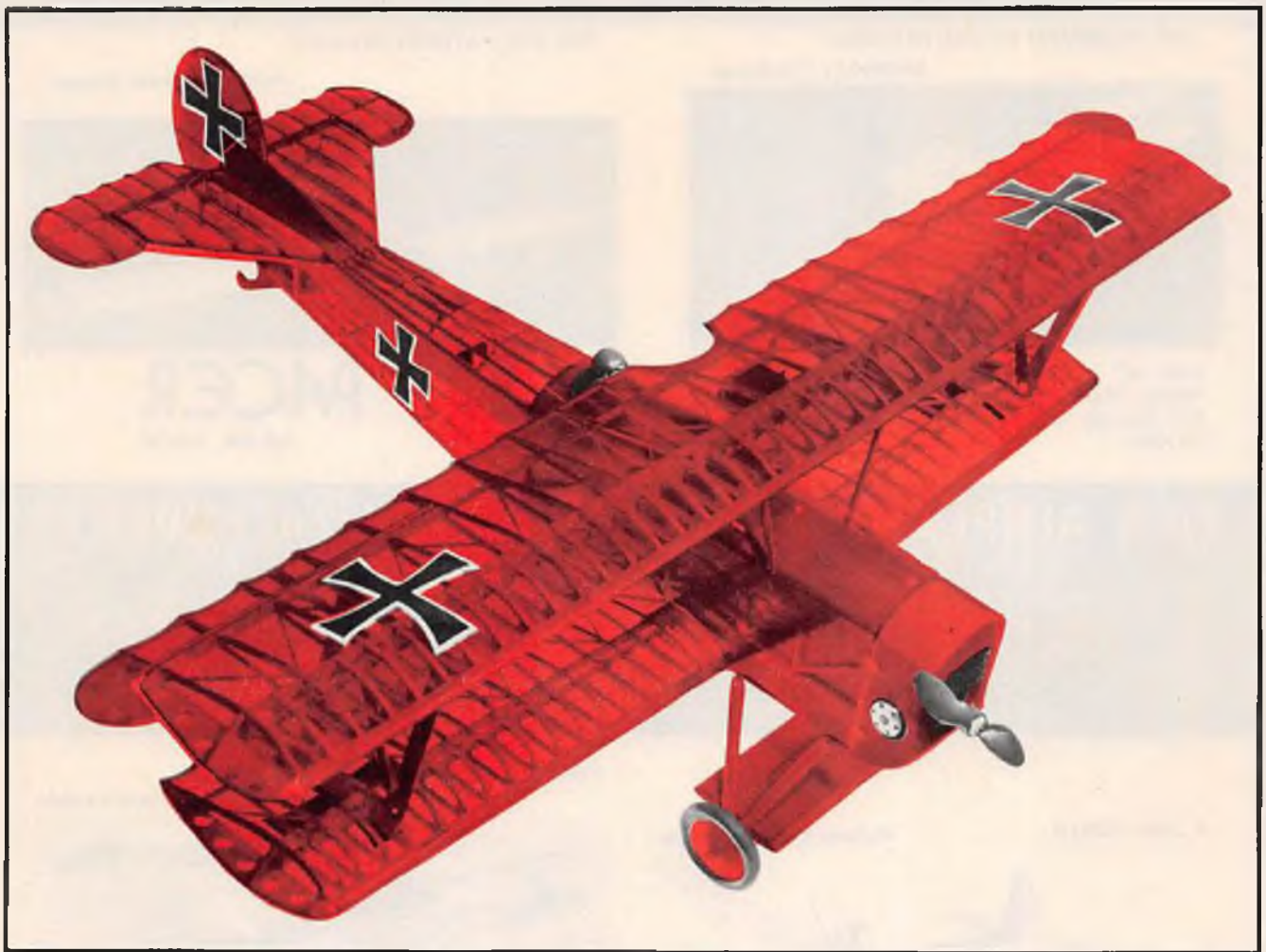
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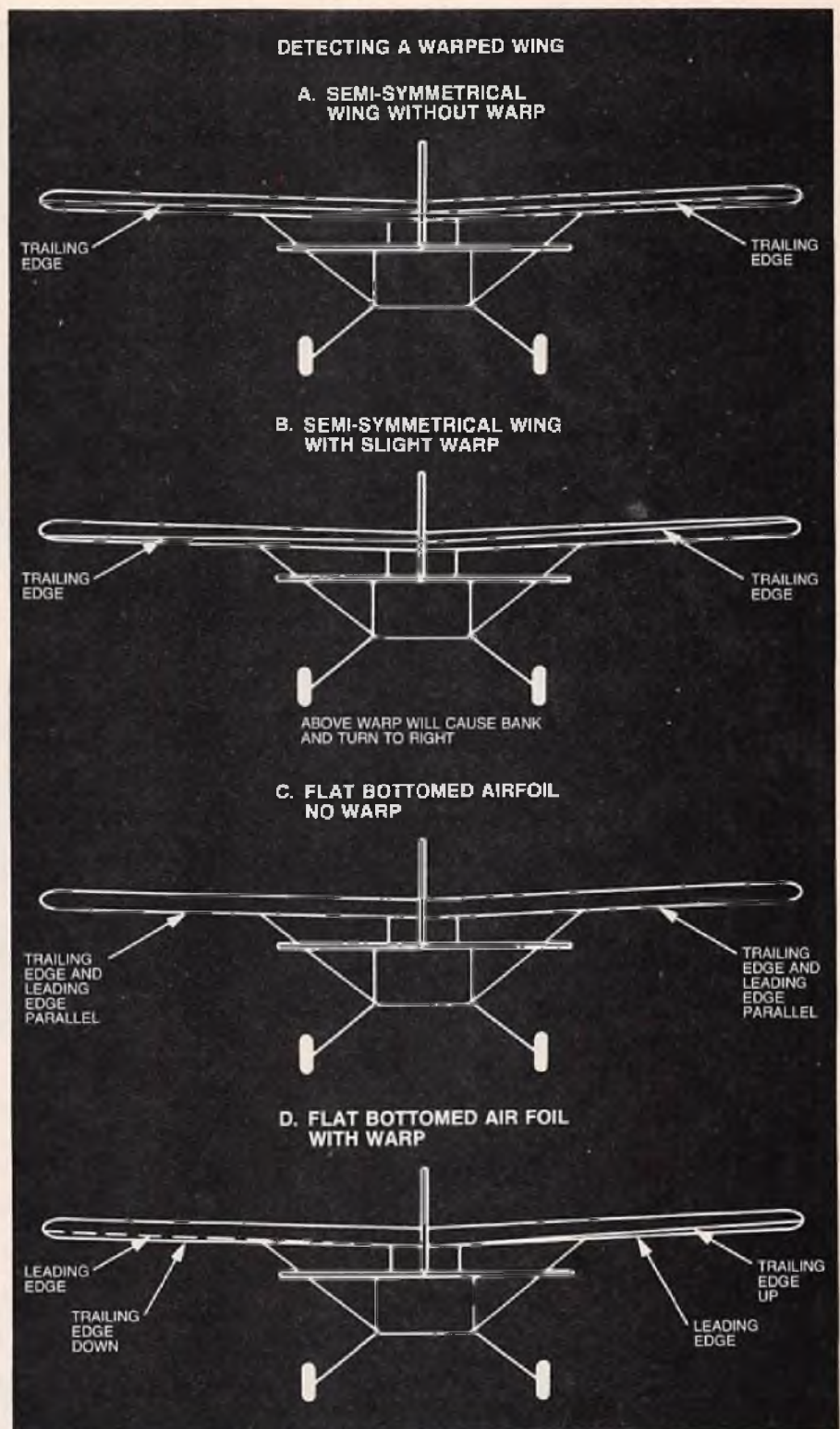
to build straight and true — is the Butterfly II by Craft-Aire. Note the basic similarity — higher aspect ratio, long wing, long tail moment, and light wing loading. All the factors which provide slow flight, gentle response, and good stability.

But one man's trainer is another man's nemesis. R/C flying is no different from full scale piloting when it comes to flight training. Times change: the jet trainers of the Air Force today out-perform the advanced fighters of yesterday. In the same way, R/C trainers out-perform the old single channel rudder jobs. I have no doubt that any young man (that's a guy who's four years younger than me) could be taught to fly by using a Dirty Birdy as the trainer — so long as he has a competent instructor and wants to learn.

So, all you Sunday Fliers, make your choice. An easy to fly, ready to fly, or a sleek pattern job. Just be sure you have a good instructor — and there are lots more for the former than for the latter.

Earlier I mentioned the importance of being able to build straight and true. This is more important in relation to the wing than any other surface, even though they all are critical to the achievement of good flight action. Recently I had the opportunity to help a couple of modelers who had built their planes straight and true — only to have them come out slightly warped. Why? The open framework structure was pulled out of alignment when the covering material shrunk up tight, but the amount was so small that, unless carefully checked, it didn't show up.

The most common error in alignment is for the wing to gradually twist from the center section out to the tip. It is particularly hard to spot with a semi-symmetrical section. A flat bottomed section will show up quite readily. I've drawn a couple of sketches to show how to spot the twist. And remember — if one wing is twisted only a degree or so out of alignment, and the other wing likewise, but in the opposite direction, it's just like having up aileron on one wing, and down aileron on the other. Sure, if you have ailerons, you can droop one and raise the other to compensate, but it all comes back to the fact that two wrongs don't make a right. You may be able to trim the plane so it flies straight at one speed, but at slower speeds the ailerons will have more effect, and at higher speed the lift differential of the wing will prevail. So don't settle for the compromise. Straighten the wing. How? Well, if it's a foam core, you may have to replace it. The conventional rib and spar open



framework wing can be gently but forcibly twisted back until it is straight — and should even be twisted slightly in the opposite direction. While doing this, you'll see stretch marks appearing in the covering. Carefully using a heat gun — or holding over an electric range heater, soften the covering material until the stretch marks disappear, then hold in position until the covering material cools. Wiping with a damp cold cloth helps. There will be a tendency for some return to the original twist, which is why I

say-go a bit beyond the perfect alignment when twisting, then, when it gets a permanent set it should be straight. It may take a couple of tries before you get it right — and some time later you'd do well to recheck the alignment.

I have even been able to twist a foam wing (one that's covered with sheet balsa) but it's pretty delicate. If you get the heat too high, the foam melts. But it's worth a try — unless you want to be

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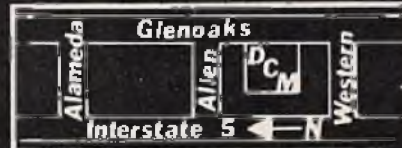
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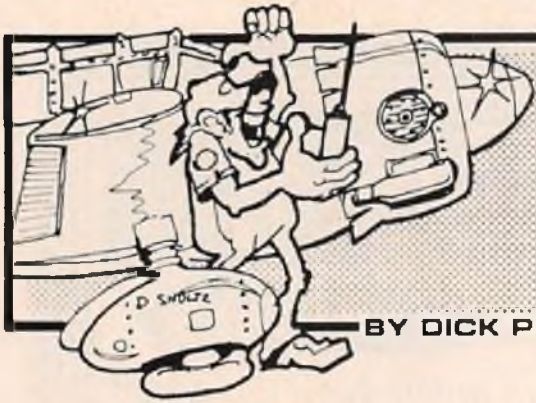
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BIG is Beautiful

BY DICK PHILLIPS

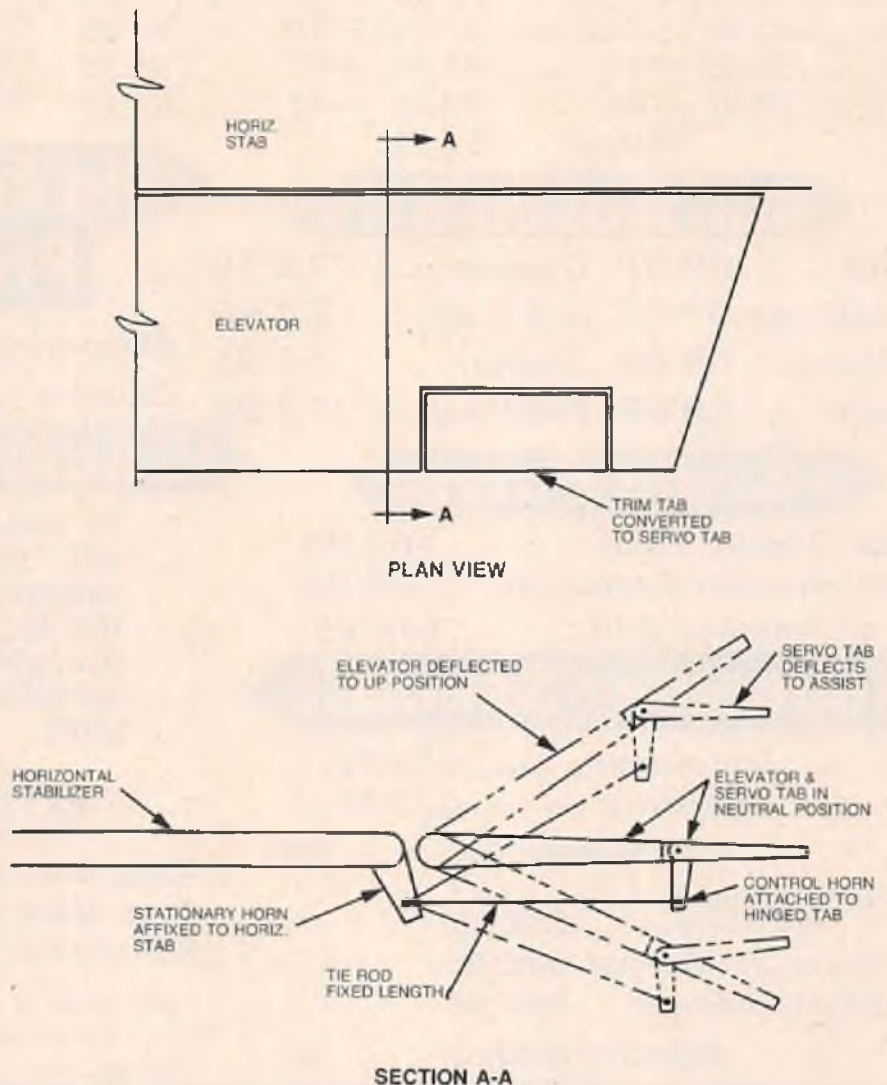


It is going to be difficult for me to contain my normal enthusiasm in this column as I have just returned from a week in Las Vegas to attend the Quarter Scale Association of America (QSAA) Second Annual Rally. This is the second annual gathering of the devout Quarter Scalers to fly, show off their creations, exchange ideas and have fun. All of these objectives were met, and then some!

There were over 100 modelers present, not counting those which did not qualify as Quarter Scale or larger. The roster of those present read like a who's who of RC modeling. Such well known individuals as Phil Kraft, Joe Bridi, Bob Violett, Walt Schroeder, Pat Potega, Bill Northrop, Dick Kidd and Dick Tichenor of RCM, Andy Sheber and many others, too numerous to mention. I can assure you it was a real pleasure to just be there! Firms represented included EWH Products, Eastcraft, Westcraft, Jim Fox with his new Super Sized Retractable Gear for the large models, Hobby Lobby, with their new Evra Engine, Quarter Headquarters with their line of Accessories for Quarter Scale birds (more later on these), Bud Barkley from Ontario, Canada, drove over 2,100 miles to have his soon to be available Tiger Moth on hand (it flew beautifully), EWH had several of their Puma's on hand with their new Hustler engine for power. However, what was there and what was done there will be old-hat by the time this reaches print, having been reported in the December issue of RCM, courtesy Dick Kidd and Dick Tichenor.

The QSAA was started by a dedicated group who met in Las Vegas less than a year ago, with the objective of mounting a **Non-Competitive** organization for the builders of the larger models. Their estimate of potential membership was for 300 members the first year of operation. This has now more than doubled to 700 in less than 10 months, probably the most phenomenal growth any RC organization has ever experienced. If that does not indicate a striking growth, then I don't know what would do so.

The QSAA members in the Las Vegas area worked hard to make the rally a huge success. They had arranged



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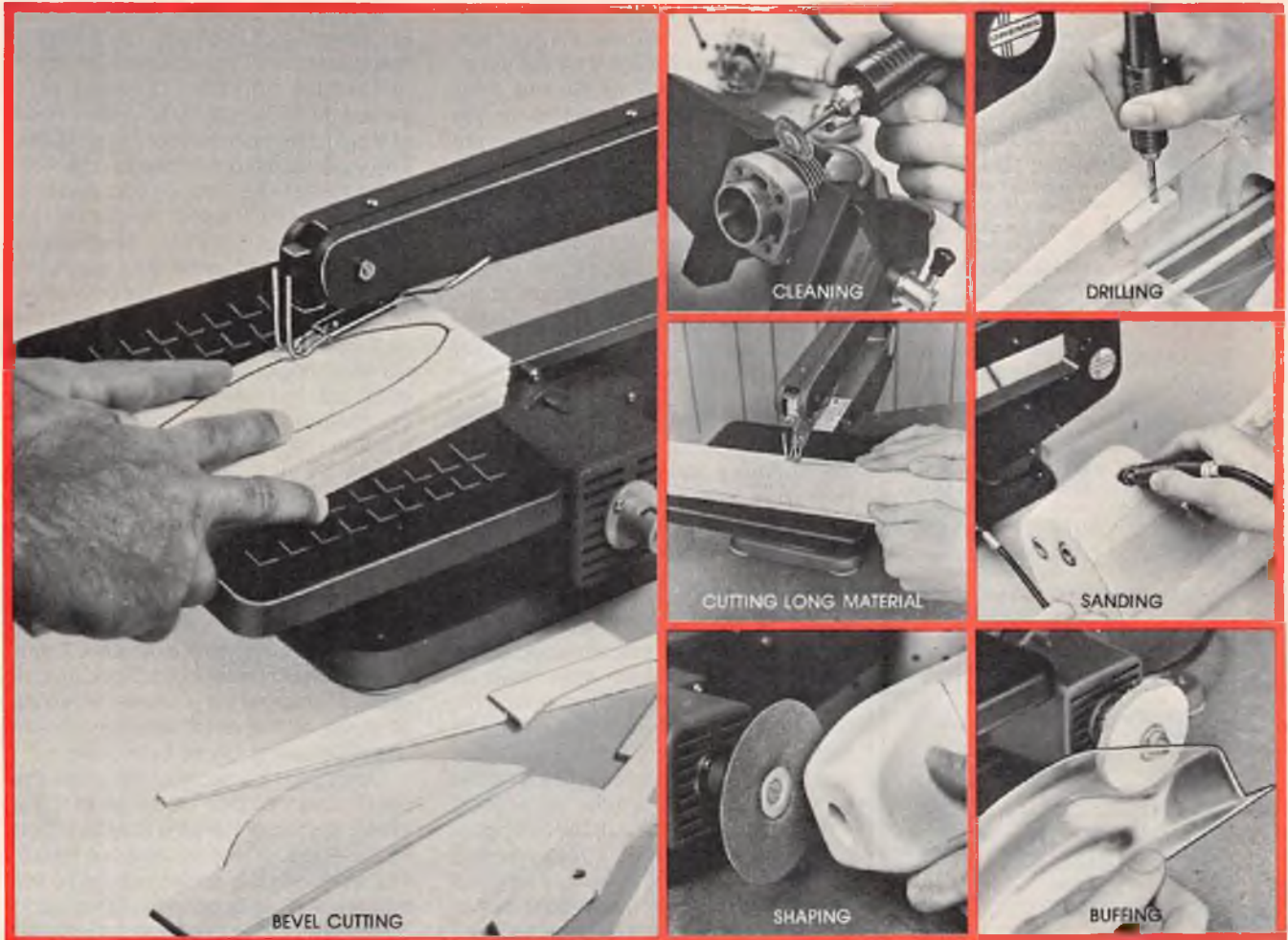
rooms at Bill Bennett's Circus-Circus Hotel at very attractive rates. Their flying site is out of this world, consisting of ten square miles of dry lake bed. To give you an idea of the size of the place, models were flown at the same time as a full scale P-51 landed, a Ford Tri-Motor landed and took off at will, private planes of several makes came and went as they pleased, a full sized Great Lakes performed aerobatics several times during the three day weekend... well, it

was hard to know where to look much of the time.

If there was anything which met with disapproval (and it was minor), the weather was too good. I saw only one small cloud the entire week I was there and the temperature at the site was well over 100° most days. Considering that I had been scraping frost off my car windshield before leaving for Vegas, I found the contrast to be striking, to say

to page 24

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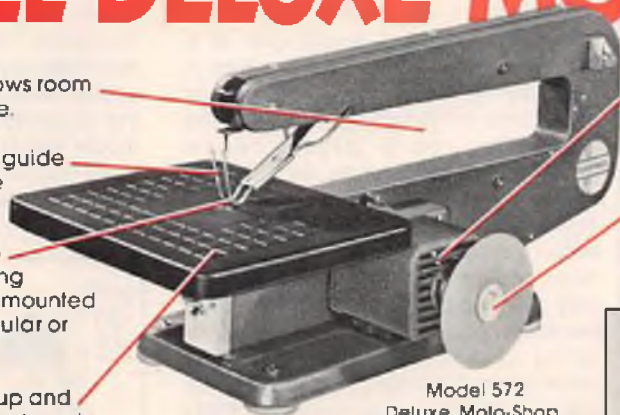
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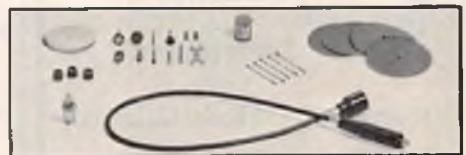
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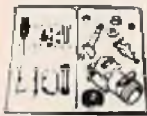
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FINE TOOTH REPLACEMENT HACK SAW BLADES. (6 inch)
TEMPERED for cutting HARDENED MUSIC WIRE.

BIG IS BEAUTIFUL

from page 22

the least! Except for the heat, which we were informed was unseasonably hot, the weather was excellent for the flying. The skies remained bright and clear throughout, the wind was moderate, the dry lake bed is absolutely flat and very smooth. I heard a comment from one modeler that it was the first time he had ever seen a field on which you could taxi a Quarter Scale bird out of sight and still be on the runway! And that is gospel truth. The day Howie Keefe landed his P-51 "Miss America" on the lake bed --- when he turned to taxi back to the flying area, he was almost out of sight in the heat haze.

The manufacturers there were really great, taking time to explain and demonstrate their wares to anyone interested. I was much impressed with the Eastcraft on-board starter. It seems well designed, works very well indeed as was demonstrated in several models present. Its battery pack is good for about 100 starts from a charge and it is very impressive to see a model, sitting out at the edge of the strip, start its engine on command from your Tx. This can also stop and start the engine in flight, which, while impressive, is of more use and even more awe-inspiring on the ground. The unit cranks at a good speed, not slowing apparently after many starts, and with a rechargeable on-board nicad pack --- should be good for many years use. The mechanics of the unit seem to be well designed and engineered, and should provide many years of reliable use to those needing on-board starting capabilities.

The guys from EWH had their new 2.6 C.I. Hustler engine with them. I managed to get a good look at a cut-away model of the engine which is made by Homelite who have plenty of experience in the light engine field. The connecting rod is forged, needle bearings throughout on the crankshaft. The counterbalance is two piece, half on either side of the connecting rod, and helps reduce vibration. There is very, very little end play in the crankshaft and the thrust bearing is large and capable of taking severe loads with ease. The piston is double ringed and the cylinder wall is chrome impregnated which EWH says is better than chrome plating. I'm no engineer, so can only accept this as being the case.

I managed to get my hands on a couple of Zinger's new props, unfortunately only the one size (20/6) was available and I'll be doing a test on them as soon as is practical and will report on them as well. Zinger claims 85% efficiency from these props, and if

that's true, this will be worth seeing. The props, while expensive at almost \$15.00 each are guaranteed balanced and true out of the package and with that kind of efficiency, they could well be a good bargain even at that price!

Jim Fox of Custom Retracts, (4290 Encinitas Way, Union City, Calif. 94587) had a set of his Super Scale Retracts in Las Vegas and they are very nice indeed, for those of you who have need of a set of retracts for your large model. The workmanship on these is very, very nice indeed. They are air operated and mechanically locked, and may be slowed down to scale speeds by restrictors placed in the lines supplying air to them. They will operate on both air or Freon, Jim suggests air as being the best and the most economical. I must confess I neglected to get pictures of the gear but have written Jim for more information and will include the details in a future column.

Lee Taylor of Taylorcraft (and Secretary of QSAA) provided me with a set of plans for Jim Folline's PT-19 in Quarter Scale. My collection of large plans is growing quite well and this latest addition is another beauty. The plan is on three large sheets, beautifully detailed and very well executed. There is an extensive set of instructions on one of the sheets and the isometric drawings of some of the detail work are really among the best I have ever seen.

One thing I particularly like about the construction of this model is that the center section of the wing may be left on the fuselage, or may be removed from it. The gear is in the center section so the model can sit on its gear during transport rather than having to provide a cradle for it. The outer wing sections remove quite easily and incorporate the separate servos for the ailerons. Jim has built a five pin plug into the center section and the tip section so that when the wing is installed, the aileron servos are automatically hooked up correctly. The additional two pins on the plug complete the circuit to the wing tip lights. A fine model which flies well. Construction is very good and the builder has incorporated information, gathered

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PHOTOGRAPHY

by
FRED HOUSE
PRESENTS

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6 FOOT WING

Wing Span..... 71½"
Wing Area..... 573 sq. in.
Weight Without Radio..... 9 oz.
Typical Flying Weight..... 18 oz.
Wing Loading..... 4.5 oz/ft²
Airfoil..... Windrifter 11½ % Flat Bottom

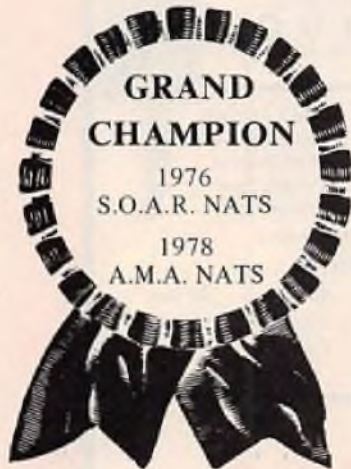
2 METER WING *

Wing Span..... 78¾"
Wing Area..... 635 sq. in.
Weight Without Radio..... 10 oz.
Typical Flying Weight..... 19 oz.
Wing Loading..... 4.3 oz/ft²
Airfoil..... Windrifter 11½ % Flat Bottom

*material for 2 meter modification listed but not included.

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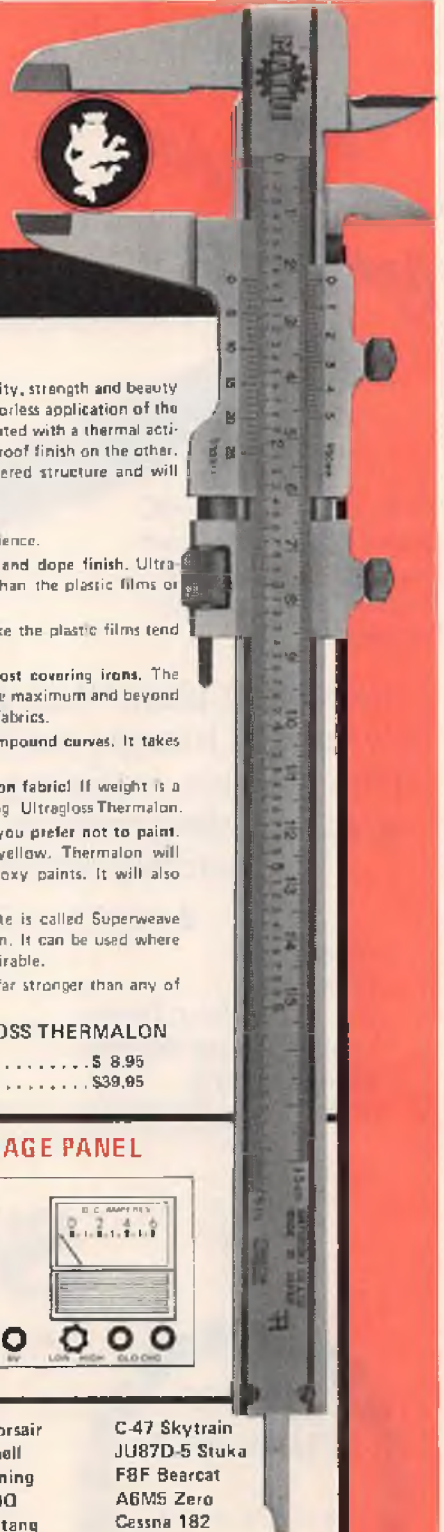
Wing Span 149 in.
Wing Area 1643 in.2
Flying Weight 5 lbs. to 11 lbs.
Lifting Surface 1931 in.2
Airfoil Craft-Air - 12% flat bottom
Wing Loading 7.0 to 15.4 oz./ft.2
Surface Loading 6.0 to 13.1 oz./ft.2
L/D (measured) 21.3:1
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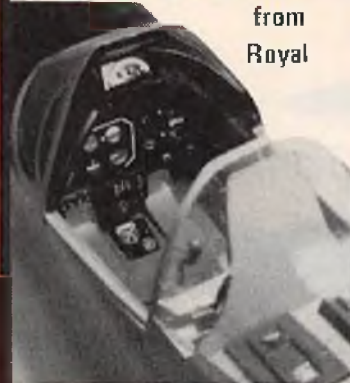
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8. **Thermalon comes in gloss or matte finishes.** The matte is called Superweave and is lighter still than the gloss (Ultragloss) Thermalon. It can be used where weight is critical or for scale where matte finishes are desirable.
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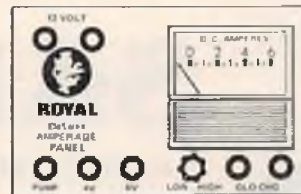
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Bleriot	564 sq. in.	\$54.95
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I am going to start this month with a brief explanation of soaring, because it is the most asked question in my mail. So, with my words and the help of Williman Carter, author of *Soaring*, I will answer those who have written and also help answer any questions from the *Soaring World*.

Even during the time a student is learning the most fundamental techniques of sailplane control he will also be learning about lift and how to use it. The instructor will most likely work in lift if available, to keep the sailplane airborne as long as possible to give the student the benefit of the practice time.

Through study, discussion, and practice, the student must develop an understanding of where to look for lift and how to use it productively. The skills involved in controlling a sailplane are relatively simple to master, but the ability to pick out areas where lift should be, determine the best direction of travel, and make the maximum use of lift, is what makes one sailplaner better than another.

Generally, three different types of lift are considered usable for soaring: thermal lift, ridge lift, and wavelift. Frontal phenomena and other unusual conditions can also cause rising currents in the air, and although unpredictable, the pilot could certainly use these other types of lift if he encounters them.

Thermal Lift: On a nice clear day when the sun is not hidden by clouds, rays from the sun warm the surface of the earth which may, in turn, heat the air near the ground. With sufficient heating and other proper conditions, a large volume of air grows warmer than the cooler air above it and, since the warm air is less dense, it tends to rise.

As cool air moves in to replace the rising air, it may separate the warming air from its source of heat, causing it to rise as a bubble like a hot air balloon. This rising air is called a thermal. The difference between the density of the warm air and that of the surrounding cooler air determines how fast the bubble will rise. The greater the difference, the faster the warmer air will rise.

If the heating action is weak, some time may elapse before another bubble will form and rise. However, strong



Three grand men of aviation, Col. Bob Thacker conversing with Leo O'Reilly father of Mike O'Reilly, Australian Champ and George Miller father of Skip Miller, U.S. Champ.

heating action may cause one mass of air to warm rapidly, overtake and join other already ascending air, thus forming a chimney of rising warm air.

The pilot learns to read the various signs that tell him where he may find lift from a thermal. Soaring birds are good indicators of the location of a thermal as are other circling sailplanes. Strong thermals over dry ground may pick up sufficient dust to form a dust devil, giving the pilot an indication of rising air. And smoke rising in the thermal from an industrial plant may also show the pilot where to look for lift.

Ridge Lift: Wind blowing against the face of a hill, a chain of hills, or a ridge of mountains, must either go around the barrier or over it. If it goes over, the air gains a vertical component of velocity which may extend as high as two or three times the height of the hill. This vertical component, if greater than the sinking speed of a sailplane, will support the sailplane and may even boost it farther aloft. The earliest soaring flights were made in this type of lift as the gliders were launched down the side of a hill and into the wind. Since the flights were usually made on a gently sloping ground, the air currents took on the name, Slope Lift. Because steeper terrain proved more capable of providing strong lift, flights were made from the top of steep, in many cases sheer, ridges resulting in the new name, ridge lift.

Today, pilots use ridge lift in much the same manner as our soaring pioneers, but with greater knowledge of the principles involved, combined with more skill and better sailplanes to use the lift more effectively. Launches can be made from the top of a ridge directly into the lift.

The height of the hill, other neighboring obstacles, the stability of the air, the wind speed and direction, and many other factors, determine the suitability of the lift for soaring. Similarly, these same variable conditions allow the pilot to fly high above the ridge or force him to fly below the highest part of the hill along the face of the ridge. If the lift is good, and if other sailplanes are in the area, good flight discipline is essential.

Instability of the air and heating action may work with the wind to produce a very useful and interesting combination of thermal and ridge lift.

Wave Lift: Wave lift has produced the highest soaring flights on record. Wave lift is generally smooth and may be very strong, yet, associated with the wave, a pilot may find some of the most turbulent and violent air known to exist.

A strong wind blowing perpendicular to a range of mountains produces the mountains wave, and although the anatomy of a wave is not fully known, much information is available on how it behaves and how pilots may use it. The wind striking the face of the range shoots up to heights well above the tops of the mountains. As it descends on the lee side of the mountains, some of the air tends to roll under, back toward the mountain forming a continuously rolling mass of air called a rotor.

The pilot flying in wave lift uses a different technique to remain in the strongest lift from the one he uses when he flies in a thermal. He must keep his sailplane in a relatively short band of air to remain in the best lift, taking care not to allow the sailplane to be blown downwind into an area of strong sink nor proceed upwind out of the lift. This band of lift, although short, may be quite wide in the direction perpendicular to the wind flow allowing the pilot to fly back and forth across the area of lift similar to a sailboat pilot tacking in the wind.

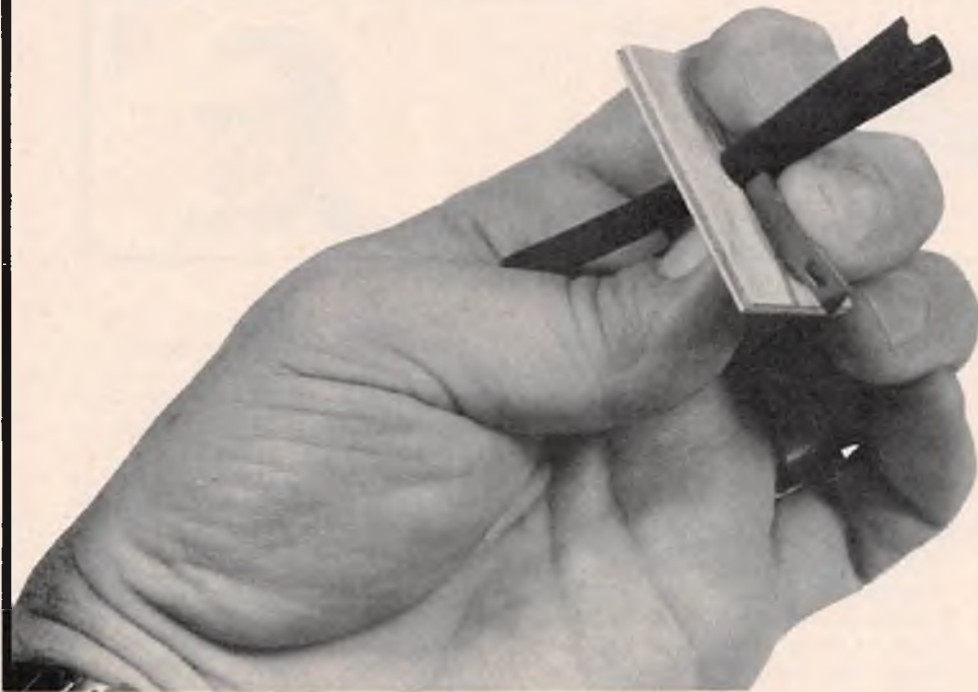
I hope this has been helpful in jogging the memory of the more experienced pilot and adding to the knowledge of the novice sailplaner.

★ ★ ★

Night flying is becoming extremely popular and with the cyalume lightsticks (available from R/C Modeler) your favorite sailplane can be converted to a night flyer very easily. A wing band

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HERE'S HOW



A simple and effective way to cut tubing. A small piece of 1/8" ply, a #11 X-Acto blade and you are in business.

cutting the tubing depending on whether you split or slit? (My goodness!!)

I am sure many of you will agree that fiberglassing the center section of a foam core wing is anything but pleasant. The cloth is difficult to handle — it usually shreds, the resin always sags, and sanding the hardened uneven surface is never easy, not to mention the overall sticky mess. Ray Craig of West Chester, Pennsylvania, has found a material that is very unique with respect to application in fiberglassing. The material Ray suggests using is called "Ultra-Patch." It can be found in most automotive stores such as Pep Boys, Penn Jersey, and Western Auto stores in auto body repair patch displays. The material itself is generally sold in sizes up to 6" by 12" and is a mere .015" thick. It can be found under other names, however, the material is essentially the same as described here. "Ultra-Patch" is a product of Duro Woodhill Chemical Sales Corp.

The patch itself is a fiberglass cloth impregnated with resin. It is quite flexible as it comes from the package and will literally adhere to any surface. Of course, it must be oil and dust free. The application is quite simple and positively no mess. The patch has a protective covering on both sides, a thin plastic film on one side and a heavier waxed paper on the other. The patch is cut to the widths with both protective sheets in place, then the heavier paper is peeled off and that side is placed on the wing joint. The thin plastic film permits you to rub the surface to remove the air bubbles to insure uniform contact. Now peel off the thin plastic film, apply sun lamp or place wing in direct sunlight per

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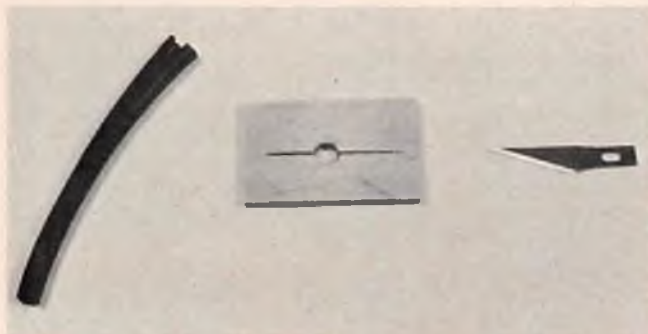
receive a number of ideas to share with you each month. Unfortunately, it is impossible to include them all in each issue of RCM. However, I try to pick out the more interesting ones. Ideas that will benefit the largest audience (I hope) is really what I am interested in presenting. If you have sent a suggestion to RCM and it didn't get published, do not despair, try it again. There are many RC'ers just starting out who need little hints and ideas to make things go easier; especially those RC'ers who live in remote areas and do not have the benefit of experienced help and club affiliation. So keep those ideas coming and we will do our best in For What It's Worth, as well as my monthly stint, to keep you keenly interested.

Here are a couple of good suggestions that are aimed at getting your attention. The first was sent to me from John Krebs of Pittsburgh, Pennsylvania. How many times have

you tried to split or cut in half rubber or plastic tubing? The purpose being for use of cockpit coaming on airplanes or rubber fenders on boats. I have tried this many times using just a plain X-Acto knife with some success, however, usually a bloody finger resulted along with that success. John's idea is absolutely ultra simple.

Start with a piece of 1/8" ply, approximately 1 1/2" x 2". Saw a slot in it about 1/4" long using a razor saw or Dremel disc saw. Next drill a hole in the slot just a little larger than the tubing you intend to cut to accommodate the blade thickness. Finally, place a #11 X-Acto blade in the slot. John's simple tool is now ready to go to work. The blade can be held with your fingers or Hot Stuffed in place.

John chose to retain the blade with his fingers so he could reuse it for regular use. It took him a total of 5 minutes to make the tool and split 10' of tubing for a model boat. Note the two set-ups for



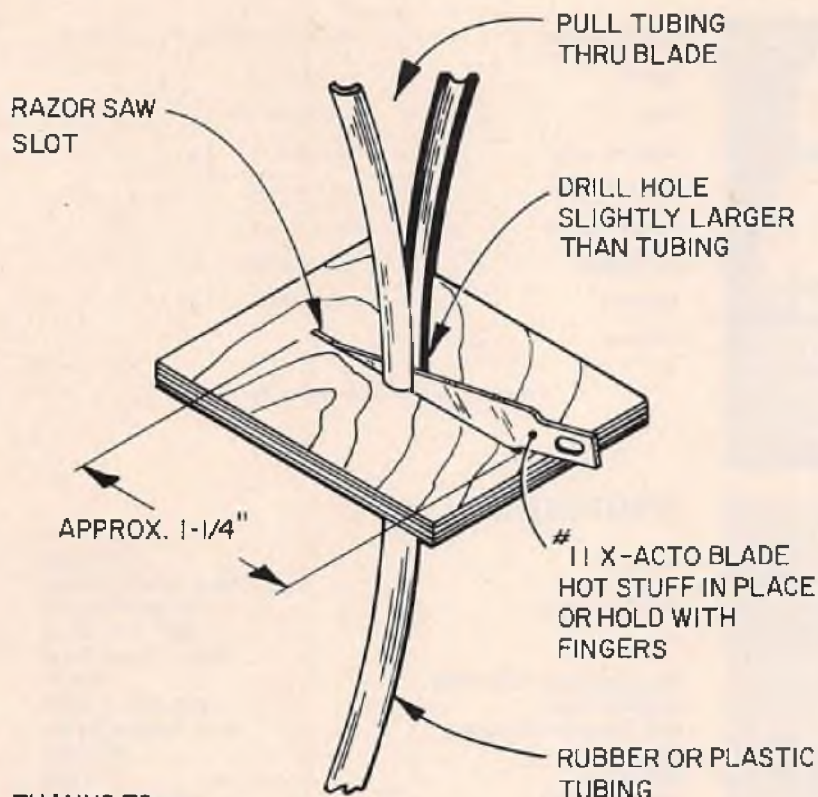
Cutting tool in action cutting tubing in half. Reposition blade toward hole to cut through one side of tubing.



Proper method of retaining blade with fingers. Just pull tubing through blade to cut it in half. Slick and easy.

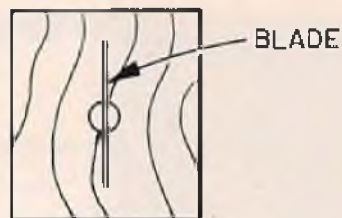
TUBE SPLITTING

The easy way

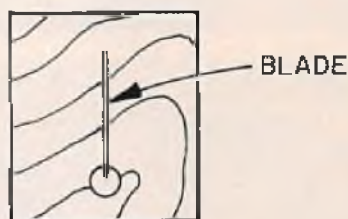


THANKS TO —
John Krebs
Pittsburgh, PA

SPLITTER SET UP FOR CUTTING TUBING IN HALF.



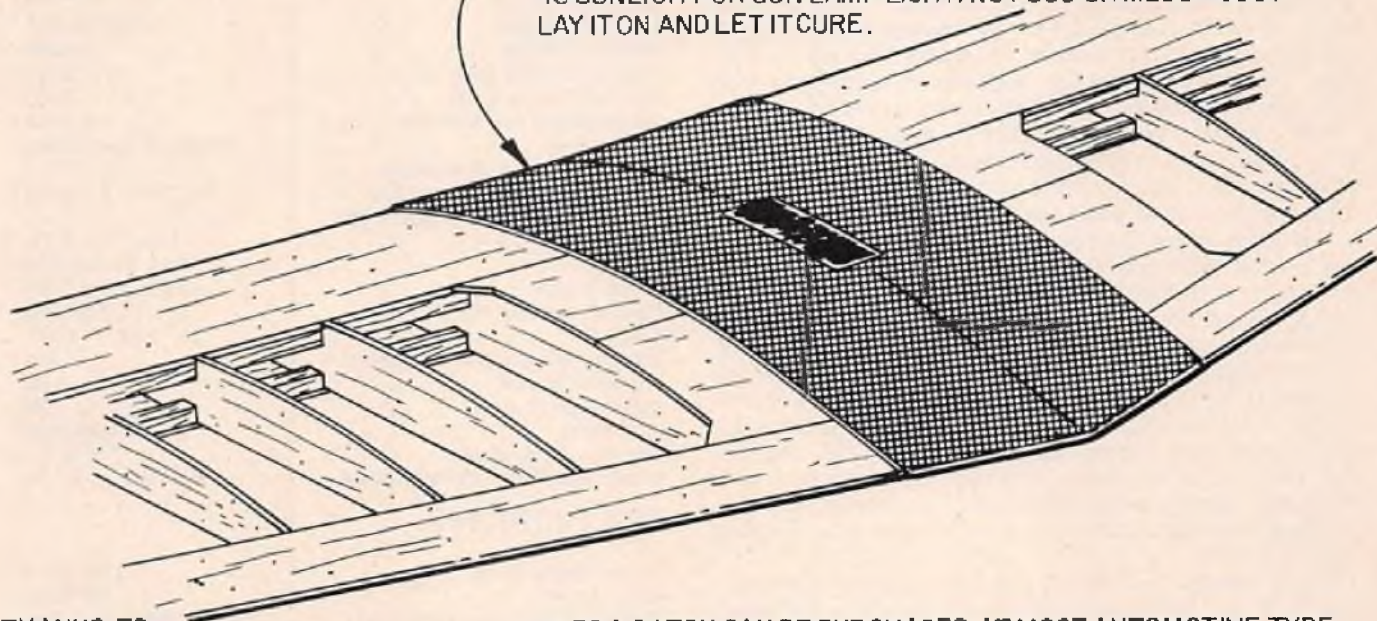
SPLITTER SET UP FOR CUTTING ONE SIDE OF TUBING.



FIBERGLASSING

The easy way

FIBERGLASS CENTER SECTION OF WING WITH DURO ULTRA-PATCH. A FIBERGLASS MATERIAL WHICH CURES WHEN EXPOSED TO SUNLIGHT OR SUN LAMP LIGHT. NO FUSS OR MESS — JUST LAY IT ON AND LET IT CURE.

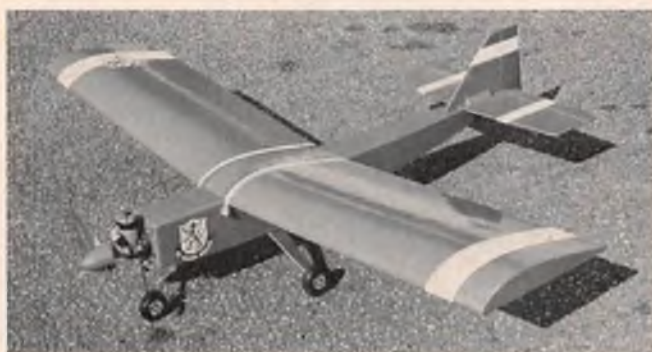


THANKS TO —
Ray Craig
West Chester, PA

● ULTRA-PATCH CAN BE PURCHASED AT MOST AUTOMOTIVE TYPE STORES. THERE ARE MANY BRAND NAMES OF THIS PRODUCT. THEY ALL ARE ESSENTIALLY THE SAME IN APPLICATION.

RCM PRODUCT TEST

Flite Line Products EZ TRAINER



The EZ Trainer is the lead plane in a four ship fleet by Flite Line Products, designed to lead the beginner through the steps from rank beginner to Sunday sport pattern expert. The approach, judging from the EZ Trainer seems a sound one.

On opening the kit box, this reviewer was impressed by the organization and packaging of the contents. The foam wing cores, covering material, full length fuselage sides, shaped stab-elevator, shaped vertical fin, rudder, formed landing gear, and hardware package, appeared to support the four hour assembly time claimed emblazoned on the box.

The hardware package contain: (2) nylon control horns; (4) 2/56 horn screws; (7) nylon hinges; (1) nylon tail wheel bracket; (1) 1/16" music wire; (2) #2 hatch screws; (1) aluminum landing gear; and (2) servo mounting rails.

The wings are super simple and quick. The foam cores were well cut and required only light sanding, inserting the full-span pine spars, slotting for hardwood dihedral brace and attaching balsa trailing edge and tapered before covering. After completing the above steps we used 3M #77 spray adhesive as recommended and encountered no problems. The kit contains a good quality cardboard wing skin material and results in a strong attractive wing. After both wing panels were skinned, the balsa leading edge, tapered center ribs, and end ribs, were added. The panels were then epoxied together and the center section was wrapped with the material supplied. Following directions contained in the kit resulted in a strong warp-free wing.

Construction of the fuselage presented no major problems. The 3/16" full length sides, reinforced by 1/8" x 3/4" pine, 1/16" plywood sheet tank and radio compartment floor, 1/4" firewall and (2) 3/16" formers, resulted in a strong fuselage capable of withstanding the anticipated beginners crash. Two

to page 162

IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging	●					Pre-Shaped Parts		●			
Plans		●				Parts Match to Plans	●				
Written Instructions			●			Overall Parts Fit	●				
Quality of Hardwood	●					Ease of Assembly		●			
Quality of Fiberglass			NA			Fidelity to Scale			NA		
Other Materials	●					Flight Performance	●				
Accessories			●			Overall Appeal	●				
Die-Cutting		●									

E=Excellent / G=Good / A=Average / F=Fair / P=Poor

SPECIFICATIONS

Name	EZ Trainer
Aircraft Type	Basic Powered Trainer
Manufactured By	Flite Line Products 3207 34th. Street Lubbock, Texas 79410
Mfg. Suggested Retail Price	\$29.95
Available From	Both Mfg. & Retail
Mfg. Recommended Usage	Basic Powered Trainer
Wing Span	48 Inches
Wing Chord	10 Inches
Total Wing Area	480 Square Inches
Fuselage Length	35 3/4 Inches
Radio Compartment Dimensions	(L) 10" x (W) 2 3/4" x (H) 2 3/4"
Wing Location	Shoulder Wing
Airfoil	Flat Bottom
Wing Planform	Constant Chord
Dihedral (each tip)	2 3/4 Inches
Stabilizer Span	18 Inches
Stabilizer Chord (incl. elev.)	5 3/4" (Avg.)
Total Stab Area	103 1/2 Square Inches
Stab Airfoil Section	Flat
Stabilizer Location	Top Of Fuselage
Vertical Fin Height	5 Inches
Vertical Fin Width (incl. rud.)	6 3/4" (Avg.)
Mfg. Rec. Engine Range	.19-.35
Recommended Fuel Tank Size	4-6 Ounce
Landing Gear	Tricycle or Conventional
Recommended No. Of Channels	3
Recommended Control Functions	Rud., Elev. & Throttle
Basic Materials Used In Construction:	
Fuselage	Balsa, Pine & Ply
Wing	Foam, Balsa & Pine
Tail Surfaces	Balsa Sheet (3/16)
Hardware Included In Kit	See text
Plan Size	35" x 23" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	No
Construction Photos	No
Kit Includes	Shaped Parts
Mfg. Rec. Flying Weight	52-56 Oz.
Wing loading based on rec. flying wt.	15.6-16.8 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly	Not Given
Wing Loading	Not Given
Covering & finishing materials used	Sanding Resin, Kwik Cote
Engine Make & Disp.	D.S. .25FSR R/C
Muffler Used	No
Radio Used	EK
Tank Size Used	6 Oz.

25th TOLEDO

ANNUAL RADIO CONTROL EXPOSITION

The 1979 edition of the world's greatest radio control exposition promises to be the best as this is our Silver Anniversary. Plan now to attend and bring your latest completely finished model to display or enter the competition for awards. The WRIGHT FLYER, which has been displayed for the past three years, will be awarded to this year's Best of Show winner. See and meet the leading radio control manufacturers and personalities. We will celebrate our twenty-fifth birthday at the Toledo Sports Arena at One Main Street next to the historic Maumee River. This year's show features the Saturday Night Auction and one of the world's largest Swap Shops. During the course of the exposition complete r/c systems, radios, engines, and accessories will be raffled off. We are open to the public all three great days. So, come, join us, help us celebrate the Silver Anniversary edition of unquestionably, the world's greatest radio control show.

APRIL 6, 7 & 8, 1979

FRIDAY	9 am to 6 pm
SATURDAY	9 am to 6 pm
SUNDAY	9 am to 3:30 pm

presented by **Weak Signals R/C Club**
P.O. Box 5772
Toledo, Ohio 43613





SPORTY ACE

By Chuck Cunningham

As you may be able to recognize, the Sporty Ace is a first cousin to the Lazy Ace. Somewhere along the line the Sporty Ace didn't get enough vitamins, and didn't grow up to be as big a biplane as the Lazy Ace. In fact, the Sporty Ace is just what her name implies. Sporty, Perky, Pretty, and an Ace when it comes to flying. She has the same look as the Lazy Ace, but is designed for a .40 engine. She can be flown with anything from a .19 to a .45, but a .40 is the best size to carry her around. Don't get wild and try and put your favorite .60 in the nose; it might fit, but way too much power.

The Sporty Ace was designed to be a fun flying bird for the biplane lover who doesn't want to build a big biplane, but would like the good looks and flying ability of the Lazy Ace. The SA has a semi-symmetrical airfoil, but retains the slightly lifting stab of the Lazy Ace, Miss Texas, and Lucky Lady series of design. Her handling ability is the same on take-off and landing. On take-off you merely turn her into the wind, hesitate for a moment while she sniffs the breeze, then shove the throttle forward. Her aft end lifts up in about 3 or 4 feet, she tracks straight down the runway, and lifts up whenever you want to become airborne. On a paved field, this is in

If you're a biplane lover and don't want to build a large one, the Sporty Ace is a must. Designed around a .40, it has both appeal and ability. Try it and you'll like it.

about 50 to 60 feet. When landing you can either bring her in for a two wheel landing, or slowly rock back on the stick until you drag her in for a three point touch down. I have tried making stalled landings with her, and it is almost impossible to get her to stall out and drop. When she does break, it is just a slight settling straight ahead.

I went to a semi-symmetrical airfoil on the Sporty Ace since most biplane fliers of this size aircraft like to do wild and wooley maneuvers. The SA will do them. The wing area is generous for a .40, 700 square inches, and the weight is low, only 4¾ lbs. (covered with Super

MonoKote), which gives her a wing loading (based upon total wing area) of 15.63 ounces per square foot. If you're a heavy handed builder, and like to cover with silk and smear on lots of dope or paint, then you might add a pound of total weight and even then the wing loading would still be a respectable 18.93 ounces per square foot. Trouble comes in when you work in wing loadings of 29 to 30 for sport and fun fly airplanes, but that's another story.

The Sporty Ace is very easy to build yet, by using spruce spars for the wings, is very strong. You can use very hard 1/4" balsa for the spars if spruce is not available, but the 3/16" spruce spars weigh about the same as balsa, but are a heck of a lot tougher. The interplane struts are very simple to build and install, yet give her just that bit of finish look. Don't let building a wire cabane scare you away. It is easy to do, and is not installed on the fuselage until the finishing process is completed. If you want, you can bolt the wings in place, but I like to use rubber bands on any new design so that, if need be, I can make adjustments in wing incidence.

And, speaking of incidence, make sure that both wings are zero with the bottom of the stab. If any variation creeps in, this can louse up your model. Before covering, put everything in place,

slip the cabane structure into the tubes, block the aircraft up on a table and then, with a ruler, check that the stab is horizontal. When you have it blocked up correctly, check to see that the chord line of the ribs of each wing is horizontal. If not, then take the time to make the necessary adjustments to zero out everything. The time that you spend checking on this, or any other model, will be well spent and return the profit to you of a good flying airplane.

If you're a biplane lover, or if this is your first biplane, you're going to enjoy the Sporty Ace. She can make your day of fun flying really fun. Clear off the work bench, get out the glue pot and stack of balsa, and let's get started.

CONSTRUCTION

Wings: Well, why not start out with the wings --- when you get them done, you're half way home with a biplane. Cut out 18 ribs for the top wing from 1/16" sheet balsa; then cut 18 ribs for the bottom wing. Both are the same in regards to size and spar location, except at the trailing edge for the lower wing. This is cut short to allow for the ailerons. When you have the ribs all cut out, then build a stack for the top wing; pin this stack together and sand to final shape. Do the same for the lower wing ribs. Now, let's build the top wing first. The plans show half of the lower left wing, and half of the upper right wing. Since the wings are similar, you can build all of the top wing at one time and all of the bottom wing at one time. The wings are built with the trailing edge flat on the table, so follow closely. Once you get the hang of the sequence, it's easy to build a straight and true wing. First cover the plans with wax paper and pin the trailing edge sheeling flat to the plan. Then put the bottom cap strips in place. Next, place the bottom two spruce spars in position. The cap strips hold the spars 1/16" above the building board. Glue all of the

SPORTY ACE

Designed By : Chuck Cunningham

TYPE AIRCRAFT

Sport Biplane

WINGSPAN

47 1/2" (Both)

WING CHORD

7 1/2 Inches

TOTAL WING AREA

700 Square Inches

WING LOCATION

Biplane

AIRFOIL

Semi-Symmetrical

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

1/2" Top --- 1 1/2" Bottom

OVERALL FUSELAGE LENGTH

37 Inches

RADIO COMPARTMENT AREA

(L) 6" x (W) 3" x (H) 4"

STABILIZER SPAN

16 Inches

STABILIZER CHORD (incl. elev.)

6 7/8 Inches

STABILIZER AREA

101 Square Inches

STAB AIRFOIL SECTION

Flat Bottom

STABILIZER LOCATION

Top Of Fuselage

VERTICAL FIN HEIGHT

6 1/2 Inches

VERTICAL FIN WIDTH (incl. rudder)

5 1/2" (Avg.)

REC. ENGINE SIZE

.19-.45 Cubic Inch

FUEL TANK SIZE

8 Ounce

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Throt., Ail.

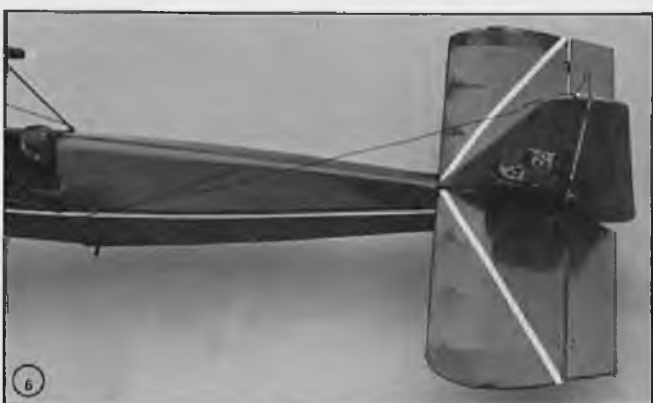
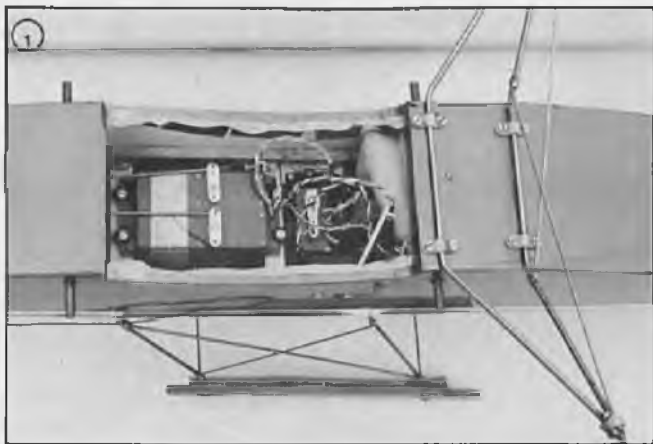
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Ply & Spruce
Wing	Balsa, Ply & Spruce
Empennage	Balsa & Ply
Wt. Ready-To-Fly	76 Ounces
Wing Loading	15.6 Oz/Sq. Ft.

ribs in place working from the tips toward the center section. Note that at the center section the ribs are cut short to allow for the center section cut-out so that the pilot can see where he is going. When all of the ribs are in place, use scrap balsa as shims and glue the leading edge block in place. Do not join the top wing at the center section. This wing has 1/2" dihedral at each tip, which keeps it from having that droopy drawers look. Next, glue the trailing edge sheeting in place, then the top leading edge sheet and the top cap strips. When this is dry, remove both wing halves from the plan, turn over and glue the leading edge sheeting in place. When all of this is dry, using a razor saw, cut slots in the ribs for the 1/8" ply dihedral braces. Smear 5-minute, or longer, epoxy all over the dihedral braces and slip them into the slots in the ribs. Make sure that the braces, glue, and spruce spars are in close contact. Block up the tips to 1/2" each; block up the trailing and leading edges so that the chord line of the wing is horizontal; pin in place and let the glue dry. When this is done, add the center section sheeting at both the top and bottom. Add the wing tip blocks and sand everything down to finished size. The lower wing is constructed in exactly the same manner, except that you add the 1/4" x 1/2" trailing edge piece, and the extra scraps to give the aileron hinges more bearing. The dihedral on the lower wing is 1 1/2" under each tip so be sure to slant the center ribs enough to take care of this. After the lower wing is complete, cut out a small well for the aileron servo.

The ailerons may look a bit large to you, but they are not. Make them the size shown on the plans. This aircraft responds nicely to aileron control, and you can throw them a lot, or a little --- it all depends upon your style of flying. The hold-down pieces for the interplane





(1) Bottom view of fuselage shows nylon clips for L/G, also ample radio room. (2) Servo and linkage for lower wing. (3) Close up of cabane struts. (4) K & B .40 up front sporting a Semco muffler. (5) Close up showing tailwheel, rudder & elevator installation. (6) Overall photo showing completed tail group.

struts are added after the wings are completely finished.

Tail Section: The horizontal stab is built flat on the board and offers no

problems. Pin the leading and trailing edge pieces to the plan, as well as the bottom spar. Glue the 1/16" center section sheeting in place. Cut the ribs

from 1/16" balsa, stack and sand just like the wing ribs. Glue them in place. Add the extra pieces at the trailing edge
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WHAT'S YOUR RC I.Q. AND HONESTY RATING?

By Arthur J. Sabin

Note: After months of intensive research involving the gathering and use of extensive raw data, followed by computerization, then analysis by trained statisticians working in conjunction with psychologists and behavioral scientists, your author is able to announce this RC first . . . a truly accurate, scientific measuring tool for determining the I.Q. (intelligence quotient) and honesty rating of RC modelers. Now by taking this carefully constructed test, you can measure your RC knowledge, basic intelligence and honesty against a wide, national sample!

Directions For Testing: Use ballpoint pen (to prevent re-thinking and changing your mind) and place an "x" in the box that, for each question asked, **immediately** appears to **you** as the answer that is correct **for you**. Our staff recommends that you take this test only when well rested and in a quiet place. **DO NOT** peek at the ranking of results until you are through and have added up your score! Only **one** choice per situation-question. Be entirely honest or you won't really get a reading of your RC I.Q./Honesty rating.

The Test

A. Having commenced an R/C project, how often have you left your local hobby shop forgetting to purchase one or more important items (even if you had a list)?

1. Never
2. Every fifth project
3. Every other project
4. Almost always
5. Always

B. When building, have you ever had to tear out more than two different spars, bulkheads, planked areas, or ribs of any one kit because you "goofed"?

1. Never
2. Every fifth project
3. Every other project
4. Almost always
5. Always

C. When working on your last R/C model, how often did you discover that you had left the glue bottle open or uncapped?

1. Never
2. Once a week
3. Every other day
4. Almost every night
5. Every time

D. When installing R/C gear, how often have you had to

remove the engine because you forgot to fit the muffler properly, seal the compartment, or allow for pushrod or tank installation?

1. Never
2. Every fifth project
3. Every other project
4. Almost always
5. Always

E. When covering your R/C model, how often have you had to buy more covering material because you figured wrong?

1. Never
2. Every fifth project
3. Every other project
4. Almost always
5. Always

F. In the last spring-summer flying season, how often did you discover, after reaching the flying field, that you had left at least one needed item at home (e.g., battery, starter, transmitter, fuel, hat with club emblem on it, etc.)?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

G. In the last flying season, how often have you gotten ready to pack your gear and discovered you forgot to charge the batteries.

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

H. In the past two years of R/C modelling, how often have you slammed the trunk or car door and smashed or dented some part of your model (includes stepping on model, kicking the model by accident)?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

I. Upon arrival at the flying field, how many times have you forgotten to range check your radio gear?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

J. During the months of April through September, 1978, how many times have you forgotten to clear the frequency before turning on your radio?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

K. Refer to J, above: if your action caused another plane to crash or almost crash before you were discovered, how many times did you deny it or hide the fact?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

L. During the last flying season, how many times did you fly with a low cloud ceiling so that you endangered your model and others by losing sight and control?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

M. During the last flying season, how many times did you take off when someone else was in the process of landing?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

N. During your last flying season, how many times did you break in a new engine or otherwise keep it running wide open in the pit area to the discomfort or consternation of your fellow pilots?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

O. During your last flying season, how often did you find

yourself in need of something from a fellow R/C pilot (fuel, sparkplug, tool) and failed to replace or pay for same?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

P. How often during your last flying season were you unable to start your engine and then had it pointed out that you forgot to connect the starter battery?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

Q. During your last flying season, how often did you take off or land in the wrong direction?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

R. During the last flying season, how often did you fly over the pit area in a low pass or over spectators, to "show your stuff"?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

S. During this last flying season, how often did you crash your plane and announced that you got "hit" when deep down you knew it was pilot error?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

T. How often in the last two years have you offered to help fly a novice's plane and smashed it up?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

U. How often in the last year have you flown a plane that was really beyond your skill to fly with less than safe results?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

V. How often in your flying career have you ever flown a plane into a tree?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

W. How often in the last flying season have you forgotten to time a flight and wondered when you would run out of fuel?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

X. How often in the last flying season have you failed to inspect your plane after a flight and before the next?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

Y. Over the past two years, how often have you left your plane full of fuel residue on the theory that the "grease makes it fly better"?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

Z. In this last flying season, how often have you grabbed the frequency use out of turn, or played dumb about whose turn it was, or held out the pin so no one else could get it?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

AA. In this last flying season, how often have you sworn that you would give up this "stupid hobby" when you stupidly crashed a plane?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

BB. Since you have been an R/C modeller, how often have you returned a radio or an engine to the manufacturer stating it was at fault and ruined your plane when you know it was really pilot error?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

CC. Since you have been an R/C modeller, how often have you failed to read the instructions that came with the radio gear, engine, propeller, or the like, since you know all about these things?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

DD. Since your involvement with R/C modelling, how often have you had lecherous desires with respect to one of the cover models on an addition of RCM?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

EE. Since you have been an R/C modeller, how often have you gone to your local dealer for information and help, but purchased everything from a mail order house?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

FF. Since becoming an R/C modeller, how often have you failed to read R/C Modeler magazine?

1. Never
2. Once
3. Twice
4. More times than I can remember
5. Always

**Now Add Up Your Score
& Turn To Page 158 To
See How You Rank.**

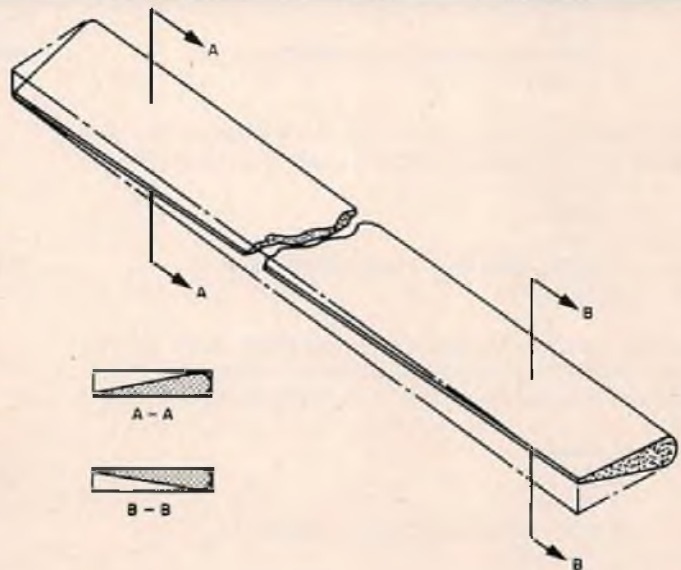
WHY DIDN'T I THINK OF THAT?

By Dave Kovensky

Many designs call out a requirement for "wash out" (i.e., lower angle of attack at the wing tips) to keep the tips of the wing from stalling out first during a reduction in airspeed or increase in angle of attack.

This feature is very significant during the landing phase, since slowing down the model will tend to encourage a tip stall and resultant re-kitting operation, or at least considerable damage.

Instead of building in the "twist" for wash out in the **wing**, the following suggestion will accomplish about the same result. The idea is to build in the "twist" in your strip **ailerons** instead. If you are building a kit, discard the pre-shaped tapered aileron stock, and substitute rectangular material planed or sanded down as shown in the sketch. Use rectangular stock measuring the same as the tapered material, or slightly oversize if you want more roll sensitivity.



RCM PRODUCT TEST

Peerless Corp.
LAMBORGHINI
COUNTACH



We have reviewed a number of gas and electric powered RC cars in the rapidly growing class of 'fun cars' and a couple or so that were pretty close to 'race-ready' just as built from their kits. The Peerless Lamborghini is a high performance, 5-cell, nicad-powered, pleasure car that certainly rates right up there with the better ones. It hits around 20 mph actual, which is 240 mph scale and, given a half decent surface, it has a very effective suspension system at these relatively high speeds. Stability and maneuverability are further enhanced by an efficient differential gearing in the transmission and the use of a double-hinged, transverse, anti-sway bar. Quality, semi-soft, sponge-rubber tires and light mag-style wheels complete the running gear with the same competency as the rest of the system. To add to the fun and realism, this car is equipped with both forward and reverse, fully-proportional, speed control.

SPECIFICATIONS

Name	LAMBORGHINI COUNTACH
Car Type	1/12 Scale, Sport & Fun
Manufactured By	Peerless Corporation 3919 M St. Philadelphia, PA 19124
Mfg. Suggested Retail Price	\$110.00
Available From	Mfg. & Retail
Length	13½ Inches
Width	6½ Inches
Height	3½ Inches
Wheel Base	7¾ Inches
Track	5½" front — 5¼" rear
Weight	6 Ounces
Suspension	Single fore & aft leaf at each wheel. Transverse anti-sway bar at rear.
Gear Ratio	1.5/1 (installed)
Fuel	5, sub C nicads included
Motor	12,700 rpm, Mabuchi RS-380 (included)
Speed Control	20 watt slide rheostat with forward and reverse (included)
Rec. Channels	2
Functions	Channel 1 — forward & reverse with proportional speed Channel 2 — steering
Basic Materials Used in Construction	
Chassis	Duraluminum
Gears	Drive/brass: Driven/nylon
Shafts	H.D. steel
Wheels	Gold-anodized nylon
Tires	Semi soft sponge rubber
Body	Vacu-formed polycarbonate
Instructions	6 page manual
Photos	yes & diagrams
Kit Includes	Formed servo rods, alternate 1.14/1 gears, all hardware, foam mounting tape, Allen wrench, antenna tubing, necessary decals

RCM PROTOTYPE

Finishing Materials	See text
Engine Make and Disp.	As supplied in kit
Gears Used	Hi-speed, as installed by factory
Muller Used	Not required (electric)
Radio Used	Kraft KP-2AW (see text)
Note	

Manufacturer makes available both a trickle charger and a quick charger for the nicad power pack, priced respectively at \$14.00 and \$27.00.

However, before you rush out to the local parking lot to enjoy yourselves you have to do just a little installation work. Most of the component assembly and installation has already been done at the factory. It has not only been done but it has been done very well. We checked our chassis really thoroughly and found all fasteners tight and all gears and other componenets correctly aligned. The completed front-end has the tie rod installed so that proper toe-in is pre-set, as is camber. The entire rear-end, suspension, drive train, differential, motor and speed controller are also pre-assembled into the chassis and all is completely wired. All you have to do is tape-mount your two servos and install the ready made, shock resistant, control rods supplied; mount your receiver and Rx battery and screw your Rx switch to either one of the two plates provided on the chassis. Then add the 5-cell power pack and you can run right now (provided you remembered to charge the power pack as well as your radio last night).

We charged the power pack with our Astro Flight Rapid Charger on the Lo-Amp setting which, on a fifteen minute

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A NEW HORIZON: The Outboard Tunnel Hull



BY JAY SELBY

This article is an in-depth look at the design characteristics of the latest new class on the RIC boating scene: The Outboard Tunnel Hull. It is written by veteran driver, tunnel designer NAMBA Outboard Chairman, Jay Selby.

Overview

Some three years ago John Broadbeck, of K & B Manufacturing, introduced his Class A 3.5 cc. outboard. Outboards are certainly not new to the boating fraternity, but up to this time the only available internal combustion outboard engines were the early K & B .049 and .060's, a twin .12 and .15, and the Atwood and Wen-Mac Half-A's in the 1950's. Fuji, of Japan, entered the scene with a water cooled version that developed gear problems in the lower end. Outboards never gained a recognizable foothold in the US because of the lack of a dependable engine.

In the late '60's Renato Molinari appeared on the American boat racing scene with the first well-known attempt to change to a new and unusual configuration. Not unlike a South Pacific outrigger, it was soon referred to as a tunnel hull on this side of the ocean, and a catamaran by the British. About this time, I turned my attention to hulls. As far as the design of a "tunnel", I had no idea of what was really involved in terms of dimensions or force arrangements. After many frustrating hours with the butcher paper and T-square, I put my first

prototype together in 1969. It incorporated ideas of what I thought a "tunnel" should like like . . . two outer hulls with a concave tunnel! It looked rather pregnant and it ran that way! The big surprize was its inherent ability to turn in its own length. The problems were eventually solved through an intense program of attending tunnel races and numerous model tests.

Later, John Brodbeck informed me that his company would produce an all new Class A Schneurle ported 3.5 powerhead with an enclosed lower unit transmitting the rpm's by way of a flex shaft. I think it was June of 1976 that John ran 12 prototype engines and, of all things, sent me one! I immediately attached it to an all balsa tunnel hull called the Twister that I had built in 1971. I tested it one Saturday, and the next Saturday attended a time trial consisting of a 1/16th mile straightaway run. The catch was that, under the North American Model Boat Association (NAMBA) rules, you have to make two passes, back to back, and then you average those two speeds for your time. Luck was with me, and 37.66 mph was darn good but, since there were no outboard rules, it was unofficial . . . even though I received a little plaque from NAMBA headquarters.

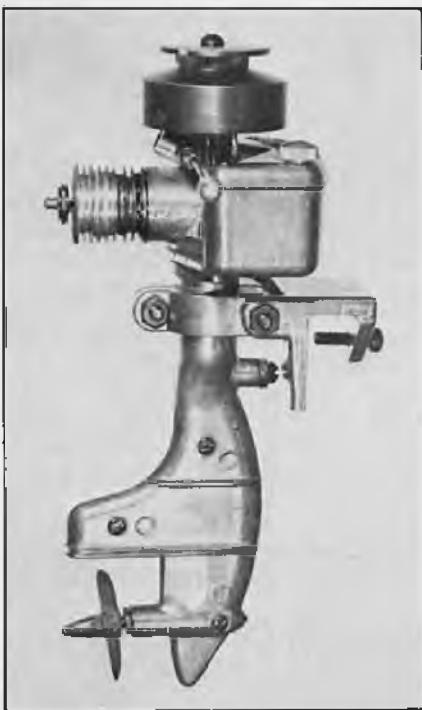
The popularity of the K & B 3.5 cc. outboard is phenomenal. At the NAMBA Nationals, the entry list tops 50 hulls. Local meets seem to draw 20 to 30. For

those of you who haven't the time nor the inclination, there are many "almost ready to run" fiberglass hulls marketed. Added to this is the installation of the R/C gear and engine which are both well within the capabilities of the average boat builder. Voila! You're a member of the clamp-on crew!

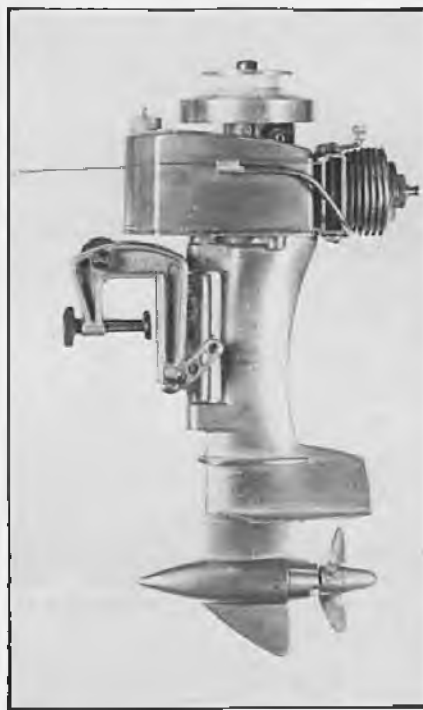
Tunnel Theory

Let's examine the hull that seems to have become the most popular with outboard drivers, the tunnel or catamaran. The tunnel lends itself well to the use of the K & B 3.5 cc. outboard probably because modelers like the scale possibilities of the full size outboard performance craft (OPC) tunnels that have dominated the outboard racing circles since its introduction by Molinari.

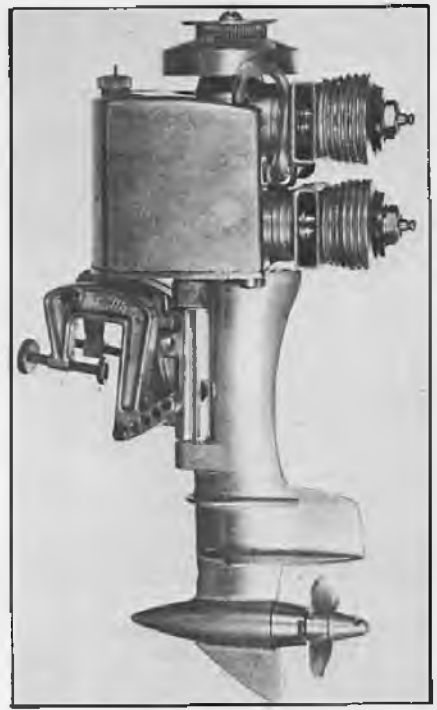
Basically, the tunnel theory is a simple one; two outer sponsons (hulls), connected by a floor, forms a tunnel which extends the length of the whole hull at a constant width. A stationary drive shaft, as utilized on most hulls with a rudder to change the hull's direction, would not suffice. Tunnel hulls, per se, are not new, but it was not until the outboard developed into a dependable, powerful source that the full potential of the catamaran or tunnel was realized. When the driver can "steer" the outboard unit, he literally changes the whole thrust line at the power source (the prop) and an astounding hull utilizing the advantages of the



The Atwood .049 featured cable drive. The power-head was also used on Wen-Mac outboards. Both Atwood and Wen-Macs were available with water cooled cylinder heads.



K & B SeaFury .060 manufactured in the mid fifties.



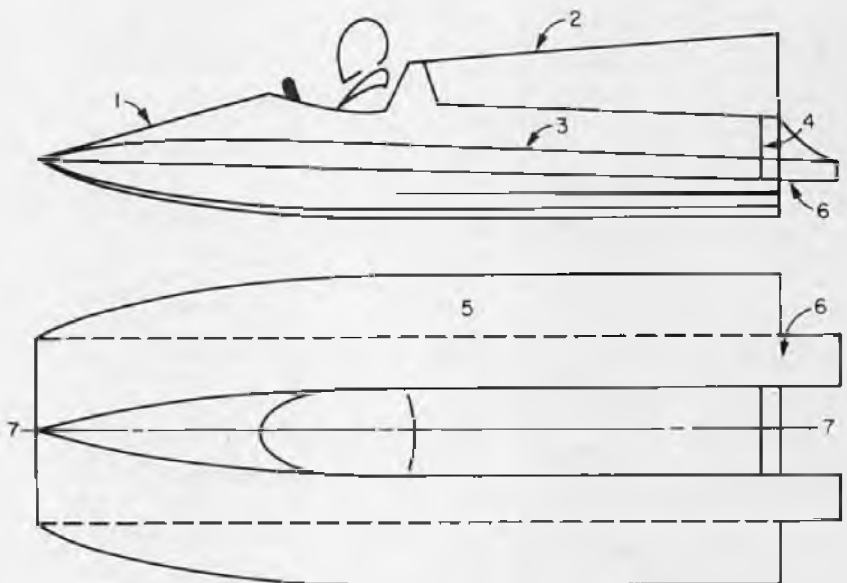
K & B SeaFury .12. This .12 (Twin .060's) shows the ingenious method of doubling the power output.

hydroplane (speed) and deep vee hulls (rough water handling) was born.

As our tunnel picks up forward speed and gets up on plane, the air is "trapped" in the tunnel and is compressed into a smaller area at the transom where it escapes. The whole hull rides on a cushion of air; it literally flies. Consequently, the tunnel is actually a cross between a boat and an aircraft and functions on aero and hydrodynamic principals. The longitudinal stability is controlled by the relative positions of the hydrodynamic lift and the Center of Gravity (C.G.). For maximum stability, from the front, hydro and aero, nearly together, ahead of the C.G. when at low forward speed. When at high speeds, the hydro lift reduces and moves behind the C.G. To obtain this attitude, it is necessary to have the sponsons ahead of the wind, hence the use of the "pickle-fork" configuration. A pickle-fork, as you view it from the top, does indeed look very much like the business end of a three pronged table fork. The usual "squared" bow of a typical tunnel hull is relieved, i.e., the area between the cockpit coaming and the sponsons is cut away. So much for the basics of tunnel theory.

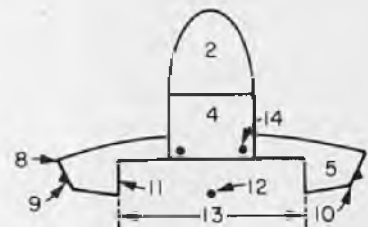
Tunnel and Sponson Design

Over the years, I have managed to compile, through the good old "hit and miss" method, some general dimensions for designing tunnel hulls. Figure #1 shows a "standard" type hull. The numbers designate hull nomenclature. Of all my experiments, the most crucial seems to be tunnel and



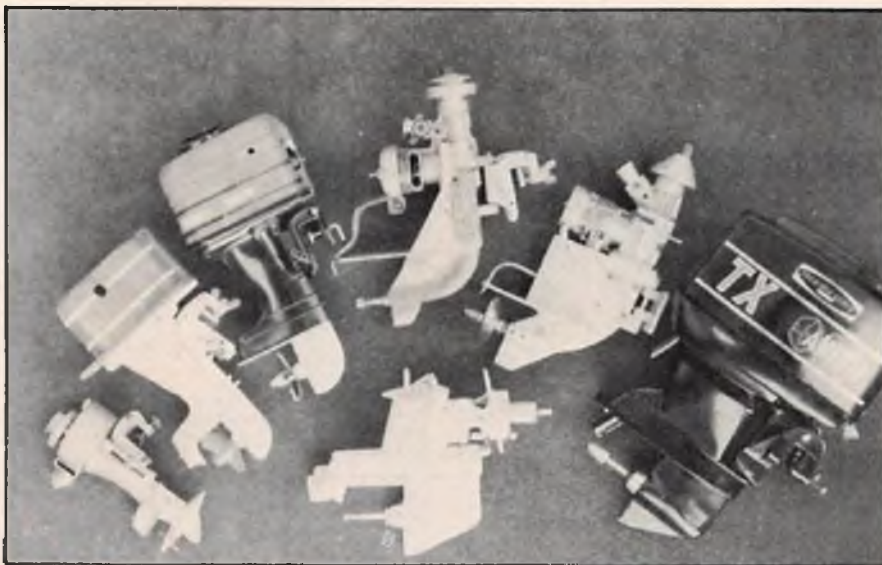
DIMENSIONS:

LENGTH: 27" (BOW TO TUNNEL EXTENSION)
 WIDTH: 12"
 TUNNEL WIDTH: 6"
 COWLING AND FIN WIDTH: 3"
 SPONSON WIDTH: 1 1/4"
 TUNNEL DEPTH AT TRANSOM: 1 1/2"



- | | | |
|------------|---------------------|----------------------|
| 1. COWLING | 6. TUNNEL EXTENSION | 11. KEELSON |
| 2. FIN | 7. CENTER OF LIFT | 12. PROP THRUST LINE |
| 3. DECK | 8. SHEER | 13. "TUNNEL" |
| 4. TRANSOM | 9. SPRAY RAIL | 14. TRANSOM DRAIN |
| 5. SPONSON | 10. CHINE | |

FIGURE 1



A short history of the model outboard engine: (From L. to R.) K & B SeaFury .049, Fuji .15 water cooled, Fuji .15 air cooled, Veco .19 Flex Shaft (Custom Built), K & B 3.5 cc., AMPS .40 and (center) the AMPS outrdrive.

spoonson width. Using the K & B 3.5 cc. on a light, but strong, hull and using a JG C-7 prop with the center of the prop thrust line level with the bottom of the spoonson, a 6" tunnel width does the best job. The depth of the tunnel at the transom works out at 1 1/8". From the transom to the bow, there is a "rise" in the tunnel floor of exactly 1". The running wetted surface of the spoonson (the surface in contact with the water) should be 1 1/4" in width. One of my designs used a 7" tunnel width with a spoonson width of only 1". At this point I should mention the use of a skeg or turn fin. Many designers feel that the addition of the fin, on the inside of the right spoonson, aids in turning. I have never seen such a fin on any of the many full size OPC tunnels I've observed, nor have I ever used one on any of my hulls, nor do I recommend it. It is merely drag and actually will not allow you to turn as easily in **both directions**. This does not mean, however, that its application to model hulls has not been effective, for example, skegs are often used on hulls with a wider tunnel with good success.

Anyway, the 7" tunnel width was rather unstable, first because of the smaller spoonson wetted running surface and, second, because of the tunnel width. It didn't like turns and had a tendency to "tuck in." The width of the spoonson should remain constant at least 12" from the stern and then taper in a gentle sweeping angle to the bow.

Figure #2 shows the different types of non-trip spoonson angles, as viewed from the stern. No. 1 is perhaps the most commonly used, and is the best all-around design for most water. No. 2 shows a flat wetted surface and negates the whole concept of spoonson design, because it will not allow the hull to turn, that is, the hull will slide through the corners. No. 3 was an attempt to break the spoonson loose from the sucking

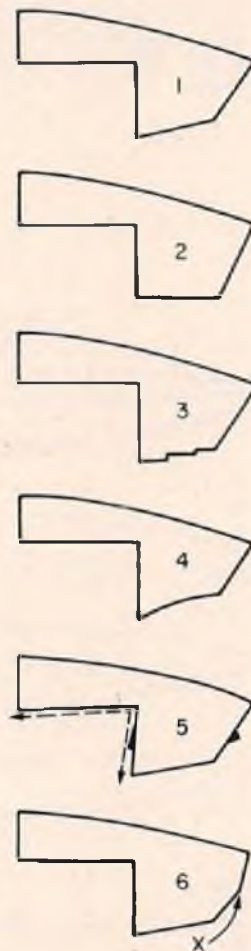


FIGURE 2

action of the water. A more efficient design would allow only one step on the spoonson bottom. No. 4 is a workable design for sprint hulls, where quick acceleration is needed out of a turn. It literally lifts the hull off the water. The bottom contour of the spoonson is somewhat exaggerated in this view. No.

5 first appeared on Molinari hulls and is for high speed hulls. Its advantages will be looked into a little later. The last, No. 6, is a design that the Seebold hulls are using with a spray rail located at X.

Another important feature (see Figure #2, design 5) is the spray rail located on the outer side of the spoonson using a triangular cross section. Its usefulness is apparent at low speeds before the hull reaches a planing attitude. It helps to "curl" the water away from the spoonson side. Basically, the same applies when also placing an "inner" spray rail or water rejector on the inner side of the spoonson. At high speed both are not functional but, initially, at low speed, they both attempt to help break the hull loose.

Next in our discussion of spoonsons is cant. By definition this is the "toe in" of the spoonson as viewed in Figure #3.



FIGURE 3

The advantage of this modification manifest itself at high speeds, especially in turning. In essence the inner edge of the spoonson, because of the inner angle, literally "bites" the water and pulls that side of the hull down. Coupled with the engine pivoting on the transom, and the resultant change in thrust, it makes for a definitely decisive turning machine! The addition of the cant will make trimming your hull more difficult, and again as this is a high speed modification, I would not recommend its use for the beginner. You will, however, have a hull that turns on its own length with a vengeance! Moving from the spoonson to the tunnel "floor", another effort to break the hull loose and cut down the friction of the water, is the addition of dihedral as viewed in Figure #4. This perhaps also aids in dumping

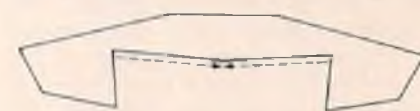


FIGURE 4

the air to the sides of the tunnel, thereby contributing to an increase in speed. Again, on the big OPC hulls, it is another experiment to increase speed and stability. A good analogy would be if the reader at this point, would visualize a "flat" bottomed hull and a graceful V-bottomed hull. Which would run with more stability and speed? My choice would be the slight V-bottomed hull over the flat.

There are other techniques used with varying degrees of success to help lift

the hull. These are attempts to "fly" the hull; to get it off the water. Figure #5 shows the addition of a concave airtrap located at the bow in the tunnel floor.

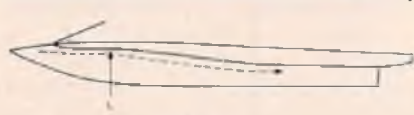


FIGURE 5

own experiments have included this modification. Its use does cause the hull to fly more at the bow; an undesirable effect, but my experiments may prove inconclusive as several of the models and full size OPC tunnels use this modification. I have had much more success with the application of the treatment of the tunnel floor as shown in Figure #6. This idea was brought to my attention by Rick Schrameck who is an avid glider nut. As you will observe, the shaded section of Figure #6 does



FIGURE 6

indeed look very much like an airfoil that is used in the construction of glider wings. You will note the undercamber designed into the tunnel floor approximately the last one third of the tunnel. The center of lift has moved from the bow of the hull (as shown in Figure #5) to the rear portion. With the use of outboards, and the resulting weight more apparent at the transom, an effort should be made to lift that area rather than the bow. This sounds logical and, at this point, I have used the modification on a 42" tunnel powered by an AMPS .40 outboard that produced very positive results. At the time of this printing, I am also well into the construction of a 3.5 cc. outboard hull with the same airfoil treatment of the tunnel floor. If it functions in the desired way, the hull should not plane at such a bow high angle, yet still keep most of the hull out of the water.

The most important design feature of the tunnel/sponson area is the treatment of all edges that are in contact with the water. All edges from the inner sponson to the chine and sheer and hence the stern must be kept as sharp and warp-free as possible. Visualize grasping a tablespoon and pulling it through water, and then lift it from the water. The rounded edges do create suction. The same general theory would apply to the sponson edges. If you are careful in your construction of these edges, your hull will be faster, handle much more precisely, and turn much better in both directions.

Let's consider next the aft-tunnel extension. From the information I have been able to secure from full scale OPC

drivers, this was an attempt to trap even more air at the stern. The initial flat extension as seen in A of Figure #7, has been modified so that there is an upswing (B of Figure #7). The idea here

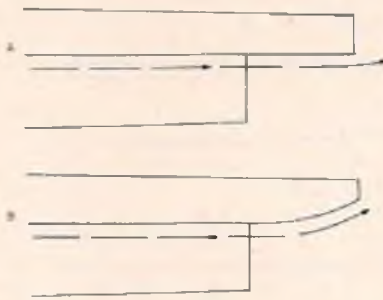


FIGURE 7

being that on turns the water would exit with less friction. An added plus for the R/C modeler is that the extension will aid in holding the bow down when accelerating to achieve a planing attitude. The plague to all tunnel drivers is the tendency of the tunnel to fly off the water and loop. Any modification that will negate this bad habit, that seems to be an inherent trait of tunnels, is well worth exploring.

Turning next to the top side of the sponsons, there are several techniques used to trap the air and maintain that pressure as an aid in keeping the hull "glued" to the water. Using the analogy of "air strakes" that you have perhaps observed on aircraft, apply it to a tunnel hull (see Figure #8). A "fin" is built as an

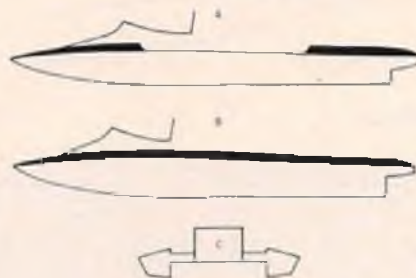


FIGURE 8

integral part of the sponson starting at the bow and extending over the arched flow of the sponson ending near the cockpit and, then again, starting the last four or five inches to the stern of the sponson. Perhaps an even more efficient air strake would be the same idea, but extending our fin the complete length of the hull as seen in B of Figure #8. Based on my own experiments, I have found that the third modification (C of Figure #8) to be the most efficient, but it does pose some design problems as the depth of the sponson from the top to the bottom (inner edge) must be thicker to maintain rigidity and strength. Another modification that is more effective on full size tunnels, because of the greater

area offered and the higher speeds, is the use of a concavity built into the cowling (Figure #9) at the bow; or built

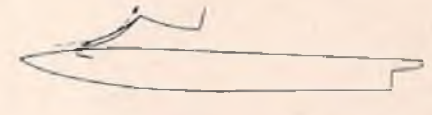


FIGURE 9

into the leading edge of the sponson also at the bow (Figure #10). These again are attempts to keep air pressure on the bow to minimize the tendency of the tunnel to loop.

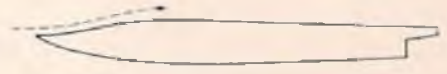


FIGURE 10

Concentrating our discussion on the bow, let's look at adjustable wings. I am not going to dwell on the mechanics of building adjustable wings, but will confine the discussion to their usage. Full size hydros, in various classes including the big unlimiteds, make much use of the wing over the stern of the hull, as do classes in car racing. I have seen only one picture of an outboard hull with a wing located on the stern above the engine. This undoubtedly poses problems mechanically. At the Second Annual Golden Gate Outboard Regatta, Steve Hamilton from Monterey, California, ran a 2 1/2 lb. (complete weight!) tunnel with adjustable trim tabs at the stern (Figure #11), that were

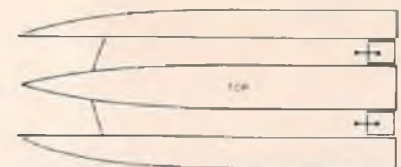


FIGURE 11

integrated with the rudder servo and worked on the same principal that ailerons do on aircraft. These seemed to do the job on turns and helped maintain an even axis. My own experiments have dealt with an adjustable wing situated between the sponsons at the bow as shown in Figure #12. This allowed me to run the tunnel at a very tender (higher) angle of attack without the usual ballast I sometimes have to add in the bow. The obvious disadvantage is the tendency of the hull to "sub-marine" if the bow assumes too low of an angle or if you enter a huge wake or swell without caution. I call the wing a "Bow-Levator" and I have used several different airfoils from flat, to the Clark Y, to a type not unlike that found on race cars.

Another experiment to aid in keeping pressure on the bow and, thereby, help

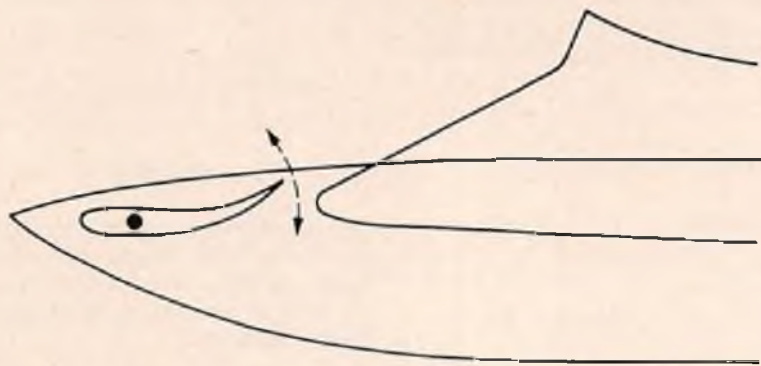


FIGURE 12

negate the looping tendency of the tunnel hull (which is just part of learning to drive these critters) is the construction of air slots (holes) on either side of the cockpit cowling at the bow between the sponsons (see Figure #13). At low speed this modification is not meant to become effective as the slots appear closed, but looking at Figure #14, you can visualize what happens to the air flow when the hull is on plane and you are moving at top speed. As the bow lifts, the slots "open" and the slipstream flows over the surfaces producing a downward force. This is a compromise and operates under most conditions, but I think that to a degree, the pickle-fork accomplishes almost the same results and is not half as difficult to construct, and even more efficient is the Bow-Llevator. Moving to the rear of the tunnel, another technique that has proven workable is the use of a "wedge" located at the transom (Figure #14).

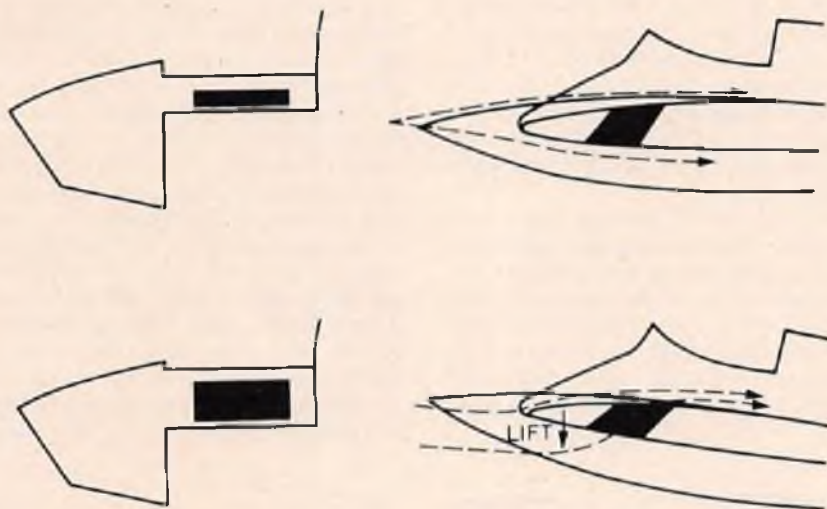


FIGURE 13

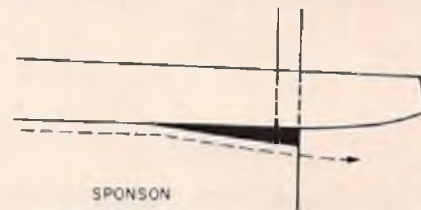
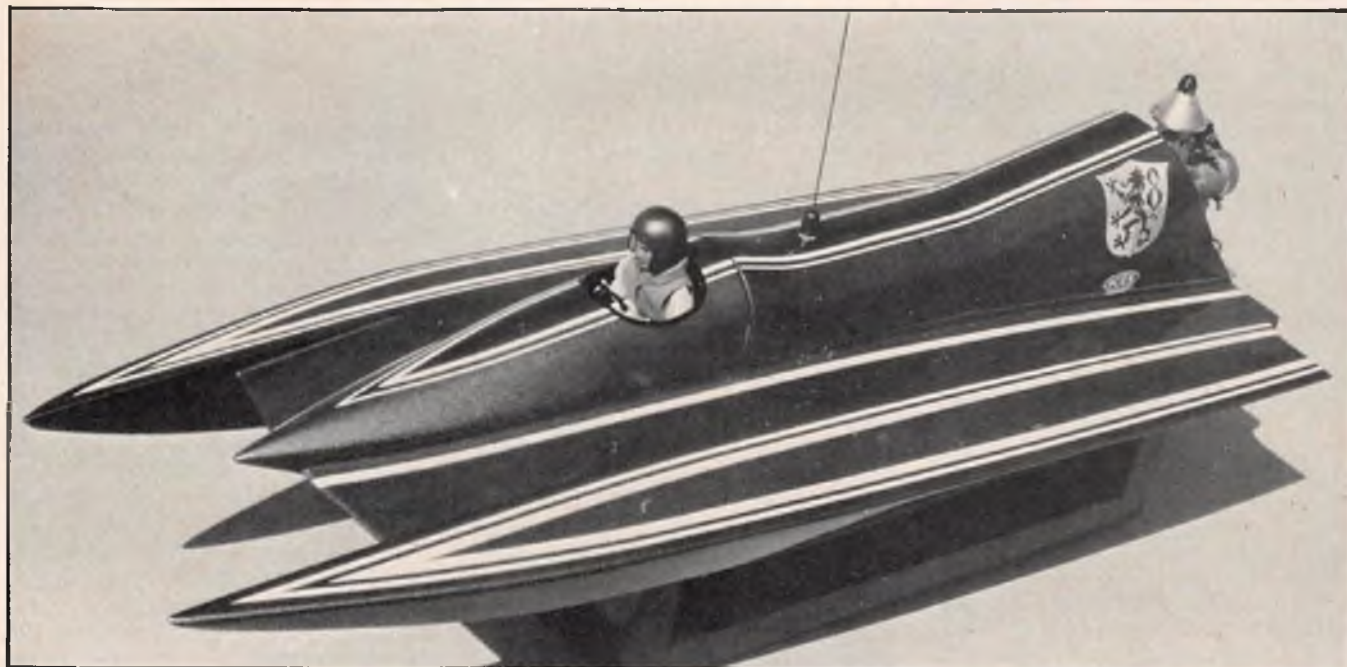


FIGURE 14

The flow of the water over the wedge forces the bow down and yet allows a smooth flow on either side of the wedge.

In a later issue we will delve into some of the problems of trim control. Until then, smooth water and speedy runs. □



R/C MODELER MAGAZINE ANNOUNCES ITS 1979 R/C DESIGN CONTEST



1ST PLACE: Your choice of any model radio control system available in the United States. No limit as to number of channels. System to be furnished with 4 servos, plus payment for your article if published by R/C Modeler Magazine.

2ND PLACE: Model merchandise of your choice to total \$300.00 list price, plus full payment for your article if published by R/C Modeler Magazine.

3RD PLACE: Model merchandise of your choice to total \$200.00 list price, plus full payment for your article if published by R/C Modeler Magazine.

TO PROMOTE AND ENCOURAGE CREATIVE DESIGN
EFFORT IN ALL PHASES OF RADIO CONTROL
OFFICIAL RULES

1. Contest is open to any individual except employees of R/C Modeler Magazine, RCM staff members, or their immediate families.

2. Competition is officially open January 20, 1979, and closes Midnight, April 30, 1979. Entries postmarked later than midnight, April 30, 1979 will not be eligible. Only articles postmarked after January 19, 1979 are eligible.

3. All manuscripts must be typewritten, double-spaced on standard 8½" x 11" white paper. Photographs must be black and white glossies, measuring 5" x 7" or larger. Artwork accompanying manuscripts must be original work (no blue lines) and neatly drawn in pencil or ink. Entrants must include their name and address in upper right hand corner of each page of typewritten manuscript, on the back (or otherwise affixed to) each photograph, and on all artwork. A mailing envelope, self-addressed, with sufficient return postage must accompany each submission if the entrant desires return of his material. No entry blank is necessary.

4. Entries must be mailed to:
R/C Modeler Magazine
Design Contest Editors
P.O. Box 487
Sierra Madre, Ca. 91024

5. Entrants must submit a radio controlled model design consisting of: (A) full size construction plans (pencil or ink); (B) manuscript of no less than 2,000 words; (C) black and white photographs consisting of at least eight photographs taken during construction of the model as well as at least two photographs of the completed aircraft (an action photo is desirable). In addition to black and white photographs, one or

more color transparencies, (35mm or larger) or color prints are helpful.

6. You may also submit an original design of electronic accessories that may be used by the R/C hobbyist in his model, in his shop, and/or field equipment. The detailed requirements for drawings, manuscripts, and illustrations will vary with each electronic design. The package submitted must be complete and to the familiar RCM format.

7. Entries will not be judged in separate categories, but equal consideration will be given to each class. Emphasis will be given, in judging, to creative design, originality of design, technical and mechanical accuracy, and neatness and extent of presentation.

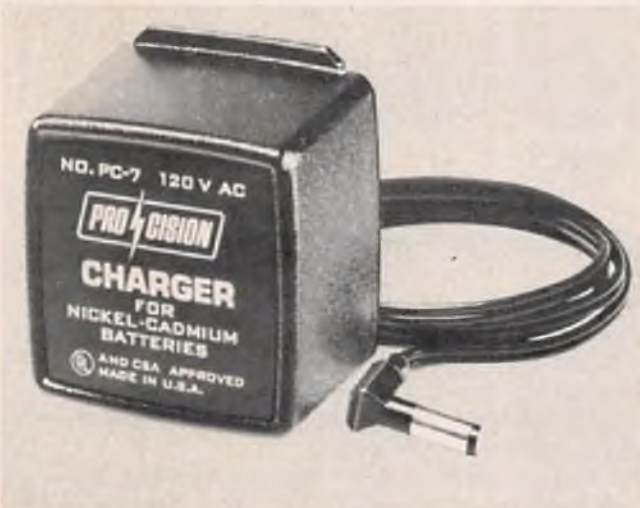
8. Winners will be selected by the Editors of Radio Control Modeler Magazine and all decisions are final. Winners will be notified by mail of the judges' decision and their names published in Radio Control Modeler Magazine in the September 1979 issue. All entries remain the property of Radio Control Modeler Magazine unless return has been specifically taken care of as mentioned in paragraph 3. Any entry that has been previously published, or is published in any publication during the period of the contest will be disqualified. The Editors of Radio Control Modeler Magazine reserve the right to purchase any entry for publication in Radio Control Modeler Magazine at the rates in existence at the time of publication.

9. The Radio Control Modeler Magazine Design Contest is void wherever prohibited, taxed, or restricted by federal, state, or local regulations. Any state, federal, or other taxes imposed on a prize winner in this competition will be the sole responsibility of the prize winner.

YOU COULD WIN A NEW RADIO CONTROL SYSTEM, OR MERCHANDISE AWARDS!

RCM PRODUCT TEST

Pro-Cision Products
**PORSCHE 935
TURBO**



(Editor's note: we offer our sincere apologies to Damon Runyan).

So it happens that I am hanging around 'Mindys' as usual, about 2 a.m. when Phil the Krafty comes across to my table and says the Kid wants to talk to me on the phone. Now, I have known Dick the Kid since back in Prohibition when a guy could make an honest buck only slightly illegally and I am overjoyed that he is calling me. I am known around as a guy with nimble fingers if someone should happen to stumble on a safe whose owners are somewhat derelict in their duty (like failing to adequately protect the building where this safe is to be found). The Kid is one of the better ones at stumbling onto such vaults which are just crying for my attention.

So, I pick up the phone and I say "Hello," very cautiously, as it is a part of my nature never to say anything that could be used against me. The Kid says: "Hello," he says, "get your butt over to Sierra Madre," he says, "I've got a car-kit for Product Review," he says, "and I want you to do it," he says. Well, this isn't exactly what I was expecting but things have been a bit slow lately, what with Pimlico and Aqueduct both closed, and I have some free time on my hands. So, I end up agreeing to drive over there and performing this small service to help him out.

Now, it is 90 miles, round trip from here to Sierra Madre and

SPECIFICATIONS

Name	PORSCHE 935 TURBO
Car Type	1/12 Scale & Sport
Manufactured By	Pro-Cision Products P.O. Box 60643 Terminal Annex Los Angeles, CA 90060
Mfg. Suggested Retail Price	\$164.95
Available From	Both Mfg. & Retail
Length	16 Inches
Width	6 3/4 Inches
Materials	High impact plastic with excellent detailed molding. All windows are glazed. All decals installed. Steel drive-shafts.
Suspension	Rear only. Motor/gear plate and rear axles are spring mounted
Transmitter	Two stick, fully proportional with trims
Functions	Channel 1 — forward & reverse and variable speed Channel 2 — proportional steering
Speed Control	All electronic, no rheostats used
Power Supply	Batteries (not incl.). Transmitter — 6, AA size. Car and receiver — 5, C size (both car and transmitter have battery power indicator lights).
Instructions	Easily understood, 8 page, illustrated booklet
Note	

This beautifully detailed and high quality scale model comes completely built and with all radio equipment. Everything is fully assembled requiring only the insertion of batteries and the two antennas to be ready for action. If desired, the car may be powered with nicads and high performance gears are supplied in the kit if nicads are used. The manufacturer makes a charger available for nicads at a price of \$9.95.

the first problem is that I will have to locate someone with wheels that will hold together while covering this great distance. Well, the Swami Tishna says that Dewy-eyed Don has just recently returned to society after a long period of meditation in an upstate government institution known as Sing-Sing. It seems this Don rides a big Honda as he really appreciates this rare commodity known as "fresh air" which was apparently in very short supply where he just comes from. After a suitable period of negotiation, he agrees to ride me over there on condition I give him the intro to one of their Dolls known as Steely Susan and a chance to say the big Hello. Now, this ride is something that I will willingly forget, if I ever can. Fortunately, the rush of wind is loud enough to drown out my screams of anguish and to blast my eyes permanently closed so that I see only a very small percentage of the many awful tragedies that are almost occurring every few minutes.

After I am returned home and have fervently wished this Don back in the upstate institution again, I take several days and a great deal of Aspirin before I am able to control my trembling every time the ice-box switches on. And it is at this point that I finally open the kit-box and start to tremble all over again. Inside is a beautifully-detailed, scale Porsche 935 Turbo (one of the prettiest things I have ever seen) and a transmitter. Naturally, this makes me very suspicious right away, as when I lift them out I see that they are obviously completely built already and everyone knows that kits just don't come this way. What makes me even more mistrustful is that all the other kits the Kid asks me to build have always had a big white sheet in them with drawings of all the little bits of wood and stuff so you can see what glues to what and what shape it should be. But this sheet is missing from this box: all I find is a small booklet with some words printed in it.

It is now that I realize the Kid has suckered me in again. Obviously he gives this kit to one of his first-class fabricators

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Stearman Conversion

... From A
Sterling PT 17 Kit.

By Bud Caddell
Photos By Doss Steed



I knew for some time I wanted a biplane; I got turned on by an Aeromaster (doesn't everyone?). However, I like scale and an Aeromaster won't quite cut it in scale competition even when it's painted up to look like a Pitts.

The Stearman looked like a good bet, but in Stand-Off Scale where flying is so important, I felt I had to do something to the basic airframe so my "trainer" would not be roaring across the field like a P-51. The man-carrying Stearman was

decided that it was the one I wanted to do.

As far as the engine is concerned, even a "light" Stearman will weigh 9 pounds and most .60's just won't hack it. I chose an OS .80, plenty of horsepower and able to swing a 14" blade, most important when you consider the cowl is 7 1/4" in diameter. The more blade past the cowl the better. When the Stearman is underpowered, the first place it shows up is on take-off. It wants to swing left and ground loop. With good power up



hard put to do anything but fly straight and level; a loop was started out of a pretty sporty dive and a roll was something that came off only every so often. Then I remembered back to some air shows I attended shortly after WW II. I saw Stearmans completely aerobatic. They had taken out the Continental 220 and put in a Pratt Whitney 450. They really moved out, and what a beautiful sound they made. I've seen them looped on take-off and four point rolls made right on the deck.

While thumbing through an aviation magazine, I happened to see one of these Stearman conversions and

front, the acceleration is fast enough for the rudder to become effective almost immediately, and this helps a whole heap.

The cowl and wheel pants are fiberglass. Unfortunately, they can't be bought, you'll have to build them --- wait a minute, don't turn the page! You don't have to make a male mold then a female mold then join the halves, none of those grubby things. I do it with urethane foam. It's stocked by insulation dealers and can be bought in sheets of 1", 1 1/2", and 2" thickness. Fiberglass resin won't attack it; as a matter of fact, you can pour lacquer thinner on it and

nothing happens! It sands better than anything you'll ever run across and it only costs about 30¢ a board foot (1" x 1" x 12"). It takes about 20 minutes of shaping and sanding for each piece. The cowl is formed by laminating enough material to make a cowl 4" wide and 7 1/4" in diameter. Cut the material about 7 1/2", find the center, drive and epoxy a 1/4" dowel **exactly** plumb, chuck it up in a drill press, and on low speed just hold a coarse sanding block on it until you get the right shape. If you don't have a drill press, you can use a 3/8" electric drill fastened down. After that it's just a matter of covering the shape with two layers of 8 oz. boat cloth. Use 80 sandpaper to cut off the high spots, then mix up a runny mixture of micro-balloons and resin and paint it on. When cured, it sands quite easily and before you know it you've got a cowl. Wait 24 hours and hack away the foam; a stiff wire brush helps for the final cleaning. My cowl is fastened on the inside. I cut a 1/4" plywood ring 1/2" wide and contact cemented it to the back of the shaped cowl before the glass was applied. I then glassed over the urethane and the ply ring at the same time. I attached it to the fuselage with four 440's and blind nuts. The wheel pants are shaped and a 1/4" dowel is epoxied in place like a popsicle stick. Do it where you'll cut out for the wheel. The wheel pants are attached to the axle by a Rocket City extended nose steering arm attached to the axle. The

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M I R A G E

The Mirage is a first class sailplane for competition and sport flying. It provides all the features demanded by the contest flyer --- high launch, low sink rate, fine L/D, wide speed range, excellent thermalling ability, and fine spot landing capability. In some of these areas, it gives a bit away to the gargantuan battleships, but in launch, sink rate, thermalling ability, and spot landing capability, the Mirage is as good or better than the competition. In addition, the plane is terrific fun to fly! Its character is that of a light air floater with speed in reserve if the nose is dropped. With ballast, the plane changes into a moving machine, great for use in strong air.

The Mirage is a proven design. About 40 have been built here in competitive Southern California. The plans presented here are the result of a year and a half of experience with the plane. The plans are accurate, and the design is worked out. If you follow the plans, the parts will fit, and the plane will be competitive right off the board.

The Mirage is not an extreme sailplane. It is moderate in size, strong, durable, and straightforward to construct. It is easily scratch-built from materials available at the local hobby shop.

While the Mirage cannot be recommended as a first airplane for the unassisted beginner, it is so easy to fly that it does make a fine second plane.

What makes the Mirage special is its configuration. The most important feature is the wing section. It is a thick, low camber section --- that is, a semi-symmetrical section. This section is responsible for the performance of the airplane. Planes before the Mirage used similar sections, with amazing performance but, in general, they flew too fast to be competitive in the typical sink rate and spot landing contest. The design problem then was to make a light plane so that it could use the section without flying too fast. This led to a design which deviates from the "ideal" aerodynamic form to obtain a decrease in weight or an increase in strength. The wing center section is a flat, continuous panel to avoid the weight and complication of a joiner or wing rod. The fuselage is an open tube all the way to the rear so that the stab has a wide base

and so that the fuselage is very strong for its weight. The rudder is offset so that it may tie in with the fuselage efficiently. The stab has a single elevator which is lighter and cleaner most of the time. Care was taken to see that the structure is strong enough everywhere, but not



overly strong anywhere. This leads to a lot of tapered structural members and a plane that is unusually strong for its weight.

So, now that you can't live without a Mirage, it's time to clean off the board and get to work!

CONSTRUCTION

General Comments:

(1) Buy your wood in whole sheets, and cut your strips from the sheets. This has several advantages including lower cost, consistent stripwood from piece to piece, and a lower chance of picking a damaged piece of wood. The time involved in cutting the wood is trivial. The imperfections created by cutting your own are not important.

(2) Use the lightest wood you can find consistent with your requirements for strength and durability.

(3) Don't use epoxy glues except where called for in order to save weight, unless you have a crude joint that needs filling.

(4) Don't skimp on Titebond. Its dry weight is about 20% of its wet weight, and it is more important to connect the pieces well than to save maybe 1/4 oz. overall.

(5) If you make up your own kit before you start gluing, it will probably save time and mental energy.

Wing Main Panel

General Comments:

(1) The tip joiner receiver box is relatively highly stressed, so it must be constructed with care.

(2) It is very important that the balsa shear webs are accurately cut in order to assure a good bond to the spars. I recommend setting up a simple jig so that accurate and repeatable webs can be quickly cut.

The Steps:

(1) Pin, slalom style, the main spar in its place on the plans. Behind the spar lay a piece of 1/8" square which will serve as a prop to hold the ribs at the proper angle.

(2) Work from the center out --- go: web-rib-web-rib and so on until the last bay which you save for later.

(3) Put your pieces of trailing edge (T.E.) stock up to the ends of the ribs and mark the rib locations. Notch the trailing edge keeping in mind that a smidge too tight is better than too loose.

(4) Remove the wing from the board. Holding the ribs flush to the board at the rear bottom, slide the T.E. with glue filled notches into the ribs. The bottom of the ribs should be flush with the bottom of the T.E.

(5) Test fit the top spar. It must sit right
text to page 52

**A PERFECT COMPETITOR, THE MIRAGE WILL PUT YOU IN THE WINNER'S CIRCLE.
DESIGNED FOR EASE OF BUILDING, IT RIDES THE LIGHTEST THERMALS. WHEN
BALLAST IS ADDED, IT CHANGES INTO A MOVING MACHINE.**

By Blaine Rawdon

Construction Photos by Vern Broesamle

*Susan Luke showing
off the Mirage high above
Palm Desert, California.
Ektachrome transparency
by Fridley Studio of
Palm Springs, California*





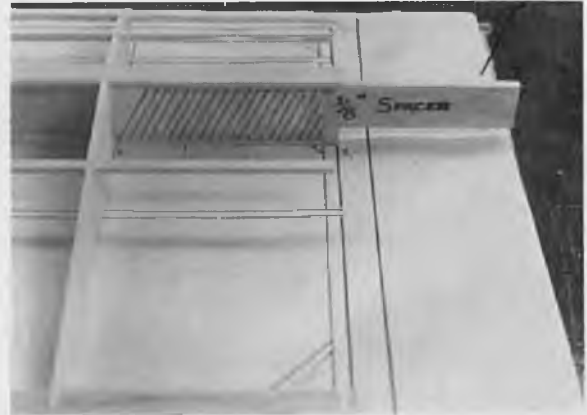
Shear web edges are coated with aliphatic glue, separated and allowed to dry before installation.



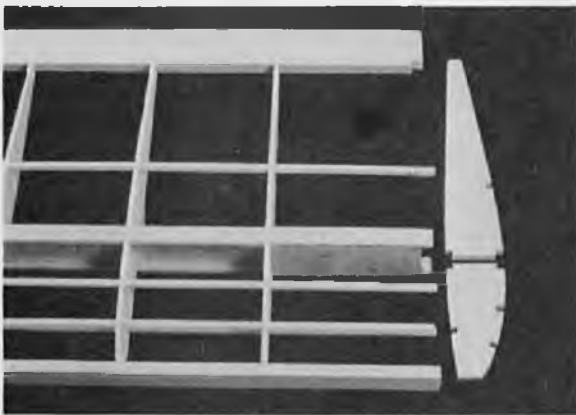
Start with center rib, add web, then next rib. This insures proper contact.



Note proper fit of shear webbing between ribs.



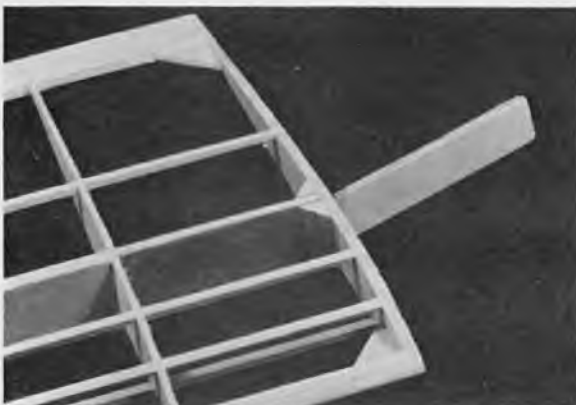
Use 1/8" spacer to obtain snug fit on wing joiner box.



Center section wing joiner box – ready for end rib.



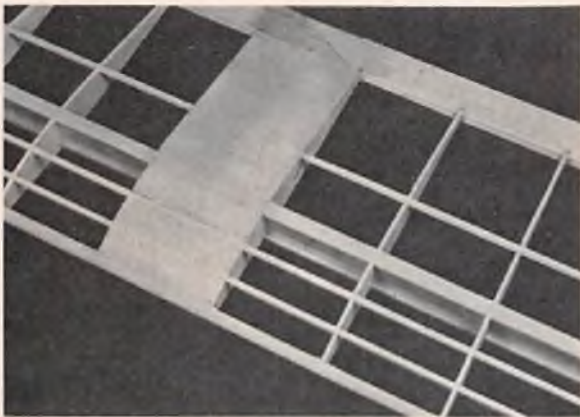
Fitting the wing joiner to the tip panel.



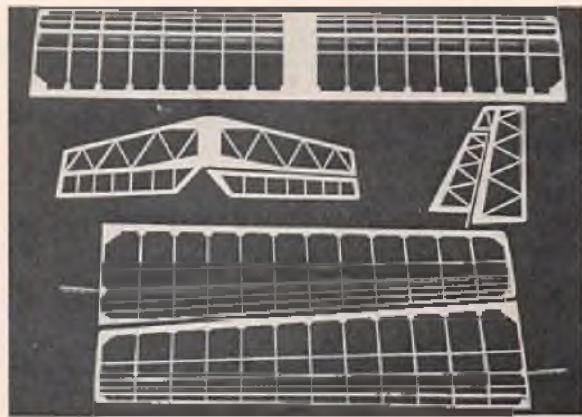
Tip panel wing joiner completed.



Center and tip panel joined.



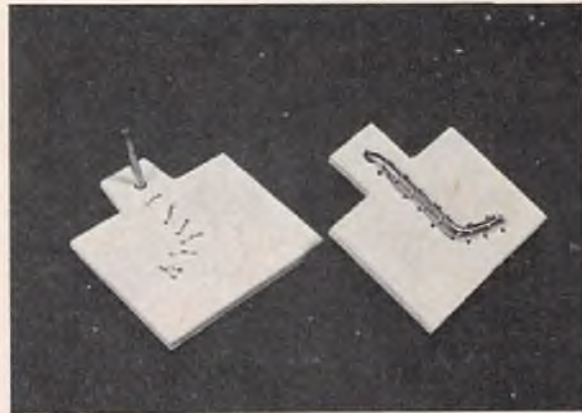
Center section covered with glass cloth and resin.



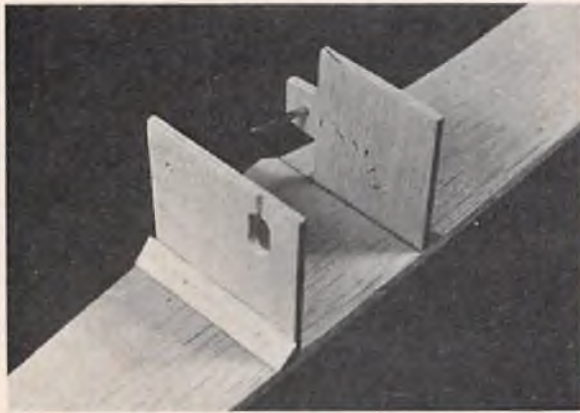
Completed wing panels and tail group.



Adding longerons to fuselage sides.



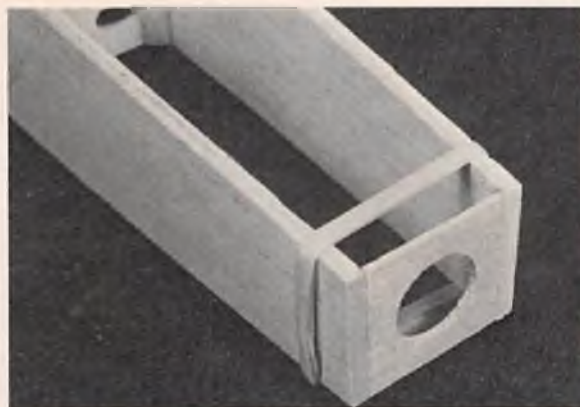
Forward wing hold-down wire and bulkhead. Wire may be wrapped with heavy thread or wire and coated with epoxy.



Forward wing hold-down and servo mounting bulkhead in place on one side.



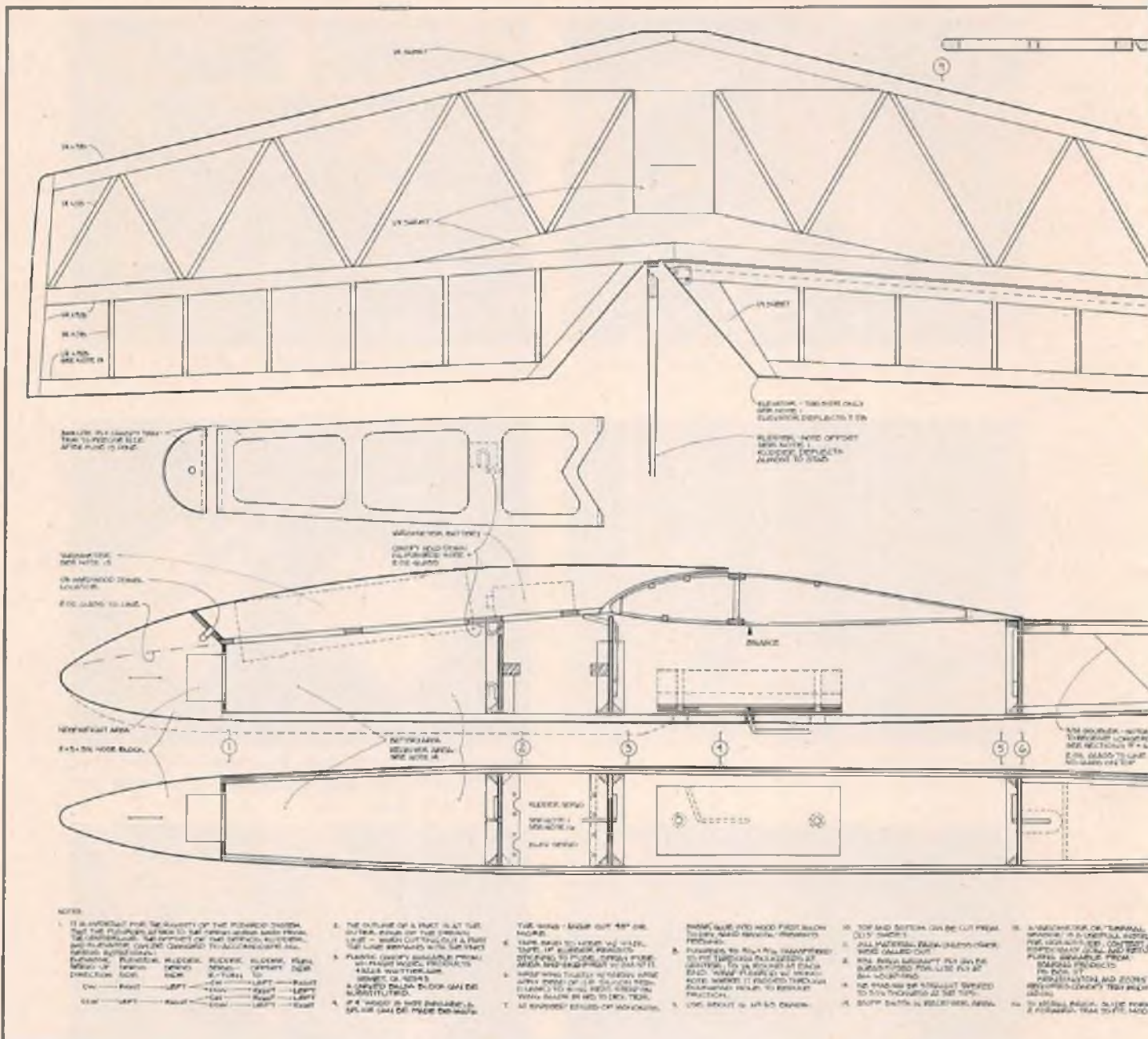
Both fuselage sides together and glued.



Rubber band holds nose while glue sets up.



Canopy tray should be completed before shaping nose block.



down on the webs, and it is nice if it is touching the rib notches too. When it's all right, glue in the top spar, and don't skimp on glue here!

(6) Glue in the turbulator spars on top.

(7) Glue on the rectangular leading edge piece. I like to use pins and rubber bands to act as a clamp.

(8) Size exactly and glue in the ply pieces for the receivers using Titebond. You can use a spare piece of 1/8" ply to make sure that the gap is the right width.

(9) Glue on the outer 1/64" ply pieces using Titebond.

(10) Glue the outer 3/16" balsa rib in, and make sure it is straight, and bumped up against the ply receiver box.

(11) Glue in the bottom turbulator, and file the shear web joints as per plans.

(12) Sheet the center section.

(13) Glue in all the gussets, and the 1/16" piano wire at the trailing edge center.

(14) Shape the leading edge and sand everything smooth.

(15) Glass the center section.

(16) Carve out the openings for the receiver boxes in the 3/16" ribs.

(17) You may find that after the tips are done, and you attempt to plug the tip into the main, that some sanding of the tip joiner will be required. If you are like me you will manage to sand too much off, resulting in a wobbly tip which is bad. One fix is to laminate onto the tip joiner a scrap of that 1/64" ply, and then sand that down until you get it right.

The Tip Panels

General Comments:

(1) In order for the plane to be responsive to the air and to your commands, it is very important that the tips be light.

(2) It is desirable to avoid using heavy trailing edge stock in order to avoid decreasing the speed at which the wing

will flutter.

The Steps:

(1) Lay the spar and rib prop as in the main panel. The tip spars are quite highly stressed at the root of the tip. You must avoid wood which has flaws of any sort in this area. Make sure that the spars are made of spruce.

(2) Glue the ribs to the spar, skipping the root rib.

(3) Glue the top spar in, flush with the rib top.

(4) Glue on the 1/64" ply tongue covers with epoxy.

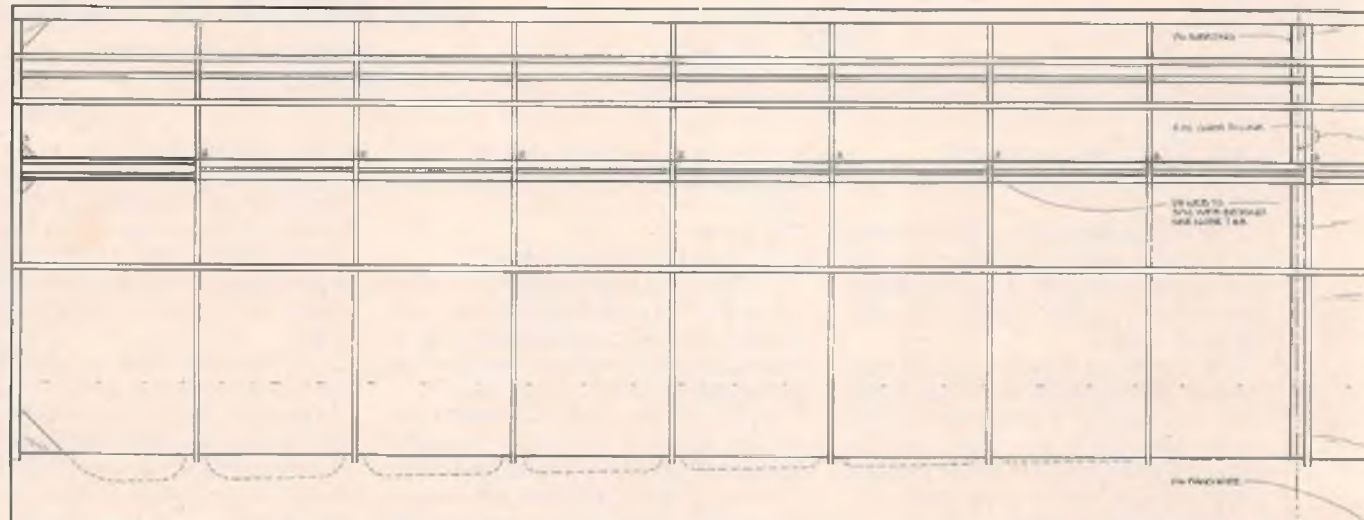
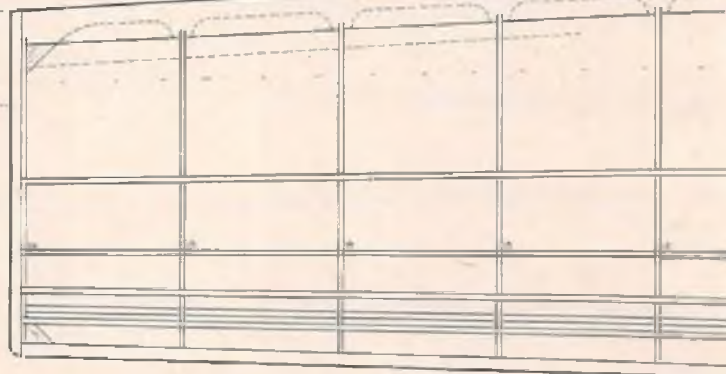
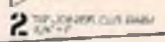
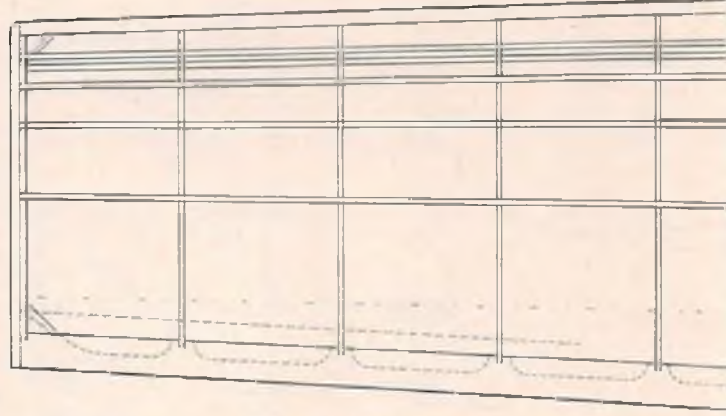
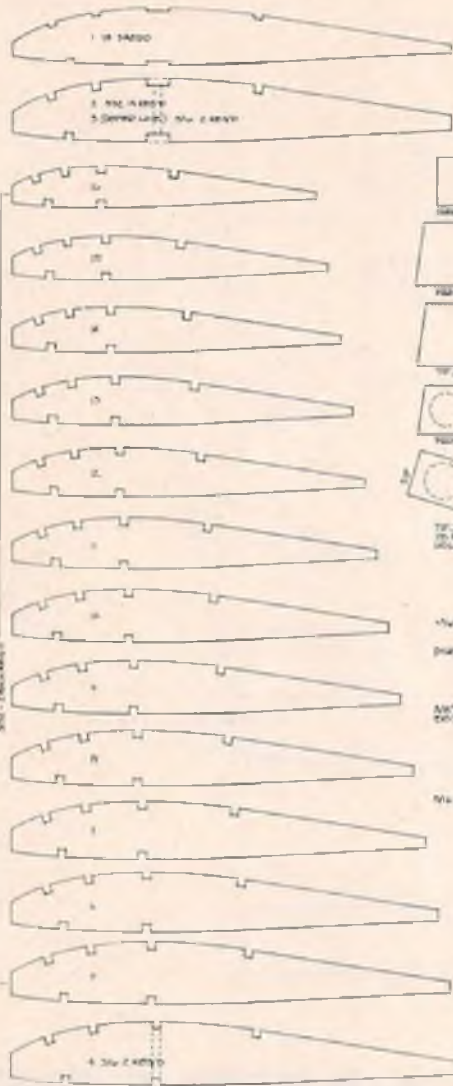
(5) Glue on the 3/16" end rib, and make sure that it is up against the 1/64" ply and that it is square in planview.

(6) Remove the wing from the board, and glue on the tapered T.E. in the same fashion as on the main panel.

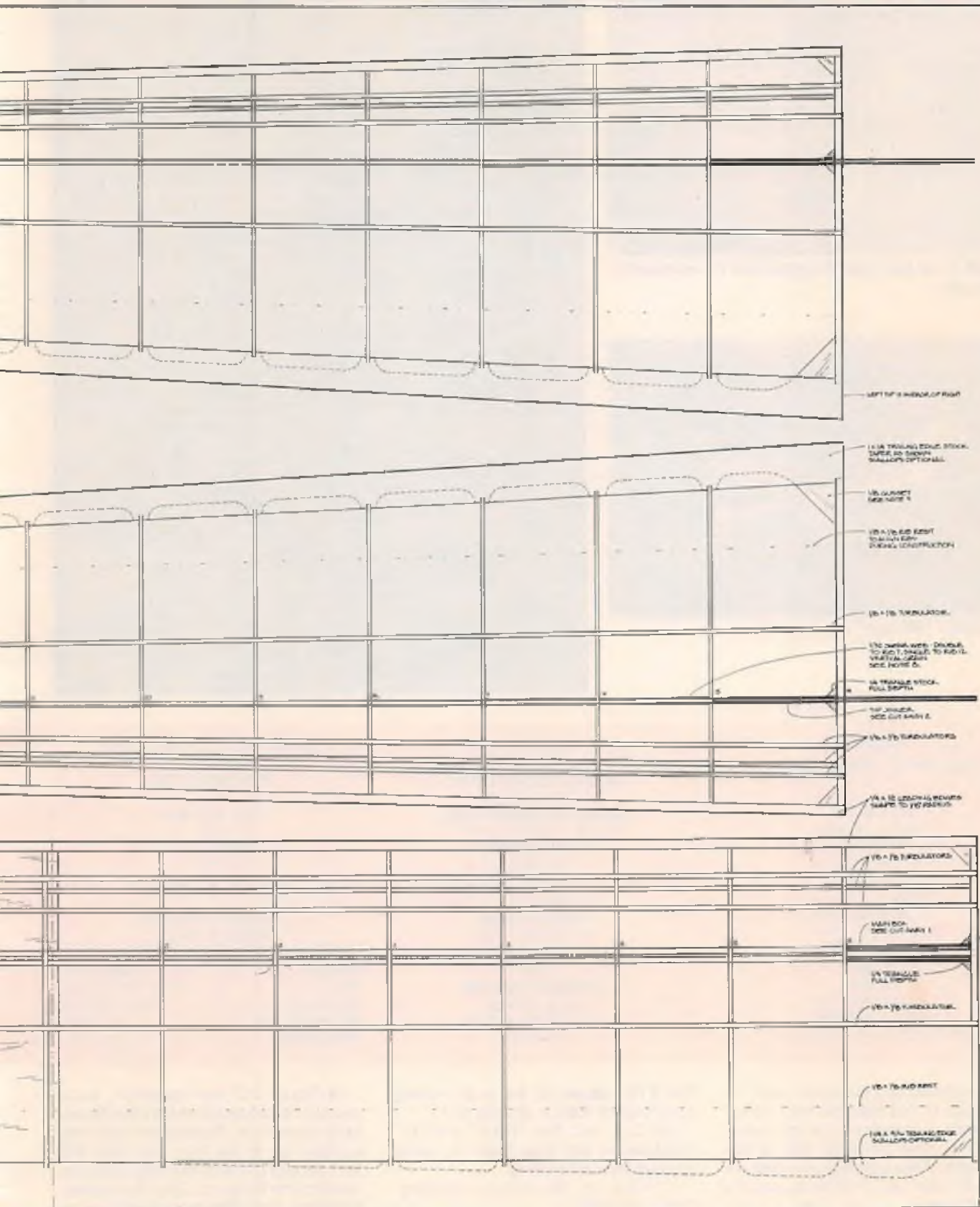
(7) Glue on the leading edge piece.

(8) Glue on the top turbulator spars.

(9) Glue in the balsa shear webs,



- NOTES:**
1. READ ALL NOTES ON PACKAGING TAPE.
 2. SLAT DIMENSIONS WILL VARY SLIGHTLY FROM AND TOP CENTER ORIENTATION.
 3. GENERAL DIMENSIONS ARE APPROXIMATE. DIMENSIONS PROVIDED FOR GENERAL INFORMATION ONLY.
 4. ALL DIMENSIONS IN INCHES.
 5. ONLY HANDLE DIMENSIONS FROM TAPE.
 6. USE SUPPLYING COMPANY'S LABELS UNLESS OTHERWISE SPECIFIED.
 7. MARK DIMENSIONS FROM CENTER OF WINDOW FRAME TO CENTER OF SLAT.
 8. MARK DIMENSIONS FROM CENTER OF WINDOW FRAME TO CENTER OF SLAT.
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MIRAGE

6N

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SHEET 2 OF 2

PLAN NO. 753



Off-set fin shows neat arrangement for concealing pushrods.



Completed "Mirage" is a beauty.

BILL OF MATERIALS

Fuselage

2	3/32x3x48	med-light	sides
1	3/32x3x36	med-hard	doublers
1	3/16x3x36	med	bottom and rear stringers
1	3mmx6x12	lite-ply or 3/32 ply	bulkheads and canopy tray
1	2x3x3.5	med	nose
1	3/32x3x36	med-light	top and bottom
1	3/32x12	piano wire	wing hold-downs & low hook
1	1/4 Intriangle	med-hard	gussets
2	8-24	nylon or steel	ballast hold-down screws & wing nuts
1	1.5x4x3/32	ply	low hook holder
1	3x4x1/16	ply	low hook holder
1	1/4x3/8x5	spruce	servo rails
2	5/16x5/16	med	pushrods
1	2oz. x 8x30	glass	glass
-	-	-	misc. pushrod hardware

Stab and Rudder

1	1/4x3x36	med-light	stab and rudder
1	1/8x1/4x18	spruce	fin spar & fuse reinforcement

Wing

2	1.25x5/16x36	med	main trailing edge
2	1x1/4x36	med-light	tip trailing edge
1	1/8x3x36	med	turbulator spars
1	1/4x3x48	med-hard	leading edge
1/2	1/16x3x36	med	planking
2	3/8x1/8	spruce	main spars
4	1/8x1/8	spruce	tip spars
1	1/32x3x36	med	tip webs
1/2	3/32x3x36	med	main webs
1	1/8x3x36	med	main webs & center ribs
1	1/8x6x12	ply	tip joiners
1	1/64x6x12	ply	tip joiners
2	3/32x3x36	med-C grain	main ribs
3	3/32x3x36	med-light C grain	tip ribs
1	2x1/16	piano wire	trailing edge center reinforcement
1	3/16x3x36	med	4 ribs
1	2oz. x3x20	glass	planking glass
1	12x18x24	iron	kitchen sink

MIRAGE

Designed By : Blaine Rawdon

TYPE AIRCRAFT

Thermal Sailplane

WINGSPAN

112 1/2 Inches

WING CHORD

9" Center — 6" Tip

TOTAL WING AREA

915 Square Inches

WING LOCATION

High Wing

AIRFOIL

Semi-Symmetrical

WING PLANFORM

Constant Chord — Tapered Tips

DIHEDRAL, EACH TIP

9-9 1/8"

OVERALL FUSELAGE LENGTH

48 1/2 Inches

RADIO COMPARTMENT AREA

(L) 8 1/2" x (W) 2" x (H) 2"

STABILIZER SPAN

28 Inches

STABILIZER CHORD (incl. elev.)

6 1/2" (Avg.)

STABILIZER AREA

162 1/2 Square Inches

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

7 1/4 Inches

VERTICAL FIN WIDTH (incl. rudder)

6 1/2" (Avg.)

REC. ENGINE SIZE

NA

FUEL TANK SIZE

NA

LANDING GEAR

NA

REC. NO. OF CHANNELS

2

CONTROL FUNCTIONS

Rudder & Elevator

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa, Ply & Spruce
Empennage	Balsa & Spruce
Wt. Ready-To-Fly	33 Ounces
Wing Loading	5.19 Oz/Sq. Ft.

wing tie-downs and the servo rails.

(3) Glue to one side the two "servo" bulkheads perpendicular to the sides. When dry, glue the other side to the bulkheads. Make sure that the sides are very well lined up, in order to avoid a crooked fuse.

(4) When dry, glue in the front bulkhead and the rear bulkhead. I like to use drafting tape as a clamp. If your two sides are made of the same wood, the fuse should be bent equally on both sides.

(5) Make up a temporary bulkhead for the very rear of the fuselage and tack it to

the 3/16" square at the rear, making sure that the fuse is all lined up.

(6) Cut out the 3/32" x 3/16" crosspieces and glue them in, using drafting tape as a clamp.

(7) Glue on the bottom sheeting, 3/16" and 3/32".

(8) Glue in all the triangle stock. I would recommend using fairly hard stock, but it's not critical. In any case, make sure the joints are good, even if you have to use epoxy to fill gaps that you can't get rid of. Do not leave out the crosspiece of 1/4" x 1/8" spruce at the top of the rear bulkhead.

(9) Rough out the noseblock, sand smooth the two faces where it meets the fuse. Glue it on. Temporarily tack the canopy tray to the fuse, and glue the front canopy former to the tray, using the block to line things up. Glue the canopy to the tray. Cover the canopy with tape to protect it, and shape the noseblock to its finished contour.

(10) Glue on the top sheeting.

(11) Razor plane the fuse corners to shape, then sand things down nicely. Don't finish sand yet because you have still to glass the thing.

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ADAM DID IT TOO!

By Col. John A. de Vries

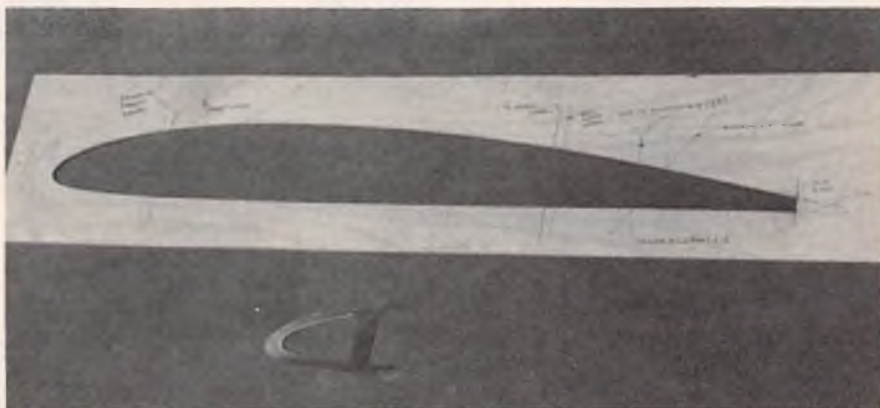
"Ecuadorean Gold," alias balsa wood, is dead! "Long live spruce and plywood!" --- the new battle cry of the 1/4 Scale model builders. The big-uns, as many of us have found out, require the use of the harder woods. For strength and lightness, spruce longerons and spars with lots of ply doublers and gussets are the way to go. Old standby, balsa, is relegated to the role of providing "easy to sand and shape" fairings and wing streamliners. Actually, construction techniques in 1/4 Scale owe more to full-scale airplane practice than to the usual R/C building methods.

And --- big models demand lots of wood. Kits range in the \$100-\$200 price class, simply because so much material goes into the box. If you're contemplating scratch-building one of the monster models, it's a good idea to consider material costs before you begin. For example, at today's prices, a single wing rib will cost up to 95¢ --- if you cut it from a sheet of balsa! That's one expensive rib. But, take heart! There's a less expensive way to go --- even though it'll require a tad more labor than making a couple of zip-zips through a sheet of "Ecuadorean Gold."

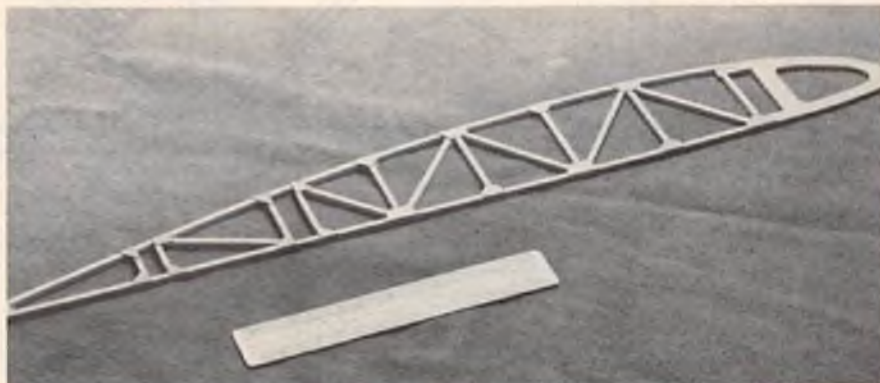
The Technique: Build wing ribs in a jig. That's the way home-builders do it, and aircraft manufacturers used to do it. Sure, it takes time, but it has its advantages. First, all of the ribs that go into your wing will be precisely the same. Second, built-up ribs are **light and strong** --- as light as solid balsa ribs of comparable thickness. Third, spar positions can be precisely located --- a very difficult task if you attack balsa wood with an X-Acto knife. Finally, built-up wing ribs are 1/3rd the cost of sheet balsa wing airfoils.

How-To: We're going to describe the technique for building wing ribs from 1/8" square spruce strips, 1/64" plywood gussets and 1/8" ply leading edge formers. Certainly, other wood sizes may be used and solid balsa leading edges incorporated --- but, the principles of construction are the same.

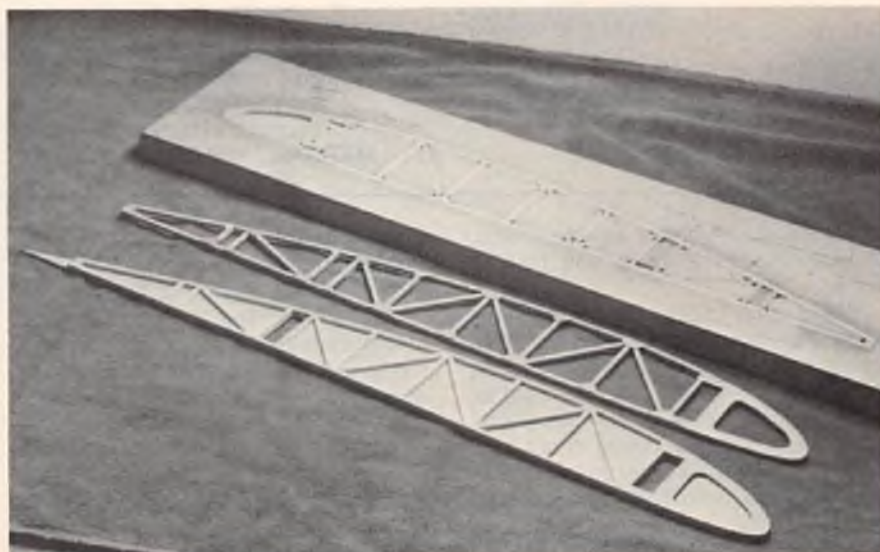
First, we need a full-sized template of the wing rib we're going to build. The template can be drawn on card stock --- file folders provide good material for the purpose. Draw the rib outline and locate the spars, leading edges, and trailing edges with center lines. Next, draw in the internal rib structure --- the outer strip locations and the vertical and diagonal bracing that'll hold everything together (see Figure 1). No need to get too exotic with the structure --- include just enough



Clark "Y" wing rib cut out of 1/8" plywood. Reference lines on the ply locate leading and trailing edges, and spar center lines. Thick brass template in foreground is for ply leading edge formers since the model will use scale aluminum-wrapped L.E.



Twenty-one inches of sheer beauty! Six-inch ruler shows the scale of this built-up wing rib. Finished, the rib weighs only 4/10ths of an ounce.



The completed wing-jig in use --- with a rib ready to be pried out. The finished rib in the middle has gussets glued to both sides. The lower rib has no gussets --- the strips are glued onto a full sized piece of 1/16" ply because the rib is intended to be used at the root of the wing.

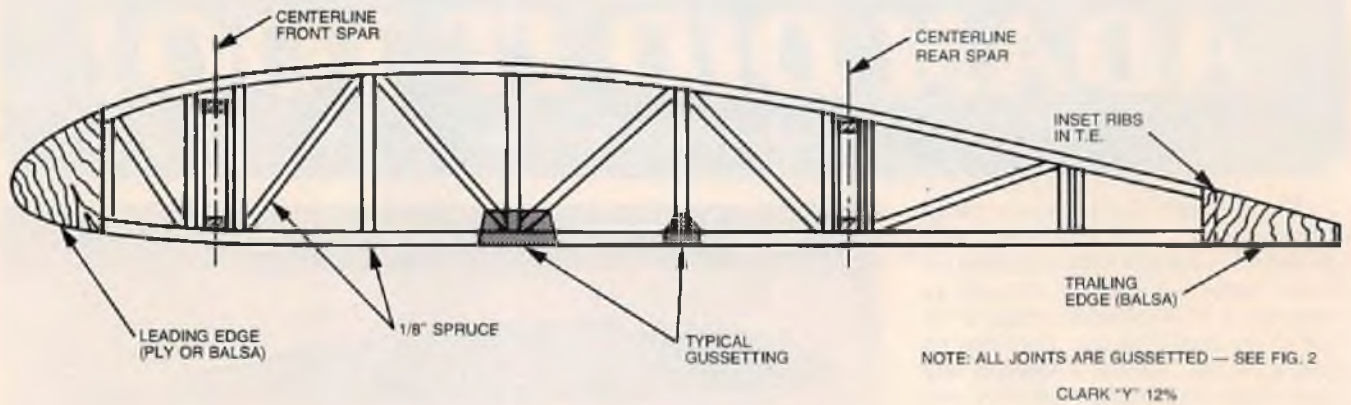


FIGURE 1
TYPICAL BUILT-UP RIB
(NO SCALE)
1/8" SPRUCE STRIP WITH
1/64" PLY GUSSETS

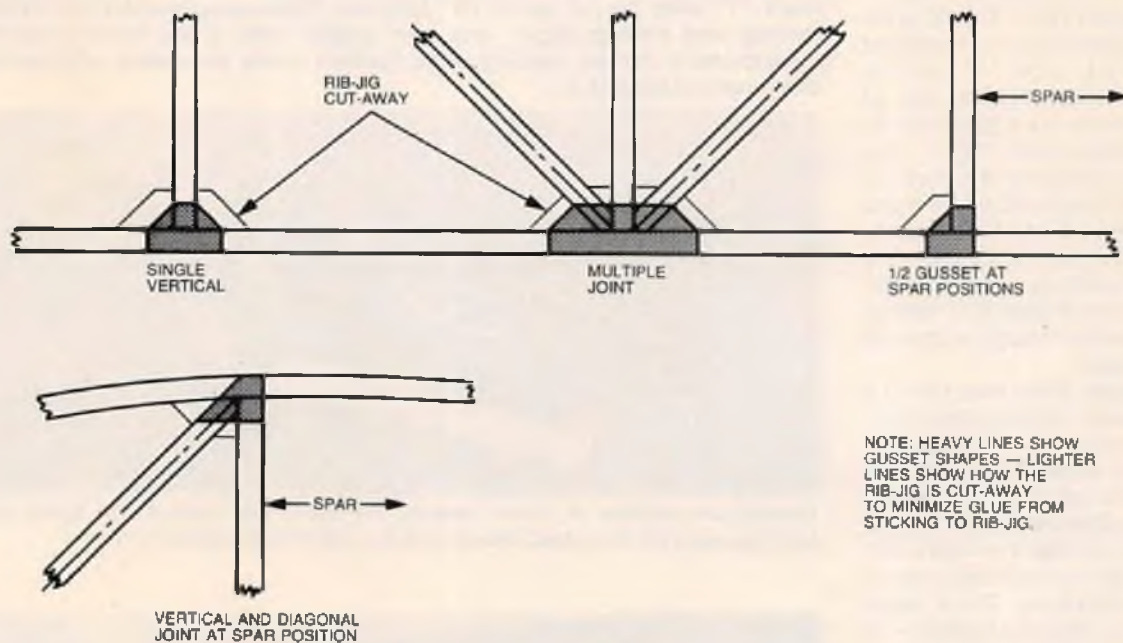


FIGURE 2
TYPICAL GUSSETING FOR
BUILT-UP WING RIBS
(FULL SIZED)
MATERIAL: 1/64 OR 1/32 PLY

to locate such things as spars and, maybe aileron leading and trailing edges.

We're ready to build the rib-jig --- and there are a couple of ways to go. The jig can be **full-depth** or **half-depth**, whichever you prefer. A full-depth jig for 1/8" square stock is cut from 1/8" plywood --- a half-depth jig is cut from 1/16" ply. Trace the outer shape of your rib template onto the plywood and carefully cut out a rib-shaped hole. Save the material you cut out --- it'll be used later. Sand the interior of the cut-out very carefully, because it will determine the outer edges of every rib you build.

Using the rib-shaped cut-out, trim and

sand it carefully so that, when it's positioned inside the jig, it's 1/8" inside all around. Scrounge a flat piece of 1" x 4" pine lumber and cut it about 4" longer than the ply outer jig --- and nail the jig to it (use headless finishing nails, about 1/2" long and countersink them just below the surface of the plywood). Recheck that the cut-out plywood rib-shape is 1/8" smaller all round and then draw the internal rib structure on it. Using the trusty Dremel saw (or other jig saw) cut out the internal parts of the jig from the rib-shaped ply piece. It's a good idea to letter or number the internal parts of the jig before you cut them out --- because a lot of the triangular pieces will

look a lot alike!

Assemble the internal jig parts, after sanding them, inside the rib outline. They're nailed in place and you should use bits of spruce strip stock to position them properly. Work from the leading edge to the trailing edge as you nail the jig together, being particularly careful in locating the strips around spar openings. When you're done, the jig should look like a negative wing rib --- with a slot for each piece of structure.

It is time now to **wax** the jig. Rub a kid's wax crayon or piece of candle into all of the grooves, paying particular attention to those places where

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RCM PRODUCT TEST

Master-Kit PEPPERMINT PATTIE



Peppermint Pattie is the unlikely name given to a very slick, very aerobatic, sport aircraft manufactured by Master-Kit of Plainville, Connecticut. The overall appearance is that of a contemporary pattern aircraft with the landing gear retracted. In this case, there is no landing gear as the little bird is intended to be hand launched and landed on its belly in the grass. An optional wheel buried in the fuselage bottom is shown on the plans for those who fly off a paved surface.

The plans are very well done, however, the instructions could be more complete.

Fuselage assembly is reasonably well described, and the instructions state: "The rest of the assembly is quite conventional and should pose no problem to the average modeler." This statement is true for most of the modelers I know, but some could have problems. The only serious problem I encountered was how to stuff four channels of Kraft into the abbreviated radio compartment. I found that it could be accomplished using KPS 12 servos with the KP5C receiver tucked away in the fuselage compartment aft of the wing. With the battery located at the front end of the radio compartment the balance worked out perfectly as shown on the plans. A system using smaller components would have probably presented no problem.

The fuselage is conventional box type construction with 3/8" triangular stock in the corners to facilitate rounding off. The top of the fuselage is 3/8" balsa carved to a round section. A 1/32" plywood doubler reinforces the fuselage sides from the firewall to just aft of the wing. A removable hatch and the wing are held on with nylon screws. The radio compartment is over the wing. The aileron servo and linkage go under the wing.

The foam wing cores are sheeted fore and aft with 1/16" balsa and the center section is fully sheeted. Cap strips are glued to the foam core to give the outward appearance of a built-up wing.

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IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging		●				Pre-Shaped Parts	●				
Plans		●				Parts Match to Plans			●		
Written Instructions				●		Overall Parts Fit	●				
Quality of Hardwood	●					Ease of Assembly		●			
Quality of Fiberglass			NA			Fidelity to Scale			NA		
Other Materials	●					Flight Performance	●				
Accessories	●					Overall Appeal		●			
Die-Cutting	●										

E=Excellent / G=Good / A=Average / F=Fair / P=Poor

SPECIFICATIONS

Name PEPPERMINT PATTIE
 Aircraft Type High Performance Sport
 Manufactured By Master-Kit
 6 Fox Road
 Plainville, Ct. 06062

Mfg. Suggested Retail Price \$39.95
 Available From Retail & Mfg.
 Mfg. Recommended Usage General Sport
 Wing Span 42 Inches
 Wing Chord 7" (Avg.)
 Total Wing Area 294 Square Inches
 Fuselage Length 36½ Inches
 Radio Compartment Dimensions (L) 9" x (W) 2" x (H) 1½"
 Wing Location Mid Wing
 Airstoil Symmetrical
 Wing Planform Double Taper
 Dihedral (each tip) 3/8 Inch
 Stabilizer Span 16½ Inches
 Stabilizer Chord (incl. elev.) 4" (Avg.)
 Total Stab Area 66 Square Inches
 Stab Airstoil Section Flat
 Stabilizer Location Top Of Fuselage
 Vertical Fin Height 5¾ Inches
 Vertical Fin Width (incl. rud.) 5¾" (At Widest Point)
 Mfg. Rec. Engine Range15-.19
 Recommended Fuel Tank Size 4 Ounce
 Landing Gear None
 Recommended No. Of Channels 4
 Recommended Control Functions Rud., Elev., Throt., Ail.

Basic Materials Used In Construction:

Fuselage Balsa & Ply
 Wing Foam & Balsa
 Tail Surfaces Balsa
 Hardware Included In Kit See text
 Plan Size 27½" x 42½" (1 sheet)
 Building Instructions on Plan Sheets Yes
 Instruction Manual No
 Construction Photos No
 Kit Includes Die-Cut Parts
 Mfg. Rec. Flying Weight Not Specified
 Wing loading based on rec. flying wt. Not Specified

RCM PROTOTYPE

Weight, Ready To Fly 40 Oz.
 Wing Loading 20 Oz./Sq. Ft.
 Covering & finishing materials used See Text
 Engine Make & Disp. O.S. .15
 Muffler Used No
 Radio Used Kraft
 Tank Size Used 4 Oz.

MACHINE AND WOOD SCREWS

Modelers must fasten many parts of their models together with metal, plastic, machine screws or wood screws. This process frequently requires drilling clearance and tap holes and tapping the holes. Less frequently we must thread a rod with a die. The different materials used in modeling require different techniques for tapping and drilling holes. Perfectionists sharpen the drills with different cutting and clearance angles for each material. This refinement is beyond most of us and the standard 34° to 36° cutting angle on the drill point is quite adequate. A new drill will come with this angle. See Figure 1.

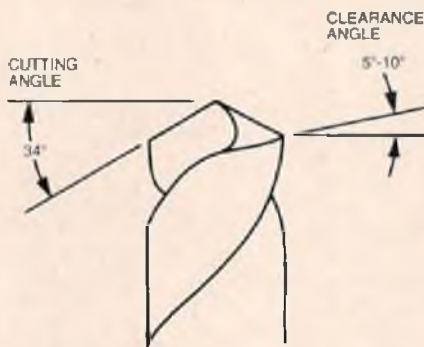


FIGURE 1. DRILL ANGLES.

Drills should be sharpened on the side or flat face of a grinding wheel. The cutting angle of the drill is relatively easy to obtain when sharpening a drill. The clearance angle requires more care and practice. See Figure 2.

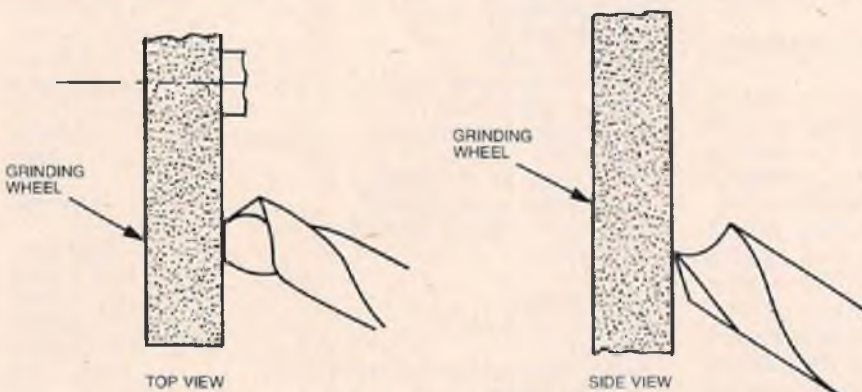


FIGURE 2. GRINDING DRILLS.

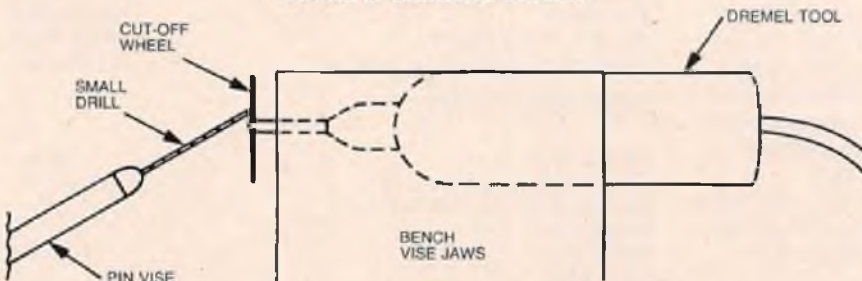


FIGURE 3. DREMEL TOOL USED TO SHARPEN SMALL DRILLS.

MACHINE SCREW BODY AND TAP HOLE DRILL SIZES (Letter drills are shown with their fractional equiv.)

SCREW SIZE	ROD DIAM.	BODY HOLE	DEC. EQUIV.	TAP HOLE	DEC. EQUIV.
0-80	0.060	52 (1/16)	0.0625	55 (3/64)	0.0489
1-72	0.073	49	0.073	53	0.0595
1-64	0.073	49	0.073	53	0.0595
2-64	0.086	44	0.086	50	0.0700
2-56	0.086	44	0.086	50	0.0700
3-56	0.099	39	0.0995	45	0.0820
3-48	0.099	39	0.0995	47	0.0785
4-48	0.112	33	0.113	42	0.0935
4-40	0.112	33	0.113	43	0.0890
4-36	0.112	33	0.113	44	0.0860
5-44	0.125	30	0.1285	37	0.1040
5-40	0.125	30	0.1285	38	0.1015
6-40	0.138	28	0.1405	33	0.113
6-32	0.138	28	0.1405	36	0.1065
8-36	0.164	19	0.166	32	0.1160
8-32	0.164	19	0.166	29	0.1360
10-32	0.190	11	0.191	21	0.1590
10-24	0.190	11	0.191	25	0.1495
12-28	0.216	2	0.221	14	0.1820
12-24	0.216	2	0.221	16	0.1770
14-20	0.242	C(15/64)	0.242	10	0.1935
1/4-28	0.250	1/4	0.250	3	0.2130
1/4-20	0.250	1/4	0.250	7	0.2010
5/16-24	0.3125	5/16	0.3125	H(17/64)	0.2660
5/16-18	0.3125	5/16	0.3125	F(1/4)	0.250
3/8-24	0.375	3/8	0.375	O(21/64)	0.2856
3/8-16	0.375	3/8	0.375	5/16	0.3125
7/16-20	0.4375	7/16	0.4375	U(3/8)	0.368
7/16-14	0.4375	7/16	0.4375	23/64	0.3594
1/2-20	0.500	1/2	0.500	7/16	0.4375
1/2-13	0.500	1/2	0.500	27/64	0.4219

WOOD SCREW BODY AND PILOT HOLE DRILL SIZES (Fractional drills are shown with their number equiv.)

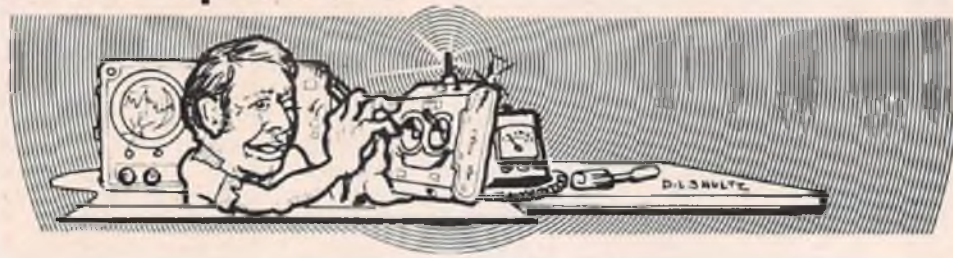
Screw Size	Body Hole	Pilot Holes	
		Soft Wood	Hard Wood
4	1/8 (33)	1/16 (53)	5/64 (48)
5	9/64 (28)	5/64 (47)	3/32 (42)
6	9/64 (28)	5/64 (47)	3/32 (42)
7	5/32 (23)	3/32 (42)	7/64 (36)
8	11/64 (17)	3/32 (42)	7/64 (36)
9	3/16 (13)	7/64 (36)	7/64 (36)
10	3/16 (13)	7/64 (35)	1/8 (30)
12	7/32 (21)	1/8 (30)	5/32 (22)

The drill is not turned on its cylindrical axis, but the whole drill is rotated about its center, lengthwise. In the top view, the cutting end of the drill would appear to raise to point straight up. In the side view, the drill would appear to rotate to raise the point straight up.

For very small drills, under 1/8" (30), hold the drill in a pin vise. The grinding wheel can be a Dremel tool with a cut-off wheel all held in a bench vise. Make a pair of soft wooden jaws to hold the Dremel without damage in the bench vise. See Figure 3.

A general rule of thumb for drilling and lapping holes and threading rods is: "the softer the material, the slower the drill." Also, "the smaller the hole, the faster the drill." Plastics require special care, because if the drill turns too fast, the heat generated will melt the plastic. For plastics, use water as a coolant and lubricant. For metals, a variety of cutting oils are available.

To avoid breaking drills, back the drill out several times rather than trying to drill the hole in one pass. To avoid



We did some flight testing of the new Kraft seven channel FM system just after we submitted last month's column. I don't know if my post flight comment got printed, but in case it didn't, I will repeat. Don't expect the system to work with an AM transmitter turned on, on the same frequency, in spite of my optimism and what I said after bench testing. This does not mean the system is no good, in fact, it performed flawlessly in the environment it was designed for. We flew the plane almost out of sight, pointed the antenna straight at it, and even flew with the antenna collapsed. It never missed a beat. To expect it to work with jamming on the same frequency is beyond the scope of the design, and just a little bit of wishful thinking on my part. I didn't have it in the best airplane in the world but I still thought it had a nice "feel" to it. The Kraft "open" plastic sticks with conductive plastic pots might be as good as anything around. The neutrals are very positive with no slop. The only thing I noticed is a slight compliance which allows some motion of the stick without moving the pot wiper and therefore the control surface in the airplane. I'm going to have to put it in a better airplane to decide if this is a problem. It might actually be helpful if you are like most guys and are a little nervous on the sticks.

I also ran a stability and linearity test on the encoder which looked very good. You should no longer have to worry about running the batteries in for a few minutes after charging.

We'll continue to report on this system as we put it through its paces.

Intermittent Battery Detector

One possible battery pack failure mode is bad connections both internal and external to the cells themselves. These might only show up under vibration, and could easily go from intermittent to what we call "hard" or catastrophic failures during flight. Charlie Reed noted that there used to be a few accessories you could buy to catch these before they cause trouble but now there doesn't seem to be any on the market. What you want is something that will latch up if the voltage is not present for even a few milliseconds. The response of most meters is not adequate. If you have a scope, you can

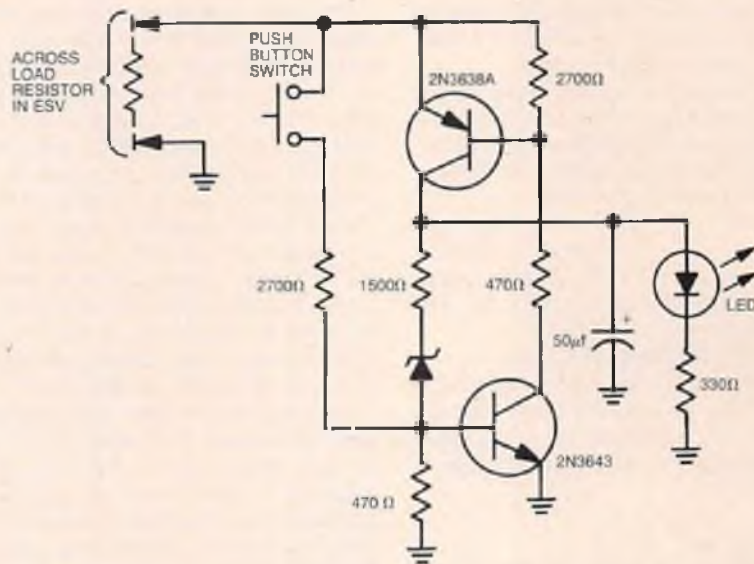


FIGURE 1

load the battery on the bench and then tap it or strap it to your jig saw, but what you would really like is a unit you can plug into the side of your plane with the engine running. Charlie suggested adding the circuit of Figure 1 to your expanded scale voltmeter.

You connect the circuit right across the receiver pack load resistor which is usually 10 to 25 ohms. If you don't have an ESV, you can use this circuit by itself but you should add your own load resistor. After plugging in to your airplane you hit the push button switch and the LED should come on and stay on. If it goes off, try it again by pushing the reset button. If it doesn't stay on, you've got trouble and probably need a new battery pack. Charlie didn't say what zener diode to use, but I would think a 3.6 volt (1N746A) should work fine.

The circuit works as follows: Pushing the reset button turns on the NPN transistor (2N3643) which in turn, turns on the PNP (2N3638). The PNP then supplies current through the zener diode to hold the NPN on. It also supplies current to the LED to turn it on. The circuit will stay on as long as the input voltage is above approximately 4.3 volts. If it drops below that level, the zener blocks the current to the base of the NPN which turns off and, in turn, turns off the PNP.

A few years ago I would have said this type of device is a must for everyone. However, the battery manufacturers got their act together and built cells specifically for the model airplane environment. The net result is almost no failures of this type. Notice I said, almost and beware of bargain nicad batteries.

Heathkit Solution?

We've had quite a few "solutions" sent in by Heathkit builders over the last year. The reason is probably related to the type of guy who builds a Heathkit in the first place. He is typically a guy with some electronics experience, is confident in his abilities, and persistent in solving problems. Guys who simply buy and install R/C systems would just give up and try something else after a few trips to the factory. Anyway here is another one.

Dear Jim,

I read with interest the letter from Fred Voegeli regarding the Heath GDA-405 radio which appeared in the November 1978 issue of RCM.

I own two Heath GDA-405 radios and have had problems identical with those Mr. Voegeli describes. I, too, incorporated the capacitor change which appeared in your May 1978 column. It didn't do a bit of good for me.

I believe I have the solution to the problem and it isn't related to grounding

the landing gear. The GDA-405-2 is an unusual receiver in that it incorporates an external switch to provide a choice of two frequencies. The pendant switch on a cable comes out of the same end of the receiver as the antenna. This is the real source of the problem. When tuning the receiver, one is normally quite careful to route the antenna wire away from the switch cable. However, when installing it in an aircraft, it is very easy to place the receiver so that the switch cable is close to the antenna wire, detuning the receiver. I discovered this when my problems would get better or worse depending on whether I had recently removed the receiver.

I now dress the switch cable as far from the antenna wire as possible and I no longer have any problems with either receiver. This fix has worked for me for several months this summer.

Sincerely,
John D. Mitchell
Webster, N.Y.

Sounds like a good idea to me. Anyone else got more ideas?

Big Airplane Problems

The following letter is a little long but it is so typical of what I've been hearing from a number of people, I thought I would lay it on you with hopes of getting some help.

Dear Jim,

I've built a 1/4 Scale J-3 (9 1/2" span) with an ignition engine the Quadra... in spite of the problem, I've gotten 7-8 flights on it and it flies absolutely beautiful... I'm a convert, that is if I find out what is wrong... so far it shows up only on the ground. I don't know if that is one of the parameters or if I've just been lucky.

What actually happens is that occasionally, and without warning, the throttle servo will start surging and I lose all control on the other channels. The baffling part is that it will be okay one day or for one flight and then it happens.

A typical example: Last Saturday, after changing the plug as advised, I took it to the field—range checked it with and without the engine running, all okay—I put the wings on and repeated the checks, okay—I taxied around for about five minutes and since it acted all right, I gave it the gun and took off. About 10 minutes later after a couple of low passes and a stall series to check an adjustment to my washout, I landed—all without a single glitch—I taxied back to take-off again and all hell broke loose--- it tried to take-off by itself and I had no control, then suddenly it idled back just before getting airborne in the direction of the club house --- a buddy stopped it before it got that far.

Two weeks ago it was fine on Saturday with two flights and on Sunday it wouldn't behave.

I've changed radios four times and three different frequencies. The motor

servo has been changed three times. I have an aluminum firewall for shielding, and the Rx is 18" from the engine. I've gapped the plug and points, I've re-routed my antenna, and even put 22uh chokes in the power leads on my extension cables to the aileron servos and to my elevator servo as recommended by Phil Kraft on any lead over 12" long. All I get for the trouble is a frantic jitter of the surface. I think I'm back in the galloping ghost days again... and the surfaces "hunt" as well... take the chokes out and they are quiet.

I have a 1.2AH airborne battery that is good, and both it and the Xmtr are peaked at the field with a field charger, so I'm not getting low voltage. I use 72 MHz and in almost 10 years I've never had any interference on this frequency (72.320) also this has happened on two different fields about 30 miles apart.

One further parameter that I haven't mentioned—the throttle is actuated by an 18" cable, plastic covered, running under the floor boards to the throttle... no metal to metal contact, but it is only the thickness of the plastic covering that prevents this at the throttle (carb).

Jim, you can't imagine how frustrated and depressed I am that I can't get reliable flights out of this wonderful airplane. I don't want to clobber it because there is just too much work in it (maybe you saw it in the Sept. issue of Model Builder), and knowing that you are swamped most of the time with others problems, I'm asking plaintively if you can null this one over and perhaps come up with a suggestion or two.

I'm no stranger to trouble shooting techniques, but as of yet I haven't been able to isolate it to any definite area. It only has happened so far when the motor was running, but I'm not sure that it is the motor. So many hundreds of these motors are in daily use with no problems... I just don't know where to go from here, perhaps you can guide me. I hope so.

Sincerely,
Maj. Bob Jacquot
APO, New York

It is pretty hard to trouble shoot by mail, but one of our local guys is having similar problems. It seems to be related to having an adjacent frequency on the air which might account for the reason Bob's ship works some of the time. The severity of the problem also seems to be related to the amount of flying wires, control cables and other such metallic items that probably affect antenna performance.

I have had experience with long extension cables. In one stunt plane I had put a servo in each wing for ailerons. The extensions definitely affected the range, but not enough to bother me in the air, so I never did anything about it.

We built some equipment for an RPV project a few years ago, and noticed a degradation due to the almost 12' long

extensions. As I recall, we put bypass capacitors on the servo signal lines near the receiver to solve the problem. I also read where Don Lowe had done the same thing on his RPV's.

The chokes should also help. It sounds like Maj. Jacquot may not have had large enough devices. They must have little or no DC voltage drop with up to 500ma current or they can cause the hunting he described.

Another fix I've heard about is the use of shielded wire for all extensions. I haven't had much time to attack this one, so I'd sure appreciate hearing from all you guys who have solved it.

Using Untriggered Scope

Tom Waller of the Bronx decided to build his own transmitter using sub-assemblies from various other systems. He used a Royal encoder and the instructions stated that a triggered sweep scope was required to set the time base. Tom has a free running Heathkit scope, but discovered he could use it with his other transmitter as a time base.

I remember having the same problem years ago when I was building a transistorized transmitter for my Space Control and only had an old Eico scope. The idea is to connect the scope to the operating transmitter and adjust the variable time base for a stable display with any arbitrary length to the pulse or pulse train or whatever it is you are trying to duplicate. Let's say you want to set the frame oscillator frequency. Adjust the variable time base so that a frame fills some even number of divisions on the scope. Then, without touching the scope, connect to the new encoder and adjust it to fill the same number of divisions. To set the individual channels it is best to use a receiver to decode the individual pulses. With the operating transmitter, display the pulse that normally goes to the aileron servo on the scope. Adjust the variable time base for an even number of divisions and without touching the scope, switch transmitters and adjust the neutral on the aileron channel of the new transmitter until the pulse on the scope is the same length. Nothing to it.

12 Volt Battery Charger

Dear Mr. Oddino:

Since this is my very first letter to the editor so to speak in better than 45 years of modeling, it is perhaps some sort of milestone.

Let me say right up front that I am worse than a one armed paper hanger when it comes to electronics. I have flown R/C from back in the very early sixties, and have always had to rely on the very good products on the market.

However in the last year or so I have had a thing happen to me that may have as nothing to others, but it bugs me.

I have been playing with electric planes, using a 12 volt motorcycle battery for recharging, all things being

equal one would think my troubles would be with anything but the 12 volt battery. There it is, however. In the past 16 months I have had to buy four new batteries. It has boiled down to the fact that the recharging gear does not tell me when my battery is fully charged or over charged. Perhaps I am barking up the wrong tree, but somewhere in the dim past I seem to have read about a Floating Charger. One that will keep a wet cell at peak after it has been charged or almost full charged.

I also remember a friend who went to build one, and who knows as little about such things as I do. He found the 12.6 volt transformer, but could not locate the full wave bridge diode, because no one could find a part number, or rating for it.

My question sir; is there such a thing in kit form or assembled? If there is, from whom??

Thank you for whatever help you may give me, truthfully, I read your Radio Spectrum every month, although I must admit I don't understand it at all, and at 64, I am afraid I am too blasted old to go to school now.

Thanks for bending your ear and I do hope to hear from you.

Sincerely,
T.J. Nauman
Lancaster, Calif.

We covered this one pretty good in the July 1978 RCM, but apparently quite a few missed it. However, we got another circuit in the mail the other day which looks like it ought to work real well.

Dear Jim,

Attached is a schematic for an automatic 12-volt battery charger that some of your readers may be interested in. I use this charger to charge my wet starting battery and find it preferable over most currently available.

The automatic feature of this charger is that when a discharged battery is connected to the charger, the charger delivers about 0.9 amps. However, when the battery reaches full charge, charging falls off to about 0.05 amps. This trickle current permits the battery to be left on the charger for extended periods of time. Thus, after a day of flying, the charger can be connected to your starting battery to assure a completely charged starting battery for the next day or for next week.

The circuit shown is a regulated 13.5 volt power supply with current limiting. R1 determines the maximum charging current. Should someone want a different charging rate for a gel-cell for example, the table provides different values of R1 for various charging currents.

R1 SELECTION TABLE

Resistance	Current (amps)
0.68Ω	0.90
0.92Ω	0.73
1.2Ω	0.50
3Ω	0.20
6Ω	0.10

To adjust the charger, connect a

voltmeter to the output and adjust R3 for 13.6 volts. Next, connect an ammeter to the output. The ammeter should read about 0.90 amps (if a 0.68Ω resistor was used for R1). This assures us that the current limiter is operating properly. Finally, connect a fully charged battery to the charger and re-adjust R3 for about 0.05 amps of charging current. The charger is ready for operation.

Construction of the power supply is not critical. Mine was built on perforated board from Radio Shack and put inside an old box. All parts should be readily available with the possible exception of the two 1% resistors. You will probably have to order them from a major parts supplier if you don't have a well stocked parts store in town. Heat sink Q1 to the cabinet or a separate bolt-on heat sink.

Sincerely,
Douglas Dellisanti
Elyria, Ohio

I'm not sure I like that "re-adjustment with a fully charged battery" because that was the original problem, but for the practical purposes you should be able to get there this way as Doug suggests. If you let the battery charge for a few days after the original setting, it should be fully charged even if the current isn't .05 amps.

Futaba Questions

Dear Sir,

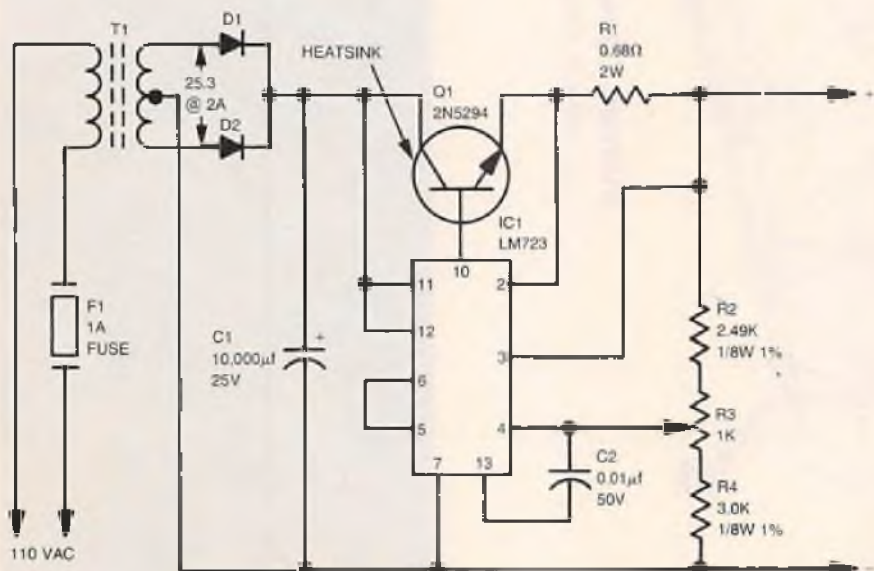
I am a hobby shop owner in a small town which means I cannot go to the local "experts" everytime I need a question answered. As you will note I have quite a list of these questions.

(1) Futaba has indicated to me that their nicad battery packs cannot be fast charged. Why is this and can some other battery be used in their system which will work with the Futaba system?

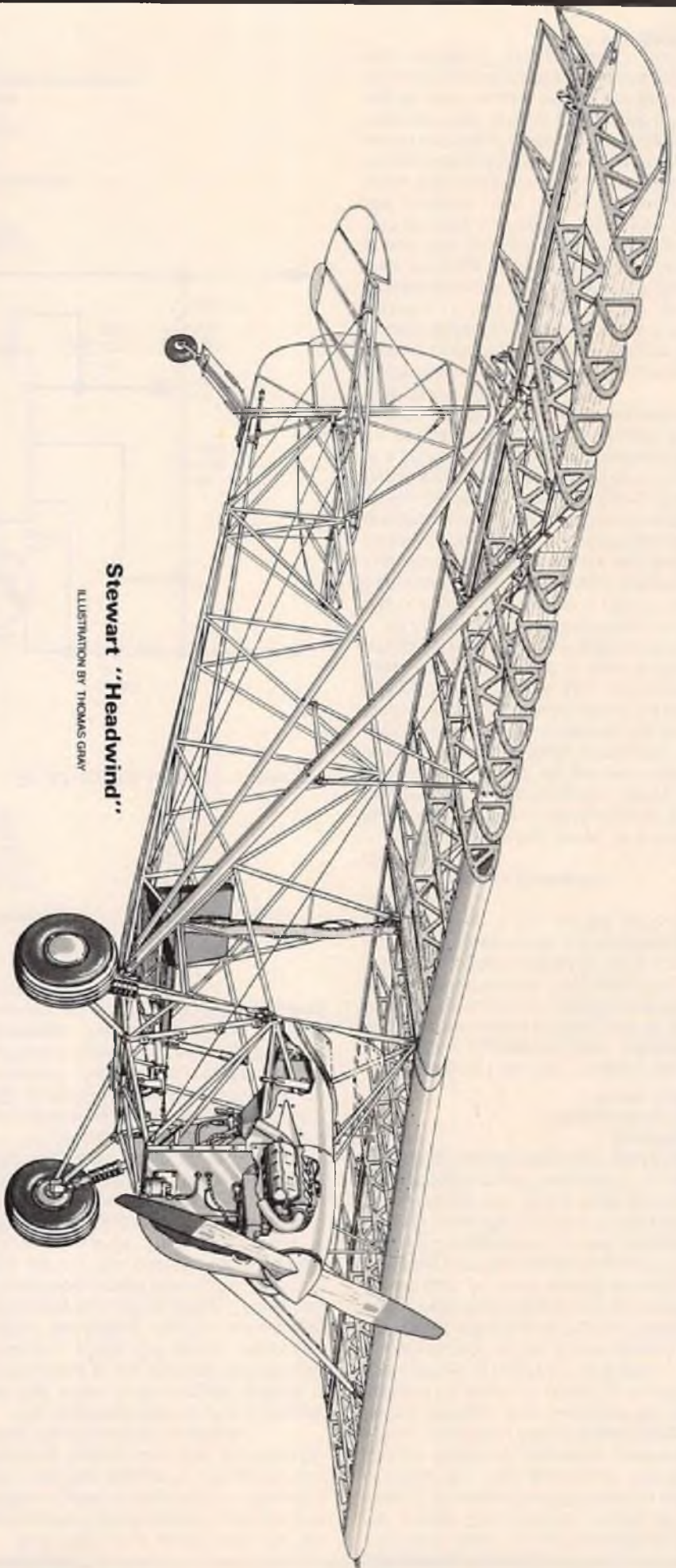
(2) I have an RIC System Analyzer by Astro Flight with which I check the batteries in my three Futaba systems. The Analyzer is used only to check battery capacity; not to fast charge. My question is this: Why does the Analyzer show 24 to 30 minutes flying time remaining whether I have just taken it off of a 16 hour charge or just finished four 15 minute flights? The batteries are Futaba NR-4C whose ages range from less than 1 year to 3 years.

(3) The majority of my radio problems which required returning them to Futaba ended up being bad pots in the servos. I finally got brave and disassembled a servo to find out what was involved in changing a pot and wiper. This appears fairly easy as I own and operate a TV repair shop. Now for the question. How do you remove the wiper and how do you adjust the Futaba servos which do not have a screwdriver slot in the output shaft? Do you use any lube with the Futaba pots? Any other repair hints would be appreciated. I send these radios back to Futaba at the end of each flying season for a

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- C1 — 10,000µF @ 25V CAPACITOR
- C2 — 0.01µF @ 50V CAPACITOR
- D1, D2 — 2A 100V DIODE
- F1 — 1A FUSE
- IC1 — LM723 (OR EQUIV.) REGULATOR
- Q1 — 2N5294 TRANSISTOR
- R1 — 0.68Ω 2W RESISTOR
- R2 — 2.49K 1/8W 1% RESISTOR
- R3 — 1K POTENTIOMETER
- R4 — 3.0K 1/8W 1% RESISTOR
- T1 — 25.3V @ 2A TRANSFORMER (RADIO SHACK)



Stewart "Headwind"

ILLUSTRATION BY THOMAS GRAY

HEADWIND "B"

THIS ONE QUARTER SCALE PRESENTATION OF DON STEWART'S HOME-BUILT MAKES AN EXCELLENT PROJECT TO GET INTO THE LARGE SIZE MODELS. POWERED BY A .61 ENGINE, PLUS BEING INEXPENSIVE TO BUILD, IT FLIES LIKE THE FULL SIZE ONE

BY PAUL DENSON

The Headwind, designed by airline pilot Don Stewart, was the first V.W. engine powered home-built in the United States. Granted, planes such as the Jodel Bebe, the Turbulent and the Fournier, built in Europe, were flown with V.W. engines prior to 1961 when the first Headwind was built. In 1962 the Headwind was saluted with EAA's Best Auto Powered Aircraft award. By 1973 thousands of sets of plans had been sold and at least 30 planes were already airborne.

It was in the February 1972 "Sports Aviation", the journal of the Experimental Aircraft Association, that the Headwind first came to my attention.

I really fell for that stubby nosed offspring of the Aeronca C-3 and it became my scale RC dream. I ordered the information literature mentioned in the Steward Aircraft Co. advertisement in the magazine. When the literature, pictures and three views arrived they were for the new Headwind "B" which sported — among other things — four extra feet of wingspan, a new airfoil, nine more inches of landing clearance and a rounded fin and rudder. In fact the "B" had lost its C-3 look and has become a right pretty airplane on its own. This information was put aside for more

pressing tasks but was never completely out of mind.

In 1975, Headwind appeared in Flying Models as a construction article by Al Wolsky. Here was my chance to build one without all the design headaches. My .15 powered Headwind flew fantastically, but my dreams were not really fulfilled, it was too small and didn't have ailerons. Again the plans were put aside.

Then the Quarter Scale thing started hitting the market. Well, let us say it began getting publicity because, to my knowledge, 5 years ago at the LSF National Championship contest, Quarter Scale was thoroughly



*Posed with
author's prototype
is Miss
Sue Burwig*

HEADWIND "B"

Designed By : Paul Denson

TYPE AIRCRAFT
1/4 Scale Homebuilt
WINGSPAN
93 Inches
WING CHORD
12 Inches
TOTAL WING AREA
1116 Square Inches
WING LOCATION
Top Of Fuselage
AIRFOIL
Clark Y
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
1 1/4 Inch

O.A. FUSELAGE LENGTH
52" (Incl. Spinner)
RADIO COMPARTMENT AREA
(L) 8" X (W) 4 1/2" X (H) 5"
STABILIZER SPAN
22 Inches
STABILIZER CHORD (incl. elev.)
8" (Avg.)
STABILIZER AREA
176 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage

VERTICAL FIN HEIGHT
13 Inches
VERTICAL FIN WIDTH (incl. rud.)
8 1/2" (Avg.)
REC. ENGINE SIZE
40-60 Cubic Inch
REC. FUEL TANK SIZE
10-12 Ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail. & Throt.

BASIC MATERIALS USED IN CONSTRUCTION
Fuselage Balsa, Ply & Spruce
Wing Balsa, Ply & Spruce
Empennage Balsa & Spruce
Weight Ready-To-Fly 120 Ounces
Wing Loading 15.4 Oz./Sq. Ft.

discussed during the interminable time spent between rounds waiting to fly. It was felt that Quarter Scale would be the up and coming thing. It kinda took a temporary back seat to helicopters, but it is now on its own and "out in front" part of modeling. Let's take the dream out of the hip pocket & do something with it, build a Quarter Scale Headwind.

Back there a few years ago, I did build a Quarter Scale Longster and the construction methods I acquired from a tattered copy of the 1932 Handbook of Homebuilts and from another model builder, Lou Proctor, have helped time and time again with the Headwind. I cannot fail to credit Lou for the many construction methods I acquired while building his kits which he, in turn, learned while building full size planes and numerous models. If you have ever built one of his Antics, you will immediately recognize these techniques used in the Headwind.

Quarter Scale is extremely popular because the larger the plane, the more realistic the flight. The Headwind weighs 7½ pounds and has a wing area of 1116 square inches which gives a respectable 15 oz./sq. ft. Most of the mass is concentrated well under the Center of Gravity which will make this plane the most stable configuration you could build short of a parasol. A .60 really isn't necessary — a .40 would be adequate — but the .60's run and idle so well and slow speed is where you will do most of your flying. Except for take-off and emergencies you will probably not fly above half throttle. The weight of the .60 up front on this short moment arm will keep you from having to add weight to get the Center of Gravity right.

A big advantage of Quarter Scale is the ease by which detail is added, things are big enough so you don't have to work with a 10X magnifying glass and tweezers. It is good to have a razor saw and disc sander to finish the ends of the 1/4" square stock. For awhile it is going to feel as if you are working with 4" x 4" lumber and the ends must be square or the glue joints won't hold. You will, by necessity, have to look beyond your local hobby shop for some materials. Your welding shop can furnish the 1/16" brazing rods and the hinges necessary for the wing struts were purchased at a hardware store. While most of the wood stock will be available in the better stocked hobby shops, the 3/4" wide wing spars, etc, will have to be cut on a table saw. If you can choose your own wood, pick lightweight straight grained wood. Spruce is called out and would be preferred, but it is not usually available. Your lumber yard has in stock trim lumber cut from white pine. It is called a batt and is usually 5/16" x 2½" in 6' and 8' lengths. It is most convenient and may be re-sawed to necessary dimensions. For years I have re-sawed this white



pine lumber and have used it in both power plane and glider wings and have never had a failure.

Fuselage: The fuselage is started like any stick model — build two sides over the plans. Because of the large size of the longerons, uprights, and diagonals, it is not recommended that you build one side over the other. Cut the uprights and diagonals slightly long, in a miter box with a razor saw, sand the fuzz off one end then sand the other end to exact length using a sanding disc. The longerons are made of spruce, the uprights and diagonals are made of balsa for the most part. Cut the cockpit rail splice before it is glued in place — the aft end of this piece will be balsa and is put in place after the sides are joined at the top. At this point the sides will be rather floppy but will be strengthened when the fuselage is assembled. Drill the 1/16" holes in former #1 which will be used later when you sew on the landing gear. Pin the bottom longerons to the top view of the plans, insert the formers in place and glue. When dry, add the cockpit rail extension, which will pass outside the first upright and will join in at the second. Glue it at the crossover using a 3/16" balsa wedge to fill the gap.

Even before the first piece was cut, the problem of building the sides flat, then tapering them together at the top, was given considerable thought. It was felt that the 5/32" difference was inconsequential. The only problem it might have caused was the alignment of the wing and stab. Since they are 0°-0°, a straight-edge along the top of the fuselage will help you when you align the wing root block.

The engine mount and firewall assembly is built from a number of

pieces cut from 3/16" and 1/4" aircraft ply. The patterns are on the side and top view of the plans. The engine mounts are rock hard maple. Notice the 3° right and down thrust. Before attaching this assembly to the front of the fuselage, it will be necessary to cut and crack the longerons just ahead of former #1 so they will bend to conform to the lines of the top view. This is a weak spot in the fuselage and it will be necessary to strengthen this area with triangular ply fillets. Do not add the triangular fillets where the landing gear exits until the landing gear has been sewn to former #1 with copper wire and given a liberal coating of epoxy.

The servo tray was designed to the full size of the cockpit opening to stop torsion or twisting motion of the fuselage. It should be cut out of lite ply and installed at this time. Unless you cut the center notches in the servo tray as shown on the plans, no way are you going to get it into its place. Even so, it takes a bit of forcing. Determine the size of your fuel tank and build the tank compartment — remember, keep the C/L of the tank just below the engine throttle level. Drill holes for the fuel lines and throttle pushrods in the firewall.

Trace the outline of the wing root block on two pieces of 1/4" aircraft ply and one piece of 1/2" pine, spruce, mahogany, etc. Cut these out, tack glue together and sand to shape. Separate and cut out the center of the 1/2" piece as shown. This will facilitate drilling the hole for the wing joiner rod. Because of the short length of the usual drills, it will be necessary to drill from the front and back into the center opening. Take care and get the holes in line so the wing joiner rod will pass through the whole block on the



C/L. Epoxy the whole thing into a sandwich with the 1/4" ply on the outside. The square holes are cut through the ply pieces large enough so that the metal wing joiner plates will pass through and meet the ones from the other wing on the C/L. When the rod is pushed through the block it will pass through the centerhole of all eight pieces. If you work carefully it will work and you will be as surprised as I was.

Install the wing root block on former #2 using a 1" wide piece of aluminum angle stock. Fasten to the former with 3/4" 4-40 machine screws and blind mounting nuts. Use wood screws into the wing root block.

The side cabanes are constructed from 1/4" O.D. brass tubing with 7/32" sleeves in each end. Equip your vise with wooden block inserts and flatten 1 1/2" of one end and 1 1/4" of the other end. Round the ends and drill holes as indicated. Bend the cabane struts in such a way that the long flat will fit against the fuselage and the short flat will fit tight against the wing root block just forward of the wing joiner holes. Fasten the bottom end to the fuselage upright just aft of former #1 with 3/4" 4-40 machine screws and nuts. Place a long straight-edge parallel to the top of the fuselage allowing it to overlap the wing root block. Insure the root block is 0° to the top of the fuselage then insert the top two screws of the cabane. Fabricate the two front cabane struts in the same manner — dimensions are on the plans. They fasten to the underside of the front of the wing root block and on the backside of the firewall. They will have to be removed when you are installing the 1/32" ply cowl. The Headwind is covered from the nose back to former #1 on the outside with 1/32" ply and on the inside from former #1 back to former #2. I cut the ply cockpit panels to size then stained them. At the same time I stained the remainder of the cockpit installing the panels when they were dry. The whole interior was then given two coats of polyurethane varnish.

Wings: If you have built one of Lou Proctor's Antic kits you are going to look at this wing and say "By Golly!" or some such exclamation. Lou learned the technique from homebuilts and passed it on through his kits. It is a good technique and if you order the scale verification kit from Stewart Aircraft you will find the same building methods used in the original Headwind.

Measure the diameter of the holes in the wing rib then go to your hobby shop, hardware store, and even junk yard, and find pieces of thin wall metal tubing to match all the holes. Sharpen the ends of the tubing and you are ready to cut the wing ribs. From a sheet of 1/16" aircraft ply cut a wing rib pattern, drill out the holes. Don't use your pieces of tubing --- use a twist drill, then using sandpaper

wrapped around dowels, sand the holes to the same diameter as the O.D. of your tubing drills.

Push a couple of short thumb tacks through the template near each end and Hot Stuff them in place. When you place the template down on a piece of 1/16" sheet it won't slip and slide around --- later when you wish to place a rib in register with the template the holes will be there in the rib to guide you. Cut 35 or 36 ribs, a few extra is always a good idea. Find a 2" cube of soft balsa, turn it on end so the end grain will become your anvil. Hold the template and a rib together, push the tubing through its hole and, with a twisting motion, cut a hole in the rib. Do this for all the ribs, then take another piece of tubing and cut all that size holes in the ribs and so forth. When all the holes are cut, take a ruler, or other template, and cut tangents between the holes and remove the scrap.

It is best to put the cap strips on the wings using a jig. Acquire a flat piece of 3/4" lumber 6" wide and 13"-14" long. Glue two of the extra ribs to the board so one has the left side up, the other the right side. Glue two pieces of 3/32" balsa up to this template rib exactly where the spars will pass through. These pieces will locate exactly every rib when you are applying cap strips --- this way they will be identical. Cut your cap strips which are 3/16" wide from a piece of 1/32" ply.

Cut four strips of 1/8" square spruce to about 14". These strips are to sandwich the cap strips to the edge of the wing rib. They should be pinned in place with the pins on the outside of the strips: these are your wing rib jigs.

Wet four cap strips, remove excess water and lay them in the grooves you have just made. Bring the nose ends of the 1/8" square spruce strips together and pin them so they will hold the capstrips tight against the edge of the wing ribs. Apply a bead of white glue to the junction between the capstrip and the rib; allow to dry. When dry enough so they will not pop apart, trade the two ribs, squeeze down the spruce strips and apply glue to the other side. Six months later you will have your 30 or so wing ribs all capstripped. I actually made six jigs which hurried the job. I'll guarantee you if you do other work while the strips are drying you will be amazed how fast the ribs pile up. The false ribs are made in the same manner, however, if you look at the picture of the templates you will see how you can make two at a time. I had four sets of these templates so I actually made eight ribs at a time. The first set of fifteen ribs were made before a builder friend's wife asked me if I wet the strips before bending. I embarrassingly admitted I hadn't. She will know who she is if she reads this article. The next fifteen went much easier.

When you have fifteen of the ribs capstripped you may start a wing half. Place a 12" piece of 2" x 2" lumber, or similar substitute, parallel to, and exactly at, the edge of the inboard rib to act as a building stop. Pin the built-up first rib to this block, insert each of the spars into its proper hole in rib #1 and apply glue. The 1/4" spar should have its corners rounded so it passes easily through the hole in each rib. Slide the ribs on the spars one at a time stopping when they are in place as shown on the plans. Brace them with pins, then glue them in place, putting fillets of glue in the angle where the spars and ribs meet. Later you can turn the wing over and make the bottom fillets. Allow the wing to dry completely. If you have a grocery that caters to Chinese food in your area, procure a bundle of 12" bamboo slivers, used in making shish kabobs. If these are not available, your hobby shop may stock 3/32" square basswood strips. The welding shop should stock 5/64" aluminum brazing rods or, as a last resort, you could glue toothpicks together end to end with Hot Stuff. You failed to procure any of the above? Why not do as the homebuilders do, use steel cable --- steel cable? Buy a roll (25 ft.) of 20 to 30 lb. test stainless steel fishing leader wire; while in the bait and tackle store, purchase the swages for this size wire. Using fittings which may be purchased from Proctor Enterprises, make your own drag braces from cable.

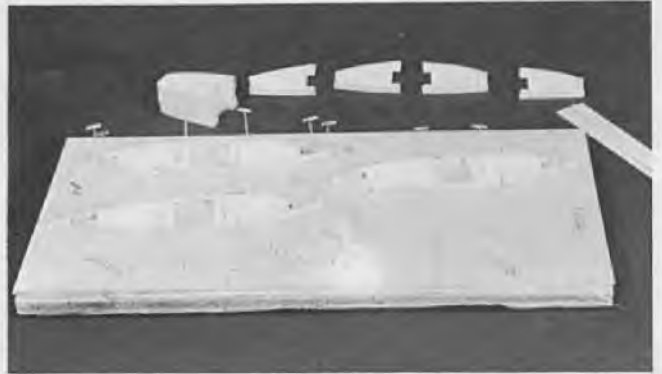
Most of the remainder of the wing is detailed on the plans. The tip may involve some problem; cut a form from a piece of 3/4" scrap lumber and nail it to a larger section of the same board. Cut five strips of 1/16" balsa 3/16" x 14", soak them in hot water for 5 minutes, dry with a paper towel, apply white glue and laminate them around the waxed form. If you are in a hurry, pop the whole mess into a 200° oven and bake till done, cover with Hollandaise sauce and serve piping hot, will serve a family of four.

Build up the outer end of each spar as indicated and trim the ends in accordance with the plans. Trim the wing tip and fit to the end of the wing. Part of each spar or the build up of the spar should touch and be glued to the wing tip. The top edge should be level with the top camber of the ribs. With a sharp knife, cut the top of the wing tip to match the contour of the top of the wing. Even though it doesn't look like it, the bottom of the wing tip is a flat taper from the last rib. Using the bottom of the last rib for a guide, cut and sand the wing tip so it resembles the various stations on the plans.

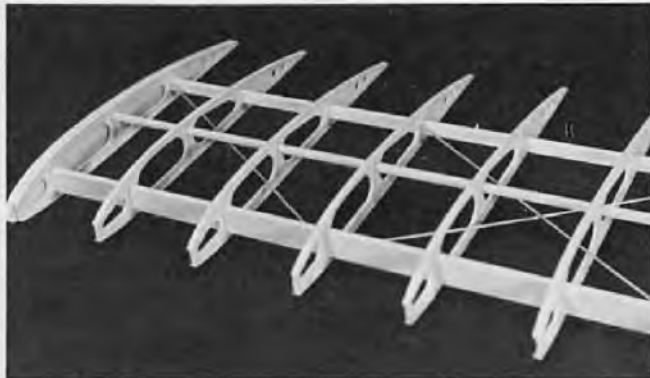
Make the trailing edge one piece, do not cut it until you are ready to cover the wing, build in the ailerons as you go. There is a jig pattern for cutting the aileron ribs on the plans. Make a copy
to page 69



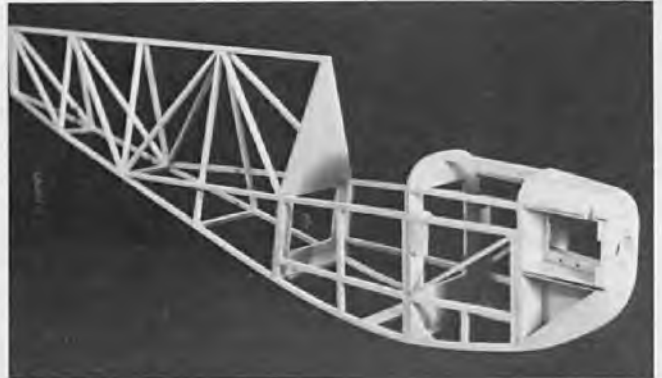
Ribs being capstripped on jig.



False ribs being capstripped.



Partial completed wing panel. Note internal bracing.



Basic fuselage construction complete.



Close-up of rudder and elevator bellcranks.



Solid engine installation.



Our beauty ready to cover.



Note servo pushrods to bellcranks.



Any size radio will fit.



View showing cockpit and engine detail.



Access hatch for aileron servo.



Close-up of main landing gear strut.

and use it to cut the aileron ribs to length. Cut the aileron end ribs from 3/16" soft balsa. Build in the floor for the aileron servo compartment and cover the first wing bay with 1/64" ply, leave the aileron hatch uncovered.

From the local hardware store, buy four sets of hinges as called out on the plans (or equivalents). The heavier hinges go on the fuselage, the lighter ones on the wing.

Make the wing struts from 1/4" x 3/4" white pine, the airfoil shape is cut with a plane or on a sander. Cut a 1 1/2" slot in each end with a razor saw, then assemble as per plans. I would make them 1/4" to 3/8" long so they may be adjusted to your plane. Since you are going to read these instructions through carefully before you start, you will not make the same mistake I did and wait until the wings are finished before you add the wing connector plates. It can be done but with great difficulty --- the

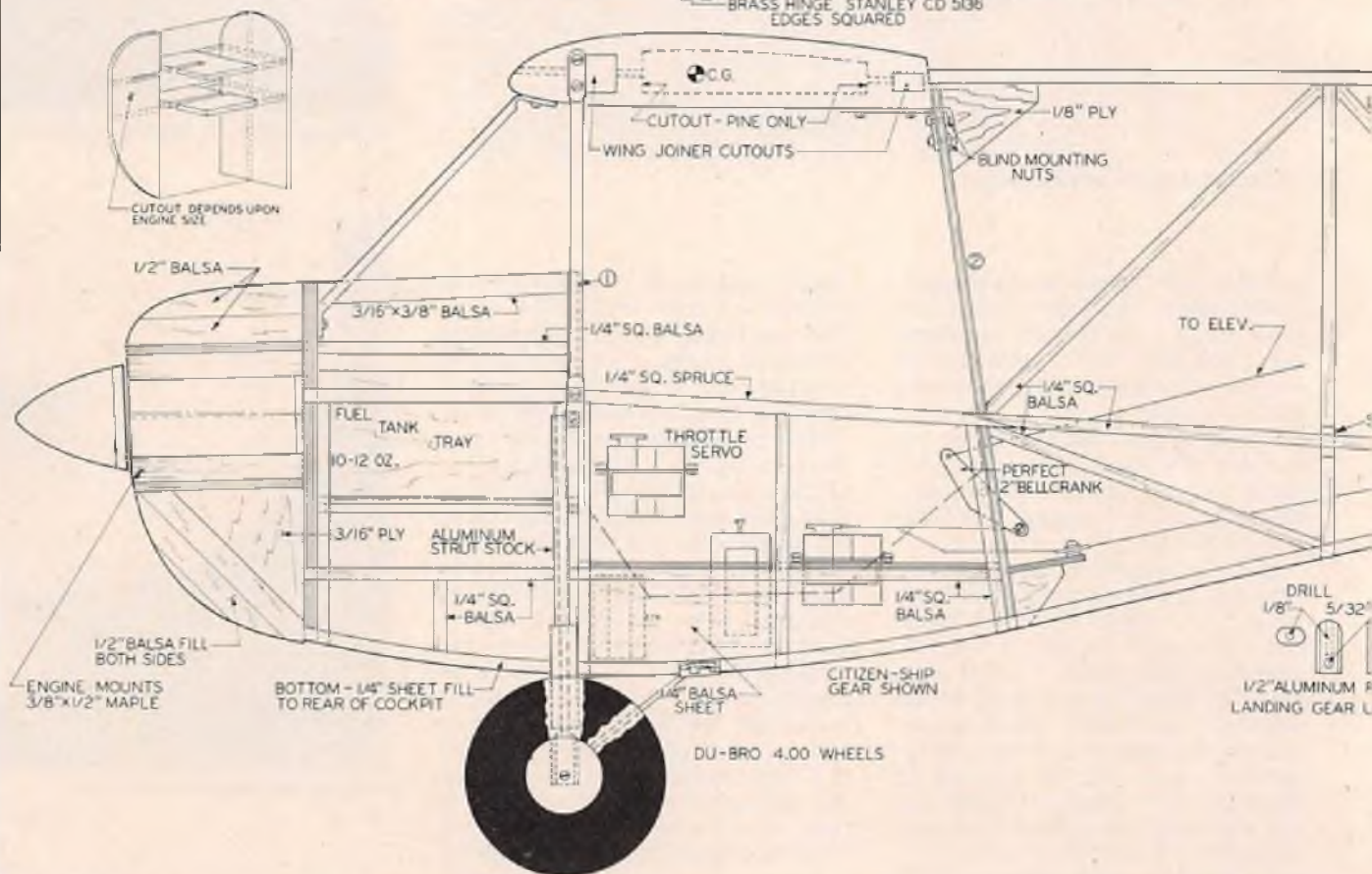
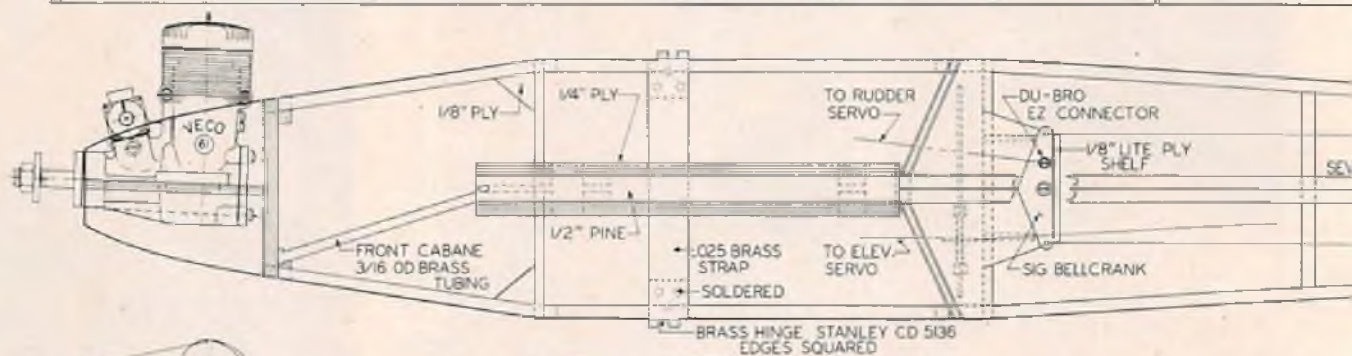
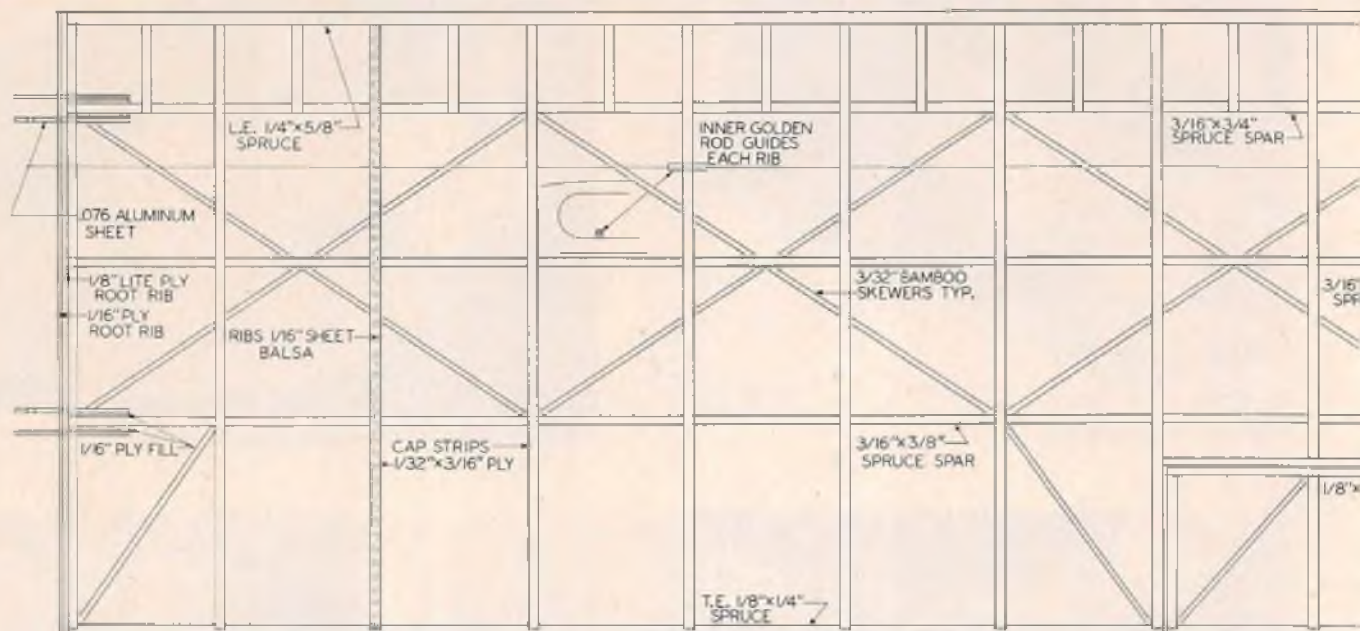
biggest problem is drilling the holes through the spar for the 3/4" 4-40 machine screws. Note that the wing connector plates on one wing are shimmed out 1/16" so they will fit on the outside of the plates on the other wing.

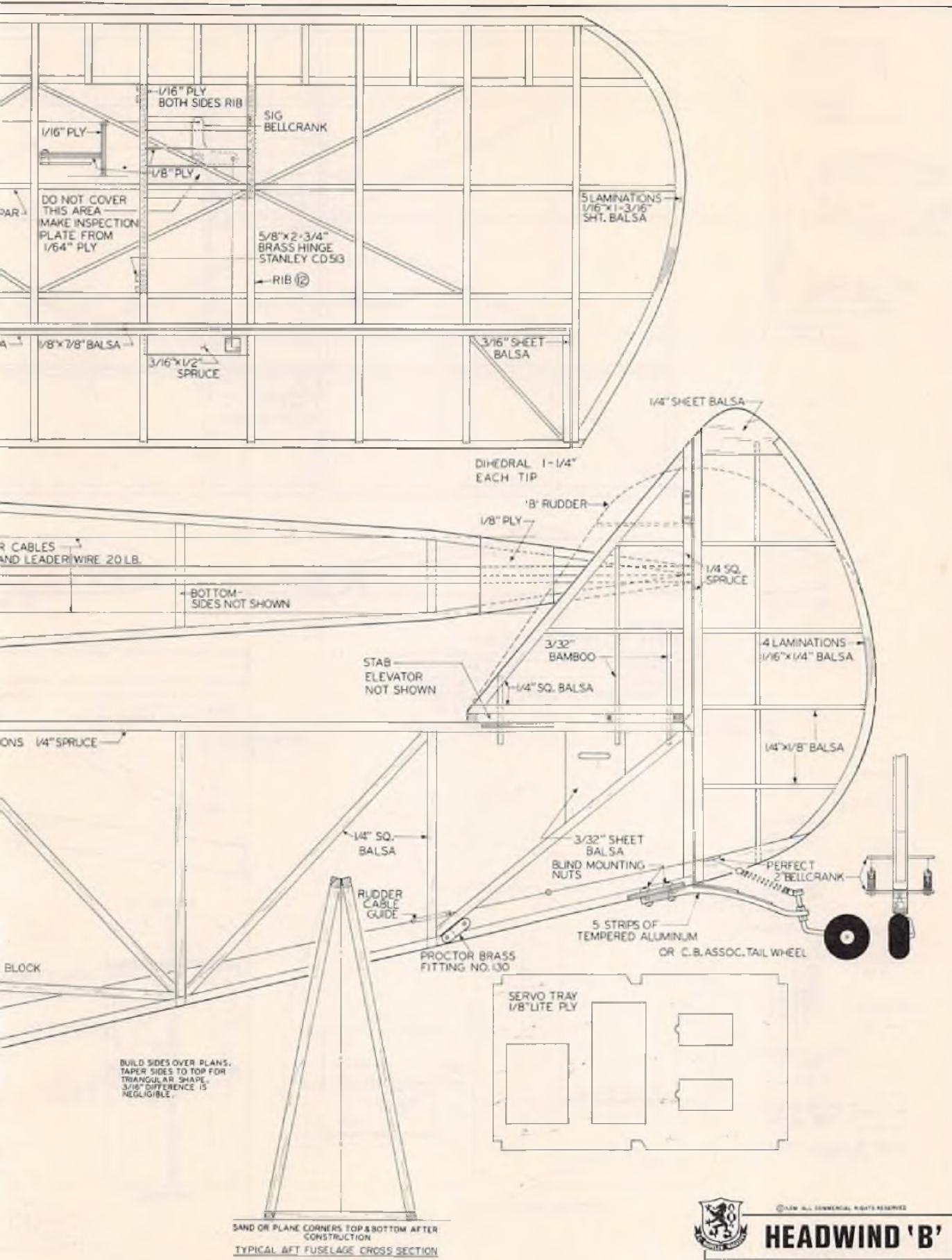
Now comes the moment you have been waiting for --- will the wing joiner rod pass through the hole in each of the eight joiner plates? Will it find the hole in the middle of the root block? Install the wing halves, brace up the tips so you have 1 1/4" dihedral under each tip and shove the joiner rod home. **It fits!! It fits!!** It may be necessary to remove the wing root block and bevel slightly for the dihedral. A small gap on each side is acceptable. Turn the plane upside down and rest the wing root on a block of wood 1 1/4" thick, block up the tail until the top of the fuselage is exactly parallel to the table, this will automatically put in the

text to page 74



Built up tail wheel assembly.





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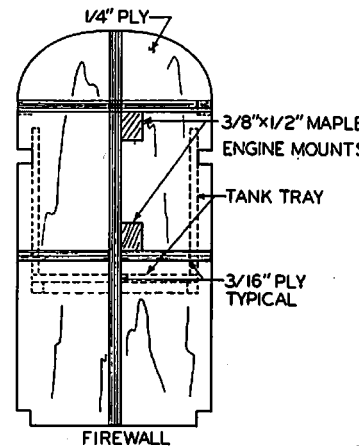
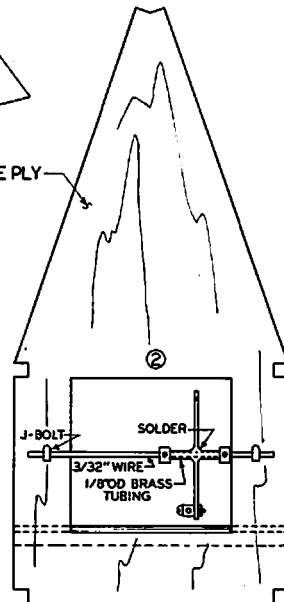
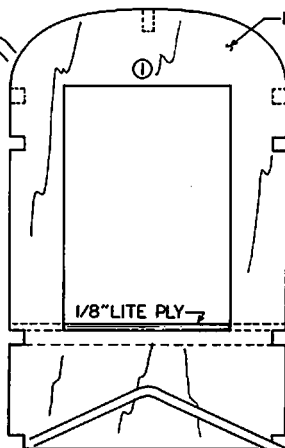
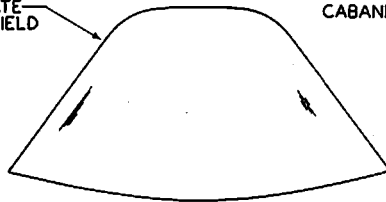
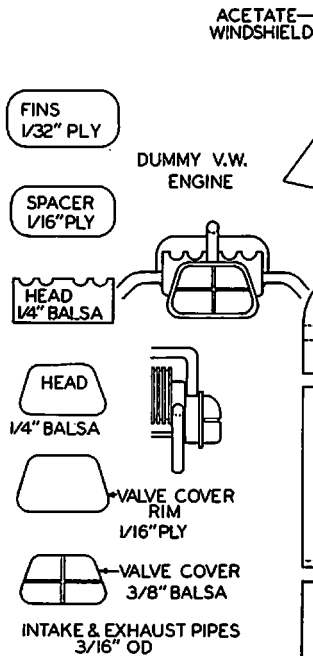
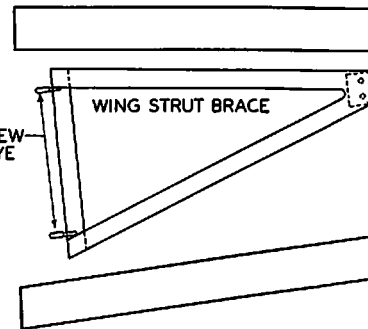
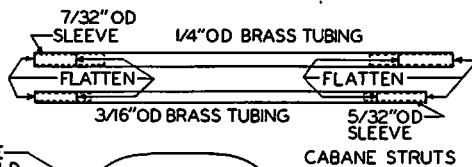
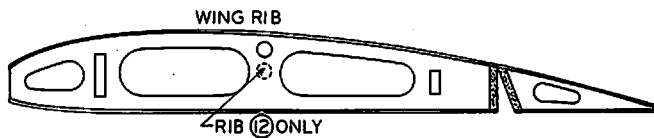
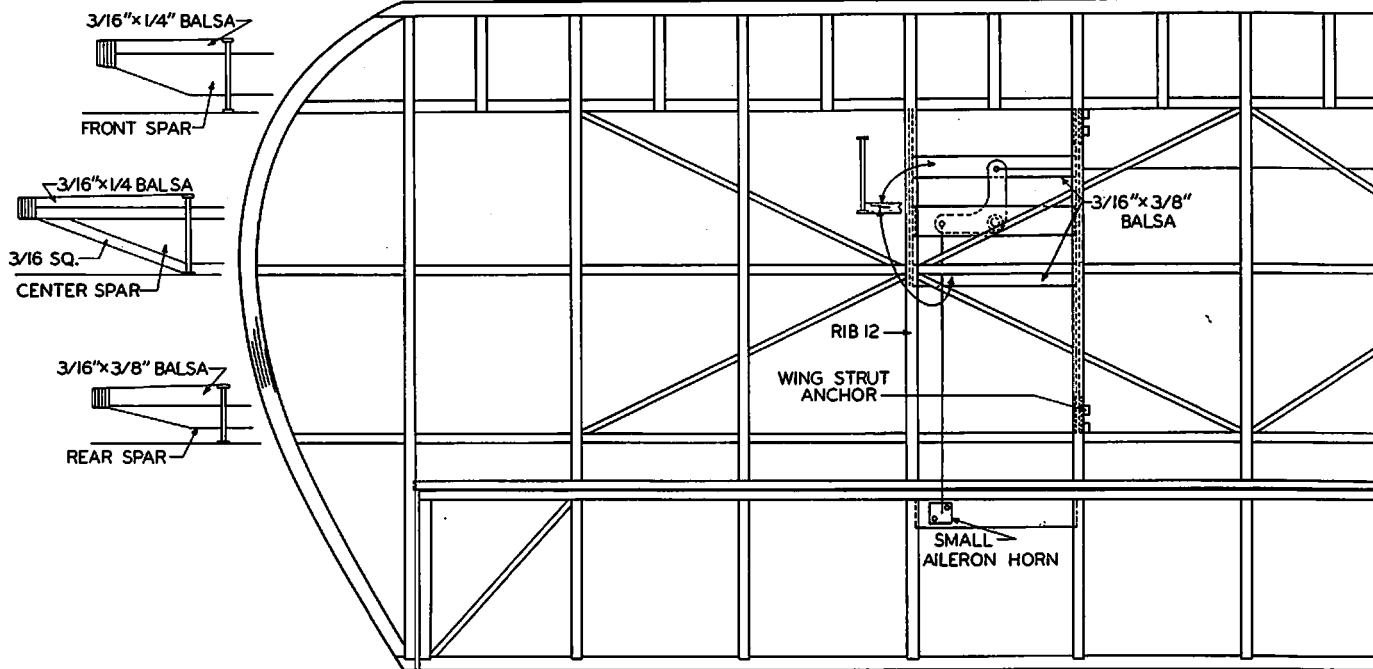
HEADWIND 'B'

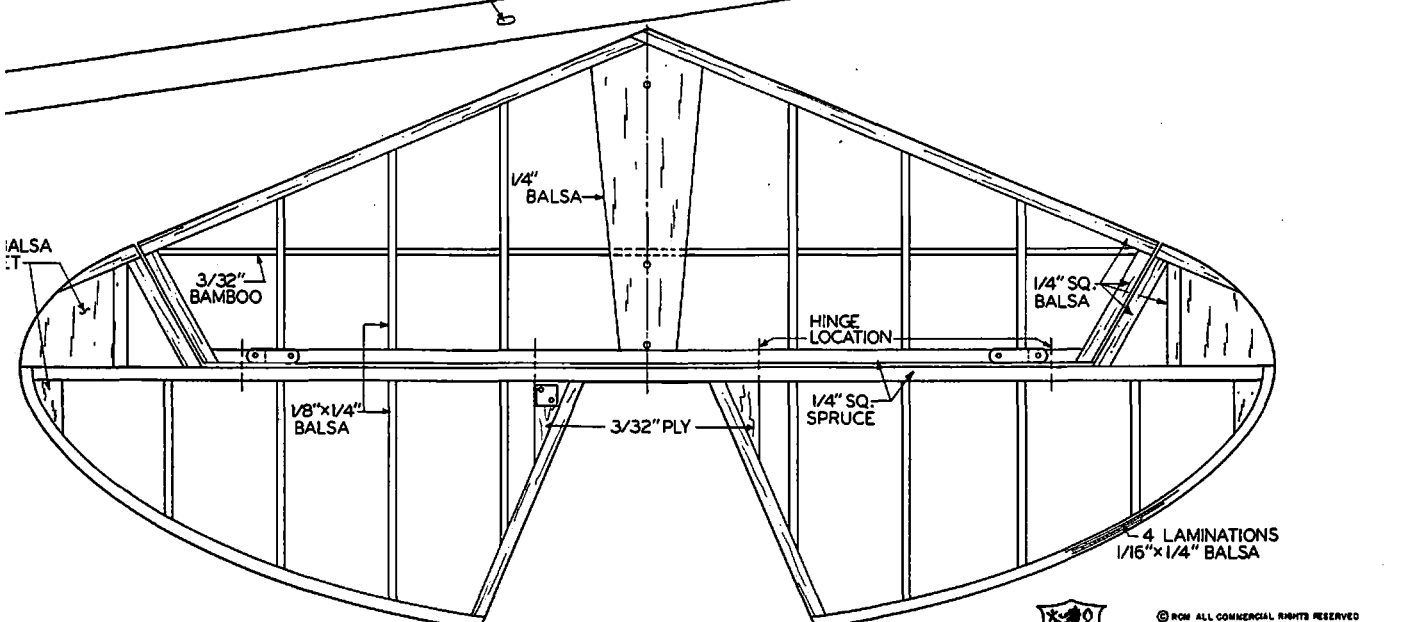
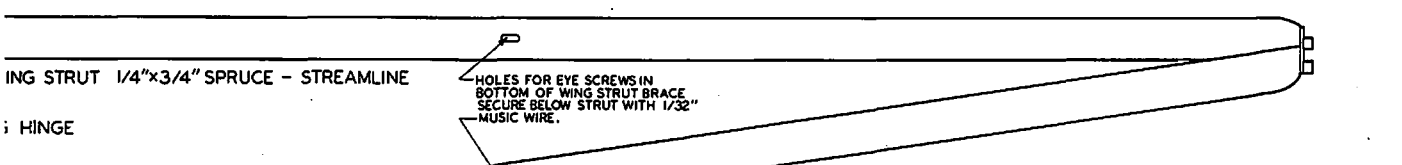
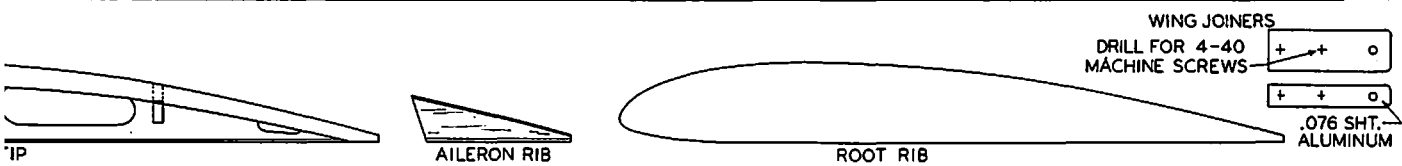
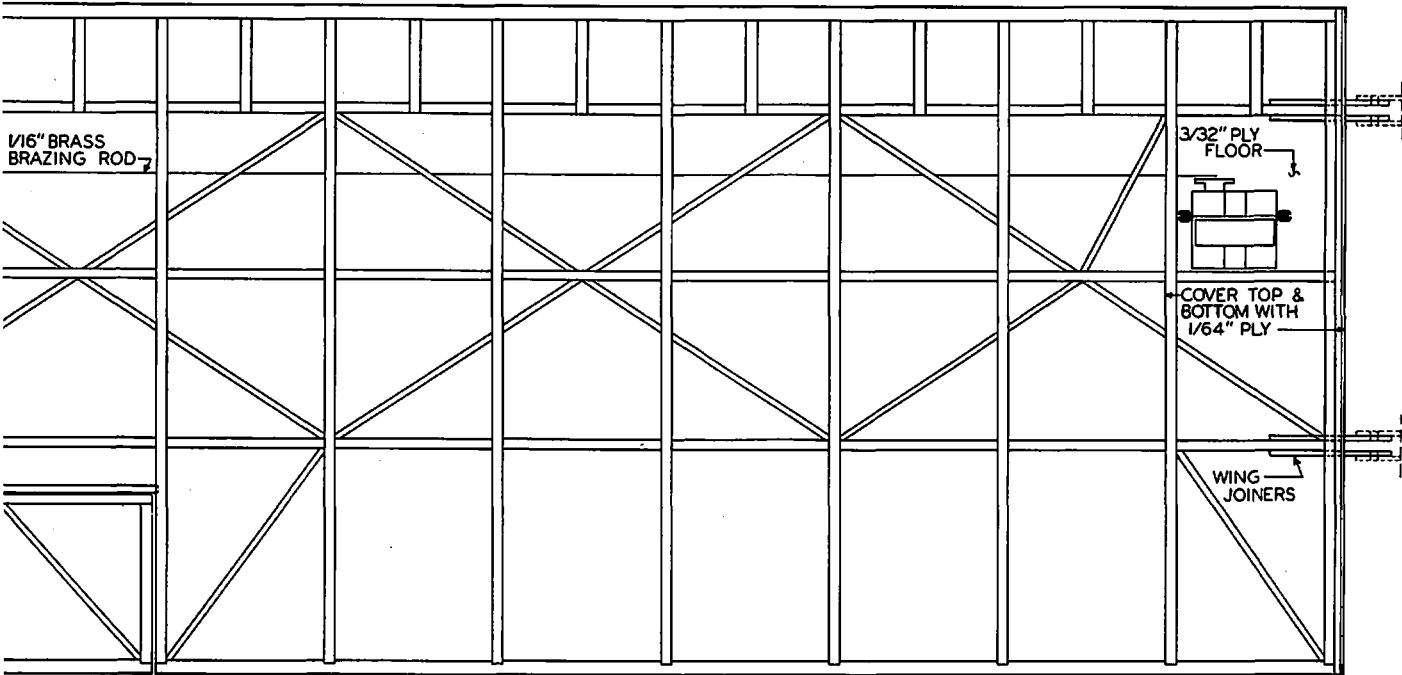
DESIGNED & DRAWN BY PAUL DENSON INKED BY PAUL DENSON



SHEET 1 OF 2

PLAN NO. 754





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HEADWIND 'B'

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0 1 2 3 4 5 6

② PLAN NO. 754

proper amount of dihedral. The wing is long enough that it will twist and since the trailing edge is heavy, it will attempt to droop. If you install the wing struts with the wing in this position you will have exaggerated washout in the wings (as I did). Shim the wing tips in such a manner as to insure the bottom of the last rib is parallel to the table and the root rib. Screw the wing hinges to the ply hinge mounts and screw the large hinges to the bottom of the fuselage. Trim the wing struts to fit, slide the hinges into the slots and bolt in place with 1/2" 2-54 machine screws at the wing end and 1/2" 4-40 machine screws at the fuselage end.

During a test hop, in a new land development where only the streets were finished, I hit a curb on take-off — strictly pilot error — the landing gear strut was bent and both wing struts on one side were broken. To avoid the calamity that would ensue were wing struts broken when airborne, I added a 1/32" music wire doubler to the front strut on each side. I made an eye in the end of the wire, put it under the washer at the bottom and reinstalled the nut. The wire was held under tension and wrapped around the machine screw at the wing end of the strut, the excess was cut off. An eye was formed and washer and nut were replaced. White electricians tape sealed it to the strut full length.

With the wing struts in place, you can turn the plane over and see the 8' wing in all its glory, would you believe 7'6"? Fills the whole room doesn't it? But it will all fit in a Volkswagon. Check each wing for washout. If there is washout you can shorten the back strut. To correct washin, shorten the front strut.

The struts will now fold flat along the underside of the wing for storage if you allowed the strut wing hinge pivot point to extend about 1/8" above the wing surface. Remove the hinge from the fuselage, use a drift pin, knock out the hinge pin, drill to 1/8" and make your own safety pin using 1/8" brass rod. To remove the wings, disconnect the pushrods from the servo, disconnect the servo wires, pull the safety pin on the struts and, finally, remove the wing joiner rod. Reverse this technique to assemble the plane.

Empennage: The empennage is straightforward and according to the plans. It would be best to trial assemble the whole tail section before covering. There are quite a number of holes to be drilled and fittings to be affixed (the holes can be opened after covering). Support and hold-down of the whole tail section is accomplished with wires. If you can find "Sevenstrand" stainless steel leader wire of 20-30 lb. test, you will amaze yourself with how many ways you can use it in model building. Be sure, when you purchase the wire, you also purchase a package of the swages

recommended for the wire. They are phosphor-bronze and, when squeezed tight with Vise Grips, hold the wire permanently in position. The fin and stab are keyed to the fuselage with three bamboo posts; they are held firmly in place and adjusted with the plastic coated stainless steel wire and turnbuckles. You will need eight #130 Proctor brass fittings, two on either side of the top of the fin, two on each end of the stab and two on the fuselage as shown. The turnbuckles used for adjustment were #5C clevis end which lock with a pin to the end of the brass fittings. A turnbuckle is located on each side of the fin and each side of the fuselage. The wire that attaches to the other end of the turnbuckle terminates at the brass fitting on the end of the stab. If you set it up in this manner, the fin may be adjusted independently of the stab and vice versa.

The rudder is also cable controlled. It is best to run these cables before covering the fuselage. After cutting to length, they may be coiled and taped aft of the NyRod guides. The normal steps for swaging a loop in the end of a piece of the stainless steel wire are as follows: run the wire through a swage, through the hole in the bellcrank, around the back side of the bellcrank through the hole in the opposite direction through the swage in the opposite direction and crimp with Vise Grips. The figure '8' is best where there is movement to stop fraying. In the wing or tail assembly a loop is sufficient, pull tight with pliers and crimp.

Tailwheel: The tailwheel is almost a duplicate of the one on the full size Headwind. I used some tempered sheet aluminum for the spring. It is made up of five pieces; only three are full length. They were drilled, bolted, and clamped, then the edges were filed smooth for looks. The axle housing at the end was a piece of outside threaded aluminum tubing; the bellcrank was cut from 1/32" sheet brass and soldered to a 5/32" wheel lock. The control springs were from a ballpoint pen. The turnbuckles, while unnecessary, were extra ones I had so I used them to extend the springs. A solid link between the wheel and rudder is impractical because the springy up and down motion would be transmitted to the rudder. Check the plans and pictures for help in building the tailwheel assembly.

The shocks are not functional, just decorative. The internal friction of their movement would help a little but the 5/32" landing gear wire and the large Du-Bro wheels take up the majority of the landing shock. The whole strut works around the aluminum landing gear strut block. It was made from a 1" piece of 1/2" aluminum rod, filed flat on each side until it is 3/8" thick (see plans). A 5/32" hole is drilled through from one flat side

for the landing gear wire. A 1/8" hole is drilled in the rounded top for the strut rod. Holes are drilled in from the rounded side which are tapped for set screws to hold everything in place. To make the struts you will need from the hobby shop tubing rack: one length of 3/8" airfoil aluminum strut stock, two pieces of 5/32" O.D. brass tubing, one 12" length of 1/8" brass rod and one length of 1/2" O.D. aluminum tubing.

Cut two 6 1/2" lengths of the strut stock, two 6 1/2" lengths of the brass tubing, two 2" lengths of the 1/2" aluminum tubing, and cut the brass rod into four 3" pieces. Bend a 1/4" right angle in two of the brass rods and a 5/8" slight bend in the other two. Ready to assemble? Solder the right angle bend brass rod in one end of the 5/32" brass tubing allowing it to stick out about 1/8". Push the brass tubing into the aluminum strut stock, it fits exactly. A little silicone adhesive squeezed into the strut stock back of the tubing stops rotation. I used a one hole laboratory stopper to fill the bottom 3/8" of the aluminum tubing — hardwood dowel would work — then I wet and slid the brass rod up through the stopper and out the top of the aluminum tubing. This brass rod then went into the bottom of the tubing in the strut. Voila! It is done.

The brass rod at the bottom of this assembly fits into the top of the landing gear-strut block and at the top fits under a 'U' shaped brass fitting at the base of the cabane.

Incidentals: My Headwind was covered with three rolls of Permagloss Coverite and I used Permagloss trim sheets for the numbers. Covers for the servo hatch in the top of the wing and bellcrank access in the bottom of the wing were made of 1/32" ply covered with the covering materials. Aileron hinges are also Coverite while the rudder and stab used Sig hinges.

The wing strut brace was half of a Sig hinge epoxied in a slot at the top, the other half hinge was epoxied between 3/32" balsa squares which were epoxied to rib #6. This hinge half stuck out far enough so that the wing strut brace folds flat under the wing strut. The bottom of the wing strut brace has two small screw eyes in the bottom edge which pass through the wing strut and both are anchored with a piece of 1/32" music wire.

A 1/16" ply sheet, with 1/8" sq. spruce strips around the bottom, is fitted into the top of the cockpit; the flight pack switch and charging jack are located in this cover. The main purpose of this cover is to keep exhaust oil out of the cockpit. It may be readily removed to be cleaned with the rest of the plane at the end of the flying session.

As a result of the minor collision with a sidewalk curb previously mentioned, it was determined that a back brace was



More On Differential

The July Scale Views column item on differential aileron movement stirred some interest in the subject. One letter came from Ron Moulton, Editorial Director of the respected English magazine *Aeromodeller* and Radio Control Models and Electronics, with the news that the feature had been selected for reprinting in the 1978-79 edition of the *Aeromodeller Annual*. The Annual is a tradition going back about 30 years and I've got just about all of these valuable references in my book collection. So I was pleased to be represented and count this as a vote in favor. Ron said he had noticed editorial mention of the article in *Rhodesian* and *New Zealand RC club newsletters*.

Shu W. Gee, who is with NASA at the Dryden Flight Research Center in Edwards, California, had some particularly interesting observations. Here are some excerpts from his comments, with a few asides from McCullough along the way.

GEE: "In actual RC flight, it is difficult for the flier to perceive adverse yaw from the ground so he probably can't tell how bad it is except that he is working harder in doing precision maneuvers. I would like to mention that when you have a pattern airplane with little or no wing dihedral and a symmetrical airfoil, then differential ailerons are undesirable and would cause nose wobble during axial rolls."

The opinions from pattern fliers I've talked to or heard from are about 50-50 divided as to the benefit of differential movement in their case. But what tips the scale for me is the vote of Dave Brown in favor.

GEE: "Many full size airplanes have differential ailerons and still have adverse aileron yaw characteristics. In flying these types of airplanes, it is necessary to apply rudder with aileron control for maneuvering, hence the term 'coordination of controls.' In RC flying, it is difficult to coordinate the right amount of rudder with aileron, and when you make uncoordinated steering corrections, the airplane wallows around (if the model has strong adverse yaw and/or excessive dihedral)."

Agreed, but is it not possible that these full-size designs do not have enough differential incorporated, and if the proper amount were used then less rudder application would be found necessary?

GEE: "Scale-like flying and improved handling qualities can be achieved by interconnecting the rudder with the ailerons at the optimum ratio. I have used both electrical and mechanical interconnects with success. I prefer electrical when the airplane is large enough and has both rudder and aileron servos. A Y connection harness (available from Kraft) can be connected from the receiver aileron output to drive both aileron and rudder servos."



EK Logictrol also has a Y connection harness. If none is available for a particular brand of radio, it is not difficult to make a "Y" by splicing two aileron extension cords together.

GEE: "For smaller airplanes like 1/2A, a pushrod added from the aileron horn to the rudder provides an adequate mechanical interconnect. When using interconnects, roll sensitivity is increased, so one should decrease the aileron throws, and the rudder throw should be only about 1/3 or 1/2 of its normal throw, depending on the particular airplane."

Right! Last summer I helped Jim Woodard test fly a model which had previously been flown in the usual configuration and then was switched to interconnected aileron and rudder servos with a Y harness. No changes had been made in the previously used control throws. When a vertical bank resulted from a "normal" correction

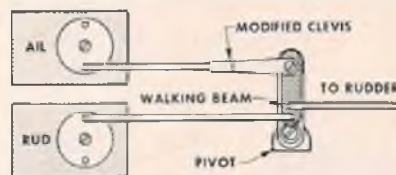
during climb-out from take-off, it was evident that some changes should have been made. Several flights later we ended up with only a small amount of rudder movement for good results.

GEE: "Too much rudder results in proverse yaw, which is also undesirable. You have to fly the model and adjust the ratio for its best result. If you hit it right, you might even see an improvement in the handling qualities of your scale model."

Probably the best known full size example of connected controls is the classic *Ercoupe*. It has a solid reputation for being a pussycat to fly with almost idiot-proof handling qualities. The limited control surface movement that was also a part of the design did, however, prevent aerobalic maneuvers.

GEE: "The disadvantage of the interconnect is that you lose the separate control of the rudder which you sometimes want during take-off and landings and some aerobatic maneuvers, but you can get that capability back with an additional rudder servo and a walking beam mixer."

AILERON RUDDER INTERCONNECT PLUS RUDDER CONTROL



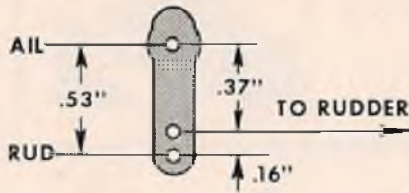
Back in the late 1950's, Maynard Hill and Jim Martin (the Tennessee J.M.) among others, flew coupled aileron and rudder or CAR as it was dubbed then. The take-off and landing problems were noted at that time also. During crosswind work, when a wing was put down, the rudder and tailwheel turned also and vice versa. These difficulties, plus the introduction of multi-channel full proportional equipment, detailed further experimentation and not much has been done since. So Shu's mention of the walking beam mixer sounded interesting and I wrote to him and asked if he'd supply further details.

Did You Ever See A Beam Walking?

Here are some notes he sent for a

practical application of the principle:

(1) Location of the holes in the walking beam determines the ratio of aileron servo and rudder servo movement that actually gets to the rudder. On the sample unit shown in the picture, the measurements are shown in an accompanying sketch.



Then,

$$\delta R = \frac{.16}{.53} \delta AS + \frac{.37}{.53} \delta RS$$

Or,

$$\delta R = .3 \delta AS + .7 \delta RS$$

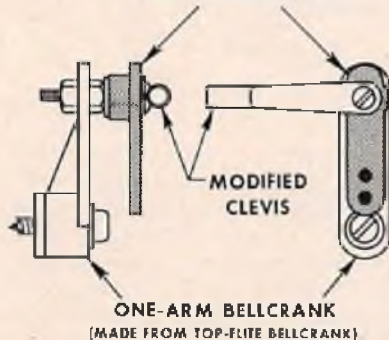
Where:

δ means deflection
 R is rudder control surface
 AS is aileron servo
 RS is rudder servo

This means:

- (a) That the rudder will deflect 30% of its full throw when full aileron is commanded and 70% of its full throw when full rudder is commanded.
- (b) When full right aileron and full right rudder is commanded, the rudder deflects full right.
- (c) When no aileron and full right rudder is commanded, the rudder deflects 70% of its full throw to the right.
- (d) When full left aileron and full right rudder is commanded, the rudder deflects 40% to the right.

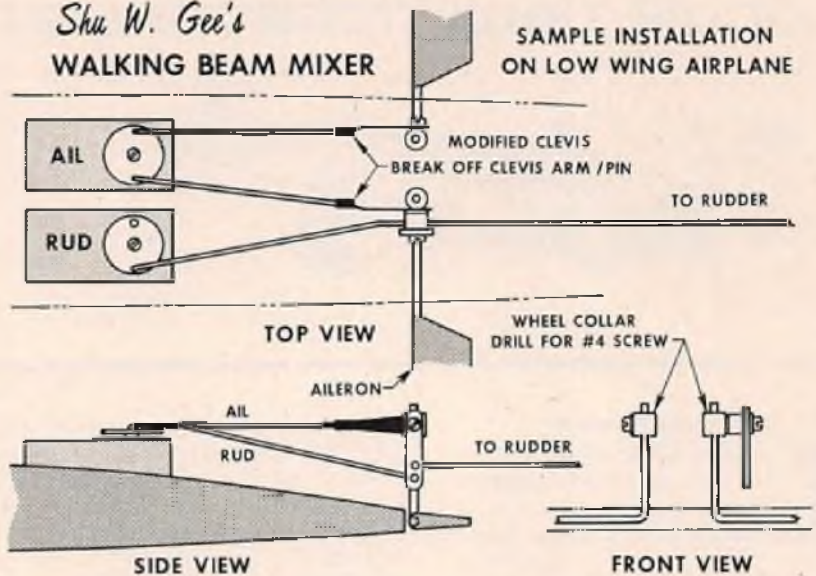
KPS-12 SERVO ARM USED AS A WALKING BEAM.



It is important to note that the beam length between the aileron and rudder servo inputs **must** be greater than the total throw of a servo to accommodate the condition when the aileron and rudder servos are at their opposite limits --- i.e., full right aileron and full left rudder.

Care must be taken to avoid linkage interference at the walking beam. It is

Shu W. Gee's WALKING BEAM MIXER



NOTE: IN THIS APPLICATION THE ONE-ARM BELLCRANK IS REPLACED BY THE WIRE AILERON HORN.



suggested to use 90° wire bends with some means of preventing them from coming out.

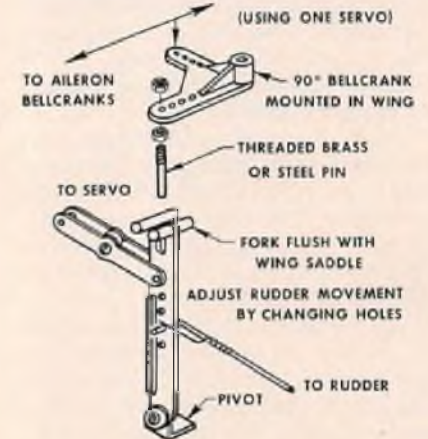
Old Timer Car Unit

This coupled aileron-rudder discussion got me to thinking that William Bros. used to make a molded nylon device for adjusting and connecting the linkages involved in CAR controls. I got to digging in the lower depths of my workshop and came up with one still in the package. I'm including it here because it may suggest some good ideas for hook-ups when removable wings are involved. Look on the back of your hobby dealer's



hardware rack --- there might still be one in stock. If not, you can make up something similar to do the job.

WILLIAMS BROS. SERVO TRAVEL REDUCING LINKAGE WITH COUPLED AILERON AND RUDDER FORK



Plug The Drain

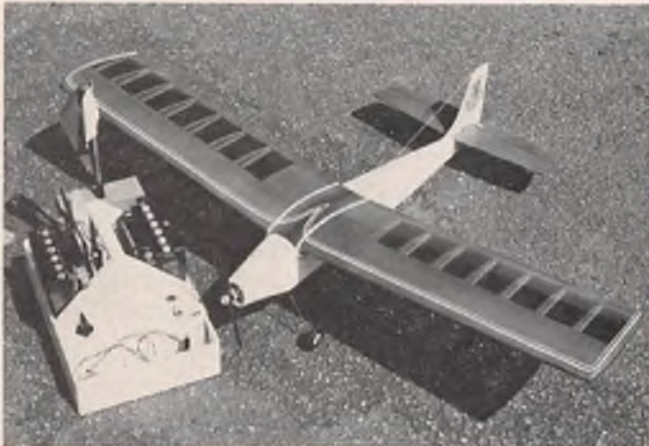
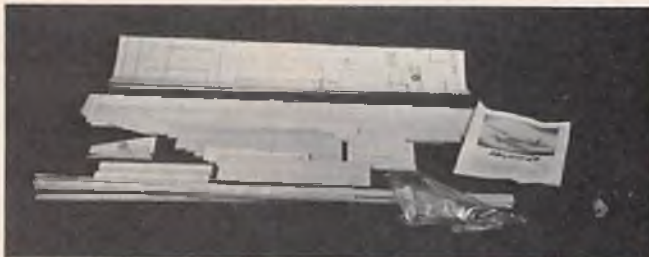
Quarter Scale fliers have learned, sometimes at a most inappropriate moment, that the biggies run down battery packs faster than the usual size model. Those barn door control surfaces are heavier and have to displace larger volumes of air when they move. This increased load causes a rise in current going to the servo. Some say they only get 1/3 normal flying time.

L & L Electronics (P.O. Box 13434, Albuquerque, N.M. 87112) has an answer to the problem in their "Super-Pak". The 4.8 volt unit is rated at 1.2 amp hours, more than double the standard 500 mah pack. I weighed it on a sensitivity scale at 190 grams or 6 3/4 ounces. Considering the large capacity, this compares favorably with the 5 ounces of a standard battery. Dimensions are 15/16" x 1 1/4" x 3 1/2" and the price is \$23.95.

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RCM PRODUCT TEST

Astro Flight, Inc.
ELECTRA-FLI



The Electro Fly Astro 10 is an electric powered sport plane designed by Bob Boucher and Dave Shadel for Astro Flight Models, and is of high quality materials throughout. All necessary hardware is furnished in kit, including a cardboard tube for Astro motor installation.

Construction of the Electro Fly is very simple, requiring little time to build, and could be built by nearly anyone with minor building experience.

The parts fit very well and the parts matched the plans very well except for tail pieces which were a little smaller than the plans. The instructions and plans were easy to read and follow.

On our model, I decided to add shear webbing out to the fourth rib for added strength. The construction is straightforward with balsa being used throughout with the exception of the plywood bulkhead and the cardboard motor tube in the fuselage.

The earlier kits, which ours turned out to be, do not have an air scoop shown under the battery pack for cooling. This plastic scoop is the same type included in the kit for the side vents. It needs to be mounted on the bottom of the fuselage directly under the battery pack with the opening facing the rear. If you have one of these early kits, write to Astro Flight and they will send you the additional air scoop.

For construction, Quick Cure 5-Minute epoxy and Wilhold Aliphatic Resin glue was used. Flite-Kote and Solarfilm covering was used to cover the entire airplane and both a heat gun and iron were used to apply the covering. D.J.'s trim tape was used for the trim.

The Electro Fly is a smooth, good flying airplane and should make a good trainer for the novice. The Electro Fly is very stable and flies well with very little control. It is rather sensitive to rudder but otherwise it will fly very nicely with hands off on landing. Be sure to keep the speed up during approach (don't try to stretch the glide) and then add a little up elevator to flair out. It makes smooth landings.

Our airplane will fly about 5 minutes on a 10 to 15 minute
to page 112

IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging	●					Pre-Shaped Parts	●				
Plans	●					Parts Match to Plans		●			
Written Instructions		●				Overall Parts Fit		●			
Quality of Hardwood	●					Ease of Assembly	●				
Quality of Fiberglass			NA			Fidelity to Scale			NA		
Other Materials	●					Flight Performance	●				
Accessories		●				Overall Appeal	●				
Die-Cutting	●										

E=Excellent / G=Good / A=Average / F=Fair / P=Poor

SPECIFICATIONS

Name ELECTRA-FLI
Aircraft Type Sport (Electric)
Manufactured By Astro Flight, Inc.
13377 Beach Ave.
Venice, California 90291

Mfg. Suggested Retail Price \$24.95
Available From Both Mfg. & Retail
Mfg. Recommended Usage Basic Powered Trainer
Wing Span 45 Inches
Wing Chord 8 Inches
Total Wing Area 360 Square Inches
Fuselage Length 32 1/4 Inches
Radio Compartment Dimensions (L) 4 1/4" x (W) 2" x (H) 3"
Wing Location High Wing
Airfoil Flat Bottom
Wing Planform Constant Chord
Dihedral (each tip) 1 Inch
Stabilizer Span 16 Inches
Stabilizer Chord (incl. elev.) 4" (Avg.)
Total Slab Area 64 Sq. In.
Stab Airfoil Section Flat
Stabilizer Location Top Of Fuselage
Vertical Fin Height 5 Inches
Vertical Fin Width (incl. rud.) 7 Inches
Mfg. Rec. Engine Range05-.10 Astro Electric
or .049 Glow

Recommended Fuel Tank Size NA
Landing Gear Conventional
Recommended No. of Channels 2
Recommended Control Functions Rudder & Elevator
Basic Materials Used in Construction:

Fuselage Balsa, Hardwood & Ply
Wing Balsa & Ply
Tail Surfaces Balsa
Hardware Incl. in Kit See Text
Plan Size 47" x 33" (1 sheet)
Building Instructions on Plan Sheets No
Instruction Manual Yes (2 pages)
Construction Photos Yes
Kit Includes Die-Cut & Shaped Parts
Mfg. Rec. Flying Weight 40 Oz.
Wing loading based on rec. flying wt. 16 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly 44 Ounces
Wing Loading 17.6 Oz./Sq. Ft.
Covering & Finishing materials used See Text
Engine Make & Disp. Astro .10 Electric
Muffler Used No
Radio Used Krall
Tank Size Used NA



Golden State Classic

When you get two super promoters, promoting something they like, there appears to be no limit to what they can do. Such was the case when Rick Perry and George Hague decided to sponsor an annual 1/8 scale race in Northern California. Rick Perry is the newly elected President of R.O.A.R. (Radio Operated Auto Racers) and, together with George, they own and operate The R/C Car Shoppe in Pleasanton, California.

The advance publicity for this race stated \$3,000.00 worth of trophies and merchandise, including a color and B & W TV, radios, etc. This brought out 85 pre-registered entries, with another 20 trying to get in after the deadline. The deadline was necessary to print the

program listing names, heats, frequencies, car numbers, etc., so everyone would know ahead of time, the exact times and schedules of the racing program. And Rick and George were able to stay with this schedule, almost to the minute.

The race was run at the Del Monte Shopping Center in Monterey, Calif. with nearby Carmel and Big Sur making it one of the most beautiful spots in all of the U.S.A. To add a little more flavor to the weekend, the hotel that we stayed at was Official Race Headquarters for the Laguna Seca Can Am Race at nearby Laguna Seca Raceway, with race cars parked everywhere.

Friday was controlled practice day for our race, and the place was packed. The parking lot was huge, but it was all hilly. The location we had, put the track right in

the center of a hill with the high part of the track right in the center and then dropping off from there in every direction 4 to 6 feet. This made all the corners off camber turns or exactly opposite of banked turns!! To add another challenge, both sides of the straightaway were lined with boards, and together with the dropoff, all you could see was the wing on your car going down the straightaway! It was impossible to tell if your car was going straight! But this didn't seem to stop most guys from trying to punch the straightaway. Naturally there were many cars being re-built Friday. Friday night was Open House at Chuck August's home in Carmel, and we all had a great time trying to beat an electronic football game.

Saturday was the first round of

GOLDEN STATE CLASSIC RESULTS

Place	Name	Laps	Qualifying Time	Place	Name	Laps	Qualifying Time
EXPERT "A" MAIN				AMATEUR "B" MAIN			
1	Gary Kyes	100	3.34.91	1	Mike Hegland	50	4.26.04
2	Gene Husting	100	3.30.86	2	Mike Gavaldon	38	5.03
3	Jeff Rold	100	3.26.17	3	Jay Spere	35	4.17.52
4	Curtis Husting	100	3.37.90	4	Tom Hickethier	33	4.46
5	Earl Campbell	97	3.42.05	5	Vic Neufeld	32	4.25.24
6	Matt Azzara	85	3.40.42	6	Jim Gonzel	31	4.30.22
7	Jim Aguirre	78	3.36.80	7	Bill Watson	12	4.27.51
8	Bob Titterington	49	3.32.18	8	Dennis Thomas	11	4.37
9	Bill Steele	20	3.28.58	NOVICE "A" MAIN			
EXPERT "B" MAIN				1	George Anderson	75	4.01.09
1	Mike Rowland	50	3.51.15	2	Randy Wente	73	4.01.66
2	Jon Quaid	50	3.52.12	3	Richard Heisel	61	4.54.58
3	Jack Barton	40	3.53.66	4	Joe Whitten	52	4.07.43
4	Bill Hegland	33	3.69.95	5	Bob Neufeld	48	3.59.81
5	Butch Kroells	30	4.26.17	6	Jim Nelson	41	3.54.94
6	Al Chuck	21	4.08.89	7	Bruce Owen	31	4.03.63
AMATEUR "A" MAIN				8	Chuck August	29	3.55.31
1	Jim Cade	85	4.10.02	9	Mike Plant	19	3.58.45
2	Joe Alves	79	3.46.36	NOVICE "B" MAIN			
3	Paul Kawaguchi	79	3.43.67	1	Joe Tentschert	50	4.13.24
4	Dana Smeltzer	79	3.30.22	2	Ira Kimble	49	4.15.53
5	Mike Reedy	78	4.12.68	3	Steve Hulbert	48	4.11.96
6	Jeff Hollfelder	71	3.50.01	4	Joe Sortillon	43	4.10.73
7	Bruce Metras	56	3.52.16	5	Reba Staele	42	4.22.66
8	Bob Mathison	56	3.56.10	6	George Haye	41	4.28.29
9	Joe Zimmerman	54	3.46.78	7	John Pagle	40	4.23.75
				8	Terry Gillot	40	4.17.46
				9	Don Baiss	12	4.31.83



The First Annual Golden State Classic race was held at the Del Monte Shopping Center in Monterey, California, with beautiful green surroundings.



All of the turns were off camber turns (opposite of banked), making it one of the most difficult courses we've ever run on.

qualifying. A semi flat bed truck was brought in and used as a drivers stand raising the drivers high enough that we could now see the back straightaway of this 700 foot long track. The track also had more bite and it began to look like at least a few guys were beginning to find the way around the track. After the first round of qualifying on Saturday, Matt Azzara, alias Matio Azzaratti, was Top Qualifier and later that night we went to eat at Fisherman's Wharf, where Matt gave us a 2 hour crash course on "How to drive the track", or was that on "How to crash on the course?" or did we just razz him for 2 hours? Something like that --- but it was fun.

Sunday, the bite on the track was very good. It was a little foggy most of the day, but when Julie Smith, the beautiful trophy girl appeared about 11 a.m., it seemed the whole day suddenly got more beautiful, too. After our 5 minute practice heat, we were ready to begin the last qualifying round. The 45 Novices were up first, with 8 qualifying at a time. To give you an idea how tough this track was, we ran 10 lap qualifying heats and during the first 3 heats only 3 cars were running at the end. During the fourth heat, all 8 cars were off the track for repairs, and it was exciting to see who could get repaired and back on the track first. Jim Nelson ended up Top Qualifier



Two of the best race announcers and promoters for R/C cars in the country, George Hague and new ROAR President, Rick Perry.



Color TV set, B & W TV, radios, plus boxes of other merchandise, and trophies that were better than Nationals trophies, gave everyone something to shoot for.

in the Novice class with a time of 3.54.94 with Chuck August 2nd and Mike Plant 3rd.

Dana Smeltzer showed the Amateurs the fast way around the track, with a time of 3.30.22 with Paul Kawaguchi taking 2nd and Joe Alves 3rd.

The Experts were next, and it seems the one that we're always chasing for Top Qualifier honors over the last year is Jeff Rold, who was also Top Qualifier at the Nationals. Jeff was continuing his fast ways again by taking Top Qualifier spot with a fantastic run of 3.26.17. Bill Steele, who also has a couple TQ's added to his list lately, was second and I got a clean run to take 3rd spot. The 6 fastest cars then ran in a 4 lap Trophy Dash. I managed, somehow, to take the lead, but it only lasted for a lap and a half until Jeff passed me to take the lead and then the checkered flag. The way he was driving, he must have seen the trophy girl!!

There was an A & B Main for each of the Novice, Amateur and Expert classes to allow more drivers to run in a main. I like this idea, when it's possible. In the Novice "B" Main, Joe Tentschert drove a clean race to win the 50 lap event, with Ira Kimble right behind in 2nd and Steve Hulbert 3rd. Mike Hegland won the 50 lap Amateur "B" Main by 12 laps, as
to page 99



The big gun from MRP, Gary Kyes wins the color TV, and is also presented with a photo plaque by Miss Golden State Classic, lovely Julie Smith.



I wonder if having a beautiful trophy queen makes you drive harder? I don't know how else I could have finished second.



Jeff Rold was Top Qualifier, won the Trophy Dash and looked like he was going to win the Main Event, until brake problems held him back to a third place finish.

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catalog 50c



Scott sitting in normal position with heel on pedal. Launching can be a one man operation using a turn-around pulley.

GASOLINE POWER WINCH

By Robert W. Metz



Launcher with Hobie. Note drag chute at nose of glider.

This gasoline winch has enough power to launch the largest RC glider, yet has the gentleness to tow the small ones aloft also. It has all of these features because of the variable speeds of the gasoline engine. When you consider power, speed range, and availability of the small lawnmower engine (approximately three horsepower) it is a natural for use as the muscle for a launcher.

The construction of this winch is simple and straightforward, as illustrated in the accompanying pictures. Built basically of wood, it uses a slip belt as a clutch to engage the engine, with the reel to wind in the tow line. The tow line speed is adjustable by varying engine throttle and can be read in miles per hour on a bicycle speedometer. It is possible to go from 3 to 33 mph with this pulley arrangement. These changes in speed are necessary due to the existing wind at the launch site. Various gliders also have different flying and climb



Side view without speedometer or wheels.



Rear view before speedometer was installed.



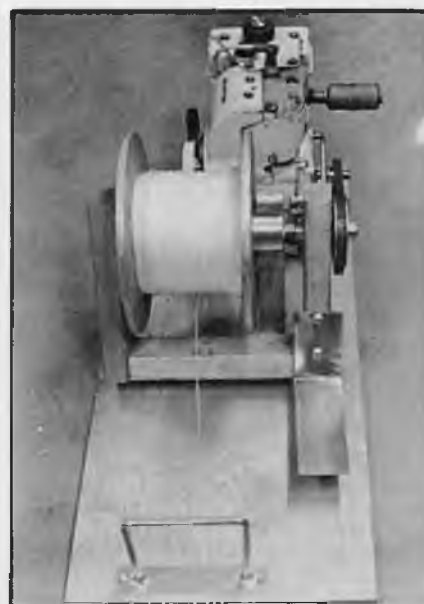
Pulling launcher by line guide on rear wheels. Hole in reel was drilled for balancing.

speeds. Since there is a throttle stop to reset any given speed, the need for a speedometer is not really necessary, but it's nice to have and isn't difficult to install.

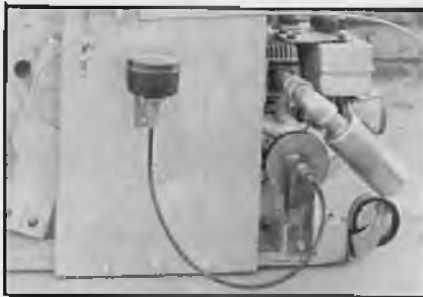
The reel used on this launcher is rather large, being 6" in diameter and laminated of solid pine. This size was chosen over a smaller one to keep the tow line speed fairly constant due to the build up of line on the reel. Solid wood is used to prevent collapse due to line pressure when it is fully wound.

The ball bearings shown in the exploded picture are out of an old motor. These, too, are not really necessary as it would work almost as well to drill the shaft holes in the wood and simply grease the wood well. Since the launcher does not run more than a few minutes at a time, this type of bearing would do okay.

The reel brake consists of an aluminum drum anchored to the reel with two long (3") wood screws. When foot pressure on the pedal is relaxed, a spring pulls the reel assembly and drum back against a cut-out in a piece of wood acting as a brake. This cut-out is lined with a piece of asbestos paper glued in place. Although one picture shows two springs, it was finally decided to use only one. This is half of a screen door spring. The brake drum has a collar screwed to it, which is pinned to the shaft. It is about the only item requiring brazing, but not difficult to do with a Bernzomatic Torch. The brake drum was turned on a metal



Front view without seat. Aluminum drum next to reel is the brake, which is pulled into an asbestos lined pocket by spring.



Bicycle speedometer adapted to read m.p.h. of string by running off engine shaft. Thus the speed can be set before starting launch.



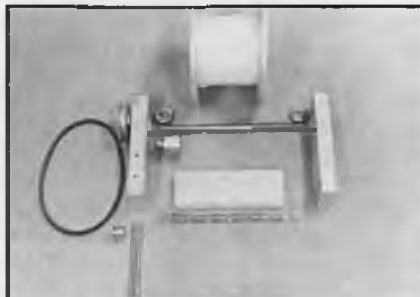
Close-up of bicycle speedometer.



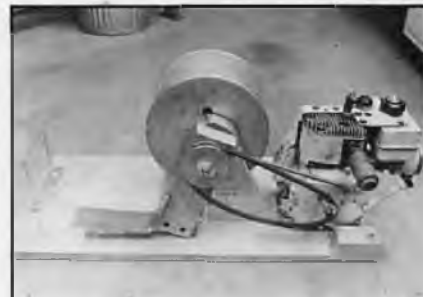
Close-up of throttle, showing adjustable stop.



Foot pedal for tightening the belt to drive the reel. Hold-down on pedal is used to hold reel off of the brake to unwind easily. It can be turned out of the way if not wanted.



Exploded view of basic parts. Reel is made of solid pine to prevent collapse due to pressure of line. Only one spring was finally used.



This view shows the whole idea - spring pulls pivoted reel back against the brake when foot is off the pedal.



Turn-around pulley showing line guide.



Exploded pulley showing spring which applies light drag on pulley wheel.



Pulley disassembled.

BILL OF MATERIALS

1 pc. 1" x 12" x 6" (seat)	\$3.25
1 pc. 2" x 8" x 36" (drum)	3.50
1 pc. 16" x 33" x 3/4" ply (base) ..	2.00
1 pc. 4" x 2" x 4"59
1 pulley 1 1/2"	1.29
1 pulley 4"	2.19
33" A Belt	2.79
Speedometer 20" Bicycle	8.79
Misc. Hdwe. screws, bolts, etc. ..	3.00
Bearings (2)	N/C

Saine Line 84 lb. test (2000')	8.00
Engine 3 H.P. (used)	27.00
Drag chute	2.50
Piano hinge85
3/4" x 18" shaft	N/C
3/8" x 20" Line guide	N/C
2 wheels	N/C
1/8" x 3" x 11" steel plate (foot pedal) ..	N/C

total \$65.75

lathe but this could be made of hardwood or some other material.

This bicycle speedometer is made for a 20" wheel. By calculating the ratios between bike, engine, and reel, it is determined that a 3 3/4" wheel running on the 5/8" engine shaft gives the proper reading. Thus, the tow speed can be set on the engine by use of speedometer and throttle stop before the tow is started.

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FLIGHT INSTRUCTOR PROGRAM

With membership exceeding 140 pilots, the San Fernando Valley Silent Flyers (SFVSF) is one of the largest clubs devoted exclusively to R/C soaring in the USA. The club is nationally known as an organization of top competition pilots, Sunday flyers, technical innovators, scale enthusiasts, and even includes four sailplane manufacturers. One reason for the success of our club is an organized flight instructor program which has been in operation for over four years. Five of the most experienced members (later increased to 12) were designated as instructor pilots and now spend part of each session at the club field helping beginners over the steep part of the learning curve. Hobby dealers in the greater Los Angeles area learned of the program and have been directing many newcomers to free instruction by qualified pilots and this has led to the tremendous growth of our club. The project has been so successful that other soaring as well as power clubs might want to consider implementing a similar program.

Selecting a flight instructor is not as simple as one might initially expect. Experience has shown that the best pilots do not necessarily make the best instructors. Rather a willingness and ability to teach has made some good pilots much better instructors than other truly accomplished pilots could ever be. Of course, instructors must be competent pilots who have flown a wide variety of airplanes, but a motivation towards teaching flying skills has proven to be the single most important factor. In addition, an ability to communicate often abstract ideas effectively in terms the novice can understand is vital. Finally, patience, technical know-how, availability, and the ability to remain calm in a tight situation all make for a more efficient instructor.

Following numerous bull sessions and much trial and error experimentation by the instructors, a sort of training syllabus has evolved. It includes a pre-flight checklist and basic and advanced phases of flight instruction. A newcomer to our field is first introduced to an available instructor, who asks the new student a few questions including previous experience in R/C and determines the level of understanding of flight principles. Certain operating procedures such as frequency control, winch operation, initial flying techniques and goals for the

day are explained while the new sailplane is thoroughly checked. Balance, alignment, tow hook installation, wing hold-down, radio installation, hinges and control throw and direction are all checked before the initial hand glide. (It is incredible how many people show up at the field with rudder and/or elevator hooked up backwards and admit that they've tried to fly that way!) Wing rigidity is checked by lifting one wing tip and resting all the weight of the sailplane on the other wing tip, then gently bouncing the plane a few times. Experience has shown how much flexibility should appear by this method and no wing so tested has ever broken on its initial winch launch. If the wing flexes abnormally or has a bending concentration, a small slice is made in the underside covering to expose the spars and shearwebs for examination. If no abnormalities are discovered, the wing is temporarily taped for the day, but usually a building fault will be found which must be corrected before attempting any winch launches. Breaking-up a new sailplane is hard on anyone, but especially on the neophyte who may decide to get out of the sport immediately after attempting to fly an improperly built sailplane. Since the inception of our flight instructor program, no student has yet objected to having a wing opened in this manner when a defect is suspected. With the pre-flight check completed, a short series of hand glides is made for initial trimming and the new sailplane and pilot are ready to begin flight training.

The basic phase of flight training seems to progress more rapidly if carried out by one instructor only, in contrast with the advanced stage where utilizing several different instructors makes for more effective learning. The instructor launches the sailplane and hands the transmitter to the student and together they work on straight and level flight, gentle turns, airspeed control, steep turns, stalls, spiral dives, and landing patterns with the instructor gently talking the student through the maneuvers and only re-taking control when necessary for safety or to emphasize a point by example. The instructor should make the first few landings, but soon the student will be able to land safely if the instructor helps set up a correct pattern, with downwind, base and final legs. In a short time the student is capable of launch (with the instructor throwing the sailplane and

operating the winch), basic flight, and most landings with the instructor standing by to help in a tight situation only. When the student can launch, fly, and land his sailplane solo he is ready for advanced training.

The advanced phase of training is designed to take the pilot from the competent Sunday flyer stage through the subtleties of R/C soaring competition, and is much more loosely organized than basic training. Flying skill increases rapidly as the student begins to understand the finer points of aerodynamics, micrometeorology, and flying hints and kinks as related by several of the instructors. Getting maximum performance from the sailplane and winch, advanced thermalling skills, ballasting, and competition strategy are all covered. Mock man on man competition between instructor and student in duration and spot landings helps to develop a sense for competition and allows the student to compare his performance against that of an experienced flyer in the same air, but without the pressure of a real contest.

Another facet of the advanced training program is taking the student through his initial competition experience. Many pilots become thoroughly competent at their home fields only to crash in the high pressure environment of a first contest at a strange field. The mere presence of an instructor standing nearby seems not only to help immensely, but in addition the seasoned competitor can aid the student in spotting thermals and avoiding sink, in making the many snap decisions required by contest flying, and in lending a quiet, relaxed voice when needed (especially in setting up landing patterns and timed spot landings). The advanced program has helped several pilots develop into top quality competition flyers, who now have the nasty habit of beating their former instructors at contests! There's gratitude for you.

A few hints and kinks have come out of the program that are worthy of note. Progressive stalls seem to be a particularly difficult problem for beginners in R/C soaring. The usual method of recovery with down elevator in the climb and up elevator in the dive component is for some reason nearly impossible for most new pilots. They easily get out of phase with the proper recovery commands and often end up making the situation worse (down

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This is what the flight instructor program is all about – helping beginners to enjoy the delights of R/C soaring with a minimum of frustrations.



Frequency control should be the first area taught to a new student.



Correct weight and balance is critical and must be checked by the instructor.



Controls must be checked for proper operation.



This picture illustrates the best way to test a glider wing prior to winch launch. No bending concentration should appear.



After awhile, most students will be able to fly the winch launch if the instructor operates the winch and gives the sailplane a good toss.



Ed Slobod instructing a new student at the SFVSF club field.



The author helping a new club member, trying to decide whether or not it is time to intervene. When to take over is the hardest part of instructing.



BEECH T-34C SPIN TEST

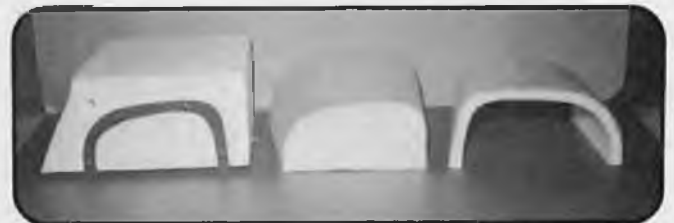
Photo Courtesy Of Beech Aircraft Corp.

Aeronautical Engineers have always wanted to dynamically test their designs without having to risk a human life or an expensive airframe. The current state of the art of hobby model technology in materials, power plants, and control systems have reached a point where a true dynamically scaled model can be built and flown. Thus, the R/C model appears to offer hope towards being an inexpensive test vehicle for aeronautical research. With this in mind, NASA contracted Beech Aircraft Corporation of Wichita, Kansas, to see if full scale spin flight characteristics could be duplicated with smaller flying scale R/C models.

The aircraft to be modeled and flight tested in this investigation was the Beech T-34C turboprop trainer. Beech Aircraft has a military YT-34C airplane which has been flight tested in over 1100 different spins. These spins provided the necessary full scale data base. This particular YT-34 aircraft was fully instrumented during the testing so that all significant aerodynamic variables were measured and recorded. Beech then wrote a set of specifications for this flying scale model similar to those used in a wind tunnel model, and subcontracted a local Wichita model building company (RAM Specialties) for actual construction of the flying model.

Beech furnished metal templates for the critical dimensions, conducted weight and stress analyses, and provided the instrumentation equipment and engineering. The scale specifications, however, were quite stringent. For example, the basic scale factor (1/6) had to be preserved in all wing, fuselage and tail contours to within 0.03", planform accuracy of $\pm 0.25\%$, and all horizontal surface incidences maintained to $\pm 0.25^\circ$. In addition, the finished model was to have provisions for ballast so that the center of gravity, inertias and weights could be properly scaled. Power was provided with a Webra 0.61 engine and a 14" propeller.

The model was constructed of basic modeling materials such as balsa, foam, spruce, and fiberglass. The wings were balsa over foam, with front and rear spars of spruce set in the foam prior to covering with balsa. The tail surfaces were also balsa over foam. The fuselage was somewhat unconventional due to the fact that dimensional stability would not permit the use of solid balsa blocks for complicated contours (such as the cowling and canopy). Fiberglass was ruled out because of difficulty in meeting contour accuracies. The fiberglass was

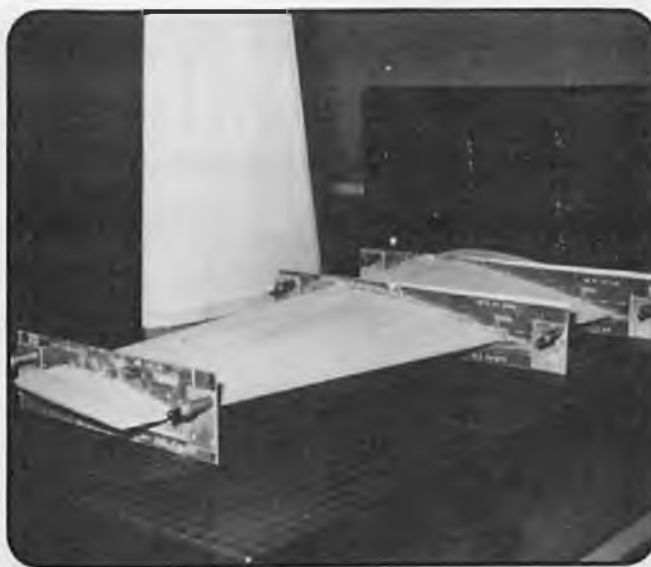
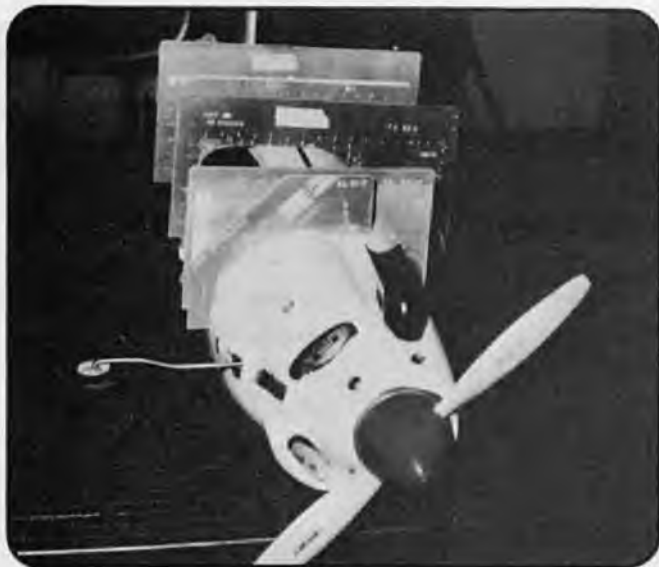


also too heavy to meet a stiffness requirement. The problem was solved by using plywood and balsa laminations for the canopy and cowling. 1/8" plywood bulkheads were made from lofts (very precise engineering drawings of aircraft contours) photographically reduced to 1/6 scale by Beech. These were sandwiched between balsa of various thicknesses (depending on the contour). Finally, the balsa was sanded to the contour of the plywood.

The rest of the fuselage was built by cutting a 1/8" plywood profile from a scale drawing. This profile was used as a center keel. The center keel was also used to carry the fuel tank instrumentation electronics and radio equipment. Sections of each side of the fuselage were made by cutting foam to slightly under desired contours using templates made from lofts, and then sheeting the fuselage with 1/8" balsa. The length of each section was determined by the shape of the fuselage where the section was to be used, and each half of the fuselage required eleven sections. Next, the foam was cut to about 3/4" thickness, and glued to the center keel. After the sections were glued on, the laminated canopy was attached.

As mentioned above, all exposed surfaces except the canopy and cowling were made slightly oversize to allow for sanding to contour. Actually, it turned out that the surfaces were sanded a small amount undersize to allow for final contouring and finish. Before final contouring, the wings had one servo for each aileron installed permanently. This was done to accurately control aileron deflection.

Now the model was given one coat of finishing resin, which was allowed to set. Then one layer of the 2 mil fiberglass cloth was applied, and all grossly low areas were filled using automobile body putty. Final contouring was accomplished using lacquer primer, but it wasn't unusual to have seven or eight coats of primer over some areas. The accuracy of the



surface was controlled with the metal templates made and supplied by Beech. These templates were made by reducing drawing lofts photographically on aluminum, and machining the contours to 0.005" in the metal. The templates were placed over the section being checked and the low spots filled or the high spots sanded down.

During this construction, Beech engineers conducted periodic inspections to insure the model was meeting their specifications. They also conducted a complete stress analysis of the model to make sure it would be strong enough for the flight testing.

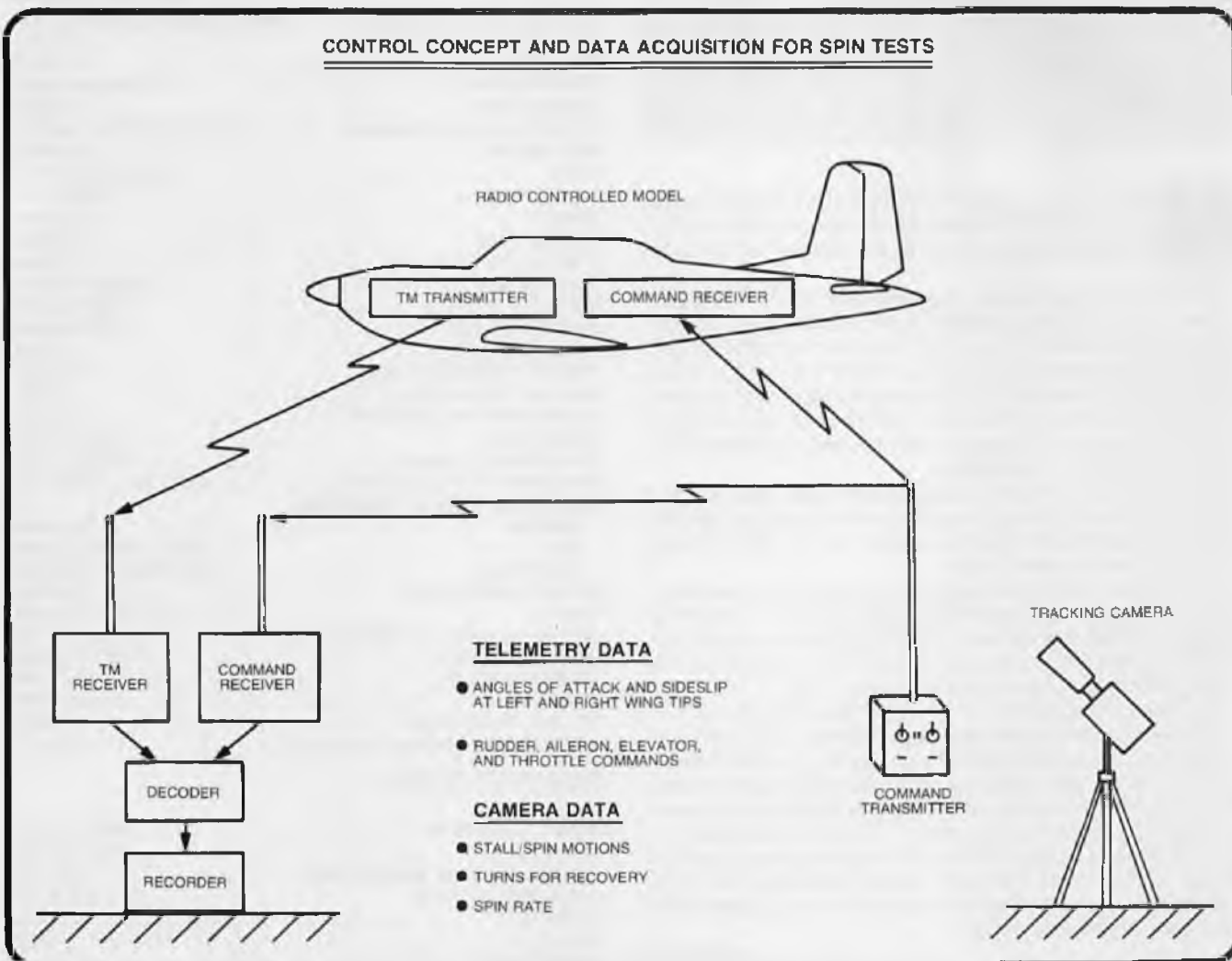
After final contouring, the model was finished with two coats of epoxy white paint. The canopy was painted black, and all control surfaces were painted red.

One additional requirement for the scale model was a spin parachute which could be first deployed, and then released upon ground command (if the model should enter an unrecoverable spin). The chute was 15" in diameter with 48" risers. The release mechanism was necessary, because the model simply will not fly with the chute deployed.

RAM Specialties completed the model with a standard set of

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CONTROL CONCEPT AND DATA ACQUISITION FOR SPIN TESTS



RCM PRODUCT TEST

**Bridi Enterprises
AT-6**



Now that you have bought, or if you are planning to buy, the Bridi AT-6 we will try to give you some useful hints for building and flying this excellent sport scale aircraft.

As to the kit layout and quality, we found all the fiberglass material of good quality. Included was a formed glass pan for wing center section, along with the normal hardware for building. The foam wing cores are excellent as are the balsa sheeting and hardware parts. I found the instruction booklet and plans very clear and explicit. I am 16 years old and have been building scale models for the last 2 years. I found all the information easy to understand.

The one most important suggestion I can give anyone building this kit is to check the stabilizer incidence as I did find mine considerably off. This can result in a very difficult flying aircraft, especially sport scale.

I found the building instructions in the booklet in sequence. It shows good starting and finishing procedures. I feel this aircraft would be a good beginning Stand-Off Scale aircraft for the RC modeler. As I mentioned before, the instructions are good and the kit does go together quite easily.

Three other things that I think would be of help to you:

(1) The fiberglass rudder and fin included in the kit are much too heavy and I suggest using a balsa built-up fin and rudder.

(2) If you are interested in a close Stand-Off Scale aircraft, the landing gear should be slightly longer and the tail moment or length could be shortened about 1". (This is not necessary.)

(3) There are much better ways of attaching the cowl than shown in the plans. There are various methods which, if I covered all, would take up too much space so suggest using your own innovations on this.

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IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging		●				Pre-Shaped Parts			●		
Plans		●				Parts Match to Plans			●		
Written Instructions		●				Overall Parts Fit			●		
Quality of Hardwood		●				Ease of Assembly			●		
Quality of Fiberglass				●		Fidelity to Scale				●	
Other Materials			●			Flight Performance		●			
Accessories			●			Overall Appeal		●			
Die-Cutting											

E—Excellent / G—Good / A—Average / F—Fair / P—Poor

SPECIFICATIONS

Name	AT-6
Aircraft Type	Stand-Off Scale
Manufactured By	Bridi Enterprises 1611 E. Sandison Street Wilmington, California 90744
Mfg. Suggested Retail Price	\$129.95
Available From	Mfg. & Retail Outlets
Mfg. Recommended Usage	Sport or Stand-Off & Competition
Wing Span	68 Inches
Wing Chord	13 Inches
Total Wing Area	680 Square Inches
Fuselage Length	47 Inches
Radio Compartment Dimensions	(L) 13" X (W) 6½" X (H) 6"
Wing Location	Low Wing
Airfoil	Semi-Symmetrical
Wing Planform	Swept L.E.
Dihedral	3 Inches
Stabilizer Span	22½ Inches
Stabilizer Chord (incl. elev.)	9 Inches
Total Stab Area	280 Square Inches
Stab Airfoil Section	Symmetrical
Stabilizer Location	Top Of Fuselage
Vertical Fin Height	7½ Inches
Vertical Fin Width (incl. rud.)	9½ Inches
Mfg. Rec. Engine Range	.60-.80
Recommended Fuel Tank Size	12 Ounce
Landing Gear	Conventional
Rec. Number of Channels	4-5 (Ret. opt.)
Recommended Control Functions	Rud., Elev., Throt., All.

Basic Materials Used In Construction:

Fuselage	Fiberglass
Wing	Foam & Balsa covered
Tail Surfaces	Foam, Balsa & Fiberglass
Hardware Included In Kit	See text
Plan Size	40" x 54" (1 sheet)
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (12 pages)
Construction Photos	No
Kit Includes	Shaped Parts
Mfg. Rec. Flying Weight	9 Pounds
Wing loading based on rec. flying wt.	21 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly	9 Lbs., 8 Ozs.
Wing Loading	22 Oz./Sq. Ft.
Covering & finishing materials used	See Text
Engine Make and Disp.	K & B .61
Muffler Used	Semco
Radio Used	Kraft
Tank Size Used	11 Ounce

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Sport or Trainer

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AREA: 377 sq.in.
RADIO: 2 channel



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TRYPSTAR-15

Best Beginners Trainer
or Sport Model

SPAN: 49 in. AREA: 403 sq.in.
ENGINE: .15 RADIO: 3 channel



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TRYPSTAR-40

ARF 40 Sport Trainer Model

SPAN: 56½ in. AREA: 527 sq.in.
ENGINE: .40 RADIO: 3 - 4 channel



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SPORTAVIA RF-5B

ARF Powered Glider
TESTOR .049 ENGINE INCLUDED

SPAN: 58.7 in.
AREA: 434 sq.in.
ENGINE: Testor .049
RADIO: 2 channel



RETAIL
\$75.00

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DISCOUNT PRICE **59⁹⁹**

CESSNA 150

ARF Semi Scale Sport Trainer

SPAN: 52 in. AREA: 426 sq.in.
ENGINE: .20 RADIO: 3 - 4 channel

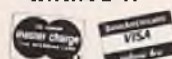


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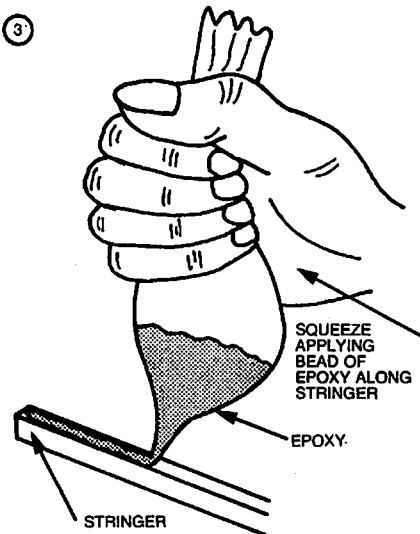
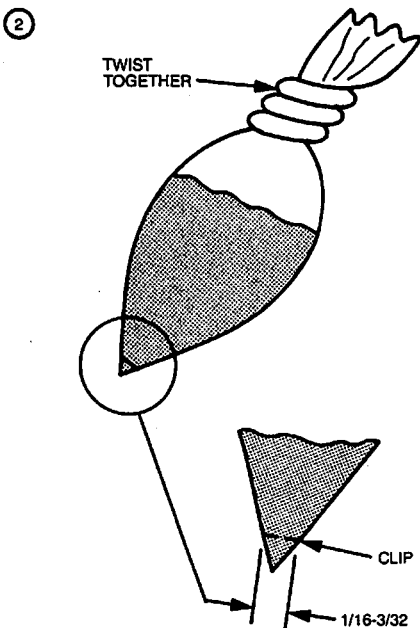
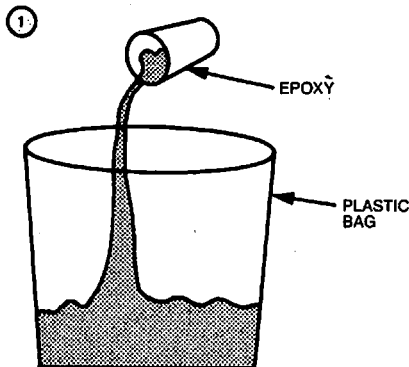
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FOR WHAT IT'S WORTH

Edwin S. Heiser of Livonia, Michigan, recently became interested in outboard boat racing. Having been involved in aircraft, he started to build a boat. The problem was putting epoxy glue on



stringers to attach planking. It was a time consuming job using a knife or spatula and, if brushed on, a waste of a brush. The solution shown in the sketches was arrived at one day while at the grocery store bakery watching a cake being decorated. Start with plastic sandwich bags and mix up the epoxy and pour into bag. Twist the top together and clip the corner of the bag to the size opening required (1/16"-3/32"). Squeeze the epoxy onto the stringers using moderate pressure. To stop, just relax the pressure and, finished, throw away the bag — no fuss, no mess.

Here are two little tricks that may come in handy, submitted by Eckart Salomon of Encinitas, California. (1) On one of his razor saws, he turned the blade around, and it cuts much easier now, especially small things like tubes. That's because the teeth don't bite into it anymore when you push since the blade is backwards now. Then when you pull, the teeth get to work, but only as much as you press down. Try it on soft balsa too! Eckart found out that he hardly uses the regular saw anymore.

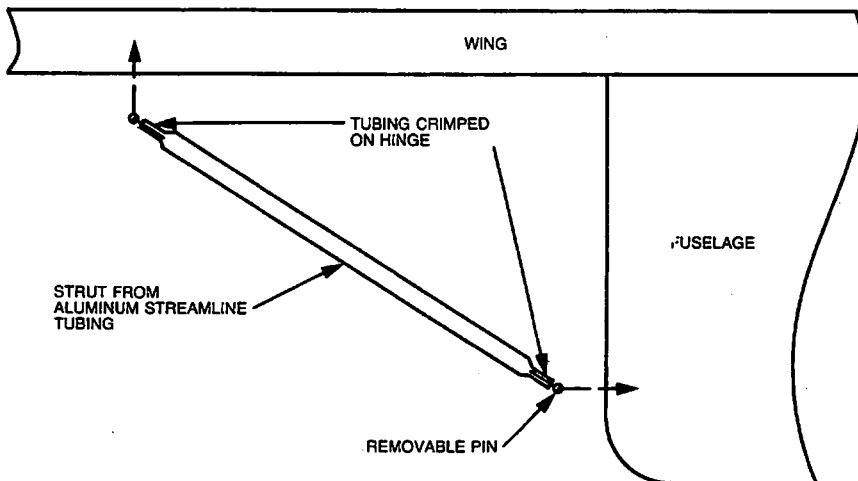
(2) Now that we are storing our Hot Stuff, Zap, etc., in the freezer department, the bottles are covered with ice, especially after setting in there for awhile. Since Eckart started putting them in a small freezer jar (any jar with a sealable lid will do) they stay dry, and he can use them without having to wait.

Bob Martin of Kirkland, Washington, has found another use for the Prather Drill Jig. Bob uses it to align the aluminum motor mounts furnished in the Midwest "Sweet Stik" kit. Just place the two mounts in the jig and adjusted them

until they are even and parallel on the firewall. Clamp and drill. He always uses thrust line and center line marks on the firewall so you can just about "eyeball" it into position, but measure with a steel rule if you wish. Try it — it's fast and neat and you'll receive compliments from fellow flyers who never can get a set of aluminum mounts to align for their .40 or .60.

Don Drury of Ann Arbor, Michigan, has been using a marking pen to letter, outline control surfaces and trim lines on his sailplanes along with the Stand-Off Scale models he builds. This particular pen Don found, is called "Pilot" ultra fine point and is permanent. They are available in red, blue, green, and black. The ink is not fuel-proof, however, a thin spray coat of clear Perfect Paint solved that problem.

S.L. Gruebbel of Birmingham, Alabama, has a Skylane 62 which has developed a nasty habit of having the friction fit wing struts come loose in flight. This made for some exciting "strut down" landings. To remedy this situation, a replacement strut was made per the accompanying sketch and instructions. (1) Cut a piece of appropriate size streamline tubing (aluminum) to the required strut length. (2) Crimp the tubing ends to fit snugly over a nylon pin-type hinge and epoxy a hinge in each end. (3) Remove the crimped end of the hinge pin on the hinge at the fuselage end of the strut. (4) With the wing mounted, epoxy the hinges into the wing and fuselage strut mounting slots. The resultant strut assembly is easy to detach from the fuselage for wing removal by simply removing the hinge pin and separating



CROSS SECTION AT STRUT

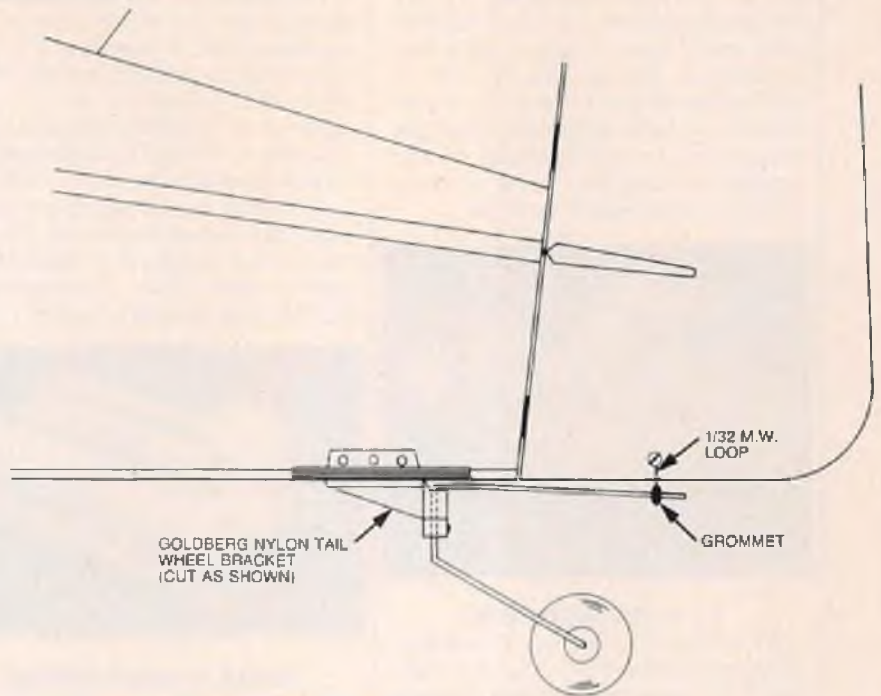
FOR WHAT IT'S WORTH

the hinge halves. A slight bow in the hinge pin insures a secure fit in the hinge.

For conventional gear addicts who want lots of rudder throw but don't like the associated touchy ground steering, reduced tail wheel throw may be obtained as shown in the accompanying sketch. This idea was sent in by Ronald P. Fortune of Lakewood, Colorado. Ron has used this installation on his Aeromaster with extremely good results. A Goldberg nylon tail wheel bracket was cut down as shown to provide clearance, but the 1/8" plywood mounting plate may be mounted externally to give the same results. The position of the bracket, as well as that of the actuating wire, may be shifted to give the desired steering sensitivity for smooth take-offs while maintaining the huge rudder throw needed for knife edge, four-pointed rolls, etc. As a side benefit, the rudder servo is well protected from shocks to the tail wheel.

Frank Wöhlrab of Paramus, New Jersey, is a R/C model boater who often returns home from a days running at the pond with a few drops or more of water in the radio box. This is not a good condition for the delicate electronics enclosed within. A radio box may be waterproof when first installed in the boat, but engine vibration, collision, and wear takes its toll. Hairline cracks may open which are difficult to see. How are we going to find them? Taking a hint from the local garage where auto tires are repaired, Frank proceeded with the following solution: Remove one of the screws holding the lid on the radio box and replace it with an engine pressure fitting. The pressure fitting must enter inside the radio box. A rubber bulb type gas fueler is applied to the pressure fitting with rubber tubing. Now mix a few ounces of soapy water and apply this with a small paint brush to the radio box, and squeeze the bulb at the same time. Where the bubbles appear, you have found the leak.

George Turco of Carmel, New York found that while trying to come up with hard fuel line that would not cause splitting of silicone fuel lines, would be easy to bend to a small radius without kinking, fit clunk type tanks, be fuel proof and durable, he discovered the following solution: George cleaned out the ink tube found in "BIC" pens. It will bend easily using low heat, is lighter and more desirable than brass, and an excellent brass fuel line substitute.



Here are two building hints sent in by Robert J. Levy of Springfield, Ohio:

(1) Some models require pushrods made up of a balsa or dowel center section and threaded metal end sections which are epoxied into holes drilled into the ends of the wood section and running down the center line. This presents the builder with a task that presents two difficulties: (1) drilling the hole precisely down the center line of the dowel and (2) avoiding splitting of the wood. Although the task can be done freehand, here's a better way. First, obtain a set of nesting aluminum or brass tubes from your hobby store. The largest of these tubes should have an inside diameter equal to the outside diameter of the dowel pushrod material. This tube is then slipped over the dowel with a portion extending out beyond the end of the dowel. The smaller tubes are then fitted one-by-one inside the larger tubes until the inside diameter of the innermost tube equals the diameter of the drill to be used (usually 1/16"). The nesting set of tubes now determines the exact center line of the dowel and the outer tube prevents splitting the dowel as you carefully drill. A further feature is that, if the overlap of the nesting tubes is carefully measured, it can serve as a depth gauge for drilling the hole by stopping the forward motion of the drill. Even though the method was developed for drilling dowels, it can be used with 1/4" square balsa pushrods since these fit snugly into 3/8" I.D. tubing. One variation on this method is to drill a pilot hole in the dowel end and then tap the dowel for the 2-56 threaded stud which

is then threaded and epoxied into the tapped hole for a more secure joint.

(#2) Judging from the number of hints on plugging the holes in the exhaust stack of a K & B .40 when using a muffler on this engine, these holes continue to present a problem. Here is a painless method for solving this problem. Some plastic pushrods are packed with a thick rubber tube to be used as a "rubber nut" to hold the pushrods in place. Since most builders epoxy the outer tube to the sides and the bulkheads of our ships, the bottom of the scrap box often holds three or four of these rubber tubes. By splitting these tubes lengthwise and cutting them to a length of about 1/2", you have manufactured excellent plugs for the K & B .40. Simply slip the plug against the hole in the stack with the rounded side toward the hole. Then, clamp the rubber plugs with the muffler strap. These plugs last a good while and it is certainly easy enough to carry a spare rubber tube for instant field repairs in case one is lost. For those who do not have a supply of these rubber tubes, button-shaped globs of silicone bathtub caulk work just as well. Since most tubes of this type of silicone rubber are packed on a card with such a button-shaped glob as a sample, the modeler has at most one such item to manufacture for himself.

Send your hints & kinks to R/C Modeler, P.O. Box 487, Sierra Madre, Ca. 91024 & win a free 1 year subscription to RCM.

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.



1.2 CUBIC INCH TWIN

Fox Manufacturing Company announces production on a 1.2 cubic inch Twin. Unlike earlier Twins, the new Fox is big, sturdy, and powerful. Features are a one piece crank, steel connecting rods, 3 ball bearings, dual carburetion, Schneurle porting, removable propeller stud and button type head. Supplied with a firewall type motor mount. Every motor test run and carburetor adjusted. Can be supplied with rear exhaust. Weight is 2½ lbs. power about 3 horsepower. The smoothness of operation exceeds by far that of any similar power single. Priced at \$250.00 from Fox Manufacturing Company, 5305 Towson Ave., Fort Smith, Ark. 72901.



SKYHAWK II

The Skyhawk II is produced from a Bob Violett Models Semi Kit. What is new about this product is the addition of the Avionics Dorsal Pack (humpback) and the long range fuel tank, expanding the variation of the A-4. Unlike the primary years of development that required exotic engines and fuels the jet now operates throughout an impressive envelope of performances using off the shelf stock items. K & B 7.5 Fan Engine, K & B 500 or 1000 fuel, Bob Violett Models kit, Skyhawk Fan (mod. Scozzi) Bob Violett, B & D Pneumatic retracts

and I.M. Products pilot. The availability of these products and flight performance ranging from slow stable landings to fully aerobatic flight at speeds of 120+ mph now brings fan jet flight into the range of most R/C modelers of 2-3 years experience. Recently demonstrated in Las Vegas, at 2500 ft. above sea levels at field temperatures of over 100°F, this combination proved insensitive to these most demanding conditions. For more information contact: Bob Violett Models, 26516 Aiken Drive, Clarksburg, Md 20734, or at selected dealers.



SCALE ALLISON ENGINE

This kit contains pre-cut material to build your Scale Dummy Allison, Series E, or Budweiser engine for your Scale Hydro. As you know, the major difference between these two engines is the valve covers. Enclosed in this kit is material the proper size for the Allison covers, if you require the Budweiser, simply add flat stock to make the desired thickness you need. An engine may require turbo charges, if so install the intakes in the upright position and use larger top dowels on both sides. Ignition wires, template for valve covers and picture of assembled engine are also included. Kit sells for \$15.00 and can be ordered from The Pipeline, P.O. Box 1868, Fremont, Calif. 94538. Send \$1.00 for The Pipeline's R/C boat catalog.



NEW CONCEPT IN SERVOS

Novak Electronics proudly presents, for the first time in RC history, a new concept in servos offered by no other manufacturer. These new servos use the highly advanced Signetics 544 IC, offering internally regulated power supply, dynamic braking, linear ramp timing (only IC available with this feature) and an exclusive temperature

compensated dead band circuit. Servo reliability is further enhanced by the use of the Clarostat conductive plastic potentiometer (which eliminates the necessity of frequent pot cleaning), external silicon PNP drive transistors, and output gears that are 0.150" thick (which makes them practically indestructible.) The light weight and high power is accomplished by the use of a new motor by "Toyko-Micro". This motor uses ferrite magnets instead of the larger and heavier aluminum cobalt alloy magnets. It also features a 5 pole armature, silver commutator, and gold alloy brushes to practically eliminate starting dead spots. Each servo is factory assembled and tested with the proper original manufacturer's plug harness and each is set up to manufacturer's specifications. Therefore, the customer does not have to do any tricky re-harnessing. Specifications for Bantam Midget: Compatibility, all modern, 3 wire, positive pulse systems; Torque, 21 oz. in.; Transit time, 0.3 seconds/100 degrees; Size (inches), 1.125 H x 0.7 W x 1.43 L; Weight, 0.846 oz.; Outputs, Rotary wheel, arm, adjustable arm. All outputs have both 0.050" and 1/16" dia. holes to accommodate both small and large clevises. Price \$29.95. Available in eight colors at your hobby dealer or direct from Novak Electronics. For more information write: Novak Electronics, 1915-A South Evergreen, Santa Ana, Calif. 92707 (714) 549-3741.

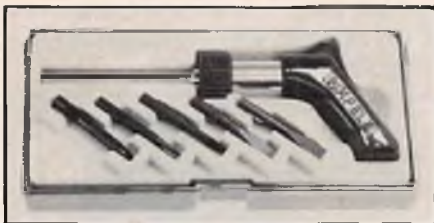


HELI-BOY KIT

The 'Heli-Boy' is the latest in the line of RC helicopters from the factory of Dieter Schluter. Dieter is well known all over the world as "The Father of RC Helicopters" because of his pioneering work in producing and flying the world's first practical RC helicopter. For the last ten years he has produced a line of very successful machines ranging from the now famous Bell Huey Cobra featured in the September 1972 issue of RCM, to the ubiquitous Heli-Baby in 1976. The all new Heli-Boy is a big step forward in RC helicopters because it is designed to be much easier for the beginner to master, while at the same time it is very capable of performing the entire aerobatic program. The Heli-Boy features: Dual head design (beginner and expert) included in kit, no belt starting, shaft

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drive tail, automatic tail compensation, and collective pitch is standard equipment. The Heli-Boy kit is absolutely complete including tools, greases, and all plastic and metal parts are completely finished. Main blades are sanded, drilled, and ready to cover. Tail blades are fiber-filled plastic and ready to fit. All fittings, rods, clevises, tank, tubing, etc., are included. The kit can be assembled in a few evenings, since it is designed to be built on a simple stage by stage basis. The only extra items to buy before flying are a 4 channel radio, a .60 cu. in. engine, and a muffler. The Heli-Boy is distributed in the U.S.A. by Gorham Associates, Model Products Division, P.O. Box 1347, Thousand Oaks, Calif. 91360; Miniature Aircraft Supply, Inc., 2563 Diversified Way, Orlando, Florida 32804; S.C. Modelers, Inc., 1999 Larkin Avenue, Elgin, IL 60120; and in Canada by London R/C Hobby Centre, 972 Hamilton Road, London, Ontario N5W 1V6. Over 200 hobby stores now stock the kit and all spare parts.



RAPID ACTION SCREWDRIVER SETS

Are you still using conventional screwdrivers? These sets give you a new versatility. Pistol grip handle makes it easy to loosen and tighten screws. Simply engage ratchet mechanism and turn the handle firmly. "Wise" Super Set consists of 2 standard screwdriver blades: 2 Phillips head blades, sizes 1 and 2; 6 sockets (3/16", 1/4", 5/16", 3/8", 7/16", 1/2" sizes); socket adapter; pistol handle; storage case. The price is \$14.95/set plus \$1.50 for postage and handling. The Super Set is also available with metric sockets 5 to 10 mm at an upcharge of \$1.50 per set. The "Wise" Magnetic Set consists of 3 standard screwdriver blades; 2 Phillips heads, sizes 1 and 2; pistol handle; storage case. Blades are magnetized to hold screws in place. The magnet is not

in the bit but in the shaft connected permanently to the grip with its mechanism, thus only at the time a bit is inserted is the magnetism transmitted to the tip of the bit. The price is \$12.95/set plus \$1.50/set for postage and handling. Checks or money orders together with specification of which model is requested should be sent to Eurotrend, Inc., 1750 S. Anaheim Blvd., Unit J, Anaheim, Calif. 92805. Telephone (714) 991-8710. Mastercharge and BankAmericard (VISA) are accepted if purchaser includes signature, expiration date and card number.

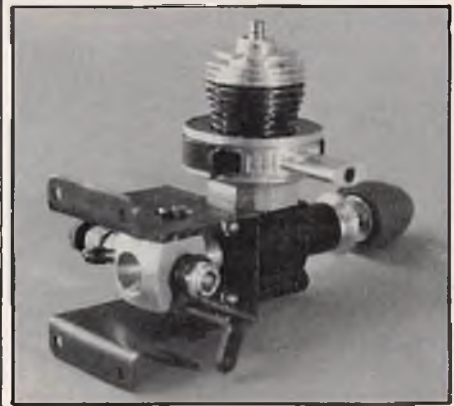


C & D GLOW DRIVER

C & D Enterprises, 10042 Merrimac Dr., Huntington Beach, Calif. 92646 releases the new C & D Glo Driver --- a new dimension in Glow Plug energizing. The self contained unit automatically provides pulsed power according to the needs of your glow plug for fast and reliable starting under all conditions. This unique capability is accomplished by an efficient, solid state electronic sensing circuit and self contained 4.8 volt battery. In addition, the C & D Glo Driver features no adjustment for different plug voltages or heating elements. Large meter allows easy visual detection of open, shorted or flooded glow plugs. Charging or ESV monitoring is compatible with your present 4.8 volt airborne system. The C & D Glo Driver is available at your local hobby shop for \$59.95 (including batteries) or direct from C & D Enterprises.

TARNO CARB FOR REED ENGINES

Tarno developed this carburetor for modelers who wished to convert their Cox .049 reed valve engines to throttle — (Babe Bee, Golden Bee, ORC, Black Widow). Throttle override is as on the T/D Carb. Idling at 3,500 rpm with 6/3 prop. In addition to clockwise running for pusher type aircraft, if desired. Must be used with 1/2 AR Reed Housing and



Motor Mount listed below. Price is \$12.95. Tarno also offers a Reed Housing and Mount. These components are needed to install the 1/2 AR Tarno-Carb on any of the Cox .049 engines. Price is \$3.95. Available from Tarno Aero Engines 1285 Hodge St., 205, St. Laurent Que. Canada H4N 2B6. Telephone (514) 747-0384.



MODELER'S SAFETY KIT

You spend several hundred dollars for a radio, planes, engines, and etc., why not invest \$6.95 on your health? You need total protection for your nose, throat, lungs, ears, and eyes! This kit includes industrial quality: dust mask, ear plugs, and eye cover mask (can be worn over glasses). Manufactured by the Fibre-Metal Co., for Michigan Hobby Hangar 460 W. Broomfield Rd., Mt. Pleasant, Michigan 48858.



"MAZDA RX-7"

BoLink does it again! First came the M.G., then the Corvette, then the 280-Z. Now BoLink has made a model of the sports car of the future — "Mazda RX-7". Available clear and painted. Made from Tuffak. Send \$1.00 for catalog to BoLink Ind., P.O. Box 80653, Atlanta, Georgia 30366.



STERN DRIVE HARDWARE SET FOR THE MIGHTY DOLPHIN KIT

This stern drive hardware set along with a 5" motor mount will complete your Mighty Dolphin kit. Hardware set includes stainless steel drive brackets, stainless steel strut with Teflon bushings, stuffing box with Teflon tubing, rudder bracket, rudder, water pick-up assembly, 3/16" flex-cable assembly with drive dog, thrust washer, and propeller jam nut. Propeller not included. Manufactured by Steve Muck's R/C Boats, 6003 Daven Oaks Dr., Dallas, Texas 75248.



UNI-CHARGER

With this kit you can build an economical C/10 nicad charger to match most requirements for a flight pack or transmitter battery pack. Contains the proper dropping resistor so one of the following charge rates can be programmed. 10 ma @ 2.4V; 20 ma @ 2.4V; 33 ma @ 2.4V; 50 ma @ 2.4V; 10 ma @ 4.8V; 20 ma @ 4.8V; 33 ma @ 4.8V; 50 ma @ 4.8V; 50 ma @ 9.6V. Kit is complete with wall-type transformer, PC board, LED charge indicator, and dropping resistors. No connectors are furnished. Assembly required. Available for \$4.98 from Ace R/C, Box 511, 116 W. 19th St., Higginsville, Mo. 64037.

BEST IN SCALE CATALOG

Bob Holman Plans are the major distributor for the M.A.P. line of British scale plans. They try to keep all the scale 3-views as well as all FF Rubber, and R/C Scale plans in stock. They also can supply on special order any plan of any type aircraft or boat from their catalogs. A reprint of their 3-view and scale plan



list is included in the Best in Scale Catalog. Catalog price is \$2.00 via first class mail. Copies of the M.A.P. plan books are available at \$1.25 each. Available from Bob Holman Plans, P.O. Box 741, San Bernardino, Calif. 92402.



HOBBY LOBBY/EVRA 190 ENGINE

Hobby Lobby International, Rt. 3, Franklin Pike Circle, Brentwood, Tenn. 37027, now offers the Hobby Lobby/Evra 190 engine as the first and only large ignition engine ever made and offered for large model airplanes. Some specifications are as follows: Displacement: 31cc 1.9 cu. in.; compression ratio: 7 to 1; engine weight: 3 lbs., 11 oz. (prototype); engine timing: electronic, spark advances and retards with engine speed. No breaker points; fuel mixture: 20 to 1 ratio, regular gasoline and 30 wt. automotive or chain saw oil (2 cycle oil); ball bearings: 2 roller bearings on crankshaft, 2 needle bearings (sealed) on connecting rod;

cylinder: chromed; piston: aluminum; rings: 2, iron. The engine is totally made in the U.S.A. Carburetor is made in Japan. A full line of spare parts will be available. Introductory price \$97.50, regular list price \$139.95.



JEWEL-STRIPE LETTERS & NUMBERS

Applied Design Corp., 738 Penn St., El Segundo, Calif. 90245, has just announced new additions to its Jewel-Stripe line of diffraction grating tape. Now available in 1", 2", and 3" letters and numbers in six scintillating colors; silver, gold, blue, orange, green, and red. The Jewel-Stripe selection is enhanced by smart packaging and display devices. The reflective material is Mylar, and the pressure sensitive adhesive is a permanent acrylic that assures long lasting as well as pleasing results in any indoor or outdoor location. Introductory prices per character are: for the 1", 10¢; 2", 25¢; 3", 39¢. Also available are 1" "Jewel-Lettes" in packs of 84 assorted characters, priced at \$3.99 per pack.



NEW K & B 7.5cc INBOARD MARINE ENGINE

The larger K & B 7.5cc has more power, plus all the qualities of the record holder K & B 6.5cc. It features rear exhaust butterfly throttle; water-cooled head; ABC combo — chromed brass sleeve and expansion aluminum piston; con-rod (machined from 7075-T6 aluminum solid bar stock) bushed both ends; rear rotor — with new machined steel rotor disc; ball bearings; rotatable case — change exhaust from forward to aft position; beefed-up crankshaft — tungsten alloy counter weights for super-smooth operation; K & B's

quintuple porting. The K & B 7.5cc is easy to mount. Hulls already equipped with a K & B 6.5cc need only make the change to the K & B 7.5cc as both engines use the same mounting set-up. Manufactured by K & B Mfg. Co., 12152 Woodruff Ave., Downey, Calif. 90241.



BALSA AND STYROFOAM FILLER

From R & S Hobby Products, Inc., P.O. Box 1161, Oak Lawn, Ill 60453, is a one coat filler — used straight from the can. From the company that gave you "Perfect" paint. This filler can be tinted with "Perfect" paint, making it easier to see brush marks. Balsa and Styrofoam Filler comes in 4 oz., 8 oz., 16 oz. containers and can be thinned with "Perfect" thinner. It works well on styrofoam and on balsa wood.



OUTBOARD MONO HULL

Hyde Engineering Co., Rt. 3, Box 236, Crystal River, Fla. 32629, proudly announces production of their new Outboard Mono Hull, the "Bobcat", designed by Bob Hyde, the senior member of the company. The "Bobcat" won both First and Third at the NAMBA Nationals at Naples, Florida, July 10th. The "Bobcat" is a double dihedral mono hull designed to run with the nose low to virtually eliminate flipping. The "Bobcat" turns beautifully in either direction, making it a perfect hull for both "M" course racing and conventional oval courses. The designer, in his second race ever (at Naples) produced a 2:28 heat time (within 4 seconds of the National record), showing that the "Bobcat" handles easily and is very fast!

One man operation is a cinch with "bowling ball" holes in the cowling for easy one hand launching. The prototype also won the first race it ran in at Bartow in late June driven by Jim Hyde. This is a very fast hull for the experienced racer, but easy enough to handle for a beginner. The "Bobcat" has sealed in floatation, a built-in radio box with cover, and an aluminum motor mount already drilled and tapped. Complete instructions are included for setting up and running. Specifications: Hull length, 26½"; width, 14¼"; hull weight, 3 lbs.; ready to run, 5 lbs. All Hyde hulls are made from .16" ABS white plastic sheet, vacuum formed on precision high production tooling. They can be painted, trimmed out with trim tape, or run as is. Price is \$69.95. The "Bobcat" is a finished hull, not a kit!



"HOW TO" FINISHING BOOK

Pactra Ind., Inc., has a brand new book loaded with illustrated step-by-step instructions for covering and finishing model planes, boats and cars, with particular emphasis on flying and R/C models. The new book entitled "Pactra Finishing Systems" was produced and collaborated by Pactra and Jerry Schwartz, an active R/C modeler and member of the Valencia Valley Headwinds Model Aeronautic Club. Primarily produced to aid modelers in the use of Pactra's increasing lines of specialized finishing systems. A must for any serious model builder who wants expert advice on the use of Pactra products such as Aero-Gloss, Formula/U, Aero-Poxy and Solarfilm, along with the techniques and materials needed to successfully complete a model. "How to" instructions cover: Introduction and characteristics of each Pactra finishing product; finishing methods, paint equipment and application techniques; basic surface preparation; complete step-by-step

instructions for preparation; sequential application of each type of paint system; and highly detailed steps from pre-start to finish, with plenty of helpful photos and illustrations. A big plus are all the helpful tips that will add to the enjoyment of model finishing, by eliminating common mistakes in procedure, and helping the modeler to achieve a "Professional Touch" to his pride and joy. Now available for \$1.00 by writing: Pactra Finishing Systems, Pactra Industries, Inc., 7060 Hollywood Blvd., Hollywood, Calif. 90028.



PORTABLE IGNITION SYSTEM

L & L Electronics, P.O. Box 13434, Albuquerque, New Mexico 87112, has announced the release of their Portable Ignition System #978. This is a small, self-contained, self-sufficient unit for starting all glow plug engines. The unit features automatic temperature regulation to insure optimum starting even under the most adverse conditions. Although it is not a nicad based unit, it can be recharged from most 4.8 and 9.6 volt nicad chargers currently available. The unit has been field tested under heavy use without recharging for three days and performed exceptionally well. During light use, it has been operated for periods up to a month without recharging. Normal life expectancy is 500 complete discharge/charge cycles. L & L Electronics will be announcing a charger for the unit in the near future. Available from retail outlets or direct from L & L Electronics. Price is \$19.95.

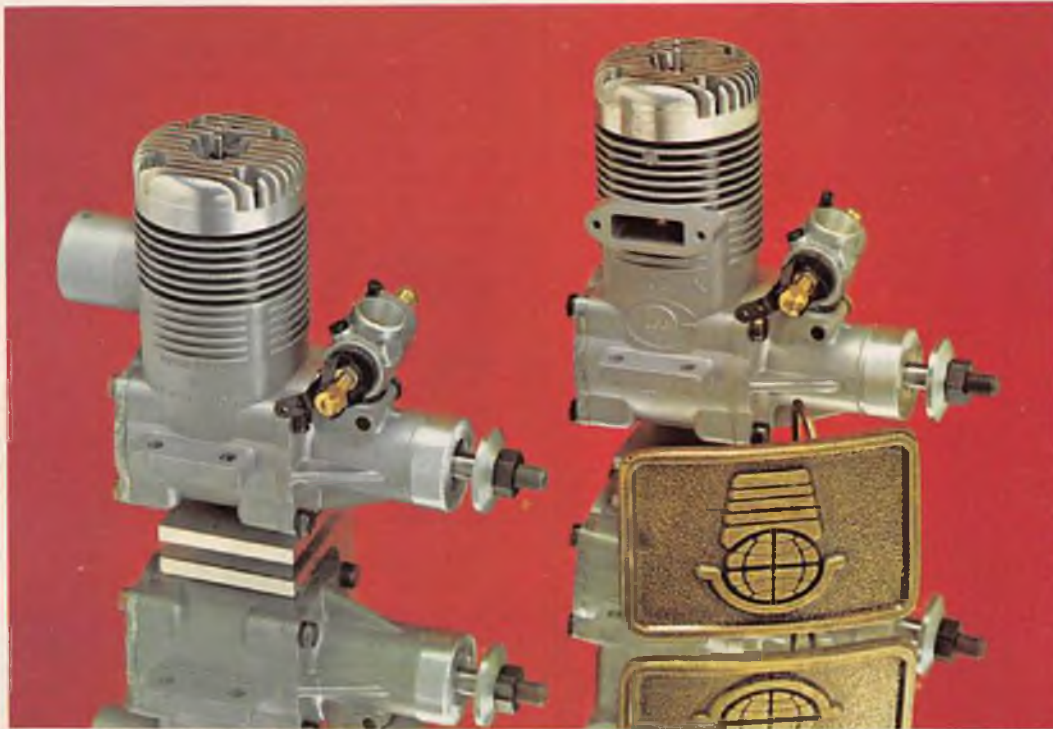


SKYLARK 56 MARK II

Carl Goldberg Models, Inc. 4732 West Chicago Ave., Chicago, Ill 60651, presents their newly updated Skylark Mark II --- a sharp, sport airplane with many new features, strong construction, and great flight performance! If you want a fun to fly ship with pattern capability,

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THE X-60's



SuperTigre's Durable Duo

REAR Supertigre engines are appealing to racing people because they are well machined and, above all, durable. The rear exhaust configuration seems to be the coming preference in high performance engine design. Front induction makes for more convenient trouble free mounting and installation.

ABC with ring and twin ball bearing (11199)..... \$125.00
Pipe and adapter (15145) 34.45

SIDE To be accommodating, Mr. Garofali also offers a side exhaust. The side version fits many model airplanes better than the rear. The pipe for the side exhaust also fits the G-60 Blue Head engines. Both side and rear version use cast aluminum pistons for dimensional stability. Excellent output and durability.

ABC with ring and twin ball bearing (15135)..... \$125.00
Pipe and adapter (15222) 34.45

World Engines

8960 ROSSASH AVE., CINCINNATI, OHIO 45236 - (513) 793-5900

HAPPENINGS

OS ENGINES IN STOCK

11158	21 FSR Marine W/O Muffler	64.95
11167	45 RSR Marine RC ABC W/O M	120.95
11175	60 RSR Marine RC W/O M	SALE
11177	65 RSR Marine RC W/O M	142.95
11180	OS Wankel	119.95

OS COMING

(about December 15, 1978)

11162	S-35 RC W/M	53.95
11168	40 FSR RC W/M	89.95
11170	45 FSR RC W/M	104.95

(about January 10, 1979)

11148	15 RC W/M	39.95
11154	S-30 W/M	45.95
11152	S-30 RC W/M	50.95
11172	60 FSR RC W/M	129.95
11181	60 Four Cycle RC W/O M	225.00
15135	90 FSR	225.00

SUPERTIGRE IN STOCK

11203	G20/23 RC Ball Bearing W/M	53.95
11196	X-29 RV Schnuerle ABC	79.95
11198	X-45 FI RC RE	83.00

SUPERTIGRE COMING

(about December 19, 1978)

15125	G21/40 RC W/M	66.95
11205	G21/46 RC W/M	69.95
11197	X-40 RV Speed ABC Schnuerle	81.95
11199	X-60 FI RC ABC RE Schnuerle	125.00
15131	X-60 FI RC ABC SE Schnuerle	125.00

X-11 COMING SOON

15185	RC PB W/M	35.95
16340	RC BB W/M	42.95

NEW... WORLD ENGINES' BELT BUCKLE

15753	W.E. Buckle	6.95
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WORLD'S EXPERT R/C

7 Ch. S. S. (5 servos)	484.95
7 Ch. D.S. (5 servos)	454.95
7 Ch. S.S. (4 servos)	459.95
7 Ch. D.S. (4 servos)	439.95
5 Ch. S.S. (4 servos)	419.95
5 Ch. D.S. (4 servos)	399.95
4 Ch. D.S. (3 servos)	239.95
3 Ch. (Nicaid) 3 servos	239.95
2 Ch. (Nicaid) 2 servos	179.95

PATTERN SERVO

S-12 servo; Waters pot; ball bearing output; four transistor external power bridge - this gets the power transistors out of the amplifier and greatly adds to its stability. \$75.00

WORLD'S HOBBY DEALERS



ARKANSAS

Sherill's House of Hobbies
3804 West 13th St.
Little Rock, AR. 72204

CALIFORNIA

Covina Hobby Center
140 N. Citrus Ave.
Covina, CA. 91722

Evert's Model Shop
1836 Ocean Park Blvd.
Santa Monica, CA. 90405

Franciscan Hobbies
1835 Ocean Ave.
San Francisco, CA. 94117

The Hby. Co. of San Francisco
5150 Geary Blvd.
San Francisco, CA. 94118

The Hby. Co. of San Francisco
217 Sutter St.
San Francisco, CA. 94108

Smith Bros. Hobby Center
8941 Reseda Blvd.
Northridge, CA. 91324

Smith Bros. Hobby Center
1542 Los Angeles Ave.
Simi Valley, CA. 93065

Smith Bros. Hobby Center
16217 Victory Blvd.
Van Nuys, CA. 91405

T & A Hobby Lobby
3512 W. Victory
Burbank, CA. 91505

COLORADO

Custom Hobbies
2408 E. Platte Ave.
Colorado Spgs., CO. 80905

Tom Thumb Hobby Center
7020 E. Colfax Ave.
Denver, CO. 80220

CONNECTICUT

Al's Hobbies
54 Chestnut Hill Rd.
Norwalk, CT. 06854

Bristol Hobby Center
641 Farmington
Bristol Plaza
Bristol, CT. 06010

FLORIDA

Action Hobbies
4301 N. Dixie Hwy.
Ft. Lauderdale, FL. 33334

Art's Hobby Shop
103-34 Atlantic Blvd.
Jacksonville, FL. 32211

Farmers Sundries & Hobbies
4926 E. Broadway
Tampa, FL. 33605

Field's Hobby Shop
802 S. Edgewood
Jacksonville, FL. 32205

Garand Hobbies
605 Wand Rd.
Seffner, FL. 33584

The Hby. House
360 Hwy. 17-92
Maitland, FL. 32751

HAWAII

The Hobbietat
1423 Tenth Ave.
Honolulu, HI. 96816

ILLINOIS

Al's Hobby Shop
121-123 Addison St.
Elmhurst, IL. 60125

Slot & Wing Hobbies
511 S. Century Blvd.
Rantoul, IL. 61866

Slot & Wing South
1914 Round Barn Rd.
Champaign, IL. 61820

Stanton Hobby Shop
4736 Milwaukee Ave.
Chicago, IL. 60630

West Side Hobby
2629 W. Main St.
Belleville, IL. 62221

INDIANA

Heuberger's Hobby Shop
3 Blks. N. US 5 on Ind. 331
Bremen, IN. 46508

Jackson Enterprises
3953 Pippin Lane
Lafayette, IN. 47905

Mitchler's Hobby
4620 Crandall-Lansville Rd.
Corydon, IN. 47112
PH: 812-366-3141

Spencer's Craft & Hobby
2015 Ewing St. Rd.
Seymour, IN. 47274

Westside Hobby Shop
Old US 30 W. (at city limits)
Plymouth, IN. 46563

IOWA

Railroad Craft & Hobbies
1826 E. 7th St.
Atlantic, Ia. 50022
PH: 712-243-3137

KANSAS

Campbell Electric & Hobby
1003 E. 11th St.
Concordia, KA. 66901

Modeler Hobby Shop
1726 S. Hillside
Wichita, KS. 67211

LOUISIANA

Hub Hobby Shop
2616 S. Broad Ave.
New Orleans, LA. 70125

MASSACHUSETTS

Fisher R/C
17 Salmi Rd.
Framingham, MA. 01701

Ray's R/C Specialties
12 Sherman St.
Worcester, MA. 01610

MICHIGAN

Hobby World
1049 28th St. SW
Grand Rapids, MI. 49509

Joe's Hobby Center
17900 E. 10 Mile Rd.
E. Detroit, MI. 48021

MICHIGAN (cont'd)

Joe's Hobby Center
33418 Grand River Ave.
Farmington, MI. 48024

Joe's Hobby Center
7845 Wyoming Ave.
Dearborn, MI. 48126

MICHIGAN (cont'd)

Rider's Hobby Shop
115 W. Liberty St.
Ann Arbor, MI. 48108

Rider's Hobby Shop
920 Trowbridge Rd.
E. Lansing, MI. 48823

MICHIGAN (cont'd)

Trackside Hobbies
418 Main St.
Rochester, MI. 48063

MINNESOTA

Medical Center Cycle
5680 W. Broadway
Minneapolis, MN. 55428

Moon's Hobby Shop
Miracle Mile Mall
Rochester, MN. 55901

MISSISSIPPI

H & B Models
319 W. Main
Tupelo, MS. 38801

NEBRASKA

Chick Bartlett's Hobby Town
134 N. 13th St.
Lincoln, NB. 68508

NEW HAMPSHIRE

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from page 95/92

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Technical Enterprises, P.O. Box 123, St. Charles, MO 63301, introduces the Saucer-Roonie Flying Saucer model. Build this Flying Saucer for display or flying. The extremely simple kit goes together in minutes without glue! When used with the safe rubber launcher, the Saucer swoops up and away then hovers to a gentle landing. Contests for altitude, distance flights and even dogfights are possible with the Saucer. The kit features a die-cut rotor wing and pre-printed cabin. Development history of the unique aircraft is free with the kit. The kit is only \$3.00 pp and may be ordered from Technical Enterprises. □

AT-6

from page 88

In completing the AT-6 I used the aluminum finish put out by Pactra called Flight Aluminum. This finish seems to cover well and has good fuel resistant qualities. On the balsa covered portions of the aircraft I used Jet Cote mylar covering over the wood portions and primed with synthetic lacquer primer.

I found this to be a very fast method of sealing the wood portions of the aircraft; however, I feel there are better methods for longevity and quality finishing.

For radio installation I used the Kraft 7 channel radio; however, only 5 channels were used, the fifth channel being retracts. I used Kraft multi-con retracts which I feel, for this particular aircraft, is much more reliable and have scale operation.

I did not incorporate flaps into my model but there would be no reason why they would not work well on the aircraft.

Trimming and flying the AT-6: I found that almost all cases of modelers having problems with scale aircraft is that they are not balanced properly. Normally they try to fly the aircraft tail heavy which has disastrous results. My particular AT-6 took 6 oz. of nose weight to balance it. On the other hand, my Dad's AT-6 only took 2 oz. of nose weight. This could be due to different finishing and painting materials and/or location of radio systems. If your AT-6 is slightly nose heavy you will never have problems and it's much better than being slightly tail heavy.

The AT-6 has good flying characteristics. It has good take-off and landing capabilities, it is stable in all flight maneuvers that most stunt aircraft would perform. On your scale fly-bys they look like an AT-6. The AT-6 is such an easy airplane to fly that you may find yourself using it as your every day fun flyer.

I hope you enjoy your AT-6 as I have mine. □

BEECH T34 SPIN TEST

from page 87/86

...Kraft radio equipment for flight control and various command functions, and then delivered the model to Beech for their acceptance and instrumentation. For the instrumentation, the Beech engineers had developed a pair of subminiature air stream instrumentation booms which were mounted at the wing tips. These booms were used to sense the direction of the relative wind with respect to the aircraft body, measuring both the sideslip angle as well as the angle of attack. The control surface commands and the instrumentation data were telemetered back to the ground station, and printed on a multi-channel strip chart.

A special runway was built for the test. This consisted of 400' of asphalt runway, with 400' of grass overrun. This runway is located at the Beech Aircraft Model Flying Field, which is a super model runway used by local modelers, when not required for Beech tests. This field is open to any modeling activity, and is about one mile north of the Wichita company location.

Flying a model of this caliber is not your everyday sort of sport flying, so a

trainer was built. This trainer was an Air Capital Products F.B.-100 powered by a Webra Speed engine, (a 60 sized, low wing fun bird). The unusual thing which was done to turn the F.B.-100 into an RPV trainer was to add enough lead to bring the weight up to twenty pounds! Take off and flying the trainer were easy enough, but glide was extremely steep.

After the YT-34C Model was fully checked out and F.B.-100 training flights were completed, it was time to fly the Beech T-34 scale model. The actual flight tests were done by the Beech Company Model Test Pilot, Loren Tregellas. Loren is a Beech electrical engineer in its Missile Systems Division, and is also one of the regular company pilots. The model was flown at minimum weight for initial taxi and flight tests. After the necessary taxi tests were completed, the maiden flight was undertaken. Most of the asphalt was used to insure sufficient airspeed as the model lifted off and flew. Watching a scale model of this caliber fly is a beautiful sight, indeed. Unfortunately, Beech was not flying the model for beauty so after a short checkout flight, the spin tests were started.

As of this writing, a second T-34C model has been constructed and flown. These two models have already completed nearly 400 spin maneuvers and some of these spin tests were conducted at an actual gross weight of twenty-one pounds! A lot of valuable data has been recorded by the data collection system of strip chart recorder, movie camera, and visual observations. The spin test program is continuing, and it is hoped that a direct correlation will be made between model testing and full scale flight testing. R/C modelers can be proud of the fact that their hobby will someday be used to save human lives. When you get down to the basics, that bottom line makes it all worthwhile. □

SFVSF FLIGHT INSTRUCTOR

PROGRAM

from page 84

elevator in the dive, up elevator during climb). A much better recovery method for beginners is to give rudder to begin a tight turn. The stall pattern will be damped automatically in most cases, requiring little or no further input from the student. Once a smooth turn has been established, the next maneuver can be flown at normal airspeed. Try this one - - - it works!

Almost every newcomer to R/C flying has trouble with rudder commands when the airplane is coming toward the pilot and this can be catastrophic. After a little experience, this problem usually disappears but at the outset it can be a severe impediment to learning. Many techniques for avoiding confusion have been tried, including looking over one's

shoulder when the plane is approaching or trying to consider oneself inside the airplane. Neither of these works very well. Two successful approaches which minimize confusion are to give almost constant very small rudder commands or to simply remember that moving the control stick toward the low wing will right the airplane. This last method is probably best.

Knowing when to stop trying to talk a student pilot out of a tight situation and to grab the transmitter and re-establish control is one of the most difficult aspects of instructing. Of course, if the student is successful in correcting the problem by himself he will learn more, but at a certain point a crash becomes inevitable whether or not the instructor intervenes. This is a matter of judgment that requires experience and no instructor can expect to make the right decision all the time. Having made the decision to take over, however, it is sometimes difficult to get the transmitter from the student before it is too late to recover. For this reason a more positive way of taking command was developed. The instructor stands to the student's right and during landing approaches or other difficult maneuvers puts his left hand on the bottom edge of the transmitter. This does not interfere with the student and the instructor can grab the transmitter immediately if necessary, having told the student in advance what will be happening should things get out of control. This method works well because it eliminates the need for communication at such a critical time.

Finally, one might wonder what motivates the instructors to want to give up some of their own flying time to participate in the program. Actually, there are many advantages to being an instructor pilot including the chance to do a lot more flying per session than usually is possible. Being recognized as an expert pilot by the club is certainly an ego booster, but the instructors also gain a wealth of experience by flying a wide variety of sailplanes. They also test fly almost all of the new ships at the field, and while this can certainly be tension producing in the extreme, it can also be a high point of any flying session. Instructors become better pilots because of the constant input of new ideas that come from students, as well as constant infusions of their seemingly limitless and contagious enthusiasm. Just being part of the neophyte's first successful encounters with the world of R/C soaring and its joys makes participation in the program well worthwhile.

The SFVSF Flight Instructor Program has been successful in every respect and will soon be expanded with the addition of several new instructors. Perhaps a similar program would benefit beginners in your area. □

GASOLINE POWER WINCH

from page 83/32

Contests can be run in this manner with each launch equal in initial distance and speed.

The goal-post shaped object in front of the reel is a string guide to keep the line within the confines of the reel. It also serves as a handle to hold and to pull the launcher on the wheels. Since it weighs 50 pounds, it is more convenient to roll than to carry.

The small clip holding the foot pedal down is a brake release. In the position shown, it holds the reel forward off the brake to enable one to pull the line out to the launch site more easily. It swivels out of the way when not needed.

All in all this launcher is easy to build and does a good job. I'm sure you'll like it for yourself or your club.

The following figures represent theoretical speeds:

ENGINE rpm	REEL rpm	LINE mph
390	150	3
780	300	6
1040	400	8
1300	500	10
2600	1000	20
3500	1345	30
3600	1400	33 (peak rpm)

PIT STOP

from page 79/78

everyone else had problems with Mike Gavaldon in 2nd and Jay Spere 3rd. Mike Rowland ran away from the field in the Expert 50 lap "B" Main until about the 40th lap, when he became a little erratic, allowing Jon Quaid to close right up and take 2nd with Jack Barton 10 laps back in 3rd.

We were sitting on the left end of the track, and because of the contour of the track, we could only see the cars half of the time as they would disappear over the crown of the track for about 10 seconds and then they would re-appear. But after watching the racing to this point, and seeing how many guys that were having trouble with the boards, I made up my mind, in my main, to do my best to keep off the boards, instead of trying to make it a Trophy Dash.

The 75 lap Novice "A" Main was up next, and it looked like a one man race, as Jim Nelson ran away from the field until the 40th lap when he lost his radio. In the end, George Anderson outlasted all the crashing to take First Place with Randy Wente 2 laps back in second and Richard Heisel another 12 laps back in 3rd.

The 85 lap Amateur "A" Main

convinced me more than ever about not trying to make it a Trophy Dash because all 9 drivers were off the track at one time or another. At one time only 3 drivers were on the track. Dana Smeltzer and Mike Reedy were running very fast in the early stages of the race, until their problems dropped them back. At the finish, it was a smooth driving, consistent Jim Cade winning a B & W TV set with Joe Alves 6 laps back in 2nd and Paul Kawaguchi right behind in 3rd.

The 100 lap Expert "A" Main was next. With only a 2 minute warm up period prior to the start, I realized my engine was running a little too rich and just as I pulled into the pits to lean it down, they called the cars to the line, so I let it go. I got a good start, running in 2nd Place till the first corner where I got bumped, along with about 4 other cars and dropped to 5th spot. Jeff Rold took the lead with Curtis Husting right on his tail. The two of them ran that way quite a while. I had moved into 3rd with Earl Campbell 4th. Rick Perry and George Hague were doing such a dynamic job announcing the race that it sounded so exciting I wanted to pull my car off the track and watch.

At the 12th lap, Gary Kyes had pulled into the pits to make a carb adjustment on a sick running engine. He pulled out of the pits, with the leader Jeff Rold right on his bumper. As Jeff started to pass Gary, they bumped and Gary ended up upside down as Curtis and Gene also put Gary a lap down.

It was still Jeff and Curtis, running almost side by side, with myself about 30 feet back in 3rd and Earl Campbell 4th. Rick and George announced the 30 lap rundown showing Jeff leading, Curtis 2nd, myself 3rd, but Gary Kyes in 4th instead of Earl Campbell. It was an obvious lap counting error, because for Gary to unlap himself he would have had to pass Jeff, Curtis and myself, which he didn't do. But in the sponsoring BARCAR club, the decision of the lap counters is final, so Gary gained a lap. It happens.

At the 50 lap mark, the positions were the same — Jeff and Curtis together, myself a short ways back in 3rd, Gary 4th (?) and Earl Campbell 5th (?). Jeff got some fuel on his brakes at the 45 lap pit stop and now he was having a hard time staying in front of Curtis. Jeff's brakes locked up at the end of the straightaway, spinning the car out letting Curtis and myself slip by. Curtis had to slow to miss Jeff and I closed up close to him and we had a lot of fun racing together for quite a few laps. That guy doesn't make many mistakes so there was no way I could catch him.

Curtis had to slow for traffic, got stuck and I slipped by to take the lead at the 65th lap, with Curtis now about 30 feet back in 2nd. Meanwhile, Jeff was still having brake problems, and another spin-out allowed Gary Kyes to get by. At

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lap 80 Gary was right behind Curtis and for the next 15 laps they swapped 2nd and 3rd places back and forth. Curtis then cut a corner too close, flipped over and Gary and Jeff both slipped by. At the 95th lap Gary was right on my rear bumper. He had more horsepower than my rich running engine, but it was getting him into trouble making the car squirrely and overshooting corners. In the meantime, Jeff Rold's brake dried

out, and Jeff was closing fast on Gary and I. It looked like it might be a 3 car dead heat. But on the last lap, Gary passed me on the straightaway to take the checkered flag. I was 2 seconds back in 2nd, Jeff was right behind in 3rd and Curtis close in 4th. After watching all the other races, there was no way I would ever have believed that 4 cars could have finished that close together after 100 laps on that track. It was

incredible! And the announcing of Rick and George made the close race that much more exciting for the crowd. I would have loved to have watched it. Miss Golden State Classic, Julie Smith, made the awards ceremony a memorable affair for everyone, as Gary collected his color TV and the rest of us received some very beautiful trophies and merchandise, for which we'd like to thank all the sponsors. □



Curtis Hustling lead part of the race, battled the other leaders side by side, and ended up 50 feet behind the leader in 4th place.



Jim Cade drove a very smooth, consistently fast race, to win the Amateur Main by 6 laps.



The Novices were all trying a little too hard, but George Anderson kept his head and worked his way up to a win in the Novice Main.

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(All engines have ball bearings. Add \$7.98 for .40 and .60 mufflers.)

SHIPPING INSTRUCTIONS
 Specials based on present list prices, subject to change without notice.
 C.O.D. MONEY ORDER CHECK
 Texas residents Add 5% Sales tax.
 Shipping Charge \$2.50
 Add \$4.00 for oversize and heavy boxes.
 (FUEL SHIPPED UPS-COLLECT) CHARGE IT!



TOWER IS PEOPLE !



Here you see most of the staff at Tower Hobbies - by far the largest, most professional staff in the industry. We have dedicated specialists in every facet of the business in order to serve YOU in the best possible manner.

PROFESSIONAL PURCHASING! We're proud to introduce our Purchasing Agent, Mr. Alan Green (far left). He picks up his pay checks here at Tower Hobbies, but he's really working for you! He's 100% dedicated to protecting YOUR interest by getting you great deals on popular modeling supplies. Tower's immense buying power enables Al to get volume discounts, which leaves extra cash in your pocket! That monstrous buying power, and Al's years of experience, extensive training, and progressive and innovative attitude all add up to create his unique skill for making timely purchases so you can get what you want even when everyone else is out of stock! Al frequently purchases up to a one year supply of popular merchandise which contributes to our absolutely incomparable order fill rate.

THE WORLD'S GREATEST HOBBYIST! Mr. Bill Baxter, Tower's Sales Manager and Hobbyist (far right), has more knowledge of the entire spectrum of the RC hobby than any other man, woman, or child on the face of the Earth! And his job is to SERVE YOU! Our professional staff is well qualified to answer the vast majority of the questions that you ask us, but if you come up against a problem which you feel demands Bill Baxter's personal attention, please feel free to use the following number to call him direct: 217 - 384 - 1097. Being a dedicated manager, he's just about always immediately available for those who need him, Monday through Friday, 9:00 A.M. to 5:00 P.M.

DEDICATED TO ACCURACY! We know well how important it is to you not only to get your order as soon as you possibly can, but also to receive exactly what you actually ordered at the correct low, low Tower discount price. The minute we get your order, either by mail or by phone, we begin to process it. First we carefully check your order and our records to be sure that we have your name and address recorded accurately. Then we check the items that you ordered against our stock numbers to make sure that we know what you want. Before we enter your order into our computer, we review our prices and whether or not you have any credits due, so we know that you're getting what you bargained for. Next your invoice and packing list is prepared by our computer at lightning speed, and your order is double - checked for accuracy. It would take over 100 experienced secretaries all day long to prepare as many orders as our computer does in only one hour! Within only one day your order is checked, double checked, picked, packed, and shipped to you by the best means available! Tower does it all for you!

TOWER HOBBIES IS THE ONLY RC COMPANY YOU'LL EVER NEED!



TOWER HOBBIES

P.O. BOX 778 CHAMPAIGN, ILLINOIS 61820

217-384-1010

CONTINENTAL UNITED STATES (EXCEPT ILLINOIS):

800-637-7686

ILLINOIS RESIDENTS ONLY:

800-252-3336



TOWER HOBBIES

P.O. BOX 778 CHAMPAIGN, ILLINOIS 61820

\$\$ SUPER SPECIALS OF THE MONTH \$\$

The following Tower Hobbies pages represent super savings for you on hundreds of popular items; specially selected for you from our huge, several thousand item inventory. This page gives you complete information on how to place your order with Tower Hobbies, and how to obtain any other information that you may need relative to that important purchasing decision.

The special stock numbers must be used for the super special prices to be honored. Tower will do everything possible to keep all special items in stock throughout the special; however, if necessary, Tower reserves the right to cancel and/or place limits on any or all items. For your convenience, Tower will accept backorders for only those items which we will be able to deliver within a reasonable amount of time. All of our super special prices are subject to change if the manufacturers retail prices change during the sale period.

HOW TO ORDER FROM TOWER

Ordering your modeling supplies from Tower Hobbies is just as fun and easy as sitting in your favorite lounge chair. You'll never have to worry about fighting a crowd, and when you deal with Tower Hobbies you're always assured of getting low, low sale prices, the best selection, and the best help and advice that you can possibly get ANYWHERE in the world. There are two easy ways to order:

BY TOLL FREE PHONES

When you place your order over the phone we will ship it to you C.O.D., and you pay for it when it's delivered to your door.

When you phone in your order, please have the stock numbers written down ready to give to the order taker.

800-637-7686 CONTINENTAL UNITED STATES (EXCEPT ILLINOIS)
800-252-3336 ILLINOIS RESIDENTS ONLY

The "800" WATS lines are open weekdays from 9:00 A.M. to 5:00 P.M., Monday through Thursday evenings 5:00 P.M. to 9:00 P.M., and 10:00 A.M. to 5:00 P.M. on Saturdays. Closed Friday evenings and Sunday.

BY MAIL ORDER

If you have a Tower order form, please use it. If not, then just use any piece of paper or stationery. Write down all of the items that you want along with their special stock numbers and prices. Total them up (Illinois residents add 5% sales tax) and add \$2.00 for postage, handling, and full insurance, to obtain the grand total. Obtain a money order, certified check, bank check, or write a personal check for the grand total amount (personal checks may be delayed to allow for clearance). Foreign orders add \$10.00 (excess will be refunded with order). Date of postmark determines special period eligibility. Send your order along with full payment to:

TOWER HOBBIES
P.O. BOX 778
CHAMPAIGN, ILLINOIS 61820

HOW TO GET INFORMATION FROM TOWER

The following list gives our other phone numbers and a brief description of why and when to call them. Please write these down for future reference, or just save this page.

217-384-1010: This number can be used by anyone from anywhere in the world to PLACE AN ORDER with our phone sales staff. Primary usage comes from foreign customers or from Alaska, Hawaii or Puerto Rico, however, anyone can use it.

217-384-1097: This number is a HOT LINE direct to the desk of Bill Baxter, who is our resident RC expert. If you have a technical question or a problem you need help with then call Bill on this number. It is answered on Monday through Friday from 9:00 A.M. to 5:00 P.M. only.

217-384-7217: This number is a HOT LINE direct to our main office. If you should have a question about an order such as when it was shipped, then call this number. Our office staff will immediately look up whatever you need to know and give you an instant answer to your question or problem, Monday through Friday, 9:00 A.M. to 5:00 P.M. only.

TOWER CATALOG!

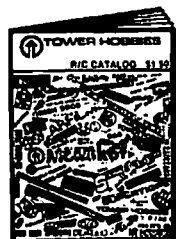
The Bible of the RC hobby! ANYONE interested in the RC hobby should have this catalog! It's the finest available, featuring 294 exciting, fully illustrated pages of over 3,000 RC items from over 130 manufacturers at super discount prices, including all of the latest RC products. It's filled with helpful information, and is complete in every detail. Get it free with your first order, or send \$1.50 today!!

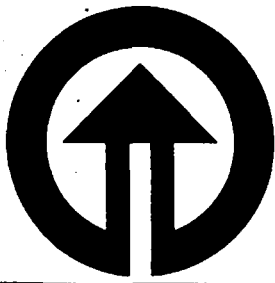
TOWER HAS EVERYTHING!

You can count on Tower for all of your day to day modeling needs, as well as a one stop source of full information. Think of Tower the next time . . .

- . . . You need new product information
- . . . You want to check on current prices
- . . . You need to know current availabilities
- . . . You want super fast service
- . . . You want to save money on all of your R/C needs
- . . . You want to do business with the BIGGEST AND THE BEST!

ORDERING INFORMATION GUIDE





TOWER

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EVERYTHING YOU WANT!

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

YOU WANT QUALITY! That's why we took our Radio Control Systems 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. Take, for example, our rugged servos -- they're 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 preventing 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 -- this makes an unbeatable combination. Just ask any one of the thousands upon thousands of people who own one of our fine digital proportional radio control systems about our reputation!

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 in addition to being able to check for possible cell malfunction. This deluxe feature is usually only found 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 airborne systems! Our airborne systems are quite powerful, yet light in weight. This gives you greater maneuverability, and faster climbing, acceleration, and top speed potential.

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; lightweight, 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, chargers, trays, output arms, or anything from the Kraft line-up of outstanding products.

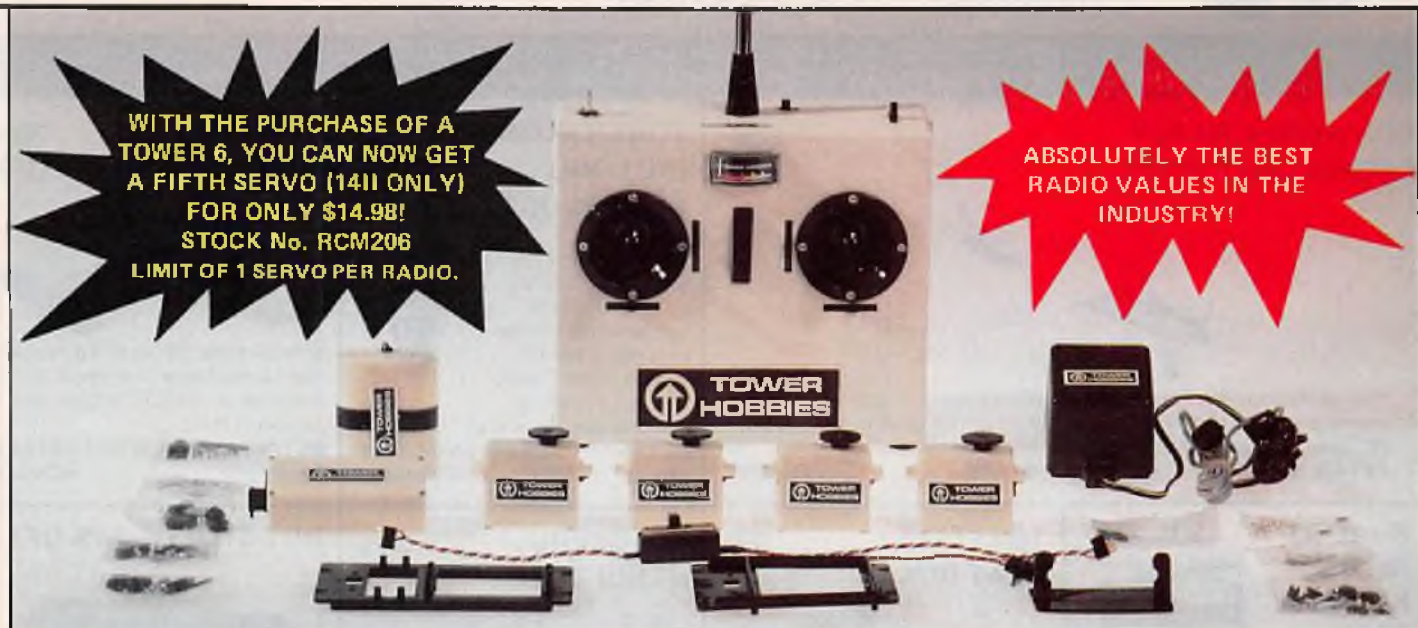
YOU WANT ASSURANCE! Even in consideration of the meticulous care that goes into every Tower radio, you know that nothing on Earth is truly perfect. Our Tower radio control systems are warranted against defects in materials and workmanship for 180 days from the date of purchase. There are six Tower Hobbies 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 \$2.00 for postage. 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 purchase price refund.

HOBBIES

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ILLINOIS TOLL FREE: 800-252-3336
CONTINENTAL UNITED STATES TOLL FREE: 800-637-7686



WITH THE PURCHASE OF A
TOWER 6, YOU CAN NOW GET
A FIFTH SERVO (14II ONLY)
FOR ONLY \$14.98!
STOCK No. RCM206
LIMIT OF 1 SERVO PER RADIO.

ABSOLUTELY THE BEST
RADIO VALUES IN THE
INDUSTRY!

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 four KPS-14 or KPS-15 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 the 14's and 13.5 ounces with the 15's.

With KPS-14's - ONLY \$199.95 (Stock No. RCM205)

With KPS-15's - ONLY \$209.95 (Stock No. RCM121)



WITH THE PURCHASE OF A TOWER 3,
YOU CAN NOW GET A THIRD
SERVO FOR ONLY \$14.98!
STOCK No. RCM207
LIMIT OF 1 SERVO PER RADIO.

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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COX READY TO FLY CESSNA CENTURION

30%
OFF



This all molded foam scale model comes complete with a Cox .049 engine, prop, push rods, horns, and all other fittings already installed. 36" span. Requires a 2 channel radio.

RETAIL \$64.95 NOW ONLY \$45.48 RCM001

TOWER HOBBIES R/C LONG GLOW PLUGS

48%
OFF

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 \$7.50 NOW ONLY \$3.88 RCM002

STERLING 1/2 A CORSAIR

35%
OFF



This all balsa 36" span kit features special hardware and decal sheet. Requires a .049-.10 engine and a 2 channel radio.

RETAIL \$29.95 NOW ONLY \$19.48 RCM003

X-ACTO No. 87 KNIFE & TOOL CHEST

30% OFF



Limit of 1

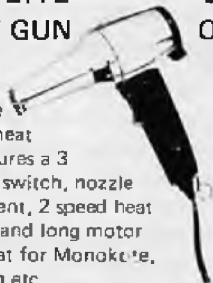
Contains Nos. 1, 2 and 5 knives, complete set of blades, gouges, routers, punch, plus X-acto planer, sander, hobbycraft saw, spoke-shave, balsa stripper, pin vise, screwdriver, sand, drill bits, in large fitted wood chest.

RETAIL \$29.95 NOW ONLY \$20.98 RCM004

TOP FLITE HEAT GUN

36%
OFF

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 \$19.18 RCM005

GOLDBERG HANDI TOTE

34%
OFF



This flight box is compact yet has room for everything you need.

Most popular flight box ever made!

RETAIL \$15.95 NOW ONLY \$10.48 RCM006

HOT STUFF 50% 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 \$1.98 RCM007

DUMAS HOT SHOT 21

35%
OFF



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 \$67.95 NOW ONLY \$44.18 RCM008

K & B .40 RC ENGINE

40%
OFF



The most popular .40 ever made! Features a Perry carb.

Quantities are limited. Limit of 1 engine per order until sold out.

RETAIL \$67.50 NOW ONLY \$39.98 RCM009

DU-BRO KWIK FILL FUEL PUMP 36% OFF



RETAIL \$10.95
NOW ONLY \$6.98
Stock #RCM 010

HOUSE OF BALSA P-51D (.29-.40)

36%
OFF



This all balsa sport, stand-off scale ship is beautiful. It has a 49" wing span and takes a .29 - .40 engine.

RETAIL \$59.95 NOW ONLY \$38.48 RCM011

K & B .61 R/C ENGINE

40%
OFF



The most popular .60 engine in the R/C hobby!

This outstanding engine features a Perry carb and muffler.

RETAIL \$90.00 NOW ONLY \$53.98 RCM012

ZAP ZAP ZAP ZAP 50% OFF



Zap is a Super Cyanoacrylate adhesive that is super fast setting. Large size comes with extra applicators. Limit of 6 per order.

RETAIL \$3.50 NOW ONLY \$1.78 RCM013

COX READY TO FLY SPORTAVIA THE PERFECT TRAINER

35%
OFF



This completely ready to fly molded foam trainer with a 70" wing span is unbelievably easy to fly. The first-flight beginner can take off and land by himself. Comes with .049 engine installed. Requires the Sanwa 2 channel or any other 2 channel radio.

RETAIL \$84.95 NOW ONLY \$54.98 RCM014

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<p>TOP FLITE 30% OFF SEALING IRON</p>  <p>This sealing iron is great for covering with Monokote, Solarfilm, etc. It features adjustable temperature, teflon shoe, and a handy shape. Excellent quality.</p> <p>RETAIL NOW ONLY \$13.98 \$19.95 RCM202</p>	<p>DREMEL 43% OFF MODEL 381 MOTO-TOOL WITH FULL ACCESSORIES</p>  <p>The Model 381 is the ultimate in hand grinders. It features variable speed control, ball bearings, and full accessories.</p> <p>RETAIL NOW ONLY \$39.98 \$69.95 RCM015</p>	<p>MILLER 40% OFF No. 2017 SPRAY SET</p>  <p>Complete set includes a 12 foot air hose, compressor, spray gun, air brush, and nozzles.</p> <p>RETAIL NOW ONLY \$46.78 \$77.95 RCM016</p>	<p>QUADRA 2 CUBIC INCH ENGINE</p>  <p>The perfect engine for the biggies. It comes complete with muffler, mount and Tillitson pump/carb. Longlasting.</p> <p>RETAIL NOW ONLY \$99.98 \$139.95 RCM017</p>
<p>DEVCON 40% OFF 5 MINUTE EPOXY IN ECONOMY 9 OZ. SIZE</p>  <p>Now in squeeze bottles for your convenience. Limit of 3 per order.</p> <p>RETAIL NOW ONLY \$3.48 \$5.80 RCM018</p>	<p>DREMEL 572 35% OFF MOTO SHOP</p>  <p>This deluxe saw features a complete accessory set of blades, discs, etc. and flexible shaft. Limit of 1.</p> <p>RETAIL NOW ONLY \$58.88 \$89.95 RCM019</p>	<p>GOLDBERG 40% OFF FALCON 56</p>  <p>This all time best seller is now redesigned with ailerons. 56" span. Uses a .15 - .35 engine, all balsa construction. An excellent trainer.</p> <p>RETAIL NOW ONLY \$26.98 \$44.95 RCM020</p>	<p>ZINGER 35% OFF WOOD PROPS</p>  <p>Two popular sizes-Stock up now on these high quality props!</p> <p>10X6 WOOD PROPS(6) RETAIL NOW ONLY \$5.48 \$8.40 RCM021</p> <p>11X7 WOOD PROPS(6) RETAIL NOW ONLY \$6.28 \$9.60 RCM022</p>
<p>POWER PACER 22% OFF BATTERY TESTER</p>  <p>A new ni-cad battery tester, cycler, and charger. Works great!</p> <p>RETAIL NOW ONLY \$46.98 \$59.95</p> <p>RCM023 9.6 volt RCM024 6 volt</p>	<p>GOLDBERG 40% OFF SKYLARK 56 MK II</p>  <p>Fun to fly sport airplane with pattern capabilities. 56" span. .30 to .40 size engine, all balsa construction. New improved design!</p> <p>RETAIL NOW ONLY \$29.98 \$49.95 RCM025</p>	<p>SULLIVAN 38% OFF ELECTRIC STARTER</p>  <p>The Sullivan electric starter is a high torque, high R.P.M., 12 volt starter. Limit of 1 per order.</p> <p>RETAIL NOW ONLY \$22.98 \$36.95 RCM026</p>	<p>BOLINK 20% OFF ELECTRIC CAR</p>  <p>This 2 channel 1/12 scale electric car comes already assembled with 05 motor, nicads, & charger & goes over 25 mph.</p> <p>RETAIL NOW ONLY \$79.98 \$99.95 RCM027</p>
<p>CRAFT-AIR 33% OFF FIELD BOX</p>  <p>It's ready to use, not a kit, made of lightweight indestructible polyethylene. 22" long & holds everything. A SUPER BUY!</p> <p>RETAIL NOW ONLY \$19.98 \$29.95 RCM028</p>	<p>CRAFT-AIR 35% OFF HI-START HEAVY DUTY</p>  <p>Features reel, tubing, towline, parachute, stake, tow ring, and strong construction. For sailplanes of 100" wingspan and larger.</p> <p>RETAIL NOW ONLY \$27.98 \$42.95 RCM029</p>	<p>AIRTRONICS 30% OFF OLYMPIC II</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>S&O BATTERY 35% OFF TESTER</p>  <p>Test all aspects of your batteries with this high quality tester.</p> <p>RETAIL NOW ONLY \$19.48 \$29.95 RCM031</p>



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DA ENTERPRISES 36%
SERIES IV OFF
POWER PANEL



The all-in-one power panel!

Supply power to starter, plug, pump, etc., as well as fast charge your radio at the field!

RETAIL NOW ONLY \$22.48
\$34.95 RCM033

BRIDI RCM 34%
TRAINER 40 OFF



This popular all balsa trainer has a 52" span and takes a .35 - .49 engine. A high quality kit.

RETAIL NOW ONLY \$36.28
\$54.95 RCM034

COX TD .049
STD. ENGINE 38%
OFF



A super hot 1/8A engine ideal for free flight, control line, 1/8A R/C, and more.

RETAIL NOW ONLY \$ 12.98
\$20.95 RCM035

DUNE 25%
BUGGY OFF



This is the Sigma-Ace .19 size dune buggy distributed by Leisure Electronics, 17" length.

RETAIL NOW ONLY \$149.98
\$199.95 RCM036

12 VOLT
MOTORCYCLE
BATTERY 50%
OFF



These are high quality, heavy duty motorcycle batteries that are perfect for all electric starters. Brand new.

RETAIL NOW ONLY \$13.48
\$26.95 RCM037

12 VOLT
BATTERY
CHARGER 50%
OFF

To go with your 12 volt motorcycle battery, or any other 12 volt battery, we now have this high quality charger that does a perfect job. Safe and easy to use. Works great with battery at left. UL approved.

RETAIL NOW ONLY \$6.98
\$13.95 RCM038

NOSEN GERE 28%
SPORT BIPE OFF



This all wood stand off scale bipe has a 96" span. Uses a .80 engine and a 4 ch. radio. Necessary hardware is included. 18 hour assembly time.

RETAIL NOW ONLY \$93.58
\$129.95 RCM039

K&B .35 RC 35%
ENGINE OFF



A front rotor type engine featuring a light aluminum piston with the dykes ring. High quality!

RETAIL NOW ONLY \$22.78
\$34.95 RCM040

MARK'S MODELS 35%
WANDERER OFF



This easy to build and easy to fly glider has a 72" wingspan. So stable it will fly free flight without a radio. Great for the beginner!

RETAIL NOW ONLY \$12.98
\$19.95 RCM041

K&B .61 RC W/PERRY
PUMP & CARB & MUFF



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 \$68.98
\$115.00 RCM042

BRIDI RCM 35%
TRAINER 60 OFF



This popular all balsa trainer has a 58" span and takes a .40 - .60 engine. High quality, flies great.

RETAIL NOW ONLY \$40.98
\$62.95 RCM043

FOX .45 RC 40%
BALL-BEARING OFF
SCHNEURLE



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 \$38.98
\$64.95 RCM044

VK CHEROKEE 30%
OFF



This semi-scale model features a 65" span and uses a .40-.61 engine. Full length die cut sides. A good-looking high quality kit.

RETAIL NOW ONLY \$48.98
\$69.95 RCM045

K&B .19 40%
RC ENGINE OFF



Features "squish band" head machined from solid aluminum bar stock; precision ball bearings.

RETAIL NOW ONLY \$29.98
\$50.00 RCM046

LANIER 36%
COMET II OFF



This popular almost-ready-to-fly features a 63" span and takes a .50 - .61 engine. Great trainer.

RETAIL NOW ONLY \$39.98
\$62.50 RCM047

ASSOCIATED 35%
RC 200 KIT OFF



See Tower Hobbies Catalog P. 118 for available bodies. 22" body length. Features ballbearings for rear axle & clutch, glass chassis, disc brakes. Kit comes complete less engine, body, and radio. Best gas car anywhere!

RETAIL NOW ONLY \$126.78
\$195.00 RCM048

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**K&B .40 RC W/
PERRY PUMP &
CARB NO. 8360** **40%
OFF**



Features Perry Pump/Regulator and a larger Perry Carb specifically designed to be used with the Pump/Regulator system. Adds 1000 RPM's!
RETAIL NOW ONLY \$56.98
\$95.00 RCM049

**KRAFT .61 RC
SCHNEURLE
WITH MUFFLER** **28%
OFF**



This high performance schneurle engine comes with a perry carb and special muffler. This is the highest quality engine you could want!
RETAIL NOW ONLY \$71.98
\$99.95 RCM050

**PICA
DUELIST 2/40** **35%
OFF**



This all balsa twin is easy to fly and safe handling. It has a 67" wing span and requires two .23-.40 engines.

RETAIL NOW ONLY \$58.48
\$89.95 RCM051

**JENSEN
UGLY STICK** **36%
OFF**



This all-balsa kit is the ideal trainer. It takes a .45 to .61 size engine and has a 60" span. Very stable.

RETAIL NOW ONLY \$39.98
\$62.50 RCM052

**ANDREWS
BIG H-RAY** **40%
OFF**



This 3 channel trainer has a 56" wing span and takes a .19-.45 engine. Super performance and strength.

RETAIL NOW ONLY \$29.98
\$49.95 RCM053

**MIDWEST
ATTACKER** **40%
OFF**



This all molded styrofoam kit builds fast and flies great. 48" span. Uses a .19-.35 engine. Very popular.

RETAIL NOW ONLY \$25.98
\$42.95 RCM054

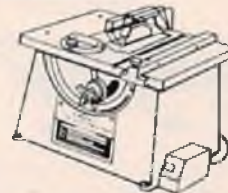
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This complete wing & fuse jig holds alignment within .1%. Allows you to make up to a 6 foot wing. Fuse jig fits on without tearing down your wing jig.

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**DREMEL 580
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A.R.F.** **41%
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**STERLING
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JUMPER MK II** **35%
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This airboat has a plastic hull and cabin with balsa and plywood parts. It uses a 2 channel and a .15 to .35.

RETAIL NOW ONLY \$25.98
\$39.95 RCM058

**JEMCO
CORSAIR** **30%
OFF**



This beautiful stand-off scale favorite has a 54" span and takes a .40-.60 engine and a 4-6 ch. radio. This high quality kit has foam wings.

RETAIL NOW ONLY \$47.98
\$68.50 RCM059

**BUD NOSEN
P-51 D** **28%
OFF**



FOR MODELLERS WHO THINK BIG!! 102" span! Uses a .60 engine with prop driver. Uses a 4 ch. radio. Very stable flyer.

RETAIL NOW ONLY \$122.38
\$169.95 RCM060

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The ultimate in pattern! This new release is .60 size with fiberglass fuselage and foam wings.

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\$129.95 RCM061

**STAFFORD
TWIN
COMMACHE** **30%
OFF**



This museum scale twin engined favorite is always in high demand. It's all-balsa, has a 72" span, and needs two .40 engines.

RETAIL NOW ONLY \$97.98
\$139.95 RCM062

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SWAMP BUGGY** **36%
OFF**



This rugged and stable airboat runs on water, dry grass, or snow. Really moves out with a .40 and speeds with a .60. Lots of fun!

RETAIL NOW ONLY \$19.88
\$31.00 RCM063

**SUPERTIGRE
.35 RC
ENGINE** **30%
OFF**



For the value-conscious flier, this powerful .35 is moderately priced. Ideal for the medium-sized RC ships.

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<p>ANDREWS AEROMASTER 35% OFF</p>  <p>The most popular Biplane in B/C!! 52 1/2" span, 910 sq. in. area, .60-.78 engine. All balsa construction.</p> <p>RETAIL \$79.95 NOW ONLY \$52.48 RCM065</p>	<p>WES CRAFT B-17 FLYING FORTRESS 21% OFF</p> <p>THE ULTIMATE RC PROJECT!</p>  <p>This stand off scale kit includes an all glass fuse, wing cells, and engine cowlings. Complete balsa sheeting for wing and stabs. Pre-formed plastic canopies and gun turrets. 120" span. Uses a 5 ch. radio and four .30 size engines. Flying site assembly is quick and simple.</p> <p>RETAIL \$495.00 NOW ONLY \$389.98 RCM066</p>	<p>MRC RTF CHEROKEE 20% OFF</p> <p>RADIO NOT INCLUDED</p>  <p>Professionally built, uncommonly attractive. Made for the sport flier. 57.5" span. Comes with an Enya .40 engine with muffler installed. Uses a 5 ch. radio. Fiberglass fuselage.</p> <p>RETAIL \$419.95 NOW ONLY \$314.98 RCM067</p>	
<p>MRC RTF CESSNA 20% OFF</p> <p>RADIO NOT INCLUDED</p>  <p>MRC's fine fiberglass Cessna trainer comes completely ready-to-fly. Requires a 5 ch. radio. An Enya .35 RC engine and fuel tank are already installed. 55" span. It can be in the air within one hour.</p> <p>RETAIL \$369.95 NOW ONLY \$277.48 RCM068</p>	<p>MRC RTF HAWK TRAINER 20% OFF</p>  <p>You can be ready to fly this foam trainer within one hour. Comes with an Enya .15 engine already installed with muffler. Uses a 2 or 3 ch. radio.</p> <p>RETAIL \$98.00 NOW ONLY \$73.48 RCM069</p>	<p>MRC FMC COMBAT VEHICLE 20% OFF</p>  <p>This 1/12 scale electric RC vehicle has 2 forward & 2 reverse speed control. Big output electric motor for indoor or outdoor quiet running. Excellent detailed scale! Requires a 2 ch. radio. 15" length.</p> <p>RETAIL \$74.98 NOW ONLY \$59.98 RCM070</p>	<p>MRC SHERMAN TANK 20% OFF</p>  <p>Building is simple due to a complete manual containing about 50 photos, and exploded views. Requires a 2 ch. radio with 2 servos and 6 "D" size batteries. 14" length.</p> <p>RETAIL \$134.98 NOW ONLY \$107.98 RCM071</p>
<p>MRC LEOPARD ELECTRIC TANK 20% OFF</p>  <p>18" length. Takes 40 degree inclines with ease. Movable latches, swiveling periscope, and authentic decals. Operates forward, reverse, left or right. It turns on a dime.</p> <p>RETAIL \$174.98 NOW ONLY \$139.98 RCM072</p>	<p>MRC MARTINI PORSCHE 20% OFF</p>  <p>This 1/12 scale RC electric racer has 2 forward & 2 reverse speed control, big output electric motor, and scale detailing. Requires any 2 ch. radio. Batteries not included. 15" length.</p> <p>RETAIL \$67.98 NOW ONLY \$54.38 RCM073</p>	<p>MRC PORSCHE 934 TURBO 20% OFF</p>  <p>This electric RC favorite is 1/12 scale and 15" long. It features a big output electric motor, 2 forward & 2 reverse speeds, precise scale detailing, and rugged ABS plastic body. Requires any 2 ch. radio.</p> <p>RETAIL \$64.98 NOW ONLY \$51.98 RCM074</p>	<p>MRC TYRRELL 6 WHEELER 20% OFF</p>  <p>This 1/10 scale electric RC car is 16" long and has the following features: 2 forward and 2 reverse speeds, big output electric motor, rugged ABS plastic body and excellent detailing. Requires a 2 ch. radio.</p> <p>RETAIL \$67.98 NOW ONLY \$54.38 RCM075</p>
<p>O.S. MAX .60 RC BLACKHEAD 30% OFF</p>  <p>A front rotor ball bearing RC engine that comes complete with a muffler. The .60 Blackhead is also known as the H60F. It has conventional porting. An economical, fine quality engine!</p> <p>RETAIL \$99.95 NOW ONLY \$69.98 RCM076</p>	<p>SOFTGLAS 22% OFF</p> <p>NEW</p>  <p>The new, complete sealer-filler-primer for balsa wood models. Sands as easily as primer! Easy to apply. Dries hard, fast, and flexible.</p> <p>RETAIL \$8.95 NOW ONLY \$6.98 RCM077</p>	<p>MIDWEST SWEET STIK 42% OFF</p>  <p>54" span. Uses a .19 to .45 size engine. Requires a 4 channel radio. The Sweet Stik is an ultra simple trainer by Larry Leonard and Bud Anders.</p> <p>RETAIL \$42.95 NOW ONLY \$24.78 RCM078</p>	<p>GOLDBERG SR. FALCON 40% OFF</p>  <p>The Sr. Falcon is the standard big trainer. 69" span. Uses a 4 ch. radio and a .35 to .60 size engine. Every design element is engineered for simplicity and fast building.</p> <p>RETAIL \$59.95 NOW ONLY \$35.98 RCM079</p>

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KRAFT	KRAFT	KRAFT	KRAFT
KP-2AW (Wheel)	\$129.95	\$88.98	RCM080
KP-2A (2 Stick)	129.95	88.98	RCM081
KP-2AS (1 Stick)	129.95	88.98	RCM082
KP-4A	299.95	189.98	RCM083
KP-6A	329.95	204.98	RCM084
KP-5C	375.43	269.98	RCM085
KP-5CS	375.43	269.98	RCM086
KP-7C	515.43	369.98	RCM087
KP-7CS	515.43	369.98	RCM088
KPS-14II	44.95	34.88	RCM089

FUTABA	FUTABA	FUTABA	FUTABA	FUTABA
FP-2GS		99.95	69.98	RCM091
FP-2F		149.95	94.98	RCM092
FP-2E		149.95	94.98	RCM093
FP-3S S-17		139.95	92.98	RCM094
FP-3S S-20		159.95	104.98	RCM208
FP-3FN		209.95	132.98	RCM095
FP-4FN S-17		279.95	179.98	RCM096
FP-4FN S-16		309.95	194.98	RCM097
FP-5FN S-16		359.95	214.98	RCM098
FP-6FN S-17		329.95	204.98	RCM099
FP-6FN S-16		369.95	229.98	RCM100
FP-7GN		579.95	377.98	RCM101
\$-17 Servo		29.95	22.48	RCM102
\$-16 Servo		39.95	29.98	RCM103
\$-7 Servo		39.95	29.98	RCM104

SANWA	SANWA	SANWA	SANWA	SANWA
2 Ch. No. 8020		99.95	69.98	RCM105

STOCK NUMBER	DESCRIPTION	RETAIL	NOW ONLY
RCM107	Airtronics Aquila	569.95	548.98
RCM111	Associated RC 100 Car	125.00	87.48
RCM112	Badger 200-3 Deluxe Spray Kit	29.95	25.98
RCM113	Bolink Car W/Futaba 2F	239.95	174.98
RCM209	Bridl Dirty Birdy 40 - wood	59.95	39.98
RCM114	Bridl Dirty Birdy 60 - wood	84.95	55.98
RCM210	Bridl Dirty Birdy 60 - glass	124.95	79.98
RCM211	Bridl Kraft Super Fil - wood	92.95	58.58
RCM115	Bridl Sun Fil 4-20	29.95	17.98
RCM116	Bridl Super Kaos 40	55.95	35.98
RCM118	Bridl Super Kaos 60	69.95	45.18
RCM119	Bridl AT-6 Texan	134.95	89.98
RCM124	Coverite Balsarite	2.95	1.98
RCM125	Cox Electric Ferrari	99.95	83.98
RCM126	Cox T.D. .051	20.95	13.68

STOCK NUMBER	DESCRIPTION	RETAIL	NOW ONLY
RCM128	Craft-Air Butterfly II	49.95	32.48
RCM212	Craft-Air SD-100 Glider	59.95	35.98
RCM213	Craft-Air Viking MK I Glider	79.95	49.98
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RCM221	DAE Dual Range Power Panel	27.95	17.48
RCM215	Dubro Lg. Nylon Hinges (15)	2.49	1.78
RCM216	Dubro Flex Cable - 20"	1.49	.98
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RCM218	Dubro Prop Drive Unit	100.00	66.98
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RCM219	Dumas Hot Shot - wood	30.00	19.48
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	Kwikcote - All Colors	8.00	2.98
RCM223	Lanier Jester II	73.50	45.58
RCM224	Lanier Transit	46.50	29.78
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RCM156	Marks Bushwacker w/accessories	52.95	31.78
RCM157	Men Trainer (.15 -.25)	31.95	21.38
RCM158	Microflame Dix. Welding Kit	35.95	23.28
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RCM165	Pica Waco	79.95	53.58
RCM227	Robert Super Pumper MK II	17.95	10.78
RCM166	Robert Wing Incidence Meter	15.95	10.98
RCM228	Sanwa No. 8022 2 ch./ 2 st.	139.95	97.98
RCM168	Sealector Custom Iron	25.75	17.28
RCM169	Skyglas Phoenix 5	50.00	32.48
RCM170	Skyglas Phoenix 6	65.00	39.98
RCM172	Skyglas Vertigo II	65.00	39.98
RCM173	Slimline Muffler for K&B .35-.40	8.95	6.28
	Solarfilm - Reg & Trans Colors	7.98	3.98
RCM174	Sonic GR-3A Retract System	55.90	36.38
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RCM184	Sureflite Foam J-3 Cub	37.95	24.68
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RCM186	Top Flite 10x6 (12) Super Maple	16.20	10.58
RCM187	Top Flite 11x7 (12) Super Maple	18.60	11.98
RCM188	Top Flite Freshman Trainer	44.95	29.18
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RCM230	Tower No. 11 Knife Blades (5)	74.95	44.98
RCM191	Tower 12 v. Gall-Cell	26.95	18.98
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ELECTRA-FLI

from page 77

charge. On our model an in-flight switch was installed. To turn the motor on, "bump" full down elevator on the control stick. To turn the motor off, "bump" down elevator again. This switch can be purchased from Astro Flight. The Electra Fly is ideal for flying close to residential areas since there is no loud noise to contend with. All in all, the Electra Fly Astro .10 is a real neat combination that is a real pleasure to build and fly.

One suggestion --- if flying from a rough field, it is advisable to reinforce the main landing gear area. After several hard landings, our gear started to crack loose. □

SCALE VIEWS

from page 76/75



Scale fliers with average sized models, but having scale operations of one kind or another hooked to the flight batteries, would also find the Super-Pak useful. It could replace some lead in the nose and provide a safety margin of juice.

NASA or ASA?

The National Association of Scale Aeromodelers has circulated a proposal to its membership to obtain opinions on whether the name of the organization should be changed, in view of the fact that a number of overseas scale modelers are joining. If accepted, the name would probably become Association of Scale Aeromodelers. I think an international outlook would be a good thing and would not interfere with

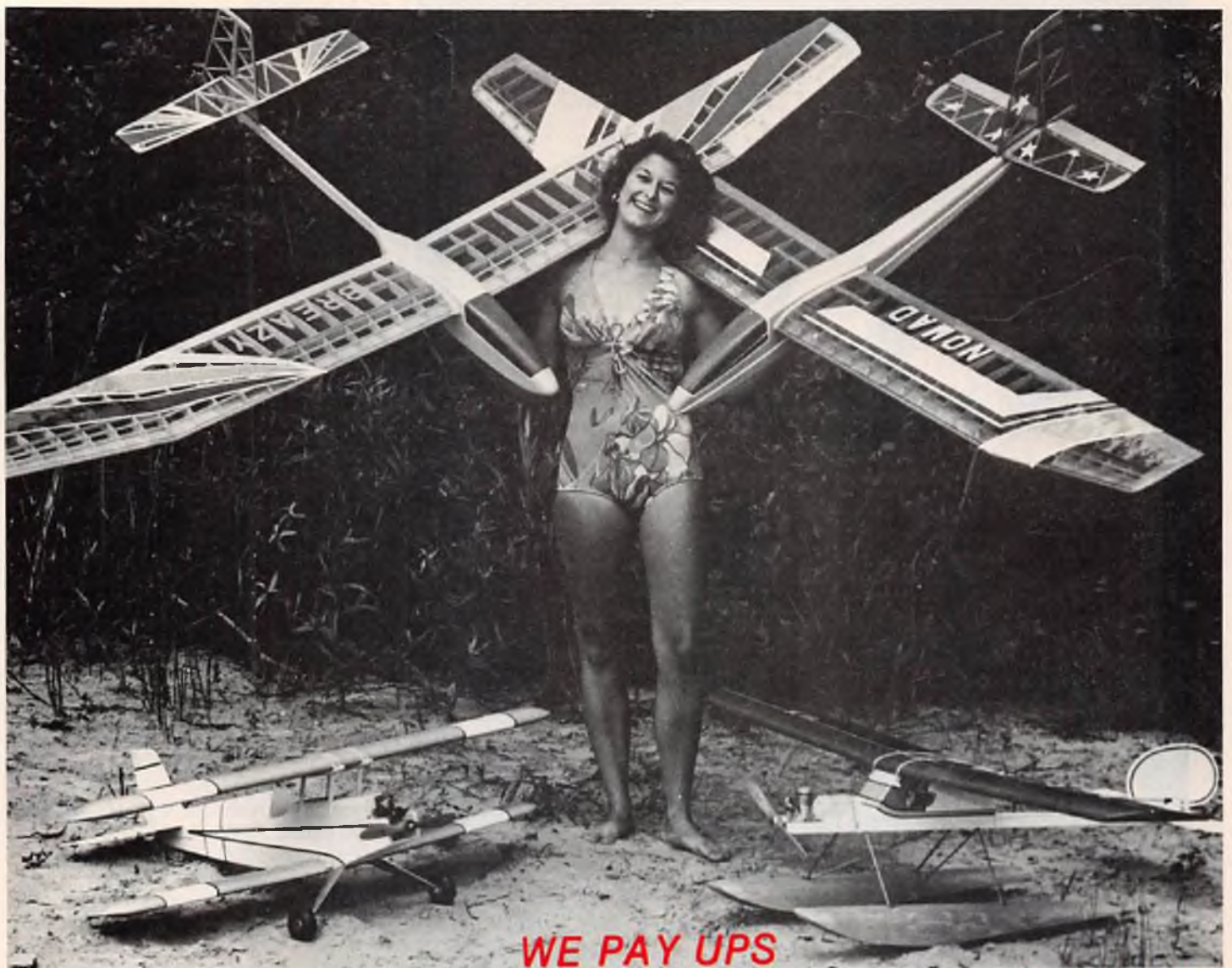
to page 114

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About Our Kits
 All our kits are designed for fast building, are all Balsa with fallout
 (except on machine cut parts and printed parts-no foam) all kits come
 complete with sorted balsa grains, necessary hardware, formed wire, canopy,
 ABS-coats and wheel pants.

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SMOOTHIE, 52" SPAN, .40-50 POWER	19.99
EXCALIBUR, 52" SPAN, .40-50 POWER	21.99
TEMPO 11, 60" SPAN, .30-45 POWER	17.99
SWIZZLE STICK 30, 48" SPAN, .15-29 POWER	11.99

BREAZY SAILPLANE, 99" SPAN, 10" CHORD, 900 SQ. IN. CANOPY, 1/32" PLYWOOD BOOM, NO FOAM	\$ 20.99
PHAETON BIPLANE, 48" SPAN, .35-.45 POWER, ALUM GEAR, 4 CHANNEL, SEMI-SYMMETRICAL AIRFOIL NOT FOR THE BEGINNER	\$ 22.99
NOMAD SAILPLANE, 100" SPAN, 10" CHORD, 914 SQ. IN. CANOPY, NO FOAM	\$ 19.99
SWIZZLE STICK 40, 60" SPAN, 10" CHORD, .30-.45 POWER, BASIC TRAINER AND SUNDAY FLIER, FAST BUILDING	\$ 13.99
FLOAT KIT, 30" LENGTH, FOR AIRCRAFT UP TO 6 1/2 LBS.	\$ 9.99

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1/4 x 2 (10 PK)	4.50
1/16 x 3 (10 PK)	3.00
3/32 x 3 (10 PK)	3.60
1/8 x 3 (10 PK)	4.50
3/16 x 3 (5 PK)	2.50
1/4 x 3 (5 PK)	2.80
3/8 x 3 (5 PK)	3.59
1/2 x 3 (5 PK)	4.49
1/16 x 4 (10 PK)	4.80
3/32 x 4 (5 PK)	2.69
1/8 x 4 (5 PK)	3.33
3/16 x 4 (5 PK)	3.63
1/4 x 4 (5 PK)	4.22

STICKS 36"

1/16 x 1/4 (30 PK)	2.16
3/32 x 1/4 (30 PK)	2.25
1/8 x 1/4 (30 PK)	2.34
1/8 SQ. (30 PK)	1.80
3/16 SQ. (30 PK)	2.34
1/4 SQ. (30 PK)	3.60
1/4 x 3/8 (30 PK)	3.96
1/4 x 1/2 (30 PK)	4.32

DOWELS 36"

1/8 DIA. (10 PK)	.60
3/16 DIA. (10 PK)	.70
1/4 DIA. (10 PK)	1.00

STRIPS 36"

1/4 SQ. x 30 (20 PK)	1.99
1/4 x 3/8 x 30 (20 PK)	2.13

MUSIC WIRE 36"

1/16 DIA. (10 PK)	.79
3/32 DIA. (10 PK)	1.49
1/8 DIA. (10 PK)	1.99
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1 x 2	1.00
1 x 3	1.47
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2 x 3	2.22

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3/32 x 3 x 30 (10 PK)	3.00
1/8 x 3 x 30 (10 PK)	3.80
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3/32 x 4 x 30 (10 PK)	4.79
1/8 x 4 x 30 (5 PK)	2.25

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3/32 x 6 x 48 (2 PK)	4.39
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1/4 x 6 x 48 (2 PK)	4.49

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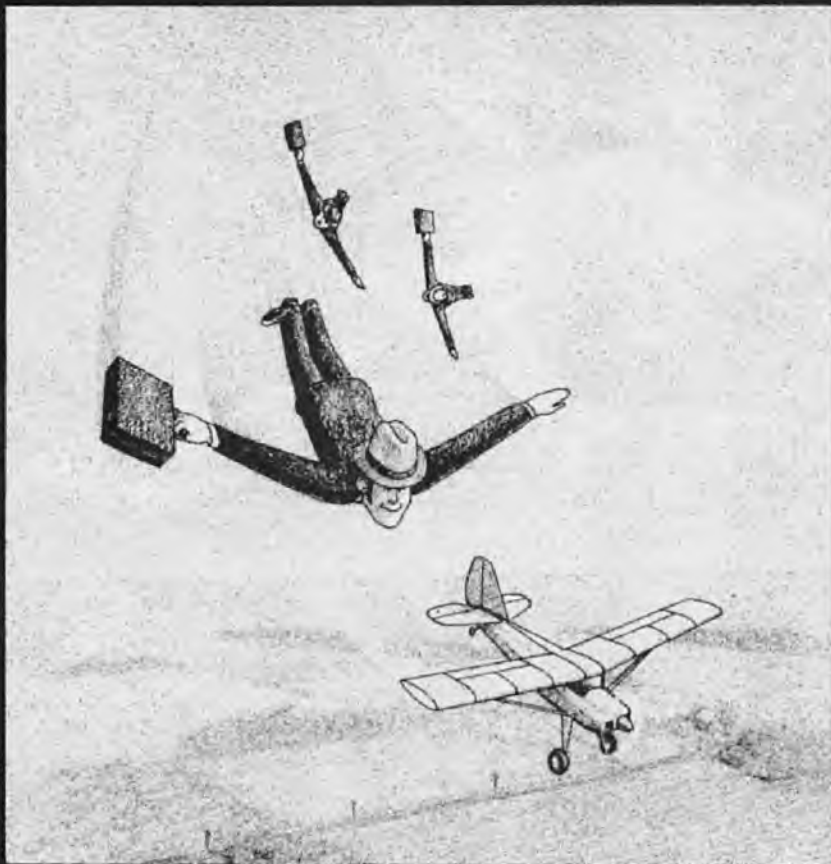
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SCALE VIEWS

from page 112/75

any of the strictly national preoccupations such as rules and team selection. Some members have never liked the NASA name because of possible confusion with the National Air and Space Administration, so it may pass.

Whatever the title, considering the growing influence of, and necessity for, specialist groups, every serious scale model builder should be a member. As the organization grows it will be an increasingly important influence on scale affairs as has been the case with older specialist groups such as NSRCA, NMPRA, IMAC, etc. A newsletter is published regularly. Send editorial material, suggestions and comments to NASA President Bob Underwood, 4109 Concord Oaks Dr., St. Louis, Missouri 63128. Dues are \$5.00 per year, payable to Noel Allison, Sec.-Treas., NASA, 4174 W. 120th St., Hawthorne, Calif. 90250.

Footnotes

That list of Nats Scale entrants in the December issue is short a name: Mike Gretz, who flew a Zlin Akrobat. I made the list from the flight line roster so I could keep track of who was flying what model. Didn't bother to write down his name because he spends 50 weeks a year at a desk just 6' from mine and I knew what he was flying! Mike won 1st in both CL Sport and Precision Scale in Lake Charles and is steadily gaining in RC Scale events.

If you have developed a better way to build a model mousetrap, send in a sketch and/or photo and we'll present the best efforts here in Scale Views. □

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HEADWIND "B"

from page 74/64

necessary to strengthen the landing gear. This may be bent, wired, and soldered to the main gear. The other end should be fastened with a loop to one of the screws that holds the strut hinge on the bottom of the fuselage.

If you mount your engine exactly horizontal, there is a possibility your muffler may not fit. It may be necessary to rotate the engine mount a few degrees clockwise — looking at the spinner — to obtain sufficient muffler clearance. The only problem this could cause would be with the 1/2" balsa fill on the top of the nose.

Verification: When you order your plans for the Headwind "B" from RCM, it would be advisable to order the scale verification kit from Stewart Aircraft Corporation, 11420 State Route 165, Salem, Ohio 44460. This is the same kit that is sent to people interested in building the full size Headwind "B". It contains 8 x 10 reproductions of each sheet of the plans for building the full size Headwind. Also included are 3-views, a drawing of a complete full size without covering, and other incidental pictures --- it is well worth the \$5.00 asking price. This kit was not available when I drew the plans (they were taken from a larger blue line from which the 3-view in the packet was taken). This Headwind is only Stand-Off Scale --- if you want to go exact scale, the verification kit is a necessity. □

RADIO SPECTRUM

from page 63/61

complete check and alignment, but there are still some small bugs, like worn pots, which show up between these examinations. The delays become irritating at the peak of the flying season.

Thank you very much for your time and attention. Keep up the good work!

Yours truly,

Charles E. Herzog

To tell the truth, I haven't any first hand experience with Futaba batteries but I have heard that they do not have the low internal impedance of other cells. This would prevent fast charging. It would be similar to trying to fill your swimming pool through model fuel tubing verses the fire department hose. You just can't push the water through the high impedance line.

You should be able to substitute G.E. cells with no problem.

The Astro Flight Analyzer doesn't actually check battery capacity, but only its ability to deliver high current. As you have found out, the batteries can deliver about the same until they are really low.

to page 120

Top Placing Contestant



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RADIO SPECTRUM

from page 118/61

The only way to measure capacity is to go through a timed discharge as we've discussed in the past. With an expanded scale voltmeter you can then predict remaining flying time fairly accurately.

If the Analyzer shows high discharge currents it sounds like you ought to be able to fast charge. I would try the fast

charger as directed but then check to see how well it worked by running the discharge test. If you don't average about one amp charge current for 15 minutes, you are not getting enough charge and should try the G.E. cells.

I haven't been inside any Futaba servos, but usually the wipers are crimped on a carrier that is pressed on. You really shouldn't need to remove the wipers. You should be able to adjust the servo by rotating the pot element rather

than the output shaft. A very, very little lubricant such as Lubriplate should be used on the element.

Mixed Systems

Dear Jim Oddino:

Help!

When I was moving my pattern ship and stuff from my truck to the house two weeks ago, some dirty dog stole my transmitter from the back of my open truck.

to page 122



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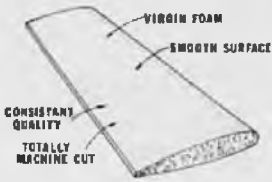
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More quality products from WING MFG.

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LOW PROFILE NYLON WING BOLT 1/4-20 x 2" WITH HEX KEY HEAD FOR FASTEST AND CLEANEST REMOVAL OF WING. COMES WITH ALLEN WRENCH AND NYLON WASHERS TO PREVENT CRUNCHING WHEN WING IS BOLTED DOWN. INCLUDES 4 BOLTS, 4 WASHERS & WRENCH.

ITEM #215 9 Piece set \$1.99

1" WIDE ALL PURE BRISTLE BRUSHES WITH WOOD HANDLES

IDEAL FOR APPLYING WING ADHESIVE, EPOXY & POLYESTER RESIN. CAN BE CLEANED MANY TIMES WITHOUT BRISTLES CURLING. HANDLES WON'T MELT IN SOLVENTS LIKE PLASTIC BRUSHES.

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NI CHROME WIRE FOR FOAM CUTTING. THE SAME HIGH RESISTANCE WIRE WE USE FOR PRODUCTION. GIVES EXTREMELY SMOOTH CUT—LONG LASTING. 928 G. 1/16" - 50 FT. SP. COIL \$4.95 EA. no. 229

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CRYSTAL LAKE, ILLINOIS

SEND \$5.00 FOR COMPLETE PRODUCT CATALOG

RADIO SPECTRUM

from page 120/61

The problem: My radio was (is) a Pro-Line Challenger II, 5 channel purchased in 1975 from Dick Chronister of Glendale. Transmitter was 72.400, serial number 007357.

Cannot understand a thief who would steal only a transmitter and of a make

from a defunct company to boot!
My dilemma: As my Pro-Line is a "negative pulse" system, now what do I do? Not an expert on radios, I'm not aware if another breed of transmitter will work with the Pro-Line receiver-decoder?

Regards,
"Doc" Gerry Casey
Santa Barbara, Calif.
Don't know about that defunct company business, so my first reaction

is to say — call Pro-Line and get another transmitter.

You will need to send your receiver to get it tuned to the new transmitter. The real reason for printing this letter is to clarify the positive-negative pulse thing. The pos./neg. defines the interface between the receiver and servos. A Pro-Line airborne system could be adjusted to work with almost any transmitter on the market. You might run to page 126



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Engines,
Small Parts Galore!

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FILTERS IN EITHER DIRECTION



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ONLY
\$1.75

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5 MINUTE EPOXY ONE POUND PACK

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Only \$0.90



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Only \$2.25

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RELAX AND HAVE FUN WITH A KIWI!

We're all sport fliers at heart and this is a great model for Sunday sessions. Fly it on wheels at the club field. Stick on some ready-made plastic floats and take the family down to the lake for an outing. When the snow gets higher than your low bounces, substitute a set of skis. Install one of those molded bomb droppers and challenge all comers to an informal dive bombing event. You name it and the Kiwi can probably do it. And check that price against comparable models of other companies. A bargain without any shortcuts.



Above and below: Hank Pohlmann gets his feet wet launching the Kiwi, which takes to water like a duck on a pair of 33" Gee Bee floats. Lower right: Jim Duda's Kiwi has a sharp red, white and blue color scheme. Cables from the nose gear steering bracket operate a water rudder on one float.



KIT FEATURES:

Built-up Wing
Die-Cut Sig Balsa and Plywood
Printed Balsa Fuselage Sides -
Build Directly on the Wood
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Illustrated Instruction Book
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Nylon Control Horns
Wire Aileron Torque Rods
Nylon Wing Bolts
RC Links and Threaded Rods
Screws, Blind Nuts and Other Small Hardware

WINGSPAN: 54"
SUGGESTED ENGINES: .35 - .45
SUGGESTED RADIO: 4 CHANNEL

Designed by HANK POHLMANN

SIG

KIT NO. RC-42

\$42.50

The Kiwi kit doesn't come with floats, skis, or bomb droppers but Sig has them in stock:

GB-F-033 GEE BEE FLOATS, 33" 22.95
RV-AS-005 REV TRI-GEAR SKI SET 10.95
VT-BR-001 VORTAC BOMB RELEASE 4.98
VT-EB-001 VORTAC EXPLODING BOMB 5.98



New! 7/32" WIRE FOR 1/4 SCALE

Landing gears have to take it when twenty-five pounders touch down. Sig introduced 3/16" wire to modeling many years ago and now we are adding this new heavy duty size.

HEAVY DUTY
SPRING STEEL
36"
LENGTHS
MW-013 .98

New! STRAIGHT EDGES AND TRIANGLES

ALUMINUM STRAIGHT EDGES

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TR-036 6" \$.69 each
TR-612 12" \$1.29 each

New! WHEEL COLLARS



TOP QUALITY PLATED BRASS
COLLARS WITH SOCKET HEAD
SET SCREWS & ALLEN WRENCH

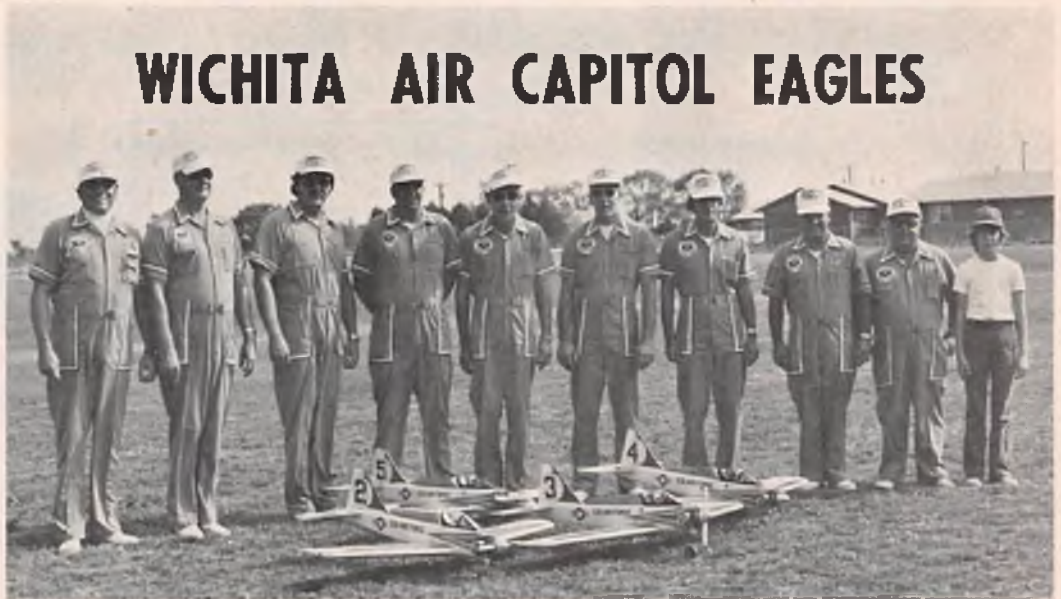
SH-584 1/16" Inside Diameter Pkg. of 4 - 75¢
SH-585 3/32" Inside Diameter Pkg. of 4 - 75¢
SH-586 1/8" Inside Diameter Pkg. of 4 - 75¢
SH-587 5/32" Inside Diameter Pkg. of 4 - 75¢
SH-588 3/16" Inside Diameter Pkg. of 4 - 75¢

The best hobby dealers stock Sig products. For direct orders, add \$1 postage on orders under \$10. Postage free over \$10. No C.O.D. Latest complete Sig Catalog - \$2 P.P.

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SIG SALUTES THE ACES SHOW TEAM

The Air Capitol Eagles (Aces) are one of the many AMA Show Teams that use Kougars in formation demonstrations, aerobatic work and other demanding tasks. Larry Vickers said, "We have 30 flying airplanes in our demonstrations. Our favorite is our Sig Kougars. Great flying airplane!!" From the left: Captain-Jerry Shumaker, Jay Osborne, Weyn Sallada, Clyde Young, Keith Penner, Larry Vickers, Scott Davies, Jerry Carley, W.L. Gambin, and Eddie Jump.



WICHITA AIR CAPITOL EAGLES

FLORIDA SHOW TEAM FLIES WITH THUNDERBIRDS



Since a performance by an AMA Air Show Team is generally a feature of every full-size air show, they frequently find themselves on the bill with the famous Air Force F-5 aerobatic group. The styling of the Kougars has some of the same lines as the big bird so a combination of the two makes an attractive photo subject. This shot was taken at Patrick AFB and shows Art Johnson and Bob Temple. Art tells us they recently finished three more Kougars and are painting them in the new Thunderbird color scheme with sequenced tail numbers for an even better match with the AF stunt team.

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BUILDS FAST
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SMOOTH CONTROL RESPONSE
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SYMMETRICAL WING SECTION

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WING SPAN: 50-1/2"
WING AREA: 540 Sq. in.

\$47.50

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New! 1979 KIT HAS OPTIONS FOR EITHER 3 OR 4 CHANNELS
MATERIAL AND DIRECTIONS SUPPLIED FOR AILERONS **\$39.95**

In the few years since its introduction, the Kadet has become the standard by which other RC trainers are judged. Sig dealers have sold ten's of thousands—proof of the acceptance of our "Learn To Fly RC The Sig Way" program, which suggests that beginners start with rudder control on 3-channels and the Kadet. Some club instructors prefer to teach beginners using aileron control from the start and have recommended to us that the Kadet be equipped with ailerons for those who wish to use them. We are still going to recommend starting with 3 channels and rudder control, but now an easy half step up in learning to fly RC can be accomplished by plugging in the ailerons and getting in some easy, forgiving 4 channel flight time before moving on to a faster trainer.



STILL AVAILABLE - AILERON SET FOR 1978 KADET KITS

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- 84" span, 1000 squares
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- Perfect flyer on a .61, really turns on with a .91. Buy it — build it and really have fun.

Sleek & sporty
Miss Texas

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RADIO SPECTRUM

from page 122/61

into some timing problems because Pro-Line always set their neutrals on the long side. This means you would have to adjust the servos to the transmitter or vice versa, but you don't have to worry about the positive-negative thing as long as you have the same brand receiver

and servos.

Oddino Invents Rubber Transistor

Dear Jim Oddino,

With regard to your article in the August issue on a typical R/C transmitter, I found it a very straight forward, easy to follow design article. Having been in the electronics end of space systems design my only objection is your use of a rubber

(silicone) transistor. I guess typo's occur in the best of articles. Keep up the articles on R/C systems design. There are a few of us who like to understand how they work.

E.L. Spolinger
Camarillo, Calif.

I hope it was a typo, because I have been known to blow a few. Engineers are not known as spellers but I'm not
to page 128



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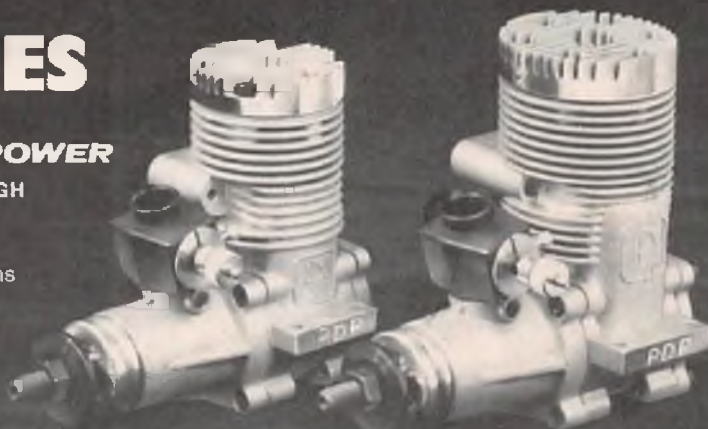
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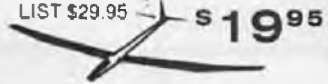
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FAI	9.95	Power and you'll both be pleased. These
5%	10.95	are a few of the in-the-know people who
10%	11.95	do: Tony Bennetti
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40%	21.95	Cool Power is now available in metal
Helicopter	12.95	cans as well as plastic bottles (\$1.00 more
		in cans).

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RADIO SPECTRUM

from page 126/61

supposed to worry because RCM has this machine with all the words pre-stored and spelled right. The only problem is the machine wasn't smart enough to know if I meant silicon or silicone. I really do know the difference.

We will leave you for another month on this high intellectual plateau. □

MACHINE AND WOOD SCREWS

from page 60

breaking taps, when the tap appears to bind, reverse one turn and try again. Deep holes might require many stops and starts per thread.

To select the right size rod to thread for numbered machine screws, this equation can be used: Rod diameter = $0.060" + 0.013"N$, where N is the number of the screw. Example: Required — the proper rod diameter for a 4-40 threaded rod. Rod diameter = $0.060" + 0.013" (4) = 0.112"$.

Two charts are presented to permit choosing the proper size rod, drill or tap for threading rods, and drilling clearance and tap holes. The first chart is for metal screws and the second is for wood screws.

There are five standard ways in which drills are identified: (1) Numbered, (2) Lettered (3) Fractional (4) Decimal in thousandths; and (5) Metric, with decimal equivalent in addition. Screws and bolts are classified as: USS or SAE and ASA course, fine and extra fine, and, of course, metric. □

PEPPERMINT PATTIE

from page 59

The fin, rudder, and stabilizer are built-up from 1/4" strip stock and the elevator is 1/4" sheet balsa sawed to shape.

Hardware items furnished include aileron torque rods, control horns, nylon screws, and living hinge material. Plywood parts were sawed to shape or beautifully die-cut with no crushing and many of the balsa parts we also cut to shape. The aileron stock was completely shaped including a rounded leading edge. The quality of the balsa was excellent and showed real care in its selection.

I used Hot Stuff, Devcon 5-Minute Epoxy, and Cam Craft Core Cement to hold it all together. The little bird is finished with red and white Solarfilm. Less than one full roll of covering material is required.

to page 130

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the want and need your support as well as what new numbers you ask for since we've become a volunteer design service organization, without dealer support.

See* Name Plan	78 Lock Hudson Bomb \$49
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58 Supermarine S6B \$20	102 Flying Fort B-17G \$49
43 Howard "Ike" Race \$25	65 M. Marauder B-26 \$39
78 RT's Weddell-Wing \$29	49 Black Widow P-61 \$26
64 D H Comet Reccer \$18	99 Black Widow P-61 \$69
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74 "Perez Special" \$35	58 H.P. D400 Handi-PG \$30
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58 Maehi A-3 Sea Fr \$14	78 Sopwith Pup Pr \$25
70 Bayle's Geo-Bee \$29	63 B-W Bird-Bipe \$29
62 Curtiss Hawk P-6-E \$29	107 Martin MB-1 Bomb \$30
66 Curt Thrive A-8 \$22	66 Caudron G-III Obs \$15
40 Douglas O-38 Obs \$19	61 AEG GIV Bomber \$18
71 Martin B-10 Bomb \$20	58 Salinas 2-A-2 \$15
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Two Maserati Boras and two BMW 3.5 CSLs. Each Pro-Cision car has its own configuration. Each a fantastically scaled replica of the full-sized

original. And each has its own frequency so all four cars can be raced at once.

Pro-Cision's handling is phenomenal. A steering wheel control on the transmitter assures you of precise steering. There's even a trim adjustment for exacting wheel alignment. And the throttle control enables you to crawl or run flat out—and everything in between! You can stop or reverse at will.

If you think racing these Pro-Cision cars is kid stuff you just haven't tried it!

Ask for a demonstration wherever hobbies are sold. See Pro-Cision's incredible trio of racing Porsches and the rest of the exciting Pro-Cision line.

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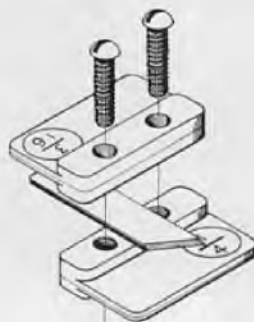
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PEPPERMINT PATTIE

from page 128/59

Up front I used a trusty O.S. Max .15 with a four ounce Sullivan fuel tank.

I was a bit concerned about hand launching a plane of this type with this wing loading, but there was no need. The little bird practically flies right out of your hand with complete control almost instantly. Minimal control surface throws should be used as this thing is super responsive. It is not a novice's airplane. The "Hot Dogger" who gets his kicks showing off for the Sunday afternoon crowd can have a ball with this little bird. The roll rate is so fast that if you blink you'll probably miss it! The engine should be set up so that you can kill it with low throttle trim. Landings are stable and graceful and the Solarfilmed belly doesn't seem to suffer from sliding along in the grass.

For less violent control response I recommend that the aileron horns be extended as long as possible within the belly hatch and a longer horn be used for the elevator. This should make Peppermint Pattie into a really good flying fun machine. For those who want to go faster or perform extended vertical maneuvers, a Cox or Rossi .15 or a K & B .19 would make this little bird sizzle. □

ADAM DID IT TOO!

from page 58/57

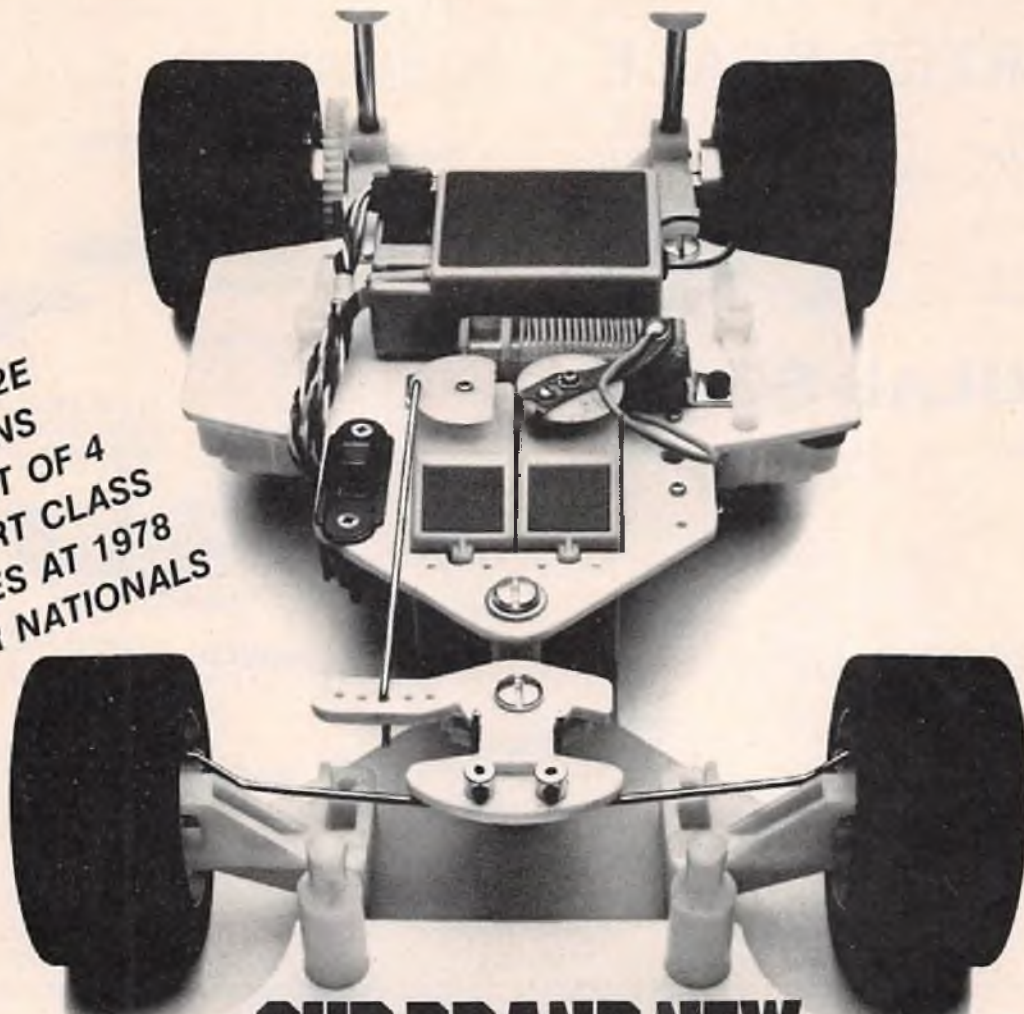
structural parts join. Don't overdo it — a thin layer of wax is all that is needed to keep ribs from sticking to the jig. Half-depth jigs require less wax than full-depth ones since there's less chance of glue holding rib to jig.

Before beginning to turn-out ribs, pre-cut all of the gussets that you'll need. Gussets "tie" the rib parts together and add a lot of strength even though only 1/64" or 1/32" ply is used for them. See Figure 2 for the various gusset shapes you might need. It's not a good idea to pre-cut the 1/8" square spruce internal structural members because they should be fitted **exactly** as you build a rib. We've found that a Powr-Mite Sander is an invaluable rib building tool. It'll allow you to sand rib components squarely and precisely with a minimum of effort.

Let's start building! Lay-in the outer spruce strips first and then add any **vertical** strips your design calls for. Don't glue anything yet! Add the diagonal spruce strips, sanding-in the angles at their ends. You will find that **all**

to page 132

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ADAM DID IT TOO!

from page 130/57

of the strips you bought at the hobby shop are not the same size. Some of them will be slightly wider than others and some of them will be more rectangular than square in cross-section. Choose your strips to fit the slots in the jig as closely as practical.

With all of the spruce strips in place,

start gluing the gussets in place. Use slow drying epoxy, applied with a pointed piece of spruce or balsa strip. Too much epoxy, and the rib will be stuck to the jig, so apply the glue judiciously. When the epoxy sets, carefully pry the rib from the jig. We use a 6" length of 5/32" music wire as a pry-bar. One end is ground to a rounded screwdriver-like wedge, the other to a rounded point to push gussets into

place.

With the rib out of the jig, flip it over and glue the gussets to its "other" side. Use a cyanoacrylate glue (Hot Stuff, Zap, etc.) for this second set of gussets — it's quicker. A tad of sanding (to even up the gussets with the outer edges of the rib) and the rib's completed. If you get up early, come home for lunch and build one after supper, three ribs a day is

to page 134

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ADAM DID IT TOO!

from page 132/57

par for the course. 5-Minute epoxy will speed things up a bit but if you're building a particularly large rib, the epoxy "goes" before all of the gussets are in place. The ribs shown in our photographs have a chord of 21" — and took two or three "batches" of 5-Minute epoxy to complete when we tried to use it.

Gotta admit it, built-up wing ribs are a lot of effort. And, tapered wings need several different sized jigs if you want to go that route. Dick Kidd, RCM's Technical Editor, thinks the author is off his rocker — for building 39 ribs for his latest scale design (the ribs in the photos are for a 1/4 Scale Ryan B-5 Brougham). But, the 127" (2,667 squares!) scale wing weighs less than four pounds! And — all of those spindly sticks look very sexy! "Chacun a son gout" — everyone to his own taste — we always say!

Try built-up wing ribs for your next 1/4 Scale project. They're light and cheap and exact — and just like real airplanes! □

MIRAGE

from page 56/48

(12) Glass the forward portion of the fuselage with two ounce glass. Note the dotted lines on the plan which show the extent of the glass. Note that you can cover the whole shot with one piece of glass.

(13) Trim whatever needs to be trimmed, and sand it for the last time.

Covering

I recommend MonoKote. All of the torsional rigidity in the wing comes from the covering, and MonoKote seems to be the most rigid. I would also cover the fuse with MonoKote since it is rugged, light, easy, and works fine over glass.

Some comments on color scheme: Dark wing bottoms seem to be the most visible at really high altitudes. You might also add a chrome band around the fuse, and maybe a strip on the rudder, so that if you lose sight of the plane it will flash occasionally.

Finishing Touches

Make the pushrods. I strongly recommend the balsa rods called for in the plans. Balsa has two big advantages: it is lightest, and it does not change size relative to the fuse with changes in temperature. This means that you can learn the trim settings on your transmitter and count on them all day long and from week to week.

Do make up blocks of lead ballast. I make blocks by melting lead in an old tin can on my gas stove. Simply pour the

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lead into a form made of lumber scraps with an aluminum foil liner. Be careful when you do this — be ready for such unlikely disasters as the bottom of the can falling out — wear shoes and pants!

Prepare the plane for flight. Get the C.G. in the right place. Make sure the wing is straight except for equal washout on both tips. You can do this by sighting from behind the trailing edge. Get the rudder and elevator pointing straight, with the correct throws. Shake the airplane to see what you forgot to fasten in properly. Check to make sure that the wings are of equal weight. If not, add weight not at the tip, but rather at the joint between the main panel and the tip where it will have less effect on the moment of inertia. If you are going to do it right, put it ahead of the spar as well.

Flying. At Last!

Give the thing a hand toss to see if the laws of aerodynamics still work. If you didn't get out on that thermal you flew through, you might cheat and put it up on a winch or high start. There is really nothing to it. On launch the plane is not sensitive to trim — too much up and the plane mushes, too much down trim and it goes up faster. In any case it should go up about as well as a Paragon, with about two-thirds the line tension.

The big thing with this plane is the speed range. This means that in thermals while circling you should really slow it down. Just floating around at minimum sink speed you want to be significantly above stall speed — it will take awhile to figure out the very best speed, but it isn't crucial. For best L/D you want to move about 10% faster than minimum sink speed. In sink or heading upwind you want to go faster. The plane will really move if you put the nose down.

If you are flying on a day with strong lift and sink, or a day with wind, you will want to broaden the speed range further at the expense of the lowest speeds by ballasting the airplane. Just don't get carried away showing off the plane's speed because you just may blow the wings off. Don't exceed 60 mph and you will be okay.

When working thermals, try to determine the thermal size and center. If the thermal is very small, as is often the case at low altitudes, don't hesitate to bank the plane steeply to get into the core. The plane seems to fly cleanly at bank angles as high as 45°.

The best spot landing approach for this plane seems to be of the rectangular type. Fly by your head downward with some extra speed at about 10 feet and 15 seconds. At 8 seconds or so, depending on the wind, start your about-face. Work the turn as necessary to lose altitude or keep it. Then come right down to the deck and line it up. Then nail the spot. If you are stretching, make the turnaround gently and come down to the deck later. And vice-versa.

to page 138

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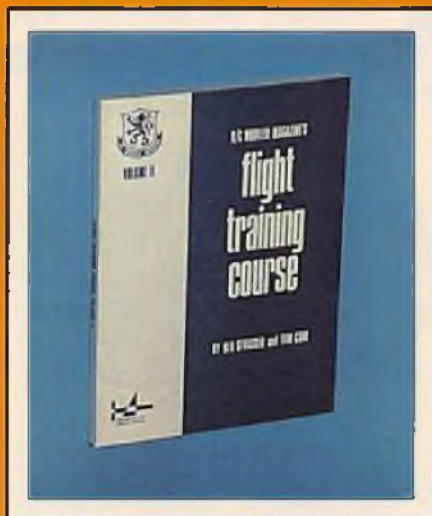
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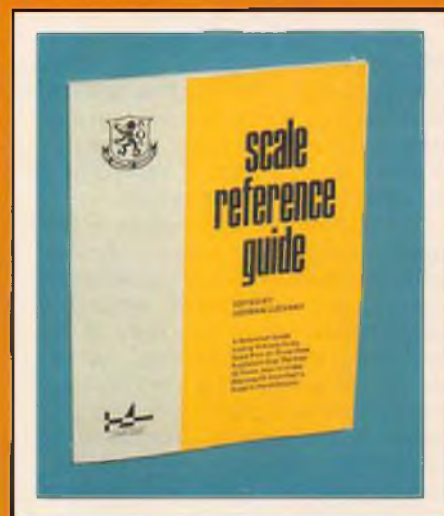
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MIRAGE

from page 135/48

I like to practice my landings from a hand launch. A hard toss will give you 30' easy, and a full approach can be made. If the day is good it is fun to do a little circuit of the field, and try to work lift. It is not all uncommon to get out from 20' with this plane. If you get tired of bending over to pick the plane up, it is very easy to play catch with yourself!

□

STEARMAN CONVERSION

from page 47

pants are slotted and they slip over the axle and are held in place with two #2 sheet metal screws. Lay a couple of extra patches of fiberglass on the inside of the pants where they attach to the arm.

The model is primed with Super Poxxy primer and sprayed with plasticized acrylic lacquer.

The cockpit has just bare essentials. Not really necessary for Stand-Off, but I decided to go to a little extra trouble in case a judge got between the airplane and the outer boundaries of that 20' circle. It's not supposed to influence them, but I've more than a sneaking hunch that it does.

The flying wires are round elastic cord that I stretched and sprayed silver with heavily plasticized lacquer. I know some hawk-eye out there is going to note that Stearman flying wires were streamlined and also note from the pictures that they attach to the struts and not to the wing as on the big one. This was done for ease of assembly. The flying wires are pulled through the cleats, doubled back 1/2" and stuck together with Hot Stuff. A piece of 3/32" heat shrink tubing about 1/2" long is slipped over it and shrunk. It looks a whole lot better than hooking the ends over the cleat. The wings can then be removed without having to fuss with the flying wires.

to page 142

DAMO 4 CYCLE TWIN 1.1 cu. in.



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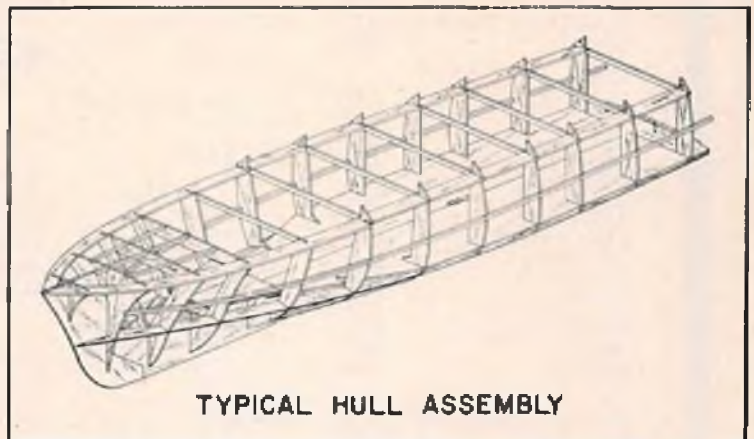
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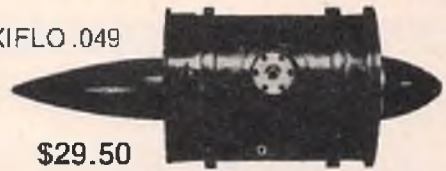
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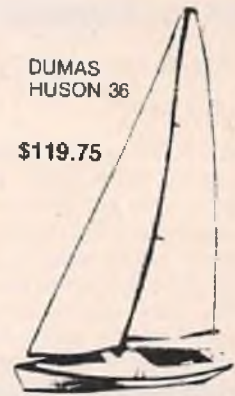


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STEARMAN CONVERSION

from page 138/47

When you have your new bird all ready to go, don't leave anything to chance - - - double check everything. When satisfied, take it to the field when there won't be a crowd of onlookers. I know you'll be anxious to show it off, but the fewer people around on the first flight the better. To begin with, you can "back

out" better if you are alone. By that I mean if you take it out and the weather is just marginal or you've got a servo acting up a little or any one of a number of things, you might be goaded into flying it for fear you'll disappoint some people waiting to see it fly. Remember, you're the one who will have to do the repair work; the others will just be able to offer sympathy. Next, and this is most important, if you're by yourself, or nearly,

you can concentrate better. You take it out on Sunday afternoon and you'll have at least two or three planes in the air; you can't hear the engine; you don't know if it's lean, rich, or worse, not running until too late. Being able to hear the engine is most important in a scale model. I once violated this rule and was on the final with a model that I had spent five months building, when all of a sudden somebody

to page 144

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STEARMAN CONVERSION

from page 142/47

fired up a .60 right behind me. My concentration was broken and I stalled it 4' off the runway; all because I couldn't hear the engine. I suspect a lot of "bad" flying is caused by this - - - after all even Jack Nicklaus likes quiet on the back swing!

PORSCHE 935 TURBO

from page 46

... who does a super-duper job of building it up and then, I bet, he is unable to make it work. That is when the big sheet gets lost and, in the confusion, the Kid decides to give me the shaft by

turning it over to me and not telling me the problem his super-builder runs into. Well, dumb I am not: a bit slow maybe but I get there eventually, so I look at this booklet and run into trouble right away. Like I say, it has words in it and I don't read too good - to be strickly honest I don't read at all! My education teaches me to recognize the numbers on a combination lock and how to turn it right

to page 146



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102	1 8	30
103	5 3/2	35
104	3 1/8	40
105	7 3/2	45
106	1 4	50
107	9 3/2	55

ROUND BRASS TUBE (12")		
STOCK NO.	SIZE	PRICE EACH
125	1 1/8	30
126	3 3/2	30
127	1 8	30
128	5 3/2	35
129	3 1/8	45
130	7 3/2	50
131	1 4	55
132	9 3/2	60
133	5 1/8	65
134	11 3/2	70
135	3 8	75
136	13 3/2	85
137	7 1/8	80
138	15 3/2	95
139	1 2	1.00
140	17 3/2	1.05
141	9 1/8	1.10
142	19 3/2	1.20
143	5 8	1.25
144	21 3/2	1.40

COPPER TUBE (12")		
STOCK NO.	SIZE	PRICE EACH
*117	1 1/8	25
*118	3 3/2	30
*119	5 3/2	40
120	1 8	30

SOFT BRASS FUEL TUBING (12")		
STOCK NO.	SIZE	PRICE EACH
121	1 8	40

RECTANGULAR BRASS TUBE 12"		
STOCK NO.	SIZE	PRICE EACH
262	3 3/2x3 1/8	1.10
264	1 8x1 4	1.05
266	5 3/2x5 1/8	1.10
268	3 1/8x3 8	1.20

BRASS STRIPS (12")		
STOCK NO.	SIZE	PRICE EACH
230	0.16x1 4	20
231	0.16x1 2	25
232	0.16x1 1	40
233	0.16x3 4	35
234	0.16x2 1	70
235	0.25x1 4	25
236	0.25x1 2	35
237	0.25x1 1	60
238	0.25x3 4	50
239	0.25x2 1	1.10
240	0.32x1 4	30
241	0.32x1 2	40
242	0.32x1 1	75
243	0.32x3 4	60
244	0.32x2 1	1.30
245	0.64x1 4	50
246	0.64x1 2	85
247	0.64x3 4	1.10
248	0.64x1 1	1.50
249	0.64x2 1	2.50

SQUARE BRASS TUBE (12")		
STOCK NO.	SIZE	PRICE EACH
149	1 1/8	40
150	3 3/2	45
151	1 8	50
152	5 3/2	65
153	3 1/8	75
154	7 3/2	85
155	1 4	95

BRASS STREAMLINE TUBE (12")		
STOCK NO.	SIZE	PRICE EACH
122	SMALL	75

SHEET METAL (4" x 10")		
STOCK NO.	SIZE	PRICE EACH
250	005 Brass	65
251	010 Brass	95
252	015 Brass	1.25
253	032 Brass	2.20
254	008 Alum	50
255	016 Alum	50
256	032 Alum	75
257	064 Alum	1.25
258	Ass't Brass	1.00
259	025 Copper	2.20

BRASS ANGLE (12")		
STOCK NO.	SIZE	PRICE EACH
171	1 8x1 8	35
172	5 3/2x5 3/2	40
173	3 1/8x3 1/8	50
174	7 3/2x7 3/2	55
175	1 4x1 4	65

BRASS CHANNEL (12")		
STOCK NO.	SIZE	PRICE EACH
181	1 8	45
182	5 3/2	50
183	3 1/8	55
184	7 3/2	65
185	1 4	75

SOLID BRASS ROD (12")		
STOCK NO.	SIZE	PRICE EACH
159	0.20	08
160	1 3/2	08
161	3 0/4	12
162	1 1/8	20
163	3 3/2	25
164	1 8	40
165	5 3/2	50

ROUND PLATED SPRING WIRE 12"		
STOCK NO.	SIZE	PRICE EACH
192	0.32	08
195	0.47	08
197	0.55	08
199	0.83	08

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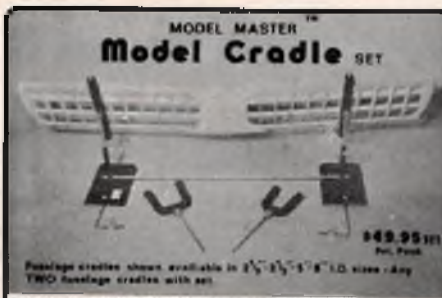
from page 144/46

or left while listening for the tumbler. I also learn the Presidents of the United States (how else you going to tell a five from a ten or a twenty?).

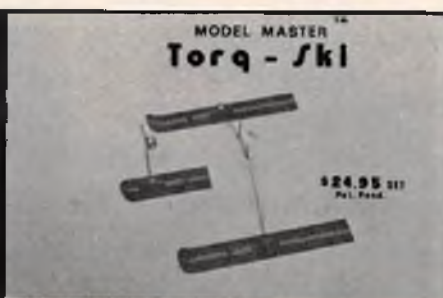
So, I head next door, where Pat the Crewchief lives and I borrow this ten year old youngun who hangs around there. His reading is not so hot either, but it is way better than mine, so I stick this booklet in one of his hands and a Ding-Dong in the other and sit back and watch for developments. Well the youngun breezes through the book in about two minutes flat and says: "Simple," he says, "give me a couple of bucks," he says. "What for?" I says. "Batteries," he says. So I turn out my pockets and come up with the necessary and in five minutes he is back with them. In a couple of shakes he opens one cover on the transmitter and one on the car, pops in the batteries, slips in the antennas and head out to the sidewalk.

By the time I catch on and get myself out there too, the youngun has the car screaming around the cement, forwards and backwards and turning every which way. He also finds it simple enough that he has time to remind me his Ding-Dong is plumb wore out and he is ready for another one. Naturally, I contribute one more to the cause as I can see he uses both hands on the transmitter and therefore he has to relinquish it to hold his replacement Ding-Dong and now I get a turn! And right away I am making like Mario Andretti and thinking this is much more pleasurable than Hondas and nowhere near as hard on the nervous system. I also realize that the Kid's super-builder, who does such a magnificent job, originally, of putting this car together, must have just missed out on the fact that all he needs to do to make it work perfectly is put in some batteries.

to page 148



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- 1/2 A Hobby Commander - Trainer with looks
- Super Quick Racer - Formula 500, ARF
- Plane Jane - .15-.25 ARF trainer
- Pogo Q.M. - Championship Quarter Midget
- Midget Mustang - Championship Quarter Midget
- Midget Mustang II F1 - Formula 1 winner

Dealer and Distributors write for pricing schedule. Texas residents add 5% sales tax.

Hobby Commander 1/2A Sport Trainer

Specifications

Span - 45 in. Engine - 049-051
Area - 260 sq. in. Radio - 2 channel
Weight - 20.25 oz.

Special Features:

- 1) Flies like a trainer - looks full scale.
- 2) Preassembled detailed fuselage.
- 3) New and unique sheet foam wing.
- 4) Easy quick construction
- 5) Stable tricycle landing gear
- 6) Pylon mounted motor
- 7) Easy to follow detailed instructions



Now here's a trainer with character! No longer is an ugly box creation needed to learn how to fly. This new Hobby Commander incorporates the ease of building and scale like details associated with both the Ricky Rat and P-40. However, that's where the association ends. The Hobby Commander has the motor mounted high on a pylon, out of the dirt and up where it is easy to start and hard to kill. A large wing with plenty of area and a flat bottom airfoil for extended flights and hands off landings. Tricycle gear for easy ground handling. And **character** that rivals most scale ships.

PORSCHE 935 TURBO

from page 146/46

But the youngun, by now, gets antsy about the lack of available space so we head to the school yard and find this little beauty has enough radio range to run all over and still remain in control. All the other infants over there keep snitching the transmitter and even the little ones can handle it like experts (in fact they handle it better than me 'cos I never get to practice with it, even though I keep on telling them it belongs to me but I still don't get no respect).

Well, anyway, I don't know how long we are over there but it is quite a long

time and the batteries are still coming on strong when we head for home. The youngun shows me the small red lights on the car and transmitter and says if they glow it means the batteries are still good. He also tells me that it says in the book you can buy a charger from the manufacturer and put nicads in the car, which virtually last for ever, and there is another set of gears in the box which he says you can put in the car, if you use nicads, and the car goes even faster. "Great," I says, but I don't say anything about it already going plenty fast enough for me - considering my total lack of practice. Not only do I have no opportunity to play with the car, I don't have my usual Ding-Dong tonight after

my TV Dinner because all the little monsters troop over to my place from the school yard and clean out my supply. And I already spent my Ding-Dong money on batteries.

You know, the Kid, over in Sierra Madre, doesn't have much respect for my modeling capabilities, but this time I have really got him. He has to be greatly impressed with my smarts on this occasion. I am sure he knows the big white sheet of drawings is missing from the box when he turns it over to me. And is he going to be surprised when I show him I am capable of making this little beauty work perfectly? Course, I am not going to tell him that a very average ten-year old figures out the whole thing

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BRIDI		
RCM-40	39.00	54.00
RCM-60	43.25	59.00
GOLDBERG		
Falcon 56 II	27.50	42.00
Sr. Falcon	36.95	52.00
JENSEN		
Ugly Stick	41.75	58.00
MIDWEST		
Sweetstick	25.86	41.00

REDCO DELUX KITS: (Trainers) Almost everything you will need. Each delux kit contains 4 oz. Withold glue, a 2.5 oz. set of Devcon 5 min. epoxy (Tubes) EK hinges, nyrod, & flex cable control rod sets as required, ail. control horns, wheel collars, metal & nylon clevises, box of rubber bands, as req. plus Dubro low bounce wheels, fuel line, and the right Sullivan tank for the largest engine called for. 2" CG spinners, Kraft Hayes Eng. mounts and Banner axels are also included in kits needing these items. All you need to complete your kit is the Radio, Engine, Covering Material and desired optional items and we can supply these also at our low prices.

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Trim (checks) & Glo	1.59	1.30
Super Coverite	7.75	5.50
TF Monoct. Iron	18.95	13.75
TF Heat Gun	27.95	19.50

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RCM T-40 w/Fox 40 SCHN	68.00
RCM T-60 w/K&B 61 w/MUFF	96.00
Big H Ray w/Fox 45BB SCHN	72.00
Skylark 56 w/Fox 45 SCHN	72.00
Tweedy Bird w/QS25 SCHN	70.00
Sun-Flt 4-20 w/QS25 SCHN	61.00

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STAFFORD		
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Other sizes in stock P.O.R.		

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See R/C Modeler Dec. 78 Model of Mo.	P.O.R.

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3 1/4"	5.20	3.95
3 1/2"	5.55	4.25
3 3/4"	5.95	4.50
4" Diamond	8.99	6.95
4" Straight	8.49	6.50

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ADD \$2.50 (+ \$1.00 for C.O.D.) to all orders for postage and handling. Visa and Master Charge welcome. Personal checks may cause slight shipping delay for bank clearance. All items subject to availability.

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from the few words in the book and a Ding-Dong bribe. You see, there is still some time before Belmont opens and I am also discovering that unattended vaults seem to be in short supply these days so I am not fully occupied. Therefore, I have hopes that after this unmitigated success, the Kid will be seeking my 'profound knowledge' on other projects for RCM (must say I hope the youngun next door is going to be around a while longer, though).

And, at 2 a.m. instead of being at 'Mindys' as usual, me and the Swami Tishna and Dewey-eyed Don will be at the school yard when all the little monsters are in bed. It's the only way we have to get our own jollies out of

zooming this little crackerjack around in all directions without any interruptions from grubby, pushy midgets. Come on over, if you are an adult and want to join in the fun, but remember, you'll have to wait your turn! And naturally, I get two to everybody else's one --- 'cos it's mine!



LAMBORGHINI COUNTACH

from page 39

... cycle, put in around 60 amp-minutes of charge. That was enough to run the car through all kinds of gyrations for about 25 minutes and still was showing no signs of flagging. We don't know how much longer it ran as at

that point our two sons took car, charger, family Mazda and disappeared. They since have chosen to issue absolutely no communiques as to their whereabouts or well-being or lack thereof! We don't know whether to be more concerned about the Lamborghini or the Mazda. The boys are no concern. They always discover they are hungry and come home eventually with a well rehearsed but incredible accounting of occurrences.

Meanwhile, we inspected the molded body with a view to detailing it preparatory to mounting. Perhaps it was because of the very high quality of materials and workmanship found in the

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NEW RC 200 KIT

LAMBORGHINI COUNTACH

from page 149

chassis assembly that we were a bit disappointed when we got the body in our hands. The molding is quite acceptable but the material is thin, clear, colorless plastic which has been spray-painted yellow on the inner surfaces. The masking around the window edges leaves something to be desired. The paint also had not adhered in sharp corners and was thin in some other spots. From the outside, these blemishes showed up rather noticeably.

After we got the rest of the car back from our errant sons we found also that a lot of trimming was necessary before the body would fit. Due to the thin and flexible material, this is not the easiest of operations. The instructions suggest using scissors but we found that even on

straight parts, the scissors caused the paint to flake off. We were successful by paring very gently with the point of a brand new #11 X-Acto blade in our knife handle. This was time consuming but it worked and produced a very tidy result when the edges were finish sanded. We have the experience and tools to tackle many modeling challenges but this car may easily be bought by newcomers to RC who could find this trimming a problem. It is essential to remove more than 1/4" all around the curved, front wheel wells because the wheels otherwise fouled the body as supplied. The body had already been die-cut from the molded sheet and we couldn't help wondering why it had not been done to the correct finish lines in the first place. It appears that it would be just as easy.

Anyway, when we got by this little hurdle the rest was easy. The car looks pretty good wearing its body without doing any further work but we decided to

gussie ours up a bit. We used vinyl tape for masking to paint the grille, rocker panels, rear end, engine covers and air intakes with flat, black, Pactra Polyurethane. We used silver Bridi striping tape around windows and windshield (which covered most of the rough painted edges) and on the grille and rear end. We detailed body panels, doors, etc., with 1/64" black chart-tape (available from good office supply stores). Application of the decals supplied in the kit and some racing numbers we had lying around finally produced a very attractive model as the photograph shows. Also included in the kit is a molding of a driver and cockpit in clear plastic too. We sprayed the whole thing black then detailed out the helmet, body, hands, seats, steering wheel, and instruments, with a conglomeration of paints and colors that we found in all the left-over bottles that we save for just

to page 154

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When properly applied, Silkspun virtually eliminates the usual air bubble problem that occurs with non-porous plastic films. The proper way to apply Silkspun to a sheeted surface is lower the temperature of your iron to 275° (usually we recommend 350°). This is hot enough to liquify Coverite's adhesive, but not hot enough to activate its shrinking action. Now you will be able to adhere Coverite to the balsa without air bubbles, and it will stick like the skin on a ballpark hot dog. Another tip for sheeted surfaces is always work from the center out to the edges. Don't start by tacking down the edges, as this will trap air. Finally, always allow the fabric to cool before going on to the next area. The best way to do this is rub a cold wet rag onto the just heated surface. This will force the adhesive into the wood and hasten its curing process.

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On sailplanes, where a translucent finish is popular, one coat of our Glaskote is

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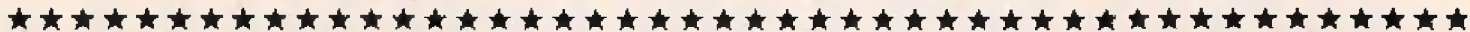
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32 oz. (quart)	3.60

HOBBYPOXY EPOXY

Formula 1-15 min. work time	1.05
Formula 2-45 min. work time	2.80
Formula 4-5 min. work time	1.40
Quick fix-5 min. foil packets	1.05

DEVCON EPOXY

5 min. epoxy (2 1/2 oz.) R206	1.89
2 in 1 applicator tube R208	1.59
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Whizard	*11.39
Dick's dream	8.99
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Q-tee	15.35
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Aquila	44.99
Gere sport	*23.59
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120 Trainer 40	36.85
130 Trainer 60	40.95
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150 RCM Sportster	26.80
160 15-500	26.80
170 Tweedy Bird-19	26.80
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210 Quickest 500	28.80
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240 Super Kaas 40	37.50
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--- RCM Wing Jig	10.99

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51 Sr. Falcon	36.99
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108 Transit	30.23
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119 Cessna	31.53
124 Jester "C"	47.78
146 Pinto	31.53

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RC 26 Clipped Wing Cub	30.90
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RC 42 Kiwi	30.90
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8054 5 ch., w/4 mini servos	189.99



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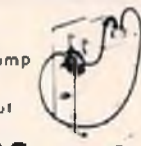
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1310 Pay'n Pak	25.45
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RC17 P-40 warhawk	41.99
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8 4.5,6,7	5.62	1.04
8 1/2 4.5,6,7	5.62	1.04
9 4.5,6,7	5.62	1.04
10 4.5,6,7	5.99	1.12
11 5,6,7W,7,7W,7 1/2,8	6.91	1.28

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12 x 6	12.18	1.16

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LAMBORGHINI COUNTACH

from page 150/39

such eventualities. This operation is well worthwhile since when the driver and cockpit are installed in the body they completely hide all the 'works' below, adding to the realism of the finished job. The car doesn't actually go any better but it sure looks a lot better if you take the time to finish up the entire body to the best of your abilities.

Perhaps this is a good place in the narrative to go back to the beginning when we took everything out of the box.

As mentioned already, this car goes forward and reverse. Now, we do a lot of RC power flying and gliding and have quite a bit of experience with power boats, sailboats, and cars, too. All our radios are two stick transmitters and we never have any directional orientation problems with any of these models until we try to steer an RC car backwards! Naturally, we don't get a great deal of practice at that maneuver. If you have ever stopped an RC airplane in mid-flight and backed it up you will know only too well what we mean. The type of transmitter controls is quite immaterial in the next few seconds. So, we decided that the time had come to invest in a

wheel-control radio.

We found there is a choice of brands available and, after much consideration, we went home with the recently introduced Kraft KP-2AW. This radio has features that really impressed us. It is available for dry cell use at a suggested list of \$129.95 but it also comes complete with nicads and a charger for \$179.95. We prefer the flexibility of nicads in our radios so that became favorable point one. The next thing we noticed was the extremely light transmitter. While still in the store, we felt that it would still be very light indeed even after the nicads were installed ---

to page 156

THE WACO

We chose the Waco F-3 as our biplane flagship because it best represents the "Golden Era" of the 1930's, when flying was an adventure. Add to this, easy, snag-free building and safe, gentle flying—the result of the thorough kit engineering and careful prototype development that are features of all Platt Kits—and you have a satisfying building and flying experience ahead of you. **Kit features:** Top-quality diecut and machined balsa and plywood. Full size plans. Separate instruction book with isometrics. Decals. Injection-moulded (Not vacuum-formed) plastic cowling, cowling blisters, and wheel pants. All required nylon fittings. Formed wire landing gear & struts. Span: 60"; Area: 950 Sq.; 4 to 6 channel. Engine: good 40 to 60



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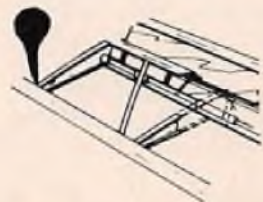
Baking soda is the best filler for gaps. Try this: Suction fill an ear syringe with baking soda and use for perfect applicator. Wipe away excess and HOT STUFF!

(Get syringe at any drugstore)

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Sprinkle baking soda into shallow gaps, wipe off excess, apply HOT STUFF. Deep gaps (holes) should be filled in stages (soda & HOT STUFF — more soda & HOT STUFF), then sand.



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"The fact that your service was so superb came in itself as a refreshing throwback to the days when the customer came first; . . . Rest assured this word will be passed along to hundreds of modelers in this area that the people of Perry Aeromotive, Inc., are in business to please their customers by not only furnishing them with a fine product line but a customer relations concern second to none." - N.L., New York

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PERRY AEROMOTIVE, INC. PERRY AEROMOTIVE, INC.

from page 154/39

then, surprise, we found the nicads were already in it!

Next, we discovered it used plug-in crystals. The transmitter crystal is readily accessible by sliding out a small cover in the back of the case and on the receiver it fits into a socket in the outer case. They can both be changed in a matter of seconds. It can be a distinct advantage at crowded practice sessions, or even races, if you can switch frequencies this simply. And this radio system does **not** have to be retuned when changing frequencies to any of the 27MHz allocations. Spare crystals are available at a list of \$9.00 each.

But, to our thinking, the best feature was still waiting to be discovered. Voltage regulators are not new in themselves but they are new in model radio receivers. The KP-2AW receiver is designed to operate at 4 volts, according to the manufacturer. (We have found that ours gives fully accurate response at voltages quite a bit lower but Kraft would rather not guarantee it at less than 4V). A voltage regulator is used in the receiver circuitry to limit through voltage to a maximum of 4V even though the supply is as high as 10V.

This really is a feature with electric powered cars or boats as it means you can dispense with the extra weight of the Rx battery and run the receiver off the power battery. If the battery is putting out from 10V down to 4V there is no need to make a 4-cell tap for the radio. And, as the power battery is exhausting, the receiver does **not** quit before the car or boat significantly loses performance. This is really great as, more than once, we have been using a 4-cell tap on our power battery to operate the receiver and have lost radio control, due to voltage drop, even though the car or boat appeared still to be running well on the available power.

Finally, we have long been enamored by the small size yet rugged power of the Kraft KPS 1411A servos and they are what we got with our radio. So, taken all together, the foregoing gives you some idea of why we now own a Kraft KP-2AW system.

Anyway, this time when we first went out to try our Peerless Lamborghini we had that neat little Kraft transmitter tucked in the crook of our left arm and found that the wheel-steering really does make a heck of a lot of difference in orientation perception either running forwards or backwards. Our overall rating of both car and radio is that we would cheerfully recommend either or both to our mother-in-law . . . and that says a whole bundle. □

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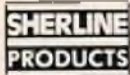
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3054 ... Boring Head	26.95
3056 ... 1 Nut 10-32 (H)	.65
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 Table
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Ideal for the apartment dweller, or anyone who does not have the room for a standard size saw. Customers who have complete shops are buying these just for the .046 thickness of the blade. This is a big help in working with expensive modelers wood or veneers.

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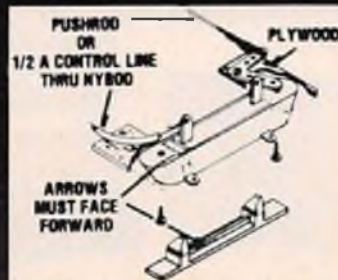
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R/C I.Q. & HONESTY RATING

from page 38/36

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- 65-85: Average & Honest
- 86-125: Below Average & Less Than Honest
- 126 +: Please Leave R/C Modelling!

SPORTY ACE

from page 34/32

for hinge bearing, and the gussets at the leading edge. Glue the stab tips in place and then the top spar. The top spar is continuous right through the rudder slot. The rudder is notched out to fit over the spars. The elevator is made of 3/16" sheet with a 3/16" hardwood dowel connector. Slightly round the leading and trailing edges — don't taper it. The vertical stab and the rudder are made from 3/16" sheet balsa. Laminate the sheet pieces together at the edges to form the finished product. Sand the edges round — don't taper.

Fuselage: Now that the time consuming parts are done, let's move on to the fuselage. Cut the sides from hard 3/16" sheet balsa. Add the 1/8" balsa wing saddle doubler and the 1/16" plywood doublers for the wing tie-downs, and the cabane braces to the inside of each side. Also glue the spruce servo rail in place. Mark the location of the firewall on the inside of each side and glue the firewall braces in place. Glue these with epoxy. Pin the cabane cross braces to the top view of the plan. Cut the bottom cross braces to size from hard balsa. Invert and glue both fuselage sides in place with epoxy. Glue them to the cabane braces that are pinned in place. Do not bring together at the tail, just glue the bottom braces in place. Be sure that, at this point, the sides are 90 degrees to the building board. When this is dry, bring the rear of the fuselage together, still with the front pinned to the board. Glue with epoxy, making sure that the center of the tail of the fuselage is right over the centerline on the plan. Glue in the bottom rear cross braces while everything is still pinned down. Add the 1/16" bottom sheeting at the tail, and then the plywood tailwheel piece. Glue the 3/16" plywood

landing gear plate in place with lots of epoxy. If you're going to bolt on the landing gear, then add 1/4" square spruce blocks, the length of the landing gear block to the inside of the fuselage at this joint.

When all of this is dry, remove it from the plan and glue the firewall in place with lots of epoxy. Before mounting the firewall, however, take the time to locate the engine mount and the holes for the fuel line and the throttle pushrod. Glue blind nuts to the back of the firewall with epoxy. It is much easier to do all of this before assembling the firewall to the fuselage. Add all of the top formers. Fix the cabane mounting brass tube in place with J bolts, or with nylon keepers, and then epoxy in position. Next, add the forward top sheeting, and the top block from the back edge of the cockpit to the front of the rudder location. Next, add the 3/16" square stringers and glue in place. Add the nose block and the 3/16" sheeting at the bottom of the nose. When all is dry, sand and set aside to cover.

Cabane: Building the cabane assembly is easy. First, bend four pieces of 1/8" wire to the size and shape shown on the plan. Cut out the 3/16" plywood top wing hold-down fitting. Sand smooth and then carefully drill the holes in the exact correct location for the cabane wires. Take a piece of scrap lumber and draw the cabane side view on this piece of lumber. Drill holes to match the location of the attaching holes in the fuselage side. Double check that the location of the holes in your fuselage are as shown on the plan. Slip the cabane wires into the holes in the scrap lumber, slip the top 3/16" plywood piece over the cabane wires. Line the assembly up in the correct forward slope and solder the 1/16" brace wires in place. Double check everything as you go. Next, reverse the drawing and build the cabane for the other side of the fuselage. The mounting holes in the top brace and the fuselage side are parallel so, if you measure correctly, the wing saddle will come out with zero incidence. Set the cabanes aside until the fuselage is completed and covered, then you can slip the wires into the tubes, solder the cross braces in place, then slip the wires slightly out of the tube, coat with epoxy, slide back into the tubes, and let dry. It is really easier than it may sound, and just about the simplest way to build a wire cabane that I can think of. The wire landing gear is built in the same manner, and add cross braces for bit of extra muscle.

Finishing: I like to use Super MonoKote for all of my aircraft, but any of the plastic films will do -- or silk and dope --- the choice is up to you. Add a Williams Bros. pilot in the cockpit for a bit of realism --- mine has slightly greying hair, I wonder why?

to page 162

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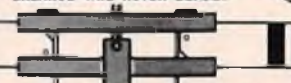
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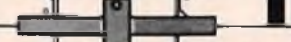
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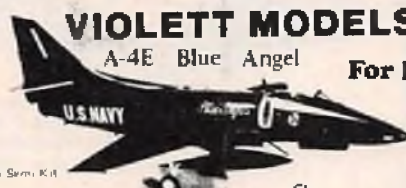
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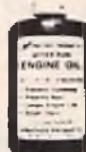
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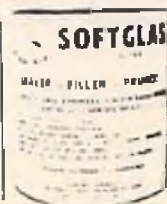
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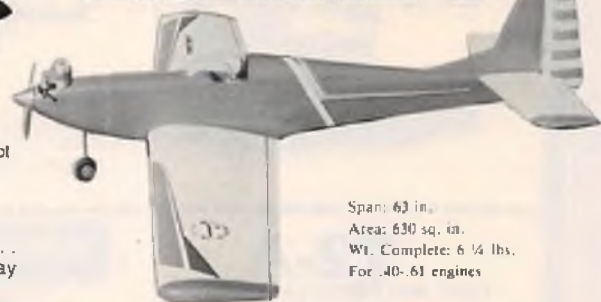
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SPORTY ACE

from page 159/32

Radio Installation: Install the radio in your favorite manner, checking the balance of the aircraft as you go along. Install your favorite type of pushrods.

Since this isn't a radio "how-to do it", I won't go into all of this here. Make sure that all of the controls work properly and that there is no binding in the linkage. Just about any radio equipment will fit in the Sporty Ace but, as in all smaller aircraft, a bit of care is necessary to get everything in place. An 8 ounce Kraft tank was used in the original and slipped in through the radio compartment. Takes a bit of fitting, but it can be done.

Flying: The Sporty Ace is a very easy aircraft to fly and one that will give you hours of enjoyment. Make sure that all of the controls have the amount of throw shown on the plans. Make sure that all of the controls are at neutral when the tank empty. Be sure that the wings have at least four rubber bands on each side holding them in place (use #32 bands). Check the engine idle and high speed settings for just a slightly rich mixture. Taxi out, turn into the wind, let her come to a stop, check the wind direction one more time (tail draggers like to take-off right into the wind), advance the throttle, hold just a nudge of right rudder (not much), watch the tail come up and, then, as she picks up speed, ease back on the elevator stick just a wee bit and watch her break ground. Climb up to a safe altitude and then start putting the Sporty Ace through her paces. I know that you're going to like taking this young lady out on a date to the flying field. When it comes time to make a landing, you're going to enjoy it even more and will want to go steady with her. □

two formers are solid sheet. Prior to installing them, rectangular openings were made to accommodate pushrods and radio connectors. Also we added 3/8" x 3" triangular stock to each side of the fuselage to provide additional strength to an area subject to much abuse.

The builder is given the option of using conventional (tail dragger) or trike-gear to page 164

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EZ TRAINER

from page 30

. . . minor modifications were made during fuselage construction. The

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EZ TRAINER

from page 162/30

arrangement. This builder opted for the trike system since he keeps telling his five year old son that he will be able to fly it as soon as dad gets it trimmed out. Dad thinks trikes are for kids and untrained adults. The steerable nose gear arrangement called for in the kit consists of drilling a 5/32" bearing hole in a Bridi Motor Mount, attaching a steering arm, and retaining the strut with a wheel collar. Most experienced builders would have no difficulty understanding the system, however, the details, as contained on the plans, are somewhat sketchy.

The tail assembly only required joining sheet parts, rounding leading edges and slotting for hinges.

The plans call for attaching the stab to the fuselage prior to finishing. We elected to use Kwick Cote mylar covering so the following procedure was employed. The fuselage was sanded and coated with sanding resin inside and out from the firewall to the rear of the wing saddle. The fuselage was then covered with Kwick Cote. The tail feathers were sanded, slotted for hinges, covered with Kwick Cote and surfaces hinged and attached to the fuselage after cutting away covering in glue areas. This approach produced well aligned control surfaces.

The radio compartment is roomy enough to accommodate any modern radio gear. We placed three EK Champion servos abreast with room to spare. The battery was positioned under the 6 oz. tank to facilitate balancing.

Performance: The plans call for engines between .19 and .35. This builder chose to use an unmodified OS .25 FSR. The first flight took place on a typical November day in California, slight wind, some sun, and no smog. Take-off was uneventful. Throttle was advanced and after a roll-out of about 100' the EZ Trainer rotated and was airborne. Climb-out at near full throttle was steep and straight. Throttle was cut and the plane settled into smooth straight away flight. Rudder throw was adequate at the recommended setting. Turns were smooth. Elevator was quite responsive. High speed runs required the use of considerable down on the stick, indicating the need for down thrust called for on the plans, but omitted by the builder. The remainder of the flight was completed at just below half throttle. The low speed performance of the EZ Trainer was outstanding --- smooth and responsive. The beginner will have no trouble developing his reflexes. The landing was uneventful. Throttle was cut just before turning base. The EZ Trainer

adopted a constant sink rate and touched down with just a tad bit of up stick prior to touch-down. About 2½" of down thrust was added and the builder had a ball. The EZ Trainer will do all the 3 channel stunts and is an excellent buy at \$29.95. □

HERE'S HOW

from page 28

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SOARING

from page 27



Claude Brown receives Cyalume lights from CD Al Kindrick at a Southern Cal. night fly.

preferably a #64, is looped through the hole on one end and a half hitch on the knob end. This forms a loop that can be slid over the wing tip and onto the wing at about where the polyhedral joint is.

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Other notable events in the Northwest this past season were: MAESTROS WON THE TOP 5 PLACES IN OPEN CLASS at the 1978 REGIONAL L.S.F. TOURNAMENT! THE NEW MEGAN in pre-production form, flown by TOM NEILSON, MADE AN INSTANT SENSATION. Among other accomplishments, TOM AND HIS MEGAN WON THE LARGEST CONTEST sanctioned by N.W.S.S. in 1978, held in Victoria, B.C. NICE WORK TOM!

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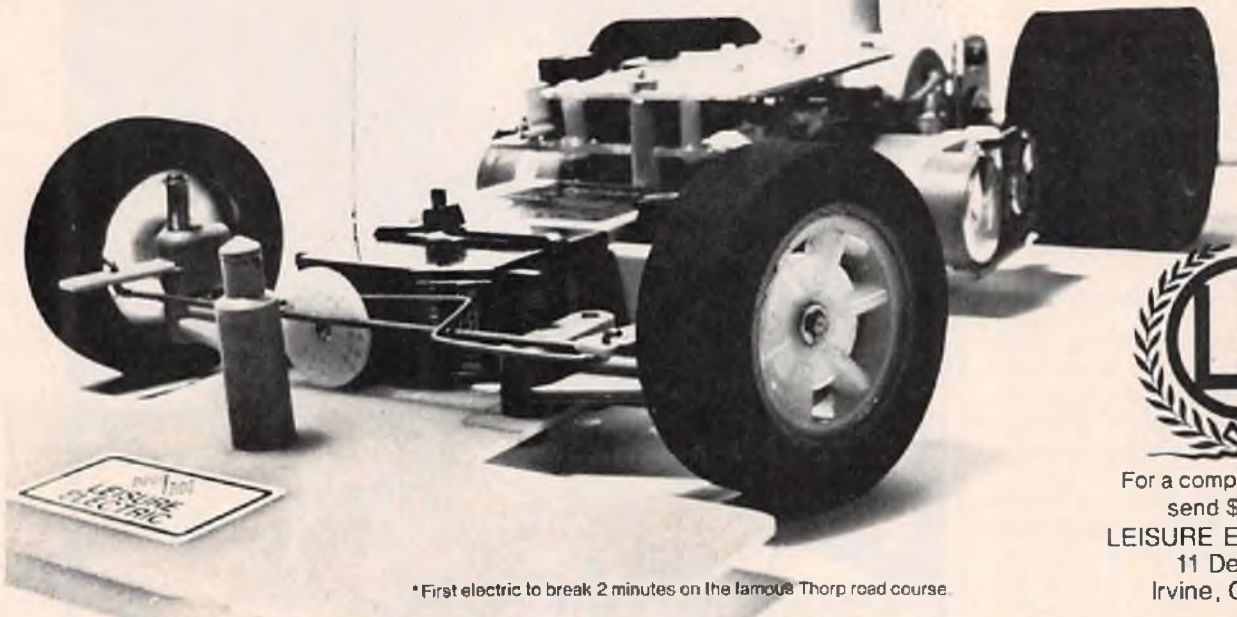
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- Motor Mid-Engined Leisure .05
ROAR Legal.
- Axles Rear: Round Solid Steel
Front: Steel pin.
- Weight 34.5 ounces.

NAKED TRUTH

LEISURE ELECTRONICS'
NEW MID-ENGINED
MODEL 100

Our new Model 100 series is truly a study in advanced 1/12 scale race car design. Its ultra-low center of gravity and mid-engined placement of the fast, ROAR Legal, .05 Leisure motor produced an amazing 10-2 win/loss record in regional and national 1/12 scale racing for 1978.*

The naked truth is we built the Model 100 from the fiberglass chassis up, to have the anatomy of a champion.



*First electric to break 2 minutes on the famous Thorp road course.



For a complete catalogue send \$1.00 to:
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The D.U.S.T. and Hemet Model Masters held a night fly in conjunction with their LSF achievement day and SC² contest. Their field is the polo grounds in Palm Desert, Calif. Picture yourself flying off of a ten acre billiard table. The field is something to see.

The night flying task was three rounds of 30 minute cumulative, no flight over 15 minutes. And get this, a standard A.M.A. graduated landing circle with the centerspot identified with a single cyalume light stuck in the grass. If your club has not organized a night fly, do it, and I'll guarantee you the best time of your sailplane career.

★ ★ ★



Bill Festag and Jack Defenbaugh waiting their turn to terrorize the night air.



Very clever "Nite Owl" trophy for first place night fly, Polo Field Palm Desert, C.D. Bill Mueller presents to Keith Kindrick.

to page 170

AN ENGINEERED DESIGN FROM MODERN MATERIALS FOR THE DEMANDING SPORT FLYER AND THE DISCERNING BEGINNER

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- Length 34"
- Fuel tank 4 to 6 oz.
- No finishing required. Simply add striping.

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**the ultimate
1/4 size and 1/3 size
power plant**

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The Homelite Division of Textron and EWH Specialties have melded together their years of experience to produce the definitive answer to 1/4 size and 1/3 size engines. No fly-by-night obscure manufacturer. Homelite has 57 years of experience building high quality and high reliability 2-cycle engines. Roller bearings are used on both ends of the crankshaft as well as both ends of the connecting rod. Crankshaft counterweights are equal in weight to minimize vibration and prolong engine life. A transistor ignition is used on the Super Hustler. No cumbersome flywheel and magneto to cause vibration, radio interference, or front bearing wear.

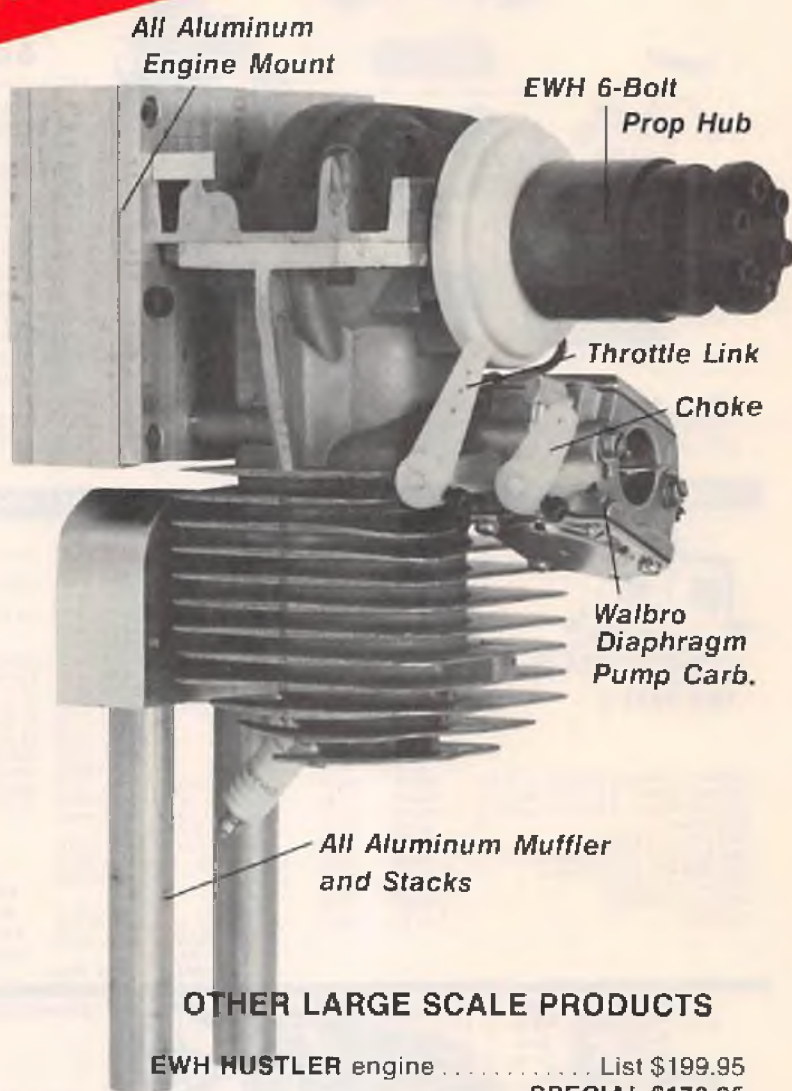
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The Super Hustler is loop scavenged for excellent breathing and power. Hemi-head combustion chamber provides smooth idling and easy starting. Roller bearings are used at all wear points. The choke is in the carburetor. Each engine comes with the EWH 6-bolt Prop Hub to allow adjustment of prop tip tracking.

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The Super Hustler has super power. 2.6 cu. in. displacement. Burning gasoline and chain saw oil, delivers 23-24 pounds of thrust on a 20" X 8" prop at 6,800 to 7,100 rpm. Any prop from 18" X 6" to 20" X 8" is well within the operational range of the Super Hustler.

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OS 20 R/C	42.95	34.40
OS 25 std	37.95	30.40
OS 25 R/C	44.95	36.00
OS 25 FSR R/C	59.95	48.00
OS 25 FSR std	52.95	42.40
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OS 65 RSR		
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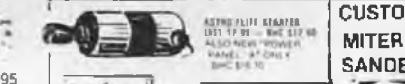
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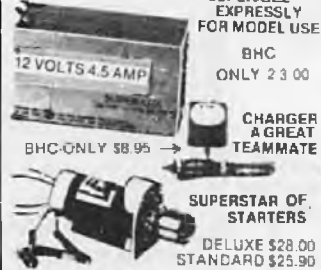
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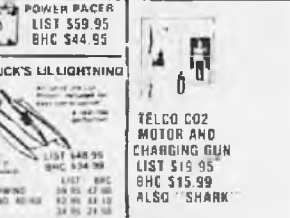
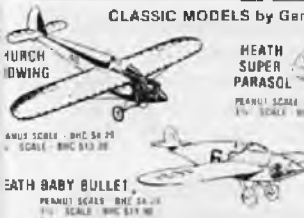
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R/C Modeler Magazine, August 1975



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Flying Models, May 1976

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SOARING

from page 166/27

Closing news item for the month is to call your attention to Hi Johnson's expanded, 17 page Super Wings information bulletin. If you have never built with foam and plastics, or have, but would like more information, this is the information to have for your library. Contact Hi Johnson at 11015 Glenoaks Blvd., Pacoima, Calif. 91331. Send in for his Super Wings bulletin --- it is a buck and a half well spent.

Good Lift. □

BIG IS BEAUTIFUL

from page 24/22

while flying the prototype, into the plans to improve the model. The plan is available from Lee Taylor (Taylorcraft Ltd., 329 C St., Roseville, Calif. 95678). Now, isn't that a familiar name? No connection with the full scale airplane company so far as I know!

Every month brings more good things for the Super Scale modeler. This month is no exception, with a number of new products being introduced by Quarter Headquarters (P.O. Box 12321, San Francisco, Calif. 94112).

Three products from Q/H are aimed at the user of the Quadra engine and they consist of a throttle control, a muffler (actually two of them) and a motor mount.

The throttle linkage is designed to make that nasty right angle bend required on the Quadra to get the throttle cable attached to the throttle arm without having to make a right angled bend in the cable. The unit consists of an aluminum bolt-on shoe, a bellcrank and wire linkage. The shoe bolts onto the engine providing a mount for the bellcrank. It seems simple enough and the linkage is formed to provide easy movement to the throttle. Order No. Q-TC at \$7.95.



Carb linkage (throttle) for Quadra engine.



Quadra mounting plate which allows thrust adjustment and can be obtained with neoprene rubber mount.

The engine mount is a cast aluminum piece, machined and drilled to fit the engine exactly. It is arranged to provide easy thrust adjustment as well and the engine may be mounted upright or inverted. Looks like a solid, well engineered accessory. Also available is a neoprene gasket which can be mounted between the firewall and the mount and is intended to absorb some of the vibration inherent in large, single cylinder engines. The gasket is 3/16" thick and provides good vibration insulation. Mount is No. Q-3 and is \$16.95, Gasket is No. Q-3NEO and is \$5.95.

The Quadra muffler comes in two styles, one with a side cowl exit and the other for bottom cowl exit. A length of heat and fuel proof neoprene tubing is supplied with each muffler, and they both attach with two screws. Both are aluminum. The range is listed as follows: Inverted engine-side exhaust, No. QM-1ST; Inverted engine-bottom exhaust, No. QM-1BT; Upright engine-side exhaust is No. QM-UST; Upright engine-bottom exhaust is No. QM-UBT. All are \$19.95 except QM-UBT which is \$21.50.

Quarter Headquarters is also producing a line of mufflers for the larger glow engines as well. The mufflers will fit most .90 to 1.5 engines and come in Side Tube (ST) Bottom Tube (BT) and Top Tube (TT) models to suit the particular engine installation. M-TT, M-BT are \$17.95 each and M-ST is \$18.95.

The Suevia has also come in for some attention from the guys at Q/H in the muffler department. Their SM-TT, SM-BT, and SM-ST models fit the Suevia and the initials denote the exit position of the tubes as above. TT and BT models sell at \$18.50 and the ST at \$19.95. All available only from Quarter Headquarters.

If Q/H's performance in the future is as prolific as it has been this past couple of months, they will have quite a selection of goodies for the Super Scale enthusiast. They apparently meant it

to page 173

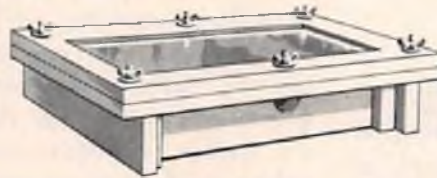


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R/C MODELER MAGAZINE'S MODEL OF THE MONTH CONTEST

The Model of the Month Award Program is designed to encourage the sport and novice competition flier to submit details of his most recent kit or scratch-built model to RCM in order to encourage general model craftsmanship and the overall promotion of R/C flying.

Each month R/C Modeler Magazine will award a 371 Variable Speed Moto-Tool as illustrated in the photograph. The second and third place winners each month will receive a one year subscription to R/C Modeler Magazine or, if they are a subscriber, an extension of their current subscription.

you could win . . .

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FIRST PLACE

**Ernest D. Harbin
Flushing, Michigan**

A quarter scale Fly Baby Model 1A scratch built from the original plans used to build his full size Fly Baby. The 7 ft. span, 11 lb. model is powered by a Fox Eagle .60 and uses a Heath 8 channel radio. Complete scale structure was duplicated and an unbelievable amount of functional detailing is included.

FEBRUARY WINNERS

SECOND PLACE

**Lowell R. Burnette
Kaneohe, Hawaii**

This super detailed S.E. 5A is a highly modified version of a Top Flite kit. A Fox Eagle .60 powers the 9 lb., 4 oz. model. A Lilco radio system provides control. K & B Super Poxo over Super Coverite hides an elaborate structure. Practical detailing is included throughout the model.



THIRD PLACE

**Jim Kennedy
Knoxville, Tennessee**

An Olympic II sailplane built from a Cox Hobbies' kit with a wingspan of 100". The wing and tail are covered with MonoKote and the fuselage is finished with K & B Super Poxo. The bird weighs 51 oz. and is controlled by a Kraft KP-2AS Sport Series radio.



RULES

- A. Model Aircraft Origin**
- 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**
- All types of radio controlled airplane models
 - Scale
 - Pattern
 - Racing
 - Fun-To-Fly
 - Original Design
- C. Entrants to submit:**
- Color photo or slide, size 35 millimeter or larger.
 - Black and white glossy photos (any size) of both sides, top, rear, front, and bottom views.
 - Close-up photos may be submitted on detail work if desired.
 - A short write-up giving dimensions, weight, power, radio, etc.
 - A statement that:
 - The submitter was the sole builder of the model.
 - Parts and/or accessories used were part of the kit or available to all modelers at retail outlets.
 - All non-available or special parts were built by the hands of the submitter.
- D. Judging will be on:**
- Workmanship
 - Quality of finish
 - Attention to detail
 - 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:**
- Members and employees of RCM or any other model airplane publication.
 - Members and direct or indirect employees of Dremel Manufacturing Co.
 - Members and employees of any manufacturer of hobby kits, hardware or supplies.
 - 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:**
- 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.
 - Models that have been built for display purposes only.
 - Models that have been built for manufacturers demonstration purposes.
 - 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:**
- 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.
 - 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**
- 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.
 - 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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pressure on a control surface (especially elevator) which is the case in our larger models. His suggestion deals with the incorporation of working servo tabs on the elevators of a model much the same as they are used in full scale aircraft. His accompanying sketch is pretty well self-explanatory. Dario suggests he has found the size which works best in these servo tabs is 12% to 15% of the entire control area. In other words, if you have an elevator of 100 square inches, then the servo tabs should amount to approximately 15 square inches total.

One of our modelers here is using this same idea in a 1/3 Scale Andy Sheber Pitts S2-A and it seems to work very well. In addition, it makes a much more realistic model as the full scale Pitts uses exactly the same thing. A good idea, and some help for hard working servos as well. Thanks, Dario, I had forgotten about the forest by being too close to the trees!

Well, guys, that's it for now. More good things next month. □

SUNDAY FLIER

from page 19/15

making constant corrections in flight for different speeds.

The same technique will work for tail surfaces, even 1/4" sheet balsa.

So check your alignment, and fix it if it needed. You'll be pleased at the improvement in flight action.



*Ace throttle for reed valve engines.
Ultra simple!*

Some time ago I wrote some observations on throttles for 1/2A engines, concluding with an opinion that the best of the lot was the Hiscott, even though it did take some rpms off the top. At the time, the new Ace throttle for reed valve engines was not available. I have had the chance to try it, and am very favorably impressed. It is so simple that once again it makes you say, "Why didn't I think of that?" With my old Golden Bee mounted in my Minimousetang, I added the throttle, and now I can start up, taxi out like the big boys, turn into the wind, take-off, cruise, make touch and goes, land, and

taxi back to the flight line. Yes, it takes a little more fussing than the Hiscott to get it right, and the idle isn't quite as slow, but for two dollars and fifty cents, you can't beat it. The idle speed is reliable down to around 4500 (the ads say 3000, but I found that marginal) and at that speed the Minimousetang just sits there until you rev up. And what difference does it really make how low the idle is, so long as it is low enough to run without making the airplane move forward?

Like I said at the beginning, "Whither goest thou, O Sunday Flier? The answer was naturally, "Many paths." I mentioned a couple, but thought I'd leave this one for a closing thought.

Paul Sherlock is a Sunday Flier if I ever saw one. Loves to try different things, but does not profess to be any great shakes as a pilot. But he certainly likes to do his thing. Many of you will remember some time ago when he came out with a scale Boeing 747 — huge! Then he sorta disappeared for a while. Only to reappear in the late summer of 1978 with his latest creation — an all foam model of Howard Hughes Hercules flying boat, more affectionately known as the "Spruce Goose". And, just as the original dwarfed all other aircraft of its time, so does Paul's model. One look at the photo and you'll know what I mean.



Paul Sherlock (with beard) and his "Spruce Goose."



Spruce Goose taking off from grass. Only the two inboard engines are functional (two .61's). The others are for appearance, and once speed is attained, the props windmill and it looks like six engines turning. Approximately 20' span, about 50 pounds weight. Impressive!

Now there's a Sunday Flier who really wants to be different! Oh yes — he flies that monster, too.

So do your thing, whatever it is — and let me hear from you. Contests are a dime a dozen, but innovation is in short supply.

What have you tried lately?

'NEWS'

IT'S HARD TO BE HUMBLE WHEN YOU'VE GOT A WINNER

We've had some questions about turning a 60 into a 120. It's true the Maximizer™ won't double the horsepower, but it will just about double the thrust due to using a larger more efficient prop. Hence the 60 into 120 claim.



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Quite a number of builders are using 40 size engines with great success. For this size a 16x10 or 18x6 seems about right with the standard ratio. Use a 14x10 or 16x6 with the optional pulley.

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For other news, we now offer a different ratio to drive a smaller prop at a higher rpm. This is accomplished by using a 15 tooth lower pulley. It fits all existing Maximizers™, and is offered as an option at \$10.00. The standard ratio uses the 12 tooth pulley. We recommend a 20x10 prop with the standard unit and an 18x10 with the optional ratio.



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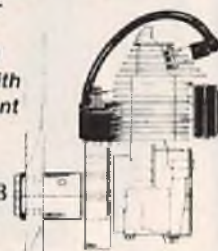
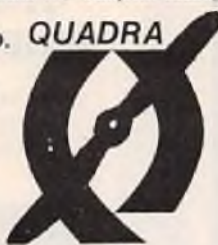
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SPECIAL OFFER

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ENGINE CLINIC

from page 12/10

throttle opening. Many manufacturers just put the parts together and make no effort to adjust the carburetor at all. Actually there is no way a manufacturer could set the idle right on for every application since there are too many variables involved. Tank position and size, propeller, fuel used, etc., all play a part in setting up a reliable idle.

The fact must also be faced that some engines (even two of the same make) will have better idle and acceleration characteristics than others. This is due to variations in port timing, compression ratio, etc.

Actually, if an engine has half way decent idle characteristics, it isn't all that difficult to set up a good idle. If the engine doesn't have good idle characteristics, then no matter how much adjusting and tinkering you do, it is never going to be 100% reliable.

The easiest method to set up a good idle is to notice how the engine is idling at the beginning of a flight with a full tank. If it has a tendency to gradually slow down and die, it is idling too rich, so lean the mixture slightly. If the engine seems to speed up a little just before dying and then stops, it is too lean and the idle mixture should be richened slightly. Then put in a flight or two and notice how the engine acts on a near empty tank. If it dies continually on the landing approach or taxi-back, chances are pretty good that the idle mixture is too lean, so richen it up a hair. Usually you have to settle for a slightly rich idle mixture at the beginning of a flight to compensate for a slightly lean mixture at the end since the fuel level in the tank has dropped. Once this point has been found then there isn't much more that you can do. I have watched guys spend hours trying to get a flawless tick-over idle with a full tank of fuel only to have the engine die on taxi-back at the end of the tank. Then they fuel up and start the procedure all over again with a full tank. In most instances you have to compromise in order to have a good idle at both the beginning and end of the flight. In most cases a fairly rich idle at the beginning of the flight will assure a good idle at the end. If the engine idles okay on a full tank, but dies on acceleration, then you have to lean the idle mixture slightly. It all requires a little trial and error to get things set properly.

Dear Mr. Lee:

I have a K & B .40FR that won't continue running at intermediate throttle settings. Following are the details: About 2 hours of running time (in the air); T.F. 10/6 prop; Duke's fuel; K & B plug; all kinds of weather (60° to 90° and 50 to

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90% relative humidity); excellent top end (and I don't run it too lean); excellent idle (neither too rich nor too lean) which it'll hold for a long time and then go to high speed with no trouble; side-mounted in Lanier plastic kit; did not have problem when vertically mounted (upright) in another kit; one mild prang in the mud, thoroughly cleaned afterwards) can't tell whether it's too lean or too rich at intermediate settings - it just quits after about 10-15 seconds, either in the air or on the ground, either leaving throttle alone or advancing or retarding; tank pick-up on engine centerline; no muffler pressure (but tried that too - to no avail).

I'm stumped.

Sincerely,
John J. Wolcott

You did not say which way you have the exhaust pointing with your side mount installation but I am assuming that it is down. You would not want the exhaust to point up since fuel would then collect in the bypass and eventually flood the engine out. However, this would be more evident on acceleration when the excess fuel laying in the bypass would be transferred to the combustion chamber killing the engine.

Since your trouble seems to have started when you went to the side mount installation, I would guess that it is due to the lower carburetor position in relation to the fuel tank. In effect, you have raised the tank level which is causing the engine to run too rich through the mid-range. You may have the idle set a little rich and are running the engine on the rich side at the top end. You can try setting the idle mixture a little leaner and be sure the top end is on the rich side of a two cycle. If the problem still persists then the tank will have to be lowered.

You mention having tried muffler pressure so I am assuming you are using a muffler. If you're not using a muffler you could have the relationship between the carburetor and exhaust baffle out of synchronization. If the baffle stays closed too long in relation to the carburetor opening, the excess back pressure causes a lean condition in the engine which will cause it to die. Be sure that with the carburetor cracked open about 1/32", the baffle is straight up and down and at full throttle the baffle is perfectly horizontal - not going past horizontal. A highly restrictive muffler could also have this same effect.

Dear Mr. Lee:

(1) Is it possible to reverse direction of rotation of an OS Max .60FSR by rotating the front section of the engine 90°, or how can I do it?

(2) If it is possible, will the engine perform as well as at standard rotation?

(3) I have the engine in a Pusher (RCM Plan #712, L-39 Albatros), and would like to be able to use standard props so that I had a wider choice of

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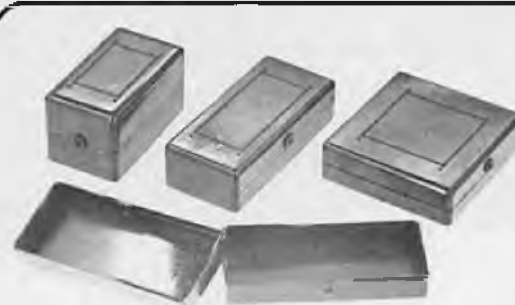
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props.

(4) Would the fact that the engine is equipped with Perry Pump & Carb have any effect on rotation, etc.?

(5) I would like to continue the use of the pump set-up so that I could put the fuel tank further forward in the plane to prevent large changes in C.G.

Your article on Pipes, etc., was very timely and informative.

Thanks,
Dick Slutz
Wilmington, Delaware

This is one of those questions that I have answered many times in the past but one which I keep getting many inquiries about.

Any engine with a removable front plate can be reversed by rotating the front plate 90° counter-clockwise. Generally, performance will not be affected but this will depend on the timing of the particular engine involved. I have not tried to run an OS Max .60FSR backwards but should imagine that it would perform just as well as in front rotation.

Reversing the direction of rotation will have no effect on the Perry pump. It does not know which direction the engine is running. It only senses the positive and negative pressures of the piston movement which actuates the pump diaphragm.

Dear Mr. Lee,

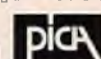
I have hit upon an intriguing idea concerning getting fuel to twin engines. I am an avid boater of 6 years -- primarily R/C racing. I am building a twin .40 hydro using two K & B 6.5 engines (also have one in the works for two K & B 3.5's).

Anyway, most of the fellows running twins have gone to remote needle valves. Of course tuning the engine is always a hassle, so... I was wondering about the possibility of running both engines on a single needle valve. The close proximity of the engines in a boat removes some of the problems



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associated with attempting this feat in an aircraft. Any thoughts you might have on the subject would be greatly appreciated. The .40's will drive separate propellers — the .21's will be physically linked and drive a single prop.

I plan to use #4049 carbs on all engines with pressure (exhaust). .40's will have stock K & B mufflers — the .21's = 1/4 wave pipes.

Thanks,

Richard J. Zimmerman
Florissant, Missouri

I doubt very much if you would have much luck trying to run two individual engines with a common needle valve.

Fuel mixture demands will vary quite a bit between engines. This was always the problem encountered with a twin cylinder engine — trying to get equal fuel distribution to both cylinders so that both would run the same --- one always wanting to run richer than the other. The same thing would apply using two engines. Better stick with individual needle valves.

Dear Clarence,

I have a Royal B-25 which performs great on two K & B .40's but the vibration is quite severe. Would the vibration of two O.S. Wankels be much lower?

I have been thinking of installing two Wankels in this model but I have heard some negative reports from several people who have owned them that the operating life of the engine is short. Have you had any experience with the O.S. rotary engine? Specifically, I have heard that the front bearing burns out in short-order and as far as I'm concerned, 90 bucks is a little too steep for an engine with a short life span.

Thanks

I flew an OS Wankel in a Little Stik for about a year with no problems other than it was a bit difficult to hand start. I did a review on the engine some years back when the engine first became available.

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The Wankel is a very smooth running engine. As far as engine life — this depends on the owner. They are quite susceptible to dirt and foreign matter. The dirt laps away the sealing areas, but this is also true of conventional engines. A conventional engine is probably able to digest a little more dirt before failure than the Wankel.

Frankly, before spending \$90.00 each for a pair of Wankels, I would figure out

why the K & B .40's are causing so much vibration. They shouldn't be shaking that badly. Your mounting must not be solid enough — the prop drive spools wobbling — the props or spinners out of balance, etc. Check your prop (and spinner if used) for run out. Few props have square hubs and you will be surprised at how far out tracking of the tips can be. Get everything running dead true and balanced and the engines

mounted solidly and you should not have excessive vibration.

Dear Mr. Lee,

I am having all kinds of rear bearing trouble with my O.S. Max .40 FSR. It's a great engine --- I think it's the best .40 made. It is just that rear bearing. I have gone through three. I'm using Dukes fuel, a 10/16 balanced Top Flite propeller, and the crankshaft seems

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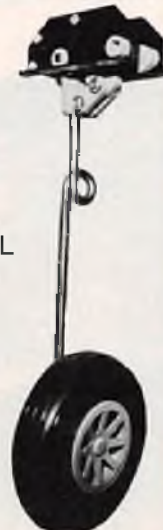
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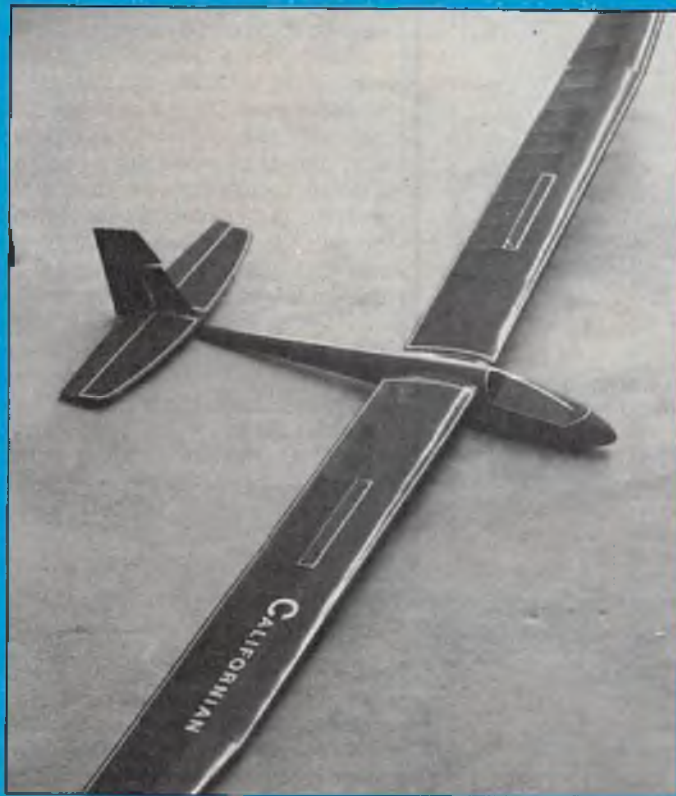
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straight. I called a bearing expert and found out that the O.S. bearing is not a high speed bearing but is a "precision #1" and I need a "precision #3" able to take 16,000 rpm's. Is that true? I need a \$40.00 bearing for an \$80.00 engine. Any help would be most appreciated. Thank you.

Sincerely,
 Bruce Addis
 San Francisco, Calif.

If you are going through rear bearings as frequently as you have been doing, the chances are pretty good that the failure is being caused by rust. The use of mufflers and synthetic oils in many of the fuels causes considerable rust formation in the engine — especially if the fuel line is not pulled and the engine allowed to run out dry on the last flight of the day. Any raw fuel remaining in the engine will draw moisture causing rust

and corrosion. Running the engine out dry and loading the engine with 3-in-1 or equivalent after every flying session helps alleviate the problem to some extent.

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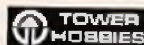
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in a higher class bearing is closer manufacturing tolerances. However, this can many times be detrimental in a model engine. A little bit of internal play in a bearing is desirable. A close fit bearing could end up being too tight in a model engine resulting in early failure. A class 1 is perfectly satisfactory in a model engine. Class 1 bearings can be had with different amounts of internal play but these usually have to be ordered special from the manufacturer and are not stocked by most bearing houses, i.e., standard class 1 bearings will have .0001"-.0003" internal play. Bearings with .0003"-.0005" or more can be had on special order. Many manufacturers use the looser bearings as it allows tighter fits on the crank and in the crankcase without binding up the bearing. Many of your foreign engine manufacturers haven't seemed to become aware of this and use bearings with little internal play but still press them tightly on the crank and in the case, resulting in a bearing with no internal play. This could also be part of your problem.

Also, there are bearings, and then again there are bearings. One manufacturer's class 1 bearing may be of better quality than another's class 3. Over the years, I have tried them all and can say without qualification that Fafnir is the best of the U.S. manufactured bearings. So get a class 1 Fafnir replacement — always run your engine out dry when you're through flying for the day — and load with 3-in-1 or equivalent and I believe you will end your bearing problems. □

CUNNINGHAM ON R/C

from page 7

very nice and interesting man. Last year we had missed him since he was on a trip to the U.S. The Nicholls' hobby shop, now operated by son Richard, is chock full of "goodies" --- kits, radios and engines from all over the world. Once again I was reminded just how lucky we are in the U.S. --- the prices that we pay on the average lower than in England, and far lower than the prices in Europe. While in London we spent some time looking in bookstores that specialize in books on aviation. I really went wild, finding all sorts of books that I had been unable to find in Fort Worth. So for the information of those who might want to locate a special book or information on a certain aircraft, here are the names of the two stores that we browsed in: Beaumont Aviation Books, 656 Holloway Road, London N19 3PD, England; and Motor Books & Accessories, 33 St. Martin's Court, Charing Cross, London W.C.2, England.

to page 184

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CUNNINGHAM ON R/C

from page 182/7

With the prices of trans-atlantic flight dropping each month, more and more of us will be wandering around overseas and, if you are an RC'er, you're going to find a friend wherever you go. Keep in mind that in all of the other countries of the world, except ours, R/C modeling is looked on as an adult sport, and is much admired. For some reason that I have never been able to fathom, here we are still looked upon as grown men playing with little plastic toys flown round and round on a string. Also, keep one other thing in mind when venturing overseas --- the costs are high, not only for modeling equipment, but for the normal things — such as food. And, plan to do lots of walking.

The big model craze is going to be with us for a long, long time. It's not a flash in the pan, but rather the desire of modelers to build and fly more realistic looking and flying aircraft. This has been brought about, I'm sure by the very high reliability of our radio equipment. For quite sometime now we have been blessed by radio equipment that is simply super when compared with radios that we were using 10, 15, or 20 years ago. Still, even with great radios, problems can creep in that are under the control of the builder/flyer. Problems such as faulty radio installation, vibration, bad or ineffective, pushrods, uncharged batteries, over discharged batteries, or any number of things. I've written many times in the past on these problems and their solutions, and will be doing so again in the future but, if you're building a "biggie", then you should take even more care to insure against the gremlins.

EK Products have announced their new XM servo for the larger models. As yet I have not had a chance to see, or operate, one but EK's Sales Manager, Bill Haga, called me the other day to tell me that it was almost ready. I have been flying my big birds on SM servos and, though I have not had any problems at all, I worried just a bit thinking about a 16

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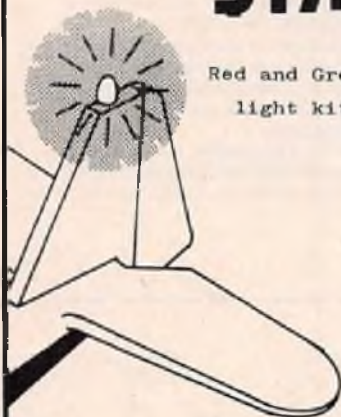
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Another thing that I am getting ready to try out is Hobby Lobby's new gas and oil engine, the EVRA 190. Mine arrived just the day I was leaving on vacation, and in the week that I have been back, I haven't had the time to put it on the nose of the Eindecker. I'll be happier with the XM servo operating the elevator when I attach this big motor to the front end. So far, the Eindecker has served as a test bed for the Webra .91 and the Suevia 25 cc engine and, next the EVRA 190.

While on the subject of Big Airplanes, let's start the 1979 ball rolling by reminding you again that this year the Second Annual Jumbo RC Fly In will be held July 21 and 22 at Thunderbird Field, on the shores of Lake Benbrook, just west of Fort Worth, Texas. If you attended last year you know what a great show it was, and if you are building a biggie for this year, then plan on showing up at the Thunderbird Field. The rules will be the same this year as last. It is a Fly In for large airplanes, monoplanes with a span at least 80" and biplanes with a span of at least 60". Antique and Old Timer aircraft are welcome, as are large gliders, but I'm sure that this coming year, as it was last year, the interest will be on the really big airplanes. Make your plans now to attend the Second Annual Jumbo RC Fly In.

One more item of interest for builders of the large aircraft. This year the Dallas Trade Show, to be held in early June will feature a category, with prizes for Jumbo models. I don't know yet what the exact category will be, but Jim Simpson promises to fill me in later.

Time to get off of the work bench for this month. Think I'll get out the trip pictures and take a look at them one more time --- seems that I can never get past the roll of slides that I took on the beach at Cannes . . . □

FROM THE SHOP

from page 2

Dick Tichenor would appreciate some help in locating a couple of his modeling buddies who lived in Nashville, Tennessee, back in the 1930's. One is Robert N. Chunn who designed and built small engines. Bob was living in Florida a few years ago. The other is Douglas T. Peck, recent whereabouts unknown.

If anyone knows how to contact these gentlemen, please drop a line to our Assistant Editor at RCM. □

Attention All Modelers
Please read **Walt Schroder's "Man At Work"** column in the February 1979 issue of **Model Airplane News . . . Pat Crews.**

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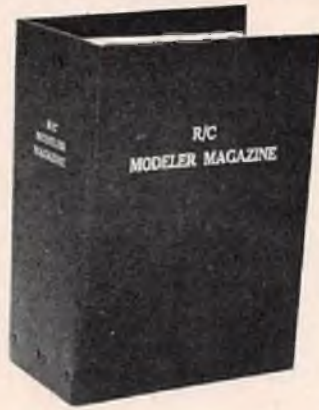
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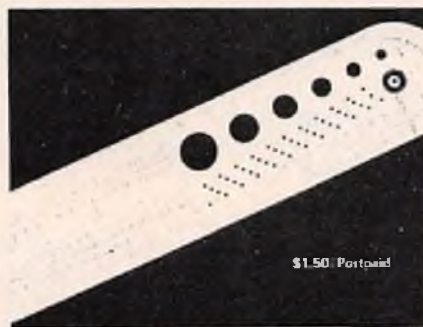
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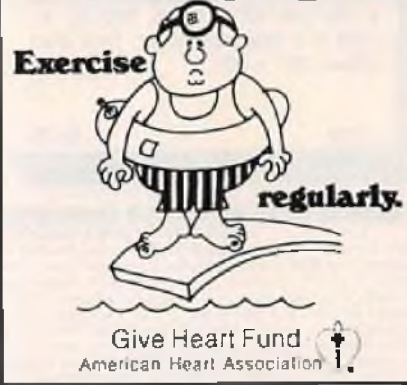
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We have received a shipment of Atlas gliders for which we had a stack of backorders. We do have some left - what a wonderful glider at the price.

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INDY R/C - 10620 N. College Ave. - Indianapolis, Indiana 46280



Indy 3 Channel... \$89.95

Indy's servos have been such an overwhelming success that by popular demand we have introduced our own radio. This is a three channel radio being offered at this low price with two servos. Airborne pack uses four pen cell batteries and the transmitter uses eight pen cell batteries. We may in the near future offer an even less expensive three channel using a stick on one side for rudder or aileron and on the left side for elevator. Such systems are much easier to build;

therefore, are quite a bit less expensive than the high quality two axis stick which we are including with our set. We are offering this system - for openers - on the 72 MHz frequencies. These systems will be serviced by Indy in Indianapolis. Also, we are looking for service agencies around the country who have made a name for themselves servicing other radios. If you are interested, please write.

3 Channel, dry, with 2 servos (2 axis stick) List \$139.95. Introductory price only \$89.95

INDY R/C - 10620 N. College Ave. - Indianapolis, Indiana 46280

Atlas

The Atlas is an almost ready-to-fly glider. This T-tail design has a span of 94.49" and a length of 45.08". The wing area is 697 sq. in. and the stabilizer area is 117 sq. in. Weighs from 2 to 2 1/4 pounds and from 2 channel to 4 channel proportional radio control. This is a beautiful almost ready-to-fly R/C glider. L: \$99.95 I: \$59.95



Cipolla

These engines are lapped piston type and are complete with glow plug. Satisfied customers are calling in and telling us that these really are little power houses.

We are now offering the following three versions. Cipolla .09 Std. U/C L: \$15.95 I: \$12.95. Cipolla R/C L: \$19.95 I: \$15.95. Cipolla R/C Marine L: \$34.95 I: \$23.95.



Indy Film

New colors similar to the K & B epoxy paint colors. Solids - White, Yellow, Orange, Blue, and Royal Blue.

L: \$7.50 per roll. I: \$3.99 or 3 rolls for \$9.99. This is an introductory offer.

Metallic red and green are coming soon. Prices slightly higher.



Como

Como engines are of a flat piston design with Perry porting. The piston carries one conventional ring. Crankshaft supported in two ball bearings.

Complete with muffler and ST carburetor. L: \$74.95 I: \$47.00. U/C version less muffler L: \$64.95 I: \$37.00. Taking orders for 48 R/C and 35 Combat.



Servos

INDY US-1 SERVO

Dunham mechanics. Rotary output plus rack. This is a small servo about the size of the D & R Batam. IC - 544 for use with systems like Futaba, Kraft and World Engines. Positive plus systems, Mitsumi connectors. L: \$28.95 I: \$20.95

INDY US-2 SERVO

This servo is built on the OS mechanics which are slightly larger and more powerful than the Dunham. Excellent for cars and boats. Electronic similar with same connector. Add \$2.00 for the standard World Engines connector or \$2.00 for standard Kraft connector. L: \$23.95 I: \$15.95



Curare

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