MARCH 1978 $1.50

RCM radio control MODELER

THE WORLDS LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

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When the elite of the radio control car racing fraternity gathered at Thorp Raceway for the first World Championships, Butch Kroells rolled to a convincing win with his works Associated RC100. Butch had the hot combination that day with his steady driving, his trusty Futaba FP-2F and his rocket-fast, 1:8 scale 917/30KL.

It came as no surprise that Butch teamed up with Futaba for his biggest ever win...Futaba systems have been in the winner's circle on the RC car circuit for years.

The reason? Simple, the traditional blend of reliability and craftsmanship of the 2F has made it the favorite of racers the world over. And, of course, our rugged S7 servos are built to take even the abuse of competition driving.

The Kroells Worldbeater.

The FP-2F system includes two S7 servos and a double-tuned, RF amplified receiver.

Congratulations, Butch! And thanks for keeping Futaba first.

Futaba

Butch Kroells: World RC Car Champion.

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

VOLUME 15 1978 NUMBER 3

R/C MODELER

FEATURES

This Month's Cover features an inviting fall scene enhanced by Gail Wehner of Columbus, Ohio. Gail is displaying an SBD built from Holman plans by Dr. Myron Timpkin. It features a Super Tigre .61, World Engines 7 channel radio and Rhom retracts. Ektachrome transparency by Lewis H. Gray.

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MARCH

From The SHOP

DON DEWEY

We would like to welcome a new member to the staff of RCM. He is Dick Phillips who will be writing a new column called "Super Scale News." The column will appear on an every other month basis until we get an idea of how much interest is generated. The name "Super Scale News" refers to the size of the models rather than being aimed specifically at Scale models.

Lots of interest is being shown in large models in recent months and we hope you'll enjoy this new column.

•

The Third Annual John Pond Commemorative Old Timer Contest grows in popularity each year. This past contest was no exception. Thanks to John LeSuer for sending us the coverage of this grand old era of modeling.

John Pond Old Timers Meet
By John LeSuer

The Third Annual John Pond Commemorative Old Timer R/C Contest was held on October 15-16, 1977, in Santa Maria, California. The contest was sponsored by SAM 26 and SAM 21 and hosted by the TRI-Valley R/C Modelers Club of Santa Maria. John LeSuer, SAM 26, was the Contest Director and he was ably assisted by Tom Bristol (SAM 21). For those of you who may be new to the Old Timer movement, this contest is held annually on the West Coast to honor John Pond who has done so much to promote and organize this grand old era of modeling. The old time free-flight program is well and growing, but this contest has, from its inception, been a radio control assist meet. In previous years, the contest was held on one day with five events being flown. This year it was divided into two days with limited engine run. Class A, B and C being held on Saturday and 1/2A Replica and Texaco being held on Sunday.

On Saturday morning the events got off to a somewhat late start due to early morning fog. At the pilot briefing, Daddy Warbucks (John Pond) was introduced to all and the meet management committee took over operations. This contest was run very smoothly with a team from SAM 26, SAM 21 and the TRI-Valley R/C Modelers Club. Team members were Carl Gawens, Dick Enos, Dave Jones, George Johnson, Bill Ader, Joe MacGregor, Bob Angel, Helen LeSuer and Pat Bristol. The flying site is ideal with a blade top runway and flat ground for great distance all around.

Saturday afternoon, after all the flying was finished, a meeting was held at the local inn where representatives from SAM 21, 26, 27, 30 and 49, discussed the coming contest schedules of the clubs. Also discussed was a 3-Day Old Time R/C Memorial Day Contest to be put on by representatives from all the clubs.

Saturday evening, a Santa Maria style beef bar-b-que dinner was served to a group of tired, wind-blown but happy contestants and their wives. Many TRI-Valley members attended and all were treated to an excellent dinner and pro-

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Contest Officials (L to R): George Johnson, John Le Suer Contest Director, Pat Bristol, Dave Jones, Carl Gawens, Joe MacGregor, Dick Enos, Bill Ader, Tom Bristol Assistant Contest Director, Helen Le Suer, Bob Angel, Pat Connick (not in picture).

General view of pit area – a busy place. Excellent flying field with protected pits, lots of spectator room, paved runway and no aircraft eating trees nearby. Contest management and control center in background. Conscientous dedicated helpers made contest a huge success.

Robert Sliff, Sweepstakes Winner, 3rd Annual John Pond Meet, October 1977.

Karl Tulp, SAM 21. A Playboy, Sr. with a Wankel engine. Injury was due to a miscalculation of distance from needle valve to prop. He won Texaco with a Dallaire Sportster.

You'll see many good radios in this magazine. Here are the BEST ones.

When we say these are the BEST radios you can buy we'd better have good reasons for saying it. We do:

MOST RELIABLE

1. Hobby Lobby Radios are the radios best designed to prevent vibration-caused failures. Ours are the ONLY radios you can buy that have the servo amplifiers inside the more shock-protected receiver case rather than inside the servos.

2. You get more SAFE FLYING TIME from a Hobby Lobby Radio. Our servo amplifiers use very little current. With a HL radio you can fly confidently right through your last flight of the day while owners of other radios are worrying about discharged batteries.

3. You are never the test flyer for any Hobby Lobby Radio system. The electronic design of HL radios is a well-proven design. It has not ever required redesign. The tradition with less reliable radios is to redesign annually. And each annual change makes the RCer the guinea pig for field testing.

4. Owners of other radios have to worry about the security of their often-disconnected aileron servo connector (which can't be tightened like Hobby Lobby's). The owner of a HL radio can tighten the connectors on his set and then forget about them. Flying a high performance RC plane can be nerve-racking enough without having to worry about connectors coming apart.

5. We don't recommend this, but many owners of HL radios tell us that they can fly their HL radio with the transmitter antenna partially collapsed. You can fly your RC plane much more confidently knowing that there is tremendous extra flying range built into your HL radio system.

6. Hobby Lobby Radios use electronic circuitry that gives you one-cell-out flight capability. In the rare event that one of the four cells in the airborne battery pack loses its charge or shorts out your HL Radio continues to fly safely.

MOST USABLE

1. One transmitter is capable of flying many RC planes. But, with most RC outfits it costs you almost the price of a complete new radio system just to buy four new servos to put into a second airplane. When you own a Hobby Lobby Radio you only pay for the expensive servo amplifiers once—they're inside the receiver case (except for the two auxiliary channels on the HL6). So, extra servos for our radios only cost you $14 each. There's no other radio made that lets you equip a second 4 channel plane with 4 servos for only $56.

2. "Usable" means your being able to change the direction of rotation of our servos in less than a minute. It's so simple to do this that you can do it right at the flying field. If you own any other radio than a HL radio you have to send the servo back to the factory for this change. Or, worse yet, you have to buy another servo.

3. The HL6 and HL3 both have adjustable centering tension on the control sticks. You can adjust yours real tight if you're a beginner and need tight sticks to keep yourself oriented during nervous first flights. When you become an expert you can loosen our control sticks so there's nothing between you and the "feel" of your high performance aircraft.

4. You get an Owner's Manual with the HL6 that tells you how to do routine maintenance, how to install the radio in a plane, how to reverse servo rotation, how to adjust servo neutral—one more example of how we make our radios more USABLE.

5. A "usable" radio is one that'll fit into today's smaller RC planes. The four-servo version of the HL6 weighs only 11½ ounces. The two-servo version of the HL3 will only add 7 ounces to a small .049 plane (with our optional small battery). And these light airborne weights are for radios that give you enough servo power to fly planes as big as a 25 pound, 12 foot span Curtis Robin that we've flown.

These are the reasons that we can say that Hobby Lobby Radios are BEST. Call us and order one today.

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Kwik Bilt P-51 ..... $49.88
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Kwik Bilt Cessna 150 ..... $60.20
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SURE-FLITE A-R-F FOAM KITS

SURE-FLITE A-R-F FOAM KIT
SPITFIRE MK I $26.56
List price $34.95

Brand new injection molded all foam kit. Clear canopy and molded radiators. Decal sheet. 50" span, 450 sq. in. wing area. For 2 to 4 channels, .29-.40 engine.

BABY BIRDIE ALMOST READY-TO-FLY $34.16
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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.

CESSNA SKYLANE 182 FOAM A-R-F $26.56
List price $34.95

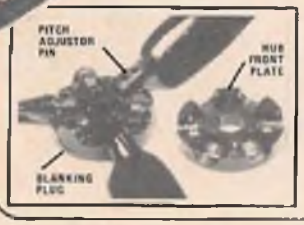
For .15-.19 engine. 53" span, 420 sq. inch area. 2 to 4 channels. Steerable nose gear. 2 hour assembly.

NEW! Revolutionary! Variable Pitch Prop!

Hobby Lobby/S.L.E.C. MULTI-PROP Introductory Price **$9.99**
List price $14.50

This is the most **revolutionary model airplane prop** we've ever seen. It is 10 inch diameter and comes with 3 blades. Extra or replacement blades are available from open stock for 99 cents each. You can set it up as a **2, 3, or 6 blade prop.** It is **scale in appearance**—both the blade shape and the hub. The 3 blade version runs **noticeably quieter** than a conventional model airplane propeller. It's made of glass fiber filled black nylon. It **will run on engines from .29 to .60 displacement** because it can be **adjusted to any pitch you want!** With 3 blades the prop looks like a Hamilton Standard with the hydraulic pitch control type of hub. With 2 blades it looks like most private plane props. With 6 blades it looks unearthly! Since the pitch can be minutely adjusted through a range of about 4 to 10 pitch it is **capable of getting the absolute maximum** out of any engine you put it on. You can't imagine what happens to engine performance when you can adjust prop pitch to any value you select.

HERE'S HOW IT WORKS:



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only **$15.96** List Price $23.95

45½" wing span, 278 sq. in. wing area.

- Precisely cut, easy-to-build, all balsa kit from Japan.
- 2-channel powered glider—great trainer slope soarer and sport plane!

This beautiful little plane can be flown in confined areas or in the wide open spaces. Its slow, gentle flight is perfect for a beginner. For 2 channels (rudder and elevator). Papillon will perform aerobatics or just hang itself on a thermal or slope updraft. **Heat shrink plastic "sock" wing covering is included.**

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★★ SPECIAL ★★

It's a good time to have your Hobby Lobby radio completely checked over. Our technician will go over the rig: Re-tune it, range and vibration check it, cycle the nicads and completely check it out. All this for $19.97 plus parts. This tune-up offer doesn't apply to damaged radios. Repairs of damage will be done at our regular hourly labor rates. Allow $1.40 for shipping and handling on prepaid orders, $2.75 on COD and bank cards.

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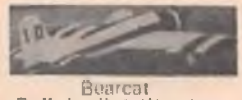
We don't know of a cheaper way for you to outfit yourself with a high performance fiberglass RC plane!



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Built by Bob Waechter

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KIT SALE!

(Prices in effect until February 28, 1978)

We have complete accessory packs available for all airplane kits. Call us!

(Accessory packs contain everything you need to complete each kit except for radio and engine!)

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RCM Basic Trainer $24.99
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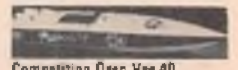
Deep Vee 60 Fiberglass $53.97
Pay-n-Pak $23.97
Deep Vee 10 ..... $ 6.97



Competition Deep Vee 40 Fiberglass $55.97
Competition Deep Vee 60 Fiberglass $59.97

Hot Shot $19.97
Deep Vee 20 CF Fiberglass $49.97

Dumas Running Hardware Kits

H-5 for SK-20 ..... $13.77
H-12 for AVL-40 ..... $41.97
H-19 for DV-40, 60 ..... $27.97
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BULK PACKAGE Control Horns

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BULK PACKAGE Polypropylene Hinges

200 Hinges only **$2.99**
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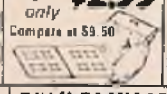

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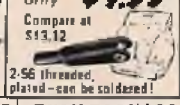
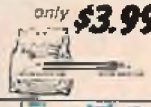


2-56 threaded, plated—can be soldered!

BULK PACKAGE Nylon Tube Pushrod

25 feet Nylon Outer Tube
25 feet Nylon Inner Tube
only **$3.99**



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35 Couplers only **$3.99**

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only **$5.99**
4 Pairs:
2" thru 2¾"
Compare at $10.76

These are lightweight, high quality air-inflated wheels on strong molded nylon hubs. We think these are comparable to, or better than wheels that sell for twice the price. We absolutely guarantee that you'll like them. If you don't think they're comparable to wheels that sell for twice the price, return them and we'll give you your $5.99 back.

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35 Clevises only **$3.99**
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BULK PACKAGE Mini Nylon Pop Clevises with 70" Rods

25 Clevises only **$3.99**
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BULK PACKAGE RC Steel Links with 70" Rods

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20 feet nylon tubing
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20 threaded wood blocks
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SUPERCYCLE $49.00
list price $89.95

The quantity is somewhat limited, but until we run out you can buy all of these you want for this ridiculous $49 price. Call now!

Comes with OBECHI-SHEETED foam wing!

Hobby Lobby/Trueline TIGER $49.97
list price $66.00

Tiger's sleek line are reminiscent of the NATO fighter. The 52" span foam wing comes ready-sheeted with obechi veneer, and the rest of the plane is very simple balsa construction. For .35 to .40 engine, 4 channels. Flying characteristics: fast, unusually aerobatic, holds knife edge attitude, lands at very slow airspeeds.

NO ONE UNDERSELLS Z-10

1/2 oz.
14.1 Grams
$1.99

Hobby Lobby's Z-10 cyanoacrylate adhesive will glue balsa wood, plastics, your fingers—anything—together in about 5 seconds. Z-10 is as good or better than any other cyano adhesive, but it costs you less.

SPECIAL! G.E. Nickel-Cadmium Batteries

1.2 volt 500 mah. Pencell size
4 for $8.99
Regular $3.20 each

This is the high quality G.E. cell that's original equipment in the best radio outfits. Cells have solder tabs.

When you've got it — FLAUNT IT! **$3.99**

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Here's the easiest way for you to start flying off the water. **Harpoon is an A.R.F.**—the fuselage is ready-formed Polyflite—similar to epoxy glass in appearance. And the wings are foam cores that come **ALREADY SHEETED** with balsa. Harpoon is 57" span, 540 sq. in. wing area, for .35-.40 engines and 4 channels. Hardware includes: Formed wire parts, hinges, control horns, pushrods.

THIS OUTFIT STARTS YOU FLYING R/C WITH A FULL 4 CHANNEL PLANE!

JUNIOR TELEMASTER BEGINNERS OUTFIT $277

A Hobby Lobby JUNIOR TELEMASTER

C Fox 15 R/C ENGINE

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D 2 rolls/Hobby Lobby SUPERKOTE

Combination price in effect until Mar. 31, 1978.

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ON TOP OF THE PROBLEM

And with the new Royal fuel pump, that's as close as you need to come to any battery. As a matter of fact, this mechanical fueler is designed to operate in the field independent of electric power. Its hand crank supplies the energy and determines the direction and speed of fuel flow.

$11.95

SEE IT TODAY AT YOUR LOCAL DEALER!

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SCALE R/C AIRCRAFT

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Pitts Special	P-51 D Mustang
Pitts S-2	Staggerwing Beech

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Bleriot	Spitfire Jr.
Hien Jr.	Cessna 182 Jr.
Zero Jr.	Piper Colt Jr.

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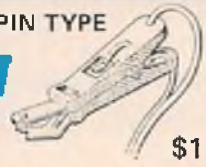
B-25	Cessna Skymaster
P-38	Victor P-68
Cessna 310 Q	Douglas C-47

CLOTHESPIN TYPE

GLOW CLIP



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Cunningham On RC

CHUCK CUNNINGHAM

Please take a look at the pictures along with this column. Yep, another Lazy Ace. But look again, does something look just a little bit strange to you? It did to me when I first pulled these pics from the envelope. I couldn't quite place what it was, so had to get to the letter from George Hume:

Dear Mr. Cunningham,

I thought you might be interested in my version of the 'Lazy Ace'. Enclosed are pictures of the model. You might notice something different about it – it's 1/2 size!

The model has a 38" span and is exactly 1/2 size. It is enlarged twice the magazine size. When I first saw the plan I thought it (the design) was just about perfect. Very good proportions except it is a tad big. I have nothing against big models – don't get me wrong – except I don't have room for a 76" Lazy Ace. My model is powered by a Super Tigre .23 and weighs 40 ounces giving me a wing loading of 12.8 ounces/square foot. I have a Kraft Series 75 radio with four KPS-14 servos with the small battery pack in it. The model is covered with transparent yellow MonoKote trimmed in metallic blue. At the time the pictures were taken, I hadn't installed the rudder or elevator pushrods, nor had the engine been run. I have also omitted the 'N' struts and I'm not sure that I'm going to add them - - - not just yet anyway.

One thing: I notice in your article on the 'Lazy Ace' you didn't say how you attached the windshields. I think I'll make 3 tabs on them and slot the fuselage to take them and cover the joint with a strip of MonoKote.

It ought to be fun flying it - - - not as slow and stately as the original - - - but fun nevertheless. If the lousy weather ever clears up here, I'll fly it next weekend.

Sincerely,
George Hume
Tukwila, Wash.

Thanks for sharing your pictures and ideas with us, George, and I expect that by the time this comes out in print, George will have made a number of flights on his model. That is, if the lousy weather ever clears up. I'm feeling just a bit the same way as I am writing this — now and then looking out the window at a very cold gray day. With a new, unflown aircraft sitting on charge just hoping that the day will warm up enough to let me get out to fly. This new aircraft, by the way, is one that I have been wanting to build for some time, just hadn't taken the time to hatch out the design. It is another large one, 72" wing span, cabin designed to be used as a trainer and as a fun-sport flying machine. One of the principle uses I intend for it is to use floats and fly from water, and for you northern guys, to use the same type of floats and fly from snow. It is designed around the standard .60 engines, had 860" of wing area and is a pretty normal looking machine in every way. It is built strong, though light, and should be able to carry a payload of three to five pounds. The name of this new bird is "Lucky Lady".

While working on the Lucky Lady, I came across another use of Super Glue, one that lots of modelers have probably discovered for themselves, but this was the first time that I had needed to use this idea. The leading edge of the wing on the Lucky Lady, on the prototype, is made from 1/2" square balsa. I was building the wings one night and thought that I had a number of pieces of 1/2" square in my balsa supply. When I started looking for them, I couldn't find them. Still don't remember what I did with them but I did have a good collection of 1/4" x 1/2" balsa that I had acquired for wing spars. Since two quarters make a half, I laminated the needed 1/4" x 1/2" to make 1/2" x 1/2" by holding them together and laying a bead of glue (in this case I was using Zap) down the joint. The result was a very good, tough leading edge, that was a bit harder to sand to a large round radius, but good and straight, and strong. It didn't take any time at all to stick the pieces together and let me proceed with building the wings. These super glues have all kinds of uses that just keep popping up. The other night, while building, I began to wonder about the old modeling days of not too many years ago. Not quite back to the days when you had to dissolve celluloid in acetone to make your own cement, but just back about 20 years to the days of model airplane cement, dope, silk and/or silkspan. I remember how long it took me to build a model then, and how much weaker and ugly it was. I sure wouldn't want to turn back the clock to the techniques that we used to use. When I started modeling in the mid-30's, my first models were Strombecker ship models stuck together with glue that had to be mixed up from small packets. This came with the kits and I never was quite sure why you had to use this kind of glue, but that's what the directions said. How many of you guys remember building these models? 'Nuff of the wanderings down memory lane, but let me get in one more plug for plastic film covering. I generally use MonoKote for all of my covering work, though I have used Solarfilm in the past. To me, covering and finishing a model has always been the toughest part. I like to get it done and get out to fly. In the days when I used silk and dope, I never made an aircraft that I felt was even remotely good looking. When I went to painted surfaces, before the epoxy paints, I tried all types of painting, and some came out good and others looked great from a distance, but not up close. But, now that I use plastic films all of the time, I can turn out a finished product in just a couple of evenings of covering that looks great, and one that I'm proud to show around. So, this lazy modeler wants to tip his hat and stiffened and drying paint brush to the men of Top Flite models who pioneered the way with plastic films.

★

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to page 177

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Engine: .09 – .10

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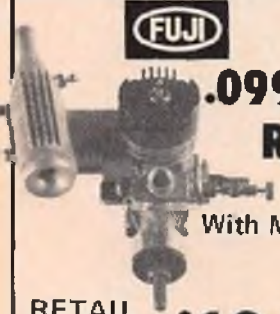

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Engine Clinic

CLARENCE LEE

Our first letter this month is the kind that I like to receive, in that it offers a possible solution to a previous writer's problem. Coming up with the answers to all the problems we receive every month is not always easy so it is always appreciated when the readers write in with their ideas. This column is not strictly for questions and answers. If any of you have had a problem for which you have discovered the cure, write in and let the rest of the readers know. It helps me and, in turn, helps keep this column going. So don't be bashful.

Dear Mr. Lee,

In reference to Mr. Morell's letter in the August 1977 RCM, the following information is forwarded for what it is worth.

I have a 1964 O.S. Max .49 which is still going strong with well over 90 flights since new. The only trouble I have had was in 1973 when I purchased a starter. While using the starter, the Max would burn out three or four plugs a day. The wing and tail would be covered with the tell-tale black oil after each flight.

Since the Max was nine years old, I thought it was over the hill and needed to be replaced. Upon taking the engine apart, I found that, while using the starter, the crankshaft had been rubbing on the rear crankcase cover. The engine was cleaned, lubricated and replaced on the plane.

I now hand start all my engines including my O.S. Max .80 and have had very little plug trouble. The plug in the O.S. Max .49 is now about a month old and still good.

Mr. Morell did not state whether or not he used an electric starter on his Taipan .21, but on a far-out chance that he did, this could be his problem.

Respectfully yours,
John Berry,
U.S. Army, Germany

Thanks for sending in your idea, John. This is a problem that is far more common than many fellows realize so I would like to comment a little further.

Although engine manufacturers set up machining and assembly tolerances that, in print, assure that everything fits properly, sometimes the finished article (engine) does not always turn out that way. The problem of the crankshaft rubbing on the back plate when the crankshaft is pushed to the rear, occurs far more often than many fellows realize. One should always check for this when purchasing a new engine. Always be sure to install a propeller on the engine before making the check, otherwise the shaft could be pushed to the rear hitting the back plate and giving a false indication. With the propeller tightened in place, push backwards on the crank with considerable pressure as you rock the shaft back and forth. The shaft should move freely. If there is an obvious bind not present when the shaft is pulled forward, the crankshaft or con-rod is rubbing on the back cover and this can lead to trouble, especially if an electric starter is used. The solution is very simple — the addition of an extra back plate gasket should give the necessary clearance. Even though you do not use an electric starter, you should still check to make sure the crankshaft or rod is not rubbing. When an engine is running, the crankshaft actually has a tendency to bounce back and forth. Although it is normal for the con-rod to rub against the back plate with an engine running, you do not want the full load of the crankshaft, prop, spinner, etc., being run against the back plate. Crank pins have a tendency to cut big grooves in a back plate. Any excess pressure this way results in metal particles passing through the engine and, in turn, burning out the glow plug as Mr. Berry experienced. It only takes a minute particle of metal on the glow plug element to burn it out.

Dear Mr. Lee,

I haven't subscribed to RIC Modeler for too long, however, I am an avid reader of your column. I am presently building a scale Corsair and am at quite a perplexing point in decision making. I cannot decide on what power train to use in it. There are so many excellent .60's and up size engines available to the hobbyist, it makes it difficult to choose. I want something that has power to spare and is dependable. One person says the Kraft .61 is the most powerful, and the next person will recommend the S.T. G60, O.S. .60 FSR, etc. Based on your long experience of usage and testing, what would you recommend? I have been considering the O.S. .80 because it provides a little additional weight for ballast. Would you recommend using one of the gear reduction assemblies? I want the engine to run not more than about 5000 rpm's as I plan to run an 18" diameter 3-blade scale prop on it.

My second quandry is which is the proper way to break-in a good engine? I'm sure you have written on this subject in the past, but I have obviously missed it. One source or manufacturer claims that the engine should be run rich for 2 or 3 minutes, then shut down and allowed to cool down and repeat the process again. Then at the end of the run, break the engine down and clean it thoroughly. The next source claims that the engine should be run rich four-cycling for 20 to 30 minutes. I would appreciate it if you could settle this matter once and for all, for me. Some also claim that it is better to break it in under a load, i.e., flying it rich.

I will be anxiously awaiting your thoughts and concerns on these matters.

Sincerely,
John Jones
Richland, Washington

John, one thing I learned many years ago when first starting this column was not to recommend a specific brand of engine as being better than another. This can lead to many problems. If I recommend brand "X" or "Y" and the engine does not live up to the purchaser's expectations, I usually hear about it. This is okay, but when fellows expect me to get the manufacturer to refund their money because they purchased the engine on my recommendation and feel it is my responsibility — that's going a bit too far. This actually happened several times so you can understand why I no longer make specific recommendations. Any of the engines you mention are excellent engines and it would be a matter of which one could be obtained at the best price.

There is no substitute for displacement so the O.S. .80 is going to be the more powerful when it comes to turning a big prop. However, I would not recommend trying to turn an 18" 3-blade prop at 5000 rpm. You would be lugging

to page 12

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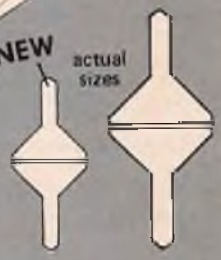

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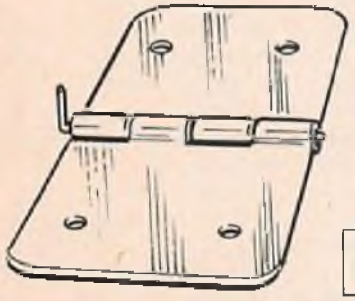

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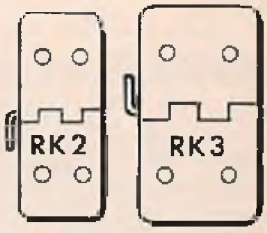

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ENGINE CLINIC

from page 10

the engine far below its horsepower peak which would result in over-heating and accelerated wear. If this is the way you want to go, then I would recommend one of the .60's in conjunction with one of the presently available prop drive reduction units. The only shortcoming of these units is very short drive belt life. Be prepared to replace drive belts quite frequently if you do go with one of these units.

The method of breaking an engine in depends on the type of piston/sleeve used and the type of model you intend to use the engine in. Most any of your present day ringed engines can be flown right out of the box if you are going to use them in a sport or pattern type ship. You can do more in the air in half a dozen flights than with several hours of bench running. This is due to the fact that you are making the engine work under actual operating conditions — not just running static as on the bench. However, if you intend to use the engine in a scale model where over-heating may be a problem or in a helicopter, or race car, then the engine should be given some bench time. The same thing would pertain to an engine with a lapped piston/sleeve. Lapped engines are always more "sticky" when new than ringed engines and you greatly lessen the chances of "sticking" the engine up on a first flight with a little bench time.

As for the bench running itself — letting the engine run for short intervals and then shutting down to cool is okay but sure takes a lot of time. I much prefer to keep the engine running, varying the mixture setting, i.e., with the engine running extremely rich, peak it out momentarily and then richen right back up again. Keep repeating this procedure allowing long pauses for the rich running. When the engine will hold a slightly rich two cycle without slowing, it is ready to be put to use in the aircraft, car, etc. Then proceed with the normal air break in running the engine very rich the first flight, a click or two leaner the second flight, etc.

I would like to say at this point that break-in of the engines using ABC type piston/sleeve assemblies is a bit different in that you do not want to run the engine excessively rich. Most ABC piston/sleeve engines are fit with the piston a bit tight at the top of the stroke. This is to allow for differential expansion of the piston and sleeve. The sleeve grows more than the piston, the hotter the engine gets. This is one of the advantages of this type of unit. On an extremely lean run, the sleeve will expand more than the piston lessening the chances of seizing. However, on the other hand, if the engine is run excessively rich, it does not come up to operating temperature and the piston/sleeve fit remains tight resulting in premature wear of the piston. This is especially true of many of your racing engines intended for use with high nitro fuels. The K & B 6.5 instruction sheet, in particular, recommends breaking the engine in with 50% nitro fuel. Many fellows disregard this and bench run the engine slobbering rich with 15%, or lower, sport fuel. Every revolution, the piston is being pushed up and yanked down due to the tight fit. It doesn't take much running like this before the rod or piston wrist pin bosses let go — then the owner wonders why. Having paid attention to the instructions would have eliminated the subsequent damage.

Dear Sir:

I am at the moment reading your column (Nov. 1977 issue) regarding problems of the Ross twin (opposed cylinder) running incorrectly in sharp turns.

This problem has been noted years ago with the O.K. and Viking twins when flying in U-control models.

Considering this problem at that time (spin rigs, etc.) we came to the conclusion that the cylinder on the outside of the circle would go rich because of centrifugal force and the inner cylinder inversely would go lean. In many cases it was noted on test that one cylinder would completely go out leaving the other one to carry the full load.

In view of the above, I have never been over-enthusiastic about model twins using the opposed cylinder configuration. I have found that the in-line twin does not demonstrate the faults apparent in the opposed type.

When one considers the great numbers of opposed twins introduced by different manufacturers from different nations, it is amazing that none have stood the test of time.

Clarence, this may be old hat to you but thought it might be some explanation for the problem detailed by one of your readers.

Sincerely,
C. Tate
Toronto, Ont., Canada

I believe we are facing a different set of forces here than what you experienced in U-control. Having flown U-control myself for many years before taking up RC, I am pretty familiar with that phase of the hobby.

Although I never flew a Viking or O.K. twin in a U-control model, I did fly a Vivel twin and Ace twin and did not experience the cylinder leaning problem you mention. This is possibly due to better design to begin with.

In U-control you are dealing with centrifugal force, as you say. However, with the R/C ship, it is pretty much up on its side when making a tight turn so more "G" loads are encountered than cen-

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FOR COMPETITION...OR FOOLIN' AROUND,

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Hot Shot for 3.5 outboards in wood and a new fiberglass picklefork version...check the records set by the Hot Shot and imagine how the new picklefork will do.

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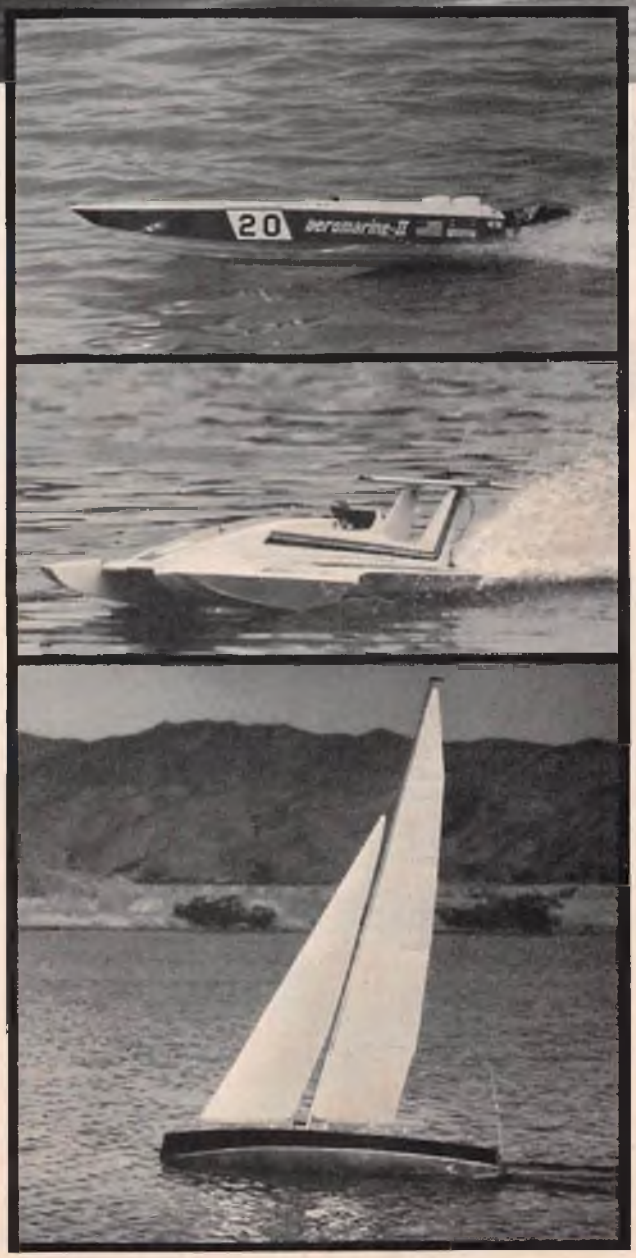

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Span:40"
Length: 34"
Weight:3½ lbs.
Power: .15 cu. in.

For 3 Channel Radio Control Systems

All Balsa Construction with Illustrated Instructions and Full Size Plans

Windfree

A WINNER SINCE 1970

Wing Span .....99.25 in.
Wing Area .....555 sq. in.
Weight .....20 oz.

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Bushwacker

$44.95 K3

Span .....68.75"
Length .....44.19"
Weight .....3 lbs.
(ready to fly)

Area .....555 sq. in.
Power 15-.19

Kit Features:

- ★ Bellcranks, control horns, mounting bolts and blind nuts included.
- ★ Formed landing gear.
- ★ Engine mount included.
- ★ Wheel pants.
- ★ Full size plans and instruction book.
- ★ All wood construction.
- ★ Muffler included.

Kit also available with the following accessories:
★ wheels ★ spinner ★ hinges ★ clevises ★ 4 oz. fuel tank

$52.95 K4

Wanderer®

$19.95 K5

Span .....72"
Length .....40.375"
Area .....563 sq. in.
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(Finest Trainer Available)

Span 72"
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Area 532 sq. in.
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Soaring

AL KINDRICK

What is a Timer? A timing device that lets you know when your eggs are finished? Lets you know when a three minute phone call is up? Or a person to let you know how long you have flown your sailplane? Right on all counts. But let's expand the thoughts on the sailplane timer.

The timer who you, the pilot, chooses to time your flying has a tremendous responsibility. He does more than punch a stopwatch. If the timer uses his own watch, great. If he, or she, uses yours, make sure they understand the functions and controls of the watch perfectly.

On launch, the timer should have one eye on the winch drum, while you are pulsing the winch, and the other eye watching your sailplane. He can see what kind of air you are in by the movement of the winch drum. Is the drum playing out line between pulses? How much does the drum pull the line in? All of these observations are verbally transmitted to the pilot. Just before the release, his eyes should be on the sailplane to mark the release time.

Once free of the tow line, his eyes are looking for signs of lift: birds circling, dust and paper particles, leaves on trees, flags or streamers on the rise, or other sailplanes to "piggy back". All this time he is vocally letting the pilot know how much time he is into or time left to fly. This portion of the timer's responsibility is very important and has to be discussed and understood **before** the flight. A count-down that you are not used to hearing can really mess up your concentration and reflexes.

When the pilot is making his approach, the timer should stand to his rear and off to one side, holding his stopwatch in a way that he can watch the sailplane and the stopwatch at the same time. He should make sure that he stops the watch when the sailplane makes the first contact with the ground, not when the sailplane stops moving. Some conditions will warrant the pilot stopping the watch with a skip, to burn off speed and stop the watch, and then proceed to the landing spot.

What this dissertation boils down to is that the timer is a very important tool in order for the pilot to perform his task successfully. To quote a phrase from Mark Smith, "Don't look at your sailplane while it is flying, stare at it." With the pilot's full attention on the sailplane, don't confuse him with idle chatter. One other item on landings - - - watch the other sailplanes landing; do you have the right skid material attached? Timing and calling is important — Do It Right.

•

Don Olson of Metairie, Louisiana, has sent in his version of "Spoilers" which

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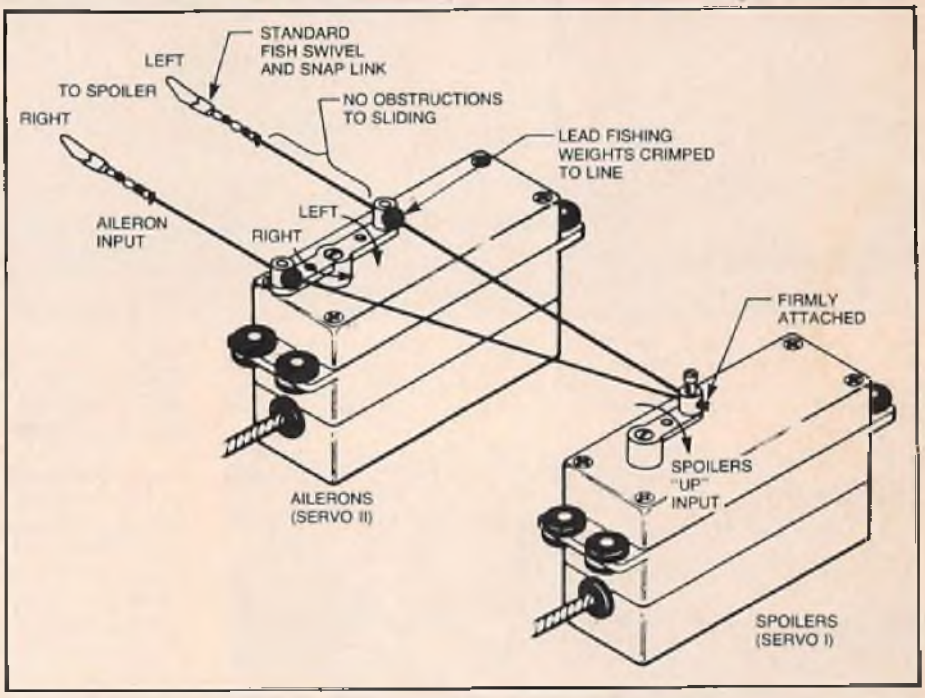

Timer Dan Tatum holds watch high so eyes can scan watch and also follow sailplane for pilot Keith Kindrick.

Total concentration is the name of the game. Pilot Lee Renaud, timer Bill Davidson.

AIR SHOW TEAMS FLY SIG KITS

Above: The Florida Air Show Team holding their fleet of Kougars. Left to right: Irv Allison, Terry Richter (Narrator), Bob Ketson, Wayne Ripple, Art Johnson (Team Manager), Mario Yederlinic, Ernie Kraft and Bob Temple. Also pictured are some of their scale airplanes and the obligatory Snoopy's Doghouse and Flying Lawnmower.

Art wrote about the team Kadet also: "In addition to the Kougar, we are using the Sig Kadet for those shows where we can introduce the public to RC flying via buddy box operations between shows. The Kadet in the photo has provided the first feel of RC flying to numerous residents of this area from 5 years to 75 years of age. It is three channel with the only change from the plans to use wing bolts rather than rubber bands to speed assembly at the fields. It is a perfect model for this type of training."

RC-34 SKYBOLT $62.50 RC-31 KADET $34.95

MORE AND MORE OF THE EXPANDING LIST OF AMA AND OTHER RC MODEL DEMONSTRATION TEAMS ARE FINDING SIG DESIGNS IDEAL FOR DEMANDING REQUIREMENTS OF PUBLIC PERFORMANCES.

Col. Art Johnson (of '78 Nationals P-38 fame) is the manager of the Florida Air Show Team (AMA-AST # 112). In recent letters he commented on their experiences with the Sig Kougar: "When I built the first Kougar, we were looking for a model that could be flown in formation to simulate the Air Force Thunderbird act. It was immediately apparent that you could not have designed a better plane for this act if you had had this purpose in mind from the start. We are flying wing man on leader formation and not just doing manuevers on call. This is probably the most difficult type of flying I can imagine for RC type models but with practice we have been able to do it successfully with as many as four Kougars in flight... We have been using the Sig Kougar as the standard plane for our Thunderbird formation aerobatic act for some time. Each of our seven team members is required to keep one operational at all times..... All of our team members are high in their praise of the Kougar. It looks the part, is stable and forgiving, yet it responds well and is fast enough to look good in the Thunderbird type act.....

Formation acts consistently get more applause and comment at our shows than any other act including Snoopy and the Red Baron. We are hoping to improve and expand this type of flying as we learn more about it. I believe it is a tribute to Sig designers that we have found their kits the best on the market for this purpose."

We appreciate Art's generous comments on the Kougar and other teams have said similar things about formation flying with this airplane. Our opinion is that the low speed stability provided by the built-in washout in the wing, helping to prevent tip stall, in company with fast high speed capability, allows members of a formation to perform catch-up and slow-down maneuvers safely.

RC-35 KOUGAR $44.95

Left: Sig Skybolts in a team aerobatic act, will join the F.A.S.T. program during the 1978 show season. Art is pleased with his and said, "After trying my Skybolt two of our team members junked their-------. The Skybolt is the most solid and responsive biplane I have flown to date."

SMITH MINIPLANE - A .40 - .45 SIZE BIPE

THE FOLLOWING IS REPRINTED FROM AN ARTICLE IN FLYING MODELS MAGAZINE, FEBRUARY 1978 ISSUE:

SIG'S SMITH MINIPLANE by Frank Tiano

The Smith Miniplane is a stand off scale biplane designed by Mike Gretz and offered by Sig Manufacturing Co., Inc., Montezuma, Iowa 50171. It's a cute little number intended for any type of competition whether it be stand-off or biplane events. The real Smith Miniplane is just an overgrown model with a wingspan totaling a mere 17 feet. Total area of the full scale ship is only 100 sq. feet. The name Miniplane seems appropriate enough for this 1/2-ton of flying delight.

In model form the ship will do everything the real one will do, only quicker. Sig markets the little jewel for a sensible $49.95 and includes almost everything needed to finish the kit. Besides a good selection of top quality balsa and plywood, there is also an ABS plastic cowling, wheelpants and headrest. Some of the other goodies include prebent landing gear and cabane wires, hinges, torque rods, threaded links, control horns, aluminum engine mounts, and assorted miscellaneous hardware like nuts, bolts and screws. Also included are two large full-size plans complete with diagrams, a magnificent construction manual with many photos, and a beautiful full color decal sheet completely free of any cracks. The builder simply supplies his time and talent along with an engine, radio, fuel tank, covering material and paint. You know, the usual things that you have laying around the house.

The kit number for ordering a Miniplane is # RC-38. It's intended for .40-.46 engines but I'm certain it would fly on a good .35. Many speed freaks will undoubtedly try to stuff a hot .60 under the cowl but it's really not necessary for anything but pure speed. The span of the Miniplane is a small 44" and the total area is 650 sq. inches. The fuselage measures 40-3/8" long. All up weight should be between 5 - 5-1/2 lbs. In fact, one would have to incorporate very sloppy building techniques to get the weight up over 6 lbs. Before we get into the building mechanics of the Miniplane, let me remind you that this is a contest proven design that can win in the hands of a competent flyer. The ship placed first in the 1976 National Multiwing Championships at Omaha and 1st at the Canadian Nationals in 76.....

A five m.p.h. wind was blowing on that Sunday afternoon, a beautiful day for test flying. Another friend, Tom Clemenate, spent a considerable amount of time in helping set up the Webra so it would perform right while cowled in. I have never changed those original settings. Armed with my Minolta 35mm camera, I asked Tom if he would mind making the first flight so I could get the necessary pictures for the article. He readily agreed and in a flash the Miniplane was at the North end of the field in preparation for takeoff. Tom advanced the throttle quickly and the Smith rolled about 50 feet before it literally jumped into the air. Initially the ship needed lots of down trim to fly hands off but there was more than enough on the transmitter available to bring it back so we could make the necessary adjustments. We refueled the 10 ounce tank and flew it one more time. This time the ship behaved beautifully and we knew we had a winner on our hands. After shooting about 20 pictures, Tom brought the little ship back home to roost and I got it ready for my first flight. The Miniplane handles very well on the ground and requires just a bit of right rudder during takeoff. By holding in a little down stick you can keep her on the ground as long as you like before letting her lift off. The ship is so quick and stable that one could actually loop or roll it on takeoff. The Webra .40 provides plenty of power for the little bipe and I wouldn't recommend anything stronger. (If there is anything stronger.) I have all controls set up for maximum throw and that's the way I prefer to fly. Others who have flown the Smith say that it's a little sensitive, although stable. If you want to zoom around a lot, go for the larger throws, it's more fun! Rolls to the right are a bit faster than those to the left and the same goes for the spins. They are quick in both directions though. Loops may be done tightly or very big and open. The ship tracks true through both types. A good indication that we had achieved a proper balance point was shown by the addition of down trim as the fuel was burned up. Jabbing at the elevator will produce some of the neatest square loops you've ever seen and all snap maneuvers happen "right now" and the ship will come out on heading with a little prac[illegible] It's the closest reacting airplane to a Pulsar that I've flown to date. A surprising [illegible] that in a dead stick situation this plane will glide very well, many times reaching [illegible]ing area when some pattern ships wouldn't have. Landings as well as touch and [illegible]re easy to execute because the Miniplane sets up a very predictable sink rate. Bl[illegible]to full throttle after a touch and go does not result in any snapping tendencies. [illegible]p flies inverted almost as well as it does upright which is very unusual for a bipla[illegible]h a semi-symetrical airfoil that is almost a flat bottom type. I think we tried al[illegible] of the AMA pattern maneuvers and found that the Smith can execute them all hands of a competent pilot. I'd love to see one perform with Norm Cassella sticks.

To wrap it all up, I have to say that this airplane is one of the sweetest, smoo[illegible] ships around. It's ideal for fun fly or serious competition. It will turn on a dime or [illegible] on one as well. It has provided me and a few of my friends with countless hour[illegible] pure enjoyment. The design incorporates some very rugged construction into a v[illegible] light airframe. The total weight of my Miniplane, after ballast, was 5 lbs. 3 oz. rea[illegible] to fly minus fuel. .....If you're looking for a plane to scream around the sky with, th[illegible] kit may be for you. As for myself, all I can say is, "Move over Pitts."

FRANK MADE MANY MORE INTERESTING COMMENTS ABOUT THE BUILDING AND FLYING OF HIS MODEL IN THE COMPLETE STORY, WITH PICTURES, THAT APPEARED IN FLYING MODELS. RC-38 SMITH MINIPLANE $49.95

Ed Wisser (McKeesport, PA) is known for his beautiful scale models that are regularly seen at Toledo and other shows. Here's his latest, a detailed version of the Sig Smith Miniplane. He went all out and added many fine details to the kit design. Sig scale rivets were used where needed.

The cockpit has a stained and varnished floor. Rudder and brake pedals, scuff pads and control stick are made from aluminum and brass tubing. The bucket seat was molded from ABS. Head rest and baggage compartment are covered with black vinyl. Final touch is the windshield, fastened in scale fashion to brass attach brackets on the fuselage. Also visible in this picture are the bracing wires, which Ed made up from Plexon plastic facing with brass tubing and clevis ends.

Sitting on the airport apron, it's hard to detect that this is Ed's miniature version and not Glen Sig's full-size airplane. Panels were formed from filled epoxy cement. A detailed tail wheel, made from spring steel and brass, is fitted. There are even "welds" on the landing gear joints. It is covered with silk and painted with Sig Supercoat Dope. Rib stitching was simulated with fine trails of Sig Bond glue. An Enya .45 is used with a Semco [illegible]s, Jr. muffler reworked to fit under the cowl. A real show stopper!

SOARING

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could be added to an existing spoiler or built in as new construction (see sketch).

Ailerons on sailplanes are usually not worth the time and effort to install all the mechanics and are fragile and sometimes hard to adjust on a two-piece wing. However, spoilers are used on virtually all new designs and the string pull-up with gravity down techniques used on the Grand Esprit, Windrifter, Pierce Paragon, Aquila, and others, are virtually foolproof. An adaptation of this spoiler design allows one to use an individual spoiler as kind of a negative aileron for quickly adjusting the roll attitude of sailplanes. The design shown gives Servo 1 full control of the spoilers at all times and Servo 2 about half control of the left, or right, spoiler. With extended or longer arms on Servo 2, any degree of either spoiler can be actuated with the aileron transmitter stick. This is found to be very useful on landings when half spoilers can be fed into increase sink rate while adjusting roll with individual spoiler height and controlling yaw (direction) separately with the rudder. Note that this allows aileron-like control with no added complication within the wings.

The hook-up is made by adding one servo to the flight pack and using radio dial cord for the rigging. Du-Bro or Goldberg connector control rod adapters, with the screws removed, are mounted at opposite ends of equal length arms on Servo 2. The lengths of dial cord for proper operation are fixed by crimping small lead fishing weights to the dial cord at appropriate locations so that when Servo 2 is actuated, it pulls one side only while sliding free on the other; any reasonable adaptive disconnecting cord system can be used.

Care should be taken that no interfering parts are allowed to foul the flexible

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RCM PRODUCT TEST

Top Flite Models FRESHMAN

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

The Freshman, manufactured by Top Flite Models of Chicago, Illinois, is designed for four channel radio operation, .29 to .40 power, and is an easy to build, easy to fly basic trainer.

Aside from the label which is dominated by a handsome rendition of a red, white and blue Freshman, the box in which our kit arrived was no different than most. However, what we found inside the box was a different story. All parts were carefully arranged and then protected from damage by layers of those little half spheres of styrofoam. Balsa, hardwood and plywood were top quality, to say the least. Die-cutting of the balsa - - - superb - - - most pieces were falling out of the sheet. Die-cutting of the plywood not quite as good; took some cutting to remove the parts from the sheets. Pre-shaped material such as wing leading and trailing edges - - - perfect. Although everything up to this point rated pluses, what was most impressive to us was the completeness of the kit: 4-40 screws and blind nuts for engine mounting; nylon nose gear mount with screws; control arm and spring steel nose gear strut; wire pushrods with housing for throttle and nose gear operation; formed wire

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SPECIFICATIONS

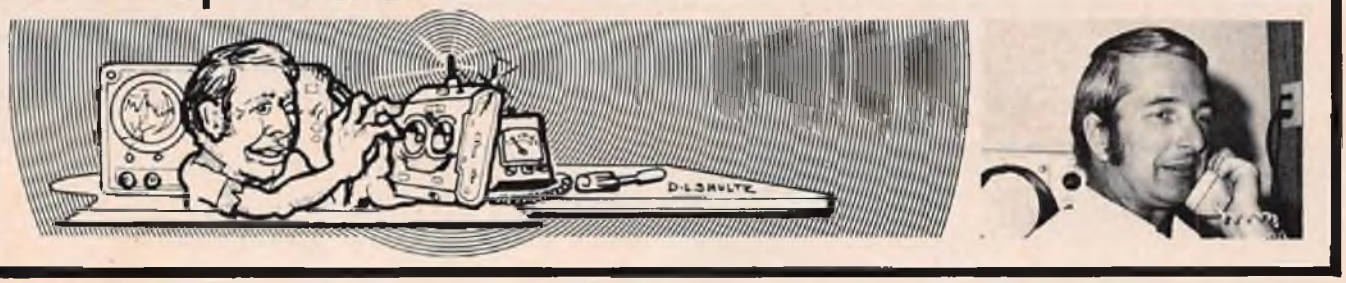
Name	Freshman
Aircraft Type	Basic Trainer
Manufactured By	Top Flite Models, Inc. 1901 N. Narragansett Ave. Chicago, Illinois 60639
Mfg. Suggested Retail Price	$44.95
Available From	Both Mfg. and Retail Outlets
Mfg. Recommended Usage	Basic Powered Trainer
Wing Span	48 Inches
Wing Chord	10½ Inches
Total Wing Area	504 Square Inches
Fuselage Length	35⅛ Inches
Radio Compartment Dimensions	(L) 14-13/16" x (W) 3⅛" x (H) 2¾"
Wing Location	Shoulder Wing
Airfoil	Semi-Symmetrical
Wing Planform	Constant Chord
Dihedral	1¾ Inches
Stabilizer Span	18 Inches
Stabilizer Chord (incl. elev.)	5½ Inches
Total Stab Area	92¼ Square Inches
Stab Airfoil Section	Flat
Stabilizer Location	Mid-Fuselage
Vertical Fin Height	6⅛ Inches
Vertical Fin Width (incl. rud.)	5⅞" (Avg.)
Mfg. Rec. Engine Range	.29-.40
Recommended Fuel Tank Size	6 Ounce
Landing Gear	Tricycle
Rec. Number of Channels	4
Recommended Control Functions	Rud., Elev., Throt., & Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa, Ply & Hardwood
Wing	Balsa, Ply & Hardwood
Tail Surfaces	Balsa
Hardware Included In Kit	See Text
Plan Size	48" x 36½" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (23 pages)
Construction Photos	Yes (drawings)
Kit Includes	Die-Cut & Shaped Parts
Mfg. Rec. Flying Weight	Not Given
Wing loading based on rec. flying wt.	Not Given

RCM PROTOTYPE

Weight, Ready To Fly	60 Ounces
Wing Loading	17.1 oz./sq. ft.
Covering & finishing materials used	Super MonoKote, Pro Trim Tape
Engine Make and Disp.	Testor-McCoy .35
Muffler Used	Sanders Closed Front
Radio Used	Hobby Lobby
Tank Size Used	6 Ounce

Radio Spectrum

JIM ODDINO



This month, we've got what I think is kind of an exciting breakthrough in radio control electronics. I'm sure it will appeal to the more serious experimenter and might result in a lot of guys going to their local electronic whiz for a modification of their equipment.

For quite some time, we've been talking about the new generation of encoders that have emerged and how versatile they are. You can add mixers, exponential controls, spin buttons, etc., with no complications. During this time, we recognized that there are jillions of guys with old-fashioned encoders who would also like to add these functions. We gave this a lot of thought when we had time (which wasn't much), but never came up with a workable scheme. We kept discussing these ideas and it finally paid off, when a reader from England, Mr. T.W. Waters, submitted an article on adding a mixer to a standard half shot encoder. I feel almost as good about this as if I had invented the circuit myself, because the number one objective of this column is the trading of information for the good of all. This input sure fits that description. You might not be interested in mixers per se, but in developing the mixer, Mr. Waters had to develop a technique of integrating his circuit into a half shot encoder, and this technique can be used for many other applications.

I'm not going to steal all of his thunder, but I did do a little breadboarding to see if the technique would work and I thought I would present that this month so those who want to, can start playing. I have not evaluated the circuits from a temperature and voltage stability standpoint and would appreciate feedback from anyone.

Figure 1 shows a before and after schematic in a typical half shot encoder.

The circuit I'm going to illustrate is a non-linear aileron control which desensitizes the control around neutral while still providing full control at the extreme stick position. Theoretically this should do away with the need for rate switches which eventually will be left in the wrong position at some critical time. Notice that all we have done is to ground the bottom of the aileron control pot that was connected to the collector of Q_1. This is a brown wire on my set (S & O). We also added two resistors, (I used 2.7K) to replace the pot in the collector of Q_1. We add our circuit to modify the control pot voltage, whether it be for mixing, non-linear control, or whatever, between the pot wiper (brown and white wire) and the top of the resistor divider we added. The schematic for the non-linear aileron is shown in Figure 2.

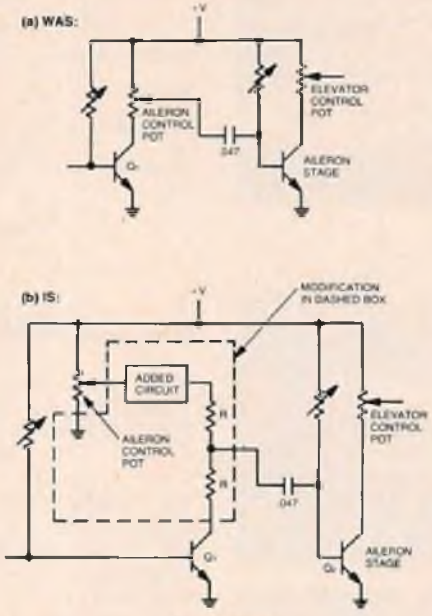


FIGURE 1

I found that the aileron control pot voltage, the 5K trim pot voltage, and the voltage at pin 14, all needed to be about 3.0 volts to result in the proper neutral pulse width on my system. This might vary on others.

The first op amp is strictly an inverter and can be eliminated if you don't care which direction your pulse width goes. You could accomplish the same thing by switching the outside wires on the control pot. In some sets with keyed shafts, you might be forced to do this in order to get to 3.0 volts. The diodes provide the non-linearity and an explanation of how is in order. If you recall our discussions on op amps a few months ago, you will remember how we mechanized the dual rate circuit.

We split the input resistor into two discreet resistors and put a switch across one of them (actually a pot) which allowed us to choose either of two fixed gains. The diode acts just like the switch. If we assume the diodes in Figure 2 were perfect, that is, they didn't conduct at all like an open switch until the voltage drop exceeded a half a volt, we would get a gain (change in output for a given change in input) of:

$$\frac{100K}{100K+27K} = .78$$

when the input was within plus and minus a half a volt of neutral. This is further reduced by the resistor divider. If we considered the diode a perfect conductor like a closed switch with a half volt drop, for larger inputs, we will get a considerably higher gain, just as when we closed our rate switch. I guess a guy could write some equations for all of this, but it is almost easier to cut and try. You

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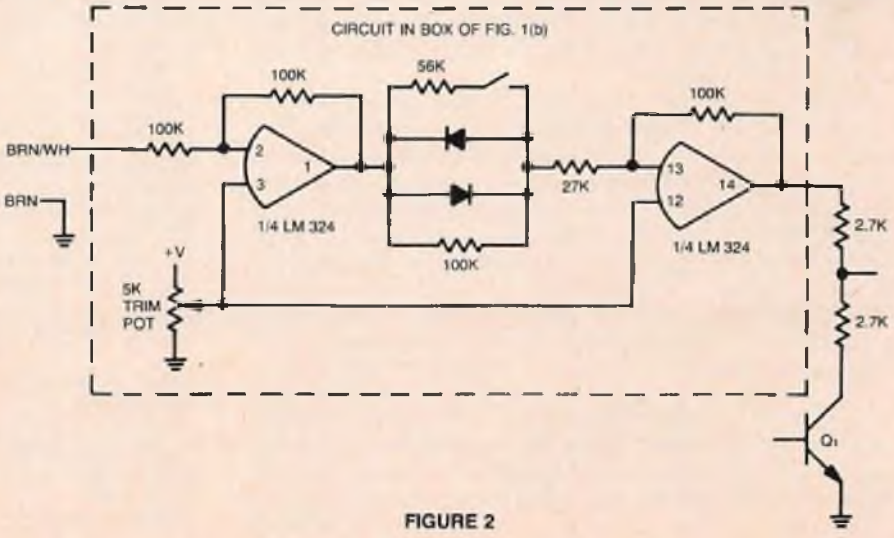
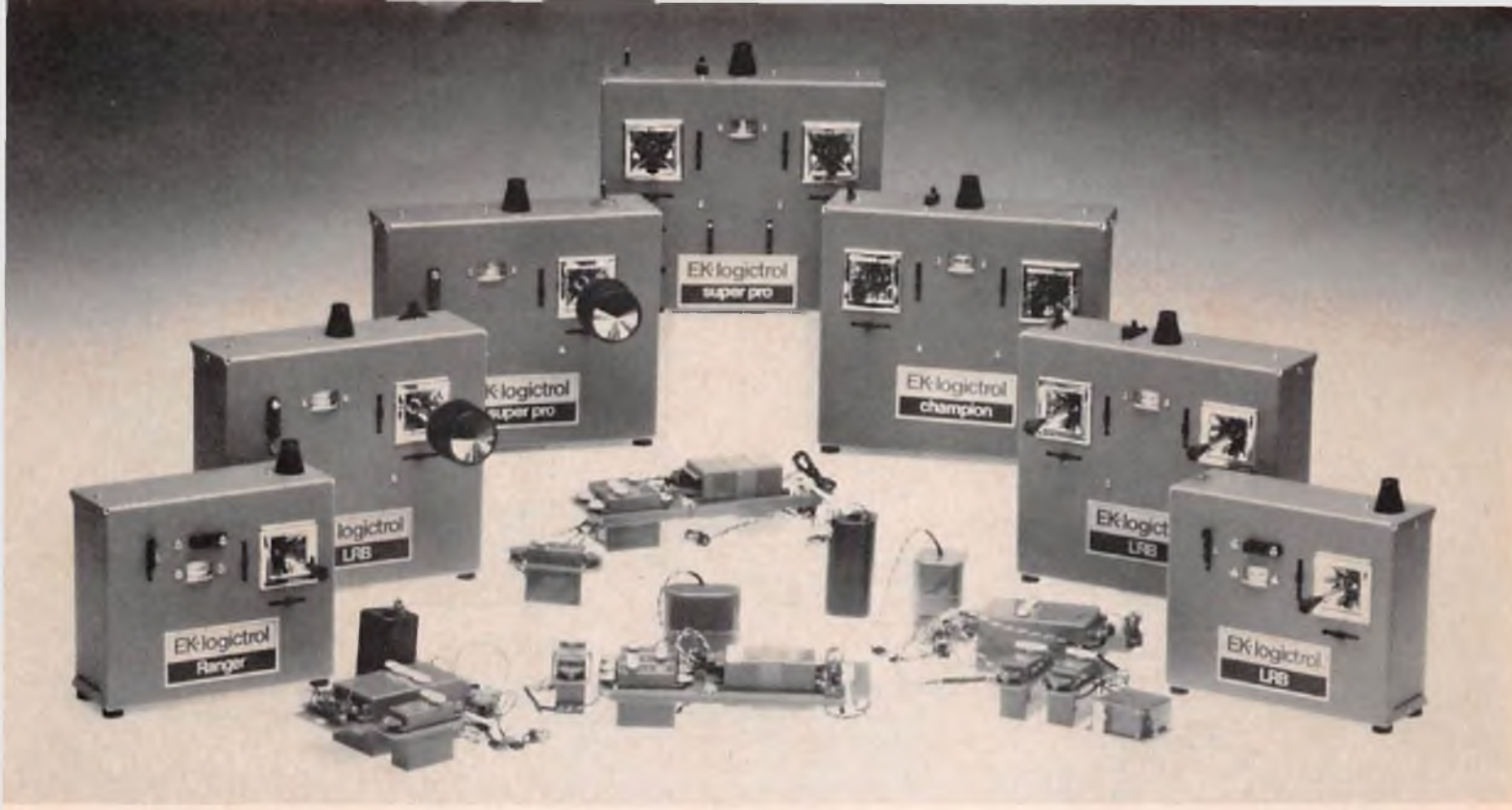


FIGURE 2



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may want to adjust all of the resistor values and you may want to add resistors in series with the diodes to reduce the slope after the diodes start conducting heavily. I must add that the diodes aren't perfect and they start conducting at very low voltages and never assume a constant .5 volt drop. The net result is good for us because it smoothes out the curve. See Figure 3.

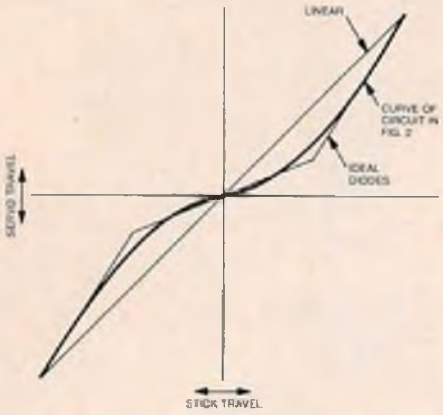


FIGURE 3

I put a switch across the diodes to switch back to a linear mode. With the values shown, you get quite a bend in the curve and it looks like it might be too much. That is, you may not have enough sensitivity around neutral. The switch will let you get your plane down until you can make adjustments. Change the 100K resistor across the diodes until you get the feel you want. This will take a lot of experimenting. I'd sure like to hear from you on what you think of this scheme as far as having better control of your plane. We may find the linear control is best and that this is a waste of time. Those of you who think this sort of thing is a crutch or cheating, can send your comments to RC Sportsman.

As I've said before, I'm all for anything that helps me fly the airplane better. I have not flown with this circuit installed yet, but I hope that I can do that and report in future columns.

☆ ☆

Mr. Jim Oddino,

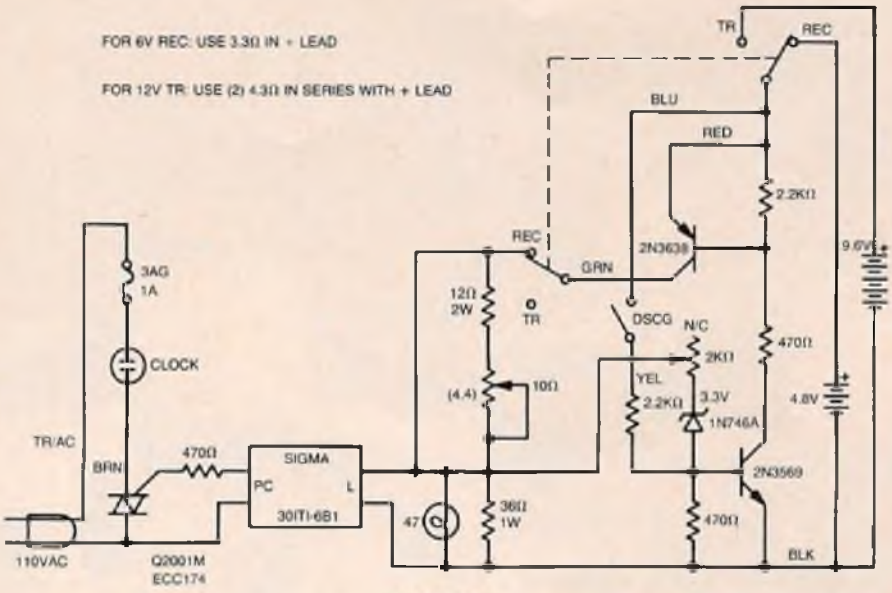
In reading your column in the November RCM, I find I have the same problem as George A. Wacker from Johnstown, PA - - - a "Flite Life" that no longer works properly. As in George's case, I've written to Electrostar who have the same address and phone number as "Misjon" Ind.

They do not answer or acknowledge my letter either. Now I wouldn't send it in for service even if they offered.

If they think I would spend $89.95 for a new one they have another thing coming. Please see if you can get them off their _ _ _!

Thanks,
H.L. Niehaus
Abilene, Tex.

We don't usually print schematics of commercial products except to illustrate principles, because we're never sure if



FLITE LIFE

what we've got is the latest. However, because so many people have had no response from Misjon or Electrostar, or whoever they are, and are stuck with units that don't work, we thought we'd help out by printing a schematic sent in by J.P. Donovan of Louisville, Kentucky. I can't imagine that anyone would want to copy the circuit to compete with Misjon, so I can't see any reason not to print it. Just don't start writing in asking where to get Sigma relays and triacs. Notice that Mr. Donovan has added the information on converting to 6v receiver packs and 12v transmitter packs. Have fun!

☆ ☆

Well, while we're on a spree of valuable contributions by readers, let's try another. Some time ago one of our readers tried to build a 180° landing gear servo using the Goldberg mechanics and switch plate and the Signetics NE 544 servo amp. The reader had a problem which I explained, but for which I offered no solution. Gary Kelson who contributed to the design of the NE 544 offers the following suggestion. "Put the switch plate in series with the motor along with a couple of diodes, rather than in the emitters of the external drivers." The circuit is shown in Figure 4.

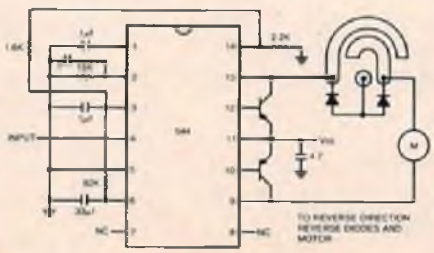


FIGURE 4

Gary has been flying this circuit in his Atlas for over a year with good results. I suspect the current drain will be slightly higher than with an IC that has no internal PNP's and has the limit switches in the emitters, but this shouldn't be any big problem. Just keep an eye on those batteries.

☆ ☆

Dear Jim,

I have followed your column in R/C Modeler whenever I get a chance to grab a copy, and I find your articles most interesting and informative. The circuit for an auxiliary controller in the October issue was interesting, as I have been using a similar set-up for a couple of years, simply using one motor wire and ground from an "Ace" servo electronics kit to run a relay, for my high speed electrics. The DPDT relay is wired to give parallel, or series, connection of 6v ni-cad packs, for about 40 minutes on slow or 8 minutes on fast (12v).

Anyway, I notice that you wrote an article on a motor speed controller in a past RCM. Could you please send me a reprint of that article, or a circuit diagram or, even better, do you have a diagram for one based on the Signetics 544 which is easier to obtain? I would like to handle 24v-20a with it! Does it have a forward-reverse capability, or one direction only?

Second, I have a "Probar sailboat winch, which is a lever type 180° rotation having a motor that draws about 3a when stalled. It seems to me that it should be pretty simple to convert this to proportional; the only problem being – how do you up the current capability of a servo amp to handle this amount of current, or is there a commercial servo amp that will do it? This same circuit could be used for a drum type winch by substituting a 5 or 10 turn pot for the feedback pot, and would probably be much like a reversible motor speed control, with "normal" pulse stretching, I guess. On the "Probar", the conversion amounts to making a huge 180° servo.

Well, thanks for your time and I hope

to page 24

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you will be able to help me with the above. Looking forward to hearing from you.

Bob Sterns
Vancouver, B.C.

In the February 1978 issue, RCM published an article by Jay Eitelman that shows you how to build the controller with the Signetics NE 544. I'd recommend going down that path for the reason you mentioned, availability of the integrated circuit. Jay also sent along some additional ideas which I think will give you some ideas to satisfy the other applications you have — you'll have to read his article first.

IDEAS FOR THE EXPERIMENTERS
By Jay Eitelman

Since this controller is simply the electronic's portion of a servo, it could be used to control a sailboat's sail winch mechanism. In this application, the centering pot, R5, could be remoted to sense the winch position, and the end result would be a big servo. For this application, the dead band may be reduced by changing C6 to a .22 ufd, and the R6 + R7 combination should equal about 75K ohm.

This control could also be used to separately control two auxiliary functions such as horns, water pumps, lights, etc., by connecting each auxiliary device to either the white or gray motor drive line, and ground. A forward command would activate one function, and a reverse command would activate the other function. If R7 was increased to about 75K, the outputs would represent an On-Off signal instead of the normal variable duty cycle.

The circuitry to the left of, and including, the IC in the schematic should be universal to any slow speed switching controller concept, and could be used in conjunction with various output configurations which may be more practical in applications requiring greater stall currents, and where a reverse function could be eliminated.

A Darlington transistor has been suggested in previous articles as a means of supplying these high stall currents without expending excessive drive currents, and the NE 544 could be used to replace the proprietary IC used in these circuits.

The Darlington transistor has a disadvantage in that it has an inherent voltage loss in excess of one volt, and a loss in either voltage or current terms is still a loss. In this example, the trade-offs would be either to increase the capacity of the motor supply to accommodate the high drive current of a conventional transistor, or to increase the voltage of the motor supply to compensate for the saturation voltage loss of the Darlington transistor.

Using several transistors in parallel as an output stage may offer a fair compromise between these voltage and current losses with the trade-offs being either to buy more batteries or buy more transistors. Since transistors are cheaper, smaller, and do not require special charging techniques, the following arrangements should be desirable:

Figure 4 illustrates using four D44H2 transistors to replace the complimentary bridge output stage in the previous

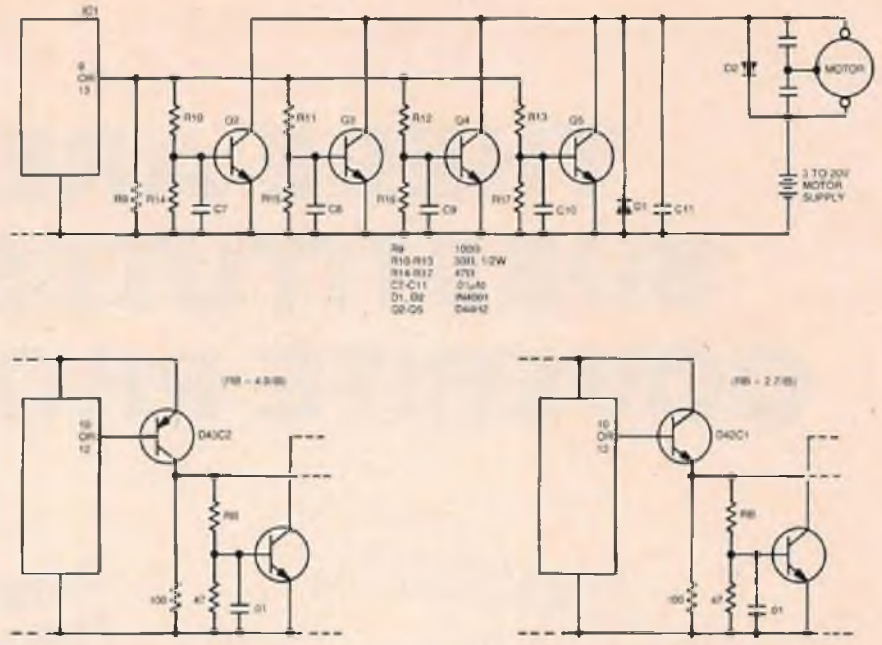

FIGURE 4

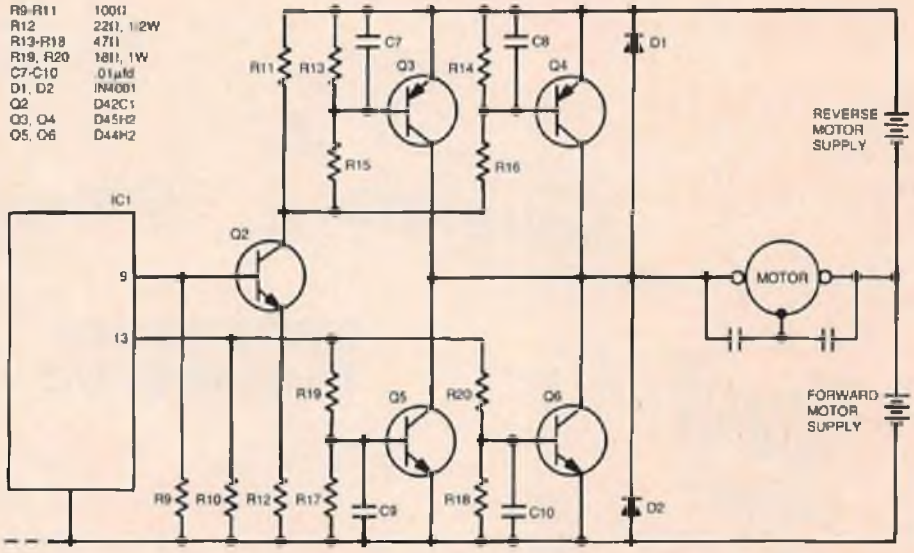

FIGURE 5

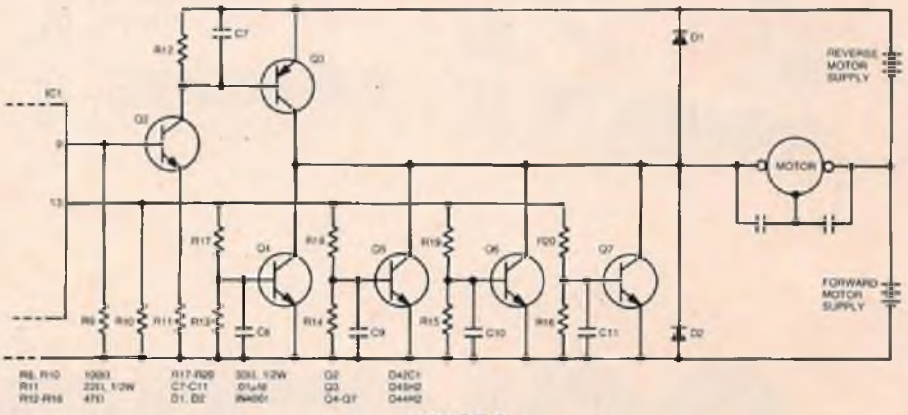

FIGURE 6

schematic. This circuit will provide a single direction speed control that should be capable of providing a stall current in excess of 25 amps at the expense of 400ma of drive current which is consumed from the receiver supply. The saturation voltage loss will be about .2v at a 10 amp load current figuring typical transistor characteristics, and excluding the losses in wiring, switches, fuses, and connections.

In this example, the drive current is supplied directly from the IC outputs 9 or 13. The choice of which output to be used will be determined by the desired direction of control stick movement. These IC outputs are only capable of sourcing or

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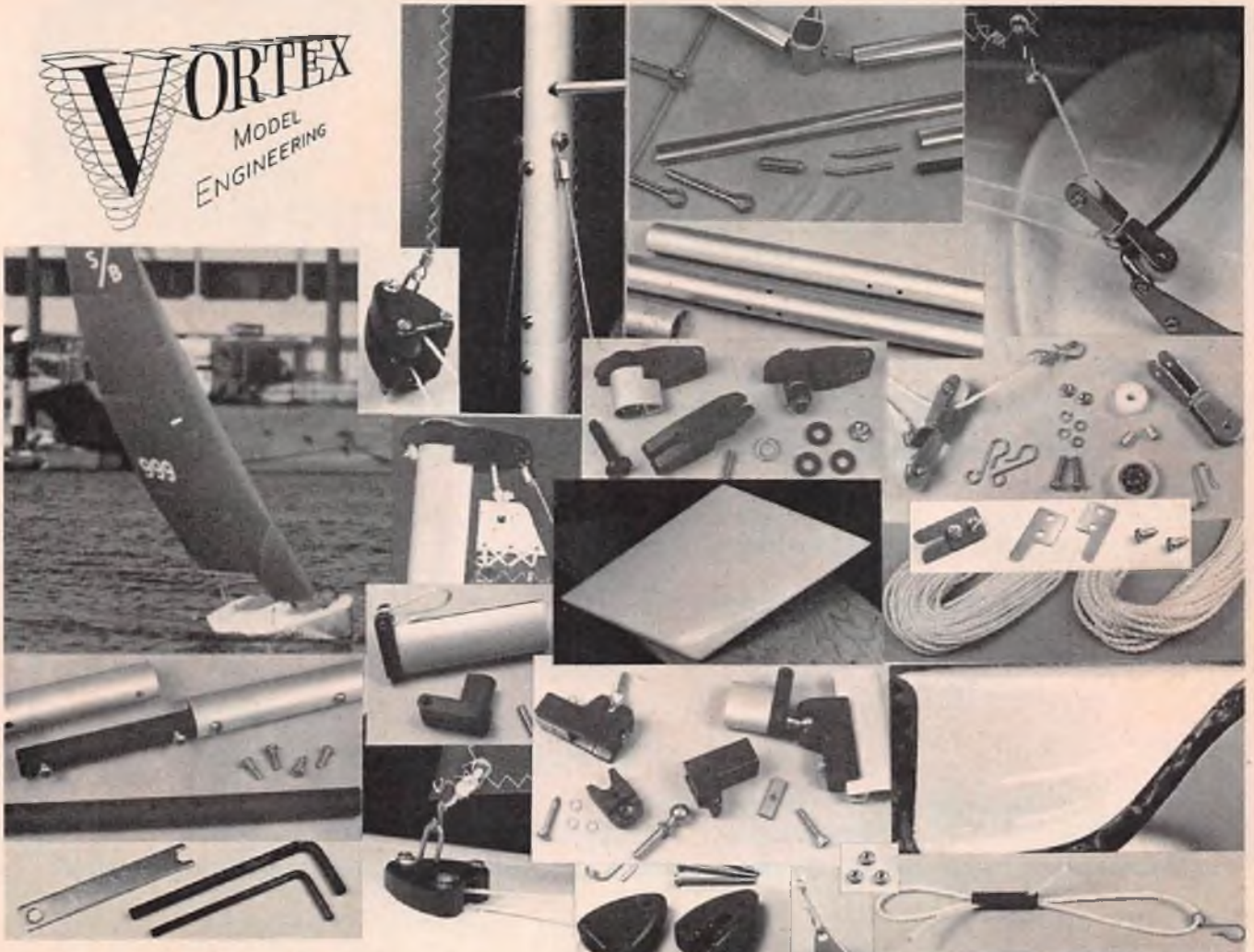

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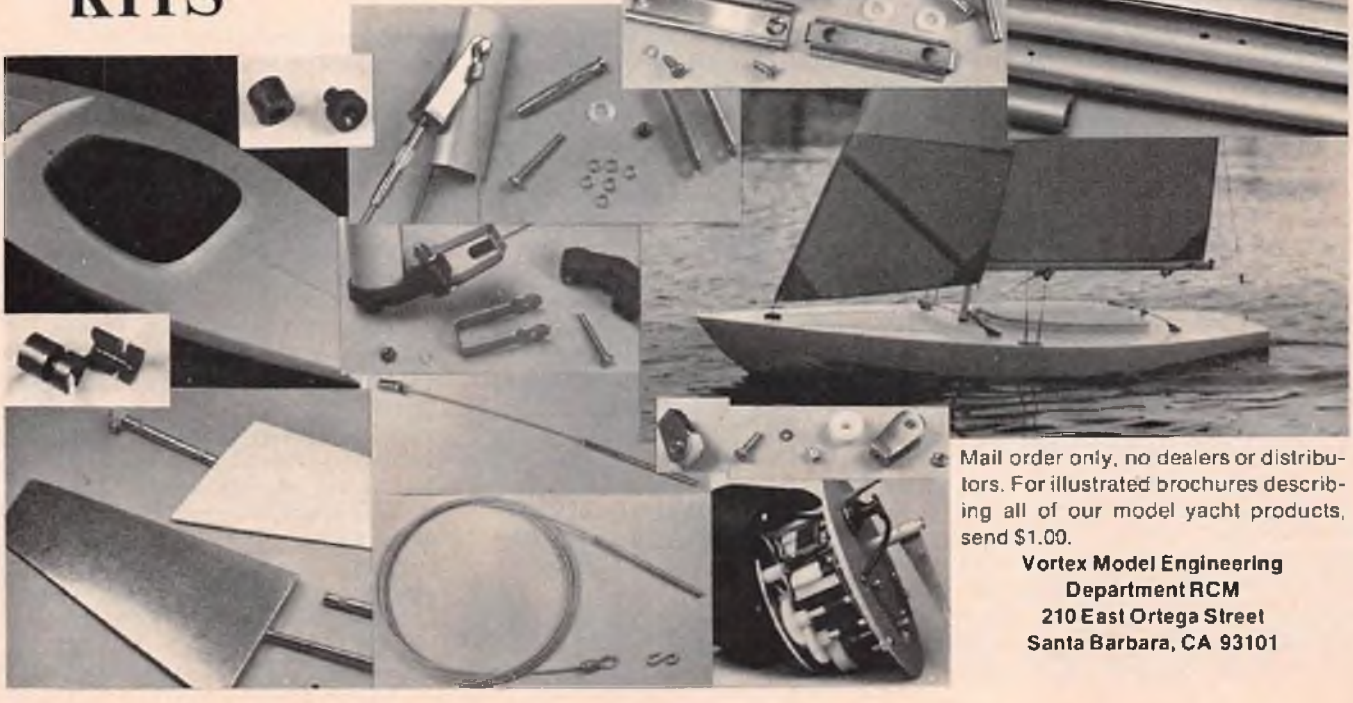

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HOVER

By Don Chapman

How can I put in writing the excitement I feel about helicopters and some of the new developments and kits that are now available or will be coming along shortly? I'll try to put it into words, if possible.

First are the Hirobos which I mentioned a few months back. I got several kits in and let me tell you they're beautiful. The literature, plans, etc., didn't do them justice. Top quality throughout, from the fiberglass fuselage to all the mechanics, rotor blades, and everything else that goes into the kits are just mouth watering, to say the least. Of the six different kits, it was impossible to pick one as the favorite to build. The only answer is to build one of each.

To pick one would be like trying to pick one of Charlie's Angels. Impossible! Again trying to put into words how nice these kits are and the excitement they generate is difficult. All the kits show much forethought. The rotor blades look super, not only in design but also they're already built and are ready to cover.

All the mechanics are done very nicely; also, something new is an all metal enclosed tail rotor gear box. All plywood bulkheads and formers are completely cut out ready to install if they aren't already installed. Yes, most of the various kits already have the majority of the formers, etc., factory installed and installed right, not a sloppy hurry-up job.

I could go on and on but, if you're still not turned on, all the kits are **scale**. The fuselage has much detail in the glass and even the landing gears, from kit to kit, are scale to the helicopter it's modeled after. The only bad thing was that all the ones I got were all gone in two days and I didn't get to keep one myself. Darn! If you're a helicopter nut like I am, you sure can't go without having one for your own stable. Now the problem is which one.

★

More exciting news. Dieter Schluter has demonstrated a new helicopter kit to be released soon called the Heli-Boy. From what I've heard, if you're looking for aerobatics, this has to be the kit to go with. I'll pass on what I've heard about the ship. It features .60 power; weighs 8 lbs.; collective, tail rotor mixing and, to quote one well-known helicopter expert, is more maneuverable than any airplane he's ever seen. True loops, rolls, Split S's - - - all being done from an altitude of 20 feet, that's right — 20 feet, not 200 feet. I'm glad to see it. That's progress! Also, from what I understand, you can fly it in different modes from mild to wild.

What I can see coming now is that, rather than just a helicopter contest, there will be different classes of helicopters, not classes of pilots. Just as with airplanes where you have, for instance, Scale, Pattern and Pylon, etc. The technology is advancing to the point where one helicopter isn't going to have to cover everything from aerobatics to scale flying. Now there won't have to be compromises. As is in race cars, you can

have a Caddy and a Camaro where, before, you had to take the Caddy and try to make a race car out of it - - - whereas it's a lot easier to make a race car out of a Camaro. Sure looks like an interesting year coming up.

★

For the guy who is thinking of getting started in helicopters, he should start now because the state-of-the-art has progressed to a point where there are kits available for the novice to start with, right through to the most sophisticated machines. Keep in mind you have to learn first, then progress ahead. You start in airplanes with the high wing trainer, then progress to the more maneuverable craft as your skills increase - - - you don't start at the top with a full-house P-51 Mustang or the all-out pattern ship. Helicopters are no different — you have to learn to fly them first and there are no real short-cuts or devices that will fly the thing for you. It's up to you, the pilot.

Pick the kit that is easy to build and fly and is rugged to learn on and definitely put in a good Schnuerle engine and not your pet airplane engine. For best results, always use an engine with more power than is needed to fly the helicopter - - - keeping in mind that helicopters don't want to fly.

Try to remember that if you're thinking about getting into helicopters, it's going to be entirely different from anything you've ever tried. If you have 50 years in R/C and airplanes, you're a novice when it comes to helicopters. You have to learn how to control the machine. So many guys I talk to want to get all the latest trick parts and set-ups before the first flight. Look at it this way — the high wing type trainer flys and is a good trainer, but will not qualify for the Masters no matter how good the pilot is at the sticks. But, to try to learn to fly with an all-out pattern ship on your first flight in R/C is out of the question. You can see what I'm saying, can't you?

This brings us up to modifications to helicopter kits. Most of the mods have been developed because of a need for flying perfection, but are not necessary for the first few hours of learning to fly. Oh, to be sure, there are a few mods that help in the beginning, but 95% of the modifications are for when you get to the point where you can feel that the machine could be a little better here or there. But, that's only after you have the ability and skills to recognize the need for a mod.

There are no mods or add-ons that will fly the machine for you. **You** have to fly the machine. Use common sense and all the advice you can get and build the machine as correct as you can in the first place - - - don't get in a hurry, take your time. This is what assures more success than gadgets and mods.

With all the new things coming, you better get started now to learn the art of flying helicopters. They are not hard to fly, but they are different — so different, in fact, that anybody is a total novice on his first helicopter "fright".

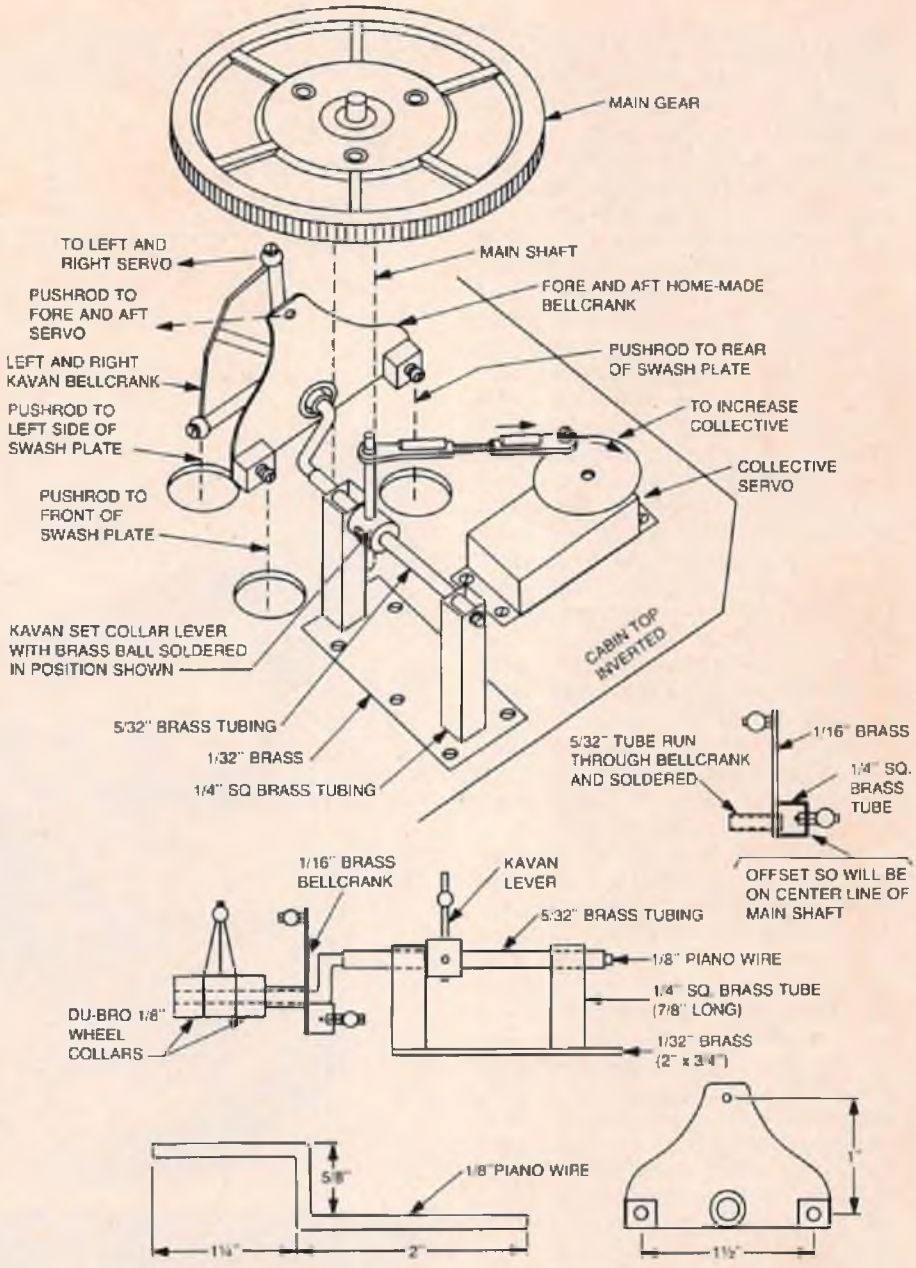

FIGURE 1

Learn to control the machine on the ground while it's skating around on that 4' x 4' masonite panel. Discipline yourself to keep it on the masonite. When it has gone off the panel, you've lost it — start over. When you can keep it on the panel more than not, you can start getting it higher. If you have learned to control the machine on the ground first, you are now hovering and you've done it without breaking a bunch of parts and without the frustrations that go with breaking your bird. I can't emphasize this procedure too strongly. Helicopters have a bad name due to the theory that they're impossible to fly - - - well they're **not**. The problem is not the helicopter, but the guys trying it. Follow the instructions supplied with the kit, build it right, learn to control it, and it will fly. If you do have any questions, it is not necessary to write, just call me at: (216) 633-2905. I'll be glad to help any way I can.

★

For you guys with Jet Rangers - - - if you have seen the need for a push-pull arrangement on the fore and aft cyclic, I've come up with this mod that has been working flawlessly and is a lot simpler than stock. Now, this doesn't mean the stock set-up doesn't work, it's for those of you who have experienced the Jet Ranger dipity-doo in fast forward flight and would like to cure it.

The fore and aft control is now done with a home-made bellcrank that works like a U-control bellcrank, only using it backwards. The servo moves a single pushrod that runs to the center of the bellcrank which, on a control-line airplane, would be the arms of the bell-

crank that go to the elevator. Now the other arms go to the front and rear of the swash plate. This would correspond to the two lead-out wires on the wing of the control-line plane. Okay, so far? The left and right cyclic is a single Kavan bellcrank. The two bellcranks are mounted on a piece of 1/8" piano wire which has been heated and bent into a 5/8" step, or dog leg. The brackets to hold this are made from K & S square and round brass tubes soldered to a 1/32" brass sheet which is bolted to the plywood. The dimensions and pictures are shown in Figure #1. The collective arm is one of Kavan's levers with the sliding brass ball which is soldered in place in its position closest to the set-screwed collar of the lever. The Kavan lever and the left and right bellcrank, which is also Kavan, will have to be drilled out slightly to 1/8" to fit the new shaft you've made. To bend the 1/8" piano wire, heat red hot with a Bernzamatic torch, then bend. Be sure to get the 5/8" dog leg right to assure enough collective. You'll probably have to make 2 or 3 until you get one just right.

The brass bellcrank has 1/4" square brass offsets for the brass balls to mount on. This is to keep the pushrods on center line with the main shaft.

Also, you will have to make an additional hole in the plywood for the rear swashplate pushrod. Cut this hole behind the main shaft the same distance as the original in the front of the main shaft. The upper bearing plate must have the rear slit opened up to a hole for the same rear pushrod. The brass bellcrank has the 5/32" brass tube completely through it to act as a long bearing. For an anti-rotation link, use the unused right side of the swashplate and run a double ended ball link to an aluminum strip, which is bolted to the rear of the bearing plate. With a brass ball bolted to the end of the strip, attach the anti-rotation link.

The pictures and drawing should clear up any questions you might have. I repeat - - - this mod is not necessary to fly a Jet Ranger and is only for those who have experienced the need for such a set-up.

There's another mod which I've come up with which deserves passing on and this has to do with the rigidity of the mechanics top plate. The very original mechanics top plate was prone to flexing in front of the main shaft and behind the front mounts. Kavan updated the unit by adding reinforcing ribs on the top plate. This really stiffened the unit substantially.

Some guys take aluminum channel and bolt it along the reinforcing ribs for additional stiffness and this helps even more. What I have done is make the top plate, engine, and engine frames a complete box type unit. After looking at Figure #2, you will see that, where the heat sink comes up through the top plate, there are two vertical air directors which are part of the top plate. What you want to do is take a 3/32" drill and drill through the plastic into the heat sink center line and then tap it to 4/40 and run a 1/2" x 4/40 bolt through the plastic and into the heat sink. Do this on both sides. What this does is tie the front half of the top plate to the heat sink and boxes the whole assembly together from front to rear. Refer to the drawing and look at your mechanics and it should be self-explanatory.

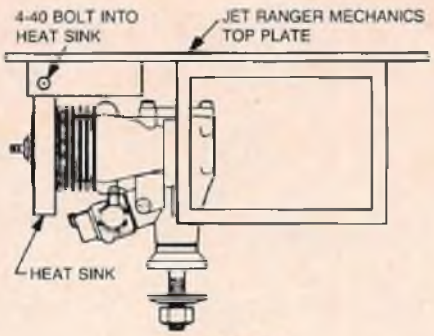

FIGURE 2

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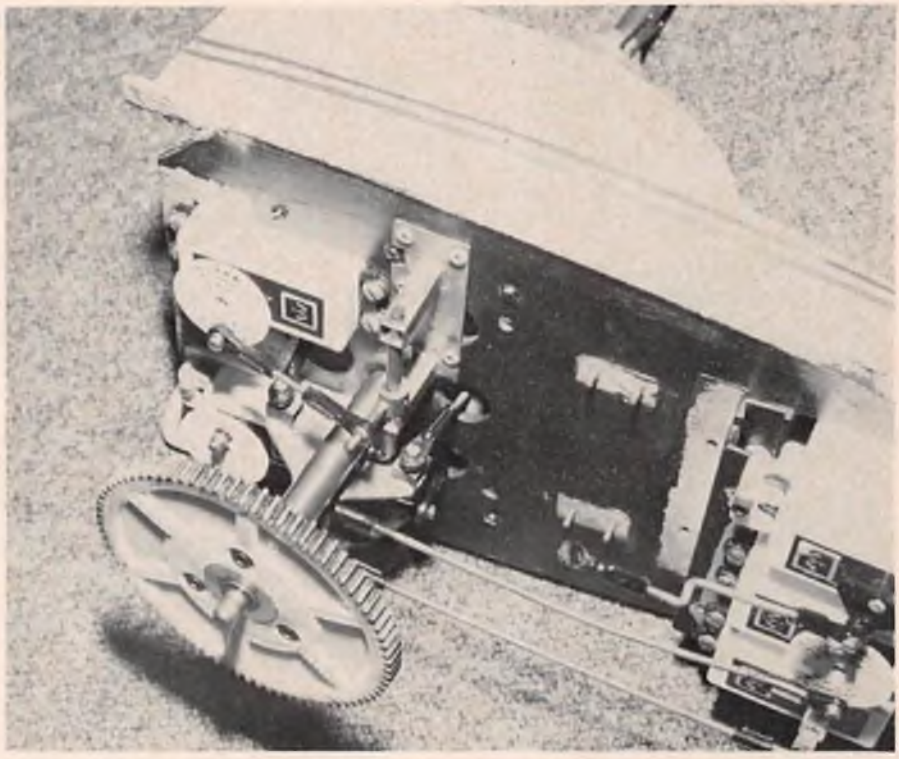
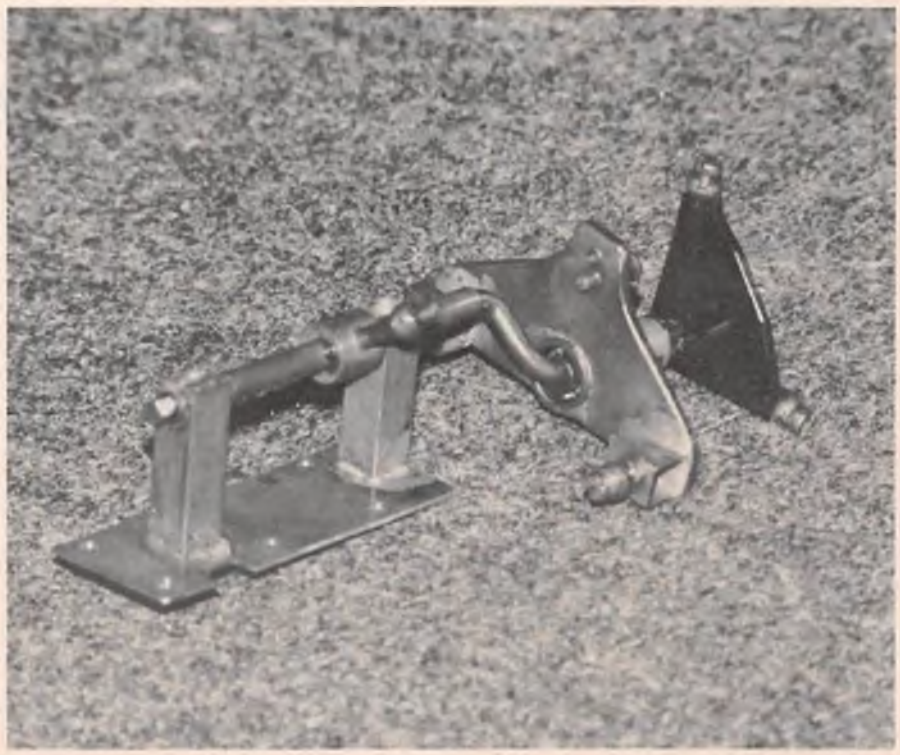
Well, that's about it for this time. Until the next column - - - keep the stick forward. □





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Plans			●			Parts Match to Plans	●				
Written Instructions	●					Overall Parts Fit	●				
Quality of Hardwood		●				Ease of Assembly		●			
Quality of Fiberglass			NA			Fidelity to Scale		●			
Other Materials		●				Flight Performance	●				
Accessories		●				Overall Appeal		●			
Die-Cutting		●									

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

This is another outstanding kit in the 1/2A category from House of Balsa. The kit comes with a pre-molded turtle deck and wheel pants. The turtle deck is detailed with rivet outlines and includes the canopy. This molded deck runs almost the full length of the fuselage, which saves building time. Also included in the kit are 1/16" brass tubing, formed landing gear wires, 1/16" music wire, glass cloth, wood dowels, miscellaneous screws and nuts along with an instrument panel.

The full size plans along with the instruction manual, which has over 100 step by step building and construction photos in it, should eliminate any building problems. Our only word of caution is when the engine cowl block is hollowed out, be sure to leave clearance for your glow plug clip. Plan ahead on your equipment installation. Lay out your servo installation on the plans to make sure you have ample room. We didn't do this and had to lay our aileron servo on its side to clear the elevator servo. Take precaution when hinging the elevator since the balsa is 3/32" thick and, if your hinge slots are not cut out clean, they will have a tendency to bulge the wood. We elected not to use the paper templates for the wing fillets. Instead, we used auto body plastic filler applied over Saran wrapped wing. This left us with a smooth, even fillet that dried in 15 minutes.

For the finish, we chose to paint the fuselage with K & B Super Poxy. It was sprayed white and trimmed in red and blue. The wing was covered with white MonoKote and trimmed with DJ's wide multi-stripe. We outfitted our Chipmunk with the wheel pants, which gives it the final touch of appeal. These, however, are not too practical when flying from a grass field.

Our aircraft was fueled and started inverted. Once the engine is running, turn it upright and fine tune the engine. This leaves you with no other choice now but to put it in the air. We

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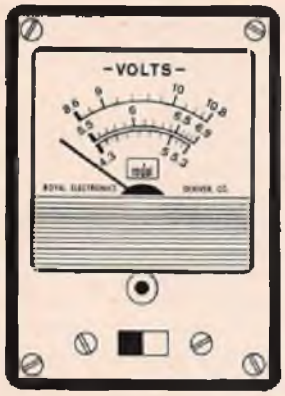
SPECIFICATIONS

Name ..... Chipmunk
Aircraft Type ..... Stand-Off Scale/Sport
Manufactured By ..... House of Balsa
2614 E. 56th Way
Long Beach, California 90805
Mfg. Suggested Retail Price $27.95
Available From ..... Mfg. Only
Mfg. Recommended Usage ..... Sport or Stand-Off Scale
Wing Span ..... 36 Inches
Wing Chord ..... 6.2" (Avg.)
Total Wing Area ..... 216 Square Inches
Fuselage Length ..... 26 Inches
Radio Compartment Dimensions ..... (L) 7.5" x (W) 2" x (H) 2"
Wing Location ..... Low Wing
Airfoil ..... Semi-Symmetrical
Wing Planform ..... Double Taper
Dihedral ..... 1½ Inches
Stabilizer Span ..... 13 Inches
Stabilizer Chord (incl. elev.) ..... 3" (Avg.)
Total Stab Area ..... 39 Square Inches
Stab Airfoil Section ..... Flat
Stabilizer Location ..... Top Of Fuselage
Vertical Fin Height ..... 4.5 Inches
Vertical Fin Width (incl. rud.) ..... 3" (Avg.)
Mfg. Rec. Engine Range ..... .049-.051 Cu. In.
Recommended Fuel Tank Size ..... 1 Ounce
Landing Gear ..... Conventional
Recommended No. Of Channels 2
Recommended Control Functions ..... Elevator & Ailerons
Basic Materials Used In Construction:
Fuselage ..... Balsa, Ply, Plastic
Wing ..... Balsa & Hardwood
Tail Surfaces ..... Balsa
Hardware Included In Kit ..... See Text
Plan Size ..... 38" x 24" (1 sheet)
Building Instructions on Plan Sheets ..... Yes
Instruction Manual ..... Yes (23 pages)
Construction Photos ..... Yes
Kit Includes ..... Die-Cut & Shaped Parts
Mfg. Rec. Flying Weight ..... 22-28 Ozs.
Wing loading based on rec. flying wt. ..... 14.6-18.6 oz./sq. ft.

RCM PROTOTYPE

Weight, Ready To Fly ..... 28 Ounces
Wing Loading ..... 18.6 oz./sq. ft.
Covering & finishing materials used ..... Super Poxy, MonoKote
Engine Make & Disp. ..... Cox .051 Tee Dee
Muffler Used ..... No
Radio Used ..... RS Single Stick
Tank Size Used ..... 1 Ounce

Expanded Scale Voltmeter



Use to test your Tx and Rx Batteries in the field and excellent for bench test fully assembled.

Tx 10 Volt/Rx 4.8 Vol5 ..... $22.95
Tx 6 Volt/Rx 4.8V $22.95
Either above models
Less Connector $20.95
Tx 10V & 6V/rx 4.8V $27.95
Above Model Less Connectors . $24.95

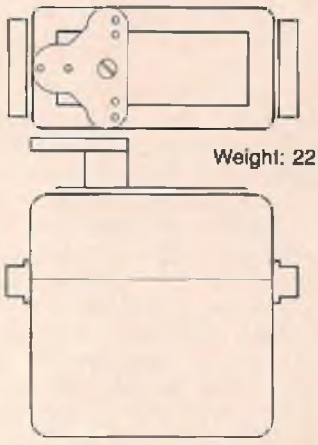
Submin Kit Radios for ½ A Flying

½ A Receiver Kit

72 & 75 mhz
1.0 oz - drain 9.0 MA
Convert to 4Ch in same case by adding one S/N74L73N for $1.95

Kit Less Conn $22.95

½ A Servo Kit



Weight: 22.5 Grams

Dunham D-5 Mechanics and Royal LSA-2 Amp (NE544) for best micro servo kit.

Quantity Pricing (with one set instructions, less connectors)

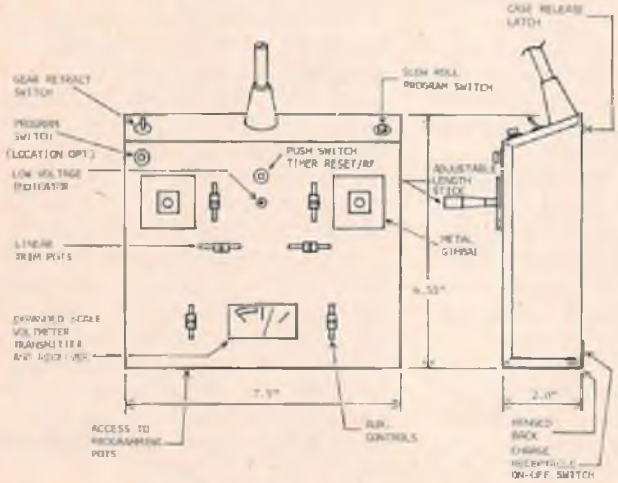
One Kit $29.95
Set of Two $28.15
Set of Three $26.95
Set of Four $25.25

100 MA Battery Pack (Fast Charge)

Plastic Dip case weight — 35.5 grams

Assembled with M'con Connector $13.95
Assembled less Connector $12.50

Omega Programable Transmitter Kit



G/R Switch

7 Channel

Programming Adjustment for Ail, El, Th, Rud.

Vinyl Case

Complete Construction article current R/C Sportman

Encoder Design by Sid Kaufman

State of the arts design for the advanced kit builder.

Mixer-Optional
Timer-Optional

Complete Transmitter Kit $299.95
Complete Encoder Electronics $139.95
Metal Gimbal Sticks, Inst Pot $125.00

Parts Price List available on request

Include $1.50 for postage and packing.
Visa or Mastercharge.

royal

Royal Electronics Corp.
3535 S. Irving
Englewood, CO 80110

Do you fly R/C for sport? Are you forty years old? Over forty? Under forty?

If you meet any one of the above requirements, then RCM's "Sporty Forty" is a biplane designed just for you. Take a look at its exclusive features. Like - - - where did the name come from? Well, it's forty inches long, has a forty inch wingspan, and sports a K & B .40 up in the nose. Here's some more - - - even though they may stretch your credulity a bit. It cruises at forty (you can make it do that), takes forty hours to build (that's if you want to **really** dress it up), uses forty dollars worth of material (not including engine and radio, but including Mono-Kote, top grade wood, wheels, and preformed landing gear), and will give you forty years of great sport flying (if you don't cream it in the first forty minutes!).

Here's the clincher. After I had it built, test flown, and proven out, I decided it was a great subject for a cover photo. So, in keeping with RCM's well-deserved reputation for well-endowed cover models, I tried to locate the perfect model to display the Sporty Forty. What could be better than a forty year old beauty with a forty inch bust?

Try as I might, I never was able to find the right model. Oh, it wasn't too hard to find a model with the right measurements, but find one that would admit to being forty? No way! Thirty-nine, yes. Forty, Nyet.

Oh, well. So next I tried the idea of a cover shot with a guy who appreciates a beautiful woman of forty, with measurements to match. He should be forty. Or over. ('Way over!)

Take a look at the cover. You can see how I made out.

Enough of this fantasizing. Let's talk about the practical features of the Sporty Forty.

Note that there's no dihedral, and the wing section is flat bottomed. That means that the wing can be built in one piece, on a flat work bench, using standard 36" lengths of wood. No dihedral braces, no splicing - - - just put it all together.

The engine is upright, and the tank is just about level with the carburetor intake. Reason? Upright engines are the easiest to adjust and, if you nose up on landing, you don't scrape the muffler. With the tank just about level with the intake, you don't need a fuel pump.

The wide tread of the landing gear is almost one-third of the wing spread. This not only makes for good tracking, but also helps to reduce the incidence of wingtip scraping with the resultant "wing rash".

Note the relatively high tail wheel setting. It's done on purpose. Remember all those learned discussions we had about "P" factor and gyroscopic action? Well, it seems that the problem with most tail draggers comes on take-off, when the plane tends to veer to the left as you raise the tail for take-off. With the Sporty Forty, this is reduced to the minimum. Don't bother to raise the tail on take-off. Just give it the gun gradually, and it'll pick up speed and take off at the same angle that it sets on the ground, with absolutely no tendency for a wingtip stall.

How about that low aspect ratio? You don't see many biplanes like that, do you? All I can say is — try it, you'll like it! The Sporty Forty has one of the most amazing speed ranges you'll ever see. You can throttle back and float along at about 20 miles an hour, or pour the coal to it and zip along about 70. Caution — don't put too much throw in the elevators or the ailerons. The short coupling, both longitudinal and lateral, makes it very responsive to control surface actions. It's not intended to be a competition biplane — just a Sporty Forty.

So there's the design philosophy behind the model. Let's get on with the construction features. Actually, it's so simple to build that you probably can put it together just by following the plans, but there are a couple of hints and kinks that may help. Let's start with the fuselage.

BY KEN WILLARD

What's forty inches long, has a forty inch wing span, sports a .40 up front, and is designed for sport fliers plus or minus forty years old? It's the Sporty Forty, designed by our perennial "forty year old" Chief Sunday Flyer.

Fuselage: Building the fuselage is straightforward. But I'm not going to say it's straightforward, because a lot of you have written in to complain that the designer says, "It's straightforward," and what you want to know is howinell to build it — not how straight it goes forward. So here are the easy steps:

(1) Study the plans.

(2) Look at the construction photos.

(3) Build the fuselage in accordance with the plans and photos. That's all there is to it.

Hm-m-m. Maybe that's not the whole story, so let's talk about some of the details, such as, after you have cut out the fuselage sides and glued the doublers, wing saddles, and longerons to them, join them together with the three fuselage bulkheads (some modelers call them formers) as shown in one of the construction photos. Then pinch the forward ends together to fit against the sides of the firewall and epoxy the firewall in place. Note the plans have it set at a slight down thrust angle, but no offset side thrust. In that regard, be sure that the two sides are evenly bent in so the firewall is centered on the fuselage center line, thus assuring that it will be properly aligned.

Next, do the same with the rear ends — pinch them together and epoxy. Note that the tailpost and rear ends of the longerons are sanded to a taper so they provide a good gluing area. When dry, add the cross braces, one at the rear end location of the headrest, the other at the forward edge of stab. You'll probably find that the curvature doesn't fit that shown on the plans unless you press the sides in and hold them in place until the adhesive dries.

Next, glue the 1/4" x 3/4" plywood cabane struts in place. Do this before you shape them into the streamline cross-section. Only that part of the strut from the top of the sides to the bottom of the upper wing cradle is shaped to the streamline.

The curved top of the fuselage takes a little doing — but not too much. Cut the sheet balsa to fit over the top curvature of Bulkhead Nos. 1, 2, and 3, and fit flush to the top of the sheet sides. If the balsa tends to crack when you bend it, wet the outer surface first and gradually curve it around the forms. You will also have to use some care in making the necessary cutouts for the cabane struts. If you do happen to cut away a bit too much, you can fill the gap later with some balsa putty.

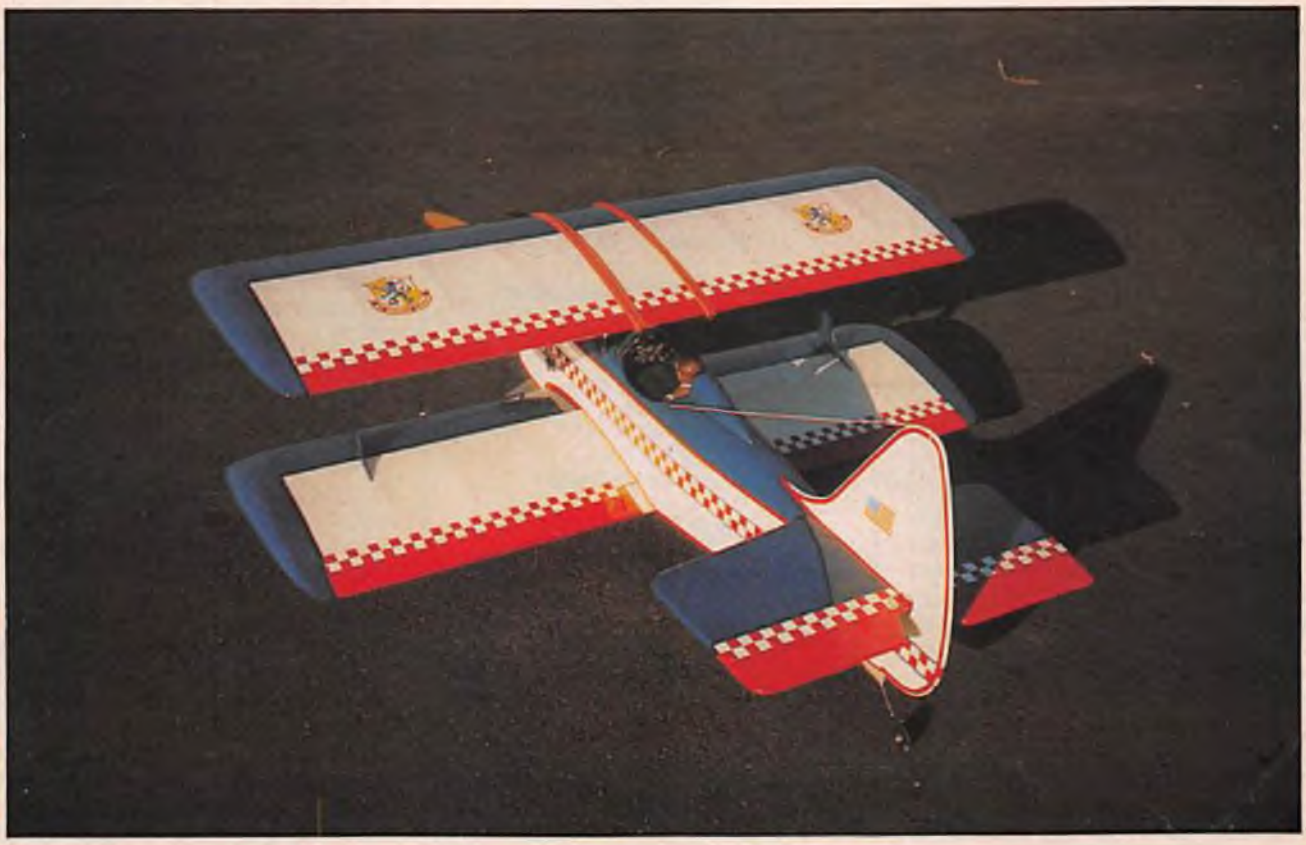
Repeat the procedure to cover the top of the fuselage aft of the cockpit. Then cut out the cockpit. Then add the lower sheeting from the trailing edge of the bottom wing back to the tail.

The nose structure, forward of the firewall, is built up by inserting balsa block filler stock at the bottom, top and sides. Sand the bottom flat across to begin with, then add the 3/32" plywood bottom from the forward edge of the bottom wing up to about 1" forward of the firewall. Cut a 1/4" hole up through the center of the balsa block filler and insert a drain tube for all the gook that collects there after an engine run. Incidentally, when you finish flying and clean off the plane, you won't be able to get all that residue, so to prevent it from dripping on your floor, you either have to put a rag under the drain hole, or plug it up until you want to fly again. Don't forget to take it out when you go flying, or you'll get quite a puddle in there.

The tank compartment hatch cover takes a bit of time but is well worth it. Note the slot in the firewall so the tank can be lifted straight up along with the hatch when you want to remove it and clean the compartment. The sheet bot-

to page 34

SPORTY FORTY



tom for the tank compartment is slanted as shown so the fuel pick-up will be right at the bottom. When you get it in place, seal it and fuelproof the whole area so fuel won't drip down into the battery and receiver compartment.

The plans show a Sullivan MM-1 motor mount, and I recommend it. I've used one both on the Sporty Forty and also on my RPV practice plane for about a year now, and have never had the engine come loose. Yet, if you want to, just loosen the two mounting bolts, releasing the lugs, and the engine comes right out. Great for servicing.

The landing gear mounting block is epoxied to the plywood bottom and the side doublers, and the landing gear bolted to it. Some guys use screws, but I prefer bolts, with blind nuts epoxied to the top of the block.

Add the plywood plate to the bottom rear of Former No. 1, with holes drilled to receive the wing mount dowels. Then install the rear mounting block for the nylon bolt that holds the trailing edge in place.

I don't think it's necessary to go into detail about the windshield, do you? The plans show it quite clearly. The slit fuel line tubing edging the windshield is just a little "touch of class" that adds to the appearance. Mounting the windshield is done with Hot Stuff, after carefully trimming the bottom edge to fit flush with the balsa.

The last item is the mounting of the wing cradle, which must be carefully aligned so the incidence of the top wing is correct. You have a good gluing surface at each joint so, after getting one properly aligned, glue it in place. Then line up the other, making sure they are parallel, and glue it. When dry, drill a hole through the center of the glue joints and run a 3/4" 3-48 bolt through the hole and tighten it down with a washer and nut. Yes, I suppose the glue joint would hold even without the bolt, but the little extra strength adds a lot of protection.

Probably a lot of you will prefer to make a fitting for a nylon bolt attachment set-up for the top wing. Fine — go ahead. I was in such a hurry to see the plane fly that I decided to use the rubber band method as shown. By cutting off lengths of heavy paper clip wire and bending them to the shape shown on the plans, then epoxying the wire firmly in place, it took a little less time. To keep the wire from chafing the rubber bands, I slipped a short length of small diameter fuel tubing over the ends. The whole set-up works so well that I've decided to leave it that way. Got some colored rubber bands and they matched the color scheme.

See? Building the fuselage is "straightforward".

Wings: To build the wings of the Sporty Forty, you start by building two identical wings. The 36" spars, leading edges, trailing edges and sheet stock

SPORTY FORTY
Designed By: Ken Willard

TYPE AIRCRAFT
Sport Biplane
WINGSPAN
40" (Top & Bottom)
WING CHORD
12" (Top & Bottom)
TOTAL WING AREA
936 Square Inches
WING LOCATION
Biplane
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
None
O.A. FUSELAGE LENGTH
40 Inches
RADIO COMPARTMENT AREA
(L) 9" X (W) 3¼" X (H) 3" (Avg.)
STABILIZER SPAN
17½ Inches
STABILIZER CHORD (incl. elev.)
5½" (Avg.)
STABILIZER AREA
138 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
7¼ Inches
VERTICAL FIN WIDTH (incl. rudder)
6" (Avg.)
REC. ENGINE SIZE
.40
FUEL TANK SIZE
12 Ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail., & Throt.
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa
Empennage	Balsa
Weight Ready-To-Fly	104 Ozs.
Wing Loading	16 Oz./Sq. Ft.

are all standard sizes available in any good hobby shop. The leading edge might be an exception. It's symmetrically shaped, mostly intended for U-Control planes or R/C jobs with symmetrical airfoils. To adapt them to a flat bottomed airfoil was easy; just glue the bottom to the bottom sheeting with the rear edge of the stock slanted, as shown in the plans. Then the top sheeting comes down tangent to the top of the leading edge stock.

The wing section is what we used to call "modified Clark Y" because that's what every flat bottomed airfoil was called. But I just call it the "super zip-zip" section, with the maximum curvature 4" back so you can use 4" sheeting from the leading edge to the spar. Very scientific — and works great.

The piece of trailing edge stock sandwiched in between the trailing edge sheeting gives added strength, but probably isn't really needed; the added strength is well worth the slight increase in weight.

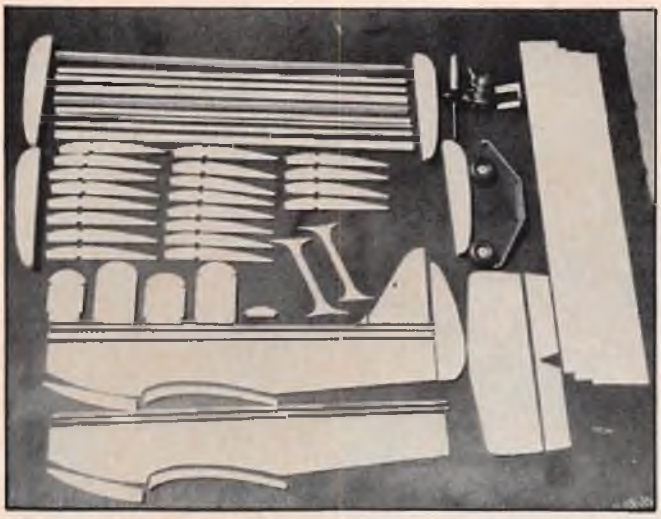
Everyone has their favorite way to attach sheeting. Personally, I use contact cement. You just have to be careful that it's lined up before you lay it on, because if it isn't, you just start over.

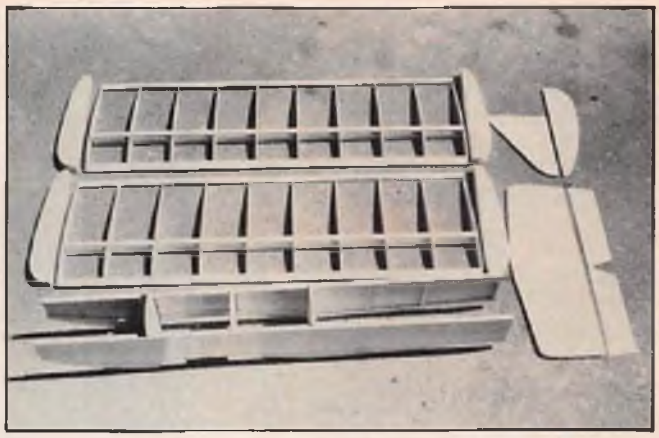
The wingtips are carved from balsa blocks. A little expensive (helps to build up to the forty buck tab for materials) but they look nice when finished. If you worry about the cost, you could make the tips out of 1/4" sheet stock and have a little open frame covering from the end rib to the outside edge of the tip. But heck — go ahead, live a little. Carve up some block tips. You'll be glad you did — they really do look sharp.

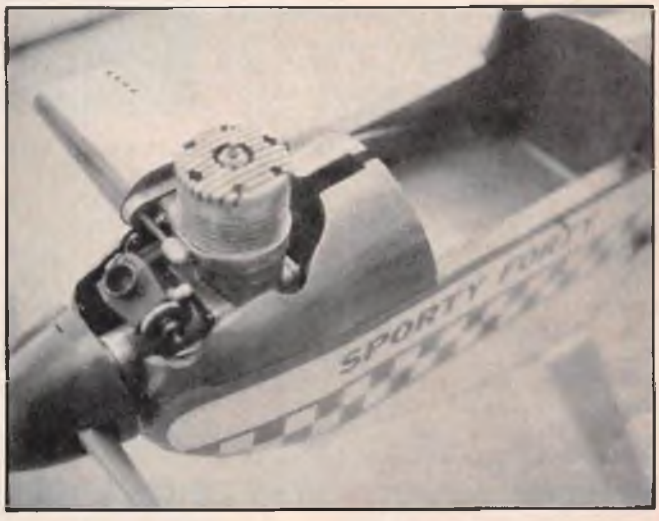
The shear webs in the center bays also add strength which may not be needed for such a short span wing. But I got into the habit with my 10' sailplane wings, and put the webs in before I thought too much about it. Again, they add a lot of strength for very little weight, so put them in.

Capstrips top and bottom with full chord sheeting in the center, make a very good surface to attach the covering, which in my case was MonoKote. I'm kinda' hooked on the stuff. It's easy to put on, gives a high gloss finish with little work involved, and repairs are easy to make.

But, wait. Before you cover, remember you've got to modify the lower wing to add ailerons. Really not much to it. Start by slicing off the ribs with a very sharp razor or X-Acto knife, 1/4" ahead of the 2" sheeting on the top and 3/8" ahead on the bottom. Then butt glue a full depth 1/4" spar from tip to tip at the angle shown in the profile view of the lower wing. Next, cut away the sheeting on the aileron section 1/4" back on the top, and 3/8" back on the bottom, and butt glue a 1/4" strip on the front as shown on the profile view. Since the aileron is hinged on the top line, the gap allows room for down travel. Add some

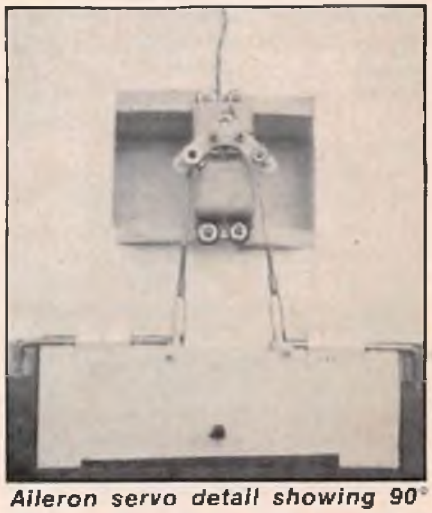






Servo tray set-up.

Tank complete with hatch.



Aileron servo detail showing 90° bellcrank attached to servo for differential throw. Horns are epoxied to top of ailerons.

end plate balsa blocks to the ailerons between the top and bottom sheeting, and the ailerons are ready for finishing, covering and mounting.

The center bay of the lower wing, at the trailing edge, where you cut away for the ailerons and added the full span spar, is rebuilt from the spar back to the trailing edge by shaping a piece of hard block balsa to butt up against the spar and taper back to the trailing edge in conformance with the wing sections. Then a hole is cut through it to accommodate the nylon bolt mounting system. Up at the leading edge, two 1/4" dowels are inserted into holes drilled into the leading edge to match the holes in the plywood plate at the back of Former No. 1.

The lower wing is now finished except for making the mounting for the aileron servo. The plans show the mount arrangement for KPS-14 type; you can easily make whatever changes are needed for your preference. But I strongly urge you to provide the offset servo arm, which gives differential aileron travel. The set-up which I have shown on the plan gives three times as much up-aileron as it does down-travel, and this totally eliminates any adverse yawing tendency.

And that, I think, adequately covers the wing structure.

Empennage (high class name for tail surfaces): These are cut from sheet balsa, of the sizes stated in the plans. The elevator, in particular, is cut from medium hard balsa stock, so the narrow

section at the center has plenty of strength. Round off the edges of all the surfaces — no need to taper and streamline them since your objective is a sport model, not a racer.

The 1/8" dowels inserted into the fin, and fitting down into the stab, give that little added strength that makes you feel secure. So do it.

Let's see. We've got the fuselage done, the landing gear mounted, the wings built, and the tail surfaces done. Not much left except mounting the servos, installing the control rods, and adding the "cosmetic" features like the interplane struts and the wheel pants. The interplane struts are cut out of 1/16" plywood to the shape shown in the profile view. They are held in place using landing gear strap fittings which have been bent through 90° so one mounting hole can be screwed to the spar, and the other can have a 2-56 bolt inserted into a hole through the strut and connected to the strap fitting which has been bent up at 90° to fit against the side of the interplane strut.

Mounting the servos is a matter of individual choice. I used a Kraft mounting tray, attached to rails, which mounted the rudder, elevator, and engine servos. The aileron servo mounting has already been discussed.

The receiver and battery pack are stuffed up forward through the hole in Bulkhead No. 1, and held there by filling up the empty space with foam.

Wheel pants are optional — just like the interplane struts. But they certainly do add to the appearance. That's why I've shown the detail on how to make them. It's worth it just to hear the comments at the field.

And that, I think, covers the construction. How about the set-up for flying?

Flying: The Sporty Forty is definitely not a "run of the mill" biplane. It was not intended to be. It's short coupled, stubby, with a very low aspect ratio and a very high response rate. But, once you get the surface travel set up at the right amount, it's one of the easiest flying biplanes you'll ever have in your stable. You can drag it across the field at 20 miles an hour, or you can zip it around at 60 or 70. Take-offs are "a piece of cake", as the English say, and landings can be made at full stall, or with a little excess speed and then flare it for a real "tail dragger" job where the tail wheel touches down first, and then the main gear hits. It's up to you.

Just so you won't blow it, here are some suggested travel angles for the ailerons and elevator. Elevator — 10° up and down. Ailerons — 18° up and 6° down. With the C.G. at the center position shown on the plans, you'll need about 2° of down elevator for a "neutral" position. If you want a wilder performance, be my guest and be ready for instant response.

Rudder travel isn't critical, except that

the tail wheel is attached. Also, believe it or not, the Sporty Forty will make rudder turns, even though it has no dihedral. So, set it up to suit your taste.

CONCLUSION

For some time now, I have refrained from designing what most of you would call a "standard size" sport R/C model. I've preferred to stick with the special purpose sizes, like ultra small designs, or slope racers, or amphibians. But you all wanted a sport R/C that used standard type R/C equipment, so I tried to come up with a good sport design that was just different enough from the usual designs to whet your desire for building.

I think the Sporty Forty meets the requirement. It's different, it's easy to build, and easy to fly. Yet it still looks like a model of a good sport biplane that a full scale pilot would like to fly. And so would a sport R/C flyer.

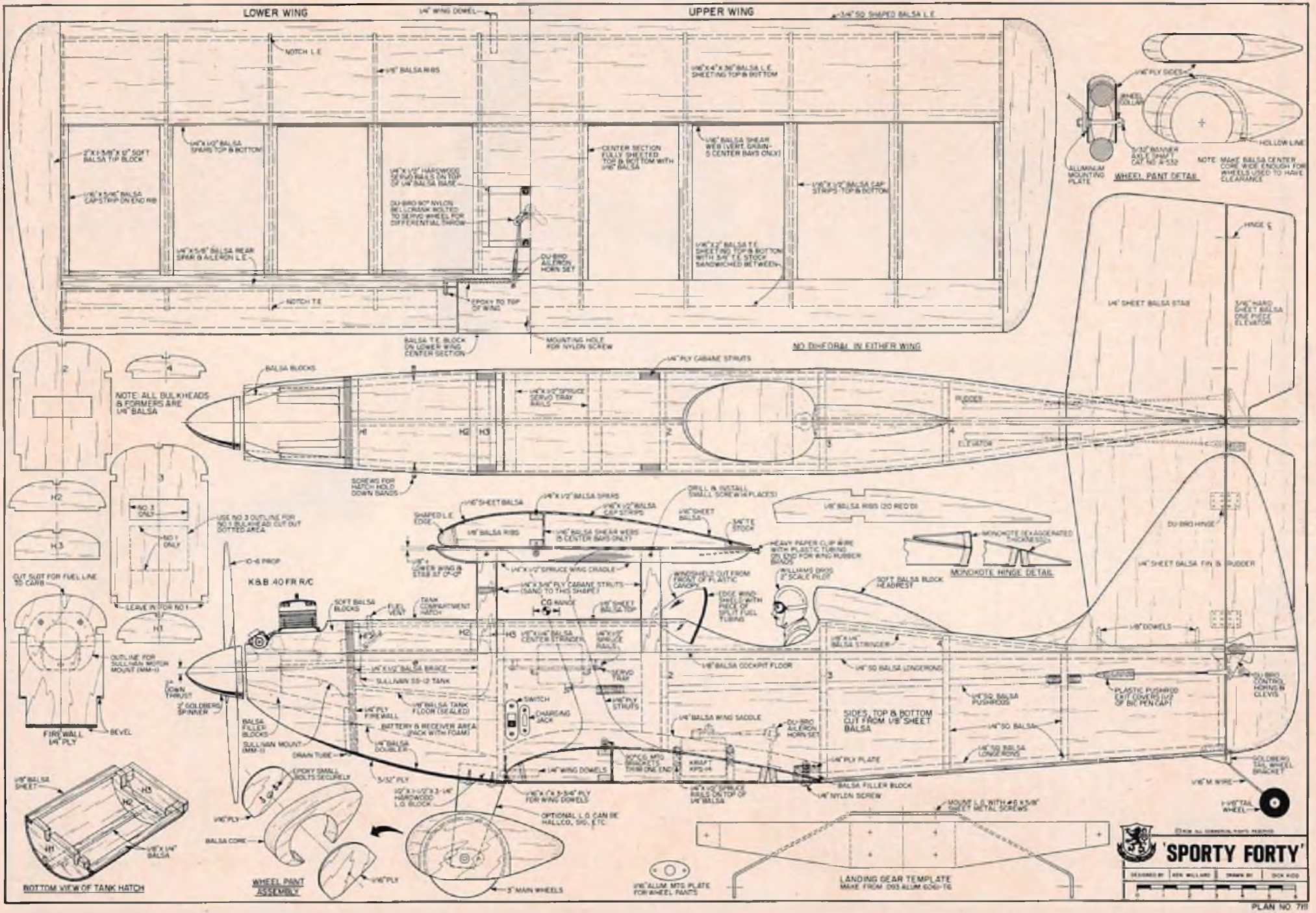
Am I right?

Let me know. □

BILL OF MATERIALS

Fuselage:
Sides — 1/8 x 5 x 36 (2)
Longerons and Vert. Braces — 1/4 x 1/4 x 36 (4)
Bottom — 3/32 x 4 x 8 plywood (1); 1/8 x 4 x 15½ balsa (1)
Doublers — 1/4 x 1¼ x 12 (2)
Hatch — 1/8 x 5 x 8 sheet balsa (1); 1/8 x 1/4 x 8 strips (3); 1/4 x 4 x 1¼ (3)
Turtledeck — 1/8 x 5 x 10 (1); 1/4 x 1/8 x 10 (3); 1/4 x 4 x 1¼ (2)
Headrest — 1¼ x 1¼ x 5½ (1)
Wings:
Leading Edge — 3/4 x 3/4 x 36 (2)
Spars — 1/2 x 1/4 x 36 (4)
Rear Spar for Bottom Wing — 5/8 x 1/4 x 36 (1)
Front Spar for Ailerons — 5/8 x 1/4 x 36 (1)
Ribs — 1/8 x 1¼ x 12 (20)
Wingtip Blocks — 12 x 2 x 1½ (4)
Leading Edge Sheet — 1/16 x 4 x 36 (4)
Trailing Edge Sheet — 1/16 x 2 x 36 (4)
Trailing Edge Stock — 1/4 x 3/4 x 36 (tapered) (4)
Stabilizer: 1/4 x 6 x 18 (1)
Elevator: 3/16 x 2½ x 18 (1)
Fin: 1/4 x 7½ x 6 (1)
Rudder: 1/4 x 2¾ x 11½ (1)
Cabane Structure:
Struts — 3/4 x 1/4 x 8 plywood (4)
Wing Cradle — 1/4 x 1/2 x 12 hardwood (2)
Interplane Struts:
Strut Material — 1/16 plywood sheet 9 x 4 (2)
Fittings — Landing Gear Straps bent 90° (4)
Landing Gear:
Main — Tempered aluminum or Hallco preformed
Tail — Goldberg tail wheel fitting and 1/16 wire
Main Wheels — 3"
Tail Wheel — 1¼" or 1⅛"
Wheel Pants — 1 x 6 x 2⅝ balsa block (2); 1/16 x 4 x 2½ plywood (4);
.040 aluminum attach plates - cut to shape shown (2)
Covering:
This is builder's choice. I chose MonoKote. Also, you'll note that I use MonoKote Trimstrip for aileron hinges. The detail shows how to make them, if you want to do it. Some modelers don't trust that type of hinge, but it seems to work OK for me.

FULL SIZE PLANS AVAILABLE — SEE PAGE 187



HERE'S HOW

Have you ever thought of doing something with your R/C model other than maneuvering aimlessly around your own little air space? Say something like pulling a streamer, dropping a parachute or maybe a bomb! It can be done, Gang, and in a very simple manner that doesn't even require an extra servo. All that is required is a trimmable function on your transmitter. In this case, I am talking about using high throttle trim to operate a simple drop release mechanism; you are not limited in aircraft type and size. Smaller aircraft can be used providing the load you intend to drop is within their lift capability.

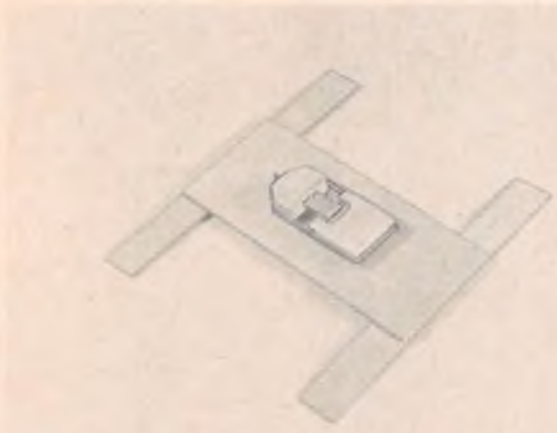
Jerry Impellezzeri of San Jose, California, sent us this neat little bomb release that he has been using successfully for some time. Like many of us, Jerry owns a four channel transmitter but wanted the capability of a simple bomb and chute release that would trigger with very little movement. He also wanted a release that could be transferred from one plane to another with little fuss. His release suggestion presented here encompasses both these features. Of course, the main feature of Jerry's suggestion is that the full weight of the bomb is on the pivot, which he found necessary for a sensitive release under vibration conditions.

With a few adjustments, you'll be ready to add some variations to your flying activity. Something different.

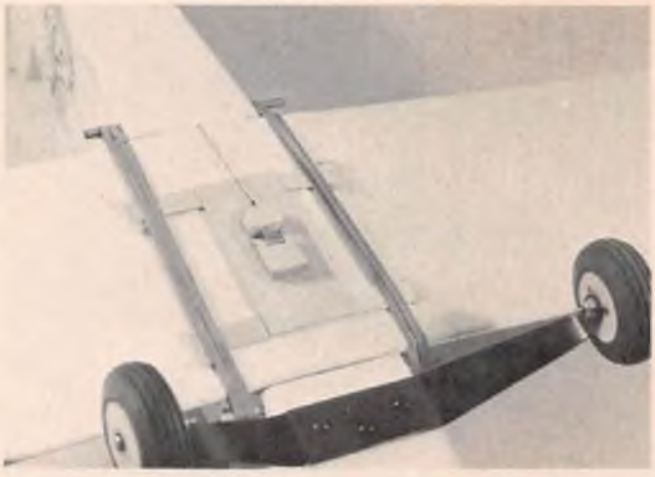
The release mechanism presented is quite simple to build providing you follow a few suggestions to make things more manageable. When building the release lever, use longer than necessary pieces. Longer pieces are easier to work with. Weight the tubing down on the brass sheet, then solder and trim it to size. The wood blocks may be made of hardwood or pine. I made mine from pine and it worked well enough. The release lever pin is 1/32" music wire. When installed in place, a touch of Hot Stuff on each end will keep it there. Note the position of the rubber band. It has the job of providing elastic tension on the trip pin and keeping it in place. When selecting a rubber band, find one to fit, with just the right tension — not extremely tight or loose. Once installed, a little Hot Stuff here and there will keep it in place. Keep in mind that the trip pin does not move more than 1/32"-1/16" at most.

Jerry's release mechanism will add to your flying variations. Why not give it a try? Many of you readers are afraid to try new ideas, but when given clear concise information regarding them, the possibility of success is increased measurably. I am vitally interested in publishing good, sound, usable ideas and spend considerable time evaluating them. In most cases, the suggestions or ideas are actually built and field tested to prove their worthiness. This necessitates extra work on my part; however, you, the reader, may be assured the highest probability of success in case you decide to try your hand. Come on - - what can be more fun than sharing an idea with others. Ya' got any? □

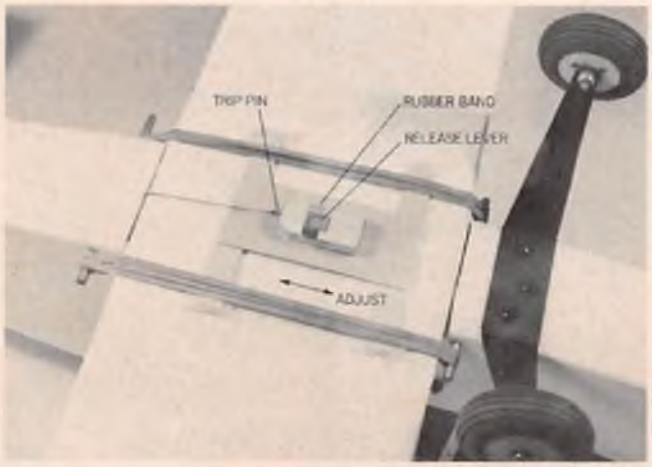
Solder lever parts together using larger pieces. More manageable this way. Then trim 'em to size.



Finished release unit can be transferred from plane to plane. Light and easy to build.



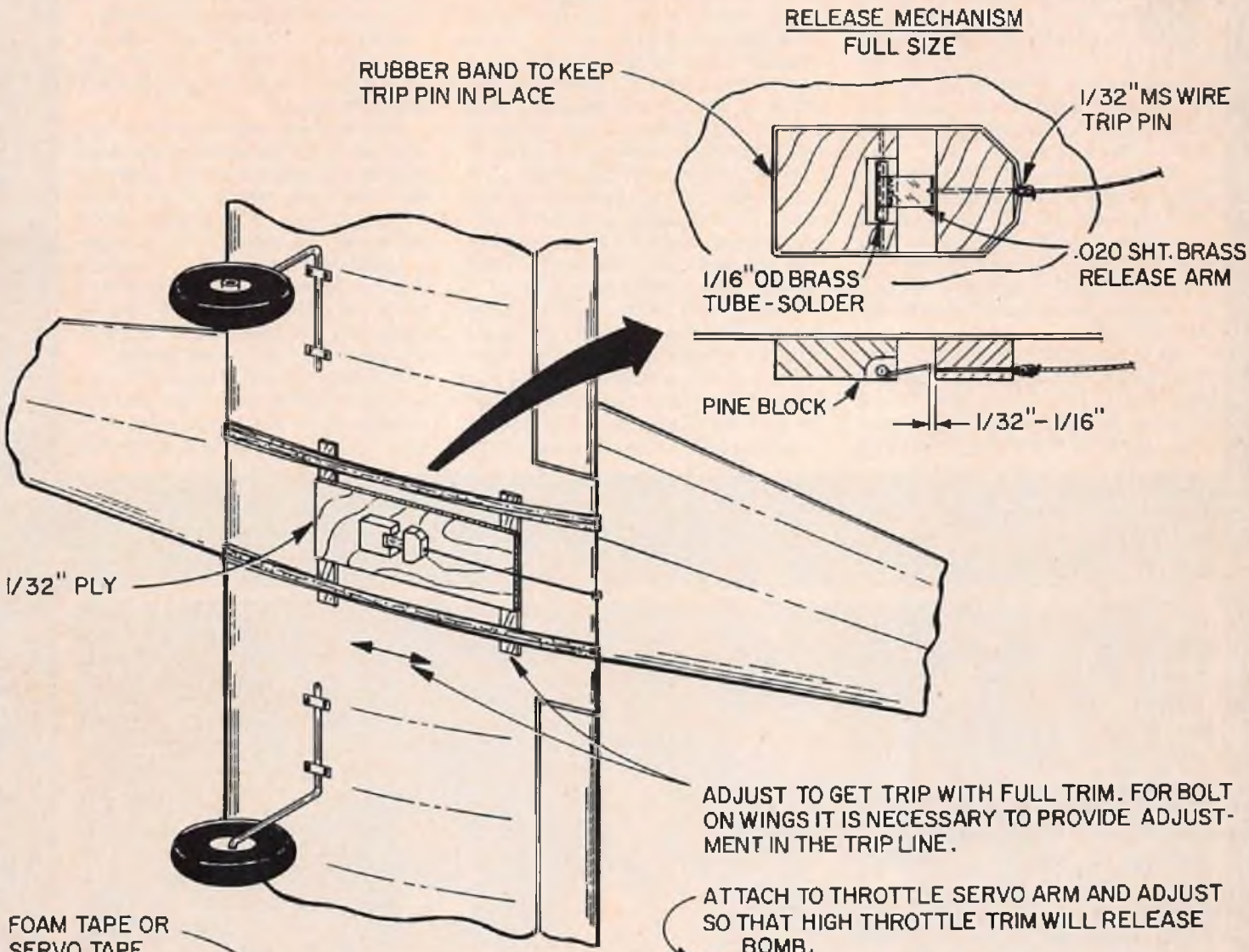
Bomb release mechanism mounted and ready. Trip line is attached to throttle servo arm in fuselage. Bomb release is easily mounted under rubber bands holding wing.

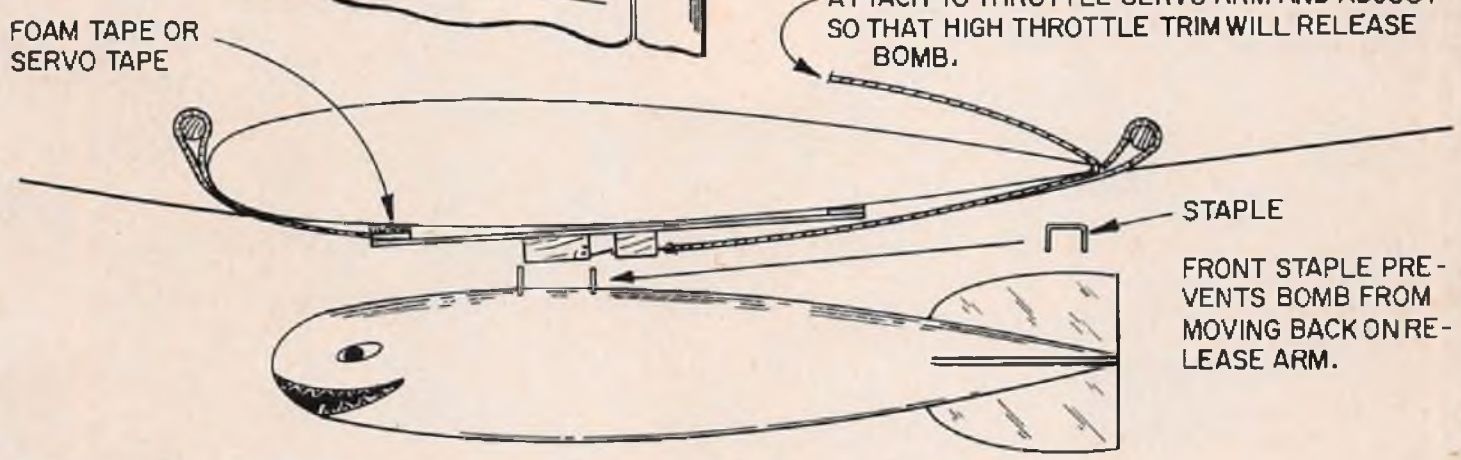


Bomb release can be moved fore and aft to get proper trip adjustment. For planes with bolt-on wings, adjustment must be provided in trip line.

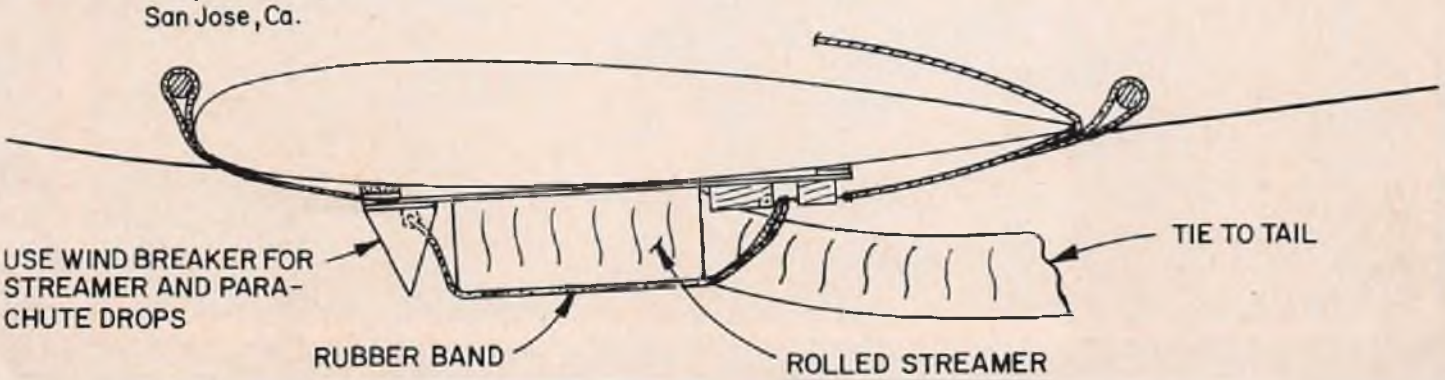
High throttle trim will get the job done whether dropping a bomb, chute, streamer or what have you. You'll have a great time with it.

BY JERRY SMITH





Thanks to Jerry Impellezzeri
San Jose, Ca.



BUTTERFLY II

Surely this writer is not the only senior citizen who has harbored a desire to participate in R/C flying. Persons with well-greyed hair attend our club meetings quite often. A few of these older folk eventually become fair pilots, but often at the cost of many crashed airplanes.

This writer came upon the Austin R/C scene in the late summer of 1975. A kit trainer airplane was built as the vehicle with which to begin indoctrination into R/C flying. My good friend and instructor, George Parks, test flew the airplane and then began the task of trying to help me learn to fly.

I was not apprehensive about trying to fly the plane. After all, I had flown several hundred hours in full scale aircraft some 30 years ago, and had a good knowledge as to why aircraft behave as they do in the various flight regimes.

Only one thing can be said about my initial attempts to learn to fly - - - utter chaos! It was frightening to me and a hazard to all persons nearby. Knowledge of aircraft and aerodynamics proved to be useless if one does not know which way the airplane is headed.

Nothing wrong with the airplane - - - it was all with me. I just could not keep up with it. The realization soon came that I would never make it with that airplane. The smartest thing I did was to sell it before it was crashed beyond repair.

Retiring with bruised ego and shattered confidence, I thought about the problem. Being an engineer with some aircraft design experience, hope was born that an R/C airplane design could be built that would make the learning process easier. Hope led to action and, thus, the first of a now long line of slow flying trainer aircraft came into being.

Model I was a big brute, relatively lightweight with lots of wing area. She had full house control and was powered with a .80 engine.

Now, this was more like it! The sheer size and low flight speed made visual orientation somewhat easier. Large size and slow flight made all of the aircraft motions slower. As an engineer would say — the "time constants" were longer.

Model I was a delight to fly. She lasted through several dozen flights before being run into by a large tree. The designer even managed one or two nervous solo flights before her demise.

At this point, having been caught up in a flood of further design and development ideas, the wreckage of Model I was piled under the workbench and plans

were drawn for Model II.

Eighteen months time, and an additional ten development airplanes, have now followed Model I in the attempt to develop "the most docile trainer". Along the way, the various models have been flown by George Parks and also a number of other experienced R/C pilots. Their comments concerning the flight characteristics and suitability of the planes as trainer aircraft have been most helpful.

The end product of all the development to this point is Butterfly II. She differs only in detail refinement from the three airplanes which immediately preceded her. All of the last four aircraft have been powered by .15 size engines. This is ample power for a large trainer provided that the airplane is made light.

The K & B rear rotor .15 engine is a good engine choice. This engine idles well due to its exhaust restrictor design and has a very high power-to-weight ratio. On a power-to-weight ratio basis, the K & B engine is superior to the Rossi and Cox engines that have now displaced it in Quarter Midget racing.

An additional advantage of the .15 engine is that, in most places, engines of 0.15 cubic inch displacement and smaller may be flown without mufflers, thus saving additional weight.

Having arrived at what seems a quite good design for the gentle trainer aircraft, it is now possible to list the characteristics which it seems she should have:

(1) The plane should be fairly large (99.5" wing span in this case) in order that good visibility be possible, and also

BUTTERFLY II
Designed By: Bill Carter

TYPE AIRCRAFT
Sport/Primary Trainer
WINGSPAN
99-5/16 Inches
WING CHORD
9¼" (Avg.)
TOTAL WING AREA
916 Square Inches
WING LOCATION
High Wing
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord Center Section
Double Taper Tip Panels
DIHEDRAL, EACH TIP
2½" First Break
3⅜" At Tip
O.A. FUSELAGE LENGTH
42 Inches
RADIO COMPARTMENT AREA
(L) 5" X (W) 2⅞" X (H) 3¼"
STABILIZER SPAN
24½ Inches
STABILIZER CHORD (incl. elev.)
6-3/16" (Avg.)
STABILIZER AREA
151 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
9⅜ Inches
VERTICAL FIN WIDTH (Incl. rudder)
5⅝" (Avg.)
REC. ENGINE SIZE
.15 Cu. In.

ground. Repair time: two evenings.

(7) A high wing configuration is desirable so as to aid visual orientation of aircraft attitude.

(8) Color combination of the covering should be chosen so as to aid visual orientation.

The requirements that the plane be large, lightweight and crash resistant might seem, at first thought, to be conflicting requirements. This need not necessarily be so. If properly designed, a lightweight airplane can be more crash resistant than a heavier airplane. The light plane flies slower and thus has far lower kinetic energy at impact. The light airplane may be designed with structure flexible enough to absorb the energy with less likelihood of failure.

Butterfly II and its immediate predecessors have suffered many crashes and, in general, have been well banged about. They have stood up to the punishment very well.

Butterfly II is not **just** a gentle trainer sedately cruising around at quarter throttle. She also has a sporting side to her nature.

At full throttle, the performance is astonishing. The rate of climb must approach 600 ft./min. Rough calculation and observation both indicate that the top speed exceeds 50 mph. She will do a very majestic slow roll across the field and gain altitude in the process.

CONSTRUCTION

Fuselage: This is a fairly simple fuselage to build, but it is important that the construction steps be done in proper sequence.

A TRAINING AIRPLANE FOR WOULD-BE RC FLYERS WITH AGED REFLEXES AND FAINT HEARTS

By Bill Carter

that pitch, roll and yaw motion rates be slow.

(2) A good balance must be struck between inherent stability and maneuverability.

(3) Cruising flight speed should be quite low which means that the wing loading must be low (7.5 oz./sq. ft. in this case). Butterfly II cruises comfortably at airspeeds below 15 mph.

(4) Requirements 1 and 3 mean that the plane must be built **light**.

(5) In addition to being light, there is the obvious requirement that the aircraft be capable of standing up to rough landings and other ill treatment. Butterfly II has had four ground loop-capsize mishaps to date resulting in only one broken propeller and a small dent in one wing tip.

(6) The airplane should be designed and built in such a way as to make repair easy following a crash. It would be folly to think that a working trainer aircraft is

FUEL TANK SIZE
4 Ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
3
CONTROL FUNCTIONS
Rud., Elev. & Throt.
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Spruce & Ply
Wing	Balsa, Spruce & Ply
Empennage	Balsa & Spruce
Wt. Ready-To-Fly	50 Oz.
Wing Loading	7.5 Oz/Sq. Ft.

not going to have more than its share of such mishaps. Butterfly I once came in straight down at high speed. Fortunately, it crashed in a freshly plowed field, but even so, the impact was energetic enough to completely bury the engine and motor mount. The only major damage was to the wings which broke free from the fuselage and impacted the

(1) After the fuselage sides and inner doublers have been cut out, glue the doublers to the inner fuselage sides. Try to obtain a good glue bond without excessive weight build-up by using too much glue. Lay down about 3/8" band of glue all around the periphery of the doubler. Use either aliphatic resin or white glue. For the remainder of the inner doubler, "spot weld" to the fuselage sides by using modest sized drops of glue on about 1" centers. Drill several 1/16" diameter holes in the doubler before laying doubler on fuselage sides. With the inner doublers carefully positioned on the fuselage sides, cyanoacrylate adhesive is run into the holes in the doublers so as to prevent the doubler from slipping when sides and doublers are pressed against a flat surface to allow the glue to cure.

(2) Next, attach the 1/4" balsa corner stock to the fuselage inner sides to form the upper and lower longerons. The

corner stock runs full length on the fuselage bottom but only to a 1" overlap with the rear end of the ply doubler on the top. Again, allow the glue to cure with the sides held against a flat surface. (Do not attach the forward spruce upper longerons before fuselage assembly. If this should be done, the fuselage sides would be too stiff to assemble with the fuselage frames.)

(3) The lower corner stock longerons should now be joined together with a 1/16" ply splice plate glued to the 45° surfaces.

(4) The fuselage sides are now clamped together, outside surface to outside surface, and the side outlines sanded to match. This operation leaves the rear portion of the longerons tapered as desired.

(5) Lines are now drawn on the inner surfaces of the fuselage sides for frame locations and also for the location of the fuel tank tray supports and the servo tray supports.

(6) The fuselage frames are now fabricated. The forward bulkhead is assembled with epoxy. The engine mount holes are drilled and the blind nuts (4-40) are secured in their holes with epoxy.

(7) The fuselage sides and frames are now ready to assemble. The inner doublers and corner stock longerons, which have been previously attached, add just enough stiffness to allow the sides to bend into fair curves around the frames.

(8) Since the upper fuselage is a straight line when seen in side view, it is most convenient to assemble the fuselage upside down.

(9) The RCM fuselage jig is helpful in assembling the sides and frames but is not essential. Draw vertical center lines on the forward bulkhead and the frames so that proper fuselage alignment may be achieved on assembly. The forward bulkhead is attached to the fuselage sides with epoxy. The main frame is now secured to the fuselage sides by wicking in cyanoacrylate adhesive.

(10) The frames aft of the main bulkhead may be moved forward or aft a bit from the locations given on the plan so as to give a good fair curve to the aft fuselage sides. After the aft frames are properly located, attach to sides with cyanoacrylate.

(11) The bottom of the assembled fuselage should now be sanded with sandpaper, attached to a flat block so as to trim the frame bottoms flush with the fuselage sides, and also true up any rotation of the longerons due to the curvature which has been pulled into the fuselage sides.

(12) Add the balsa corner stock stiffeners to the lower edge of the main frame and also to the rear bottom side of the forward bulkhead. These stiffeners are now also dressed flush with the longerons with a sanding block.

(13) The fuselage bottom may now be covered with 1/16" ply on the forward portion and 1/16" medium soft balsa aft. Balsa grain runs across fuselage.

(14) The fuselage is now removed from the jig (or flat assembly surface) and the spruce upper longerons are glued in place. Join the spruce longerons and the aft balsa corner stock longerons with a 1/16" ply splice plate as shown.

(15) Glue in the fuel tank tray supports, the blocks for locating the battery and the servo tray supports. The top fuselage planking and hatch may now be added.

(16) The cabin is **not** put in place until **all** components except fuselage Mono-Kote have been added. The tail group is covered and attached to the fuselage with 4-40 nylon screws. With all components of the finished fuselage in place (pushrods, hardware, radio, battery, padding, engine, propeller, landing gear, etc.), the fuselage Center of Gravity is located and the cabin built in place such as to put the airplace Center of Gravity right on the wing spar.

Pushrods: The two pushrods may be made from a single sheet of 3" x 36", 1/16" thick medium soft balsa. Using a long straight-edge and X-Acto knife, cut four 1/4" wide strips from sheet, keeping cut edges as near vertical as possible. The remainder of the sheet may now be cut into four strips, each about 7/16" wide. Attach two of the 7/16" wide strips to a flat work surface with a spot of glue at each end. Draw lines 1/4" apart along the middle of these strips. Bulkheads for the hollow rods are cut from a piece of 1/4" square balsa. The bulkheads are attached to the 7/16" wide strips using cyanoacrylate adhesive. The 1/4" strips may now be installed and glued in place. Cyanoacrylates are most suitable for this operation. The pushrods now have three sides assembled. Use a sanding block with fine grade sandpaper to dress off the open side of the rod so as to give a good fit for the closing side. The glue spots at the ends may now be severed and fourth side may be added. If modest care is used, the hollow rods will come out quite straight. A razor plane or sanding block is used to dress off the outstanding edges. The ends of the rods are 1" long pieces of 1/4" square spruce which are sanded to be a smooth push fit into the hollow ends of the balsa portion of the rods. The spruce ends are center drilled so that the threaded metal ends may be screwed into the spruce. After the threaded metal rods are screwed into the spruce 1/2" or so, the threaded rod and the spruce are locked together by running cyanoacrylate into the other end of the drilled hole. The spruce plugs are now pushed into the hollow ends of the balsa portion of the pushrods and are secured by cyanoacrylate. The hollow balsa pushrods save quite a bit of weight over birch dowel rods and, most important, the weight saved is toward the rear end of the airplane. Construction time for a pair of these rods is less than one hour.

Tail Group: These surfaces are constructed on the plan using aliphatic resin adhesive. Note that the spars are continuous and that the ribs are interrupted. The leading edges are sanded half round and the elevator and rudder are sanded to a taper so as to be about 1/8" thick at the trailing edges.

Wing: As per Craft-Air instructions. (Note: There have been a few minor modifications on the Windrifter wing instructions as they appear in the kit.)

(1) Cut the wing views from the plans and pin down the right wing plan, under waxed paper, to your building board. Both the center section (root section) and the tip section of a wing half will be constructed simultaneously.

(2) Set the squared end of a 21" x 1/8" x 3/8" spruce spar at the line between the two touching W-4 ribs, and extend to your left beyond W-1.

(3) Butt a 30" spar to that and extend to the tip.

(4) Repeat this with the leading edges (L.E.) and trailing edges (T.E.), tapering the tip section L.E. and T.E. beforehand. Try a razor plane for tapering the L.E. A straight-edge and an X-Acto work fine on the T.E. No glue yet!

(5) Identify the W-1, W-2, W-3 and W-4 ribs. W-1 and W-2 are thinner than W-3 and W-4. W-1 has the tube hole near the top spar slot and W-2 has its hole about the center. W-3 is identical to W-4 except that W-3 has the hole.

(6) Place a 1/16" thick spacer under W-1 and W-2 to allow for the thickness of the sheeting to be added later. Cement in W-2 and W-3 — not W-1.

(7) Cement in the W-4 ribs. Before the cement has set on these ribs, cement in the webs. Take care not to glue the root of the wing to the tip.

(8) Cement in place all of the tip section ribs except W-4 (W-5 through W-15).

(9) Glue in the top spruce spars.

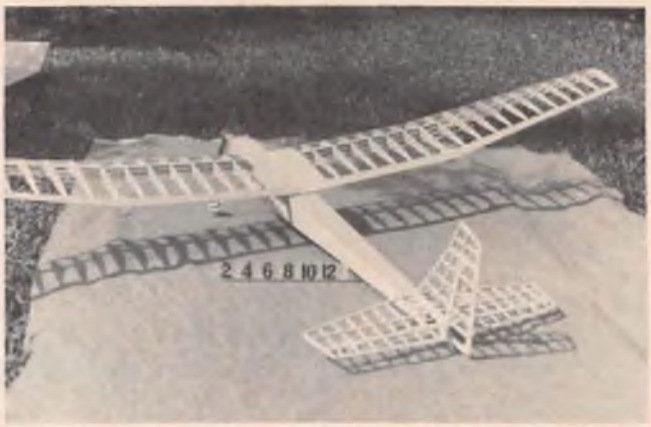
(10) Mark position, cut notches for, and cement in the 1/8" sq. spruce turbulator spars in the root section. The top of the turbulator spars should be smooth with the top of the ribs. These do not extend inward beyond W-2.

(11) Cut notches for, but do not install, the tip section turbulators until after the wings are joined.

(12) Cut the inboard triangular shaped polyhedral joint braces from a 3/16" x 3/4" strip of balsa and install. Note grain direction.

(13) When dry, remove from the building board and repeat Steps 1 through 13 on the left wing. When fully dry, you should make the dihedral joints. Start with the center and then the tip joints. To make the center dihedral joint, place the 1/4" steel rod into the tubes and bring the W-1 ribs close together over a flat surface. The last W-4 rib on each wing half should be about 2⅛" above the sur-

Butterfly II complete with the exception of the cabin structure. This is left to the end so as to locate wing properly with respect to the C.G.



Overall view of structure. Wing is adapted from Craft-Air's Windrifter Standard Class R/C sailplane.

Completed tail group ready for final covering. This shows the long tail moment on the Butterfly II. Very important to keep weight as far forward as possible.

Completed aircraft showing the cabin structure added. Note the built-up balsa and ply wheels to save weight.

Cruising overhead, the airplane gives strong visual cues as to its flight attitude.

Coming in for landing.

face — 1¾" is a minimum, 2½" is a maximum. If this dimension checks, separate the two sections and machine the dihedral joint as follows.

(14) Remove the tube and the W-1 rib. Block up the outboard W-4 rib 2⅛" and position the wing section such that the L.E. and T.E. just barely overhang the edge of your work table.

(15) Holding your sanding block (80 to 150 grit) such that the sandpaper is vertical and using the table edge as a guide, move the sanding block back and forth from L.E. to T.E. and vice versa, until the T.E., L.E., and spars are vertical and square.

(16) Repeat this procedure on the other wing root section.

(17) This same procedure should be used on the tip sections, except the W-15 ribs will be blocked up 3⅜".

(18) Reinstall the W-1 ribs and the tubes.

(19) With the W-4 end ribs still blocked up 2⅛" and the steel rod in position in the tubes, bring the wing root sections together and glue in the W-1 ribs and the W-1 to W-2 spar webs. The W-1 ply ribs should be in position but not cemented at this time.

(20) Cement the tubes to the ribs and the webs with 5-minute epoxy and cap extreme ends of the tubes with balsa scraps. Don't economize on the epoxy. Puddle in large epoxy fillets around the tubes to ensure that the stress in the tubes is transferred to the spar.

(21) When this is dry, the W-1 ply ribs are to be removed to facilitate planking the W-1 to W-2 bays.

(22) Notch the ends of the 1/8" sq. pieces over the W-2 rib.

(23) Plank the bottom of the center bay with the 1/16" sheeting, grain run-

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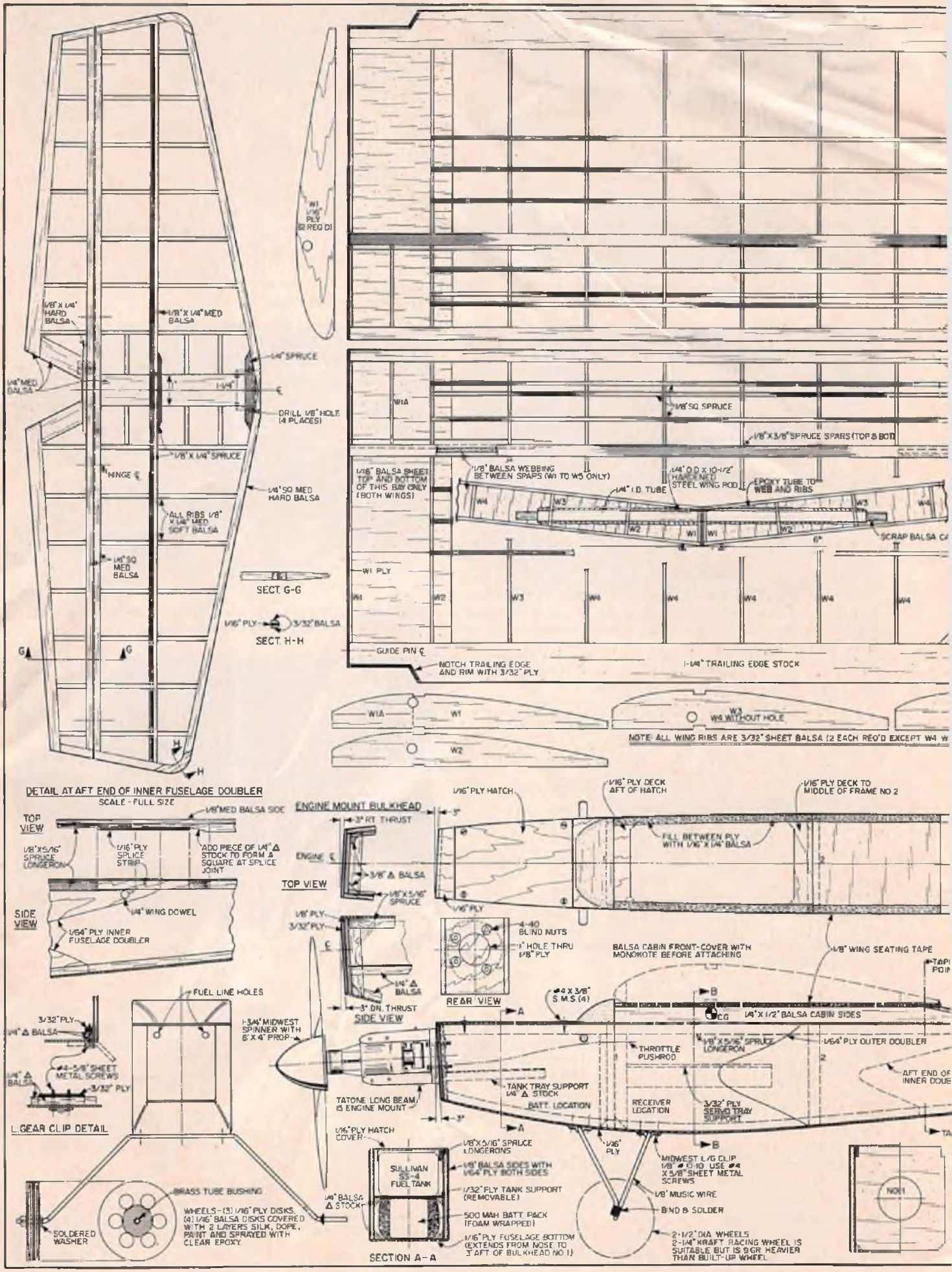
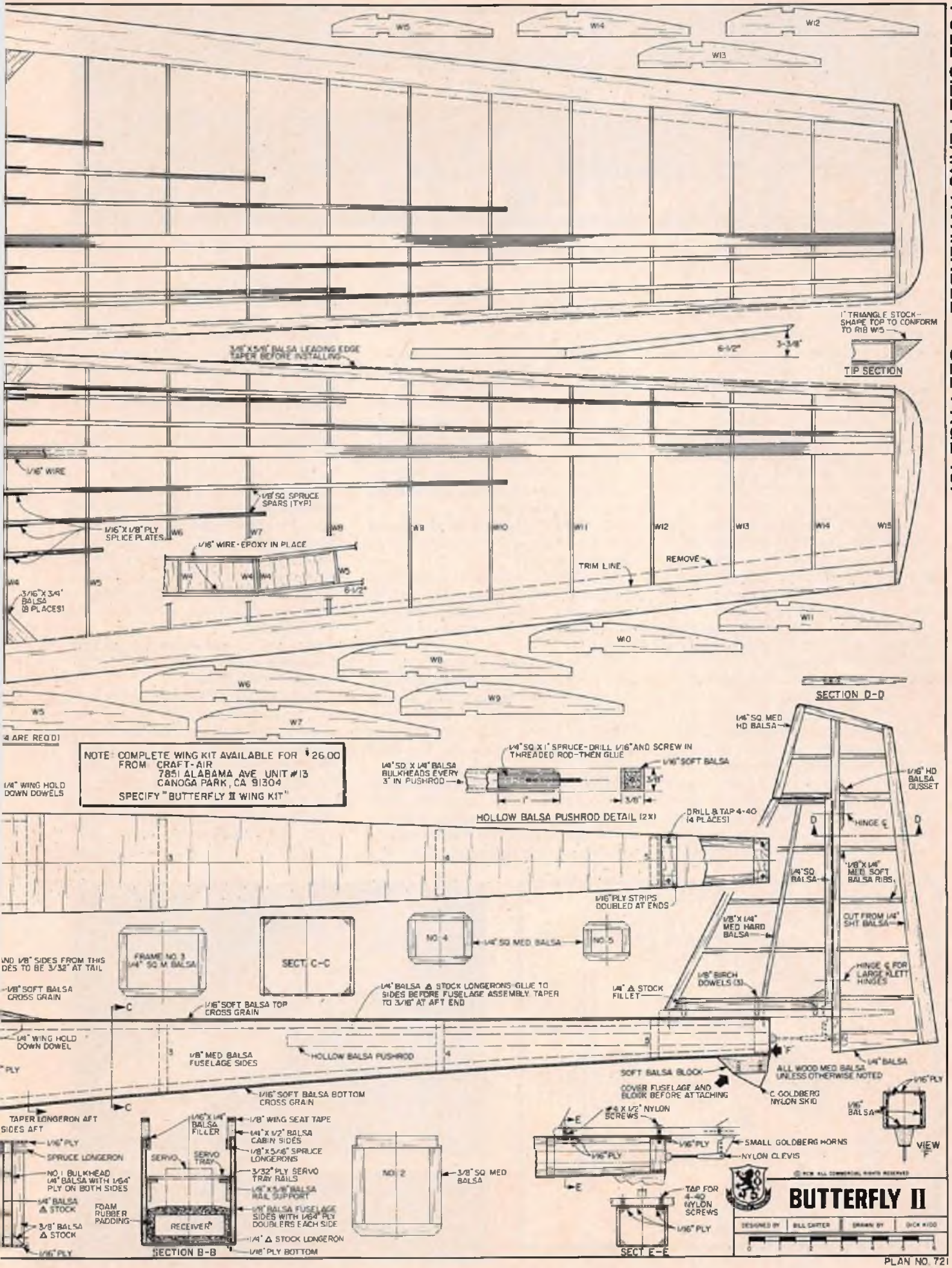

1/8" X 1/4" HARD BALSA
1/8" X 1/4" MED BALSA
1/4" SPRUCE
1/4" MED BALSA
1-1/4"
DRILL 1/8" HOLE (4 PLACES)
1/8" X 1/4" SPRUCE
HINGE ℄
1/4" SQ MED HARD BALSA
ALL RIBS 1/8" X 1/4" MED SOFT BALSA
1/4" SQ MED BALSA
W1 1/16" PLY (2 REQ'D)
SECT. G-G
1/16" PLY
3/32" BALSA
SECT. H-H
W1A
1/8" SQ SPRUCE
1/8" X 3/8" SPRUCE SPARS (TOP & BOT)
1/16" BALSA SHEET TOP AND BOTTOM OF THIS BAY ONLY (BOTH WINGS)
1/8" BALSA WEBBING BETWEEN SPARS (W1 TO W5 ONLY)
1/4" O.D. X 10-1/2" HARDENED STEEL WING ROD
EPOXY TUBE TO WEB AND RIBS
1/4" I.D. TUBE
W1 PLY
GUIDE PIN ℄
NOTCH TRAILING EDGE AND RIM WITH 3/32" PLY
1-1/4" TRAILING EDGE STOCK
W1A
W1
W2
W3
W4 WITHOUT HOLE
NOTE: ALL WING RIBS ARE 3/32" SHEET BALSA (2 EACH REQ'D EXCEPT W4 W
DETAIL AT AFT END OF INNER FUSELAGE DOUBLER
SCALE - FULL SIZE
TOP VIEW
1/8" MED BALSA SIDE
1/8" X 5/16" SPRUCE LONGERON
1/16" PLY SPLICE STRIP
ADD PIECE OF 1/4" △ STOCK TO FORM △ SQUARE AT SPLICE JOINT
SIDE VIEW
1/4" WING DOWEL
1/64" PLY INNER FUSELAGE DOUBLER
ENGINE MOUNT BULKHEAD
3" RT THRUST
ENGINE ℄
3/8" △ BALSA
TOP VIEW
1/8" X 5/16" SPRUCE
1/8" PLY
3/32" PLY
1/4" △ BALSA
3" DN. THRUST
SIDE VIEW
1/16" PLY HATCH
1/16" PLY DECK AFT OF HATCH
1/16" PLY DECK TO MIDDLE OF FRAME NO 2
FILL BETWEEN PLY WITH 1/16" X 1/4" BALSA
1/16" PLY
4-40 BLIND NUTS
1" HOLE THRU 1/8" PLY
REAR VIEW
BALSA CABIN FRONT-COVER WITH MONOKOTE BEFORE ATTACHING
1/8" WING SEATING TAPE
#4 X 3/8" S.M.S. (4)
B
CG
1/4" X 1/2" BALSA CABIN SIDES
1/8" X 5/16" SPRUCE LONGERON
1/64" PLY OUTER DOUBLER
THROTTLE PUSHROD
TANK TRAY SUPPORT 1/4" △ STOCK
BATT. LOCATION
RECEIVER LOCATION
3/32" PLY SERVO TRAY SUPPORT
AFT END OF INNER DOUB
TATONE LONG BEAM, IS ENGINE MOUNT
3"
A
1/16" PLY HATCH COVER
1/8" X 5/16" SPRUCE LONGERONS
1/8" BALSA SIDES WITH 1/64" PLY BOTH SIDES
SULLIVAN SS-4 FUEL TANK
1/32" PLY TANK SUPPORT (REMOVABLE)
500 MAH BATT PACK (FOAM WRAPPED)
1/16" PLY FUSELAGE BOTTOM (EXTENDS FROM NOSE TO 3" AFT OF BULKHEAD NO 1)
1/8" BALSA △ STOCK
SECTION A-A
1/16" PLY
MIDWEST L/G CLIP 1/8" ø #10-10 USE #4 X 5/8" SHEET METAL SCREWS
1/8" MUSIC WIRE
BIND & SOLDER
2-1/2" DIA WHEELS 2-1/4" KRAFT RACING WHEEL IS SUITABLE BUT IS SIGN HEAVIER THAN BUILT-UP WHEEL
NO 1
1-3/4" MIDWEST SPINNER WITH 8" X 4" PROP
FUEL LINE HOLES
3/32" PLY
1/4" △ BALSA
#4-5/8" SHEET METAL SCREWS
L.GEAR CLIP DETAIL
BRASS TUBE BUSHING
SOLDERED WASHER
WHEELS - (3) 1/16" PLY DISKS, (4) 1/16" BALSA DISKS COVERED WITH 2 LAYERS SILK, DOPE, PAINT AND SPRAYED WITH CLEAR EPOXY


W5
W14
W12
W13
1" TRIANGLE STOCK — SHAPE TOP TO CONFORM TO RIB W15
TIP SECTION
3/16" X 3/8" BALSA LEADING EDGE TAPER BEFORE INSTALLING
6-1/2"
3-3/8"
1/16" WIRE
1/8" SQ SPRUCE SPARS (TYP)
1/16" X 1/8" PLY SPLICE PLATES
1/16" WIRE - EPOXY IN PLACE
TRIM LINE
REMOVE
3/16" X 3/4" BALSA (8 PLACES)
W1
W2
W3
W4
W5
W6
W7
W8
W9
W10
W11
W12
W13
W14
W15
SECTION D-D
1/4" SQ MED HD BALSA
1/16" HD BALSA GUSSET
HINGE ℄
1/8" X 1/4" MED SOFT BALSA RIBS
1/4" SQ BALSA
CUT FROM 1/4" SHT BALSA
1/8" X 1/4" MED HARD BALSA
1/8" BIRCH DOWELS (3)
HINGE ℄ FOR LARGE KLETT HINGES
1/4" BALSA
ALL WOOD MED BALSA UNLESS OTHERWISE NOTED
1/16" PLY
1/16" BALSA
VIEW F
NOTE: COMPLETE WING KIT AVAILABLE FOR $26.00 FROM CRAFT-AIR 7851 ALABAMA AVE UNIT #13 CANOGA PARK, CA 91304 SPECIFY "BUTTERFLY II WING KIT"
1/4" WING HOLD DOWN DOWELS
1/4" SQ X 1" SPRUCE - DRILL 1/16" AND SCREW IN THREADED ROD - THEN GLUE
1/4" SQ X 1/4" BALSA BULKHEADS EVERY 3" IN PUSHROD
1/16" SOFT BALSA
3/8"
1"
3/16"
HOLLOW BALSA PUSHROD DETAIL (2 X)
DRILL & TAP 4-40 (4 PLACES)
1/16" PLY STRIPS DOUBLED AT ENDS
FRAME NO. 3 1/4" SQ M BALSA
SECT C-C
NO. 4
1/4" SQ MED BALSA
NO. 5
1/8" SOFT BALSA CROSS GRAIN
1/16" SOFT BALSA TOP CROSS GRAIN
1/4" BALSA Δ STOCK LONGERONS GLUE TO SIDES BEFORE FUSELAGE ASSEMBLY TAPER TO 3/16" AT AFT END
1/4" Δ STOCK FILLET
1/4" WING HOLD DOWN DOWEL
1/8" MED BALSA FUSELAGE SIDES
HOLLOW BALSA PUSHROD
SOFT BALSA BLOCK
COVER FUSELAGE AND BLOCK BEFORE ATTACHING
C. GOLDBERG NYLON SKID
1/16" SOFT BALSA BOTTOM CROSS GRAIN
TAPER LONGERON AFT SIDES AFT
1/16" PLY
SPRUCE LONGERON
NO. 1 BULKHEAD 1/4" BALSA WITH 1/64" PLY ON BOTH SIDES
1/4" BALSA Δ STOCK
3/8" BALSA Δ STOCK
1/16" PLY
FOAM RUBBER PADDING
1/16" X 1/4" BALSA FILLER
SERVO
SERVO TRAY
RECEIVER
SECTION B-B
1/8" WING SEAT TAPE
1/4" X 1/2" BALSA CABIN SIDES
1/8" X 5/16" SPRUCE LONGERONS
3/32" PLY SERVO TRAY RAILS
1/8" X 5/16" BALSA RAIL SUPPORT
1/8" BALSA FUSELAGE SIDES WITH 1/64" PLY DOUBLERS EACH SIDE
1/4" Δ STOCK LONGERON
1/16" PLY BOTTOM
NO. 2
3/8" SQ MED BALSA
4 X 1/2" NYLON SCREWS
1/16" PLY
SMALL GOLDBERG HORNS
NYLON CLEVIS
TAP FOR 4-40 NYLON SCREWS
SECT E-E
BUTTERFLY II
DESIGNED BY BILL CARTER
DRAWN BY DICK WOOD
PLAN NO. 721

THE CASE OF THE DISAPPEARING LANDING GEAR or HOW TO INSTALL HALF-A RETRACTS

Tucking away the landing gear in a Half-A R/C model, particularly a **scale** model, is **the** way to go! There are four available retract units in the hobby shops and they all function very well. What made Half-A retracts feasible was the development of those teeny-tiny servos by Cannon, Ace, Litco and Kraft. You don't have to be a watchmaker to shoe-horn in a set of retracts, but there isn't much room for them in the average .049 powered model. There are some "tricks of the trade" that will make your job of mounting the lilliputian retraction mechanisms and their actuators a tad easier.

For the purpose of this article, we have chosen to illustrate the installation of Robart retracts in a House of Balsa kit, using an Ace actuator. The reason for our choice is that all of the popular HOB kits use exactly the same wing - - the only differences being in the tips and the trailing edges. This situation results in only two basic installations - - tail draggers and tricycle gears. Our techniques, however, are directly transferable to other kits, retracts, and micro-servos.

Before beginning the detailed How-To part of this article, our criteria for retract installations should be examined:

(1) The installation of both retract mechanisms and the retract servo should not reduce the structural integrity of the model as designed. In other words, we don't want to cut into wing spars or the leading edge. The only model we've found in which this criteria can't be observed is the HOB Bf 109E. The outward retracting gear on the Messerschmitt **has** to cut into the lower, forward 1/8" square spar.

(2) Within practical limits, retraction of the gear should put the wheels and struts **inside** the model's structure.

(3) The retracts have to be mechanically actuated. Half-A models must be light - - and can't stand the weight penalty of a pneumatic actuation system.

(4) The landing gear struts have to assume a scale-like angle with both the wing and the ground. The "set" of a scale model depends a lot on landing gear leg length and the "geometry" of the angles noted.

(5) When the retraction installation is completed, the landing gear and its wheels must "track" properly. We think our solution to this problem is super-sanitary.

(6) Although there is little room to "work" in a Half-A R/C model's wing, the installation of the retracts must be easy to get at and adjust. Preparing a "mock-up" of the model's landing gear system **outside** of the model seems to be the way to solve this problem.

HOW-TO: We begin by assuming that the fuselage and the wing of the model are completed, but uncovered. The wing halves are joined, the center section sheeted and the fiberglass center section tape is in place. The leading edge and the tips are sanded to shape and the trailing edge and ailerons have been fitted. The wing has been mated with the fuselage with dowels and hold-down bolts and the forward wing/fuselage fillet is formed. In the case of tricycle gear installations, the firewall has been chamfered for the nose gear retract, mounting holes drilled and the firewall epoxied in place. Be sure that if 1/32" ply ribs are a feature of your kit, that they are in place, but without removing the rectangular cutouts needed for the fixed gear.

Begin the Robart retract installation by making a card template of the "box" that holds the landing gear pivots. We did it the easy way - - we stuck the "box" on a stamp pad and then "stamped" a template onto a bit of old file folder. Draw a span-wise center line on the template - - because you'll need it to align the mechanisms.

We'll concern ourselves, first, with the installation of the main gear in the tail-dragger configuration.

Trace the wing's forward center section on a piece of 3/32" or 1/8" flat plywood. Include all of the area forward of the main spars, aft of the leading edge and between the two wing ribs that mark the outermost rib-bays in which the retracts will be mounted. Draw in all of the wing's structural components - - ribs, spars, the leading edge, and the dihe-

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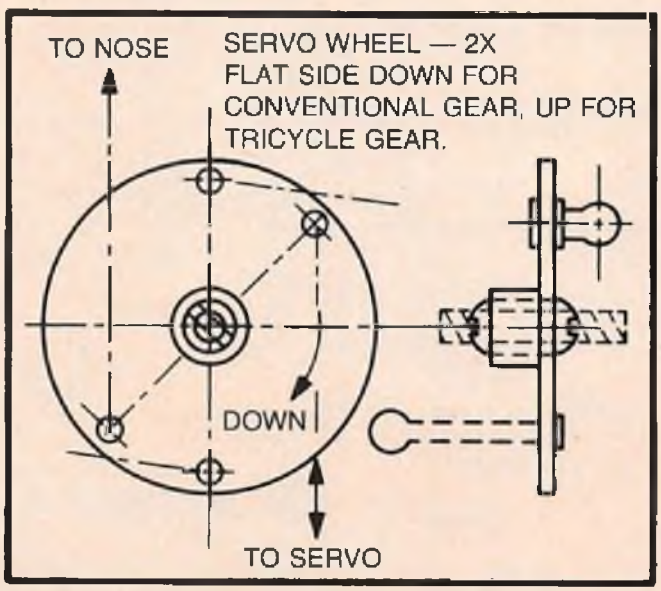
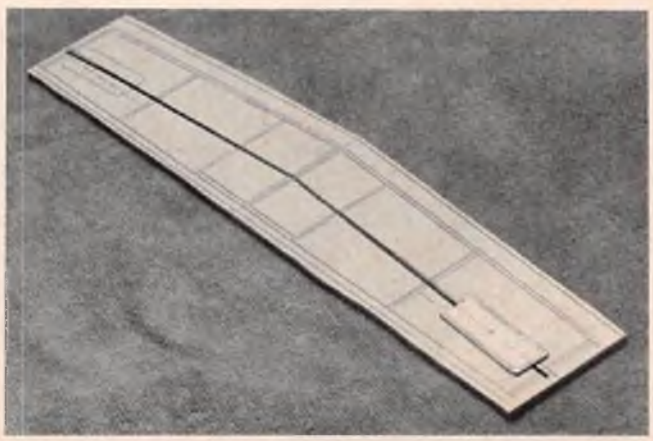
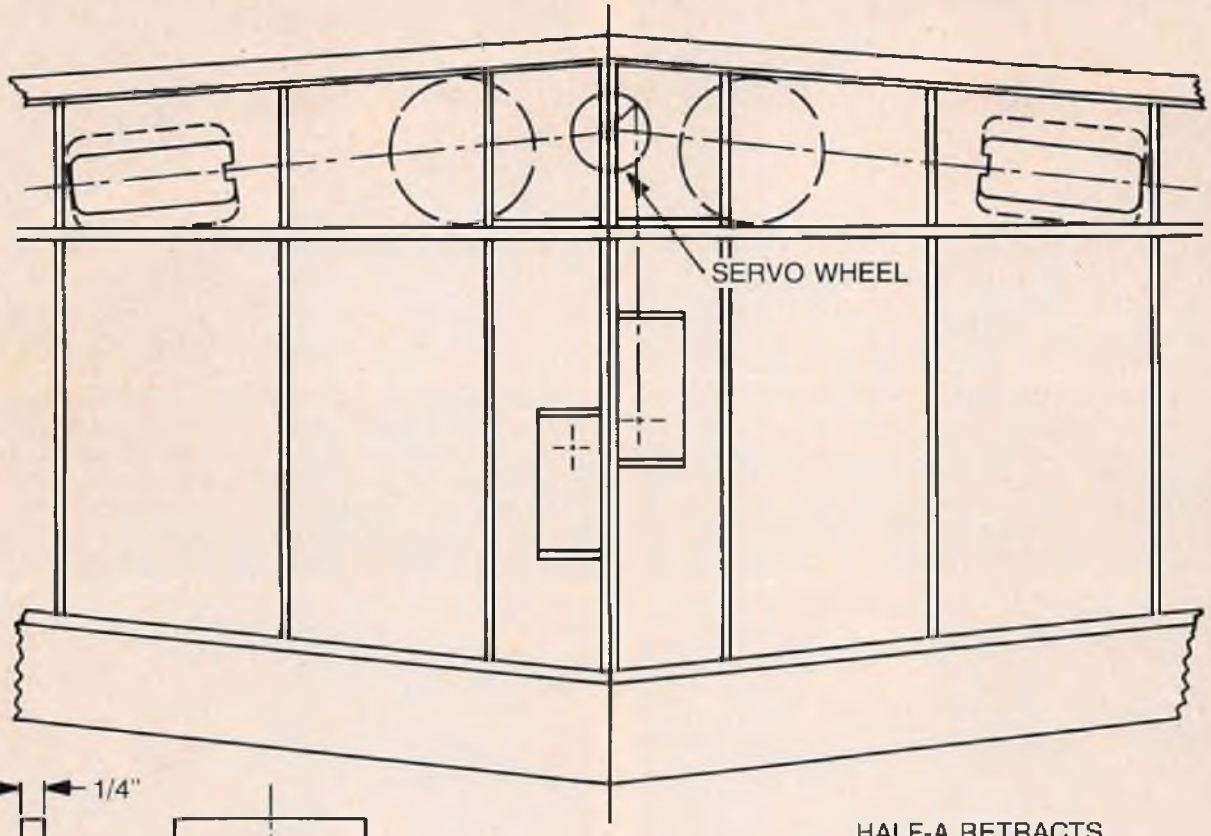
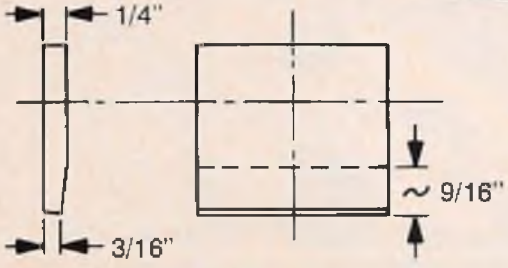




Retract installation begins with a full-sized drawing of the wing's center section on a piece of 3/32" plywood. Gear leg centerline shown by a bit of striping tape. Dotted line in the left-most rib bay indicates position of fixed gear holding blocks.

By Col. John A. de Vries

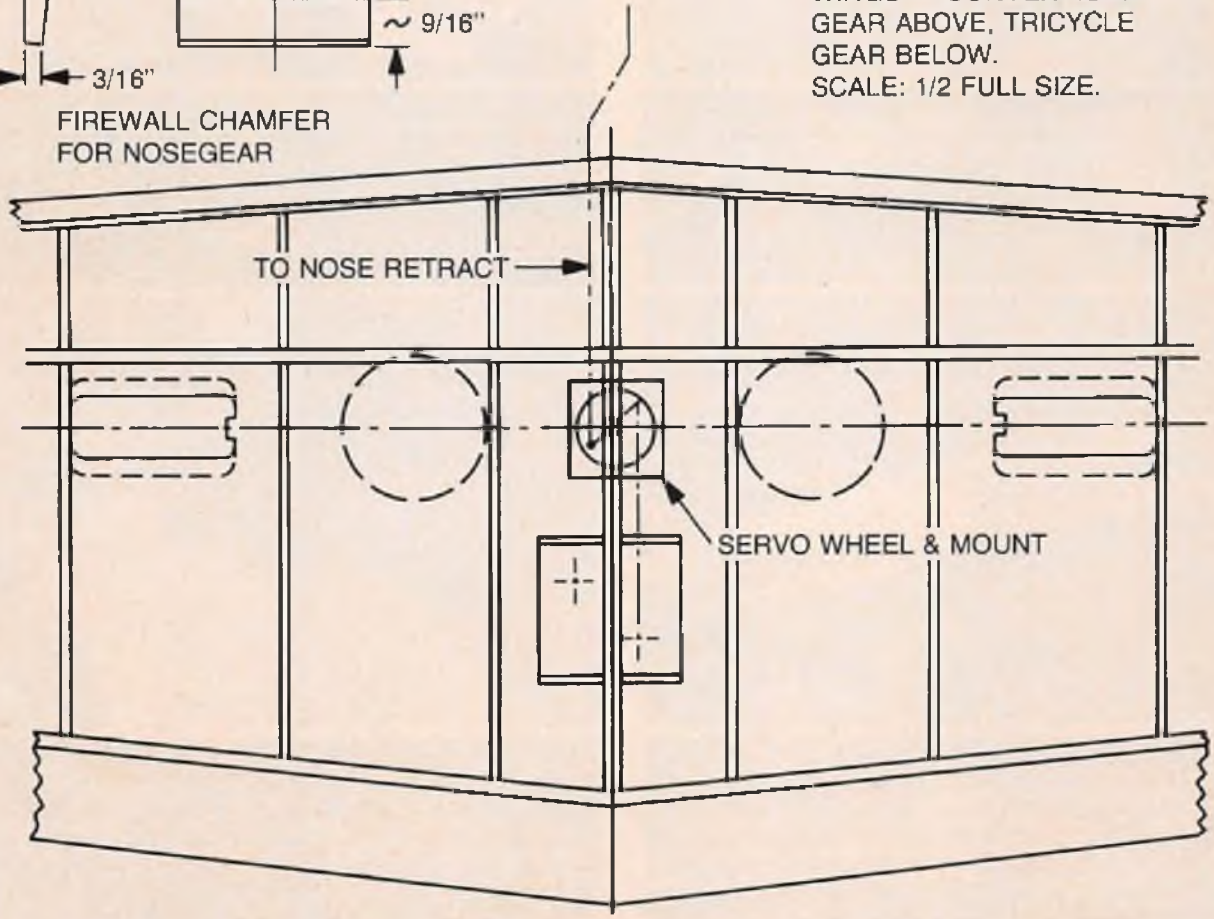


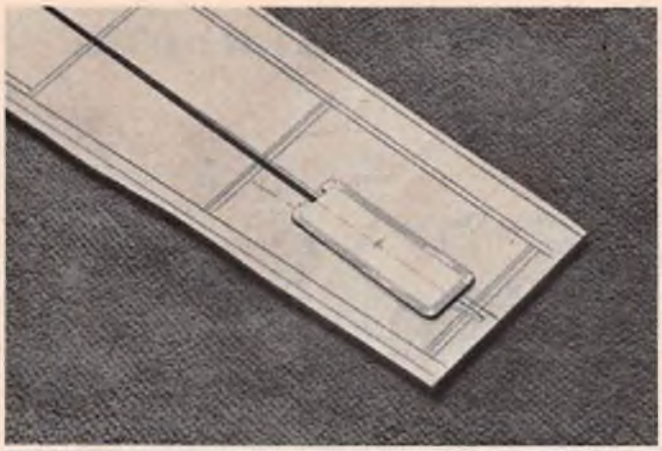


FIREWALL CHAMFER
FOR NOSEGEAR

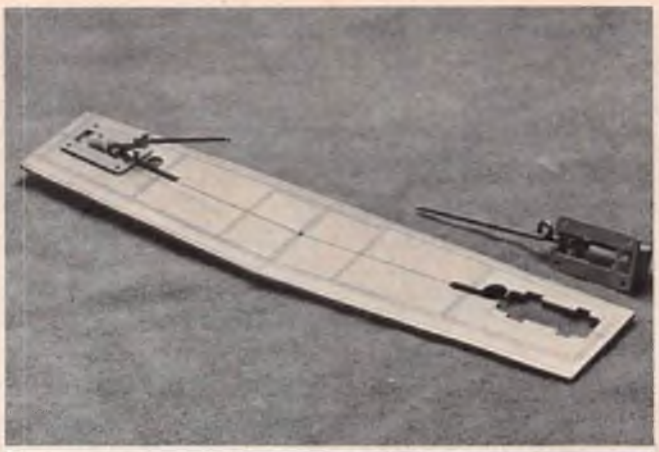
HALF-A RETRACTS

HOUSE OF BALSA
WINGS — CONVENTIONAL
GEAR ABOVE, TRICYCLE
GEAR BELOW.
SCALE: 1/2 FULL SIZE.

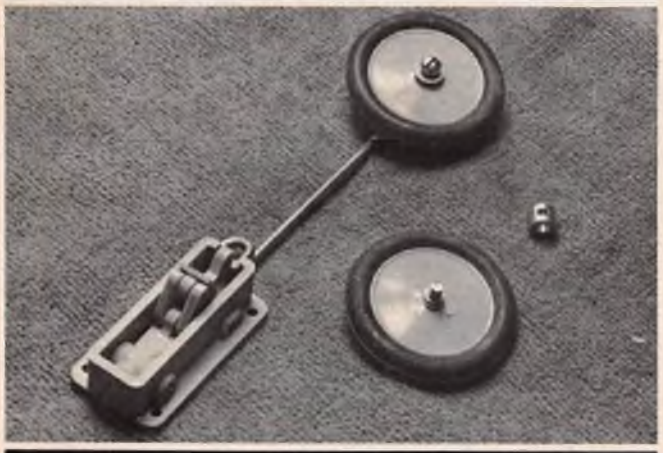




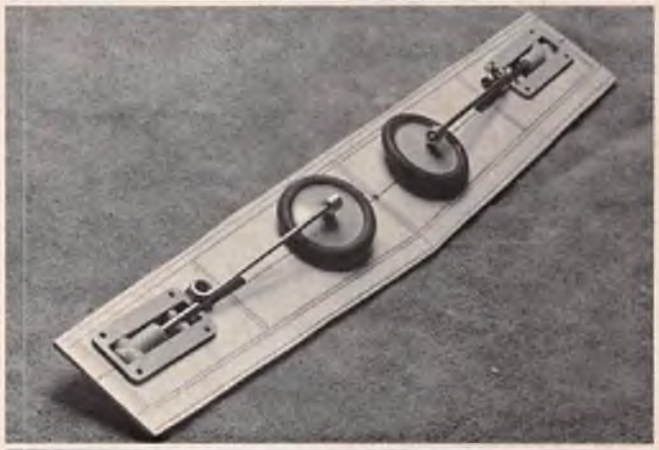
Tip of plywood mock-up, showing the "box" template in place. Area between two right-hand ribs will become the retract mount in the model.



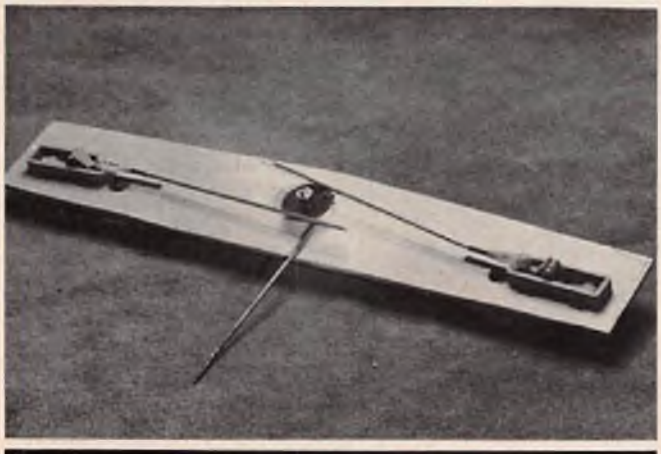
Plywood cut out to allow retracts to fit flush on their flanges. Note clearance holes for plastic projections, landing gear leg and gear's shock absorbing wire coil. This view represents the bottom of the wing. The 7/64" hole for the servo wheel may be seen on the wing's centerline.



Sanitary wheel/axle system, built from a 4-40 bolt and a 3/32" wheel collar. Axle may be adjusted up and down the landing gear leg for proper length and twisted to give proper "toe-in".



Retract mock-up with mechanisms and wheels in place.



Top of the retract mock-up. Servo wheel is mounted on a 4-40 bolt and the "servo wheel to servo" pushrod is attached to the ball-link. Note the gentle bends in the actuating rods – slightly forward on the right, slightly aft on the left – to align rods with the retract mechanisms.

Servo wheel installed on the centerline of the wing. Vertical 3/8" strip of plywood, with horizontal servo mount strip reinforces the wing. Servo wheel is held in place with a 4-40 bolt through a blind nut. Note the ball-link.

dral "jig" or wing joiners, if your kit uses them.

On your plywood pattern, locate the point exactly halfway between the front of the main spar(s) and the rear side of the leading edge on the wing's center line. Using a 7/64" drill, pierce the pattern at this point. Position the "box" template on the plywood, within the proper rib bays and align its center line with the hole you've just drilled. In general, the line from template to the hole should almost parallel the wing's leading edge. Shift the template around a bit until things line up. You'll find that your retract pivot points will be **outboard** of the landing gear location shown on the plans - - by the length of the retract mechanism. This is okay because it results in a more scale-like location of the gear.

Locate the "box" template within 1/8" or so of the main spar - - to give clearance for the mechanism within the wing. You can trim a bit of the plastic from the Robart retract without affecting its function or strength but it isn't necessary. Located well to the rear, but still forward of the spar, there's plenty of room for the mechanism under the upper leading edge sheeting.

When things look right, trace the "box" template onto the plywood at each gear location and draw in the landing leg center line you've located. Carefully now, cut out the rectangular holes for the retracts. We drilled some holes inside the traced lines, used a jeweler's saw to cut out the rounded corner rectangles (so the plywood wouldn't chip) and then finished to the line with needle files. You'll be shooting for a good, tight, mechanical fit between retract and plywood. When you test fit the retracts into the holes, you'll find that on Robart retracts, there are four projections that prevent the mechanism from fitting flush onto the plywood. Trace around 'em with a pencil and **file** clearance notches in the ply. This is a bit tricky because you have to leave enough "meat" in the plywood to hold the retract mounting screws - - and the screw holes are very close to the plastic projections.

Once the retracts are flush on the plywood, you'll find there's interference between the landing gear legs and the plywood. This requires a circular cut-out for the shock absorbing coil and the landing gear leg itself. No big deal - - slot the plywood and saw and file a clearance hole for the coil.

At this point, we have a couple of retracts stuck flush in a hunk of plywood that has some lines drawn on it. Now comes the sanitary part we talked about earlier - - the axles. You could try to bend the end of the landing gear legs to provide a place to hang your wheels. But, if you can get the same leg lengths on both retracts, you're a bloody genius! And, if you goof the bend, you've wrecked a set of retracts! So - - get a pair of 3/32" wheel collars. Remove the set-screws and install in their place a couple of 4-40 machine bolts (the set-screw holes are tapped 4-40). Voila! You've just built a set of completely adjustable axles! They can be moved up and down the landing gear leg for proper length and they can be fixed at any angle around the leg, to achieve proper wheel "toe-in". They function like set-screws, too, to hold everything like you want it.

Use 1½" diameter Williams Bros. wheels (for good spar and leading edge clearance). Bush each wheel with a bit of the brass tubing (telescope some 3/32" O.D. into some 1/8" tubing and drill it out to clear the 4-40 bolts). Put a washer on the axle bolt, slip on the wheel and then add a 4-40 nut to the assembly. Cut the bolt two threads outside of the nut - - and the axle will be of the proper length. Remove the nut and thread the axles into their wheel collars.

'Tis time for the actuation system. Scrounge a **circular** servo wheel. We used one intended for a Kraft KPS-9 - - 7/8" in diameter. Bush its center hole with a bit of the tubing you made up for the landing wheels, and mount it to the plywood pattern through the hole you drilled earlier - - with a 4-40 bolt. This is a temporary installation so the bolt need only be a friction fit. Up until now, we've been working from the **bottom** of the plywood pattern (with all of the lines drawn on it). The servo wheel should be mounted **on top** of the pattern, flat side down. Make two retract actuation arms. We used Du-Bro "Mini-Links" on 8" threaded rods. Snap the links to the retracts and lay the rods across the servo wheel. With a line of holes in the servo wheel oriented fore and aft, lay the actuating rods with the right rod forward and the left one aft of the center of the wheel. With the gear "retracted", mark the length of each actuating rod over the outermost hole on its side of the wheel. Bend each actuating rod "down" at the marked points, 90°, and cut off the excess wire. The precise length of each actuating rod will be obtained later by adjustment of the links. Loosen the servo wheel a bit and install the rods to their respective holes. Extend the gear manually and, with your fingers, put a 5° to 10° bend in each rod, just inboard of the threads. This is to align the rods with the mechanisms and put a bit of "gear down" pressure into the system.

Undo the actuating rods and remove the servo wheel from the plywood pattern. With the wheel in the same position as it will be installed in the model (lines of holes fore and aft), measure around the wheel 45° **clockwise** from the front and drill a hole (slightly smaller than 1/16" dia.). The hole should be drilled in from the edge of the wheel about the same distance as the holes you connected the actuation rods to, earlier. Install a rivet (or screw) Du-Bro Ball Link through the hole, down, on the flat side of the servo wheel. Secure it in place with a drop of Hot Stuff type glue.

Make up a servo wheel to servo pushrod by threading the nylon ball connector onto a 4" threaded wire. Cut a piece of 3/32" or 1/8" plywood 3/8" wide and about 4" long - - for the servo wheel mount. We're now ready to install our prefabricated retraction system into the model.

Locate the proper rib bays in the completed wing and trim away all of the 1/16" balsa sheeting on the bottom of the wing from the spar forward to the leading edge and between the two ribs. Fred Reese, the designer of the HOB kits, uses a 1/16" x 1/4" "false leading edge" in his wings. Trim it away for about half its depth in the opened rib bay - - it'll provide a ledge to glue the retract mount to. Carefully saw the ends from the plywood pattern you've been using (with retract mechanisms removed) so that the pieces with the holes will fit exactly into the opened rib bays. Maintain the edges of the trimmed plywood mounts parallel to the pattern - - which will insure proper landing gear alignment. Properly done, you'll have two pieces of plywood that will fit between two ribs, rest on the "false" leading edge and butt up against the true leading edge and the forward face of the lower main spar. The plywood should be a good, but not forced, friction fit.

Pull the retract actuating rods, slip the retract mechanisms into the plywood mounts and bolt the wing to the fuselage. With the gear in the "down" position and the wheels bolted in place, check the "set" of the model. Make sure you have the tailwheel in place for this check. Move the adjustable axles up or down the landing gear legs to get things right. If need be, file a bit off the plywood mounts to achieve the proper fore and aft "rake" of the gear. When the gear's position pleases you, epoxy each of the plywood mounts in place. It's a good idea to do this with the mechanisms in place to help align things. Use 5-minute epoxy and let the first mount set before gluing the second in place. When both mounts are firm, drill starting holes and install the four tiny screws through the retract flanges. Since you've established the exact landing gear leg length, cut off the excess 3/32" wire below the wheel collar axle.

Separate wing and fuselage and partially retract the gear, manually. Trim a slot for the landing gear leg in the lower forward sheeting. When you can bring the wheels almost down to the sheeting, trace around them with a felt tipped pen and open up the wheel wells. Trim the wheel wells about 1/32" larger than the wheel circumference to allow for wheel wall liners that will be installed later. You'll "lose" most of the wing ribs forward of the spar and you should remove all of the doubled center ribs between spar and leading edge. The center section of the wing will be reinforced from

spar to leading edge by the plywood servo wheel mount. Re-install the actuating rods.

Remove a strip of the upper forward leading edge sheeting, about 1" wide, on the center line of the wing. Cut your 3/8" strip of plywood in half and epoxy one part of it to the rear of the leading edge. It should stick straight up. When the epoxy has set, trim the other bit of the plywood strip to fit between the upper main spar and the vertical strip of plywood. Carefully relocate the point halfway between the spar and the leading edge on the second plywood bit and drill it for a 4-40 blind nut. The blind nut will be on the **top** surface of the plywood. Mount the servo wheel to the bottom of this piece of plywood with a 4-40 bolt, with the cylindrical projection of the wheel "up". Add a locking 4-40 nut on top of the blind nut and fix everything in place with a drop of Hot Stuff.

The end of the bolt may be trimmed flush with the nut after you check the servo wheel for free, but not sloppy, rotation. Epoxy this servo wheel mount in place, between the main upper spar and the vertical plywood piece, its top surfaces perpendicular to the vertical brace on the wing's center line. Trim the top of the vertical plywood brace flush with the top of the mount. Pop the servo wheel to servo pushrod in place after drilling a 1/4" hole through the dihedral brace/jig on the right side of the center ribs.

Hook the retract rods to the servo wheel and cycle the gear manually a couple of times to insure even movement of the legs. If things are out of whack, lengthen or shorten the actuating rods until each leg moves equally. As you adjust the rods, turn them at least one full turn - - so that the 90° bends are always **down**. When the rods are set, add nylon wire retainers to the 90° ends.

Servo mounting time! Trim a rectangular hole through the upper center section sheeting to the right of the center ribs (the aileron servo is on the left!) for the retract servo. It'll be mounted upside-down. Place the servo in position and locate the point directly below the servo arm, on the lower center section sheeting. Open up a 1/2" diameter hole through the sheeting at this location. Select a servo arm that is the same diameter as the "servo wheel" (full length of the Ace adjustable arm) and screw it in place on the servo. Install a Du-Bro servo connector to this arm, with its set screw loosened. Slip the ball link rod from the servo wheel through the connector and lower the servo into place in the wing. Reach through the 1/2" hole in the bottom sheeting with a small screwdriver and tighten the servo connector set screw. Fix the servo in place with either servo tape to the center ribs or epoxy servo mounts to the structure and bolt/screw the servo to them.

Hook the retract servo to your receiver and battery pack and cycle the gear a couple of times. You may have to re-adjust the ball link rod to get things to work properly. And, of course, the servo may rotate in the "wrong" direction. Note that clockwise rotation of the servo wheel extends the gear. You may have to switch servos. Since we use a four channel transmitter for three channel Half-A models, we usually connect the retract servo to the throttle output of the receiver. It gives a realistic, slow retraction cycle!

If the P-39 or "Bonanza" is your model, the tricycle gear is a bit more difficult to install. The main gear is mounted in the same fashion as we've indicated above - - except that the plywood pattern is made to accommodate the wing's area behind the main spars, forward of the rear 1/8" square spar and between the outermost ribs that mark the installation locations. The servo wheel is mounted in line with the main gear retracts, upright, on a 1" square bit of plywood, epoxied to a recess cut into the center ribs and the upper center section sheeting. The retract mounts can be sized to lay atop the lower main spar. And, since there's a straight line from servo wheel to the main gear mechanisms, there's no need to put in the "hold-down" bends in the actuating rods. The nose gear actuation is another kettle of fish!

Things are complicated by a couple of factors. First, the nose gear isn't in the same plane (in the geometeric sense) as the mains - - it's about 1/2" above them. Second, the linkage between the servo wheel and the nose gear mechanism has to be detachable - - in order to remove the wing. When you consider that the nose gear leg and the nose wheel end up on the center line of the model, along with the retract actuating rod, there's some plain and fancy wire bending to be accomplished. It can be done, however, but we suggest a ball link on the servo wheel end of the nose gear actuating rod to take out any misalignments. If you envision hooking up the nose gear steering to the aileron servo - - lots of luck! We haven't had the guts to try it.

We suggest that the nose gear actuating rod be attached to the servo wheel with a 1/2" vertical stand-off made from brass tubing. It's mounted directly opposite the ball link servo connection (225° clockwise from the front of the servo wheel). The stand-off may be soldered to a 2-56 bolt through the servo wheel. Make sure that the left main gear pushrod clears. This may be facilitated by filing the head of the 2-56 bolt after it is installed and inverting the 90° bend in the left actuating rod. Make sure to use a "keeper" on the left rod.

Earlier, we suggested that you chamfer the rear of the firewall and drill it for the nose gear actuator. The approximate dimensions for the chamfer are shown on our drawings. Slip the nose gear mechanism in place with the actuating arm connected, and install the four screws that hold it to the firewall. You'll have to slot the fuselage former directly ahead of the wing in order to allow the rod to pass through. The slot is for vertical movement of the nose gear rod and allows it to drop a tad when you install the wing. It's a good investment to acquire the ball link tool - - to "pop" the ball on the wing end of the rod when installing or removing the wing.

The nose gear retract has to be mounted sufficiently high in the fuselage so that the wheel doesn't project into the airstream. This may give you fuel tank mounting problems. To achieve the necessary clearances, you may have to inlet the tank you're using into the upper forward fuselage block on HOB kits. Then, too, with the nose gear in place, you'll have to inlet a pair of hold-downs for the "tank hatch". A couple of pieces of 1/8" plywood, cut to a triangular shape may be epoxied to the front of the firewall and the fuselage side doublers and tapped for two hold-down bolts, one on each side.

Only three finishing touches to complete our retract installation. First, replace the 1/16" sheeting we've removed. For tail draggers, the sheeting can be applied directly to the retract ply mounts and sanded to conform to the airfoil shape. Run the sheeting up to, and flush with, the retract's flanges. Re-sheeting the main gear areas on the tricycle installation is a bit simpler. If you've epoxied the main gear plywood mounts above the lower center section sheeting, you can replace it and cut a slot to clear the landing gear leg. The retract itself will be hidden. Second, cut a strip of card stock about 1/2" wide and 10" long and Hot Stuff it into the wheel well as a liner. Cut a couple of slots for the leg and the actuating rod and sand the projecting strip to conform with the airfoil. Finally, add landing gear leg covers of card, aluminum, plywood, or tin can material. Sand cover stand-offs carefully and epoxy or solder the covers in place.

Although we haven't tried it yet, installing AJ (Adjusto-Jig) retracts seems relatively easy. The same holds true for the super-light Flight Dynamics retracts. Both systems may be mounted on plywood epoxied to fill the appropriate rib bays, aft of the main spar. Both systems require that the landing gear leg pass between the main spars. Their actuating rods are straight from mechanism to servo so the only critical sizing problem is the proper location of the servo. It would be a good idea to pre-size things on a plywood pattern outside the model before final installation. The AJ retracts feature 1/8" music wire legs and, thus, require 1/8" wheel collars in the preparation of adjustable axles.

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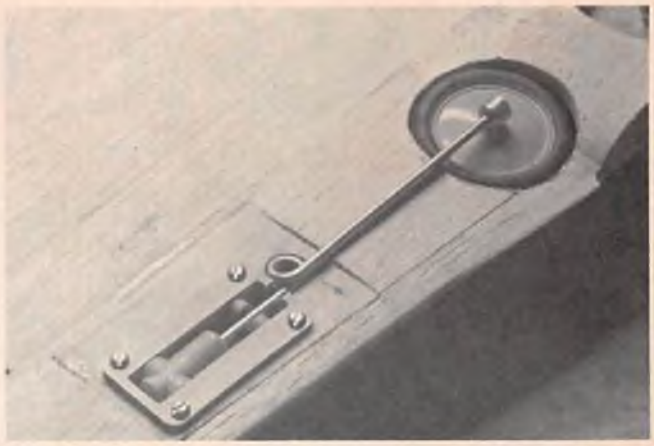
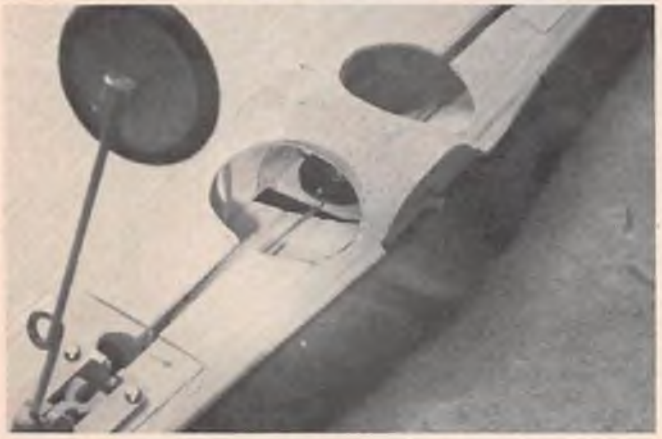
Another view of the servo wheel mount. Position of the actuating rods indicate that the gear is extended.



Left-hand gear leg bolted to its plywood mount. Ply is epoxied to two wing ribs, rests on the "false" leading edge and butts up against the real leading edge and lower main spar. Model in the photo is a HOB FW 190.



FW 190 gear extended. The 90° bends on the end of the actuating rods haven't been secured yet with nylon wire retainers.

Wheels tucked away in their wells. The wheel holes are about 1/32" larger than the wheels to permit lining them later with card stock. Hole to the right of the wing centerline is to allow access to the Du-Bro servo connector set screw – which allows adjustment of the "servo wheel to servo" pushrod.

Retract servo goes in the hole to the right of the doubled center ribs – the aileron servo goes on the left. The position of the actuating rods shows that the gear is retracted.

One of Ace's tiny ones together with a set of AJ's retracts. Like a tri-gear installation, AJ and Flight Dynamics retracts can be bolted to a piece of plywood that fits behind the main spars. AJ retracts, designed for models up to .19 displacement, are rugged – with 1/8" m.w. legs.

CLASSIC CAVALIER

Photos and Text By Mike Russell

In these days of micro circuits, foam wings, and high impact plastics, it is refreshing to see a model plane built in the time honored methods of ribbed wings and planked balsa fuselages, especially if it is 40 years old and still flying.

Mel Mattson, 57, of Antioch, California, has such a model, a Berkeley Cavalier, a free flight with a nine foot wing span that was built from a kit costing $16.50 in 1933.

Mattson sent to New York for the kit and by February 21, 1933 the model was ready for its first test flight.

The original power for the plane was a 1/5 horsepower Brown Jr., swinging a 14" propeller. The Cavalier was covered entirely with silk and painted a patriotic red, white and blue. It has only been recovered once since its original construction, and that was 20 years ago.

Mattson kept extensive logs of his early flights, and his records show that the plane logged several uneventful free flights, with a high of 27 in one afternoon. However, in February of 1939, disaster struck when he was flying the plane near the San Francisco Bay, "I forgot to set the ignition timer allowing the plane to power about on its own far longer than was ever intended," he said. As luck would have it, the prevailing winds carried the model out over the Bay and eventually deposited it there. Fortunately the model stayed afloat, thanks to the water tight construction, and it finally drifted to shore where it was recovered. Mattson dried it out, made the necessary repairs and had it back in the air again shortly after the incident.

In 1954, the age of electronics came to the Cavalier. Mattson installed an F.M. Electronics eight channel reed radio in the plane, using six of them to drive the rudder, elevator and motor control. A Veco .45 was also installed to replace the worn and cantankerous Brown. The two extra radio channels were pressed into service to trigger and on-board camera, an Argus C-3, to take aerial photographs.

Mattson made local history when he took part in the dedication ceremonies, of a nearby freeway, by flying the aging Cavalier over the event, snapping pictures for use in the local newspaper.

Today, the model's enormous fuselage, houses a Kraft four channel proportional rig, with the fourth channel being used to operate a bombay that has replaced the Argus.

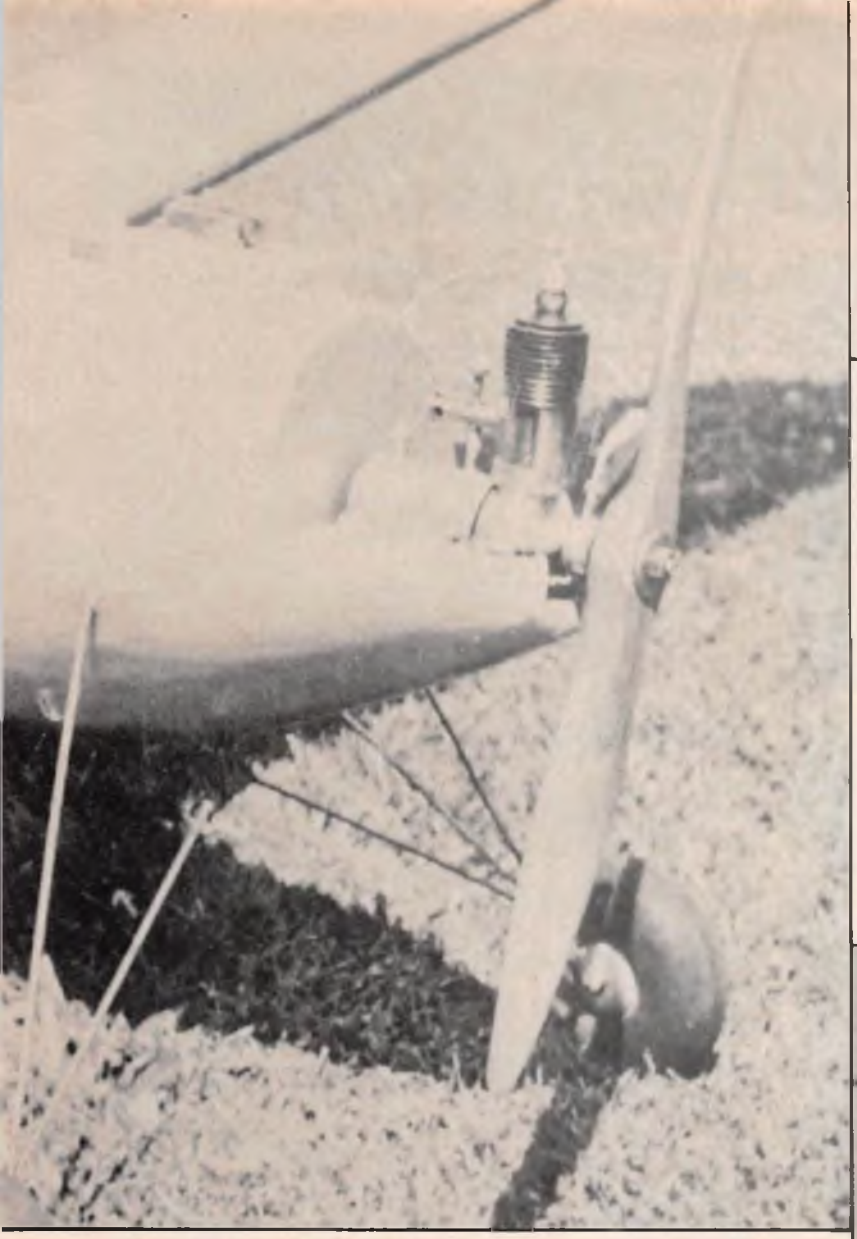
Mattson flys the model at least once a month and always on the anniversary of the models first flight, "to keep the dust off" he says.

On a cool February morning in 1977, Mattson took the nine foot wings from the back of his van and carefully placed them on top of the fuselage and using rubber bands, he attached them there securely.

Mattson at the age of 14 with the just completed wing of the Cavalier.

Mel Mattson, today with the Cavalier. His smallest model is an old Ektronics Pinto (kit) and is powered by a .010 engine. Single channel pulse radio.

40 YEARS . . . AND STILL FLYING!



An early photo of the Brown Jr.

Tucked inside the bombay was a small bottle of champagne waiting to make its splash on the Tarmac of the flying field at the old Camp Stoneman Army base in Pittsburg, California.

The radio and controls were checked and then rechecked with the engine running. Mattson carefully taxied the plane out to the take-off area, pointed the nose into the wind and applied power. With the Veco screaming, the Cavalier rumbled along and gently lifted into the air, as all the physical forces that make flight possible came together. When the plane reached altitude, Mattson tripped the bombay doors, and out came the tumbling bottle of champagne to commemorate 40 years of flying models and fond memories. □

RCM PRODUCT TEST

Prather Products
LITTLE TONI

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			NA								

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

The Quarter Midget Little Toni is the latest Terry Prather design, and is manufactured by Prather Products, 1660 Ravenna Avenue, Wilmington, California.

R/C modelers who are familiar with the Prather .40 engine size Little Toni kit will find this new kit offering to be basically a .15 engine size, scaled-down version of that most successful Formula One design.

While the Quarter Midget version of the Prather Little Toni is naturally smaller than its .40 size big brother, it possesses the same high quality, that degree of excellence that has become synonymous with the Prather name. Little things like the careful protective packaging with bubble vinyl, and the neatly sealed parts packages, each with its individual inventory check list, serve to illustrate that this is an outstanding kit. One which is not only well engineered but is also produced with an element of pride.

Since this is a product test, we will not go through a step-by-step construction review, but will briefly touch on certain assembly aspects only.

Our Quarter Midget Little Toni was powered by a Rossi .15 engine and the radio system used was Westport International's Variant.

The Little Toni goes together quite rapidly and is not difficult to build. The plan sheet is printed half size since it is not used physically during construction, but serves primarily as a parts number and orientation guide. The assembly instruction sheets are in step-by-step sequence and are very complete.

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SPECIFICATIONS

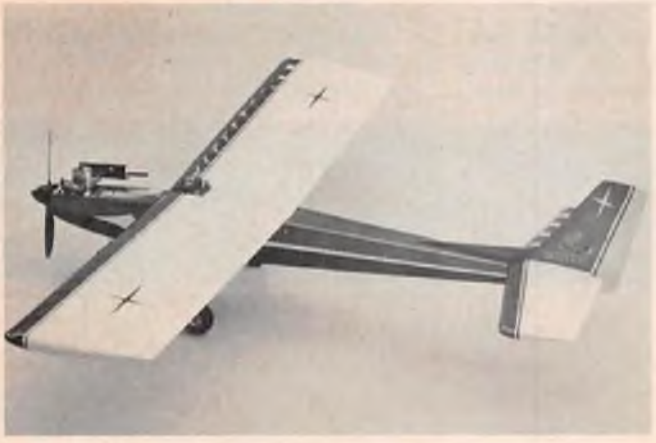
Name ..... Little Toni
Aircraft Type ..... Quarter Midget Pylon Racer
Manufactured By ..... Prather Products
1660 Ravenna Avenue
Wilmington, California 90744
Mfg. Suggested Retail Price $69.95
Available From ..... Both Mfg. and Retail Outlets
Mfg. Recommended Usage ..... Competition
Wing Span ..... 41½"
Wing Chord ..... 7½" (Avg.)
Total Wing Area ..... 315 Square Inches
Fuselage Length ..... 34 O.A. Inches
Radio Compartment Dimensions (L) 9½" x (W) 2¾" x (H) 2¾" (Avg.)
Wing Location ..... Low Wing
Airfoil ..... Semi-symmetrical
Wing Planform ..... Tapered Trailing Edge
Dihedral ..... 1⅜ Inches
Stabilizer Span ..... 13 Inches
Stabilizer Chord (incl. elev.) ..... 3¾" (Avg.)
Total Stab Area ..... 48¾ Sq. Inches
Stab Airfoil Section ..... Symmetrical
Stabilizer Location ..... Near Top Of Fuselage
Vertical Fin Height ..... 4¾ Inches
Vertical Fin Width (Incl. rud.) ..... 6" (Max.)
Mfg. Rec. Engine Range ..... .15 cu. in.
Recommended Fuel Tank Size ..... 4 Ounces
Landing Gear ..... Conventional
Recommended No. Of Channels 4
Recommended Control Functions ..... Rud., Elev., Throt., & Ail.
Basic Materials Used In Construction:
Fuselage ..... Epoxy, Glass, & Ply
Wing ..... Foam & Balsa
Tail Surfaces ..... Balsa
Hardware Included In Kit ..... Very Complete
Plan Size ..... 13½" x 19" (1 sheet)
Building Instructions on Plan Sheets ..... No
Instruction Manual ..... Yes (9 pages)
Construction Photos ..... No
Kit Includes ..... Shaped Parts
Mfg. Rec. Flying Weight ..... 40 Ozs.
Wing loading based on rec. flying wt. ..... 18.2 oz./sq. ft.

RCM PROTOTYPE

Weight, Ready To Fly ..... 40 Ounces
Wing Loading ..... 18.2 oz./sq. ft.
Covering & finishing materials used ..... K & B Super Poxy
Engine Make & Disp. ..... Rossi .15
Muffler Used ..... No
Radio Used ..... Westport International Variant
Tank Size Used ..... 4 Ounces

RCM PRODUCT TEST

Carl Goldberg's FALCON 56 Mk. II



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	Falcon 56 Mark II
Aircraft Type	Sport/Trainer
Manufactured By	Carl Goldberg Models, Inc. 4734 West Chicago Ave. Chicago, Illinois 60651
Mfg. Suggested Retail Price	$34.95
Available From	Both Mfg. & Retail
Mfg. Recommended Usage	Basic Powered Trainer
Wing Span	56 Inches
Wing Chord	10 Inches
Total Wing Area	560 Square Inches
Fuselage Length	40½ Inches
Radio Compartment Dimensions	(L) 10" x (W) 2½" x (H) 3½"
Wing Location	Shoulder Wing
Airfoil	Semi-symmetrical
Wing Planform	Constant Chord
Dihedral	2-7/16" for 4 chan.
Stabilizer Span	22 Inches
Stabilizer Chord (incl. elev.)	7" (Avg.)
Total Stab Area	132 Square Inches
Stab Airfoil Section	Symmetrical
Stabilizer Location	Top of Fuselage
Vertical Fin Height	8½ Inches
Vertical Fin Width (incl. rud.)	6 Inches
Mfg. Rec. Engine Range	.19-.40
Mfg. Rec. Fuel Tank Size	6 Ounce
Landing Gear	Tricycle
Recommended No. Of Channels	4
Recommended Control Functions	Rud., Elev., Throt. & Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa & Ply
Wing	Balsa w/Ply Dihedral Joiners
Tail Surfaces	Balsa
Hardware Included In Kit	See text
Plan Size	35" x 45" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (6 pages)
Construction Photos	Yes
Kit Includes	Die-Cut & Shaped Parts
Mfg. Rec. Flying Weight	60-76 Ounces
Wing loading based on rec. flying wt.	16-18 oz./sq. ft.

RCM PROTOTYPE

Weight, Ready To Fly	68 Ounces
Wing Loading	17 oz./sq. ft.
Covering & finishing materials used	See Text
Engine Make & Disp.	K & B .35RC front rotor
Muffler Used	Semco
Radio Used	1977 Kraft Sport
Tank Size Used	6 Ounces

The Falcon 56 Mark II is a sport trainer manufactured by Carl Goldberg Models, Inc., of Chicago, Illinois. The Falcon 56 has been in continuous production longer than any other R/C kit and the manufacturer can undisputedly claim that more people have successfully learned to fly R/C on the Falcon 56 than any other trainer ever produced.

The external appearance of the Mark II version differs from the original, mainly in the sweep back of the vertical stabilizer and rudder. The significant design changes are in the internal structure. The fuselage has been widened and lengthened to accommodate larger engines (up to .40) and larger tanks. The construction has been strengthened and simplified by using larger and fewer detail parts. The Mark II has a sturdy 5/32" diameter landing gear with a steerable nose wheel. The wing has been beefed up to handle increase flight loads that may be induced with the use of larger engines.

Our attempt to follow the plans and instructions as closely as possible was an effort to find fault with the kit. Our only deviation was to use several Kraft modeler's clamps to assemble the fuselage sides, top and bottom, instead of the bricks as shown on the drawings. That was only because we had the clamps but did not have a bunch of bricks laying around our shop.

The drawings, instructions, and photographs clearly show every detail and assembly sequence to the extent that they are understandable to even the most inexperienced modeler. The Mark II incorporates many improvements that have been suggested by modelers over several years. The grade of balsa is selected to its application and the die cutting is very good.

Having built a couple of the Falcon 56's a few years ago, we

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VIPER

By Jack Headley

The monoplane fighter was born several times, but the Establishment didn't seem to want it to live. "Too weak," they said; "Wings will break off," they said; "Biplanes for us," they said. And true, some wings did break off. "We told you so," they said.

The biplane reigned supreme, but the monoplane was to come, and designers learned about structures, and new materials were developed and tested. After all, it was the natural thing, who ever saw a biplane bird?

It took a while, but at last, it was there, looking a little gawky with its widespread undercarriage legs, reminiscent of a newborn colt, a little unsteady on its feet. And, just to make sure, the wing had a few struts to make certain it wouldn't break off - - - but it only had one wing.

The monoplane era was about to begin, but the biplane wasn't finished yet. Still to come were the last words in the biplane's long history, begun in the fires of old wars; still to come were the Hawker Furies, and the Gloster Gladiators. But the writing was on the wall. The elements of the fighters of the future were almost all present and, from these cautious beginnings came the Spitfires, M.E. 109's, and Hurricanes, lean and deadly.

But this is still in the future as far as our model is concerned. We distilled features from many early monoplanes for our model, all the forerunners of the World War II fighter to come; fighters long forgotten, such as the Dewoitine 510, the Moraine MS 325, the de Havilland 77, and the Vickers Jockey. Remember those? (You do??)

We borrowed the strong and sturdy undercarriage, designed for the rough grass airfields of yesteryear, and the open cockpit, so that the pilot could feel the wind in his cheeks, and sight his machine guns through a primitive gunsight and the tail skid, which was usually all the braking provided.

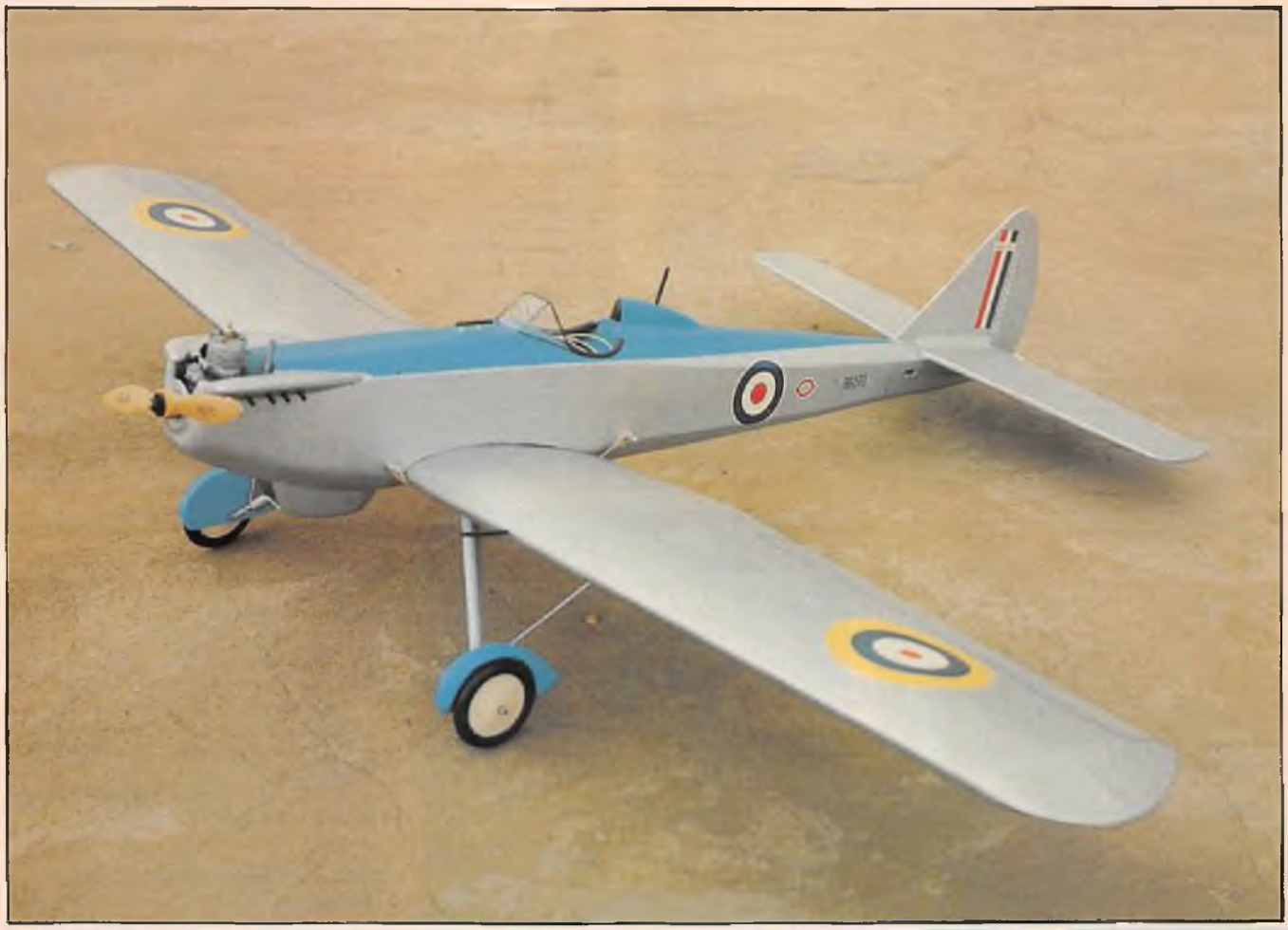
And so we ended up with the "Viper" - - - a semi-semi scale model of an airplane that didn't really exist. So, if you're looking for a little nostalgia, try this. The construction notes follow.

CONSTRUCTION

Fuselage: The fuselage is built with the use of the "inside out" technique, and begins with cutting out the two fuselage sides from 3/32" sheet. Mark on each of these sheets the position of all the frames and cross members, not forgetting to make one side left and the other side right. Cement the 3/16" square longerons at the top and bottom edges of these sheets, then install all the cross pieces. The 3/16" sheet doublers in the nose and wing area are attached next, then the sides are left to dry for a while.

But don't stop work — this is the ideal time to cut out the fuselage bulkheads and the 3/16" plywood firewall, to which the engine mount can be attached. When the sides have dried completely and all the frames are available, assemble the basic fuselage. Cement the sides together at the aft end, then install the remaining 3/16" square cross pieces, except those in the tank region - - - these are glued in place after the tank has been installed. Locate the tank securely with scrap pieces of balsa and make sure that all the fuel lines run smoothly and are well sealed.

The minor formers can now be added (all cut from 3/32" sheet), followed by the top and bottom fuselage sheeting. When



The Viper - - - A semi-scale model of an airplane that never existed for dedicated sport fliers who don't like scale. For .10 to .15 engines and three channels.

dry, the cockpit shape can be cut out and, if the wing is available, the wing cut-out can be trimmed to its final contours. Sand the fuselage all over, removing the corners from the fuselage sheeting, and then contour the nose former. Make the dummy cylinder blocks from soft balsa and also the headrest; sand to shape and glue into place. The dummy exhaust pipes and the radio mast are attached after the fuselage is completed and covered. The radiator, an essential item on all aircraft of this vintage, is made from two side plates of 1/8" sheet, and a 1/4" sheet bottom. A small piece of window screen wedged inside the radiator adds a further touch of realism.

Wings: Begin by cutting out all the wing ribs from hard 1/16" sheet. The main spars are next; these should also be cut from pretty hard strips. Add the doublers at the center section, then pin the bottom set down onto the plans (which naturally you've already covered with plastic sheet).

Glue all the wing ribs, except W1, into place making sure that the ribs are aligned correctly. A strip of 1/4" square balsa pinned to the plans near the trailing edge makes a satisfactory prop for the back of the ribs at this stage.

Cement the top main spars into place, followed by the 1/8" x 5/8" leading edge strip and the upper 1/16" sheet trailing edge piece. Add the lower trailing edge sheeting when all the above has dried.

The two wing halves can be put aside for a while now since the wing joiner/undercarriage mount is to be made next. Cut the wing joiner from 1/8" plywood, then bend up the main undercarriage wire. Using J-bolts, attach this wire to the plywood, remove and glue the wings together with the aid of this plywood piece. Don't be mean with the glue at this stage; this joint is pretty important. Rebolt the wire undercarriage legs back into place and epoxy the J-bolt nuts into place.

The remaining W1 ribs can now be installed, followed by the leading edge sheeting (on the upper side only) and all the center section sheets. Now make the outer gear struts from 1/16" wire; bolt them to their 1/8" ply plates and solder the bottom ends of the struts together. The lower leading edge sheeting can now be cemented into place; the true leading edge and the wing tips following.

This completes the wing construction. A few moments with the sanding block will prepare the wings for covering.

The wheel spats can be made and installed next, if required, together with the balsa fairings around the main U/C legs.

Stabilizer: Trace out the outline of the stabilizer onto a sheet of good quality 1/16" sheet, then mark on this the locations of all the internal cross members. Cut the sheet to the traced outline, and then make an additional piece for the upper surface. Glue the leading and trailing edge strips (1/4" x 1/8"), and the 1/8" square cross braces onto the marked sheet. After this has dried, attach the upper sheeting. Make the stab tips from 1/4" sheet and glue into place. When this assembly is completely dry, sand the leading and trailing edges to a semi-circular section and round off the tips.

The elevator is made from 3/16" sheet and the two halves are joined by a strip of 3/16" dowel. Be sure to make this joint quite strong. Sand the elevator round at the leading edge and taper it off to al-

VIPER
Designed By: Jack Headley

TYPE AIRCRAFT
Semi-Scale Sport
WINGSPAN
48 Inches
WING CHORD
7" (Avg.)
TOTAL WING AREA
336 Square Inches
WING LOCATION
Low Wing
AIRFOIL
Symmetrical
WING PLANFORM
Double Tapered T.E.
DIHEDRAL, EACH TIP
2¼ Inches
O.A. FUSELAGE LENGTH
31½ Inches
RADIO COMPARTMENT AREA
(L) 7" X (W) 2½" X (H) 2½"
STABILIZER SPAN
20 Inches
STABILIZER CHORD (incl. elev.)
4½" (Avg.)
STABILIZER AREA
90 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
6½ Inches
VERTICAL FIN WIDTH (incl. rudder)
5" (Avg.)
REC. ENGINE SIZE
.10 to .15 Cu. In.
FUEL TANK SIZE
2 Ounce
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
3
CONTROL FUNCTIONS
Rud., Elev., & Throt.
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa & Ply
Empennage	N/A
Wt. Ready-To-Fly	40 Oz.
Wing Loading	17 Oz/Sq. Ft.

most a point at the trailing edge. The plans illustrate a typical section through both the stab and the elevator.

Fix these items together with your favorite brand of hinges, then cement to the fuselage.

Fin and Rudder: These items are easily made from soft 3/16" sheet and only require sanding to the correct profile, after which they can be hinged together. If you're interested in saving a little tail weight, the fin can be built-up in a manner similar to the stabilizer, using 1/16" sheeting and 1/8" strips. Test the fin so that it doesn't interfere with the elevator action before finally cementing it into place. The triangular gussets, added next, strengthen the whole assembly.

Radio Installation: A three channel radio was installed in the original to control engine, elevator, and rudder. There's plenty of room in the cavity above the wing to locate all the necessary equipment, and it's a good plan to make a trial installation of all the radio gear before the fuselage top sheeting is in place. In this way, all the control runs can be checked out before it's too late. The servos should be mounted upside down for ease of adjusting the control throws and trims. Make certain everything is operating freely and in the correct sense (remember this particularly when the fuselage is inverted).

The 1/16" plywood cockpit floor makes an ideal location for the On/Off switch and, as a further touch of authenticity, run the antenna wire up the "radio mast", then aft to the top of the fin.

Covering: I wanted, on the prototype, to produce a dull silver finish typical of the mid-1930's color schemes, so the model was covered first in medium weight silkspan and the silver was sprayed on. Decals were then added as you see in the illustrations. The only problem with a tissue finish is, of course, that it's not very durable (if you're flying site is brush covered as mine is).

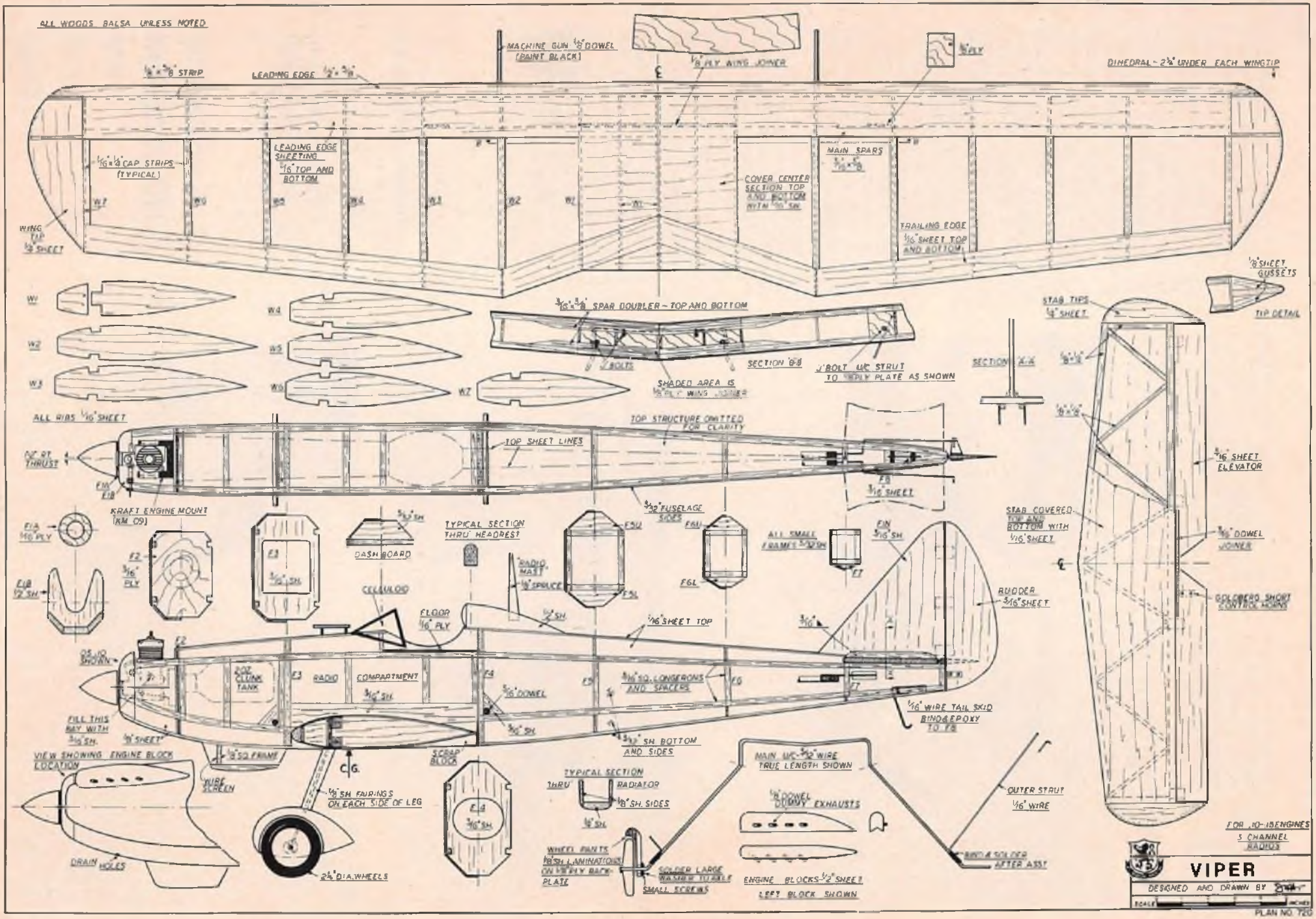
So, I would suggest that a plastic film finish on the wings would be a little more practical. The fuselage and tail unit can still be initially covered with tissue and then doped, if required.

Many other pre-WW II color schemes can be used, and a few moments spent looking through "Profile" publications should produce a few different ideas.

FLYING

A few checks should be made before presenting yourself on the runway, such as, are the controls really hooked up correctly? Stand behind the model and, with the engine running, switch everything on. Make a simulated right turn, followed by a dive, then throttle back the engine and speed it up quickly to check the engine response. Fix everything now that needs work; re-check the wing rubber bands and it's time for the first flight. This should only be a shakedown flight. Test out the sensitivity of the controls and the trims; then bring it back and make the required adjustments. After that's done, it's all up to you from here on - - - so, good luck and happy flying. □

FULL SIZE PLANS AVAILABLE — SEE PAGE 187



WHY NOT AN INNOVATOR'S EVENT?

A suggestion for putting fun back in model contests

By Robert Lopshire

Top photo shows Lou Proctor with his original Antic that he flew in the 1963 Nats with a Morton M5 engine. Next photo shows Lou's Antic Bipe and third photo shows his current version of the Antic.

A vast number of us got into modeling as a direct result of the "Golden Days" of aviation. We hung around small flying fields and got giddy on the smell of dope and gasoline, and the sight of all sorts of wondrous flying machines, each with a distinct personality. There was all that taut fabric to "thung" with a finger, and every week it seemed that someone broke a record of some sort or won a race with his own creation.

Kids today, if they bother to go to an airport at all, are faced with rows of what someone in EAA dubbed, "Spam cans with training wheels." Linen and dope has been replaced by aluminum and Emeron. The only new ships with any personality are a few dusters, and they don't hang out at the airport as a rule . . . and the last record I heard of being broken was that of a yo-yo in a private plane interrupting the most commercial landings at a large eastern airport.

I got into sports car racing in the early 50's because they offered some of the charm of the old planes . . . a collection of foreign exotics in lacquer finishes, and aside from the Jags and MG's, hardly ever two alike in a race. Then the competition began to interest the people who saw a way to make a buck on the whole thing and the fun was gone. Rules piled on rules and we all dropped out. I was on an archery team and a rifle team, and again the manufacturers moved in and destroyed fun sports performed with simple devices. A competition rifle today is hard to recognize as a gun, and a bow now looks like an exercise device.

During the years I spent doing PR work for AMA, I kept running into people I'd seen at the flying fields in the early days of R/C, and to a man, they had one thing to say when I asked if they were still competing — "No, contests are too serious today." The concensus of opinion seemed to be that progress in radios was great, but some of the charm had slipped away. Pattern planes tended to look and perform alike, and scale had gotten to the point where one needed to be a machinist with a lot of experience in

The Bolero, also built and flown by Lou Proctor in 1963, could be used as a trike gear or tail dragger. It flew very well on reeds, had brakes, muffler and smoke.

a body and paint shop.

Sport Scale has done its share to revitalize the contests, but those manufacturers are on the scene again, upsetting this applecart, too, by wading in with some pre-fabs that are hard for the scratch builder to top. As Charlie Brown might say, "Good grief, will it never end?"

So, gentlemen, a proposal — a throwing down of the gauntlet from one who gets increasingly weary of the sameness America has developed in its never ending quest of the wampum, from sea to polluted sea.

Why not an "Innovator's Class" for contests, including the Nats? Most true modelers are, after all, innovators of one sort or another. Rather than see the species die out all together, I'd propose that an event be created that would have them coming out of the woodwork to breed and multiply. Yeah, and even chuckle as the manufacturers got wind of their innovations and moved in to try and take over the event . . . and go away, having paid solid Carter diplomas for the rights to the ideas discovered at one of the contests.

But, even without the attendance of the "Make It Look Alike" manufacturers, the advances for the rest of the modelers could be manifold because new ideas would be coming out in a steady and interesting flow. New products would, of course, be developed from all this, but in all the grimness of the contest circuits, the Innovator's Class could well become the "laughing place" for all — that one point in modeldom where life was what it used to be — fun.

This line of thought developed with me over a period of months after a luncheon with one of the dropouts of modeling, Carl Cantera. We wept into our martinis about what modeling used to be and how it had gotten to be nothing but routine Dullsville, then we got into a fantasy about maybe going back over the years and doing something just for us . . . nuts to the contests. We went through all the gibberish about the planes we'd built as kids and which one flew best, etc., and wound up at the point where we both thought the true R/C fun ship should be one that was big . . . and flew at **scale** speed.

Another factor entered that influenced my later thinking about the Innovator's Class — I obtained a pilot's license at a very young age, and I loved flying. My instructor called me a natural, and I was — at low levels. Brainwashed by "Flying Aces" and other magazines, I had the mentality of a barnstormer. Fly low and see your speed, cut the switch and listen to the sounds drift up. Flying at the so-called decent altitudes bored me stiff . . . nothing moved under you. When I got out of service, I tried a couple of flights and decided it had become truly for the birds. New regulations and rules forbid my kind of flight . . . another sport down the drain. (America! The land of the free and the brave? Change that to the land of the freeloader . . . and you gotta be brave to live here.)

My reaction to standing out in the mid-day sun, getting my eyeballs sunburned while guiding a plane around by remote control reached the same point as my time in full scale aircraft . . . not much fun. It was only the thrill of designing and building that grabbed me. To see a creation go up and be right the first time was more fun than sending it up time and time again. Once it flew, I lost all interest in it.

So, I imagined, it must be with many others, and probably why the many I'd talked with had drifted away from the the hobby. The excitement of discovery had seemingly passed us all by. But, as the months slid by and I got myself involved in the design of a big, scale-speed ship, my thoughts began to center more and more on the Innovator's Class and how such could serve the interests of all, from nuts like me, who only like to design and build, to nuts who only like to fly, fly, fly.

AMA's "Model Aviation" carried an article on the idea of building BIG. There is no real spot for the ships shown in that article, but they **would** fit into the Innovator's Class. Lou Proctor did more to put a shot in the arm of fun modeling than anyone since Jim Walker and his wild creations; yet, like the big planes touted in MA, there is no place where one can compete with Lou's Antic . . . not even Lou himself.

Yet the building of an Antic is an entire education in structure and design techniques. Imagine the value of others coming forth with designs like the Antic, a confessed blending of a Bleriot and a Nieuport, and letting them all compete to show off their skills for all to see. Mind boggling!

So much for the preamble — now for the specifics of my gauntlet tossing.

First off, I propose two classes of endeavor under the Innovator's Class of competition: (1) Manufacturer's Class; and (2) Home-built Class. (Note that I've mentioned only scale-like classes . . . the scope could be enlarged to include free-style designs, but since I've heard so much about models not looking like airplanes, I'll keep my proposal as stated.)

In the Manufacturer's Class, I would see a situation where my kind of designer-builder, and others who didn't think themselves hot enough to fly in competition, would do the designing and building, but then let a "factory pilot" do the flying. "We have that stuff now!" I heard someone say, "Guys are buying planes all over the place!" Don't be hasty with your thoughts . . . I haven't finished the concept.

Before any competition in such a class would be allowed at a major contest, such as the Nats or a regional meet, the "manufacturer" and his "factory pilot" would have to compete in minor contests together for at least two years. Competition in a major contest later would require them to show proof of dual entry over the required time. If one or the other's name popped up as coupled with someone else in the same category of competition, rule them both out of further contest entry for at least one year. So long, Mr. Buy-It-And-Fly-It.

Silly idea? Stop to think about the names in aviation history. The Wrights flew their planes at first because no one else knew how. Once that obstacle was out of the way, Wilbur and Orville stayed inside at the drawing board and let others go out and risk their necks in the creations. Donald Douglas, Glen Curtiss, Walter Beech, Claude Ryan, etc., flew briefly but got their jollies at the drawing board and in the shop . . . and

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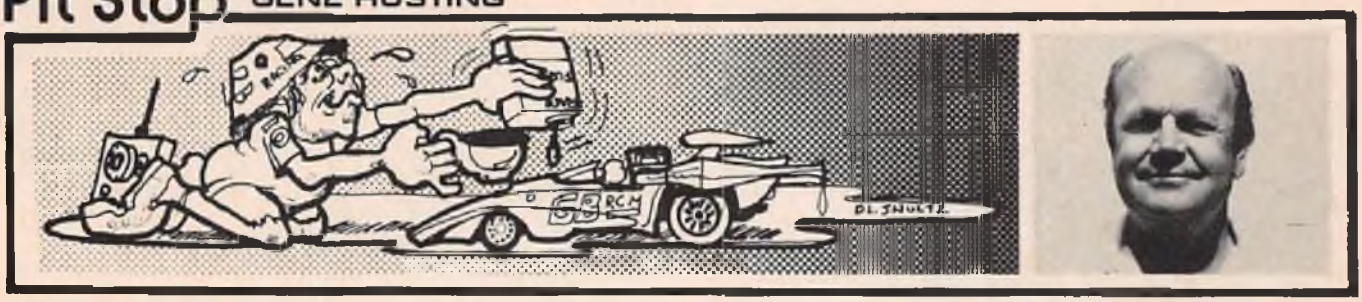
Pit Stop

GENE HUSTING



CLUTCH TRICKS

The clutch assembly can do a lot to help your car's performance, if you know how to take advantage of its characteristics. Probably the most advanced group in clutch technology in 1/1 scale racing is the drag racers. The dragsters have over 2,000 horsepower and have tires designed to give them the greatest amount of traction available, over 3 times that of any other racing car tire and their total car weight is under 1,500 pounds! The average American full sized car weighs near 5,000 pounds and has an average 250 horsepower. This car would actually need about 7,000 horsepower to encounter some of the same clutch problems the dragsters have.

In the beginning, with flathead V8's, it was fairly easy to drive a dragster, clutch-wise, that is. The engine rpm was brought up to a given figure, between 4,000 and 5,000 rpm, the clutch was fully released, the rear tires burned for a couple hundred feet, then the tires coupled up with the ground. But these motors only had 200 to 300 horsepower and the "slick" rear tires were only a little better than stock tires.

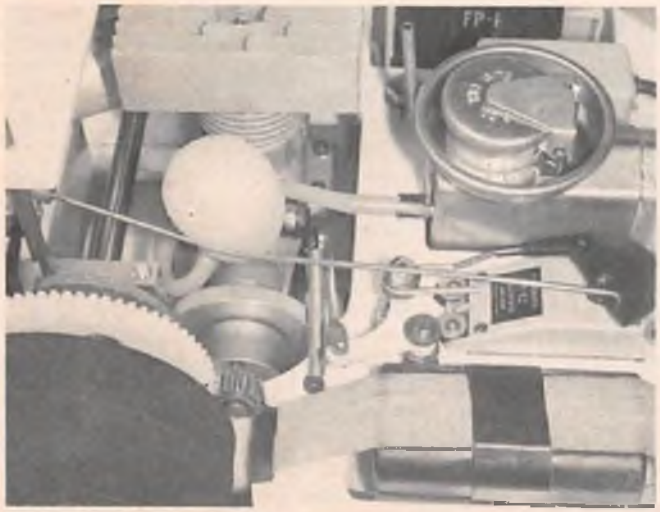
With the advent of 2000 horsepower Chrysler V8's and "Wrinkle Wall" drag tires, new problems arose. If the rpm was brought up to 5,000 rpm and the clutch fully released, the rear tires went up in smoke — that is, the tires lost their traction with the ground and, instead of the dragster going forward, the tires were just spinning in place. If the engine rpm wasn't high enough at the start, when the clutch was released, the car would "bog". The tires coupled up with the ground, dropping the engine rpm and torque so the car had no acceleration.

The drivers then tried to manually slip the clutch in an effort to keep the rpm up without burning up the tires. This did start to produce some good low E.T.'s. But then the problem was in being consistent, which was not humanly possible. So the E.T.'s varied all over the place. And, in drag racing, one loss and you're eliminated, so all your runs have to be perfect.

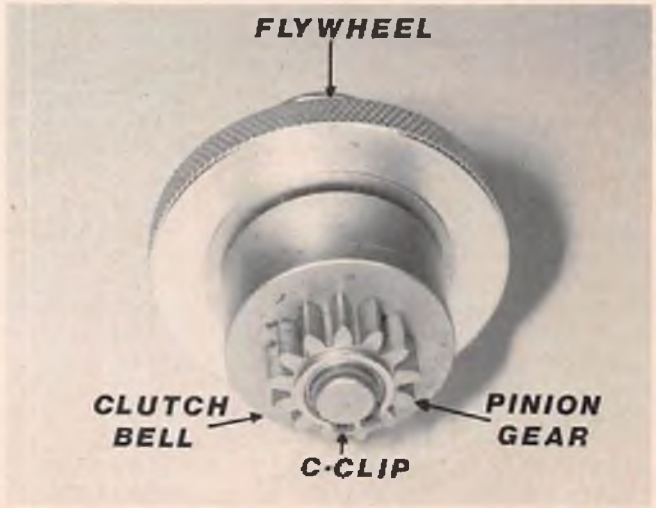
Well, they now have the clutches perfected to such a science that even a girl can drive a dragster competitively! As a matter of fact, the top dragster driver in 1977 was Shirley "Cha Cha" Muldowney. The human element has been taken out of the clutch. They now use "Slipper" clutches. The amount of clutch slip can now be dialed into the clutch. The engine rpm is now brought up to 5,000+ rpm at the starting line. The clutch is released, but the clutch is set to slip so that just enough horsepower is transmitted to the rear tires for maximum traction with maximum usable torque. The clutch will generally continue to slip about half way down the 1/4 mile dragstrip. There, the full horsepower is delivered to the tires. The results are amazing! Many dragsters have turned in 2, 3, 4 and even 5 runs in a row in the 5-second bracket! What this shows is that a machine can be much more reliable and consistent in performance than us mere mortals.

O.K., how do we apply all this to our R/C cars? I'm sure we would all like to be thought of as Super Race Drivers, but as soon as we start to drive our R/C car, we find out we're only "mere mortals". Our problem is we're driving this car that can go 50 mph, but we're driving it from up to 150 feet away from us. We can't drive "by the seat of our pants", which is what you do in a 1/1 scale car. We can't "feel" our R/C car do anything. We have to rely on our eyes only. We have to wait until our R/C car gets far enough out of shape for us to see it, and by then it's generally too late. Even if we react fast enough to keep it from spinning completely out, we've lost an awful lot of precious time.

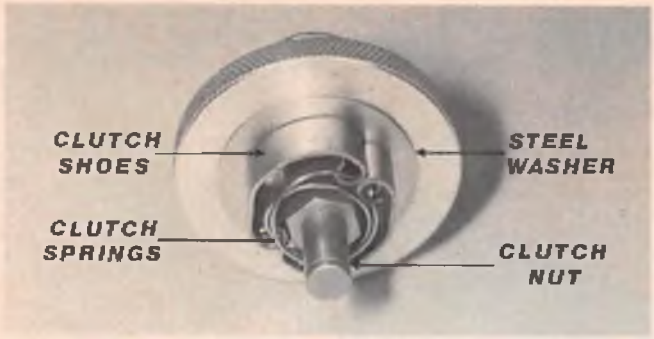
All of these problems arise in corners, where road races are won or lost. With a fast acting, quick coupling clutch, whenever you open up the throttle, the car jumps ahead. Now this sounds like what we want it to do. As a matter of fact, some R/C car manufacturers recommend this type of clutch. And, in some situations, it's the best way to go. But us "mere mortals" have this problem of opening up the throttle too much - too soon, resulting in all the spin-outs in corners, and the problem becomes worse



 # 1: The clutch assembly, as shown on the Associated R/C car, can be adjusted to perform truly amazing feats which can turn an average driver into a great driver.



 # 2: Considering the abuse a clutch assembly must go through, they are relatively trouble-free and reliable. Different gears are available, making ratios from 4 to 1 to 6 to 1 possible.



 # 3: Associated stock steel clutch shoes have an extremely long life and are trouble-free. Note steel washer added to flywheel which allows shoes to move more freely.

 # 4: This shoe has been lightened on the swing end which allows the clutch to slip more, making it easier to drive on most tracks.

 # 5: This is an extremely lightened shoe which works exceptionally well on very slippery tracks. Caution must be taken not to go too light.

 # 6: A simple method to make sure you're getting good shoe contact with the clutch bell, is to cut a hole in an old clutch bell and look through the hole to check alignment.

as the track becomes more slippery, which is probably most of the time.

So, we've found that if we let the clutch slip a limited amount, suddenly the car is a whole lot easier to drive and we're able to simply drive through corners, where everyone else is spinning out, and it makes us look like super drivers. But, in fact, it's just much easier to go faster.

A lot of people's comments are, "But if the clutch is slipping, then the car isn't going forward as fast, so the car must be going slower." Let's see what actually happens. To begin with, we need a different amount of slip for different track conditions. The more slippery the track, the more clutch slip we need, and the more bite or traction a track has, the less clutch slip we need. A slipping clutch can actually work like a "brain" or "computer" and can actually change the amount of slip in the middle of a corner. It can actually compensate for too much throttle by letting the clutch slip a little more than normal. You have to actually see, feel, and hear the clutch work its magic to appreciate it. Let's say you go into a corner a little too fast with a little too much throttle. Normally, you would end up going too wide in the corner; you would then try to correct for it and spin out. With a slipping clutch, you could go into the same corner with the same speed and same throttle opening. When you made your correction turn, instead of the car spinning out, the clutch will actually **increase** the clutch slip **automatically**, preventing the car from spinning out. The car would simply slow down a little, allowing you to turn tighter without spinning out, and you would continue around the corner.

Now, how do we control the clutch slip? It's very simple. I can't tell you exactly what's perfect for your car because there are too many variables: horsepower, gearing, tires, body style, wing angles, track traction, driving style, etc. But I can tell you how to find out your ideal combination. Photo #3 shows the Associated clutch assembly, which is fairly typical of many other manufacturers. This is a centrifugal type clutch assembly, meaning that as the rpm is increased, the centrifugal force of clutch shoe weight is thrown outwards against the clutch bell, causing the clutch bell to turn and the car to move forward. There are two steel clutch shoes and two springs. The springs help to hold the clutch shoes inward at engine idle, so the car can come to a complete stop with the engine idling. The clutch shoes, as shown in Photo #3, are of stock weight, which is ideal for a maximum horsepower engine on a maximum traction track. If these shoes were used on a slippery track, it would be very easy to spin the car out. These shoes will engage immediately.

Photo #4 shows a lightened clutch shoe. 75% of the coiled end has been cut off of the swinging end of the shoe, not the pivot end. Both shoes would be cut like this. This leaves enough of the coiled end for the clutch spring. This cuts down on the clutch shoe swing weight or centrifugal weight, which allows the shoes to slip a controlled amount. This is the configuration I have found to be the best under the widest of varying track conditions. It allows the clutch to slip a limited amount through the corners and will couple-up solid in about 50 feet.

Photo #5 shows a lightened clutch shoe configuration that is ideal on very slippery tracks. This is on the very limit of clutch slip, and caution must be taken. On a slippery track, you'll be able to drive right by your competition. This clutch will probably slip through most of the infield of the track and will couple-up in about 100 feet. On a high bite track, this clutch will slip too much, causing too much heat and will melt the plastic spur gear.

On the subject of clutch heat: there are many things that can cause excessive clutch heat. The number one cause is improper brake linkage adjustment. The brake **must be fully released at 1/4 throttle opening.** If the brake doesn't release soon enough, the brake is trying to stop the car while the clutch is trying to move the car. This can result in excessive clutch slippage and heat. If the clutch bell turns blue, which will happen from too much clutch slippage, you'll melt the plastic spur gear. All the wheels must be free turning. If there is any bind, the clutch will slip too much.

Another thing that can cause too much clutch slip is if the clutch shoes don't make full contact with the clutch

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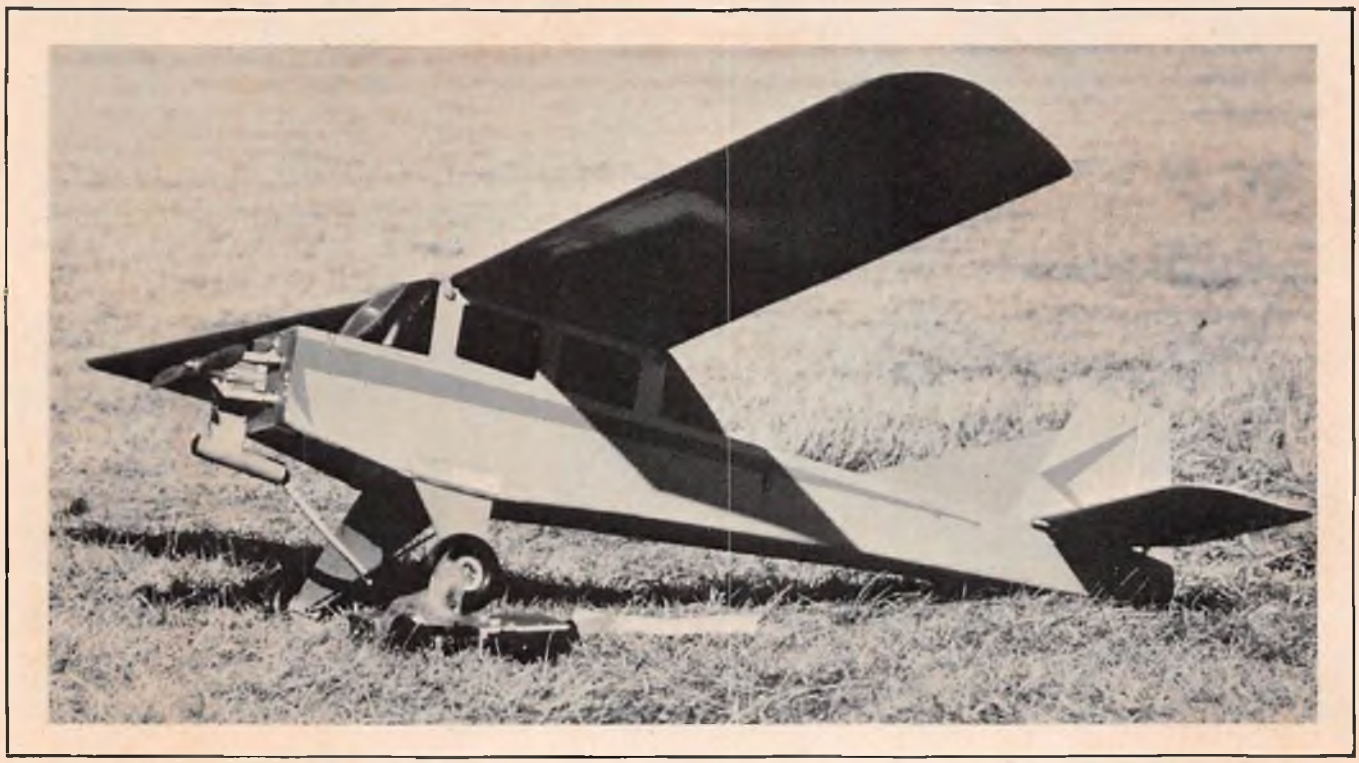
THIS PLANE IS FOR THE BIRDS!

By Frank Heppner



Gooseplane Mark III in a quiet moment. Note repairs around landing gear mounts. They do fly better with patches!

●Increasingly, the techniques and equipment of RC modeling are being used for scientific research. The reason is simple; cost. RC equipment is designed for a consumer market, and the result is that an extraordinarily complicated piece of electronic gear which would cost tens of thousands of dollars, if custom built, can be had for less than half a G-note. I have been working for the last year or so with an RC plane designed to take movies of birds in flight. The astounding thing is that it works.

By trade, I'm an ornithologist, and for years I'd thought what a wonderful thing it would be to somehow get up in a formation of Canada Geese, and take pictures of them, to see how far apart they were, and how they maintained coordination. A light plane was the obvious solution, but too expensive and too noisy. I'd been a railroad modeler on and off for years, and knew that there was such a thing as RC modeling, but was uncertain that any kind of model airplane would be able to carry the weight of a camera. A visit to a hobby shop a couple of years ago opened my eyes, however, and I decided to give it a whirl.

To make a long story short, I turned out to be one of those people who experienced fliers around the field call "one flight Charlie." My standard equipment for Sunday afternoons was plane, flight box, and large plastic Baggie to bring back the pieces. It began to look like a pipedream, until I met John Haffner.

John was a new graduate student in Zoology at the University of Rhode Island, and at the time, he wanted to be a marine biologist. We were introduced at a party, and in the course of the chit-chat, someone mentioned to John my

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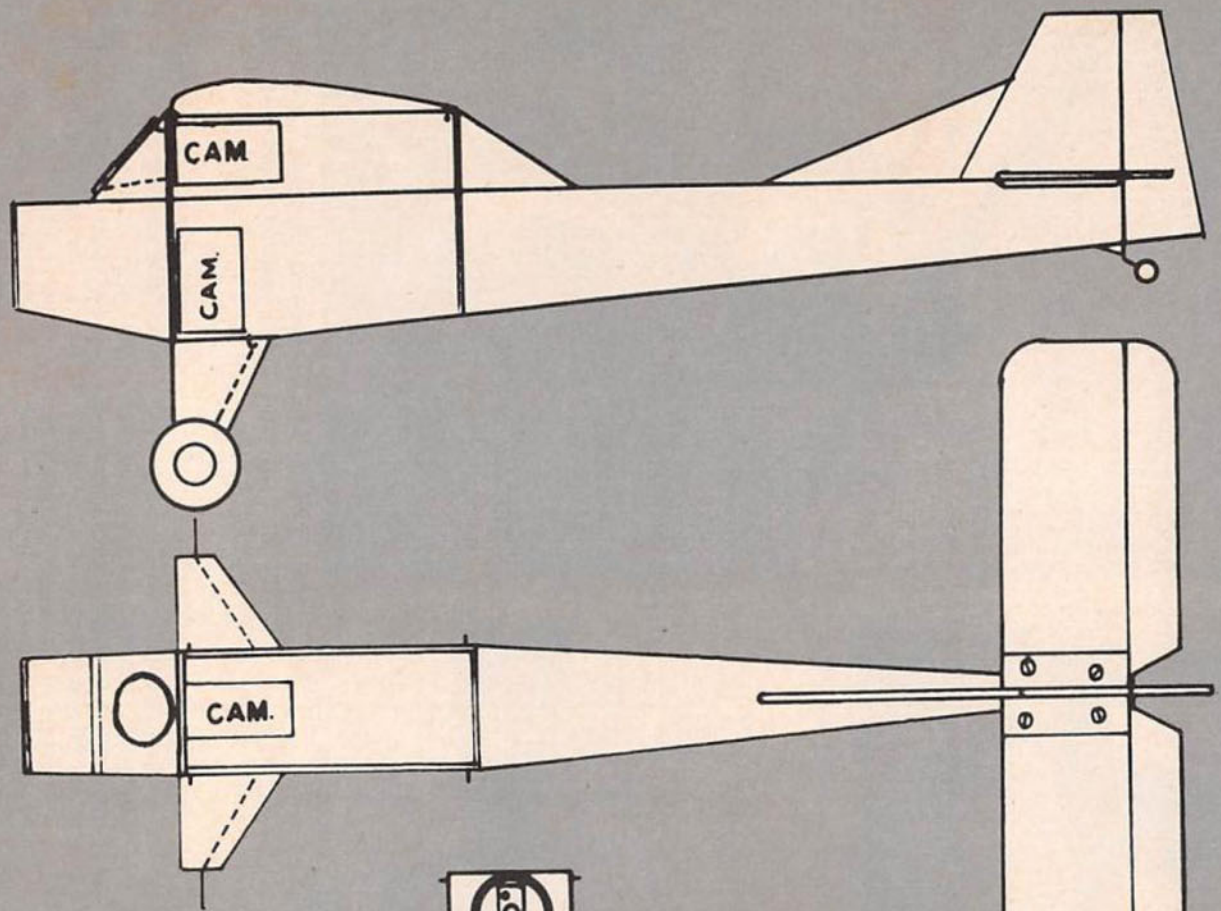
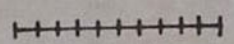
John Haffner (who claims to look like Mark Spitz with glasses) fiddles with the Fox before the next day's flight.

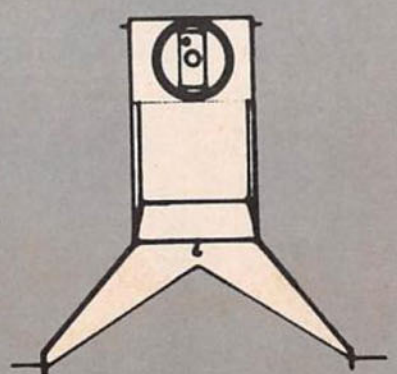
Gooseplane and assistant wait for the birds at Bombay Hook, Delaware.

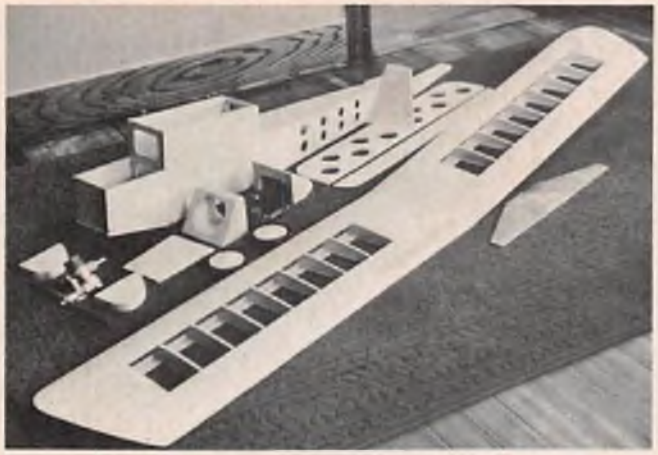
BIFOCAL I



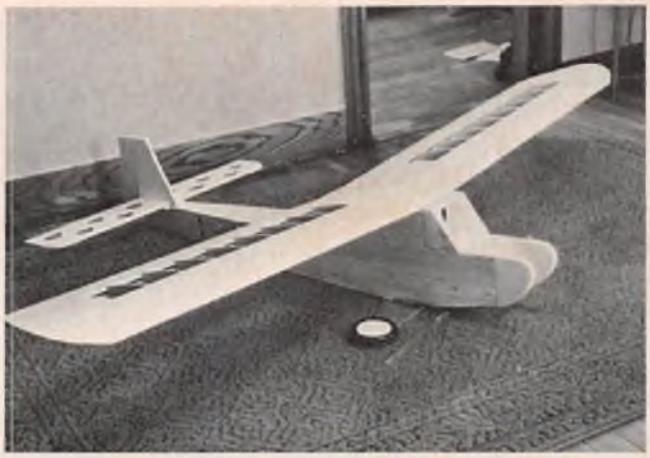
WING SPAN	96"
CHORD	14"
LENGTH	54"
WEIGHT (GROSS)	14 LBS
POWER	.60 - .80
MATERIAL.	BALSA & PLYWOOD
PAYLOAD	2 SUPER 8 CAMERAS







Bifocal 1 under construction. Simple, sturdy layout.



Almost ready for covering. Note the camera port-windshield.

Before the first flight. She's not quite as pretty now, but she's intact.

Gooseplane Mark I, R.I.P. Clever camouflage job was supposed to fake out the geese.

John holds the completed Bifocal 1. Windows were painted on for esthetic reasons – she was really ugly without them.

abortive efforts to fly with the birds. John said, "That's interesting. I do a little RC flying myself." My eyes gleamed, and I said, "Come with me, son, and let's have a little talk about this ridiculous idea of your wasting your time with marine biology."

John agreed to show me what he could do with a plane, and when we finally got out on the field, the wind was blowing about 25 knots. John proceeded to make his little biplane do everything but whistle Dixie, so we decided to try out the camera plane idea.

I had a Lanier Slo-Comet with a Webra .61 that had somehow survived my earlier attempts. We strapped a block of wood the same size, weight, and shape as the Super-8 camera we wanted to use, on top of the wing. Sure enough, it got off the ground, and flew passably well, but not sensationally. A few more flights, and we tried the camera. The engine was started, revved up, and just before take-off, the camera was put on run-lock. We had two rood flights, getting two rolls of film, then the inevitable happened. We decided to see how she would fly dead stick, so John flew around until the engine ran dry. At that point, the plane exhibited severe dynamic instability, i.e. it flew like a brick and piled in, in the most spectacular long, straight in dive I'd seen. Evidently the camera disturbed the air flow across the wing, and caused an unexpected stall while turning on final. We'd grown rather fond of that plane, but we didn't

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BY DICK PHILLIPS

SUPER SCALE NEWS

This column was conceived as an addition to the regular columns appearing in these pages in order to satisfy an increasing interest in the larger models coming onto the RC scene. The title, "Super Scale News", is from a newsletter I have been putting out privately and refers to the size of these models rather than being aimed specifically at scale models, although most of the currently available plans for the big birds are plans for existing or past full scale aircraft.

Much of the interest in these large scale birds has been caused by the introduction of some interesting new products, among which have been prop speed reducers, large engines (especially the gasoline fueled magneto engines), large props, and a growing number of items intended for the 1/4 and 1/3 scale model. These new products have sparked an increase in interest we haven't seen since the introduction of reliable digital proportional radio equipment.

The format of Super Scale News (SSN for short) will be similar to those regular features appearing in these pages to which we all refer each month. New products and new methods will be described, letters of general interest will be printed and answered and the ideas and experiences of others who are into the big birds will be shared with the reader. Initially, the column will appear each second month with the possibility of appearing in every issue if the interest warrants.

Since my article "Big Is Beautiful" was printed in the May '77 issue of RCM, I have been inundated with letters asking for additional information, wanting advice and assistance, and especially asking for sources of plans for the larger models. I have, to date, answered literally hundreds of letters (all that were received) and know that RCM and others have answered many which came out of the article. It just could be that this column came about as a result of the idea, "Listen, Phillips, you started all this, YOU answer the mail!"

The most significant lack at the present time seems to be a supply of good, large plans for 1/4 and 1/3 scale models. There are a few that I know of and I have been able to track down a few more, with the possibilities growing every day. I have inquiries out at this time to try to obtain more of these plans and will list them from time to time in SSN. At the end of this column is a list of sources for large plans, some of which I have used and I can recommend them without hesitation.

There are lots of good "2 inch to the foot" plans available and many of these can readily be enlarged to 1/4 or 1/3 scale plans, provided we are willing to invest the time and have the basic skills with which to do so.

In the first four of these columns, I'll detail four methods of enlarging existing plans to the desired size. This can be applied to three-views or even to the original drawings from which the full scale aircraft was built. Original plans will likely require reduction in size for our use, but this, too, can be done with the method to be detailed. Keep in mind that original drawings were a bit more complex than we work with and there were probably enough of them for any one aircraft to fill the back of a pick-up truck, so be careful what you ask for! Many original drawings (or copies of them) will be available from the manufacturer (if still in business), from the military, from archives, or from societies and organizations dedicated to the preservations and restoration of antique, vintage, and rare aircraft. The home-builts, which are excellent subjects for scale models, are mainly available through the Experimental Aircraft Association who also have instructional material available for the home-builder, much of which applies quite well to the construction of 1/4 and 1/3 scale models.

In choosing the material from which you'll work, there are a couple of things to keep in mind. If there are errors in the original plan or three-view, those errors will be exaggerated in your enlargment. Many plans for models of existing aircraft have been discreetly altered in order to provide a reasonable chance they will fly with some degree of stability, as compared to the same model built accurately to scale. Airfoils are made thicker, moment arms lengthened a bit, and control surfaces enlarged slightly in order to provide better control and "flyability". These alterations are usually very slight in order not to depart too radically from the subject aircraft. Fortunately for the BIG builder, these alterations are much less necessary in 1/4 and 1/3 scale. The wider chord of the wings fly better in the full scale air molecules we all have to use, full scale and model both. The larger models provide longer moment arms and larger control surfaces as a matter of course, without alteration. The propeller is almost always larger than we are used to and the engines put out more torque than is available from more conventional model engines. All of these factors contribute to better flying qualities than smaller models and make either unnecessary or, at least, less necessary, any significant change from the full scale version, allowing us to come much closer to the original than might be the case with a smaller model. The point in all this is: if you are going to enlarge an existing plan for a model, make sure that it is accurate before you start. Check dimensions against good three-views or, if possible, the full scale aircraft, in order to assure that you are on the right track before you start. No point in going to all that work to find that the dimensions are all out in left field.

The degree of enlargement required is another factor we must consider in choosing our original. A very small three-view requiring an enlargement of 12 to 14 times the original will be difficult and will require great care to assure real accuracy in the finished product. An error of 1/16" becomes almost an inch at an enlargement of 15 times. That could mean a significant gap in the strategic area, to say the least! For your first effort, try to stick to a 2 to 3 time enlargement, then as your skills sharpen and develop, you'll be ready to tackle something more demanding. Enlarging plans is a bit like using computers, where the saying GIGO means "Garbage In - Garbage Out" and that's what you'll end up with if you aren't very selective about what you use and very careful as to how you use it.

This month, we'll deal with an old stand-by many of us have been using for years to produce plans in sizes we want to build. It's the Graph Method and, as its name implies, uses a graph to produce our larger (or smaller) plan.

Assuming we have chosen our favorite aircraft (use the KISS principle, which means "Keep It Simple, Stupid") and have the original drawing or model plan in front of us, we proceed to overlay

a graph right on the plan. This will consist of laying out, **accurately** a set of squares on the plan in appropriate size. Let's say we are going to enlarge the size of a 2" to the foot Citabria to 3" to the foot. As our enlargement will be 1/3 bigger than the original, we want to choose a size for the graph which will be both convenient to work with and small enough to give us an accurate result. In this case, I'd use 1" squares laid out on the plan. Tedious? Yes, a bit, but that's what enlarging plans is, tedious and lots of work. Make sure this layout is done accurately since the amount of care you take doing this will determine how good the resultant plan will be (or even if you can use it at all!). Next, using a sheet of your favorite drawing paper, or tracing linen, or whatever, lay out an equal number of 1½" squares on the new material.

I suspect that, by now, the guys who either don't have the time to "roll their own" plans or who can't be bothered have quit reading this, so a few words about materials and equipment. I prefer to work on tracing linen although there are some newer materials like mylar which are already graphed and which are quite handy. I work on the linen in pencil and then ink later as this produces a plan which can be reproduced many times over. Good quality tracing paper is also usable but not quite as durable as linen or mylar (not as expensive either). Equipment can set you back about $50 but, if this is written off against plans over a period of time, it is quite inexpensive. You may add to my basic list over a period of time as you find other items you prefer to work with. A medium priced, good quality set of drafting instruments is a must - - - not the little dime store set used for school geometry - - - it just won't cut the accuracy we want. A set of drawing squares (45° x 45° x 90° and a 30° x 60° x 90°); a selection of French curves (two or three to begin with); a selection of pencils in varying degrees of hardness (I like 2H); some India ink if you intend to ink your drawing; an X-Acto knife; a couple of erasers (unless you **never** make a mistake!); and a T-square. These will get you started. You'll also need an area large enough for the finished plan on which to work.

Once the two graphs have been laid out, we are ready to proceed with the transfer to the larger plan. It's a good idea to mark off the graphs so you can locate all of the points accurately. I usually mark down the left side with the letters of the alphabet (AA, BB, CC if there are more than 26) at the end of each horizontal line. Then across the top I'll number the lines and the result gives me an "address" for each point of intersection.

Carefully transfer each point on the original where a line of the drawing crosses one of your graphed lines to the enlargement. A small mark is sufficient for now. Very few lines on the original will cooperate to the extent that they will cross right on intersecting lines of your graph. This means you'll be marking points on the enlargement between graph line intersections. You can measure the distances the points are removed from the intersections, but you'll find they can be estimated fairly accurately and the points will be more of an accurate guide to the finished lines than the specific location of the line. The finished drawing will be produced by joining all of these plotted points using a straight-edge and the French curves. After being joined in pencil, eyeballed for smooth curves and gentle transitions between curves (keeping in mind the form of the original), the lines may be inked and it's ready to either copy or build from.

If you intend to use your plan commercially, buy a lettering guide and an inking instrument to use with it and do the lettering neatly. If it's just for your own use, you can always refer to the original for such detail, or letter it in your usual scrawl. Using a guide makes a very professional looking job, however.

Incidentally, while on the subject of using the plan you have created in a commercial way, be warned that you may run afoul of copyright laws if you have used copyright material as an original. It is quite proper to use material in this way if it is solely for your own use, but if you intend to sell copies of your enlargement, be sure to check that you are not in violation of the copyright on the original. Local laws will differ from place to place, although copyright laws are usually federal and apply everywhere within the country of original copyright.

If you are working from a smaller original, such as a three-view, the graph for it may be laid out on a sheet of acetate which is then used an as overlay on the original. In this way, the graph may be used again and again, and you'll likely take a bit more care making it up if you'll be using it more than once. I prefer to use a tinted material as it is much more readily visible when laid aside for a moment.

Smaller originals will require smaller squares on the overlay and a much greater enlargement to get to 1/4 or 1/3 scale. The greater the enlargement required, the greater the care which must be taken to be accurate. As mentioned previously, an error of 1/16" becomes quite large in the higher enlargements.

Sound complicated? It isn't really; it is a bit monotonous and does require care, but in comparison to not having a plan at all, it's better than nothing! Next time, I'll cover enlarging using a pantograph. It's a bit easier, a bit faster and a little more convenient, but there are some drawbacks in its use. It's the old story, there just ain't no **free** lunch!

While talking about the actual construction of the larger models is a bit premature in that we haven't even got a plan yet, I'll be passing along my own experience and that of other builders of big birds, so to finish off this column, let's consider materials.

Due to the large size and the added lifting capabilities of the larger models, weight is less of a consideration than it would be in a more conventionally sized model. It is, therefore, possible (even necessary) to use much stronger materials than could be used with a smaller model. Some materials are marginally heavier than balsa and provide great strength and many of the so-called softwoods fall into the usable category. Spruce, cedar, redwood, pine and poplar are good candidates and there must be many more that I am not familiar with. Look for straight grained, knot-free wood as light as possible, although it doesn't need to be balsa weight in the big birds. The strip stock such as spars, longerons and framing material can be cut from the wood you have selected as being readily available to you. For example, one good 8' long two by four will make a lot of airplane, so you won't need to stock a full lumber yard (you might have to scout through one to find good material, however).

Sizes required will be dictated by the model being built but conventional 1/4 square, 1/4 x 1/2 and so on will be adequate for most construction. Cutting the sizes required can be readily done on a table or radial arm saw (someone in your club will have one or the other), or your local cabinet shop will do accurate cutting for you on a fee basis.

Formers, wing ribs, and similar items, can be cut from a wide variety of materials. One modeler I know uses mahogany door skins which sell here in Canada for about $1.50 each, and are readily available at your local lumber yard or plywood dealer. Sig sells a nice poplar plywood under the name Lite-Ply, which is much less expensive than aircraft grade plywood. It comes only in 1/8" thickness and is quite light, cuts well with your average modeling knife and makes a good strong substitute for 1/8" balsa. I have used it for sheeting as well as formers and wing ribs, etc., although the curve it will take is a bit limited in comparison to sheeting with balsa. Your local cabinet shop is a fine source of material since they often end up with plywood cuttings which are too small for their use, but just right for ours. These cuttings are usually available at quite attractive prices and are a good source of material for some of the parts you'll need to make while build your first biggie. Don't scrimp on the firewall though. I have been using 1/2" aircraft grade plywood behind my Quadra engines and it makes me feel a lot better to have a good sturdy firewall in there whether it has any significant structural advantage

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By Ben Strasser

SOME USES FOR THE HOT KNIFE

I'm a gimmick man. You know the type — the delight of the hobby shop owner. Some new kind of a tool hits the store and I'm apt to search for a part time job to buy it. You ought to see my collection of hinge slot cutting tools, wire benders, prop reamers, and such. I've recently started a collection of different kinds of prop balancers. Four kinds so far, but none balance props automatically. The search goes on. Thank goodness for an occasional club auction that makes it possible for me to clean up my work bench drawers and recoupe a penny on the dollars I've spent. I'm not the only gimmick man around. The other guys are just a lot smarter than I.

When the #378 X-Acto Hot Knife first came out several years ago, our local hobby shop dealer had one waiting for me. All I went into buy was some 5-minute epoxy. I left the proud owner of a new tool. Maybe I might need to cut out a foam wing for landing gear blocks — or something. And, after all, if I wouldn't use it as a Hot Knife, the tip could be changed so it would revert to its original purpose, a pencil soldering iron.

Actually, a Hot Knife is nothing more — or less — than a pencil soldering iron with an X-Acto knife type screw-in tip so it will accept an X-Acto knife blade. When the unit heats up, the blade also gets hot, though not to the same temperature as a soldering iron. Radio Shack, Sears, and many hardware stores have their own version of the tool.

You probably know what happened when I got the Hot Knife home. I cut a few pieces of foam to make sure it worked, right? Then, I neatly wound up the wire and put it away in a tool drawer for the day when it would be needed. Oh, I used it a couple of times to cut foam wing cores for landing gear blocks, cut ailerons from foam cores, and cut servo wells, but that was it. Lack of use found the tool moved from the tool drawer to what I call my junk tool box. It must have been there for at least a year or so when I was experimenting with using the adhesive from a hot glue gun to build a Kaos fuselage and wing. If you haven't seen one, the hot glue gun uses round glue sticks. The adhesive is melted in the gun and takes from 10 to 60 seconds to set-up, depending on the kind of adhesive used. Hot glue guns are sold in Sears and many hardware stores.

Getting back to the sad story, I installed one of the bulkheads of a Kaos fuselage incorrectly with the glue from the hot glue gun. (Can't say Hot Glue because that's a brand of the cyanoacrylate adhesive.) Actually, I blamed the error on a re-run of Star Trek on the garage TV. While searching for some

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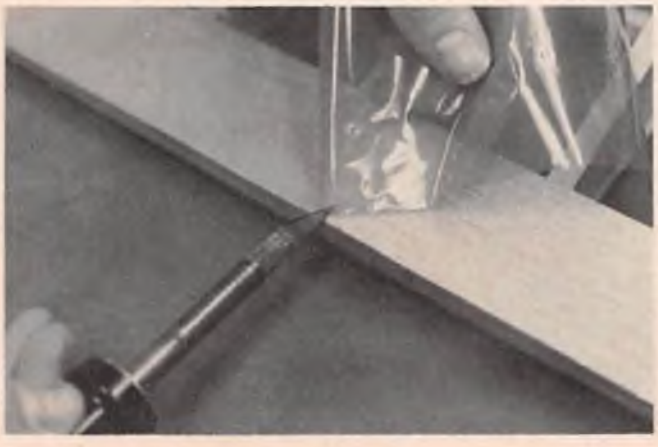
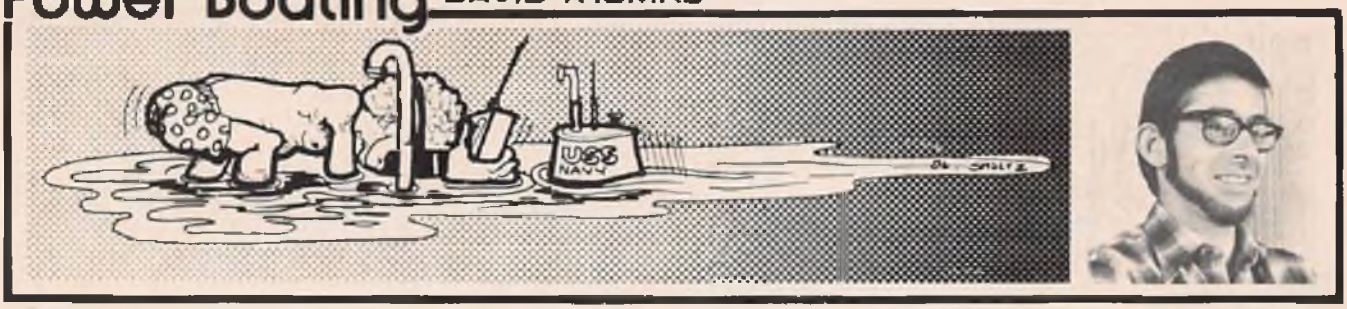


Power Boating

DAVID THOMAS



It's a funny thing how attached one can get to a model engine, especially when one has had it for a long time. I have an old, loop-scavenged Rossi .60 that I bought, second-hand, about seven years ago. It's on its second piston and liner. It's won me a lot of races in the past, before boost-ported engines came on the scene, and it's about the very last item I would get rid of if I had to sell all my modeling gear. I use it these days for sports models, and it goes as well as ever.

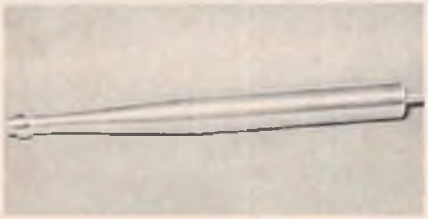
However, one of its descendants has just arrived in the post, and it is quite obvious that as much as I love that old motor, it's just not in the same ballpark as the new generation of modern engines. The new one is, of course, the long-awaited Rossi .65 RVR Marine and, if the manufacturer is telling the truth — and I have absolutely no reason to believe that he isn't, judging on past performance — then this beauty will kick out up to three and a quarter bhp, straight out of the box! That's a far cry from twenty years ago, when a standard engine producing one bhp was really something.

Of course, I haven't had a chance to put the beast in a hull and try it out yet - - - all I have done is play around with it and take a few photos. Rossi was supposed to produce it in ABC format but, from the echoes I have heard, they have had some difficulties with this and, for the moment at any rate, they are only going to produce a ringed version.

It is quite obvious that a lot of thought has gone into the design of this engine, and one of the things that pleases me most is the water-cooled exhaust manifold. I guess just about everyone has had troubles with silicone tubing for the tuned pipe connector on .60 size engines lasting only a short time because of the heat generated. Here is a serious attempt to do away with this trouble. It remains to be seen whether it works or not.

As can be seen from the photo, the engine is up to the usual impeccable Rossi finish, both inside and out. (Yes, sure, I've had it to pieces. In fact, the very first thing I do with every new engine is to strip it down. And you'd be surprised what one finds inside sometimes, in the way of metal filings and other rubbish.) It comes complete with a nicely finished tuned pipe that has a muffler built into the end of it, and which is somewhat thicker than the original Rossi pipes (they were so thin you could make a big dent in them with your finger!). The exhaust manifold is angled up, and the only point that I am not too happy about is the method by which it is fixed to the crankcase. It is quite simply a push-fit on the crankcase extrusion, held there by a tight silicone 'O' ring. It remains to be seen whether this will stay in place when running. If it doesn't, a way will have to be found of fitting a traditional style manifold. However, that may well be looking for trouble before it actually happens — if it happens. We shall soon see, because the top priority job around here right now is to get that engine into the new Tiger racing boat and see how it goes. Hang in there for more information on this one; it should be well worth waiting for.

A lovely piece of engineering – the new Rossi 65 RVR marine engine with water-cooled manifold. (The 61 on the crankcase is because the same casting is used for both engines.)



The Rossi 65 tuned pipe – nicely made in spun alloy – and quite solid.

I have been corresponding lately with Glen Dye of Performance Model Parts Inc., who make the fabulous range of T.W.A. engines. While the subject of the correspondence is not pertinent here at this time, one remark he made in a letter gave me some food for thought. He mentioned that model boating is the coming trend, and needs lots of input in the way of information. Strangely enough, I have heard similar remarks made by people in the model trade who should know what they are talking about. Over the past six months or so, I have heard it not only about boats, but about cars as well. Just how much truth there is in this is hard to say, but there is no doubt that model boats are suddenly becoming more and more popular. It could be something to do with the fact that you can practically guarantee going home at the end of the day with the model in one piece — which is not always the case where planes are concerned!

Whatever the reason, I thought it might be a good idea to take a look at the basics, in order to help anyone thinking of taking up model boats to make a choice. And the matter of choosing is not as simple as one would at first imagine, since the field is very big.

Small, .19 c.i. airplane engine, converted to marine use.

The K & B 21 outboard – an alternative to the traditional inboard engine.

The main difficulty lies in presenting a clear and logical picture of the options open to us. Perhaps the first consideration would be the choice of power, and here we can go one of three ways: internal combustion, electric or wind. (There is in fact a fourth, steam power, but this is rather a specialist subject and, in any case, I plan to talk about it at a later date.) What are the criteria for choosing one or the other?

Well, obviously, a great deal depends on the individual, since most people seem to have a natural inclination towards one particular type. It is, however, possible to give an idea of what sort of model each is suitable for.

I/C Engines: These include glow, diesel and gas engines. They are normally used for racing boats and semi-scale models. They are not very good for highly detailed scale models, since the starting process is somewhat brutal, and small and fragile detail parts would be easily broken during it.

Electric Motors: Again, these can be used for racing boats, providing high power/weight ratio accumulators are used (such as nickel-cadmium). They can also be used in semi-scale models, but their greatest attraction, in the smaller sizes, is for powering pure scale models, since there is no difficulty in starting them. From this, it can be seen that to some extent, I/C and electric motors are interchangeable to a certain degree.

Wing Power: This one, of course, speaks for itself - - - the choice of model dictating the use of sails. There is, however, a possibility of using a mixture of sails and an electric motor in such models as the Pamir, which was equipped with an auxiliary engine of 800 hp to prevent it being becalmed.

For a real beginner, the best thing to do (having seen the possibilities) is to consider the advantages and disadvantages of each form of propulsion. Let's start as before with I/C engines, but this time we shall have to take a closer look at each type within the category, because there are differences between them.

Glow Motors: It would be safe to say that these are, by far, the most popular choice within the I/C motor category. This is probably due mainly to their availability — practically all marine glows are modified aero engines. Their biggest attribute is a very high power/weight ratio, which makes them ideal for fast boats. They run on a fuel mixture made up basically from methyl alcohol and castor oil, usually with a percentage of nitromethane added to increase the power output. Modern glow motors are easy to start, simple to adjust, and very viable. The fuel is easily available, and there is never any trouble in finding someone who knows all about them and who would help a pure beginner over the first little difficulties. On the debit side, they can be quite noisy if not suitably muffled; the exhaust is very oily, due to the ejection of unburnt castor oil; and they require a starter battery.

While on the subject of glow motors, it should be noted that they come in two general types: loop-scavenged and boost-port (or Schnuerle-port). The first can be recognized by the fact that it generally has a deflector on the top of the piston, and that there is no bulge on the side of the crankcase opposite to the exhaust just above the mounting lug. This is the older type of motor and the power level is usually lower than the boost-port type. This is not a reason for not using them, because if the power level is lower, the working life is longer, thanks to less strain on the moving parts. They use a lot less fuel, they are even easier to adjust, cheaper, and make excellent sport motors. They are a good choice for a semi-scale sport boat where a good turn of speed is required, but where the ultimate in power is not really necessary.

The Schnuerle type engine has been designed to deliver extremely high power outputs — most good .60's currently develop about 2 bhp — and is thus an almost automatic choice for racing. It is generally quite a bit more expensive than a loop-scavenged equivalent, and often needs a tuned pipe to get the best out of it. Its maximum power is developed at fairly high revs, and it is a fuel gobbler. There is really not much point in going to the expense of one of these engines unless there is a real need for power.

Diesel Engines: There seems to be a renewed interest in this form of power at the moment and, in fact, these engines lend themselves well to use in model boats. The power output is generally lower than that of an equivalent sized glow motor, but the useful power is developed at much lower revs, which means less noise, and a longer working life. In addition, there is no need for a starter battery, and no glow plug to burn out. They also run a lot cooler than a glow, which can make installation a little simpler. The fuel is a mixture of castor oil, ether, and paraffin — all of which are easily obtainable.

The main disadvantage of a diesel is that it does not throttle as well as a glow if an ordinary R/C carb is used, and it will cut if the throttle is opened at all quickly after a long period of running at low revs, due to the cylinder temperature dropping below the optimum one. The answer is a throttle exhaust and in this mode their performance is, if anything, even better than that of a glow. Unfortunately, I know of only one make which has an exhaust throttle as standard equipment. Adjusting a diesel is a little more complicated because there is not only the mixture, but also the compression ratio, to sort out. Finally, all the diesels I ever owned, and I've had a few, have tended to leave a black, oily deposit in the bottom of the boat — but this is easily wiped out.

Gas Engines: This is a minority class, mainly due to the lack of this type of engine in the recognized small classes. In fact, to my knowledge, the only .60 sized gas engine built specifically for model use went out of production about 18 months ago, but I may be wrong on this one. The fact remains that most gas engines used in boats are fairly big, starting at around 1.2 cubic inches. They are almost invariably two strokes, and were originally made for other things, such as lawn-mowers, chain saws, hedge clippers, etc. The main advantages are that they can be found second-hand, pretty cheaply, and they use very little fuel, which means low running costs.

However, there are quite a few disadvantages. In the first place, due to their sheer physical size and weight, a fairly big model is needed, which can be quite expensive to build. (Of course, if you belong to the "Big is Beautiful" gang, then this is the type of model for you!) The exhaust runs very hot and needs insulating from the hull. It is sometimes a little difficult to adapt them mechanically to model use, and may need the use of machine tools to make up special accessories. And, finally, because they normally have maximum usable revs of 8,000-9,000 rpm, most model propellers are no good, and it can be difficult to find a suitable one.

If I had to sum up I/C motors in a few words, I would put it this way: Schnuerle-port glows for racing; loop-scavenged glow's or diesels for sport models; and gas engines for "them as likes 'em big." But that is a generalization.

Now, let's take a look at electric motors. Here there is really only one type, because they are all pretty much alike. The only real difference is in power outputs, and this comes mainly from the quality and tolerances of a given motor, rather than from a type of design. For the sake of argument we can divide them into high-power and low-power.

High Power Electric Motors: These are motors which may be considered as developing about the same sort of power as the smaller I/C motors, and they are generally used in racing models and fairly fast sport boats. Here the question is not so much of what motor to use but, rather, what sort of power-pack. The answer is quite simple — if you want a fast electric boat, the weight must be kept down, so the only current logical choice is sintered plate nickel-cadmium cells. These provide a high output at a far lower weight than a lead/acid equivalent.

The advantages of this sort of outfit are many: easy starting, clean, silent, practically no running costs (charge them on the car battery), very simple

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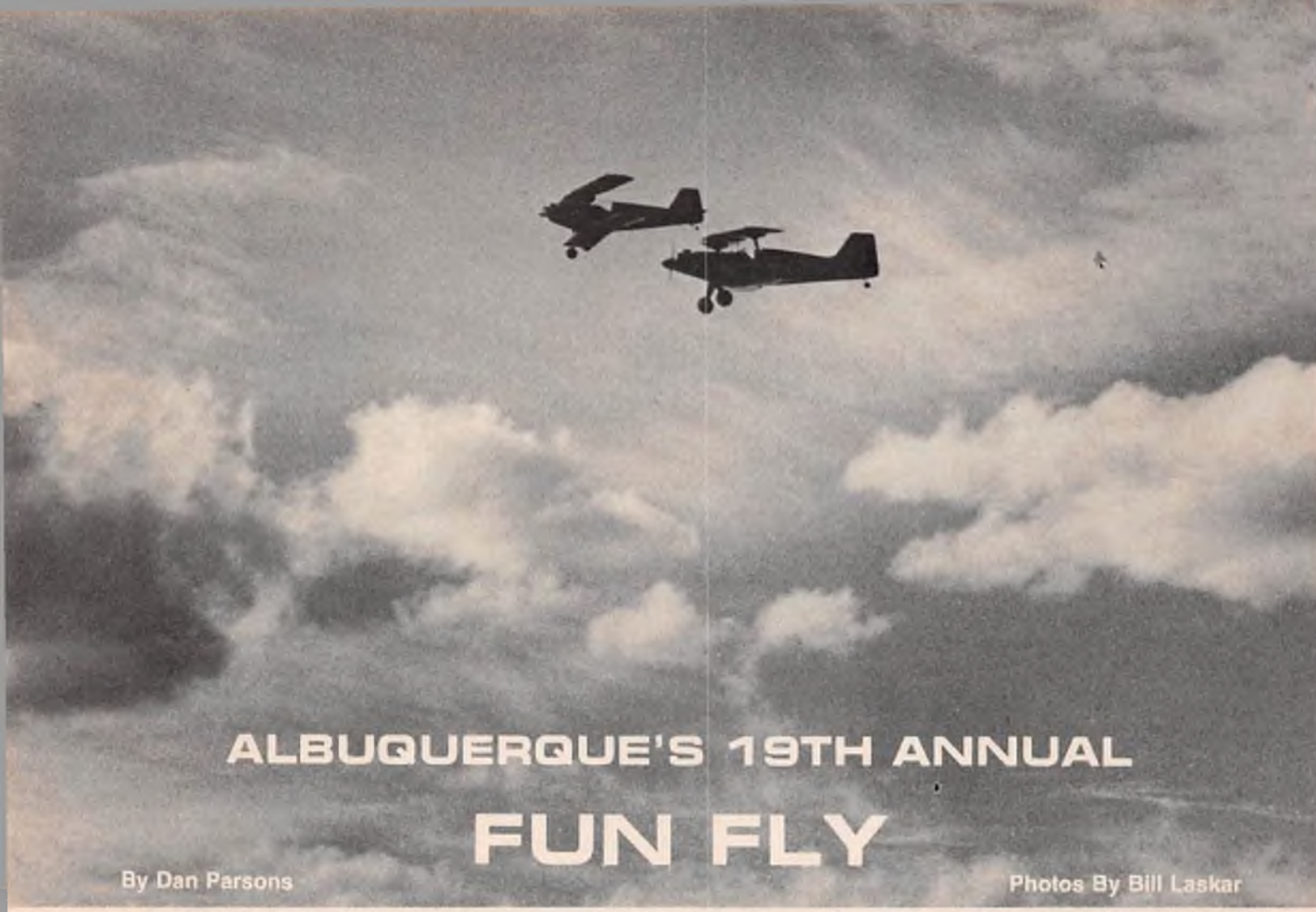

ALBUQUERQUE'S 19TH ANNUAL FUN FLY

By Dan Parsons

Photos By Bill Laskar

Albuquerque's 19th Annual Fun-Fly, held on October 29th and 30th, was a rousing success by all standards: fun, seeing old friends, lots of flying by everyone, beautiful scale ships, outstanding flying demonstrations, good weather (mostly), and many participants.

Billed as a combination free flying event and "bring your scale and show it off" affair, the Fun-Fly evolved into do-your-thing. Sixty-two sign-ups brought an estimated 90 planes that really filled our pit area. Pleasing to flyers and spectators alike were the scale ships, 12 of

ABOVE: Al Casey checking out Bob Frey's P-47. RIGHT: The sad remains of Bob's P-47 (see story).

them, most of which were flown with skill and abandon. Also present were many bipes that added to the realism.

Marty Moad of Las Vegas set the mood early Saturday morning by blasting off his 7' M.E. 210 twin and blowing us out of the tub with low passes, rolls, inverted snaps into the inverted spin, four point rolls, knife-edge flight, vertical rolls and other sundry foolishness that we didn't recognize; finishing off with a perfect three point slow, slow landing. In subsequent flights, his vertical pull-ups immediately following take-off had us musing that "he's gonna be one busy guy if he loses an engine." However, the S.T. Blueheads worked flawlessly all weekend, as they have for the previous seven months. Taking up the challenge, Bob Frey from Phoenix fired up his big, rugged P-47 and, after a take-off that would have made Gabreski envious, pulled up his gear and proceeded to show us all how a Jug should be flown. At 12½ pounds, she is a very realistic flyer under Bob's exceptionally smooth control. His Lomcevakes were the best most of us had ever seen. Bob finished off his flight with a flawless wheel landing. His wheel-up landings are also something to see; however, he did not have to make any this trip. Ted White won those honors with two on his P-51.

While the above flying was going on, there were many flights being put in by Ugly Stiks, Laniers, Joy Sticks, Falcon 56's, Solos, and others. Everybody was getting into the act and having a ball; often there were seven or eight planes in the air at once. Frequency control was expertly handled by Faye Rand, as it has been the last several years. To my knowledge, there was not one case of interference while under Faye's control. With such an informal affair going all out, this speaks worlds for Faye and the discipline of today's flyer. Bill Laskar did yeoman service on the P.A., which he left occasionally to take pictures.

Dan Fox from Clovis provided fun and excitement with his rocket firing Lanier Rebel bipe. Previous to his first firing, he asked me if it would be okay and, I replied, "By all means; just keep them away from the people." On one firing pass, he almost got Ken Meyer's Dirty Birdy. In a demonstration with a buddy, also flying a Rebel, Dan let go from about 100' astern and we recorded a near miss. The smoke trail was most realistic.

After arriving from Dallas with a trailer full of five planes, Ted White finally fixed the problem with the right engine in his sleek new Bridi Aerocommander (bad fuel pick-up line in tank). With two old S.T.S. 56's pulling 15 pounds of plane, Ted got her off after a surprisingly short run. Our 5200-foot elevation and 300-foot square shaped blacktop field was of some concern to the fellows with the heavy scale planes; however, no one had any problems. Ted's Aerocommander with Rhom retracts is fast, good looking in the air, and a fine flyer. He had a bunch of us trying her out, after he did rolls, four points, loops, knife-edge, spins, etc. She lands hot, but Ted got her on in the first 50 feet and was able to turn before running out of runway — an obvious advantage of our square field.

Bud Grover from Clovis arrived Saturday noon with a new, awesome 9 foot Nosen Mr. Mulligan. He and Jim Bresette had been up until 4 a.m. finishing her. This plane is huge but the 20/5 prop, hung on a 2 cubic inch Quadra, looked like it would do the job. And do the job it did. By the time Bud, Jim, Buzz Averill, and others, had her ready to go, the calm conditions had changed to a gusty 15 kts. out of the west. With Buzz holding the tail, Bud went to full power. On release, she rolled about 25 feet and made a pretty lift-off. Surprisingly fast, he made several low passes and then a low loop right over the center of the field. Finishing with a slow, realistic wheel landing, Bud made several converts to the quarter scale movement. You reading this, Eddie Morgan? The smooth, scale-like flying of this plane in the gusty winds further surprised all of us. Watching the coordinated turns with no adverse yaw, even in the slow approach, it was hard to believe that Bud was not using rudder. This plane is a real crowd pleaser. Unfortunately, on Sunday, she crashed; a loose transmitter antenna was the culprit. The nose was wiped out, but that was the extent of the damage and Bud will have her flying again in a few weeks.

With his usual superbly scratch-built planes on hand, Rex Johnson, from Lubbock, complained to me that he could hardly fly in the calm conditions

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Gerald Martin and Ted White (at right), flying their Aeromasters (opposite page) in aerobatic and formation demonstration.

FIVE, . . .
FOUR, . . .
THREE, . . .
TWO, . . .
ONE, . . .
DROP!

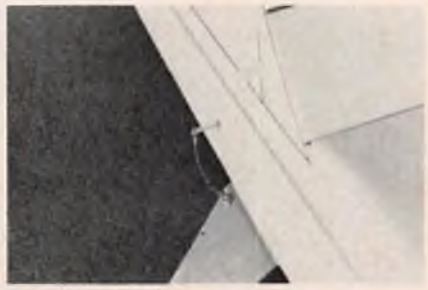
By Ben Strasser and Pat Joyner

The release servo and pin mechanism – still lots of room.

Telly and dolly!

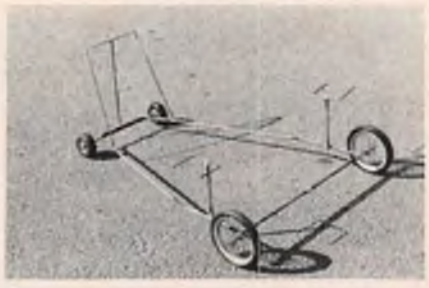
The pin and sleeve.

Jerry preparing to pack the chute on bionic man.



The release pin with sleeve attached.

Jerry Joyner packing the chute.



The wire wheeled dolly.

● A couple of Sundays ago, out at our club flying field, Pat and I began talking about our new building projects as we usually do between flights. In the course of our discussion, Pat mentioned that he was just about finished building the radio controlled parachutist detailed in a construction article in the February '76 issue of RCM. The parachutist could be "flown" in free fall, the chute would open on command, and it would be possible to steer the chute as it floated down. "Next," he said, "I have to start building the plane from the article to get the thing up there for the drop. The parachutist is about 12 inches long so it takes a big plane to do the job."

One of my favorite Sunday flying and relaxing fun planes is the Senior Telemaster, which I was flying that Sunday. No small plane either. As I glanced at it, Pat mentioned that the completed chutist would probably weigh from a pound to a pound-and-a-half. I said, "How about using my Telemaster to carry it up? I've heard that some guys have mounted a camera on that plane and carried all kinds of payloads so it should be able to take up your parachutist. We could carry him up on the bottom of the plane between the main landing gear. What do you think?" Pat agreed, and the fun began.

We started thinking about what the release mechanism might look like. Since this would be a temporary set-up until Pat could get his own plane built, it had to be something that wouldn't involve any major modifications to my plane. Something we could set up, use, and then remove without leaving a botched-up plane.

The first idea we came up with was a kind of plate that could be mounted onto the belly of the plane with some straps. The plate would hold the chutist. We also thought about the possibility of using hinged doors to be added to the bottom of the fuselage. With some more thinking we came up with the idea of just using an elastic band to hold the chutist in place. Simple. A pin sticking out of each side of the fuselage near the bottom would hold the elastic band much like the dowels we use for wing elastics. In this case though, when the release servo is operated, the pins would retract into the fuselage and release the elastic band and the chutist. As we explored that idea further because it was so easy to set up, we decided that only one pin would be necessary. The elastic band could be tied to a screw mounted on the trailing edge of one side of the main landing gear, pass under the body of the chutist, and then loop over the pin on the other side.

With that planning I agreed to get a fifth servo for my Pro Line radio and build the release mechanics. Pat would finish the radio controlled parachutist. If all went okay during that week, next Sunday would be the big day.

Monday I started calling the local hobby shops to find that fifth servo. I found one with Pro Line electronics and D & B mechanics. That was ideal because it has both rotary and linear outputs. The linear output would be best to operate the release pin because it wouldn't be necessary to contend with any sideways movement of the pin as it moves back and forth. Nice.

By the end of the week the servo and release pin mechanics were installed. Nothing to it. A short piece of brass tubing with a length of piano wire inside for added strength looked like it would be just right. The pin was to slide back and forth inside a sleeve made of a larger

size of brass tubing that was to be solidly mounted inside the fuselage. It would have to withstand the tension of the elastic band holding the chutist.

There was no problem finding enough room inside the Telemaster to set up the servo. We could have installed the automatic transmission from a Honda with room to spare!

With the servo and pin mechanics set up in the plane, we tried it out. One problem we found was that, with an elastic band on the pin, there was the chance that it might bind the pin against the side of the fuse when the servo was operated. To prevent that, we made a sleeve out of another short piece of brass tubing. The sleeve slides over the pin. Then the elastic band is looped over the sleeve. In this way the pin would be able to slide out of the sleeve and release the elastic band without jamming. So we wouldn't need a new sleeve for every drop, the sleeve was attached to the main landing gear with a short length of stranded cable.

After a couple of tries, during which some minor adjustments were made in the length of the pin to assure it would retract flush with the fuselage side, it was ready. By that time it was late Saturday afternoon. For test purposes out at the field, I had rigged up my own non-RC chutist using a chute made for flare drops. It was purchased for $1.25 at the Desert Runway Hobby Shop Saugus, California 91350. An old, worn out little Raggedy Ann doll from my niece became the parachutist for this one. Can't call me a male chauvenist!

To check out how the chutist would ride, the Raggedy Ann and chute was set in place under the belly of the plane. A week earlier the old Super Tigre .60 engine I had been running in the Senior Telemaster was replaced with a several year old Ross Twin that had new rings, pistons, and pins. As I admired my work, I realized that the Ross engine exhaust stacks stick out of the bottom of the fuselage and would blow oil all over the payload.

Just about that moment Pat called to see how things were going. I told him that the plane and I were just about ready. All there was left to do was to add some sort of exhaust deflector to the bottom of the fuselage. It occurred to both of us that the deflector would also help reduce some of the drag of the chutist. It would also decrease the possibility of having the wind blow the chutist loose before we were ready. Pat hung up to finish his work on the chutist and I got to work on the deflector.

A small piece of aluminum did the job. It was bent to shape and installed on to the bottom of the fuselage with three screws. It looked okay, but it was obvious that the deflector, alone, wouldn't keep the oil off of the chutist as I had hoped. A clear piece of plastic material was added under the front of the exhaust

The chutist almost ready!

The chutist ready to go.

Chutist in place for Phase 4 test.

Pat & pieces.

deflector so it would trail down the fuselage to cover the chutist. The elastic band that would hold the chutist in place would also keep it covered with the plastic. We used a piece of the backing from some MonoKote. Since it would only be mounted to the fuselage along the front of the deflector, it was doubtful that there was any way in which it could interfere with the drop.

By the time the deflector was made, painted, and installed, it was about 10:00 Saturday evening. The phone rang. It was Pat. "How much clearance do you have from the bottom of the fuse to the ground?" I measured it and found we had about 5 inches. Pat was quiet for a long minute when I told him. Then he said, "It looks like we have a problem. The parachutist is about 6" from the top of the chute pack to the bottom of the battery pack so we'll need at least 6½" clearance." Then he paused awhile. "Ever take-off of a dolly?"

I said that I had never tried that, but I was willing if he was. Pat said that he and his son, Jerry, had better get busy if we were going to fly it tomorrow. He hung up and I got back to work to finish up the Telemaster. Only a little left to do.

About 11:30 that evening the plane was all shined up and ready for the big day. The phone rang. When I answered Pat said, "We've figured it out. We'll use a four wheel dolly with racks for your main landing gear and a support to hold up the back of the fuselage just behind the servo compartment." He mentioned that the frame was built but before he could finish it he needed to find out the wheel size of my main gear and the distance between the wheels. With that information he said, "See you at the field tomorrow. Let's make it by about 7:30 so we can get in some flights before the wind blows up." The famed Santa Ana winds were blowing up a storm all day Saturday and the forecast was for continued winds on Sunday. Ah well, the weather forecasters have been wrong before. I hoped.

Early Sunday morning, at the field, I was putting the wing on the Senior Telemaster when Pat drove up. He bounded out of his car holding a wire framework complete with 4" wire wheels on the front and 2¼" balloon tire wheels on the rear. After we finished laughing, we put the Telemaster in place. What a sight. And, despite the fact that it was just about built over the phone, it fit the plane beautifully. My only concern was that with four wheels it looked like there couldn't be any ground control. But it rolled straight so we'd give it a try.

Then we had our first glimpse of the chutist. It was easy to see why the dolly was needed. Pat commented that the chutist weighed 1¼ lbs. With his head an inch or so behind the firewall, his legs reached almost to the rear of the servo compartment. We just about had enough room for him. And, hopefully, there was enough wing to carry the weight. If only we could get the chutist to flap his arms real hard.

After plenty of time to admire the genius of the dolly and the release mechanism, Pat, the Valencia Valley Headwinds Field Engineering Consultant Team (everyone else out at the field) and I worked out our famous five phase flight test program. First we agreed that we should fly the Telemaster once at least to "run in" the re-built engine. For phase two we would test the drop mechanics by using my Raggedy Ann chutist. After all, we had to try that

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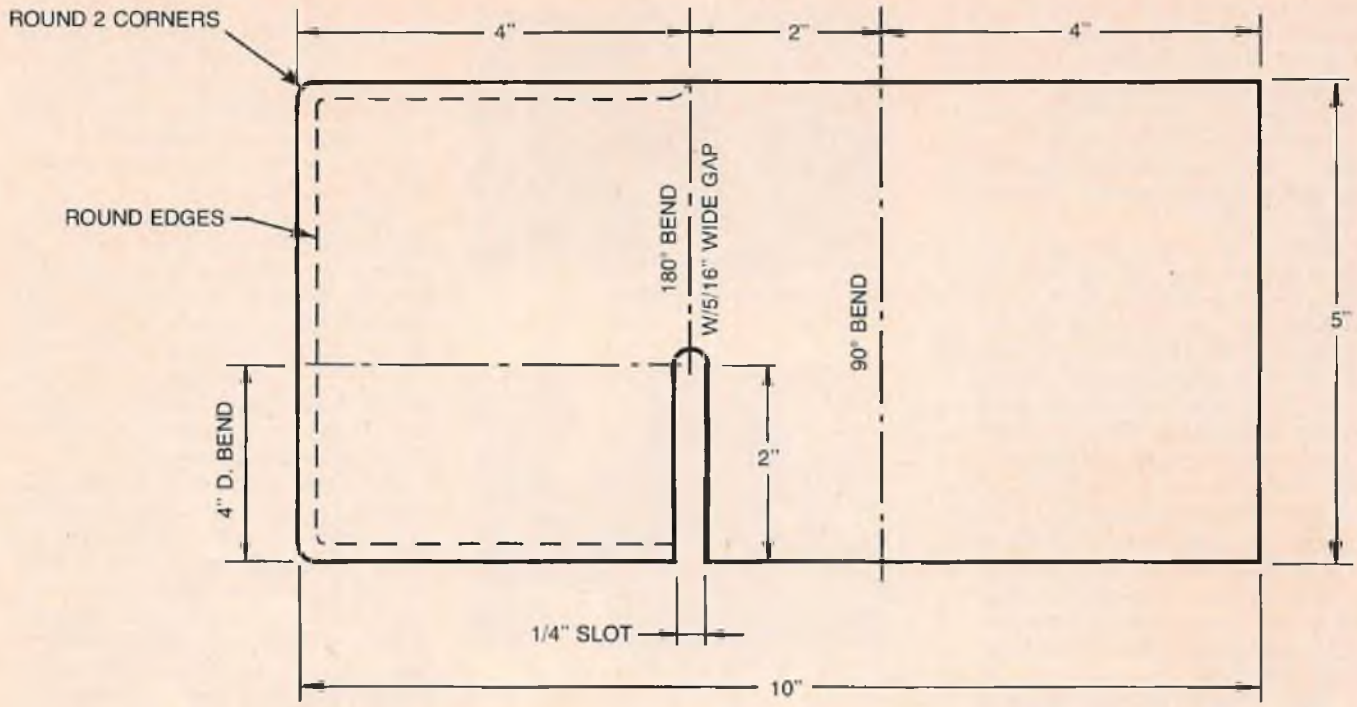


SINGLE STICK TRANSMITTER TRAY LAYOUT PLAN
3/16" THICK WHITE PLEXIGLAS

FLY BETTER, CRASH LESS

USE A SINGLE STICK TRANSMITTER TRAY

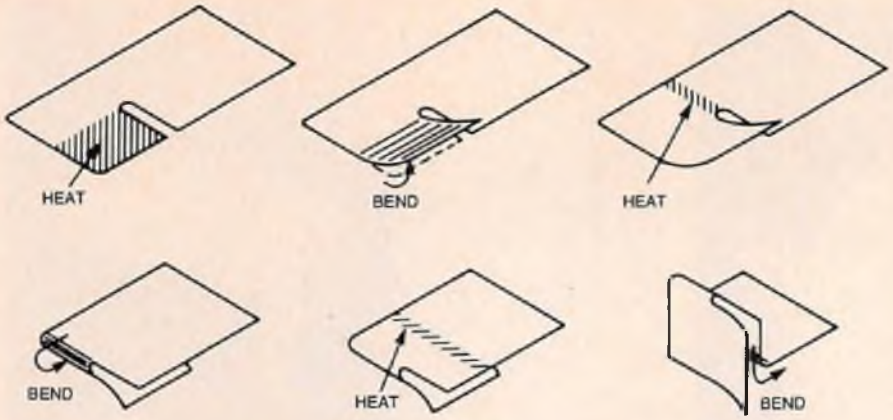
By James M. Petro

Close-up of 45° control system on tray.

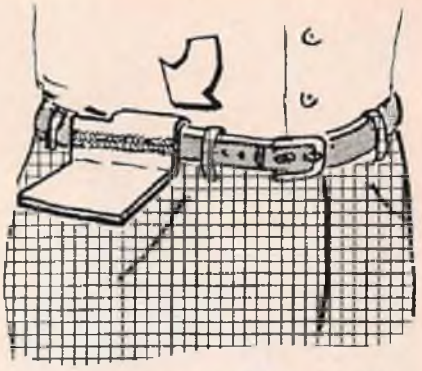
A very popular R/C system is the 2-channel model which is very reasonably priced, and has all that is basically required for beginners, 1/2A aerobatics and gliders. The single stick versions are particularly nice and compact. There is, however, a couple of built-in problems with these which have been inherited from the larger multi-channel systems. They are: (1) the transmitter is held in both hands, and (2) the normal holding position, while flying, points the antenna at the airplane. Both are the cause of crashes and sloppy maneuvers.

All too often, a "glitch" or loss of control can be caused by flying with the antenna pointed at the airplane. It's very easy to forget that there's almost no signal radiating from the end of the antenna. A low flying 1/2A is only a second away from an unscheduled and unwanted landing spelled C-R-A-S-H.

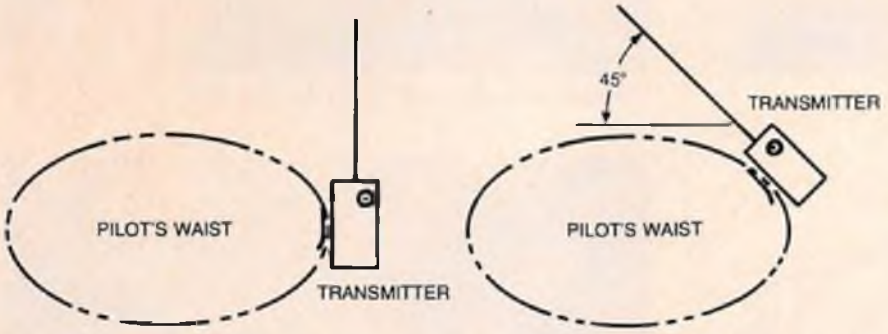
Good endurance is wanted in gliders, but have you noticed how your hands tire after about 20 minutes? Likewise, the transmitter box is not contoured for



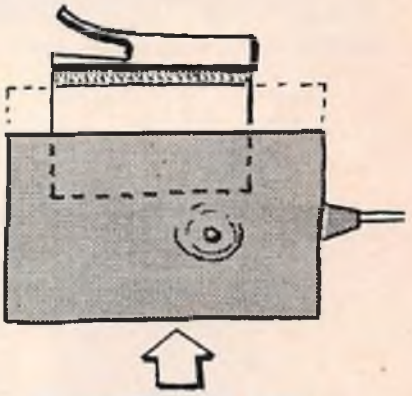
BENDING SEQUENCE



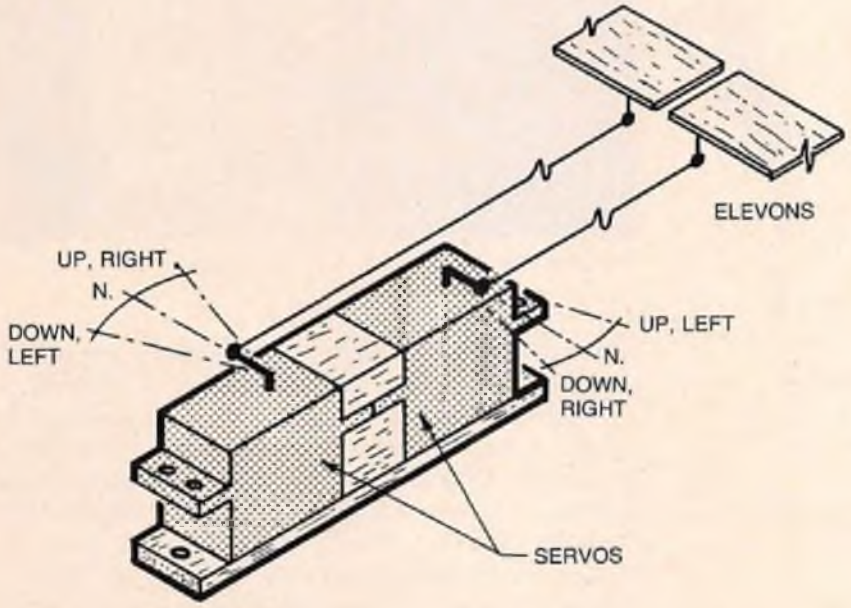
SLIP TRAY ON WAIST



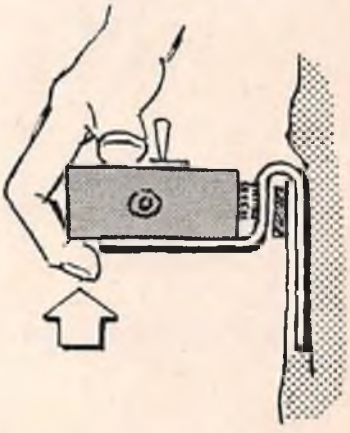
TRANSMITTER LOCATION ON BELT



TRANSFER VELCRO TO TRANSMITTER



SERVO ARRANGEMENT FOR 45° CONTROL SYSTEM



ALWAYS LIFT TO REMOVE

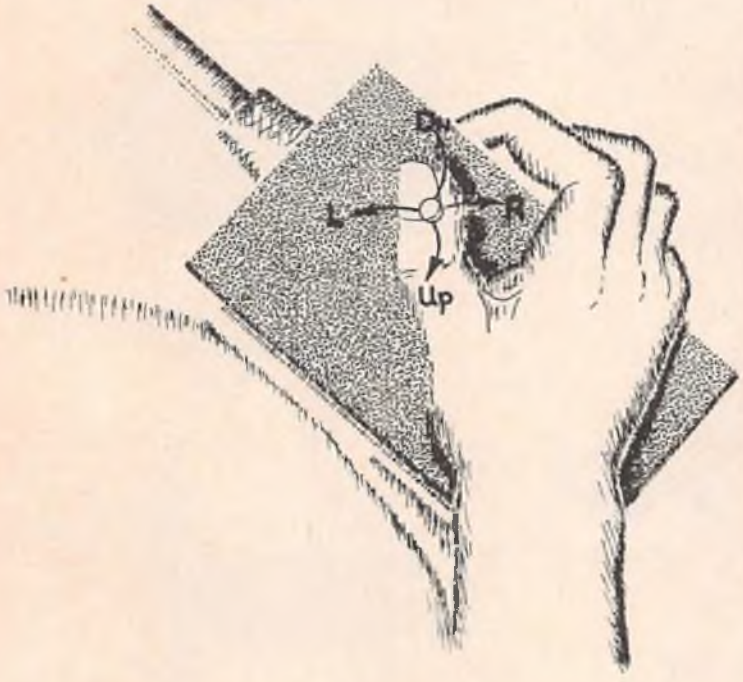
maintaining a uniform hand position on the box and stick. As your hand moves, the stick input changes and the airplane doesn't quite go where you wanted it to.

The transmitter tray is a solution for the multi-channel sets, but is a rarity in this country. Tests with it on the 2-ch. systems showed that, for these, it was a nuisance. The world's best pilots are using a side-arm handle control in the latest military fighters. The side-arm control is also used in the BD-5 home-builts. Now, there's the answer; combine a tray to hold the transmitter with the antenna not aimed at the airplane, and side-arm control location to feed in precise movements to the stick.

Developed into the belt-hung transmitter tray shown in the illustrations and photos, it fits comfortably on your hip with your hand resting on the face of the transmitter. The other hand is always free. A Velcro fastening tape securely holds the transmitter to the tray, yet releases conveniently by lifting up on the outer edge of the box. Antenna "dead spot" pointing is ended along with inad-

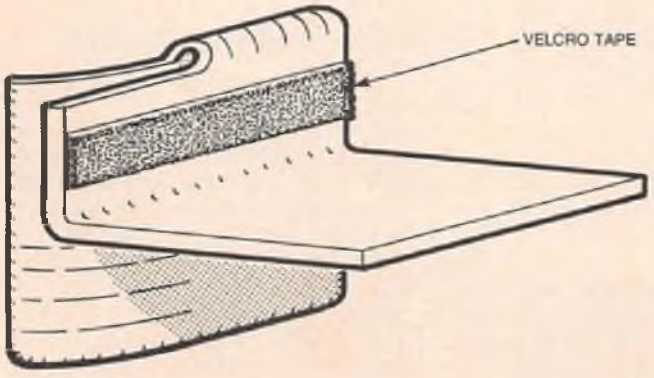
Bottom of tray with transmitter attached.

Bottom of transmitter with tray attached.



PILOT VIEW OF SIDE-ARM CONTROL @ 45°

Placing tray on belt.



SINGLE STICK TRANSMITTER TRAY
UNIVERSAL FIT FOR BOTH RIGHT AND LEFT HAND USE

vertently sticking the metal rod through your wing or into the prop while getting ready to launch the airplane.

One of the best ways of achieving elevon or V-tail control functions with a 2-channel system is to tilt the transmitter 45° and each servo is hooked to one control surface. This eliminates mixers. The illustration and R/C Modeler "V-1 Buzz Bomb" article on page 78 of the January 1976 issue shows how simple this is. With this belt-hung transmitter tray, the tray is moved forward on the hip until it is 45° cross-ways mounted. The transmitter can be moved fore and aft on the tray to position the box so the hand is comfortable on the stick.

Last, but not least, this tray is a handy way to carry the transmitter even if you don't want to fly side-arm style.

An aura of mystique attracts people to tray supported transmitters. There is something mechanical the pilot is manipulating in the open and not semi-concealed in his hands. This makes the curious spectator see an intriguing gadget, not a toy. □

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7 CHANNEL RC SYSTEM

FEATURES

TRANSMITTER

- Number of Channels: 7
- Case Material: Durable textured Vinyl covered aluminum case.
- Type Gimbals: Closed gimbal for smooth operation with adjustable tension for feel.
- Type Pots: Long life conductive plastic.
- Power Supply: Eight 550 MAH ni-cad cells 9.6 volts.
- Type Meter: Expanded scale voltmeter.
- Frequencies Available: All 72 and 53 MHz.
- Weight: 1 lb., 15 oz.
- Size: 7" x 5⅞" x 1⅞"
- Unique Features: Transmitter is equipped with adjustable tension control sticks for independent control stick feel. Single stick also available.

RECEIVER

- Case Material : Light durable Nylon case.
- Size: 1.19" sq. x 2.19" long.
- Weight: 2 oz.
- Type Decoder: C Mos integrated circuit.
- Front End: Double tuned dual conversion optional.

SERVOS

- Case Material: Light durable Nylon.
- Size: 1.41" x 1.38" x .71".
- Weight: 1.2 oz.
- Output: Rotary ±45%.
- Output Controls: Wheels and arms included.
- Type Amplifier: Dual in-line package integrated circuit; external PNP motor drivers.
- Motor Size: 16mm, 11 ohm.
- Servos Options: SM-Super Mini standard, MM-Mini Mite linear or rotary optional.

SYSTEM

- Airborne Power: Four 550 MAH cells, 4.8 volts with reverse charge diode protection.
- Type Connector: 3 pin polarized high reliable gold plated.
- Type Charger: Transformer isolated wall charger with LED indicator.
- Servo Trays: Um-6 mounts receiver and 4 servos and an AM-4 single servo mount included.
- Shipping Container: Shockproof foam rubber.
- Service Available: Yes, at EK's service centers worldwide.

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A ONE SHOT FIBERGLASS PART

By Dick Tichenor

Occasionally in designing and scratch-building R/C models, we encounter a situation in which a molded fiberglass shell is the most practical solution. One of our current projects needed a removable fuselage nose section which houses a retractable nose wheel. The requirement for one part did not warrant carving and finishing a male plug from which a female mold could be made for a lay-up. That prompted the use of a method that has been around for a long time. Also, from the number of inquiries received at RCM on how to do this sort of thing, we decided to photograph the sequence and present it to our readers. The same method is applicable to making cowlings, nacelles, etc.

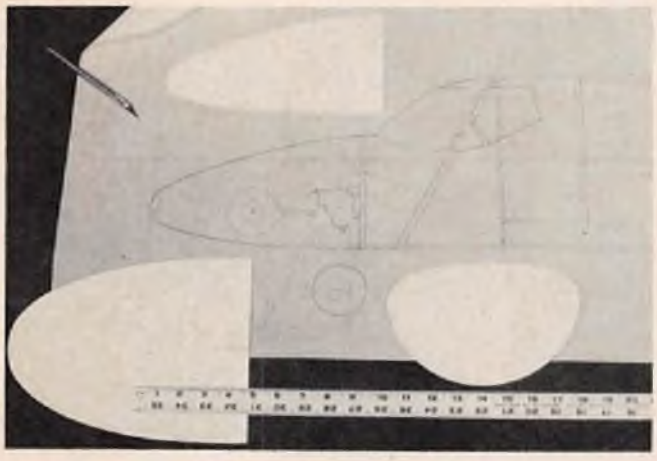


Photo 1. Start the project with card stock templates made from the plans for the side, top and aft sections of the part to be made. 1" of trim has been added on the aft end.

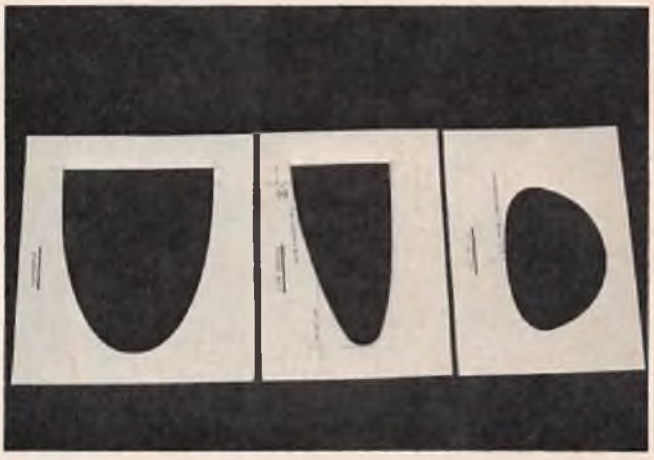


Photo 2. Female templates have been made 1/16" undersize from the profiles shown in Photo 1. Female templates are used for checking the shape during sanding the foam form.

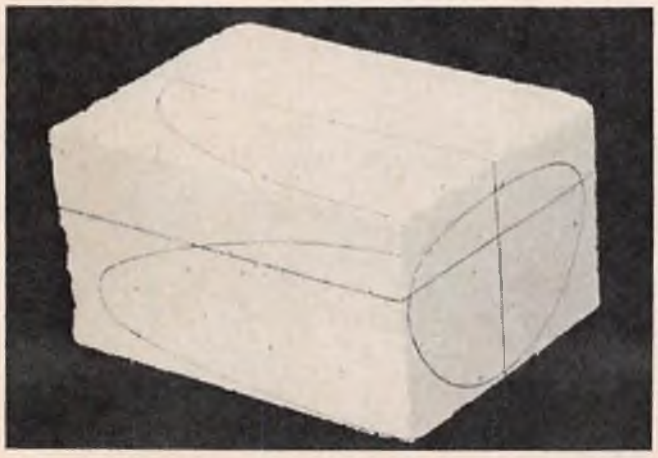


Photo 3. The undersize profiles are marked on a foam block. In this case, the foam wasn't thick enough so two blocks were joined with Blue Goo contact cement and the glue line was used as a horizontal reference line.

Photo 4. The form has been shaped and is ready for the glass cloth. The block was roughed out with a hacksaw blade, rough sanded with #80 garnet paper and finished with #150 garnet paper.

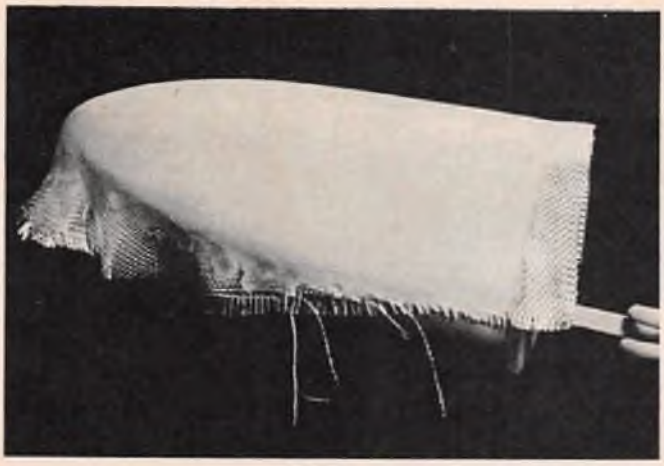


Photo 5. A 3/8" x 1" pine strip has been epoxied in a hole in the form to facilitate holding. Heavy weight glass cloth has been draped over the form and a paste of 10-Minute epoxy and micro-balloons has been applied with a sucker stick. Be sure to use epoxy as polyester resins dissolve most foam materials. When the epoxy has set, trim surplus cloth and sand down the edges.

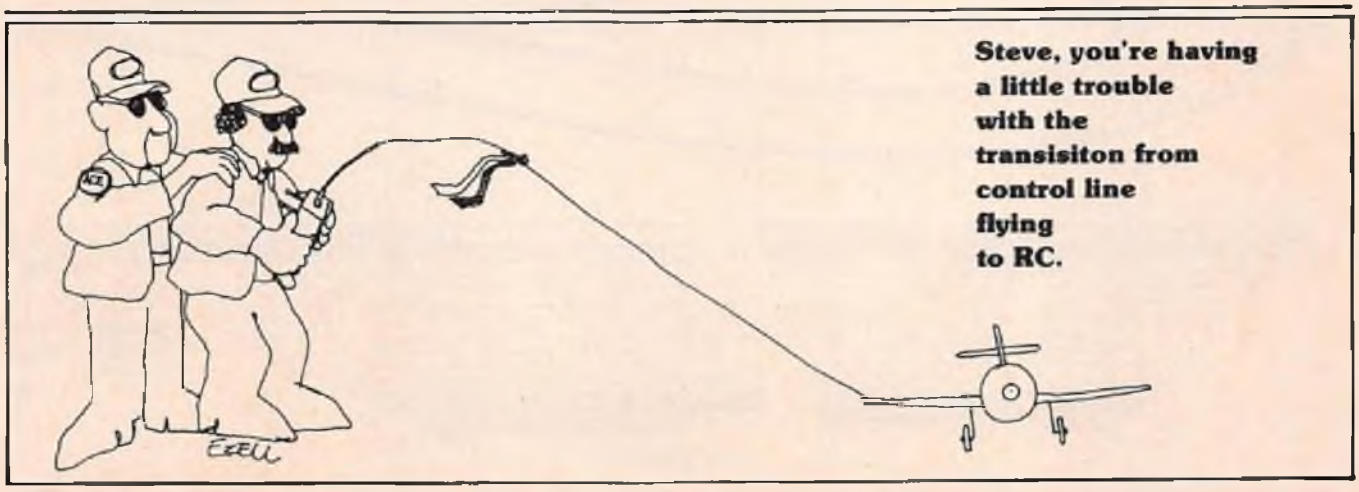
Photo 6. The top has been covered with heavy glass cloth and the whole part sanded smooth. Then both the bottom and top were covered with medium weight glass cloth. In mixing the epoxy, pour one part in the cup, add micro-balloons to a paste consistency, then add the second epoxy part, stir well and apply. The 10-Minute epoxy allows ample time if you don't fool around too much. The use of micro-balloons keeps the epoxy from running and also makes the epoxy easier to sand.

Photo 7. Now that the shell is sealed with epoxy, any irregularities can be filled with a paste made of resin and micro-balloons. After sanding those filled places smooth, apply a coat of resin to the entire part. Sand the resin smooth and you should have the nice fiberglass that you need.

Using a surface on the form for reference, measure and mark the final trim of the part. In our case, it was the aft end from which we measured 1" forward.

For removing the foam from the shell, we sort of dug the foam out with a pair of long nose pliers. We didn't try to get all the foam out, just dug a big hole into which we poured about 4 ounces of Super Poxy thinner. In a matter of a few seconds, the foam was dissolved and poured out. After wiping the shell dry, we had the nose section that we wanted.

Photo 8. This is what it was all about; the fiberglass nose mounted on the front of the fuselage. Did you ask, "What is this project?" It is a 71" span Cessna Citation I ducted fan model. How about that! □



BUILT-UP TAPERED WINGS

By H.J.R. Dillen

A general practice for building a tapered wing is to use the sandwich system. This is where a number of balsa sheets, roughly cut, are sandwiched between two plywood wing rib templates. A center rib and a tip rib can be sanded so that we obtain the desired number of wing ribs for our planned tapered wing.

Many of us scratch-builders will have had the experience that, practically every time, our wing will have a slightly different shape than our original drawing. The reason for this divergence is easily detectable when the whole operation is drawn at full scale, and the following example will be easy to follow.

Consider half a wing (Figure 1) with 11 wing ribs, of which ribs No. 1 and 11 are drawn in Figure 2.

We usually copy those two ribs to be used as templates, but what happens when we start sanding our ensemble? You will notice (Figure 3) that, in the obtained tapered block, all ribs are tapered at line AB at the leading edge, and at line KN at the trailing edge. Unfortunately, our ribs cannot be used with these tapered edges. In reality, they should be tapered as in lines AC and KM, according to the real taper of our wing panel. Our next step is to sand our ribs to the desired taper as shown in Figure 4A and 4B.

Returning to Figure 3, we notice that this way our rib No. 1 loses 3mm (1/8") at the leading edge, and 6mm (1/4") at the trailing edge. For a rib of 300mm (12"), this leaves us a total of 9mm (3/8") smaller than the desired center-rib. The difference is even worse for our tip rib. Where we planned a rib of 180mm (7¼"), we obtain one of 193mm, more than 1/2" longer than planned. In Figure 5, we can see that in the vertical section of our stack of ribs, we also have differences in rib Nos. 1 and 11. This proves that we cannot use our original rib Nos. 1 and 11 for our sandwich system.

In order to obtain ribs that will permit us to build a wing identical to our layout, some extra drawing work has to be done at full scale.

Start by drawing both center and tip ribs. Underneath and parallel to the rib centerline, draw a number of lines representing a top view of the stack of ribs. This, at a distance, equal to the thickness of the ribs (2mm or 3mm). Don't forget to draw one line more than the number of ribs (12 lines for 11 ribs). On both sides, add the thickness of the plywood you are going to use for your templates (4mm in our example). Now add the perpendicular lines from both ribs to the parallel lines. Between points A and C you have the section of your center rib and between B and D, the section of your tip rib. Now draw a line through A and B and mark points K and L. Also draw a line through C and D and mark points N and M. You will notice that you have new rib lengths KN and LM. At this stage, draw vertical lines upwards from K and N.

At the thickest point of your rib (C.G.), you draw a vertical working line and repeat the same procedure as before, but this time for the wing thickness. Both plywood dimensions can be indicated with a compass on the vertical working line. With the 4 new points, we can draw the outlines of our new plywood templates. The same procedure has to be repeated for the new tip rib LM.

Once you have drawn the new outlines, you will notice that our new center rib is bigger and the the new tip rib is smaller than the original ribs. This way, we will obtain, after sanding, true ribs which will fit to our original drawing.

The above described system is also valid if you use aluminum templates. The only difference will be noticed at the tip template, which will be bigger than our plywood model because our

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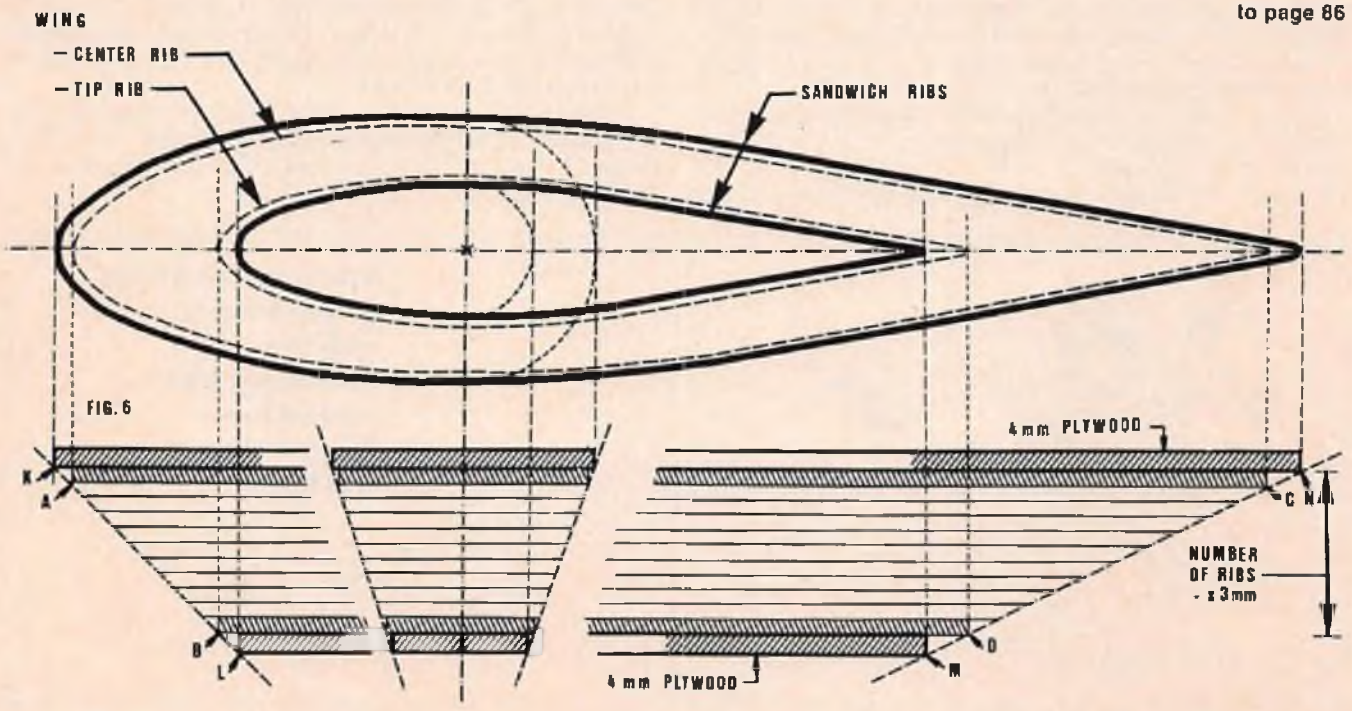


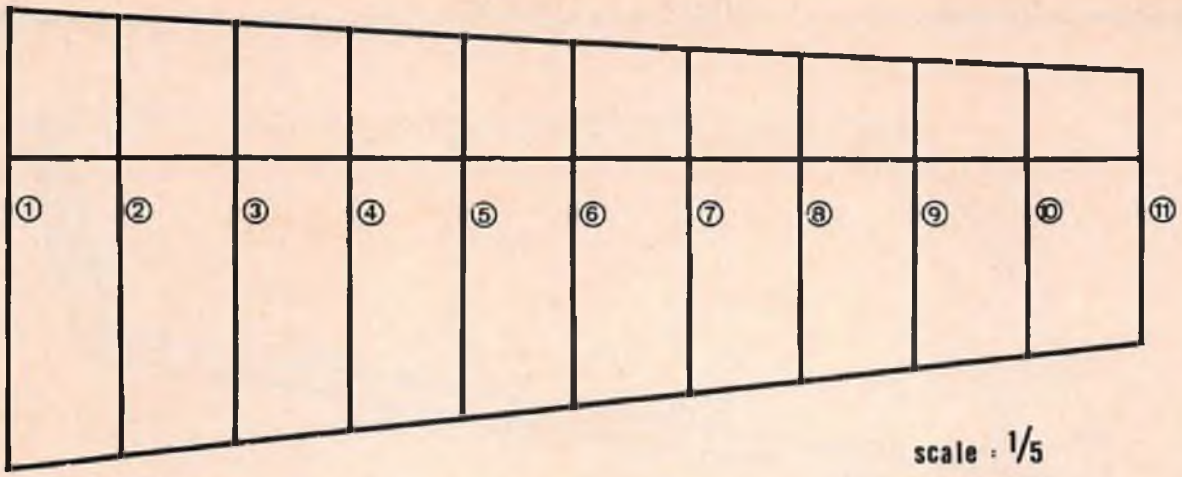
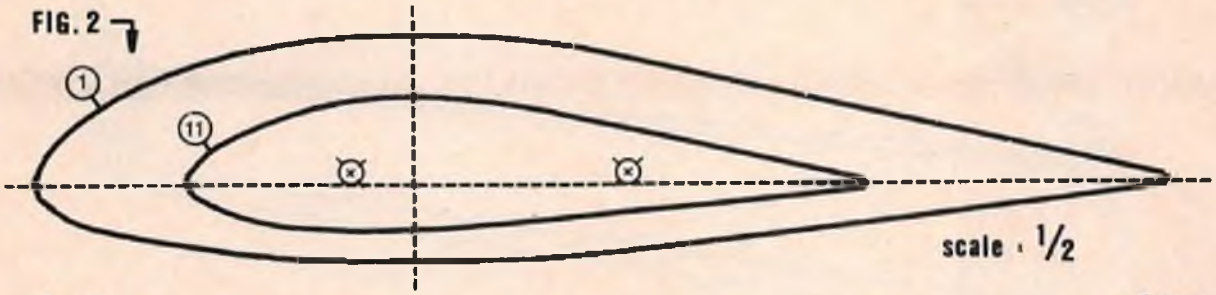


FIG. 1

FIG. 2



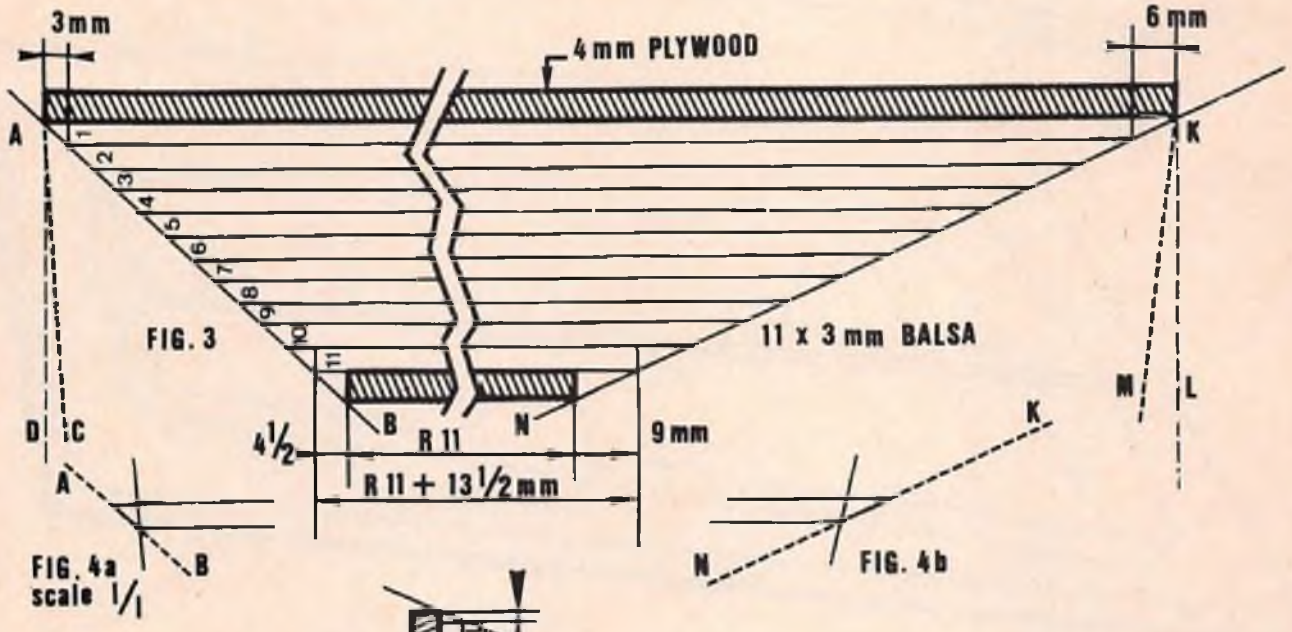


FIG. 3

FIG. 4a
scale 1/1

FIG. 4b

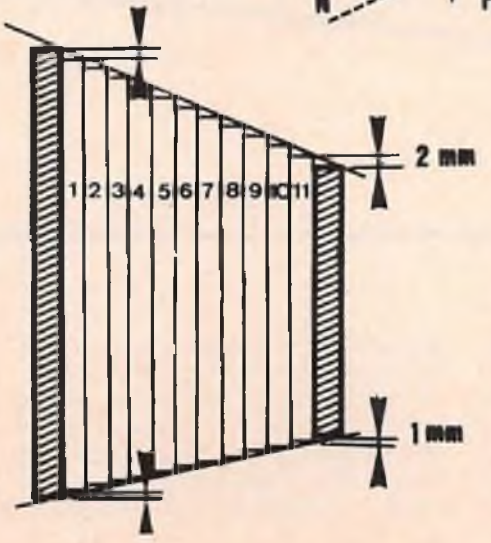
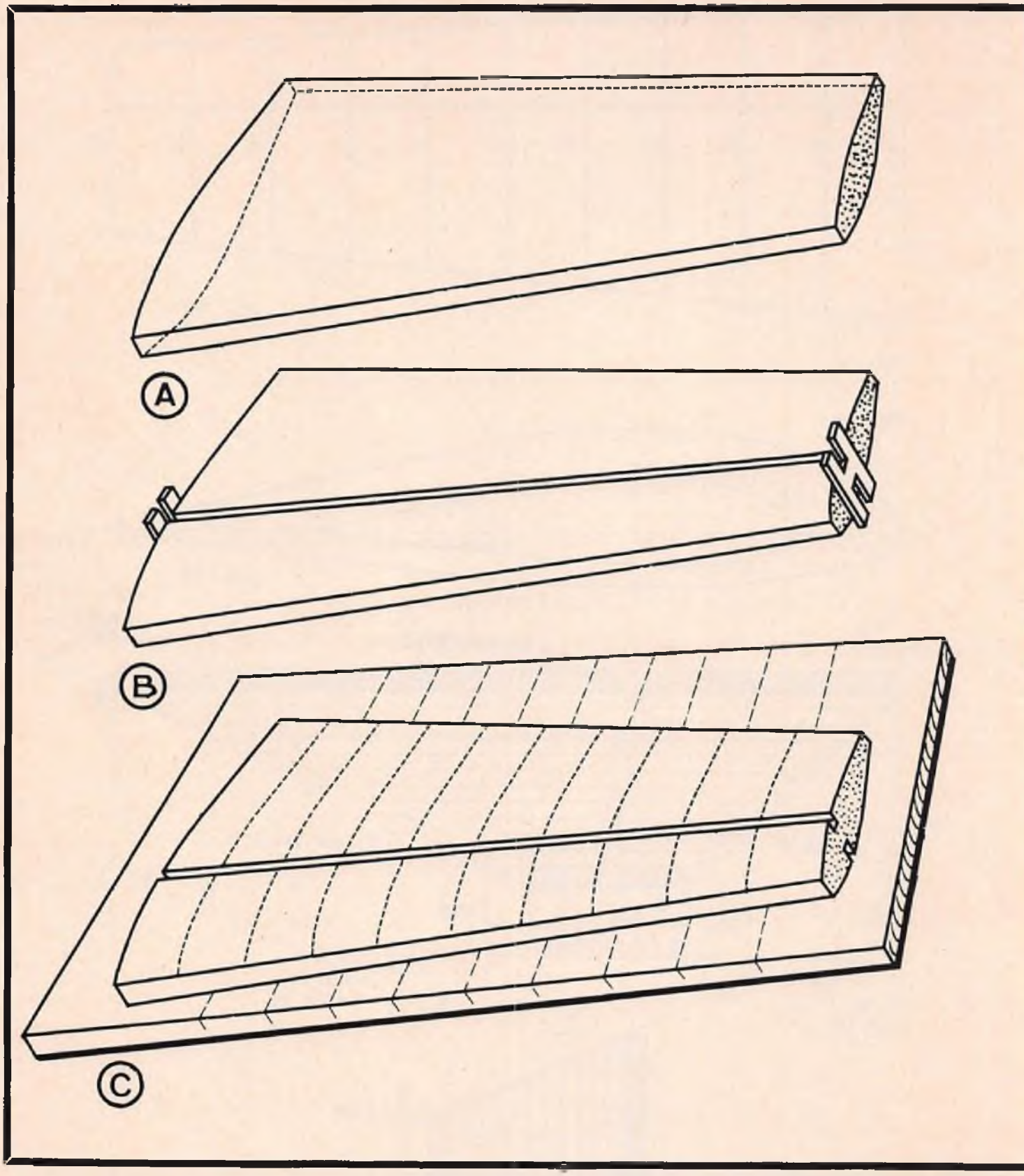


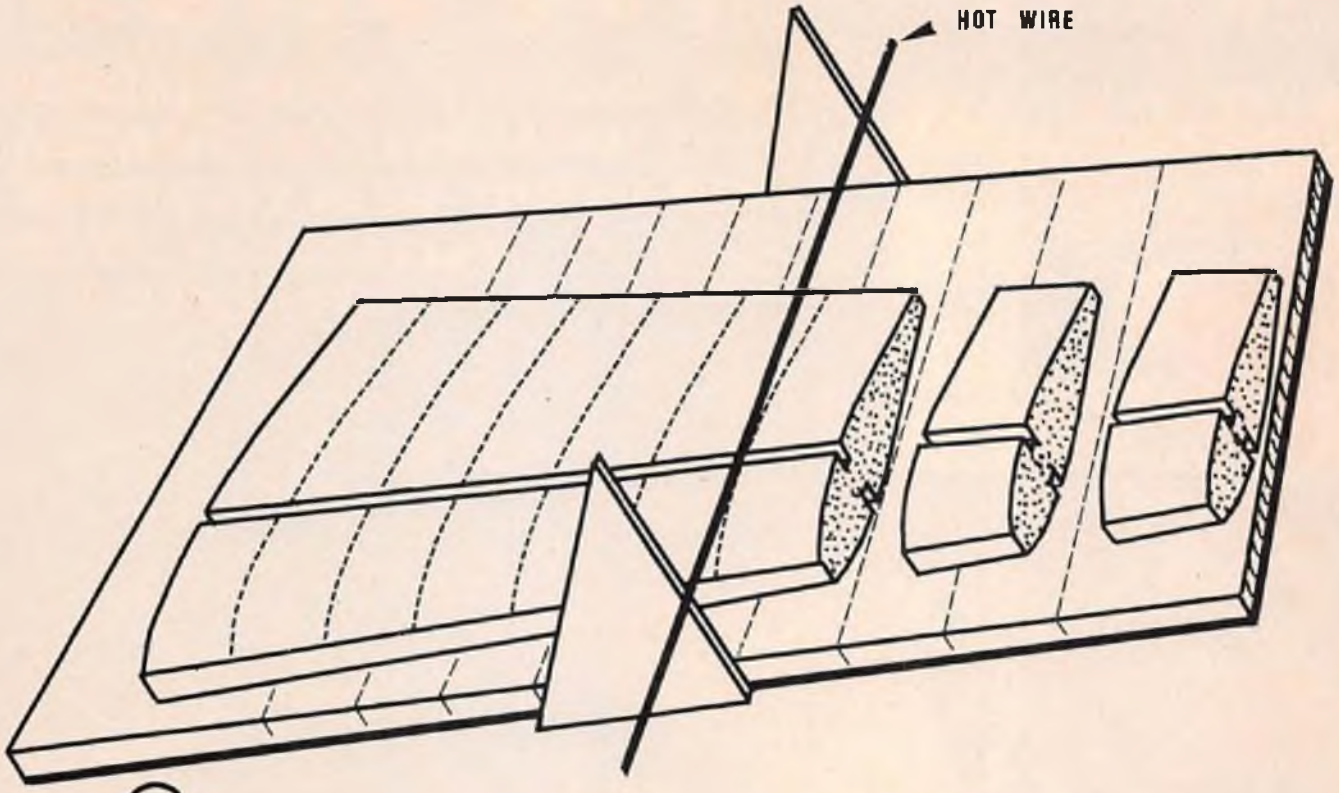
FIG. 5



aluminum will only be 1mm or 1.5mm thick.

At this point, I would like to describe another way of building a tapered wing. I tried this method once with good results.

The day that I planned to make another wing for one of my planes, I remembered that I still had a spare half of a foam wing left over from a previous cutting (Figure A). With that foam wing in front of me, I realized that I had all the ribs I needed before me. I started by making two templates of the main spar sections. I glued them to both ends of the wing and made spar notches on both sides of the wing with a hot wire (Figure B). Then, I fixed the wing to a board, slightly larger than the wing chord. Being 65cm long, I divided the wing into ten equal parts of 65mm each and drew a perpendicular line at each division on



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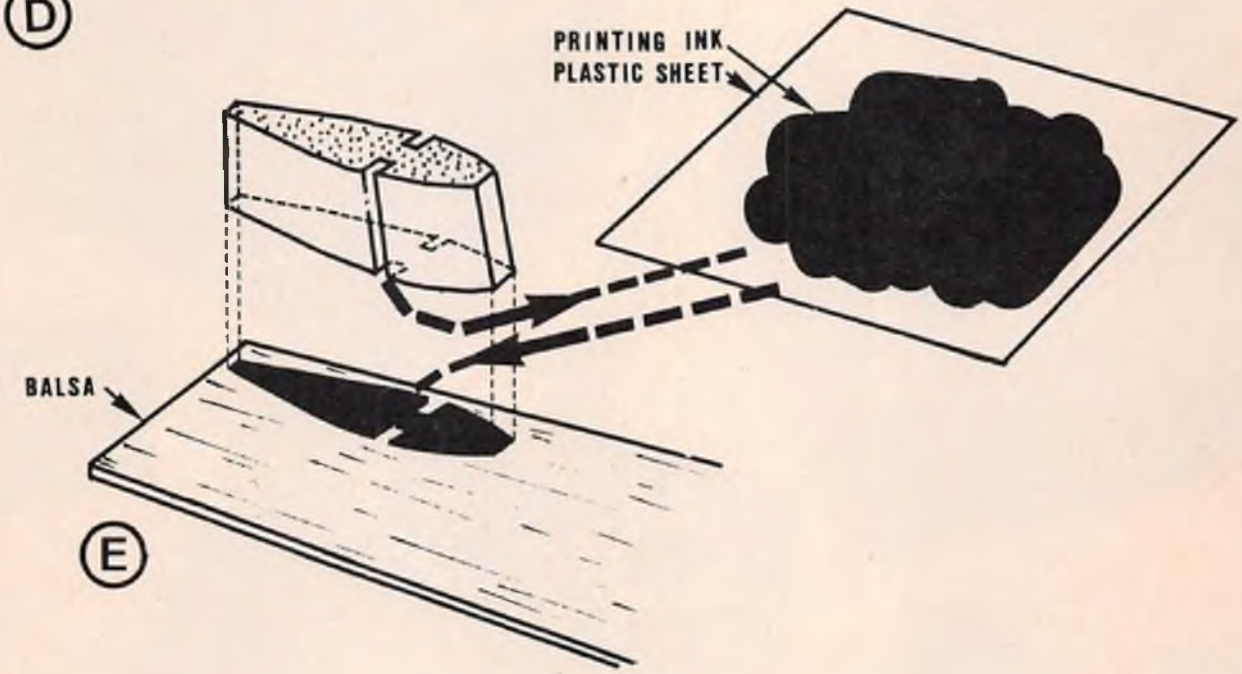

E

the board (Figure C). With two aluminum triangles fixed with double tape at the sides of the board, I made a hot wire cut at each line (Figure D) and obtained ten pieces of foam. Each cut was perfectly planed and sharp, and all I had to do was dip the same side of each piece in printer's ink and print it twice on a sheet of balsa (Figure E). Only the end piece had to be used twice on both sides for rib Nos. 10 and 11.

I also printed the ribs on a piece of paper for future use and documentation. If you do not like the printer's ink on one side of each rib, you can also make prints on a piece of adhesive paper which can be cut to the size of your balsa sheet.

All there is to do afterwards is to cut out the ribs, sand them slightly, and assemble the wing. □

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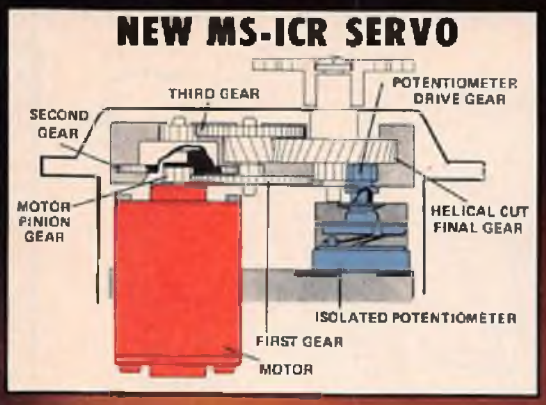

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FLUGTAG '77

By Allen M. Adler

Many modelers, after once donning a uniform of one of the Armed Forces, tend to lay aside their hobby until completion of their obligated service. This becomes especially true when the service member is transferred overseas. Usually, most people are of the opinion that the time and availability of supplies is non-existent for the pursuit of their hobby.

Not so!! Modeling is alive and well here in Germany! In fact, the U.S. Army even encourages it by making some of the training areas available for the use of modelers. Even in Viet Nam, a few of us die-hards still managed to devote what little spare time we had to building and flying. Admittedly, we were forced to order most of our equipment from back in "The World", but build and fly we did. We used some of the most horrible concoctions for our engines that anyone would ever dare try. How about aviation gasoline and SAE 10 oil, or ether with moth balls and lighter fluid; in fact, we even tried rubbing alcohol and castor oil. Anyone who managed to lay his lands on legitimate model airplane fuel would hoard it like gold. This flyer suffered bleeding, torn lips from kissing the ground on which one guy walked just to get a tankful of fuel!

Well, the conflict of bleeding knees and tear-stained eyes is over and now I'm in modeler's heaven. Yep — that's my opinion of Germany. If I had to rate countries on the quality of supplies and kits, Germany would head the list.

Once a year, we here at Fliegerhorst Kaserne hold "open house" when we open the doors to the public in a German-American friendship celebration. This year, I considered it especially eventful in that, for the first time, an American model airplane club participated in the airshow — the "Rittmeister von Hanau". That roughly translates as "Hanau Aces". We gave half of the allotted time to our German partner model airplane club of Hanau/Huttengesaess, along with guest members of the Niedermittlau club (Kinzigtal FMC).

The Kaserne opened to the public on Friday, May 13, with a static display of

Langenselbold Aero Club demonstrated glider flights.

Herr Schattats beautiful SR-71.

Would you believe a Fiesler Storch?

Herr Sauerwein's Akrostar, a Topp's Models kit.

Topp's Models "M-21".

German, American, and Belgium military weapons and hardware plus a carnival and car show. The German beer, wurst, American hot dogs, hamburgers, and steaks were consumed until 8:00 Sunday evening.

On Saturday, the 14th, the air show (Flugtag) opened with a sky diving demonstration presented by the Coleman Barracks parachute team from Mannheim. This former paratrooper's heart thrilled to it, especially the performance of the parafoil which is somewhat akin to hang gliding.

During the next 25 minutes, we were treated to "ole' timer" aerobatics by the Roten Baronne ("Red Barons") from Egelsbach, flying maneuvers by gliders of the Langenselbold Aero Club, and rappelling from hovering helicopters by the 8th Infantry Division from Bad Kreuznach. The crowd hung onto every minute of it.

At 3:00, there was a flight demonstration of the Bolkow 105 helicopter, presented by the Netherlander Royal Air Force. The BO 105 is aerobatic. Believe me, it's aerobatic! Watching it loop, dive, and roll will amaze you the first time you see it. It's the only helicopter I know of that's certified aerobatic. Its performance was incredibly flawless and there seemed little else left to top it, that is, until Herr Stroessenreuther (Manfred Stroessenreuther), the 1976 World Champion of Mandatory Aerobatic Figures, grabbed the attention of everyone when he put his Pitt's Special through its paces. He managed to hold our nerves on a string for the full allotted 15 minutes.

AH-1Q "Cobra" belonging to the 334th Attack Helicopter Company. Cowling is opened to reveal the engine and transmission. This is "Q" Model, designed to fire the tow anti-tank missiles.

Meanwhile, as pre-planned, our club and our partner club prepared to take over the next event. We had 20 minutes in which to put on our best show. It had to be our best if we had any hope of sharing a little of the glory with Herr Stroessenreuther. We had the first 10 minutes, and Jim Rice, formerly of El Paso, fired up his Aeromaster just prior to Herr Stroessenreuther's touch-down. He was scheduled to use up 5 minutes and the combat flyers (Ukie) would use up the other five, after which our German comrades would take over for the remaining 10 minutes.

As soon as Herr Stroessenreuther landed, Jim taxied out and, when the applause had died, he put the Aeromaster in the air. Just as soon as he had

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Topp's Models P-51.

The "Rittmeisters" on display. Author's 47G in the foreground.

FUEL PUMP

● Starting off on the right foot, you can blame this article on my flying buddy George King - - - he built a pump.

"Where did you get the pump?"

"Off a car in the junk yard."

"What kind of car?"

"Well, I am not sure, I think it was a foreign one."

"Where did you get the electronics parts?"

"From my junk box."

"Come on now, George, you are no help at all."

Of course George's pump worked, but who could duplicate it? Sounds like my grandmother baking an apple pie — take a dab of butter, a handful of flour, a pinch of salt, a smidgen of lemon juice and some apples . . . sound familiar?

Another friend said, go out and buy one, they are on special at the hobby shop this week. That really shows you what kind of friend he is. Actually, had I taken his advice, I would have been $5.00 richer. It really isn't the cost, it is the challenge. Sure, I could afford a pump, but it does my ego a raft of good to be able to say, "See how it pumps the tank full, then empties it when you are through flying." I feel this way; either I can build one or I will go on squeezing my air pressure pump.

The trip to the automobile junk yard was a real experience. "Do you have a windshield washer pump for a Datsun?" I asked innocently.

After discussing model and year thoroughly, I finally clued him in that it made no difference. Then he said, "Try the last row, I think that is where the foreign cars are." Apparently, if I wanted one, I removed it myself. The last row turned out to be the last two rows stacked 2 cars high. After walking past the VW's, Toyotas, Colts, Capris, Renaults and Volvos, I finally found a Datsun. Luck was with me, since there on the bottom of the windshield washer container, pressed into a recess, was the little gem. We tried it out on his battery, it ran and he guessed it would be $2.00

When I got home, I put fuel tubing on the outlets, stuck the intake tube in a glass of water and hooked the mess to my starter battery. Nothing!!! So I sucked on the output tube and the water began to move. I pointed the tube out across the yard, and in a matter of a few seconds, the pump spewed the water on my long unwatered lawn which heaved a sigh of thanks. I reversed the polarity on the motor and the tubes. Nothing!!! In fact, I discovered no matter which way the motor ran, it only pumped water one way. Well, back to the junk yard — apparently it wasn't a Datsun pump that George used.

This time it was another junk yard. "Do you have a windshield washer pump for a Toyota," I still innocently asked.

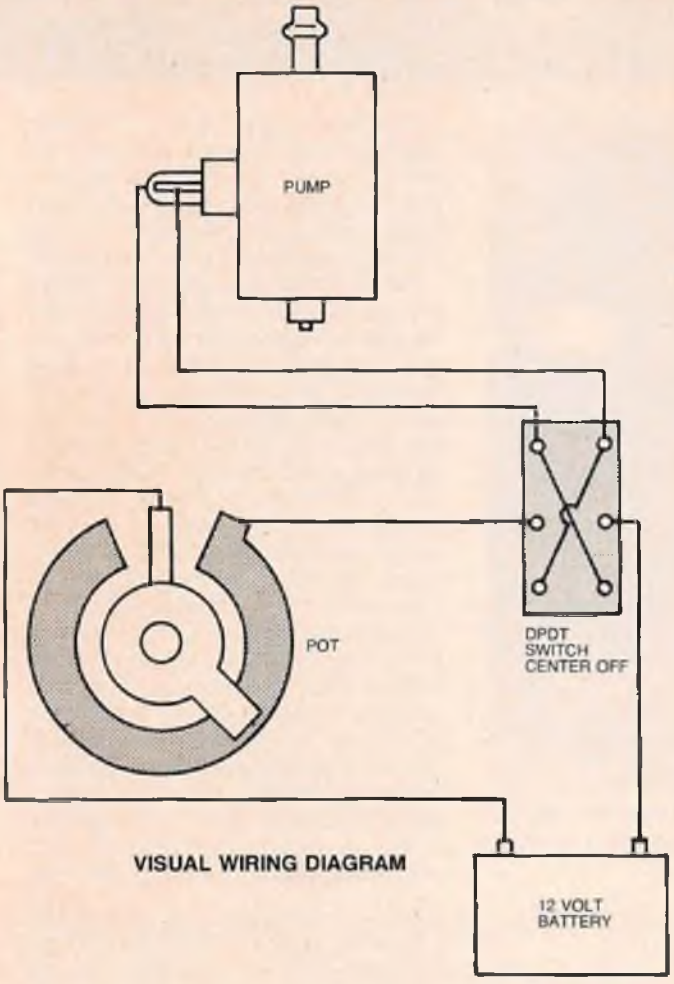
"Yeah! down that aisle over there, they are in a bin, someone out there will help you, next."

Down one aisle, up another, back and forth between aisles looking for the right bin - - - headlights, batteries, starters, tailpipes, glove compartments, decorative hood ornaments. Of course there was no one out there to help. By climbing up the side of one bin after another almost to the ceiling, I had an aerial view of most everything. There it was — a bin full of the white plastic water containers. That is exactly what it was, water containers, 75 of them. Fifteen minutes later, I had found two pumps buried in the mess. One had been in a fire and was burned beyond recognition. The other was still attached to the white plastic container. There were markings on the motor case in Japanese so it had to be from a Toyota. I carried the pump and container triumphantly to the front, paid him $4.50, and off I went home. It pumped exactly like the first one, in one direction only. Later I found out it came from a 73 Dodge Colt!

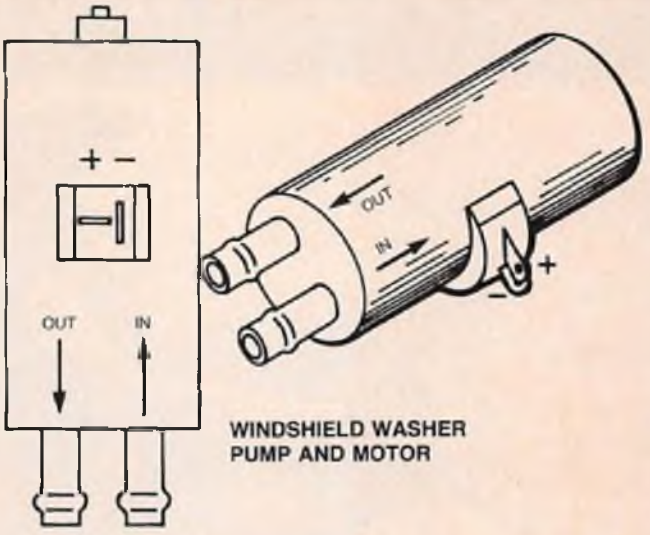
Back to the first yard again with the Datsun pump in hand. The fellow was nice and listened as I explained my purpose. He said he would trade me even if I could find one from a Toyota. This time I found two. The first one attached to the container like the others, but it did not plug into the side of the container through a grommet, it was connected with a piece of tubing. The other outlet went via a tube to the windshield. The second pump was attached to the frame some distance from the tank. These two looked good, so I took both of them. I traded for one and paid $2.00 for the other.

To make a long story shorter, the first one worked in one direction only just as before. The one attached to the frame was the right one. It pumps both directions by reversing the polarity of the battery. How do you identify the correct

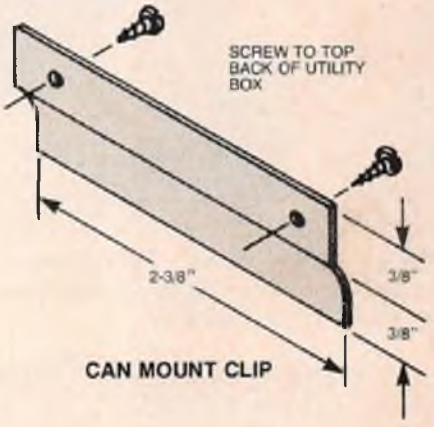
By Paul Denson



VISUAL WIRING DIAGRAM



WINDSHIELD WASHER
PUMP AND MOTOR



CAN MOUNT CLIP

one? It is, overall, 2⅞" long, the metal case is 2¼" long and is 1¼" in diameter. The plastic pump housing is held in the case with 3 metal bend-over tabs, there are two parallel plastic outlet tubes and one, the intake tube, is slightly larger in diameter than the other. There are markings on the case, **in** and **out** with arrows showing the direction of flow. The electrical connector is located in the center of the case, it contains two blade connectors. The terminals are identified by a + and − circles.

The Datsun and Colt pumps have a spout that enters the bottom of the container through a rubber grommet. Undoubtedly it takes the weight of the liquid in the tank to prime the pumps. I was going to use the white plastic water container for fuel, but these pumps just will not pump backwards no matter how you reverse the polarity. They were intended to pump water to the windshield no matter how the mechanic hooked the pump to the battery.

There was one saving grace to the whole thing. The mechanical windshield washer in my wife's Renault never did work, so it has now been replaced by the electrical one from the 73 Colt.

So far I am out $8.50 for pumps. Next, I went over to Radio Shack to buy the utility box and switch. Be sure the switch is double pole double throw (DPDT), and most important, that it has center off, otherwise it will start pumping the minute you connect the battery. You could have two switches, one for off and on, the other for fill and empty.

The wirewound pot is not really necessary; all it does is slow down the flow, but if you have a radio amateur friend or your TV repairman has a big junk box they are fairly common, any value up to about 20 ohms. They retail for about $5.00, and will make the cost approach that of a commercial pump. If you don't use the pot, you have to be on the ready to flip off the switch when your tank is full, and it will fill it fast!

Carefully drill two 1/4" holes in the top of the plastic utility box to match the inlet and outlet tubes of the pump. A thin piece of rubber foam on each side of the pump between the front and back of the box will wedge it in place. Drill a hole in the large plastic surface, which will be the front of your pump, for the switch and one for the pot if you use it. Drill a hole in the side of the box for the battery leads.

My switch was rather small, so I did the wiring before inserting it into the box. The motor leads and the lead to the pot were left overly long and were soldered after the switch was in place. The battery leads were soldered to the pot and the switch. The pot may be left out by connecting the battery leads to the center terminals of the switch.

The lip on the back used to hang it over the rim of a fuel can is fashioned out of any light metal, even tin-can stock would be okay. The two top screws on the back are used to hold it in place.

If your fuel container happens to be plastic, a few turns of vinyl tape will hold it securely on the side of your bottle. A one gallon Prestone container will work great; it has flat sides, a handle, is painted yellow for visibility and lets everyone know your car is protected. The pump can also be fastened in your field box near your fuel can.

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IT'S A BIRD, IT'S A PLANE

That's a 78 in the nose! And the wheels are six-inchers! 6" were added to the nose of the enlarged Wimpy, but 2½ pounds of lead were still necessary to bring the big bird into balance.

'Way back in the January '75 issue, RCM published an article and plans for an "old-timey" looking high winged, three channel monoplane, built from balsa sticks and MonoKote. Dr. Roger Tennyson was the proud author-builder.

Whatever the chemistry, the Whimpy fascinated Bill Tuttle of Colorado Springs. In due course, Bill sent for the full-sized plans and had at it. **Two** Tuttle-built Whimpys soon took to the rarified Rocky Mountain air — and they flew beautifully. They've been powered by Enya 15's, Enya 19's, OS 25's and a Fox 36. Three servos from a 4-channel Futaba radio were swapped between models for many pleasant flying hours. Finally, Bill sold the blue Whimpy — keeping the orange transparent one.

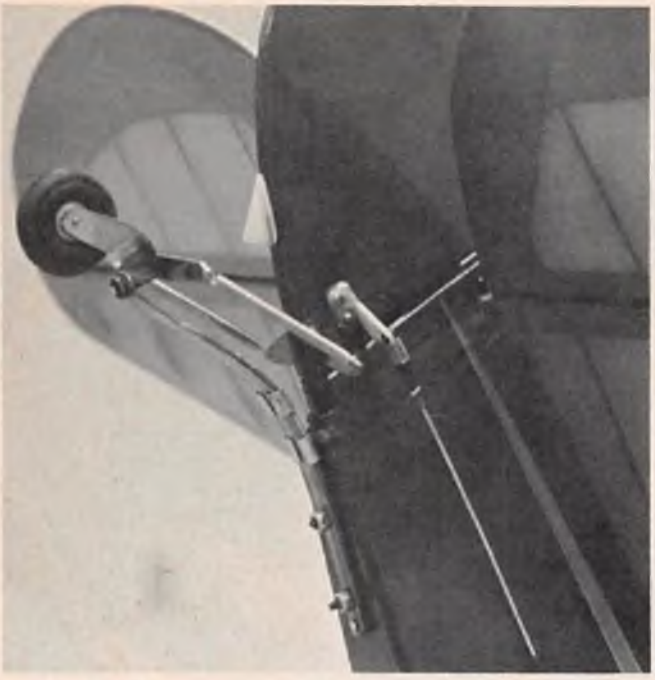
Operating on the idea that "bigger is better", locksmith Tuttle decided that he'd wipe out a balsa forest all by himself! Not content with his Bud Nosen "Aeronca" or a Senior Telemaster (another RCM design), Bill proceeded to enlarge the Whimpy plans by 50% — and knock the "H" out of it. He added 6" to the magnified fuselage length and slimmed it down a tad. But, when his

Close-up of the cabin window latch. Super Wimpy's wings are bolted and doweled into position so opening hatch allows receiver switch to be protected inside. Side windows are 1/16" Plexiglas.

Fox 78 is lost in the nose of the Super Wimpy. The wheels are six inchers on 3/16" struts. Dentist Dr. Roger Tennyson designed the original Whimpy that was the basis of the Super.

By Col. John A. de Vries

IT'S A SUPER WIMPY



Scale-like Wimpy tail wheel was built by Bill Tuttle – who is a locksmith by trade. Anti-scratch rudder bumper isn't needed.

Fin and rudder of the Super are a half-yard high and are covered with silk and clear doped as is the rest of the model.

Tuttle adjusts Fox needle valve before the first flight. Model needs both helpers to grab hold.

First flight take-off. Buffalo grass and snow patches, plus a rich engine run, held the Super back; but with 1600" of wing lifting, the model was airborne in 60'. And – it flew SLOWLY!

drawings were finished, he found that he had a 3-channel model with 1600 squares! The span of the giant wing is 104", with a 16" chord. The stab is a yard wide and has as much area as the usual Quarter Midget. The fin and rudder are 18" high.

Each of the wing ribs took half a sheet of 1/8" balsa and they were slightly modified from Dr. Tennyson's original section. Spliced sheets of 3" (1/8" x 36") balsa form the wing's trailing edge, while the leading edges were "hogged" out of 3/8" square **spruce!** "Stick" fuselage sides were meticulously built from 1/2" square balsa. The 6" "Realistic" wheels are mounted on 3/16" music wire legs, while a Fox 78, dual ignition (two glo plugs) spins a 14/5 prop up in front.

Two custom-built touches set off Bill Tuttle's "Super Wimpy". Access to the EK radio is gained through a cabin window that is latched by a beautiful machined handle/lock designed and built by W.L. Cloer Industries of Colorado Springs. And, Bill manufactured a scale-like sprung and steerable tailwheel assembly.

When it came time to cover the "Super", Mr. Tuttle contracted for half the yearly output of about 5000 Japanese silkworms and Sig's clear

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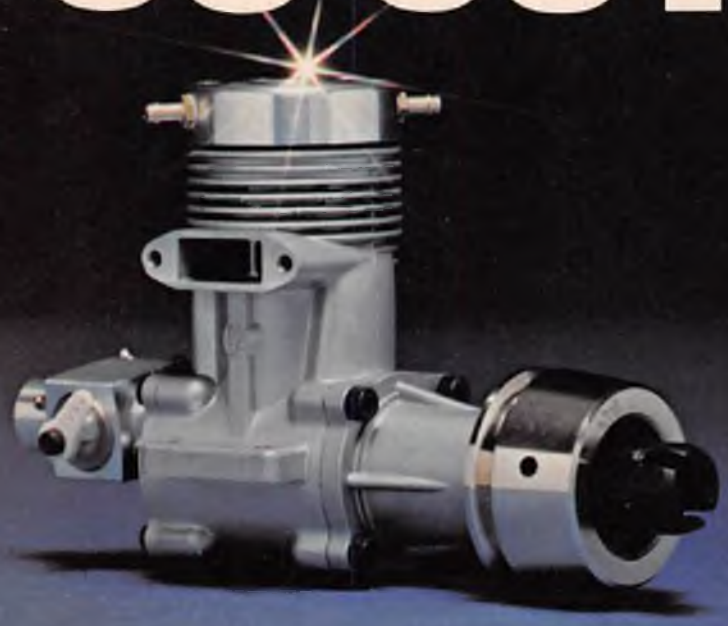
OS 60 Marine



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NEW RADIO - NEW CHAMP

World 4 Channel - $229.95

What have we here? Two new products? First, we have a new airplane at World Engines. This time the ever popular Aerobat Champ. This is an excellent companion to the now popular World Engines Cub. Power - 19, 21, 23, 25, maybe 30. Construction - balsa fuel, balsa rib, hardwood spars, die cut plywood bulkheads and fuselage sides and wing tips. Formed gear, die cut windows.

We are introducing a new 3 Ch./4 Ch. R/C System each with micro in flight pack, dry Tx. 4 Ch. with three servos, S-11A's - $229.95. The 3 Ch. with two servos - S-11A's $169.95. Both radios include a coupon so that the customer can buy the odd servo for $18.00. OS closed gimbal sticks with metal tubes. This is an introductory price.

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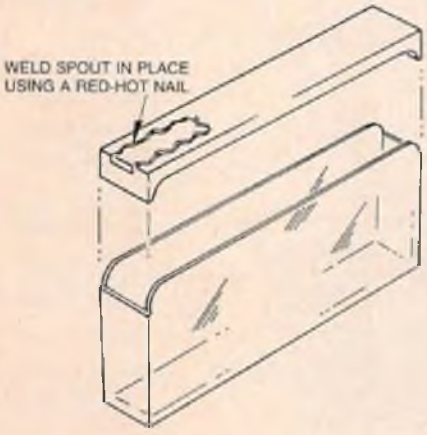
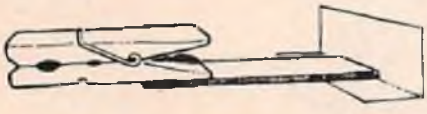
FOR WHAT IT'S WORTH

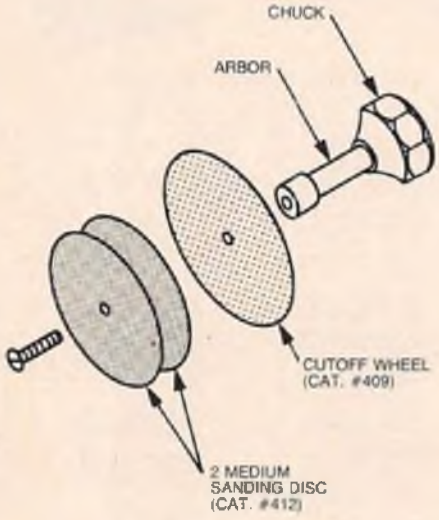
From Gus Morfis of Torrance, California, comes this simple idea that has proved helpful to him. He uses the little plastic boxes, that those little mints come in, to hold all those little gizmos that always fall to the bottom of his field box and get lost. These boxes are great for holding blind nuts, clevises, hinges, and all those little things near to your building board, with the contents visible. These boxes stack neatly and can be held together with a rubber band. He hasn't come up with anything brilliant to hold the lid on yet, so he settles for either a small rubber band or a piece of tape to do the job. A Dymo label can be put on the end or the top to identify the contents, if required. He seals up the little spout (which sometimes breaks off) by welding it in place using a red-hot nail, which he heats on the stove and holds in a pair of pliers. It's simple; it's cheap; and, it works!



The following idea comes from Wal Schubach of Victoria, Australia. Wal finds that when range testing by himself, that before he runs out of range he loses sight of the control surface he is testing. He has come up with an idea which is called his "accentuator". This consists of a clothespin with a piece of balsa 6" long glued to the clothespin, and attached to the other end of the balsa is a piece of cardboard 4" square as shown in the sketch. He now runs out of range before visibility.

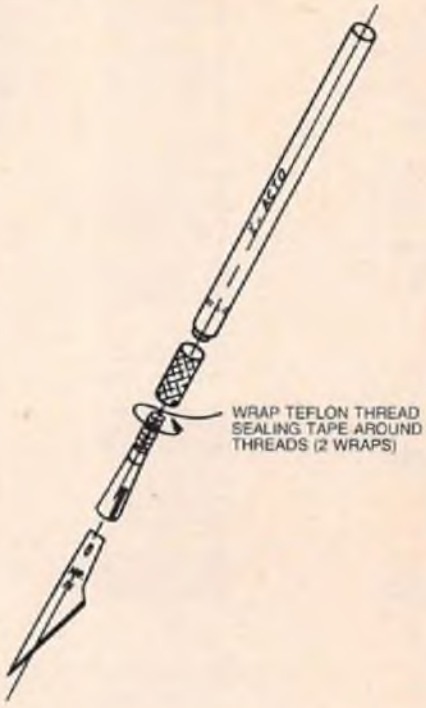


Tom Berry of Miami, Florida, has found a simple and somewhat useful fix for the delicate cut-off wheel (Dremel Catalog #409) supplied as an accessory to the Moto-Tool. Quite often when cutting music wire, brass or steel tubing, the slightest side thrust applied to the wheel can cause disintegration which, in turn, sends pieces in all directions. When installing a new cut-off wheel on the arbor, simply lay one, or better yet, two medium sanding discs on top of the cut-off wheel, then secure all three with the screw. This sanding disc is smaller in diameter than the cut-off wheel and allows plenty of wheel exposed to cut most thicknesses of material normally used. The added thickness of the sanding discs strengthens the cut-off wheel and has kept them from breaking, even if the wheel grabs and tries to "walk" around the work. The sanding disc has the added plus of being right there and ready to dress the fresh cut making it ready for wheels, wheel collars or whatever (see sketch).



If you are tired of trying to stuff a starting battery into your pocket for that long taxi out to the landing strip, only to have it fall out and break, try this: Obtain a clip-on spectacle case from your local optometry shop and use this for a battery carrier. A 6 amp Army surplus wet cell fits into the case perfectly and 2 or 3 "C" or "D" size nicads can be fitted in with no problem. The next time you start to taxi out of the pits, simply clip the case onto your belt and you are all set. The case won't fall off and the battery can't fall out. This idea was sent in by Maj. W.L. Bynum of Fort Lee, Virginia.

The #1 X-Acto Knife with a #11 blade is one of the most commonly used tools in the modeler's workshop, however, the #1 handle has one basic fault. The blade grip which screws into the upper handle fits loosely and is forever unscrewing at the wrong time, allowing the blade to drop out or to pivot in a different direction than intended. There are two solutions to this problem as suggested by Rodney S. Taylor of Van Nuys, California. The first involves the purchase of X-Acto's new Super #1 Knife, which releases or locks the blade at the flick or a toggle on the upper end of the handle. The second solution which will cure your old #1 handles, is to remove the blade grip and wrap the threaded end with thread sealant tape, which is a thin teflon tape available in the plumbing department of your local hardware store. About two wraps make the blade grip stiff enough to hold its position until you purposely unscrew it to change the blade. This is shown in the accompanying sketch.

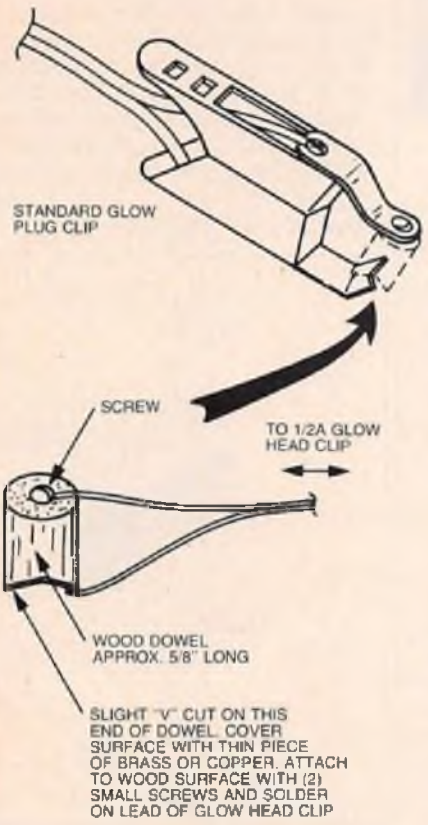


A great way to locate and outline the cut-outs for pushrod exit guides, receiver switches, charging jacks, etc., is to use a rubber stamp pad. Just press the surface of your item onto a stamp pad and then stamp the design at the desired location on your fuselage. You can then make a perfect cut-out so that, by using just a drop or two of Hot Stuff, it will hold the item in place. This idea was submitted by Austin K. Gutman of Bala-Cynwyd, Pennsylvania.

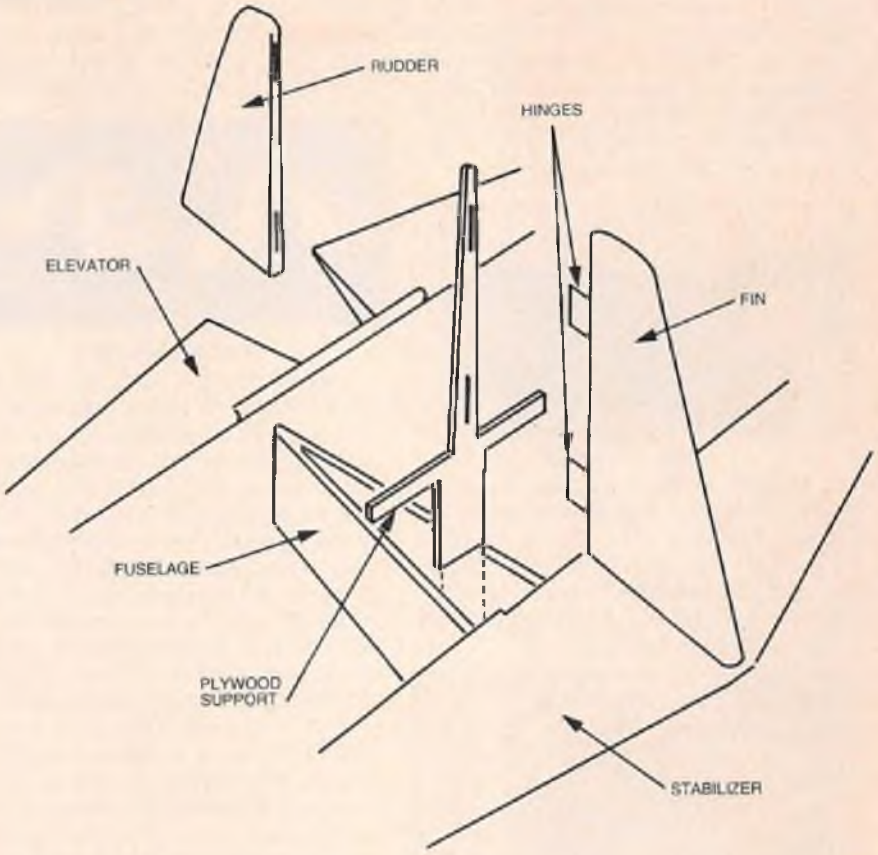
From S/Sgt. Gary B. Reynolds, Edwards Air Force Base, California, comes these suggestions for the use of fuel tubing. First, he slips a piece of fuel tubing over all of his jeweler's screwdrivers. It makes them easier to grip and turn. The second suggestion is to put a piece of fuel tubing on the end of the siphon tube that goes down in the bottle of a paint sprayer, such as Miller, Badger, etc. It then enables you to use all of the paint in the bottle.

FOR WHAT IT'S WORTH

Jack Goodrich of Troy, Michigan, regularly alternates flying 1/2A powered aircraft and larger aircraft. Jack has found an easy way to quickly attach his glow head lead to his regular glow plug clip. The sketch is self-explanatory.



Many various models have the vertical fin butt glued to the stabilizer and the stabilizer is glued to the fuselage, and rely on the addition of triangular pieces on each side of the fin to strengthen these joints. Besides making alignment of these surfaces somewhat more difficult, this method is not strong enough to prevent the tail surfaces from breaking away from the fuselage in the event of a very bad landing. The addition of the triangle stock sometimes makes it a little more difficult to get a nice covering job on your aircraft. The accompanying sketch submitted by Dave Kovensky of Creve Coeur, Missouri, shows a simple way to get around this problem. He uses a 3/16" ply crutch that self-aligns all surfaces. (Use the size plywood according to model dimensions. Use 1/8" for small models and 1/4" for the extremely large models.) His method is very "controlled crash" damage resistant, also permits a clean junction between the fin, stab and the fuselage, and if the hinge holes are slotted (by a Moto-Tool with circular saw) before final assembly, helps align the hinges mounted on the vertical fin.

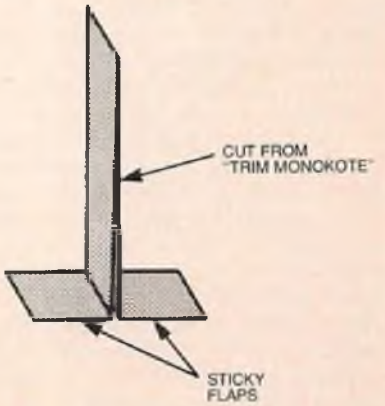


Don Leaf of Endwell, New York, suggests that after using your various paint and dope, turn your containers upside down long enough so that the paint or dope covers the inside of the container cover, then store the container upright. The paint or dope film remaining inside the cover forms an air tight seal (even when it dries), and the paint or dope keeps indefinitely without drying up.

A permanent wing seating has been suggested by Sheldon Wilson of Nanton, Alberta. Sheldon takes his fuselage, and at the wing saddle, drills holes 1/8" to 3/16" deep along the wing saddle about 1/2" apart. He then fills with silicone seal and covers the entire wing saddle. Using wax paper on the wing, mount wing and let the silicone seal cure. After drying, remove the wing and trim off excess silicone seal and you now have a true wing seat that will stay on even if the saddle is oil soaked. The silicone seal fills the holes and acts like rivets to hold the wing seat to the wing saddle.

Mike Moshenko of Scarborough, Ontario, has increased the versatility of his electric starter (Sullivan Hi Tork), by drilling a 1/16" hole behind the starter cone for easy removal by placing a scratch awl in the hole and unscrewing the cone. He has also placed a 1/4" chuck on the end of the starter which gives him a portable drill or even a small grinder, which works like a charm.

Bob Zimmerman of Neola, Iowa, has found that when applying heat shrink film covering onto foam wings that have both leading and trailing edge sheeting along with capstrips, the covering sometimes adheres to the foam core between the capstrips. An easy way to lift the film covering off of the core is to double a piece of "Trim MonoKote" in the middle leaving two sticky flaps on either side, as shown in the accompanying sketch. Simply stick both flaps to the covering and gently lift out and it will come loose without any damage.



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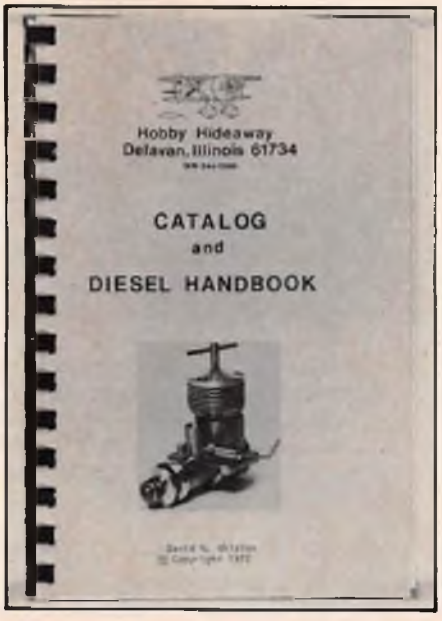
showcase '78

All items appearing in Showcase '78 are press releases supplied by the manufacturer of the product and/or their advertising agency unless otherwise specified. The appearance of an item in Showcase '78 does not necessarily constitute an endorsement of that product by R/C Modeler Magazine.

VAN LOVERS

Second in BoLink's van series — 1977 Chevy Van with side pipes and full interior. Clear ($11.95) or painted ($15.95). Fits all normal 1/12th scale chassis. Pulled from Tuffak. Inquiries to BoLink Industries, P.O. Box 80653, Atlanta, Georgia 30366.

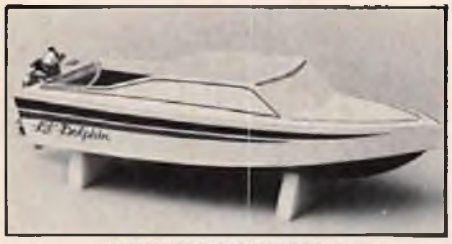


CATALOG AND DIESEL HANDBOOK

Dave Shipton, of Hobby Hideaway, has been flying model diesels for thirty years and selling them for nearly ten years. He has been called "Mr. Diesel" and his place of business "Diesel Headquarters". With this vast background of experience, Dave has recently published a Diesel Handbook that covers all aspects of the use and operation of these versatile engines; history, questions, starting and running, fuel, propeller sizes, etc. Well written, it is for the beginner and expert alike. The handbook includes an illustrated list of Aeromodeller plans. Dave has also published a new Hobby Hideaway catalog combined with the Diesel Handbook which lists many imported diesel engines, parts, kits, etc. The Diesel Handbook costs $1.25 p.p.; the Hobby Hideaway Catalog and Diesel Handbook $1.50 p.p. from Hobby Hideaway, R.R. 2, Delavan, Illinois 61734.

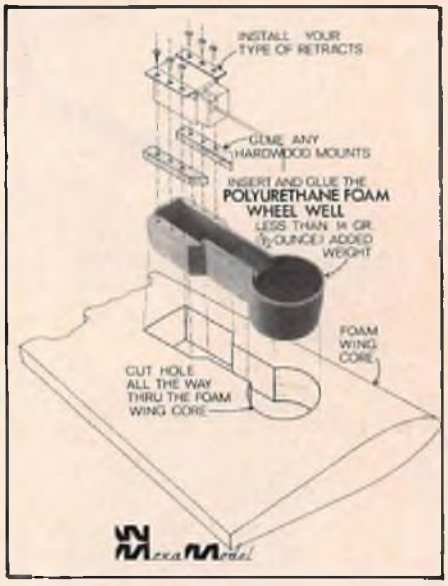
HIDDEN HINGES

Delp's Hobby Products, Inc., P.O. Box 82, Perkasie, PA 18944, announces the improvement of Hidden Hinges, #AP-1001. In answer to a few requests and the desire to provide a quality product, they have increased the width of the arm of the hinge to give increased strength and greater rigidity. The working dimensions remain the same. Actual pull tests have shown the new model hinge, #AP-1001-B, to have twice the strength of the original hinge. These hinges are designed for retract wheel doors on miniature aircraft. They may also be used for hatches, canopies, spoilers on gliders, bomb bay doors, or flaps on various aircraft. Precision molded of Hi Impact Styrene, they can be glued to epoxy resin fiberglass, plastics or wood. Price: $1.95 for a package of 6 hinges. An addition to the standard Hidden Hinges are *Hidden Hinges with Control Tab*. These hinges are the standard Hidden Hinge with a control tab molded onto it. This hinge, part #AP-1005, is designed to supplement the standard Hidden Hinges. This hinge provides an attachment point for control of the surface to be moved. To push or pull directly on the hinge line ensures free movement. Precision molded of Hi Impact Styrene, they can be glued to epoxy resin fiberglass, plastics, or wood. The price for one package containing 2 hinges (#AP-1005-2) is $.90, and one package containing 6 hinges (#AP-1005-6) is $2.50.



NEW BOAT DESIGN

A new boat kit designed for the beginner in Model Boating has been released by Steve Muck's R/C Boats, 6003 Daven Oaks Dr., Dallas, Texas 75248. The Boat can be made into any one of three different motor configurations: K & B 3.5cc Outboard, inboard engines up to 3.5cc and electric motor systems. The Lil Dolphin kit comes with all bulkheads and sheeting made of quality aircraft birch plywood. All bulkheads, deck shears, cabin sides and radio box are pre-cut out. Also included is a plexiglass radio box lid, screws and turn fin. Building instructions include step-by-step photographs and building hints. Length is 28½", width is 9½", and uses a 2 channel radio. The inboard hardware kit No. 63 uses a cable stern drive system. All parts are stainless steel, using an adjustable strut for better control. The hardware kit also includes motor mount, cable engine coupling, cable assembly, rudder, rudder arm, stuffing box and teflon liner. Kit No. 55 is manufactured by Steve Muck's R/C Boats.



PRE-FABRICATED POLYURETHANE FOAM WHEEL WELLS

A revolutionary new way to install wing retracts. Pre-fabricated polyurethane foam wheel wells — made to save your precious time. Give your plane perfect wheel well finishing; takes minutes to install. Suggested retail price $3.50 pair. Dealer inquiries invited. Available at your hobby shop or direct from Mexamodel, A.P. 381, Colonia Del Valle, N.L. Mexico.

CAN AM SHADOW

Pulled from .040 Tuffak — strongest, most durable plastic available. Fits long wheel base cars as well as regular (JoMac, MRP, etc.). Includes molded-in driver. Available clear ($9.95) or painted ($14.95). Order direct from BoLink In-

dustries, P.O. Box 80653, Atlanta, Georgia 30366.

STERLING INSTRUMENT CATALOG

The new Sterling Instrument Catalog No. 82 consists of 464 pages and shows more than 20,000 precision electromechanical components. A highlight of this catalog is a 109-page technical section prepared by the Sterling engineering staff and Dr. George Michalec, the author of several publications related to precision gearing. The 109-page technical section includes information on precision gearing and gear train design - - - areas in which the company has special expertise. A uniquely arranged series of technical tables, which puts information ranging from strength of materials to metric equivalents at the designer's fingertips, is another feature. There is also data on proper application and use of Sterling products, along with a bibliography which will help users find information not included in the catalog. The catalog itself is broken down into nine product sections, each with its own index as an aid to the buyer and specifier of electromechanical components. The listing includes over 6,500 gears plus differentials, gear heads, speed reducers, limit stops, magnetic clutches and brakes, slip clutches and couplings, drive components and shaft accessories, clamps, dials, knobs and counters, fasteners, standoffs and electronic hardware. The catalog is available at just $3.95 postpaid from Sterling Instrument Div. of Designatronics, Inc., 55 South Denton Avenue, New Hyde Park, New York 11040.

60 MAXIMIZER

Stewart Aircraft Corporation, 11420 Rt. 165, Salem, Ohio 44460, introduces the 60 Maximizer. This is a very compact lightweight propeller speed reduction unit. It has twin low cost belts for long belt life; plus, firewall mounting. The 60 Maximizer has approximately the same frontal area as the engine alone and a much improved thrust for more power due to increased prop efficiency. Available at your local hobby shop or direct from the manufacturer and priced at $100.00.

NEW GLUE GUN

Yale Interior Art, 21700 Costanso St., Woodland Hills, California 91364, announces their new Glue Gun that features a curved spout for hard to reach spots; fine tip for accurate placement; and a dual ring plunger for smooth, easy flow. Priced at 98¢ each, they are available at your local hobby shop or you can order direct.

"40" PROP DRIVE UNIT

D.C. Engineering, 355 Geneva Ave., Tallmadge, Ohio 44278, now has a 40 sized prop drive to power the 60 sized airplane while using a scale sized prop. Now you can build the 60 scale or sport airplane and power it with your 40 and have more power than if you had used a 60. This unit uses 14", 16", 18", and 20" props. It has adjustable gearing to accommodate different engine and prop combinations. Using a Schnuerle 40 with stock gearing will turn a 16" prop at 9000+ rpm developing 10 lbs. thrust. It takes any 40 ; is simple and trouble-free; is small and light (under 2 lbs. with engine prop included); and economical to operate. Props are readily available at lower prices. A better selection of kits at a more practical size; factory direct only for $89.95.

SAIL CONTROLS

This photo shows the difference visually between the switch and proportional type sail controls. The units pictured on the left are the SE-2S switch type sail control shown both in and out of the case. The high quality epoxy fiberglass printed circuit board is shown, as is the actuating switch, the fuse, and the arc suppression capacitor. On the right is the SE-2P proportional sail control shown both in and out of the case. This unit plugs directly into a radio control receiver. The unit also shows the printed circuit board and features a servo amplifier and a separate drive circuit. The unit also features fuse protection and built-in arc suppression for the motor. The value in using a proportional over a switch model servo is in being able to always know where your sails are in relation to the position of the transmitter stick. You don't have to wonder where the sails are or adjust them in a hit-or-miss fashion as you do when you "eyeball" the sheets when using a switch servo. Available from Sail Engineering, P.O. Box 8439, Richmond, Virginia 23226.

ALPHA

The new Alpha from Ace R/C, designed by Tom Runge, has the following specifications: Span, 40"; engine, .049-.09; area, 250 sq. in.; weight, approximately 25 oz.; functions, two or three channel. The Alpha offers what most novices and sport flyers are looking for — an attractive airplane that gives durability and flyability at an economical price of $19.95. Lite plywood fuselage construction and double sparred foam wing assure the strength necessary to hold up under rigorous flight conditions. In addition to the strength, the high wing with a flat bottom airfoil provides stable flight with good slow speed and glide characteristics. Complete hardware included. Alpha — the ideal small sized trainer/sport airplane from the small plane experts, Ace R/C, Box 511B, Higginsville, Missouri 64037.

SPARROW HAWK

T.R. Yates Models, 45 Cowley Rd., Littlemore, Oxford, Great Britain, presents the Sparrow Hawk. It is an ideal low wing semi-scale model for the sports/Sunday flyers. It has a 57" span and is for .19-.35 motors; 3-4 channel radio. The kit includes veneered wing panels, veneered top decks, GF tape, pre-cut ply parts, GF cowl, plan and template sheet. It is available either from your hobby shop or direct from T.R. Yates Models. Price is $31.50.

1/2A STAND-OFF SCALE EOS/00½A

The Model Factory offers the latest, and possibly the cleanest designed airframe for Sport and Stand-off model builders. TMF has chosen the EOS/001 design by Airmotive Engineers of Pontiac, Michigan, as the first test bed for the new patent pending urethane foam molded fuselage process. The molded urethane fuselage offers a tough, but light, outer skin with a glass-like finish which needs only to be painted. The fuselage interior is completely filled with rigid urethane foam which can be hollowed out with a Dremel-tool or file to accommodate the engine, gas tank, radio gear, and control linkages. Aside from the firewall and canopy formers, there are no bulkheads or formers to get in the way of installing the radio and balancing the model. In addition, to service or repair the model interior, just remove the canopy assembly for easy access to everything. The wings feature precise hot-wired foam cores with all necessary balsa sheeting supplied. A symmetrical root airfoil and semi-symmetrical tip airfoil combine for good high-speed flight, yet slow airspeed landings. The wings may be shortened for racing or extended for a fast, maneuverable slope soarer or motor-glider. The airfoil is thick enough to easily install the new Robart retracts and the entire model is designed to handle from two to five channels of radio gear. Repairs to the model are the easiest yet! The fuselage breaks cleanly with very little crush or crumbling, leaving a hairline crack that cannot be seen 3' away when reassembled. Nearly all types of commercial glue will work effectively, including cyanoacrylates. Wing repairs are straightforward using epoxy. The EOS design uses tricycle landing gear, so take-offs and landings are easy for the beginner, yet, with retracts and a powerful .051 engine, this little plane can perform! For those who are interested in flying as much as they are in having a beautiful Stand-Off Scale airplane, contact or order direct from The Model Factory, 1307 E. Main St., Alhambra, CA 91801. Price: $28.95.

DAMO 18

DAMO 18 is a new sensational motor from Aero-Hobby of Sweden. It has 2 cylinders, boxertype, 18cc (1.1 ci), 4-cycle ohv, glow ignition. It is great for large scale R/C models: scale-like sound, not much noise, power enough. It has very low fuel consumption, 1/2 pint methanol for half an hour of running at 6,000 rpm. The features are: compression 11.2:1; bore, 24mm; weight, 550 grams; Length, 95mm; width, 160mm; height, 60mm; RPM, 1,500 — 11,000 on 11/8 or 12/6 wooden prop. Needle and ball bearings are used over all (no plain bearings). Prepared for helicoptor and marine conversion. Can also be converted to spark ignition. For further inquiries, write to: Aero-Hobby, Box 16163 — S-103 24 Stockholm 16, Sweden.

NEW SINGLE STICK

Millcott Corporation has recently added a custom single stick to their top of the line, maximum performance radio. The entire, all-metal gimbal assembly of the Specialist Eight can be physically rotated in the transmitter case. The discriminating flier can now tailor the stick angle (within 30°) for total flying comfort and precise control. The rudder knob houses its own complete pot assembly, and runs on widely spaced bearings for smooth operation. Another feature exclusive to the Specialist Eight single stick is the human-engineered console of easy-to-reach secondary command controls. Located on the right side of the case is a series of logically arranged toggle switches, tabs, wheels and levers. Each function is controlled by a differently shaped device, so that all radio operations are instantly at the touch of a finger. No more fumbling for the right adjustment. The aileron and rudder trims (as well as the three-position auxiliary function switch) are located where they won't inadvertently be disturbed, at the top of the transmitter. An optional rudder control lever can be installed on the case top, so that a second auxiliary rudder command falls comfortably under the left thumb. Then the right hand is thus free to coordinate aileron and elevator movements only. The three color-coded maneuver buttons — roll, spin and throttle — are conveniently positioned, and are fully variable from a separate control panel on the front of the transmitter. These panel adjustments can even be performed in flight! While comfort and convenience are important, today's competition and sport fliers demand a radio with extreme versatility. For the first time, one radio can accommodate both the pilot's and plane's individual requirements. The Specialist Eight comes equipped with dual linear rates, for almost limitless ratios of stick-to-servo throws. If the flier prefers, he can order the Specialist's exclusive optional Exponential rate feature instead. With this feature, elevator and ailerons are desensitized around neutral at the flip of two switches. More finely-tuned control and smoother aircraft response are the result. Both the dual and exponential rate inputs are also fully adjustable on the front panel. This panel even permits servo reversing at the flip of a switch — no need for odd-ball reversed servos. There is even a panel switch for the optional electronic mixer, which interconnects two separate controls, e.g., coupled rudder and ailerons. All Specialist MC-3 servos are identically matched and tuned to a precise factory standard. The system's electronics are of advanced state-of-the-art design, with the emphasis on tested and proven circuitry for maximum reliability. This full eight channel system is available in either a two stick or the new single stick configuration. For prices, specifications and detailed information, contact Millcott Corporation, 1420 Village Way, Unit E, Santa Ana, CA 92705.

P-51 MUSTANG

House of Balsa, 2814 E. 56th Way, Long Beach, CA 90805, introduced a .29 to .40 powered Sport, Stand-Off Scale P-51 Mustang at the Chicago Expo, October 29 and 30, and it was one of the hits of the show. Long noted for their excellent 1/2A Stand-Off Scale kits, House of Balsa has really out-done itself on this model. The kit features built-up balsa construction, full size plans, 3-view plus color scale documentation for both a military and racing version and

full color mylar decals to build either version! If you've never looked at a House of Balsa kit, it's worth a trip to your local hobby shop just to see the instruction book. Complete step by step instructions are complemented by over 200 detailed photos showing exactly how everything goes together - - - and what a pleasure to build! Every part is preshaped, machined or die-cut to exact tolerances, and the parts fit. The preformed top assembly-canopy makes easy work out of an otherwise difficult job, and pre-formed exhaust stacks add realism with simplicity. An added nicety is a nylon steerable tailwheel assembly, nylon "live" hinges, control horns and landing gear bushing. The model flies extremely well with a sport .35 and is envied wherever flown. Look for the distinctive black outlined full color House of Balsa label; at only $49.95 retail, your hobby dealer will have a hard time keeping this sport flyer's dream in stock.

MIRACLE MICRO-BALLOONS

The new micro-balloons from Prather Products, 1660 Ravenna Ave., Wilmington, CA 90744, are really different. They are called Miracle because they do everything you want a filler to do: are smooth with no lumps; sand easily; come in a convenient easy-pour container and are snow white in color. The new micro-balloons retail for $1.98 per bottle. Prather will continue to sell their popular Phenolic Micro-Balloons (brown).

HANDYSHEAR

Handiest little tool of them all to meet the needs of the handy-gal, homeowner, hobbyist, cook, and gardener is this new shear — a year-round gift. Handyshear®, with stainless steel blades that never need sharpening, cuts almost anything, plastic, paper, fabrics and metal. Contoured ground blades are rounded for safety, yellow handles have a non-slip textured grip and a snap-lock for safe storage. Handyshear (#84-300) easily snips through fish, lobster, poultry and vegetables, cuts cardboard and paper, leather and vinyl, carpeting and linoleum, flowers and shrubs, light gauge sheet metals. Use it in kitchen, workshop, garden, office, flower shop — even snip the wire for flower arrangements. Individually carded with a suggested list price of $3.69. Available from Stanley Tools, Dept. PID, Box 1800, New Britain, CT. 06050.

SYDNEY R/C SAILING YACHT

Peerless Corporation, 3919 "M" Street, Philadelphia, PA 19124, presents the Sydney R/C Sailing Yacht Kit, a beautifully designed and detailed model sailing yacht kit. Everything necessary to build this model is included in the kit. Pre-finished ABS vacuum formed plastic hull, cabin, and hatch with a minimum of trimming. Precision die cut plywood parts including a printed deck. Factory finished sailcloth sails, mast, pre-formed and drilled keel weight, 70 precision metal fittings . . . everything, except the R/C equipment. Easy to follow step-by-step full size plans and instructions that reduce difficult operations to a minimum, and greatly simplifies assembly. Materials are selected from the finest available and are easy to work with. Even a beginner will find that construction is not beyond his capabilities. Available through retail outlets or direct from Peerless, the kit is priced at $100.00.

AMAZON SUPER-200

Hobby Shack, 18480 Bandilier Circle, Fountain Valley, California 92708, introduces the "Amazon Super-200", an almost ready to go air boat. It features a .15 to .20 size engine. The 28" length x 11" hull is completely finished heavy duty ABS plastic. The only work to do: Assemble the power pod and install the radio. All hardware is included: fuel tank, spinner, plastic cement, pre-formed aluminum power pod struts and air rudders (pushrods not included). Total assembly takes one evening. For 2 channel radios. Available now at your local hobby shop, it is priced at $49.95.

VULCAN DELTA 1/2A

North American Model Enterprises, Inc. (NAME, Inc.), 7639 Grapevine Hiway, Ft. Worth, Texas 76118, introduces their 1/2A Vulcan kit after 6 years of development. It flies great with hot 1/2A engine and includes a control mixer for full house operation with 2 channel, 2 surface configuration. The complete ready to fly weight is only 14 oz. (less

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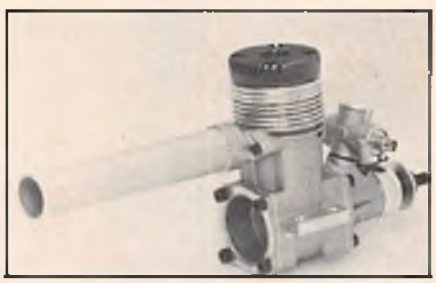
engine and radio). It has a span of 28½"; length 20" (not including engine); and takes a 2 channel or more radio. Price is $35.00 direct from NAME. (Direct orders must include $5.00 for handling and shipping.) The ready to fly kit is $75.00.

STINSON RELIANT SR9 PLANS

Barrons Scale Classics, 1213 Holly Spring Lane, Grand Blanc, MI 48439, introduces a plane and construction manual for the Stinson Reliant SR9. These full size plans show all patterns, fuselage sections, wing ribs, etc., plus a step-by-step construction manual. 1/4 scale exact outline is perfect for the geared type engines or the Quadra type. Suggested list price is $25.00 direct from Barrons.

FORMICATOR

Idea Development, Inc., P.O. Box 7399, Newark, Delaware 19702, introduces the "Formicator", a vacuum forming device for easy home usage. It works in conjunction with any home oven and home or shop type vacuum cleaner. Directions for assembly of kit unit are fully illustrated. Instructions as to vacuum forming, mold making, and general information as to plastic and uses of the product are included (seven pages of easy to follow instructions). The kit is from select, precision cut, kiln dried poplar — top grade hardware and is complete except for glue. (Aliphatic resin types are specified on instructions.) Available factory direct only at a price of $27.00 postpaid.



OPS "BIG RED" ENGINE

OPS has announced the introduction of their new 1978 SPA .60 R/C "Big Red" engine. It is an ABC piston and sleeve assembly with Schnuerle porting. Designed for the serious pattern fliers, it comes with a front intake slide valve carburetor and a muffled tuned pipe. The engine is presently available at your local hobby shop. OPS engines are imported by Shamrock Competition Imports, P.O. Box 26247, New Orleans, Louisiana 70186.

MOCONTROL VC R/C MOTOR SPEED CONTROL

With the Mocontrol VC, you get maximum top end speed because power bypass relay eliminates transistor loss. All other controllers suffer from large power and speed loss without this feature. You get a speed controller designed and tested for both indoor and outdoor tracks. Mocontrol VC has reverse for indoor racing and dynamic braking for outdoor racing. No other controller has these built-in features. Mocontrol VC is the most versatile

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Hobby Shack® SPEED BUI
MANUFACTURED BY O-K MODEL CO., LTD.

lamborghini countach LP400

RADIO CONTROL RACING CAR
.09 - .10 ENGINE 2 CHANNEL

- FORWARD – REVERSE AND ENGINE SPEED CONTROL WITH ONLY A TWO CHANNEL RADIO SYSTEM
- ONE PIECE ALL DIE CAST METAL CHASSIS
- TRANSMISSION GEAR BOX, NYLON MOTOR GEARS, CLUTCH AND REAR SUSPENSION ALL FACTORY INSTALLED – ELIMINATING ANY DIFFICULT WORK FOR YOU
- STEP BY STEP INSTRUCTION BOOK WITH PARTS BAG NUMBERED TO THE INSTRUCTION BOOKLET
- Total four wheel independant suspension
- Fast servo installation – Gas tank built-in to the die cast chassis
- Start with either electric starter or pull rope
- Wheels all die cast racing type with treaded racing tires
- Kit comes complete with: Smoked glass windscreen, side windows, front blinkers, all decals and a Lamborghini emblem
- Body is pre-formed, 1.2 mm thick, and colored a beautiful yellow – No painting for you!
- Hard rubber bumper, die cast cooling fan and a formed plastic fan cover

TECHNICAL DATA

Length: 14.4 inch	Forward gear ratio: 7.00 : 1
Width: 7.08 inch	Rear gear ratio: 18.7 : 1
Height: 3.54 inch	Radio: 2 channel
Wheel base: 8.14 inch	Engine: .09 – .10

C.O.D. OR CHARGECARD

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BANKAMERICARD
master charge

Add $3.00 postage and handling. Calif residents add 6% State Sales Tax.

Hobby Shack®
18480 BANDILIER CIRCLE, FOUNTAIN VALLEY, CALIFORNIA 92708

lamborghini countach LP400
COMPLETE KIT LESS MOTOR AND RADIO

RETAIL $109.95 **$79.99**

from page 104/100

speed controller. It runs on four through ten cells and handles 15 amps for competition planes and boats. Mocontrol VC has rugged construction and all key components pre-tested for reliability. A 1-year guarantee shows their confidence in its quality. Available at $55.95, ready to run. For those who do not need all the features of Mocontrol VC, a low cost Mocontrol VC2 for $47.95 is offered. This has dynamic braking, optional reverse, no power bypass relay. It may be purchased from your local hobby dealer or, if not available, send check money order, or request COD allowing $1.75 for postage to Galler Electronic Industries, P.O. Box 87, So. Walpole, MA 02071.

DOUBLER II

The all-new Doubler II is a 1/4 Midget racer and sport model kit featured by Sig Manufacturing Co., Montezuma, Iowa 50171. The kit features handy printed fuselage sides — build directly on the wood; clear bubble canopy; pre-bent aluminum gear; die-cut ribs and formers; die-cut plywood parts; Sig quality balsa; and big full size plan. It has a hardwood package which includes: molded control surface hinges; nylon control horns; formed wire aileron horns; Tuf-Steel R/C links; nylon screws for bolt-on wing attachment. The instruction book is illustrated with over 50 photos and drawings. Available from your dealer or order direct. Price is $24.95.

SUPER MALIBU AND SUPER MONTEREY

Astro Flight, Inc., 13377 Beach Ave., Venice, California 90291, presents two kits — the Super Malibu and the Super Monterey. The Super Malibu is a perfect first sailplane, quick building, very stable and easy to fly. It can be flown three ways: thermal, slope, or with the Astro 05 electric flight system. The deluxe kit features machine cut balsa parts and all hardware. Wing span is 72", wing area 525 sq. in. Priced at $29.95. Super Mon-

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terey is a big brother to the Malibu featuring a 99-inch span with two piece plug-in wing panels. Its floating glide-hands off stability, and smooth control response make it very competitive in standard class soaring events. Priced at $44.95. Available at your dealer or order direct.

FIELD SUPPORT BOX

Craft-Air, 7851 Alabama Ave., Canoga Park, California 91304, introduces their new Field Support Box. It is not a kit, doesn't need to be painted, won't absorb fuel oils, and won't break. It is made of hi-density polyethelene; holds a motorcycle or gel-cell battery securely. It holds any size can of fuel securely as well as any size transmitter or any starter. It holds props, tools, etc., has a removable ditty well in top. It has room for mounting power panel, E.S.V., etc. It is attractively finished and includes 10 minute instructions for aircraft cradle. The price is $29.95. Ask your dealer or order direct from Craft-Air.

BIG GAS ENGINE

Horner's Sales, Dixie Highway, Beecher, Illinois 60401, introduces the Big Gas Engine. This engine runs on 20 to 1 gas and oil mixture with super power for its weight. It is easy starting plus being economical. The engine is a 1.9 cu. in. and turns a 20 x 5 prop. It has 8500 rpm; has 19 lbs. of thrust. The engine comes complete with prop. hub ready to mount in plane. It is very rea-

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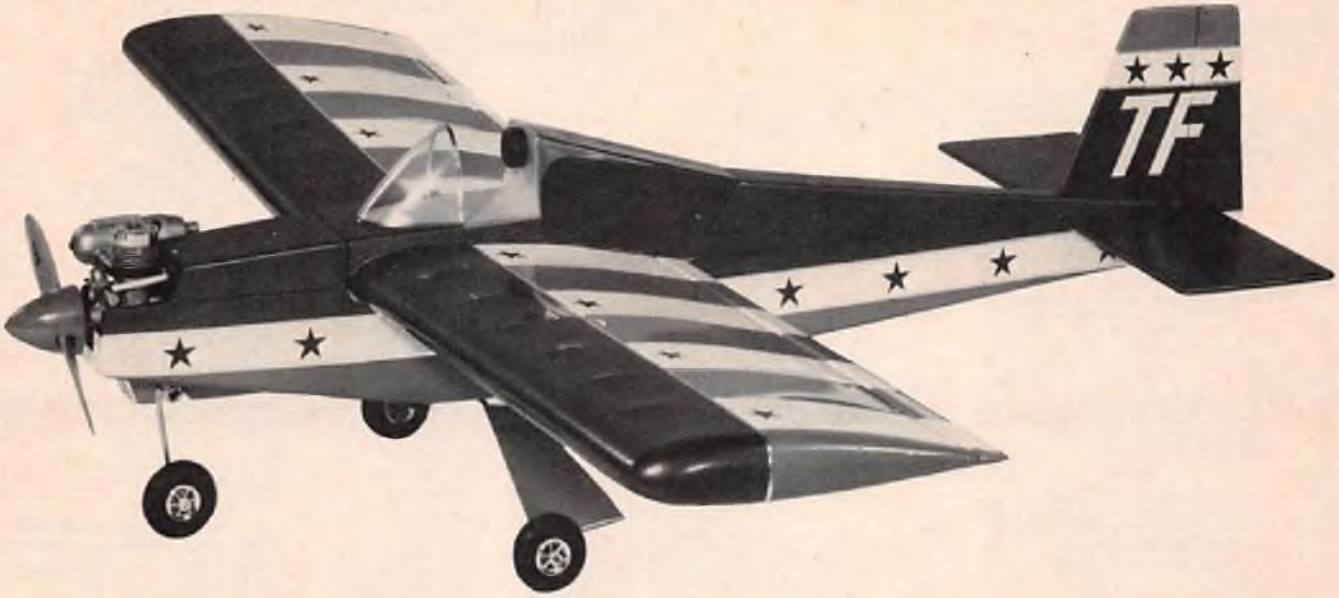
ATTENTION:
ALL R/C FRESHMEN STUDENTS



report to your nearest Top Flite dealer.

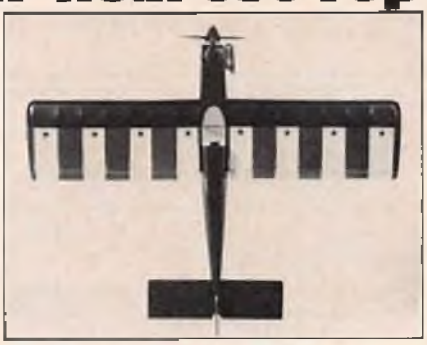
Top Flite knows how confused and overwhelming it can be for the new R/C enthusiast... you can get in over your head in no time at all.

2 YEARS IN THE MAKING

That's why we've made our newest R/C just for you, the beginner. It's called the "Freshman Trainer."

EASY TO BUILD

The "Freshman" is a snap to build. An all balsa wood kit, with precision, die-cut and machine finished parts, plus simple, easy to follow, step-by-step instruction booklet that make assembly easy even if this is your very first R/C model. With reduced building time, you'll be in the air faster.



Calling all new R/C students—get your plane flying today. The "Freshman Trainer," the newest R/C in the air—from Top Flite.

WING SPAN: 48"
AREA: 504 Sq. inches
ENGINE SIZE: .29 to .40
APPROX. WEIGHT: 3 lbs. ready to fly
3 OR 4 CHANNELS

Kit No. RC-20 **$44.95**

TOP FLITE

TOP FLITE MODELS, INC.
1901 N. Narragansett Ave.,
Chicago, Ill. 60639

EASY TO FLY

The "Freshman" is a gentle, slow flying, very stable yet responsive R/C airplane. It's perfect for the beginner because it "forgives" easily. It gives you time to think and react while learning.

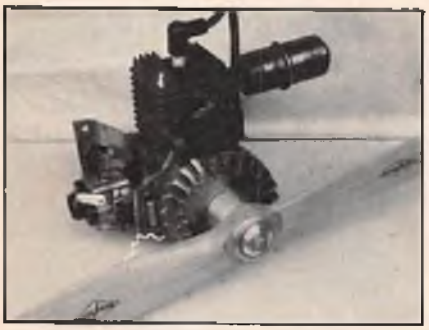
SOLOING A SNAP

Top Flite's new "Freshman Trainer" can be flown with 3 or 4 channels out of the smallest field and needs very little room for take-off and landing. Yet, the "Freshman" is rugged enough to take the flying knocks from almost any surface and can even be hand launched if necessary.

SHOWCASE '78

from page 108/100

sonably priced at $69.95 with a 100% guarantee. Direct from factory only. □



SUPER WIMPY

from page 95/94

dope plant. The acres of light blue silk are decorated with dark blue Sig dope and 6" vinyl numbers (white) that give Bill's AMA number.

When construction was done, the model weighed 10 pounds. Despite the nose-lengthening effort, things turned out sorta tail-heavy. Fact is that additional weight had to be added inside the capacious nose to bring the model into balance. But a 12½ pound bird with 1600 square inches of area and a foot-deep fuselage isn't **anything** like a bomb!

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The "balsa-overcast" passing overhead - - Super Wimpy at 6000 feet above sea level. That's about 200 feet over the ground in Colorado Springs.

SERVOS, RECEIVERS, COMPLETE FLITE PAKS REGULAR OR MICRO, ASSEMBLED OR KITS

Litco flite paks or components can be purchased assembled or in kit form. Assembled units are pretuned and ready to use with transmitter specified below. All units use Deans connectors. Servos are supplied with extra female Deans connector to simplify installation.

Litco Systems has pioneered the concept of fully assembled flite paks custom matched to various transmitters. Our servos are electrically adapted to match the transmitter specified. There is no universal servo that operates properly with all transmitters since throws and pulse spacing vary with each make. Please order from table below.

PLEASE CIRCLE THE MAKE OF YOUR TRANSMITTER: KRAFT EK ROYAL FUTABA WORLD MRC RS ORBIT HEATH ACE UNICOM CANNON (PRO LINE COMPLETE FLITE PAK ONLY) SANWA CIRRUS MICRODAVIONICS KRAFT KP4A

REGULAR COMPONENTS

MICRO COMPONENTS

SERVO
- Double sided PC boards
- Solid tantalum capacitors
- Long life potentiometers
- High quality servo motors
- 4.0 lb. power, 0.5 sec transit
- 8 mA drain
- Fast, precise, high resolution
- Gold plated Deans connectors

REGULAR Size: 1.5x1.45x.73 Wt. 1.2 oz.
MICRO Size: 1.28x1.3x.6 Wt. 0.7 oz.

RECEIVER
- Double sided PC boards
- Double tuned front end
- 1.5 μV. AGC on 4 stages
- Gold plated Deans connectors
- High selectivity and rejection
- 5 channels, 8 available

FREQUENCY: 72.08, 72.16, 72.24, 72.32, 72.40, 72.96, 75.640

REGULAR	Size: 1.9x1.7x.8	Wt. 1.5 oz.
MICRO	Size: 1.75x1.14x1.0	Wt. 1.5 oz.
MODULAR RF	Size: 1.6x1.0x.55	Wt. 0.5 oz.
DEC.	Size: 1.5x1.0x.21	Wt. 0.5 oz.

BATTERY

REGULAR
- 500 mAH, vibration resistant
- Nylon D&R case
- Gold plated Deans connectors

Size: 2.2x1.25x1.25 Wt. 4 oz.

MICRO
- 225 mAH, vibration resistant
- Nylon D&R case
- Gold plated Deans connectors

Size: .85x1.45x1.45 Wt. 2 oz.

SWITCH HARNESS
- Noble high quality switch
- Deans gold plated connectors
- Nylon protective cover
- Wt. 0.4 oz. (charging connector to be supplied by user)

WRITE: We answer inquiries immediately. We ship rapidly when paid by money order or cash.

GIFT CERTIFICATES $25.00 EACH

NEW 544 SERVOS! NEW LOW PRICES!

After one year of research we are introducing the best servos ever produced regardless of price — the 544 Servo Line. Also in addition to our regular kits a new microservo kit (S5443K) is now available.

These new servos and kits use a new highly advanced 544 AA IC offering internally regulated power supply, dynamic braking, linear ramp timing and the need for very few external components. This revolutionary new IC is complemented by the most sophisticated PC board in the industry — double sided, plated inside holes, reflowed in hot oil and manufactured of epoxy glass. This inherent reliability and vibration resistance is further enhanced by CTS metered deposition pots and the best motors available. D&R mechanix production is now electronically controlled for increased precision. Finally a burn-in procedure further assures the highest reliability.

We have purchased a large volume of parts at low prices and we are passing the savings on to you. The prices will hold as long as this supply of parts lasts.

Our flite pak approach has been immensely popular and many modelers have purchased their 4th or 5th flite pak. If you have not yet tried our approach now is the best time to do it and save. Flite pak prices are the sum of component prices and all parts can be mixed.

NAME

ADDRESS ZIP CODE

QUANTITY	CAT. NO.	DESCRIPTION		PRICE	TOTAL
	S5441	Rotary D&R servo, assembled	544 IC	20.00	
	S5442	Rotary Dunham servo, assembled	544 IC	22.00	
	S5443	Rotary Dunham micro servo, assembled	544 IC	29.00	
	S1001	Rotary Dunham servo, assembled	543 IC	25.00	
	S1003	Rotary D&R servo, assembled	543 IC	25.00	
	S1005	Rotary Dunham micro servo, assembled	543 IC	33.00	
	R2000	Receiver regular, assembled	Frequency _____	36.00	
	R2001	Receiver micro, assembled	Frequency _____	39.00	
	R2001A	Modular receiver RF module, assembled	Frequency _____	22.00	
	R2001B	Modular receiver decoder module, assembled, 2 channels		13.00	
		Each additional channel for R2001B		1.50	
	B1000	Battery regular, assembled		13.00	
	B1002	Battery micro, assembled		13.00	
	H1001	Switch harness, assembled		5.00	
	S5441K	Kit of S5441 servo	544 IC	17.00	
	S5442K	Kit of S5442 servo	544 IC	19.00	
	S5443K	Kit of S5443 servo	544 IC	25.00	
	S1001K	Kit of S1001 servo	543 IC	20.00	
	S1003K	Kit of S1003 servo	543 IC	20.00	
	R2000K	Kit of R2000 receiver	Frequency _____	30.00	
	H2010	5 male & 5 female Deans 3 pin connectors & assortment of wire		8.00	
	S2000	Trays for all regular servos 5 pcs.		4.00	
	S2000A	Single snap on tray for all micro servos		1.25	
		☐ COD, Shipping, handling & insurance		2.50	
		☐ Cash, money order, bank draft, certified check, shipping, handling & insurance		1.50	
		On personal checks delay of up to 3 weeks. N.J. res. add 5% sales tax. Foreign orders add 10% of the total.		TOTAL	

Litco Systems BOX 90, EAST HANOVER, NEW JERSEY 07936

SUPER WIMPY

from page 110/94

"The Day" finally arrived and it was time to see if the Super would fly. But first, a couple of rolls of 35mm film had to be exposed — just in case! After a bit of photography, Bill filled the tank, diddled with the sticks of the Super Pro transmitter and pressed the starter to the spinner. It was a cold Saturday morning and the big Fox started reluctantly. Bill hadn't really set-up the engine so it ran super-rich and never got more than a beat or two into two-cycle.

Nevertheless, after a run of about 60' over very bumpy ground, Super-Wimpy took to the air! Climbing like a J-3 "Cub", the sun was blotted out as the "balsa overcast" passed overhead. Because of the rich engine-run, the 16 ounce fuel tank was soon emptied and it was landing time. Soon after touchdown, Wimpy ran into a snow drift and flipped majestically. No damage was done and the second flight was a duplicate of the first except for the touchdown. Measurements in the soft dirt showed a 5 knot wind landing distance of only 15 feet!

After the congratulations and back-slapping from the assembled RC'ers, Bill allowed as how the Super flew as well as the original Whimpys. The 8⅔' span model is as gentle as a trainer and would serve as such for the richest kid on the block.

Needless to say, Mr. Tuttle isn't contemplating building a second Super. But if the first flights are any indication, his bird will have a long and leisurely life. On hot summer days, it can be circled overhead, protecting the pilot from sunburn.

And — it'll never fly out of sight! □

FUEL PUMP

from page 93/92

Five watts should be sufficient for your pot and 5-20 ohms will be enough resistance. The more resistance you have, the sooner your motor will come to a complete halt. My pot, which is 5 ohms, cuts the motor speed in half. Experiment, since this may give you a chance to be an electronics expert!

PARTS LIST

Pump from older model Toyota — $2.00.

Mini Utility Case (Radio Shack), 2⅝" x 5-1/16" x 1¾", Cat. No. 270-233 — $1.49.

DPDT Mini Toggle Switch (Radio Shack), Center Off, Cat. No. 275-1545 — $1.99.

Wire Wound Potentiometer (5-20 ohms, 5 watts) — $5.00 est. □

Ready-built R/C Cessna Centurion by Cox. Buy it and fly it!

You want the fun and excitement of flying a Radio-Controlled aircraft—but not the hassle of building one?

Then you want the rugged *Cessna Centurion* by Cox. It's not only easy to fly, it's *ready* to fly. Engine and pushrods are already installed, control surfaces are prehinged, and all radio gear (not included) slides right into place with Cox "Snap In-stallation." Even the switch mount and antenna restraint are premolded. You can buy the *Cessna Centurion* with 36-inch wingspan for under $55—and that is some bargain.

Ideal R/C for the *Cessna Centurion* is our Cox/Sanwa 8020 radio. This digital proportional, 2-channel system features a voltage regulator, LED indicators, and much more—all for less than $100.

The *Cessna Centurion* comes complete and ready-built except for radio controls. Included is a QRC .049 engine with muffler and spring-starter, prop and spinner, control linkages, high-gloss fuel-proof finish, authentic decals and striping.

So don't just sit there. *Take off!*

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(uses 2 motorcycle batteries, not included)

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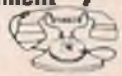

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The Hobby Market P.O. Box 2172 Ft. Worth, TX. 76101

THE HOBBY MARKET

from page 91/90

minimum clearance, Jim rolled it on its back which delighted the crowd. They applauded and we knew we had it made. He then duplicated every maneuver Herr Stroessenreuther performed. Unfortunately, when Jim had used up 3½ minutes of his time, the engine flooded and quit, and Jim brought it in for one of the most beautiful touch-downs I've ever seen.

Meanwhile, the combat flyers started to fire up, however, one flyer's engine refused to take hold. While all the cranking was going on, three of the Germans fired up their machines, as pre-planned, for any slow down. A lesson to you all — when putting on a demonstration, be sure to have someone waiting to fire up after no more than one minute of lag time. It worked for us because, after one minute of elapsed lag time, the German club was in the air and took over the remainder of the demonstration.

In 14 minutes time, they managed to put over 20 airplanes in the air! Well, watch our smoke next year! The Germans characteristically see how many model airplanes they can get into the air at one time and the crowds are really entertained. Me thinks we "Rittmeisters" will adopt these tactics for our next demonstration. If nothing else, the crowd should at least love the head-ons, the smash-ups, and jammed frequencies. Actually, the Germans can do this because they have switched to FM with only 10 KHz difference between receiver and transmitter. On 27 MHz FM, they have 32 frequencies, 18 on 35 MHz, and 4 on 40 MHz FM. This is not even counting AM frequencies, which cannot interfere with FM. Even the CB'ers can't touch 'em! Wise up, radio manufacturers.

Anyway, they really put on a show and all we could do was stand back and drool. One delta winged airplane with an OS Max "Schnuerle" .40 and pusher prop would make screaming passes in front of the crowd at about 180 mph, while an Akrostar piloted by Herr

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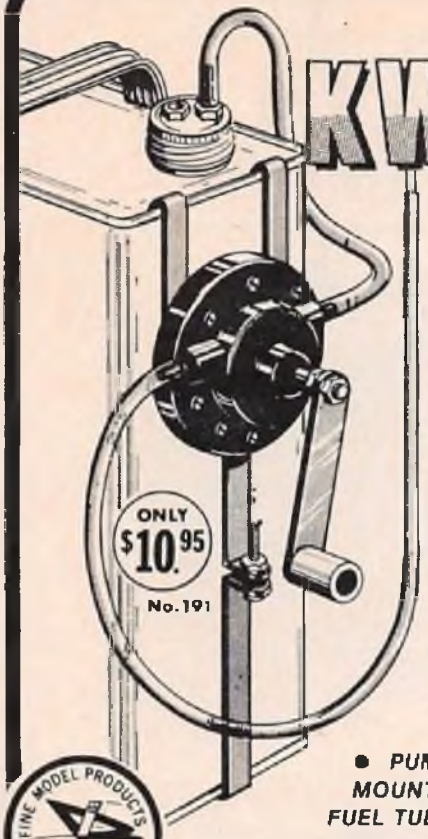
DU-BRO KWIK-FILL FUEL PUMP



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CAT. NO. R-180
90¢ each

NEW!

DEVCON® SUPER-LOCK™ A

locking compound

An anaerobic liquid that hardens or cures when air is removed. 100% reactive. No mixing required. One or two drops locks/seals screws, nuts, shafts, bearings in place. Prevents loosening due to vibration/ shock.

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DEVCON® "5 MINUTE EPOXY"®

For super fast repairs Tried and proven by modelers everywhere. DEVCON is the ideal model builders cement. Great strength, fast setting and is fuel proof.

2 Sizes.

R-205 . . . 1 oz. $1.50
R-206 . . . 2½ oz. . . . $2.65

DEVCON® "DEV-TUBE"™

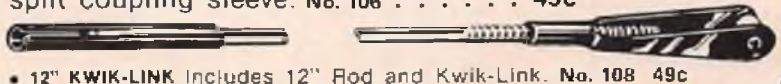
"5-Minute" Epoxy in the Revolutionary new 2 in 1 dispenser.

Just snip off end of double nozzle and push out equal parts of epoxy and hardener - automatically. Just mix and apply. When finished, close nozzles for future use with special cap. "5 minute" epoxy is famous for super fast repairs - even in thin films and at low temperatures.

R-208 . . . 1 oz. . . . $1.95

THE ORIGINAL DU-BRO KWIK-LINK®

Control yoke assembly for any control linkage. Allows easy removal for on-the-field adjustments. 4" rod and split coupling sleeve. **No. 106** **49c**



• 12" KWIK-LINK Includes 12" Rod and Kwik-Link. **No. 108 49c**

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480 Bonner Road Wauconda, Illinois 60084 U.S.A.

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THREE CHANNEL SYSTEM KIT

SINCE ITS INTRODUCTION LAST SUMMER, our Three Channel System Kit has gained tremendous popularity in the field. Its flawless performance, easy assembly, sensible mechanical layout, and low price all have combined to make a radio system kit that is one of the best bargains in the industry today.

Now we are adding another dimension to this concept: transmitter conversion kits so the Three Channel System can be upgraded to five or seven channel operation . . . the builder can start at an economical novice level with a Three Channel System and, as he gains competence, he can add functions at a minimum of expense; none of his equipment is obsoleted.

The conversion contains an additional stick assembly, a new case, and complete instructions for performing the conversion. All existing electronics and hardware are utilized.

Since the receiver has eight channel capability, all that needs to be added is more wires and connectors plus additional servos for each additional channel.

If you didn't buy a Three Channel before because you knew you would want to go to more channels later, you no longer have any excuse.

THREE CHANNEL SYSTEM KIT WITH STANDARD FLITE PACK
10G30 $119.95

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FIVE CHANNEL TRANSMITTER CONVERSION
11G35 $21.95

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11G37 $26.95

TRANSMITTER
- Expandable to more than three channels.
- Open gimbal two axis stick.
- Quality throttle stick with trim.
- Battery condition meter.
- Uses 9V dry battery.

RECEIVER
- Double deck design for small aircraft.
- CMOS Decoder for low current drain
- Eight channel capability.
- Light weight

AIRBORNE BATTERIES
- GE 450 mah or 100 mah Ni-cds.
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SERVOS (TWO FURNISHED)
- Quality D & R Bantam or Dunham Micro mechanics.
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- One comes assembled.

AVAILABLE ON ALL AMERICAN R/C FREQUENCIES.

ACE R/C, Inc.

PLY FUSELAGE, FOAM WING TRAINER
FOR THE NOVICE AND SPORT FLYER

Wheel Pants Not Included

NEW! ALPHA

DESIGNED BY TOM RUNGE

50L212 ALPHA KIT $19.95

The Alpha offers what most novices and sport flyers are looking for--an attractive airplane that gives durability and flyability at an economical price.

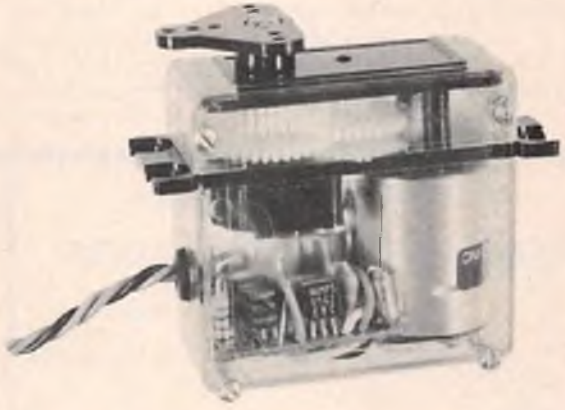
Lite plywood fuselage construction and double sparred foam wing assure the strength necessary to hold up under rigorous flight conditions. In addition to the strength, the high wing with a flat bottom airfoil provides stable flight with good slow speed and glide characteristics. Complete hardware included.

Alpha--the ideal small sized trainer/sport airplane from the small plane experts, Ace R/C.

THE ANATOMY OF A SERVO

When you look into a servo, what do you want to see . . . . .Power?--the Ace R/C Digital Commander Bantam servo is powerful enough for the .60's (about 5 lbs. of thrust from the inner hole). Speed?--Almost as quick as you can move the stick (about a half second for 90° rotation). Strength?--heavy duty gears that can stand the punishment. Resolution?--better than 1%. Size?--measures only 3/4" X 1 3/8" X 1 1/2" and weighs only 1.25 oz. Cost?--how about $23.95 for a kit and $29.50 for an assembled unit.

A state-of-the-art Signetics 544 amplifier with external drive transistors, top quality mechanics, motor, and pot all combine in the Ace Bantam Servo to give the performance you want when you look into a servo.



DIGITAL COMMANDER BANTAM SERVO
14G20 Bantam Servo, Kit $23.95
14G20C Bantam Servo, Assembled $29.50

Separate servos come less connectors. Will work with any positive pulse receiver (if you have a negative pulse receiver, a 14G18, Pulse Inverter, $2, is needed for each servo.)

We have other servo options available including the popular new Micro, plus flite packs and complete systems. See our catalog for complete details.

Please send me your complete catalog. Enclosed is $1.00 which is refunded on my first order. (Add $.50 for 1st class mail return; add $1.00 handling on all other orders.)

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ACE R/C, Inc.

BOX 511B, HIGGINSVILLE, MO. 64037

FLUGTAG '77

from page 116/90

Sauerwein went through the FAI pattern along with a couple of "Ugly Sticks" doing their thing. They further managed to put three Messerschmitt BF 109's in the air — and flying formation! These 109's are kitted by Topp Models and feature fiberglass epoxy fuselages with planked styrofoam wings. One glider (I think it was a Kestrel) was towed aloft by another model and wowed those who had never seen it done by model airplanes. Needless to say, the crowd loved us and, thanks to the efforts of our club president, Hubert "Herb" Dirr, and the German club president, Herr Gassen, we considered it a successful afternoon.

Once we had finished, the air show continued with Herr Bruno Walz from Frankenthal, a baker by trade, being towed aloft in a Vee-tailed glider and, once released, began a show of his own with glider aerobatics. He dramatically concluded his performance by putting the glider in a dive to gain speed and, at about 200 feet above the runway,

to page 122

Lanier Ready-to-Fly Models

...every one designed and flown by the experts!

Four Easy Steps to R/C Flying
1. Glue pre-cut wing halves together.
2. Mount tail surfaces.
3. Attach control surfaces.
4. Install engine and equipment (not included).

NOTHING to cover or paint.

Span 50"
Area 700 sq. in.
Power .45-.60

IF YOU WANT TO FLY A BI-PLANE THIS IS IT

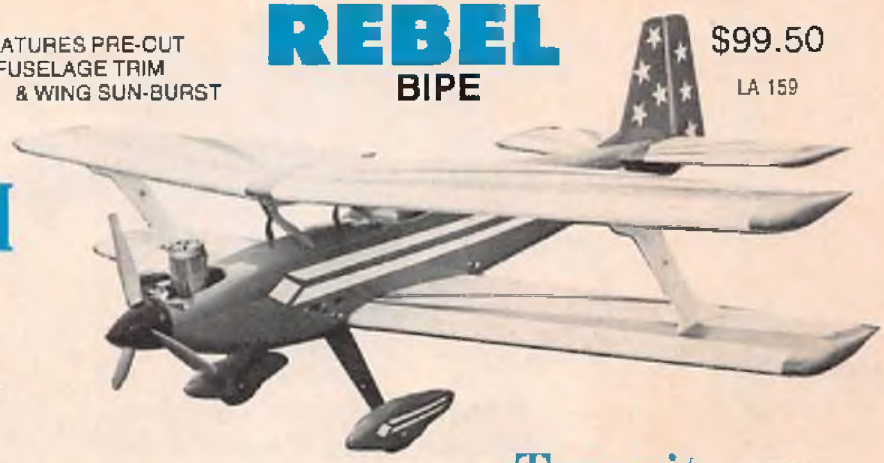
FEATURES PRE-CUT FUSELAGE TRIM & WING SUN-BURST

NOTHING To Build, Cover, Or Paint

REBEL BIPE

$99.50

LA 159



Jester II

designed by Len Purdy

Span: 83 in.
Area: 630 sq. in.
Wt. Complete: 6¼ lbs.
For .50-.61 engines
Flies with rudder, elevator, aileron and motor control.

KIT LA 124

FLIES COMPLETE AMA & FAI PATTERNS

Lanier INSTANT R/C WING KITS

All Lanier Wings are pre-covered and furnished with Tips & Gear blocks installed (where applicable) and correct Dihedral angle cut. Hinges are pre-installed in the wing with slots in the Ailerons. Aileron connecting fitting is also provided (where applicable).

65" Span 12% Symmetrical Standard Taper — 520 Sq. In.

Regular Low Wing Trike	LA 131	$22.95
Retract Low Wing Trike	LA 127	$22.95
Tail Dragger Low Wing	LA 133	$22.95
Retract Tail Dragger	LA 126	$22.95
Shoulder Wing Style	LA 136	$22.95
Stab. to Match Above		$ 6.00

52" Span 10" Chord Clark Y Straight Chord 520 Sq. In.

Shoulder/High Wing Low Wing Trike	LA 138	$18.95
Stab. to Match Above		$ 6.00

50" Span 10% Symmetrical Standard Taper 350 Sq. In.

Regular Low Wing	LA 157	$16.95
Shoulder/High Wing	LA 156	$16.95
Pre Hinge Stab. for Above		$ 5.00

Len Sez

QUIK® fuselage repairs. Try this for quick & easy fuselage repairing of Lanier models. (1) Clean the damaged area with alcohol. (2) Cut a piece of Lanier QUIK® which will cover the area + 1/4" on all sides. (3) Dip the QUIK® in Air-O-Cement (or MEK) & apply the now flexible patch to the outside of the fuselage. (4) Allow the repair to dry & then paint with scrap fuselage plastic dissolved in Air-O-Cement for a near invisible repair.

Len

See next month's ad for other details & hints.

IMMEDIATE DELIVERY FROM Our complete stock of kits and parts ... thru your dealer or direct. Same day shipment — prepaid.

Pinto

48" - 3 CHAN. TRAINER/SPORT

LA 146

$46.50

Span: 48 in.
Area: 480 sq. in.
Wt. complete: 3 lb. 8 oz.
For .23 or .35 engines

Flies with rudder, elevator and motor control.

Transit

LA 108

$44.50

Flies with motor, rudder, elevator control. (No ailerons).

Span: 65 in.
Area: 520 sq. in.
For .35 or .45 engines

Wing, Stab & Fin covered with "Toughskin"

Cessna

LA 119

48" - 3 CHAN. TRAINER/SPORT

$46.50

Flies with motor, rudder, elevator control. (No ailerons).

Span: 48 in.
Area: 480 sq. in.
For .15 or .19 engines

ACCESSORIES

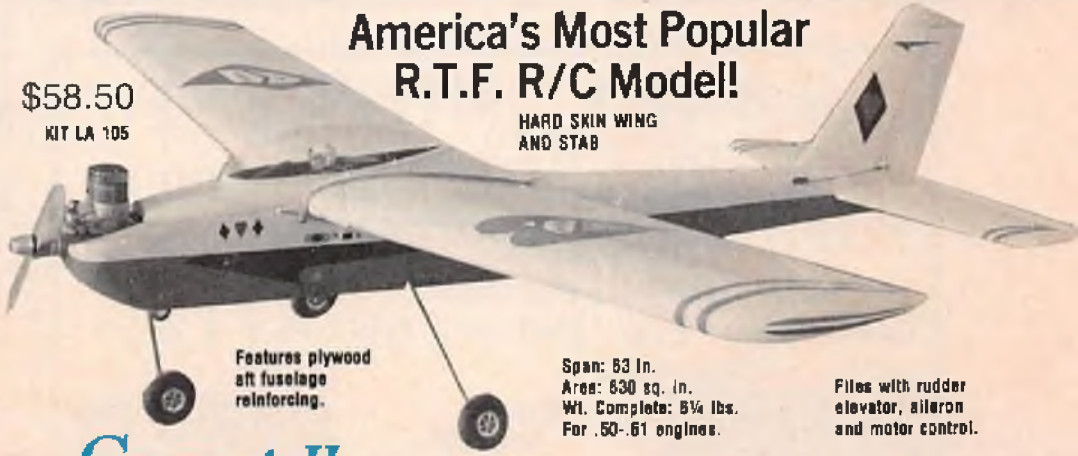
QUIK® 6" x 12"	70¢
AIR-O-CEMENT	65¢
"TRIM" PACK 5 asst'd colors	$1.25

America's Most Popular R.T.F. R/C Model!

$58.50

KIT LA 105

HARD SKIN WING AND STAB



Features plywood aft fuselage reinforcing.

Span: 53 in.
Area: 630 sq. in.
Wt. Complete: 6¼ lbs.
For .50-.61 engines.

Flies with rudder elevator, aileron and motor control.

Comet II

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from page 120/90

leveled off, and zipped by inverted in front of the crowd at a speed that I didn't believe a glider could attain. The silence was only broken by the beautiful sound of the wind as he sliced through the air. In case you've ever wondered why Germany produces such fine glider pilots, consider this — here you must learn to fly gliders before you are permitted to fly a powered aircraft.

After another skydiving demonstration — this time by the German civilians — the "Blue Bees" of the Belgium Army performed a helicopter ballet and flight demonstration that topped just about anything seen so far. They used seven Alouette II's to show the public just how maneuverable helicopters are. They couldn't have picked a more capable helicopter than the Alouette. The Alouette has been around for 20 years and is still one of the best light observation helicopters in the world today. Even when armed with rockets or machine guns, it's still fast and very maneuverable.

They danced around their leader in a delightful hovering ballet, performed the "cross of death", and when this was all finished, they lined up at a hover in front of us, dipped their noses in a uniform bow to the spectators. They then formed up into formation for a final fly-by with colored smoke trailing.

After more aerobatics by Herr Stroessenreuther, the Red Barons, a Hawker Siddley "Harrier" took off, circled, and made a deafening low level pass in front of the viewing stands. The "Harrier" is a VTOL aircraft capable of close fighter support, and when I say it can hover, baby, it can hover! The pilot brought it back and slowed it to hover almost immediately in front of us. The "Harrier" performed a ballet showing movement to the right and left, flying both forward and rearward, settling straight down and lifting straight up, turning while at a hover, and drew delightful chuckles from the crowd as it bowed to us. I've seen the "Harrier" many times before and this is truly one aircraft that delights crowds everywhere it's demonstrated.

At 6:00 p.m., we were scheduled to once again fly, but we were cancelled out due to the crowds now becoming uncontrollable even to getting on the runway as the "Harrier" taxied in. A hot air balloon was the only other thing to fly and we started to pack up, somewhat miffed at the cancellation, but in the interest of safety, we had to realize that the "powers that be" were rightly justified in doing it. We had at least a small portion of the glory; plus, we revelled and basked in our vanities by answering the questions put to us about the models

we had on display. We had over 60 models there.

The one model that drew the most questions and longest stares was one of a Lockheed SR-71, built by Herr Schattat of the Niedermittlau Club. His workmanship was flawless and no photograph could really do it justice. This project took him over 350 hours to build and is constructed of fiberglass, Styropor, balsa, plywood, and is powered by two OS Max .60's. Thus far, Herr Schattat has not flown it, even after all the badgering he has had from us and his club, but he says that the time is near. In a way, I don't blame him for putting off its maiden flight, as it is truly a work of art.

All of our models drew attention and many, many questions. It was hard to mind the models and watch the air show at the same time. Al Doucette had all he could handle in answering questions about his scratch-built CH-47 "Chinook" helicopter. Al has taxied it and done a little hover work with it so far, and is presently eliminating all the bugs in the control system. In 1976, at Toledo, Al displayed an amazingly detailed scratch-built UH-21 tandem rotor helicopter.

I'm sorry that I don't have the space and time to describe every model on display, but considering that this was our first show, we did ourselves proud. So, modeling is alive and well here in Germany; therefore, don't disparage just because you're in the military, or going into the military. Most mail order houses give you excellent service at substantial savings; so there, you've got it made. Well, gotta' go chase earthworms — er — that is, fly. Auf Wiedersehen! □

FIVE, FOUR, THREE, TWO, ONE

from page 75/74

one too! For phase three I'd try the take-off from the dolly a few times. Phase four would be a final check of the release mechanism with the weight of

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.

MARCH WINNERS

2ND PLACE

Jerry Voth
Moundridge, Kansas

Original design R/C pattern ship. Wingspan 63", Length 52.25", Weight 7.5 lbs. dry. Powered by an O.S. Blackhead .60, Pro-Line transmitter and Ace flight pack. The model is finished with Hobbypoxy II, glass cloth and DuPont #100 primer surfacer.

1ST PLACE

Donald A. Grassi
Bedford, Massachusetts

Scratch-built, original design .40 size pattern ship — Avatar. Span 54½", Length 46", Weight 5 lbs. Powered by an H.P. .40, Super Semco muffler and Kraft radio. The fuselage was covered with K & B Super Poxy and the wings with Super MonoKote.

3RD PLACE

Arnie Gaus
Wheelersburg, Ohio

The model is a kit-built Wayfarer biplane by Svenson (RCM plan #482 $4.00). Wingspan 52" both wings, Length 45", Weight 7 lbs. The model is powered by a Fox Eagle .60 swinging a 12/6 prop. The radio is a World 5 channel Expert. Finish: silk, Aero-Gloss dope, Bridi stripe tape.

RULES

A. Model Aircraft Origin
   1. Any kit — wood fiberglass, foam, or ARF kit is eligible. Any scratch-built aircraft built from magazine or original plans is also eligible.

B. Category
   1. All types of radio controlled airplane models.
      a. Scale
      b. Pattern
      c. Racing
      d. Fun-To-Fly
      e. Original Design

C. Entrants to submit:
   1. Color photo or slide, size 35 millimeter or larger.
   2. Black and white glossy photos (any size) of both sides, top, rear, front, and bottom views.
   3. Close-up photos may be submitted on detail work if desired.
   4. A short write-up giving dimensions, weight, power, radio, etc.
   5. A statement that:
      a. The submitter was the sole builder of the model.
      b. Parts and/or accessories used were part of the kit or available to all modelers at retail outlets.
      c. All non-available or special parts were built by the hands of the submitter.

D. Judging will be on:
   1. Workmanship
   2. Quality of finish
   3. Attention to detail
   4. Subject of model or difficulty of the project will count in judging.

E. Judging will be done by RCM Editors Don Dewey and Pat Crews.

F. Persons not eligible
   1. Members and employees of RCM or any other model airplane publication.
   2. Members and direct or indirect employees of Dremel Manufacturing Co.
   3. Members and employees of any manufacturer of hobby kits, hardware or supplies.
   4. Anyone engaged in the wholesale or retail distribution of hobby kits, hardware or supplies as a major source of income.

G. Models not eligible for submittal are:
   1. Models that have been submitted for judging of workmanship at any major AMA sanctioned contest and have placed 1st, 2nd, or 3rd in that judging. Flying points as a final standing do not apply.
   2. Models that have been built for display purposes only.
   3. Models that have been built for manufacturers demonstration purposes.
   4. Models that have won a similar award in another publication.

H. Entrants who have models that qualify under these conditions are eligible to enter. Included with the entry should be the entrant's AMA and FCC numbers, and also, the name of his club, if any.

I. Prize Information:
   1. A Dremel 371 Variable Speed Moto-Tool will be awarded to the monthly winner. An illustration and description of the kit will be included each month along with the winner's name, address, club, etc. The second and third place runners-up will be awarded a one year subscription to R/C Modeler Magazine.
   2. Dremel Manufacturing Co. of Racine, Wisconsin will be notified of the monthly winner immediately after a decision is reached by the judges so that the kit award can be received by the winner prior to the issue of that months RCM.

J. General:
   1. All contest entries must be addressed to RCM Model of the Month Award Program, R/C Modeler Magazine, P.O. Box 487, Sierra Madre, California 91024.
   2. All photographs and materials submitted by the contestant will become the property of R/C Modeler Magazine and none will be acknowledged or returned.

This contest will be null and void in any state or locality where specifically prohibited by law.

Pat's chutist. And, finally, the flight of the frenzied, fearless flier for phase five.

Step one was easy; putting a flight on the re-built engine. After watching the first take-off though, I had a new worry. It looked like the engine wasn't putting out as much as it would have to, to get the plane off of the ground with that 1¼ pounds of weight and added drag. We'll see.

In our phase two test, the plane went up with the Raggedy Ann doll to check the release mechanics under flight conditions. In a few minutes the plane was high enough and upwind, so the switch was thrown. I had connected the drop servo to the retract switch on the transmitter. After what seemed to be about 10 minutes, but what was really about 1/2 second, the doll fell free. The chute opened and she floated down to the pit area within 10 feet of our spot amidst some controlled cheers from our engineering consultants. "See what a good job we've done so far?" they said.

"Phase two okay," I shouted in a mild hysteria.

Then came the hard part, taking-off of the wire wheeled dolly. We set the plane on to the dolly and started the engine. It still wasn't running very well at an idle. First the throttle was eased open a bit to see how the dolly would track with the plane on it. It seemed okay. With Jerry Joyner holding the tail, I opened up the engine, nodded nervously, and he let go. Pat had suggested that I hold in some down elevator during the take-off run to make sure the plane would stay in place on the dolly until it had plenty of flying speed.

It started rolling down the runway, the damnedest sight I had ever seen! The rear of the fuselage had lifted off of the support, but the wheels stayed right in place in their racks. When it looked like the plane was at flying speed, I gave a little up elevator and the plane lifted off easily. Up it went and the dolly rolled to the end of the runway and stopped. No problems getting free of the dolly.

I made a hard left bank of 360° and landed to try that one again before we could think too much about what might happen during that take-off and chicken out of the whole affair. It turned out that our first try was the best. On our following practice take-offs the winds began blowing harder and it became somewhat more tricky. One time a wind gust blew the plane off course; almost 90° to the runway. By habit (and because I didn't know what else to do), I used the rudder to try to correct the taxi. The plane and dolly responded. So we could use the rudder to steer the plane fairly well while it was rolling on the dolly. Whew!

Now we were getting close to the moment of truth. In phase four, we put the radio controlled chutist onto the bottom of the plane to make sure it would release as it should with that weight. As soon as we got the elastic band in place, we realized that one wouldn't be enough to do the job. The chutist was too heavy and too long. So, we added a second elastic band. This one was attached to a screw installed at the leading edge of the landing gear. It passed under the neck of the chutist to the other side of the main gear, and back to the pin. Despite the added pressure on the pin, because of the second elastic band, it still worked fine.

There were no more tests left to do. It was time for the big moment.

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STERLING Under

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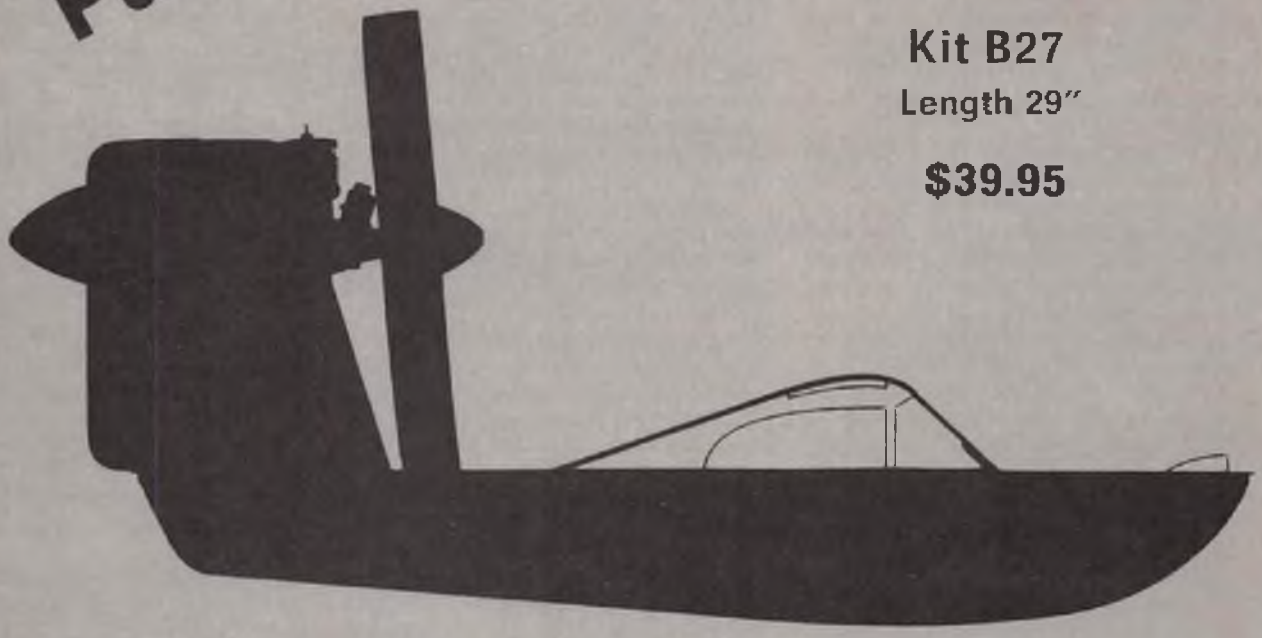

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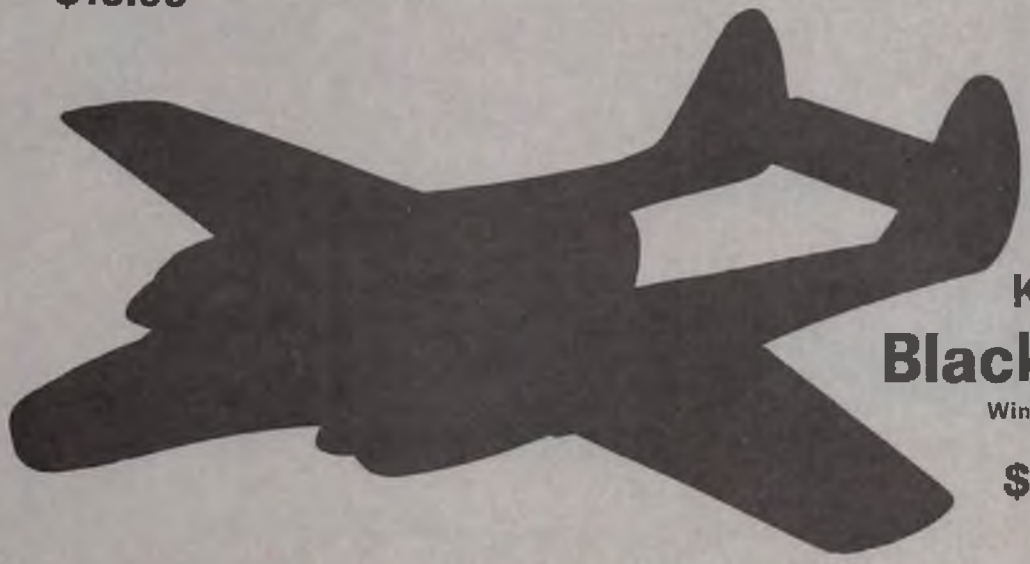

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FIVE, FOUR, THREE, TWO, ONE

from page 125/74

Pat did a range check for the radio in the chutist, then he mounted it on to the belly of the Senior Telemaster. The plane and dolly were carefully carried out to the runway and set up. We turned on the receiver in the Telemaster, the plane's transmitter, the receiver in the chutist, and the chutist's transmitter. The engine was started. By now the wind was blowing a pretty good clip and at an angle of about 30° to the runway. This time the weather forecasters weren't wrong.

Since we were all ready to go, we decided to go to it, in spite of the wind, my shaky knees, and sweating thumbs. The plane and dolly were set up to run at an angle across the runway, directly into the wind. A couple of guys held the wing tips so the wind wouldn't blow the plane off of the dolly. I opened the throttle, gulped a few times, nodded, and Jerry gave the concoction a shove. This was it.

The Telemaster started rolling straight into the wind, but much slower than I expected. Normally the plane can take-off in a few feet, but not this time. I began to wonder if it would get off at all. Before the plane reached flying speed, the plane and dolly were approaching the other side of the runway. I thought some good thoughts, gave the plane a little up elevator, watched, and hoped. It lifted off of the dolly just as the dolly ran off of the runway and tumbled to a stop. Then, just like carrier launched planes sometimes do (at least those I saw Sonny Tufts fly in the movies about World War II), it began sinking down to the point at which we thought the chutist's belly — his battery pack — would scrape on the ground. But by that time, we were fully committed. We were airborne and there was no way of getting back down in one piece with that chutist hanging there.

to page 130

1/2 A, SPORT, STAND OFF SCALE, 2 CHANNEL RADIO

P-51D
$29.95

Features:
- Semisymmetrical airfoil that builds flat on the full-size plan
- Formed plastic fuselage, top, and canopy
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Specifications:
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Photo of actual model built from kit

The House of Balsa *P-51D Mustang* and *ME-109E* are big steps ahead in low cost RC that gives both realism and performance. These high quality kits build quickly, using preshaped balsa fuselage sides, light weight moulded fuselage tops including the canopies, and shaped blocks. Rugged balsa and plywood construction make light yet strong models that are ideally suited for schoolyard and small field flying.

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FIVE, FOUR, THREE, TWO, ONE

from page 128/74

As soon as the plane lifted off of the dolly and began to sink, I started adding in some more up elevator. Almost full up elevator without much airspeed isn't the position we want to get in too often! Finally, the plane responded and began a slow, but nice, climb that was accompanied by cheers from the group. And that was worth the cheers. Nothing like a near catastrophy to make things a little more exciting.

My second surprise was to find that, even though the re-built engine hadn't come in yet, it did seem to be pulling it in the air alright. In addition, the plane felt like it was responding as it always did, even though it was carrying that extra weight. To play safe though, all of the turns were made very gentle using the rudder, elevator and ailerons. And any sudden up elevator shots were avoided to prevent any unnecessary G's on the wings.

The plane got upwind, and I do mean up-wind, to the proper altitude and at the drop zone in a few minutes. Then Pat began the count-down. To make sure he would know what was going on up there, two fellows were watching the big moment with binnoculars. "Just about there, Ben. Five, . . . four, . . . three, . . . two, . . . one, . . . DROP!" I pushed the retract switch and waited. I saw the sunlight flash off of something below the plane and heard the yell, "It's dropped. It's clear."

Now it was all up to Pat and the chutist.

According to our pre-flight planning, Pat was first going to check out the chutist in free-fall. While I was too busy flying the Telemaster to watch that speck plummeting toward the ground, I did hear Pat saying, "It's going to the right. Now to the left. It works!"

After a few more tricks, I heard Jerry

warn Pat that the chutist was getting low and the chute should be opened. I heard Pat say, "Okay. I'm going to open the chute. . . . I'm going to open the chute. . . . I'm going to . . ." Pat was interrupted by the ominous sound of a thud that came from a puff of dust that rose a hundred yards off of the end of the runway. You know the sound.

By that time, I was just about ready to land the Senior Telemaster. We all ran over to the disaster area where the remains of the chutist was scattered all over the place. Wires, chute, servos, battery pack, lots of pieces of balsa, and a nicely carved, though dented, balsa wood head laying over a-ways. It looked as though our bionic man was in need of some new bionics. Or something.

As we walked back to the pit area, I overheard one member of the disaster crew saying, "We have the technology. Now it's just a matter of getting the thing to work!"

At first, we theorized that possible air turbulence on the top side of the chutist as he dropped in free-fall may have prevented the chute from opening. We thought that the turbulent air might have held the chute in the chute pack. Spring load the pilot chute. But then, as Pat checked out the remains, he found the real problem. The chutist was given a final coat of dope late Saturday evening to make sure it wouldn't get oil soaked. While the dope felt dry when the chute was packed that evening, it wasn't. The critical washer that releases the chute pack was stuck to the paint. Drat.

Cheered by the fact that it looked like everything was "go", we made plans for the following Saturday. Pat was going to reassemble the first chutist and make a second one, but without the radio. It would be weighted the same, though. We'd work out a static line to open the chute. That one would be flown first. If it worked okay, we would then fly the RC version.

The following Saturday took forever to come. But it did, right after Friday as

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JULY 15 - 16

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  July 15, 1978 Processing 8:00 a.m.
  July 15, 1978 First Race 10:00 a.m.
  *George Washington Motor Lodge — Phone: 215-OL9-7200
- Trophies to 15th Place
- Cox Engines Fast Time Awards
- World Engines Flyoff Event — Top 12 Contestants Qualify
- Terry Prather Grand Champion Award

INFORMATION

Joe McDermott, C.D.
275 Bryn Mawr Avenue
Bryn Mawr, PA 19010
215-527-0508

Al Grove
1431 Woodford Drive
Wayne, PA 19087
215-688-8622

usual. 7:00 and we were out at the field setting up. This was going to be the day. Blue sky with a few wispy clouds. It warmed up to about 75° by the time we were ready to go, with no wind at all. (That's December in Southern California for you. Heh, heh!) But first a couple of practice take-offs from the dolly to make sure I hadn't forgotten anything. Then we rigged the chutist with the static line and set the plane on the dolly. It was a sight we still found funny to look at, though scarey.

The engine was started, the plane released, and down the runway it went. It lifted off nicely and the dolly stopped at the edge of the runway. The plane climbed up to altitude and to the drop zone. Down the dummy came. This time the chute was open. Sofarsogood.

Finally, we got into the air with the radio controlled chutist on the belly of the plane. By now, we had several flights on the re-built engine so it was running much stronger. And, I was feeling much better about those take-offs from the dolly.

At altitude and in the drop zone. All eyes up and watching. "Five, . . . four, . . . three, . . . two, . . . one, . . . DROP!" The chutist was in free-fall under Pat's control. As it was on that fateful Sunday. "Turning to the right. Turning to the left." Then came the words I was waiting for. "I'm opening the chute." Everything was quiet for a few seconds, then you could hear, "Look, look, it's working!"

First we saw the red pilot chute come streaming out of the pack. Then the 16 foot diameter chute came billowing out of the pack silhouetted against the blue sky. What a beautiful sight it was. The cheering was so loud that for a moment I forgot I was still flying the plane. Maybe because I was jumping up and down and cheering the loudest! As the chutist floated down, lifted occasionally by the breeze from a passing thermal, I circled it gloriously. Once again, science and technology triumph over ignorance, superstition, and fear.

In following drops, Pat and Jerry came up with the idea of dusting the chute with some talcum powder when it is packed. That way when the chute opens at a good altitude, the talcum powder creates a big puff of "smoke" you can't miss from the ground. When you see that you know it's working okay. And it does.

Incidentally, while dropping the RC chutist has been the wildest thing I've ever tried, it has also been fun to drop the Raggedy Ann chutist from the Telemaster. We also rigged up a second chutist and dropped the two at the same time! Seems that our pin-elastic band parachute drop rig could be used on just about any .60 sized plane like Bridi's RCM Trainer .60, the Senior Falcon, and so on. The chute we used is still available from the hobby shop we mentioned earlier in this article.

For our next act, we're going to try to film the drop from the air. John Fodor, our flying buddy and club member who also flys a Senior Tele, has just completed a rig to mount a motion picture camera on his plane. Hopefully, in addition to towing up a glider, which is no simple trick in itself, he'll soon be able to get our parachute drop action on film. We have the technology, all we need is the know-how and the luck.

And our field engineering consultants are working on that. □

ALBUQUERQUE'S FUN FLY

from page 73/72

Saturday morning (the wind always blows in Lubbock). Seriously, his latest design, featuring a T-tail, Fowler type flaps and wing slots, does wondrous things — like a loop right over the end of the runway and then touch-down within the first 50 feet. The flaps have no effect on the trim at any speed or power setting. But Rex is going to have to paint an outhouse on the fuselage because he got ours after an engine failure. His large Travel-Air looked like the real thing in the air and prettier on the ground. When Marty Moad saw it in the air, he said, "My God, that's beautiful; I soloed in one of those in 1932."

After a brief break for the team relay event which Bob Maynard and Ed Harvey won, flying returned to the hectic pace. Al Casey from Phoenix (13th consecutive Albuquerque Fun-Fly) finally got up enough nerve to fly his almost new and immaculate P-51. The previous weekend, in Phoenix, I had seen him hot dogging it on the first flight (with a rich O.S. .80) after telling me before the flight that it would probably be a couple of weeks before he would do that. My answer at the time was, "You wanna bet?" Al was somewhat nervous about our elevation and his 10 pound P-51. He needn't have been. After a smooth take-off and gear retraction, Al got down to some serious tub-blowing. His four point rolls were particularly impressive.

When Ed Kilian put his red Astro-Hog in the air, you could tell who the old-timers were. "Hey look, isn't that an Astro-Hog, well I'll be!" was a common remark. Hauled around by an S.T. .51 **rear rotor**, the engine is as rare as is the plane. Shades of Bob Dunham. Ed very seldom flys higher than 75 feet and pre-

fers slow, light planes; he is a deceptively good flyer.

About this time, Gerald Martin, flying in from Hereford, arrived over the field in his Bonanza and I left to pick him up at Alameda Airport, just three miles north. The previous week, he had told me he was bringing an old beat-up bipe. Hardly - - - it was an unfancy, but pretty, Aeromaster. On the way back to the field, I casually mentioned I had been doing snaps on take-off with my tail-dragging Kaos. Having impressed Ted White with this statement several weeks earlier, I was somewhat deflated when Gerald told me he was doing a snap-and-**a-half** on take-off with his Aeromaster. Shortly after arriving at the field, he had the Aeromaster together and, sure enough, he did his snap-and-a-half on take-off. From there on, Gerald turned that plane every way but loose. On the next flight, he did a pretty four-point roll on take-off. He does both of these maneuvers low, right after take-off.

The youngest flyer at our Fun-Fly was Mike Kunkel of Borger, Texas, who admits to being thirteen, but looks about eleven. He looked even younger when he was putting Marty Moad's twin through its paces, especially when Marty showed his confidence in Mike by walking away from him and talking to Mike's father, Earl.

Clouds approaching from the west brought some breezes and sprinkles. This thinned out the large crowd and many of the flyers. A bunch of us old die-hards who stuck it out were soon rewarded with calm conditions and no rain. Bob Frey and Ted White flew their P-47 and P-51 in formation for some truly scale fly-bys. Flying continued until almost dark.

A few words about publicity. Pre-coverage was generously provided by TV, radio, and the newspapers. Channel 4 took movies Saturday morning and showed them on the Saturday evening 6 p.m. and 10 p.m. news. A few phone calls and trips to their offices arranged for all this coverage.

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ALBUQUERQUE FUN FLY

from page 134/72

Sunday produced good weather, even larger crowds and continued great flying. Our second scheduled event, Carrier, was cancelled due to weather on Saturday, so the third and final event, "Race What You Brung", was run off Sunday morning, taking only about one hour.

A fly-off heat between Ted White and Noel Rozelle was judged a tie.

A highlight for the spectators was Ted White having them fly his Bandito. It seems the adults were shy about stepping forth, but not the kids! For at least an hour and a half, there was a long line of youngsters waiting their turn. Once, when I looked over Ted's way, he was instructing a little girl who couldn't have been over four years old. Later, Ted reported all she wanted to do was loop!

The look on their faces after flying was something to see. I'll never forget the sight of the country's best demonstration pilot helping all those kids.

Lt. Ferris from Clovis added a nice touch for everyone by making repeated parachute drops of GI Joe. His take-offs, slowed by a dragging belly pod, also added some thrills. Even though the chute failed on one drop, GI Joe kept coming back for more.

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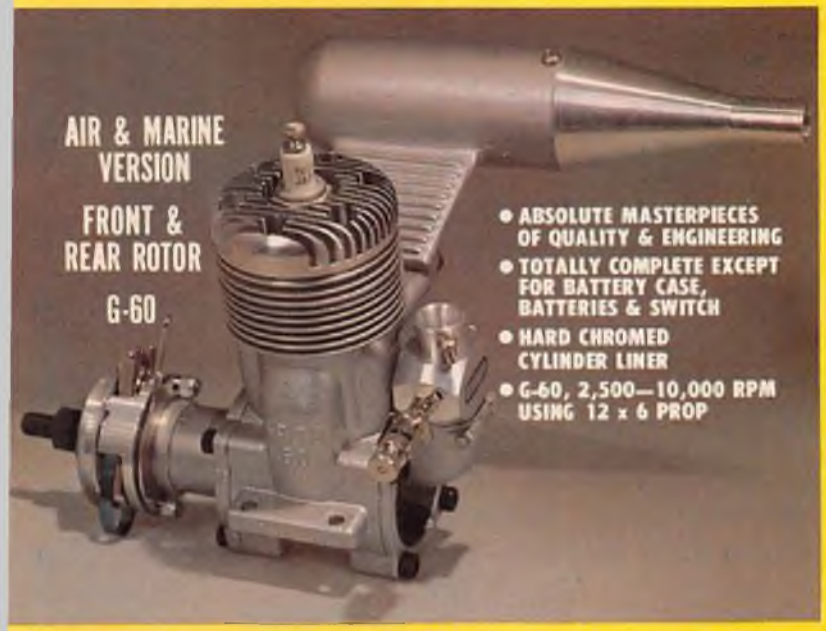
Hobby Shack SAITO Gasoline Ignition Engines

Saito, the manufacturer of precision model steam engines, has just released their newest line of Gasoline Model Ignition Engines. These are absolutely superb, as is their way of doing anything, and we are delighted to be able to introduce these engines to the American modeler.

At this time we have in stock the G-60 in a Front rotor and Rear rotor version, and also offer both as an air cooled engine for model airplanes or a marine type for model boating. The marine type comes complete with a flywheel machined, universal joint, and of course is fitted with a water cooled head. These are the most economical engines to run, because they run on regular gasoline! Thus, instead of paying up to $12.00 a gallon for model fuel, your gallon of gas for the G-60 will cost you about 60¢ per gallon. At those prices it won't take long until you have paid for your engine in gas savings alone!



ALL ENGINES COME COMPLETE EXCEPT FOR BATTERY CASE, BATTERIES AND SWITCHES.

YOU GET: Engine, Carburetor, Muffler, Coil, Condenser, Spark plug, Spark plug cap, 10K ohm resistor, Connector, Shrink tube, High tension wire, Neoprine fuel line & Tools — Puller, Box wrench, Hexagonal wrench and gauge board.

GASOLINE IGNITION ENGINES	Retail	OUR PRICE
REAR ROTOR AIR COOLED G60.....	$195.00	$148.88
REAR ROTOR WATER COOLED G60....	$215.00	$164.99
FRONT ROTOR AIR COOLED G60.....	$200.00	$149.99
FRONT ROTOR WATER COOLED G60...	$220.00	$169.99

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QUALITY - PRICED RIGHT - POPULAR SIZES

Thunder Tiger
GAS MODEL ENGINES

- .15-.20-.25 ALL WITH MUFFLER
- BEAUTIFULLY ENGINEERED
- PRECISION - TOP QUALITY
- PLAIN BEARING - IDEAL DISPLACEMENT

R/C ENGINES	Retail	SALE
.15 III R/C (with muffler)	27.95	21.99
.20 R/C (with muffler)	29.95	23.99
.25 R/C (with muffler)	32.95	25.99
STANDARD ENGINES		
.15 III STD. (with muffler)	23.95	18.99
.20 STD. (with muffler)	24.95	19.99
.25 STD. (with muffler)	26.95	21.56

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HIGH EFFICIENCY FUEL FILTER

THE MOST SOPHISTICATED FUEL FILTER EVER DEVELOPED FOR MODEL ENGINES!

- Tempered glass bowl.
- 120 mesh stainless steel filter element (clean filter by removing glass bowl).
- Filter seperates both dust and water — dirt and water are left on the bottom of the bowl.

Retail $2.95 **Our Price $2.27**

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California residents please add the 6% State Sales Tax.

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DA ENTERPRISES SERIES IV POWER PANEL — 40% OFF

The all-in-one power panel !

Supply power to starter, plug, pump, etc., as well as fast charge your radio at the field!

RETAIL $34.95 — NOW ONLY $22.48 — Stock #DAE90000

BRIDI RCM TRAINER 40 — 34% OFF

This popular all balsa trainer has a 52" span and takes a .35 - .49 engine. A high quality kit.

RETAIL $49.95 — NOW ONLY $32.98 — Stock #BRI73007

COX TD .049 STD. ENGINE — 35% OFF

A super hot ⅛A engine ideal for free flight, control line, ½A R/C, and more. Limit of 2 per order.

RETAIL $19.95 — NOW ONLY $ 12.98 — Stock #COX01049

CRAFT-AIR FIELD BOX NEW — 33% OFF

It's ready to use, not a kit, made of lightweight indestructible polyethelene. 22" long & holds everything. A SUPER BUY!

RETAIL $29.95 — NOW ONLY $19.98 — Stock #CRA90100

WE ABSOLUTELY WILL NOT BE UNDERSOLD BY OUR COMPETITORS! HERE IS JUST A SAMPLE OF OUR LOW PRICES. WE HAVE THOUSANDS MORE JUST AS GOOD. CALL TOLL FREE FOR A LOWER PRICE BEFORE YOU BUY ANYWHERE ELSE. IT PAYS TO COMPARE WITH OUR PRICES!

Futaba Sale!

	Retail Price	Tower Price
2GA	$99.95	69.98
2E	139.95	94.98
2F	139.95	94.98
3F	179.95	119.98
3FN	199.95	132.98
4FN4	299.95	194.98
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6FN	359.95	229.98
7GN	579.95	394.98

	Retail Price	Tower Price
Airtronics Aquila	64.95	45.48
A-Justo-Jig	54.95	36.98
Bridi Super Kaos 40	52.95	34.98
Bridi Sun Fli 4-20	24.95	16.48
Bridi Dirty Birdy 40	58.95	38.88
Bridi Dirty Birdy 60(glass)	119.95	80.38
Bridi (S&O) Battery Tester	24.95	16.18
Craft-Air H.D. HI-Start	39.95	25.98
D&B Corsair	159.95	111.98
Fox-----ALL RC ENGINES-----40% OFF RETAIL		
Hot Stuff Blue Line 1/2 oz.	4.95	2.98
Skylane 62 & Sr. Falcon	55.95	33.58
House of Balsa-ALL 1/2A KITS-30% OFF RETAIL		
Jensen Ugly Stick	62.50	39.98
K&B .19RC	47.00	28.18
K&B .35 RC	34.95	22.78
K&B .61 RC Pumper	110.00	64.98
K&B .40 RC Pumper	89.50	53.68
Kraft .61 RC w/muffler	99.95	71.98
Kraft KPS-141 & 151 Servos	44.95	34.98
Kraft 7C & 7CS Radios	515.43	377.98
Mark's Bushwacker w/access.	52.95	31.78
Midwest Sweet Stick	39.95	24.78
Monokote--Regular & Trans.	9.00	4.98
Nosen---ALL KITS---28% OFF RETAIL		
O.S. Max .15 RC w/muffler	33.95	24.78
O.S. Max .30 RC w/muffler	43.95	31.18
O.S. Max .60 RC Blackhead	84.95	59.98
Dave Platt-- ALL KITS	79.95	53.58
Skyglas Phoenix 6 & Vertigo II	69.95	38.98
Solarfilm--Regular Colors	7.98	3.98
Sureflite All-Foam J-3 & Spitfire	34.95	22.78
Robart Super Pumper Mk II	17.95	10.78
Sig Kadet	33.95	25.48
Sterling Fledgling	37.95	23.88
Sullivan Deluxe Starter	36.95	23.98
Top Flite P-51	57.95	38.88
Top Flite Contender	45.95	30.78

GOLDBERG HANDI TOTE — 34% OFF

This flight box is compact yet has room for everything you need. Limit of 1 per order.

RETAIL $14.95 — NOW ONLY $9.98 — Stock #GBG90000

KRAFT KP-6A 6 CHANNEL NEW — 34% OFF

6 channels, open gimbals, 4 servos, nicads, trays, harness, charger & 1 yr. warranty make this all new Kraft radio a super value.

RETAIL $339.95 — NOW ONLY $224.98 — Stock #KRA88262

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SPECIALS GOOD UNTIL MARCH 15th, 1978 ONLY

BRIDI RCM TRAINER 60 — 34% OFF

This popular all balsa trainer has a 58" span and takes a .40 - .60 engine. High quality, flies great.

RETAIL $59.95 — NOW ONLY $39.58 — Stock #BRI74002

BUD NOSEN TRAINER — 28% OFF

This 8.5 ft. wingspan all wood, fast building trainer is designed for a .60 size engine & 3 or 4 channel radio.

RETAIL $79.95 — NOW ONLY $57.58 — Stock #NOS74008

BRIDI UFO — 33% OFF

The ultimate in pattern! This new release is .60 size with fiberglass fusealage and foam wings.

RETAIL $124.95 — NOW ONLY $83.68 — Stock #BRI74011

FUN BUGGY — 22% OFF

This is the Siguma-Ace .19 size dune buggy distributed by Leisure Electronics. See the Dec. RCM article for more details.

RETAIL $179.95 — NOW ONLY $139.98 — Stock #LEI90000

MRC–TAMIYA 1/12 SCALE RC PORSCHE — 20% OFF

This outstanding electric RC car features 2 forward and 1 reverse speed. 14" long, ABS plastic body, and full instructions.

RETAIL $54.95 — NOW ONLY $43.98 — Stock #MRC91201

RHOM-AIR TRI-GEAR RETRACTS — 35% OFF

The finest pneumatic retracts available! Everything is included.

RETAIL $114.95 — NOW ONLY $74.68

BELLY MOUNT — Stock #ROM22105

FIREWALL MOUNT — Stock #ROM22104

BOLINK ELECTRIC CAR — 20% OFF

This 2 channel 1/12 scale electric car comes already assembled with 05 motor, nicads, & charger & goes over 25 mph.

RETAIL $99.95 — NOW ONLY $79.98 — Stock #BOL90094

AIRTRONICS OLYMPIC II — 30% OFF

This 99.9" span trainer is capable of contest competition. All balsa with pre-cut parts. An excellent quality sailplane.

RETAIL $49.95 — NOW ONLY $34.98 — Stock #AIR71208

ZINGER WOOD PROPS — 35% OFF

Two popular sizes–Stock up now on these high quality props!

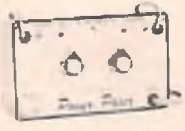
10X6 WOOD PROPS(6)

RETAIL $8.40 — NOW ONLY $5.48 — Stock #ZIN17663

11X7 WOOD PROPS(6)

RETAIL $9.60 — NOW ONLY $6.28 — Stock #ZIN17675

POWER PACER BATTERY TESTER — 20% OFF



A new ni-cad battery tester, cycler, and charger. Works great!

RETAIL $59.95 — NOW ONLY $47.98

9.6 volt — Stock #PWR80096

6 volt — Stock #PWR80060

LANIER COMET II — 36% OFF

This popular almost-ready-to-fly features a 63" span and takes a .50 - .61 engine. Great trainer.

RETAIL $58.50 — NOW ONLY $37.48 — Stock #LAN74105

SONICTRONICS ELECTRIC FUEL PUMP MODEL No. 1250 — 36% OFF

This outstanding fuel pump operates on 12 volts. High quality.

RETAIL $13.95 — NOW ONLY $8.98 — Stock #STR54249

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ZAP ZAP ZAP ZAP 44% 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 $1.98 — Stock #SOR32050

TOWER HOBBIES 3 CHANNEL 43% OFF

This 3 channel made by Kraft includes 2 servos, Rx ni-cad, dual charger & dual function meter.

RETAIL $210.00 — NOW ONLY $119.98 — Stock #TOW88231

KRAFT KP-5C 5 CHANNEL Sale 34% OFF

Lowest price ever for this 5 channel with open gimbals, 4 servos, nicads, trays, charger, changeable Tx freq. module & 1 yr. warranty.

RETAIL $375.43 — NOW ONLY $249.98 — Stock #KRA88252

HOT STUFF HOT STUFF 44% OFF

Hot Stuff is an instant bonding cyanoacrylate super adhesive that is a must for modelers. Stock up now at this super price.

RETAIL $3.50 — NOW ONLY $1.98 — Stock #HOT32001

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 $62.50 — NOW ONLY $37.48 — Stock #K&B01040

DU-BRO KWIK FILL FUEL PUMP 36% OFF

RETAIL $10.95
NOW ONLY $6.98
Stock #DUB20191

HOUSE OF BALSA P-51D (.29-.40) 30% OFF

This all-balsa sport, stand-off scale ship is absolutely outstanding. The hottest new seller of the year.

RETAIL $54.95 — NOW ONLY $38.48 — Stock #HOU73000

K & B .61 R/C ENGINE 40% OFF

Limit of 1 engine per order.

This outstanding engine features a Perry carb and muffler.

RETAIL $85.00 — NOW ONLY $50.98 — Stock #K&B01161

TOWER HOBBIES R/C LONG GLOW PLUGS 50% OFF

These excellent glow plugs feature an idle bar. Made by the world's finest plug manufacturer especially for Tower. 6 plugs per package. Limit of 2 packages per order.

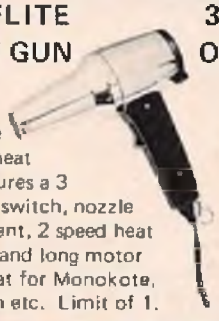
RETAIL $7.20 — NOW ONLY $3.58 — Stock #TOW15006

STERLING 1/2 A CORSAIR 40% OFF

This all balsa 36" span kit features special hardware and decal sheet. .049-.10 engine and 2 Ch. radio.

RETAIL $29.95 — NOW ONLY $17.98 — Stock #STE72036

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. Limit of 1.

RETAIL $27.95 — NOW ONLY $17.98 — Stock #TOP45301

DUMAS 24" HOT SHOT TUNNEL HULL 40% OFF

This die-cut mahogany and birch plywood kit is designed for a 3.5 cc outboard like K&B's.

RETAIL $26.95 — NOW ONLY $16.18 — Stock #DUM70400

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12 VOLT MOTORCYCLE BATTERY — 50% OFF

These are high quality, heavy duty motorcycle batteries that are perfect for all electric starters. Brand new. Limit 1/order.

RETAIL $26.95 — NOW ONLY $13.48 — Stock #TOW19000

12 VOLT BATTERY CHARGER

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. Limit 1 per order.

RETAIL $13.95 — NOW ONLY $6.98 — Stock #TOW19100

COX READY TO FLY CESSNA CENTURION

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. Cox 2 Ch. recommended.

RETAIL $49.95 — NOW ONLY $34.98 — Stock #COX72401

The Cox/Sanwa 2 channel radio fits perfectly into this model. Buy both and be in the air within one hour!

RETAIL $109.95 — NOW ONLY $69.98 — Stock #SAN88522

DREMEL MODEL 381 MOTO–TOOL WITH FULL ACCESSORIES — 37% OFF

The Model 381 is the ultimate in hand grinders. It features variable speed control, ball bearings, and full accessories. Limit 1 per order.

RETAIL $64.95 — NOW ONLY $40.98 — Stock #DRE34381

SEALECTOR CUSTOM MODEL SEALING IRON — 33% OFF

This custom model is great for covering with Monokote, Solarfilm, etc. It features adjustable temperature, teflon shoe, and a handy stand. Excellent quality.

RETAIL $22.40 — NOW ONLY $14.98 — Stock #SEA45202

MILLER No. 2017 SPRAY SET — 40% OFF

Complete set includes a 12 foot air hose, compressor, spray gun, air brush, and nozzles.

RETAIL $73.95 — NOW ONLY $44.38 — Stock #MLL62017

SULLIVAN ELECTRIC STARTER — 35% OFF

The Sullivan electric starter is a high torque, high R.P.M., 12 volt starter. Limit of 1 per order.

RETAIL $33.95 — NOW ONLY $21.98 — Stock #SUL12200

KRAFT KP-4A 4 CHANNEL — 35% OFF

4 Channels, open gimbals, 4 servos, ni-cads, trays, harness, charger, and 1 yr. warranty make this all new Kraft radio a super value.

RETAIL $299.95 — NOW ONLY $194.98 — Stock #KRA88242

DEVCON 5 MINUTE EPOXY IN ECONOMY 9 OZ. SIZE — 40% OFF

Now in squeeze bottles for your convenience. Limit of 3 per order.

RETAIL $5.80 — NOW ONLY $3.48 — Stock #DEV32209

DREMEL 572 MOTO SHOP — 33% OFF

This deluxe saw features a complete accessory set of blades, discs, etc. and flexible shaft. Limit of 1.

RETAIL $87.95 — NOW ONLY $58.88 — Stock #DRE34572

GOLDBERG FALCON 56 MKII — 40% OFF

This all time best seller is now re designed with ailerons. 56" span, 15 - 35 engine, all balsa construction. An excellent trainer.

RETAIL $39.95 — NOW ONLY $23.98 — Stock #GBG72015

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ALBUQUERQUE FUN FLY

from page 136/72

Jim Leonard of Slim Line Mufflers and Bill Kessler of B/K Products generously volunteered mufflers and fuel as prizes which we awarded by drawing participant's sign-up numbers from a hat. Bill flew his new design which had one of his usual sparkling fiberglass finishes. Jim spectated. When he called me early Saturday morning from Phoenix, he said it was raining there. I assured him the weather would be good here and the flying even better; he was not disappointed.

Bob Frey with his Jug, and Ted White with his P-51, decided to gang up on Marty Moad and his Messerschmitt 210. After a staggered take-off, with the 210 last, Marty must have gotten in some telling shots because Bob's P-47 suddenly peeled off and went straight in. A groan went up from everyone. A post-mortem indicated the receiver switch failed. We all hated to see such a fine plane go in; however, during her illustrious career, she had provided many pleasurable moments for spectators and fellow flyers alike. Bob is building a stagger wing Beech that is going to be a beauty.

Dave Linne from Phoenix, with an exquisite 10 pound Pitts that was admired by everyone, had been flying his "practice" plane all weekend, a rather beat-up Skybolt that someone had given him. Though he had put in a fine flight with his Pitts the previous week-end at their scale and bipe Fly-In, he was somewhat apprehensive of our high altitude and relatively short field and decided not to fly it.

Sunday afternoon, the "Piece de Resistance" to the whole Fun-Fly was added by Gerald Martin and Ted White flying their Aeromasters in formation maneuvers. Even though mis-matched in speed, Gerald and Ted got their birds "synced-in" after a few maneuvers and put on a show that can only be described as beautiful. A perfectly timed and executed stall turn will be remembered a long time by all those who saw it.

A few thoughts about this get-together, in particular, and the hobby of radio control in general. Just about everyone seemed to have a good time and had all the flying they wanted; at least, that's what they told me. I think many of the flyers, like myself, so enjoyed watching all that was going on, they didn't fly a great deal. I didn't even put my Aeromaster together Sunday. I'm happy to report that the spirit of flyers gathering from afar, enjoying each other's company, kicking tires, flying together in spontaneous enthusiasm, and having fun, is very much alive! □

2ND ANNUAL GREAT LAKES MODEL AVIATION EXPO
March 25, 1978

Presented by the Capital Area Radio Drone Squadron (C.A.R.D.S.) of Lansing, Michigan, the event will be held at Long's Convention Center, 6810 South Cedar St., Lansing, Michigan, with well over twice the area of last year's show available for the static model competition, tech talks, and movies.

An AMA meeting will be conducted by Johnny Clemens and John Worth from 4:30 p.m. to 6:00 p.m. with an awards banquet to be held at 7:00 p.m.

CATEGORIES:

R/C AMA Scale — R/C Glider
R/C General — R/C Old Timer
R/C Stand-Off Scale
Stand-Off Scale R/C Glider
Free Flight General
Control Line General
Best of Show

For more information and a pre-registration entry sheet, write:
C.L. Hard, 2909 W. Michigan Avenue Lansing, Michigan 48917

from page 71/70

A hi-power electric motor, complete with sintered-plate nicads and wiring harness. Equivalent to about a .21 c.i. glow motor.

Twin medium power electric engines used in a scale model. The reduction gearing has been removed from the plastic housing. A 5 a/h 12 volt lead-acid gives an hours running time in this configuration.

installation, and you can run them anywhere because they don't bother anyone. While they can't really be compared, speed-wise, with a .60 powered model, they can be pretty fast. And, finally, recharging can be carried out in 15-20 minutes.

There are two main disadvantages: Top speed is limited, unless you are prepared to buy a really good motor, and the running time is definitely short. This latter is perhaps the main reason why so few modelers are interested in electric speed. In fact, it has been found that 10 minutes is the tops with a really fast electric boat. Against this is the fact that the batteries can be recharged in a very short space of time. I have a feeling that there is going to be a growing increase in this sort of model boat in the near future — after all, look at the number of 1/12 scale electric racing cars there are around at present.

Low Power Electric Motors: Here we move into quite a different category.

The power outputs are really quite low, but this is acceptable since this type of motor is used principally in true scale models, particularly merchant and naval vessels. Here the criteria is totally different; I think it would be fair to say that the scale modeler is not interested in performance. He wants to reproduce, as accurately as possible, a miniature replica of a full-size ship, and this includes the speed. And, because of the scale effect, the speeds required are very low with the exception, perhaps, of high-speed naval attack craft. There is a vast range of small electric motors to choose from, and they are not expensive. In this case, there is no need to use the high priced nicad — in fact, it can be quite a disadvantage. One of the important things about a scale model is getting it to float on the correct waterline, and one often sees models carrying quite a lot of ballast in order to achieve this. Being a practical sort, and one who, moreover, likes running boats, I prefer to use heavy lead/acid batteries, which serve as useful ballast, and which give me more time on the water.

In this case, it is difficult to talk of advantages and disadvantages, since the use of this type of propulsion is almost imperative. Going back to the use of the biggest batteries possible, this is because lead/acids do not like fast charging and, if they are to last for a reasonable length of time, they should be charged at the 14-hour rate. This means that once they are flat, there is no more sailing that day — unless you have a spare set. Even the traditional disadvantage of lead/acid batteries, that of holes in your clothes caused by spilled acid, is not really valid now with the advent of unspillable gel-cells.

Finally, we come to sail and here, again, there is really not a lot to say. If a sailboat appeals to you, then you are going to build it, whatever the advantages or disadvantages may be. On the good side, it is a very cheap form of

to page 146

super bargains!

save

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Not for the beginner, fast building, fast flying and manoeuvreable semi-symmetrical airfoil 4 Channel

PHAETON BIPLANE 22.99
.35-.45 power 48" span Aluminum gear

Great Sunday Flier and it looks good too
Aluminum gear
TEMPO II 17.99
.30-.45 power 60" span
ABS Wheel Pants
3-4 Channel

Basic Trainer and Sunday Flier for the man with limited building time
STICK 40 WING KIT $8.49
STICK 30 WING KIT $7.69

2 SIZES

SWIZZLE STICK 40 13.99
.30 - .45 POWER 60" SPAN

SWIZZLE STICK 30 11.99
.15 - .29 POWER 48" SPAN

FLOAT KIT 9.99
30" LENGTH
FOR AIRCRAFT UP TO 6 1/2 LBS.

SMOOTHIE 19.99
symmetrical airfoil
40-.50 power 52" span
Aluminum gear ABS Wheel Pants
4 Channel

EXCALIBUR 21.99
symmetrical airfoil
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POWER BOATING

from page 144/70

power: low initial costs and no running expenses. On the other hand, the model is entirely at the mercy of the weather, and so is the pilot, come to that. If you fancy sailing when you have time to do so, and there is no wind, then you will be disappointed. Mind you, it is very rare that there is no wind at all.

There then are the options open to the beginner (with, of course, the exception of steam, which in any case is not really suitable for the pure neophyte). It is all a matter of deciding what you want to do, and then choosing the power plant as a function of that choice. Next time we'll take a look at the different forms of construction that are open to us, and the materials that can be used.

Before wrapping it up for this month, I have to mention a letter which I received recently from Hobby Hideaway in Illinois. Some of you may remember that a few issues ago, I had quite a lot to say about Davis Diesel Developments, and diesel engines in general. Well, Dave Shipton of Hobby Hideaway wrote me to say that they have been carrying a big range of diesel engines for some time now, both for planes and boats. Dave also sent me a copy of his latest Catalog and Diesel Handbook, which, quite apart from showing what he has for sale, contains some useful information on running and maintaining diesel engines. So if anyone wants to get into the diesel scene, they would do well to send $1.50 to Hobby Hideaway, R.R.2, Box 19, Delavan, Illinois 61734, for this useful little booklet.

And that's it for this month, folks — don't forget to break the ice before you try putting that boat in the water! □

HOT KNIFE

from page 69

way to correct the mistake without having to break the bulkhead out of the fuselage, I found the Hot Knife. It worked to soften the glue so the bulkhead could be moved to the correct location. Clever, eh? Oh, well. Once the Hot Knife had been moved out of my junk tool box, it was also used to cut away excess beads of the hot gun glue to lighten the plane. (Don't use hot gun glue in any area that is to be sanded and finished. It won't. It's only useful on inside glue joints.)

Several months later, I was faced with another earth shaking problem. When I glued the top and bottom wing sheeting together at the trailing edge of a sailplane wing I was building, some of the Titebond adhesive had squeezed out of the glue joint. Somehow I was distracted when the sheeting was pinned down and

didn't wipe off the excess. This time it was a TV premier of *Gone With The Wind*. When I saw what I had done, I knew it was all Scarlet's fault. Damn you, Scarlet.

Trying to cut or sand dried glue from balsa without messing up the job can be tricky. As I looked at the job ahead, the magical Hot Knife somehow rolled to the center of my work bench. I called it magic because the Hot Knife was in my tool drawer at the time. After the knife was plugged in and heated up, it put the blade in place at the beginning of the trailing edge glue blob. As a continuous pressure was applied to the knife, it slowly started cutting the excess glue away. A difficult job made easy. The temperature of the Hot Knife was just right. It was warm enough to soften and cut through the glue but not hot enough to scorch the balsa.

One job led to another. The Hot Knife also works well to cut through blobs of epoxy. It's especially useful, though, when you want to rim two pieces of balsa that have been laminated together. The sharp blade cuts the wood while the heated blade melts and cuts its way through the dried adhesive. It doesn't make the cut with the ease of cutting a piece of 1/16" balsa with a new X-Acto blade, but it sure is a lot quicker, easier, and more accurate than using either a regular X-Acto knife or sandpaper.

And that's not all. By using even pressure, the Hot Knife can be used to trim a canopy to size. The temperature is just right so you have good control over the knife as it cuts. No melting blobs as a soldering iron might do.

Probably the more frequent way I've used the Hot Knife is to trim and seal the edges of the plastic, heat sensitive covering materials. After the material is ironed down and shrunk as necessary, I use the Hot Knife first to trim the material. Then, with the blade flat, the trimmed edges are sealed. Seems like the Hot Knife seldom finds its way into my junk tool box any more. It's one of the tools you like to have handy for lots of those little jobs that can take lots of time, from shrinking heat shrink tubing to cutting a canopy down to size. Neat tool, that Hot Knife. □

SUPER SCALE NEWS

from page 68/67

or not.

Don't sell short the old tried and true method of laminating strip wood for wing tips and the circumference of control surfaces. I have used ordinary builders supply spruce cut into strips and lami-

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from page 147/67

nated them around a shaped plywood form for this sort of thing and using 1/8" strips, soaked in water and then glued up on a form, makes the strongest possible shape with practically no weight at all.

Filling in areas which are normally sheeted up with balsa inside the framing members can be done with ordinary plywood in the lighter sizes. I'm thinking particularly of areas such as the front end of such models as the Sid Morgan J-3 Cub which calls for a fair amount of 3/16" balsa fill-in. 1/8" ply will do this at a much lower cost than balsa on a larger model and the rather minimal increase in weight will be of little consequence in a 1/4 scale ship, not to mention a very significant increase in strength.

You may think I concentrate on reducing the cost of large models and, if so, you are correct. So long as there is no reduction in strength, I can accept an increase in weight if it will cut the costs. My 9' J-3 was completely framed up for about $25.00, using substitute materials, which compares to $119.95 for a currently available 9' Cub in kit form. It is my suspicion that the high costs of such kits dissuades many of us from building big. I have no doubt the kit manufacturers are charging what the kit is worth and that such costs are quite justifiable; I just think it can be done better, stronger, and less expensively with substitute materials which will add to, rather than detract from, the model. One Canadian builder of large models tells me that his first large bird had the unfortunate experience of folding the stabilizer and elevator on its first flight due to the balsa spar not being able to handle the loads imposed on it by the large model. He managed to save the model by judicious application of flaps since the model was trying to commit suicide by dashing its brains out against the ground.

Incidentally, there is probably no way to crashproof the big birds; they represent a lot more mass than a conventional model and when they go into the ground, they hit pretty hard. There is compensation, though, as they tend to be lots slower than glow powered smaller models and they fly in as stable a fashion as anything you'll find outside the ranks of full scale. There just isn't anything to compare with the sight of one of the monsters on final, coming in over the end of the strip, reaching out for the ground. They are . . . well . . . stately, I guess describes it about as well as anything.

In construction, I use the same glues we have always used: aliphatic resin, the epoxies, and cyanoacrylates, along

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from page 148/67

with a bit of contact cement and pretty conventional construction methods, although, as you've noticed, some of the materials differ quite a bit. In my next column, I'll cover a bit more on some even less conventional materials and some information on covering the acres of area we will create. Also, in future columns, I'll be going into construction in more detail, including detailing your big bird, power plants, propellers, landing gear, and the myriad detail on how to do it, what to use, how to improve your techniques, even invent a few new ones and, hopefully, some sources of plans for the big birds. In other words, **"Watch this space"**, and remember, **"Big Is Beautiful"**.

SOURCES

Experimental Aircraft Association, P.O. Box 229, Hales Corners, Wisconsin 53130.

Sid Morgan Plans, 13157 Ormond Drive, Belleville, Michigan 48111. Sid has an excellent J-3 Cub and a 101" Stinson Voyageur 108-2.

Richard Barron, 1213 Holly Spring Lane, Grand Blanc, Michigan 48439. Richard has a very nice Stinson Reliant (SR-9) in 1/4 scale which will be on my building board by the time this reaches print.

Both Richard Barron and Sid Morgan have other irons in the fire in 1/4 scale and should have more large plans on the market in the near future. They will be eagerly awaited by those of us who are into bulding **big**. Neither of the rascals have told me yet what they have in the works, but judging from what I have seen of their past work, their new birds will be worth waiting for. □

from page 66/64

have to worry about giving her a decent burial; she took care of that herself. Out came the Baggie!

Several gallons of coffee later, we threw away all the airplane kit catalogs, and decided to try building a research plane from the ground up, rather than modify if from an existing design. Our requirements were simple. It had to be hand launchable, carry two movie cameras, have an endurance of about 45 minutes, be able to overtake a goose flying full bore (55 knots), and be steady as a rock. John cautioned me that the final product would fly, but it might not be pretty. He was right!

After playing with some exotic designs, we finally settled on a good, old-

fashioned, high winged cabin plane, built from plywood and balsa. Since it would be carried in our truck, we went for a one-piece, eight foot span wing for strength and simplicity. We were uncertain about engine requirements, so threw conservatism to the winds, and powered it with a Fox 78. My MRC 5-channel radio had survived earlier Gooseplane disasters, so it was used for the control department. A later modification substituted a 6-channel Kraft (to gain the extra channel), but both rigs worked well. Two Super 8 movie cameras, an Instamatic M24, and a Sears, were wrapped in foam rubber, and mounted in styrofoam cradles built into the plane. One camera pointed straight ahead, through a glass window in the cabin, and the other pointed straight down, between the legs of the landing gear. We were worried that vibration from the engine would cause problems with the steadiness of the film image, or cause the automatic exposure diaphragms to bounce, but this fear was groundless - the pictures were amazingly steady, at least when the plane wasn't bounced by turbulence. We dissected the innards of the cameras, which were both electric motor driven, and by-passed the camera on-off button, connecting the wires to a microswitch. The fifth channel servo pushed the microswitch on. This arrangement led to the only electro-mechanical problems of the whole project. The camera motors evidently produced enough interference, in spite of having capacitors connected across their terminals, to cause the camera on-off servo to hunt back and forth. The result was a certain amount of "jerkiness" occasionally, as the camera servo retreated momentarily to the off position. When the cameras subsequently turned off, the interference stopped, thus causing the camera servo to return to the on position. The result was blank frames every now and then on the film. Replacing the microswitch with a toggle switch should correct the intermittant camera operation.

The plane itself was eairly conventional. Since we were operating off rough fields, the craft was designed as a tail dragger, with solid aluminum landing gear legs, and a bent steel one piece axle. The axle was attached at the point of the bend (see the drawing) with rubber bands to the fuselage, giving a shock absorbing action. This system worked well, with the exception of a particularly hard landing when the whole landing gear assembly, mounting plate and all, broke off the fuselage.

The tail was fastened to the fuselage with four nylon bolts, for portability. The theory was that, if the plane turned turtle, the bolts would shear, protecting the rudder and stab. When this finally happened, the bolts turned out to be too strong, and the whole tail mounting plate

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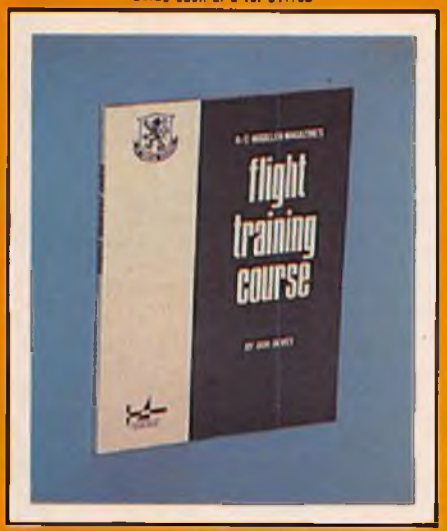

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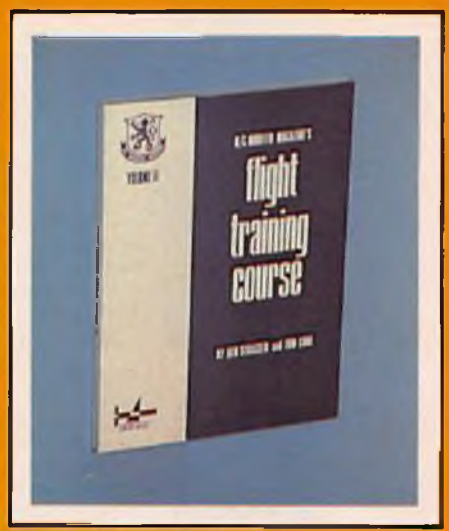

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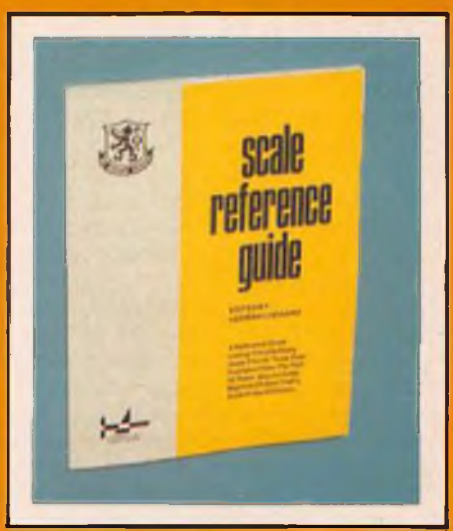

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THIS PLANE IS FOR THE BIRDS
from page 151/64

PIT STOP
from page 156/62

the gears too tight, there will be too much friction and you'll lose horsepower and wear parts out. If the gears are too loose, there will be too much backlash which can knock teeth off the plastic gear.

Go out and beat your competition. □

INNOVATOR'S EVENT
from page 61/60

hired pilots who were better than they were to go up and sell their airplanes through flight performances. Related to modeling, this would allow the thinkers to put out stuff not seen for quite some long time now. The whole of modeldom would benefit, from Sunday flier to international competitor . . . just the way full scale aviation benefited by the pioneers grounding themselves to think and build while others flew their dreams into reality.

What would a "manufacturer" build? In this class, I see it starting out as one where the designer-builder could go a couple of ways with his creation, build **his** version of an existing airplane, or do as Lou Proctor did and cross breed two or more planes to arrive at his answer. In any event, the plane built would have to look like a **real** airplane, and he would have to name it accordingly to imply the name of the ships used in his creation, i.e., a "Waco-Beech", etc.

In the Home-Builder Class, a builder would **have to be the pilot**, just as almost all full scale home-builders are the pilots of the ships they build. Their designs could be their own, or a combination of parts and pieces from full scale home-builts. As in the Manufacturer's Class though, true scale copies would not be allowed . . . those ships belong in AMA scale or Stand-Off scale. The name of the game over here is innovation, **not** standardization.

Lou Proctor once wrote me that a good model should really, in effect, be a home-built in all respects. After I built one of his Antics, I saw his reasoning. He used structural design and products available to us as they should be used . . . not a slab of balsa here and a chunk of foam there. Any Proctor design could be scaled up and built by a home-builder, and flown with confidence and . . . full approval of an FAA inspector.

One of the criteria I would want to see established with any who might enter into the Innovator Class concept is that they adopt the thinking that's only too evident to any who get into scale building — one simply cannot duplicate the full size planes with balsa and spruce used to try and duplicate welded steel fuselages. Scale builders are doing a remarkable job of "cheating" this draw-

back, but this new class should be free of those restrictions . . as long as the finished product has a look of "shrunken realism". The innovators would come up with new means of getting the look. Of this, I have no doubts.

Judging of such ships should be ala Stand-Off Scale — with one exception — that the judges be placed in a lined-off box, ten feet away from a line that no part of the plane being judged extends over. I see the innovators going toward the 8' spans and larger with the new engine reduction gearing units coming on the market. Plop a plane of this size down with the wheels on the line, and the wing tips angling off toward the judges and one has the beady-eyed ones only six feet from a wing tip. As in the days when the Ryan's, Curtiss', and others went to all extremes to sell a plane to the military, let the designer-builder place the ship back of the 10' line as he chooses for his best advantage. (Remember, we want this to stay **fun**.) **One** part of the ship, though, would have to be even with the 10' marker, otherwise our innovators will tend to get overly innovative . . . like putting their creation 100 feet **behind** that line.

Home-built, or Manufacturer, would have to submit his specs to the "buyers" (judges). These would consist of plans for the ships from which he made up his design, **his** design work in plan form, and a listing of his innovations, i.e., cat collar tank hold down, airborne butane tank to simulate flame of afterburner unit, etc. (oh, wow).

Judging would be based on not only the flight performance, but on the innovations, finish, and fidelity to real plane appearance. As far as I'm concerned personally, any plane that flew at a scale speed in excess of reality would be **fined** points. Always found it disgusting at the Nats when a WW I plane took off and flew at a scale speed of 600 mph, or when a bomber or airliner did loops and rolls. This should be out of the Innovator's Class entirely unless the planes melded were capable of doing such. Even in that case, I see no extra points allowed for dashing maneuvers. This would only lead the competition astray from the original concept — innovation in design and building to obtain a realistic looking plane capable of realistic flight. Aerobatics should only count in the realism of flight, but no extra points granted for their performance. After all, a Pitts Special is designed and built for one thing, while a Boeing 747 is designed and built for yet another.

Perhaps eventually, should my proposal gain acceptance, there would be breakdown of categories under the Manufacturer's Class, allowing various categories of competition, but initially I believe the whole thing should be kept simple and clean. Once it starts to get complicated, the fun will go out of it.

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INNOVATOR'S EVENT

from page 159/60

Another vital point of lesser importance than the foregoing is that of aircraft markings. Designer-builder in either of the suggested categories would always have to mark his ship with his AMA numbers displayed per the ships redesigned, i.e., should he choose two planes of the 30's when all U.S. planes carried the "NC" designation preceding the numbers, he would have to use the NC in front of his AMA license number. Should he choose two German planes to make his design from, he would have to use the D for Deutchland, and then his and his pilot's initials for the remainder of the national registration, with his AMA number placed as to designate a form of aircraft serial number . . . all in a realistic sizing. Private and commercial rehashes would also be required to carry a designation of an air service or airline that would come about from a combination of designer-builder's name and that of his pilot, i.e., Don Sherman designs and builds, while Jack Crickenberger is the pilot. Plane(s) would carry the designation, "Sherberger Air Charter", or "Crickman Crop Dusters", etc. Designs made up from foreign ships should carry the same type of personalized markings . . . after all, they could have been "bought abroad" and brought over for service in this country. The main thought behind these markings is that of further welding that designer and builder together as a competition team where the builder is not simply a bought entity supplying flying material for Daddy Flybucks.

The home-builder would be left free to do his own thing with names, as long as he did not use the name of an existing home-built design. He would, though, have to use his AMA number as a part of the aircraft markings, just like the manufacturer class.

Challenges and proposals are a dime a dozen, but as I said earlier, I got involved with designing and building that big, scale-speed job that triggered the idea of the Innovator's Class. While it's a far cry from the blending of airplanes that I've suggested here, it does have some innovations. So, this month, the instigation . . . next month, the "Almost A Fairchild." □

FALCON 56 — MARK II

from page 55

. . . . learned a helpful hint concerning the wing structure. The ribs have cutouts through which the wing spars are inserted, so we spent a

few minutes to check the fit of the spars into each rib cutout. Any slight roughness was carefully smoothed out with a #11 X-Acto blade. A rather small detail but it certainly makes the assembly easier and you don't risk splitting a rib by forcing it over the spar.

We used the K & B RC Sport .35 for power and a Kraft Sport Series 4 channel radio for control. MonoKote was the covering material with D.J.'s tape for trim. We even went overboard and duplicated the red, white and blue color scheme shown on the kit box label. That was a lot of work but it looks nice.

Regarding flight performance, it flys like a Falcon 56. The K & B .35 naturally gets it off the ground quicker than a .19 and it also climbs out faster. With a bit of altitude, you can cut back to about 1/3 throttle and have a trainer as stable and forgiving as can be found.

It is our opinion that Carl Goldberg has made a good thing better and more versatile while retaining the desirable features of the original Falcon 56. The Mark II will probably continue the Falcon 56 tradition for a good many years. □

LITTLE TONI

from page 54

The wing and tail surfaces may be finished with fiberglass cloth and resin, and painted; or, heat shrinkable film covering, such as MonoKote, may be used. Our Toni was finished with fiberglass cloth and resin on the wing and tail surfaces and the entire plane painted with K & B Super Poxy. The finishing method is as stated — optional. If film covering is used on the wing and tail surfaces, a weight savings of about 2 ozs. will be realized, along with a substantial reduction in building time. We simply preferred the glass-resin and paint route, as it results in a longer lasting, better looking finish if properly applied.

We used yellow as our basic color with red and blue trim, and the ready to fly weight of our Little Toni was exactly 40 ozs., with the Variant radio components installed. A 225 MAH battery pack was used, although the radio compartment is sufficient in size to accommodate the larger battery packs. The only change we made in our Little Toni was in the dural landing gear attachment method, since we were to do most of our flying from grass field. The instructions call for the landing gear to be recessed into the bottom of the wing center section, just aft of the leading edge and a fillet of epoxy & micro-balloons to be built up to blend in with the fuselage bottom contour with the two front nylon wing bolts holding the gear in place. We used a block of 1/4" basswood, which was drilled to match

the landing gear mounting holes and countersunk to accept the flat head nylon bolts. The block was contoured to the fuselage outline, just the same as the epoxy and micro-balloon fillet would have been. The only difference in this method is that, when the wing is removed, the landing gear and basswood plate are also detached. We have found from past experience with the .40 size Prather Little Toni, that if the landing gear is installed with an epoxy and micro-balloon fillet, the fillet has a tendency to crack or fracture, due to the rougher landing conditions found at many grass flying fields. The basswood plate, being more flexible, seemed to hold up better under these adverse landing conditions.

It should be emphasized, however, that this change is not a criticism of the manufacturer's attachment method. It is simply an alternative to be considered if you plan to fly from less than ideal grass fields.

The flight characteristics of the Little Toni are outstanding. It is stable, yet responsive, in a smooth fashion and does not possess any "squirrelly tendencies".

The instructions even provide recommended travel amounts for the respective control surfaces. These, coupled with the indicated C.G. location, produced an airplane that required absolutely no control surface adjustments. Prather Products also has available an exhaust pipe for the Rossi .15 engine (slotted or unslotted), that has the proper offset angle. It greatly simplifies the exhaust system installation and is highly recommended if the Rossi .15 is your engine choice.

In conclusion, the Prather Quarter Midget Little Toni is truly an excellent airplane. Obviously not a beginner's airplane, it's designed as a racing aircraft. If you are a Quarter Midget flyer, or intend to try your hand at Quarter Midget racing, the Prather Little Toni would be a "can't go wrong" choice. □

HALF-A RETRACTS

from page 50/46

We haven't tried to collapse the gear on the Messerschmitt. Since it retracts outboard on the real airplane, it means one of two actuating systems be used on the model. The first must be designed to go over the mounted retraction mechanisms to connect to the outboard retraction arms. This places most of the actuating mechanism above the wing structure and gives fuselage side clearance problems. The other alternative is to use four bellcranks (two to a retract) to "bend" the servo push around and outboard. This keeps everything in the wing

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HALF-A RETRACTS

from page 163/46

but gives bellcrank "sizing" problems. We did test-fit Robart retracts in the 109 and found that the gear provided a better "set" if it was adjusted to the 80° "Focke-Wulfe" retraction position. If we had our "druthers", though, we'd build the 109 the way Fred Reese designed it - - and unscrew the landing gear retaining straps if we wanted to fly a gear-up configuration!

When we "tried" this article on some of the members of our R/C club, some of them had a question. "Howcum you didn't hook-up the retraction arms to the servo directly?"

The answer is, "Because of a couple, three reasons!" Robart retracts need 9/16" of movement to work. That's kind of difficult to get from a teeny tiny servo without a special retraction arm. Second, it requires the servo be mounted in such a way that the output is aligned with the actuating rods - - that is, well forward in the wing. This tears the h--- out of the forward center section, including the spars, without compensating reinforcement. It also puts a servo where the receiver and/or battery pack should go. Third, and most important for us ham-handed builders who haven't built anything smaller than a .60 powered pattern ship in the past 10 years, fitting the push-rods directly from retract to servo would be an exercise in frustration. The **big idea** of our suggested installation technique is that the entire retract system is built on a nice, clean, uncluttered, full sized hunk of plywood, away from the brittle, breakable, soft balsa. Only when things are fitted properly do we delve into the fragile structure - - and then only to glue and bolt pre-fitted pieces in place. That's "howcum"! □

BUTTERFLY II

from page 43/40

ning parallel to the spars.

(24) Install W-1A ribs. Their function is to support the top planking under the rubber bands.

(25) Plank the top of the center bay with the 1/16" sheet stock.

(26) Sand the ends at W-1 smooth and attach W-1 ply with contact cement or epoxy — not a water base glue. Water base glues warp balsa whan large areas are glued, therefore contact cement or epoxy is always preferred.

(27) Notch the T.E. at W-1 and W-2, and rim with 3/32" ply. Epoxy these ply pieces in place as they will prevent the rubber bands from cutting into the T.E.

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BUTTERFLY II

from page 166/40

(28) Using a similar procedure, the root to tip section polyhedral joints are made. I prefer epoxy on all joints in this area. When dry, add the two remaining spar webs.

(29) Using the edge of a flat file, roughen the dihedral brace wires to ensure a good bond.

(30) Make holes in the W-4 ribs, bend the wires, and install such that they are flush against the spars as shown. Attach the wires with a generous amount of 5-minute epoxy.

(31) Make and install the triangular shaped joint braces.

(32) Drill a 3/32" hole 1/2" deep in the right wing T.E. at W-1 for the guide pin. Drill hole perpendicular to W-1 ply, not parallel to the T.E.

(33) Sharpen one end of the 3/32" wire and push it, dull end first, into the hole.

(34) Assemble the wing halves, marking the guide pin location on the left W-1 ply.

(35) Drill the left side hole 7/64" diameter. Dull the pin.

(36) Plane the L.E. and sand your wing. It is wise to make an L.E. template from scrap cardboard using the wing section view on the plans. This is helpful in obtaining a true L.E. profile.

(37) Drill 1/16" diameter through the bottom spruce spars and install the #4 x 1/2 S.M. screws. A rubber band between the two screws will hold the wings together.

When attaching the wing to the fuselage, use four #64 rubber bands — two on each side parallel to the direction of flight. This method ensures that the wing will come off on bad landings, reducing the damage hazard, yet is sufficiently affixed so as not to come off in flight. Contest competitors may wish to risk wing damage and use more and criss-crossed rubber bands.

CHIPMUNK

from page 30

.... were on a grass field, so hand launching was a must. Care has to be taken when launching this low wing aircraft. A good hard launch is essential to eliminate any stall. Once airborne, the controls are very effective. Aileron throw is 3/16" both ways from neutral and elevator is 1/4". With this minimum throw, aircraft response was fantastic. Rolls are very quick, left or right, spins are fast and true, just like the aircraft is on a wire. If you have one of those micro-miniature systems, we would guess that, by adding rudder con-

trol, there would be no limit as to the maneuvers you could perform. The one-ounce fuel tank lets you fly gives you 6 to 8 minutes of fun filled, fast flying. Be ready when the engine quits to head for home. The glide is fast so keep up the air speed right through the landing to final touch down. If it is slowed down too much, it will stall right now.

This Chipmunk is a fast fun/sport aircraft for the quick reflexed flyer. The faster it went, the better it flew. We used a Cox Gray 6/3 prop and Carl Goldberg's Magnum Power 25 Glo Fuel in our prototype. □

RADIO SPECTRUM

from page 24/20

sinking up to 500ma of current, and if additional drive current is needed, a driver stage must be added as suggested by Figure 4A or 4B. This circuit will fit on the existing circuit board with only minor modifications, and a one-piece case assembly will be needed.

Figure 5 is another arrangement which will provide a reverse function at the expense of a separate reverse motor supply. This concept would be desirable in an application which required a limited reverse feature, and a small separate battery pack would provide a sufficient reverse capability. This circuit would also fit on the existing circuit board, which was the main reason for using two pairs of output transistors. As shown, this circuit could be expected to provide about 15 amps of stall current with 400ma of total base drive current, and the voltage loss would be about .3v into a 10 amp load. Any combination of battery voltages could be used as long as the total voltage of both supplies is between 6.0 to 18.0 VDC.

Figure 6 is a combination of examples 4 and 5. This arrangement could be assembled using the existing circuit board, but it would require hanging the components R12, C7, Q3, and D1 from the one-piece case assembly, and using unsupported solder joints.

In defense of the Darlington, it provides high current with only one large transistor that needs to have a heat sink. Sometimes volume is the major consideration.

☆ ☆

See you next month. □

FRESHMAN

from page 19

. . . . main gear with mounting straps and screws; wheel collars for all three wheels and for retaining the nose strut in the mount; screw eyes for securing the fuel tank in position with rubber bands; hardwood servo tray rails with plywood scabs for wing and fuselage; nylon wing mounting screws with

tap; pre-formed aileron torque rods with nylon horns; poly hinges; wire and wood pushrod material for rudder and elevator; nylon control horns with screws for rudder and elevator; and metal snap links for all needed points. But - - - that's not all - - - in addition, there was a full size plan sheet, decal sheet, and a 23-page, fully illustrated construction manual that covers virtually every detail involved in putting the Freshman together.

Assembly of the Freshman was pretty rapid and pretty easy. This was due to the outstanding construction manual and the fact that little time had to be expended in cutting, sanding, or shaving of parts to get them to fit. Although we assembled our Freshman in strict accord with the manual, construction can be speeded up somewhat by building the wing and fuselage simultaneously. This is feasible because the plan sheet is only required for wing assembly. Speaking of wings, this is the only place where we ad libbed; we substituted 1" chord conventionally shaped ailerons for the 3/4" chord triangular shaped ailerons provided in the kit. After having observed that another Freshman equipped with stock ailerons gave very, very poor response to aileron commands, we felt the change to the larger ailerons was desirable, if not mandatory. Anyhow, after a couple of weeks of sneaking a few hours here and a few hours there, our Freshman was eventually completed. We covered ours with white Super MonoKote and then "gussied" her up a bit with red and blue Scotch brand plastic color tape edged with Pro silver trim tape. The end result - - a pretty good looking airplane, not quite as pretty as the one portrayed on the kit box but, nonetheless, not bad at all.

Although "antsy" to fly our Freshman, Mother Nature intervened and grounded us with three continuous days of lousy weather. Eventually though, along came a fairly decent day, 10-15 miles per hour wind, partial overcast and fairly mild temperature; so — to the field we went. Since we had some misgivings about the ability of our McCoy .35 to haul the Freshman, we ran a few fast taxi tests. Well, that .35 made the Freshman accelerate like a dragster. We believe that a good .25 would fly the Freshman with no trouble at all. We then taxied her to the edge of the field, turned her into the wind, started advancing the throttle, and at about half throttle, she lifted off and headed for the clouds. Once we had her at a comfortable altitude, we tried hands-off flight; just a shade of down elevator trim and she was all set. Although fairly gusty upstairs, the Freshman flew just great - - - did everything we asked of her. About the only things we didn't try were spins, snap rolls, and knife edges; we figured we'd try those at some later date. After some four or five minutes of tooling around, we closed the throttle to a fast idle and entered the pattern. Before turning onto final, we closed the throttle and headed her for the landing area. Over the fence she came at a fast walk. We then eased in a little more back pressure on the stick and let her settle in on the main gear with hardly a thump; landing roll 'bout 10-15 feet. Our reaction to the first flight? A perfect first ship for the beginner and a real fun airplane for the more experienced. Also, if our Freshman is any criterion, then the Freshman is due to become one of the most highly regarded trainers of all time.

Yes, sir! The Freshman is a real fun airplane — fun to build, fun to look at, and more importantly, real fun to fly.

Note: The first run of Freshman kits had a 2½" nose gear included and should have had a 3". The plans called for 1¾" nose wheel and 2" main wheels. These should all be 2¼". If your kit has the short nose gear, just contact Top Flite for a replacement. □

SOARING

from page 18/15

cords between the two servos.

Once the lead weights are crimped and are in their final position, use a drop of epoxy to ensure no sliding of weight to loosen adjustment. If you use Don's idea on your spoilers, I would suggest you get the feel of sailplane movement at an altitude where recovery is possible. Spoilers extended at different heights can be a handful for the inexperienced pilot.

•

Howard Short of Southern California, uses a novel switch arrangement on his "Double Ugly" sailplane.

He uses monofilament line for his "Cats Whisker" switch actuator. A monofilament line is passed through a small hole on either side of the fuselage. The knob of the switch has a small hole drilled in it and the line is passed through this hole and knotted on either side. Pull the whisker on the left side — switch is on. After flight, pull on right — switch is off. Very clever and drag-free.

•

Howard Short's "Cats Whisker" switch actuator. See text for details.

100" RC ASW 15 held by Robert Tede alongside his full size ASW 15.

Robert Tede of Lake Tapawingo, Missouri, flies his 100" ASW 15 R/C sailplane on his lunch hour during the week. He then forces himself to pilot his 1:1 scale ASW 15 on weekend junkets. Both models are constructed of fiberglass and Bob holds the international F.A.I. Silver Badge #3108.

Good Luck and Good Lift □

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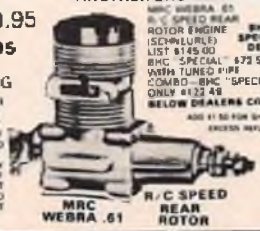

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from page 12/10

trifugal force. I believe the "G" load would apply pretty much to both cylinders. Of course, who can say for sure. Theory and actual application do not always agree. However, sagging in a turn is not characteristic of the Ross twin as far as I know so I had to assume that there was something else wrong. In most cases, it is tank position, a pinched fuel line occurring under "G" load, etc.

Dear Mr. Lee:

Flying alone out here in the bush gets a little sticky at times, when I have no one around to discuss the problems I get into. If you have time for a note on the following problems, it sure would be appreciated.

I have had good luck with K & B engines, having a couple of .19's, a .40, and a .61. However, I find that the prop shafts on all of them are just too short by about 1/4" to accommodate the Sullivan spinners. Where can I get longer replacement shafts, and how do I replace the one in the .19? That one seems to be in pretty tight.

My other problem is with the .40. I just simply cannot get it to break into a 4 cycle. It will richen slightly with the valve out about 4 turns, but then the vibration makes the needle valve drop off completely. I have changed lines, filters, tank locations, and completely checked the Perry carb with a 10X jewelers glass looking for obstructions, but still have the same problem. Is this engine just a "screamer", or am I doing something wrong? Would a muffler and pressurized tank help the .40 any?

Thanks for any help you can give.

Yours Truly,
David E. Kendall
Valdez, Alaska

Dave, most any hardware store carries 3' lengths of threaded rod. The thread size for the K & B .40 and .61 is 1/4"-28, a standard size. For fellows here in the "original 48", a machinist supply will have better quality threaded rods. A 3' length costs about $1.00 and you can, in turn, cut it to any length you want. The Veco .19 uses a one piece crankshaft so there is nothing you can do to lengthen this. If more length is needed, you can use an aluminum prop nut with the 3/8" shank but this, in turn, requires enlarging the hole in the prop.

As for your problem getting your .40 to richen up — some things are pretty basic. Any engine will four cycle if it gets enough fuel, providing the head is not loose, the back plate about to fall off, etc. You must have your tank too far from the

engine, too low, or an air leak somewhere in the system. Check the brass tube in the tank neck as these will many times develop hair line cracks that go undetected and cause the problem you are experiencing. If you have your tank mounted too solidly, there is a possibility of the fuel foaming which will also cause the problem you are having.

Dear Mr. Lee:

I have a problem that neither the Robart nor Perry companies have answered. Where and how can I attach a fuel pump from a large tank to my two .30 Wankels? The tank is going to be about 8" away from the engines that I want to mount on my 6' PBY.

Can you please help me with my problem or suggest anything else that you know.

I am sure the Wankels cannot suck up the fuel from that distance without some kind of mechanical or electrical help.

Thank you.

Kass Beyer
Cape Coral, Florida

Kass, I am afraid you have created a monster. There is no way you can use either the Perry or Robart pumps with the Wankel engine. It takes the up and down pumping action of the piston to, in turn, operate the diaphragms in the pumps. The Wankel with no piston cannot do this. The Wankel works more like a four-cycle engine, in this respect, in that it has no crankcase compression.

It is very doubtful that the Wankels will pull fuel 8" even with the use of muffler pressure. Unless you can mount the fuel tanks in the engine nacelles, you had best consider using two conventional engines with which pumps can be used.

Dear Mr. Lee:

Several of us in this area have become interested in diesel model aircraft engines, once again. A couple of us had some bad memories of the McCoy and O.K. Cub diesels of the 1950's, but we want to try them again.

Two years ago I began corresponding with two Czech modelers and they have sent me several types of their engines to trade for American made R/C items. Their Sokol, MVVS 2.5cc, MK-16 1.5cc and Jena DDR diesels all seem to start easily and are much easier to adjust than the aforementioned McCoy .049 or Cub or, for that matter, the .46 E.D. my Dad brought back from England in 1956.

In addition, the new diesel conversions for Cox engines are very interesting and will be tried here. However, the $5.00 per quart price for Davis Diesel fuel is pretty steep.

We are able to get ethyl ether, petroleum ether, castor oil, and kerosene quite easily here, and I understand these items are what is needed to mix a passable diesel fuel. Can you give me a recipe for such a fuel using these ele-

ments?

Also, I have read the term igniters on the can labels. What are these and in what quantities should they be used in this diesel fuel?

In closing, I want to thank you again for your fine contribution to RCM. We all read it religiously every month.

Sincerely yours,
David L. Stevenson
Harpersville, New York

There are as many formulas for diesel fuels as there are recipes for cakes. Hundreds of manufacturers have made diesel engines over the years, particularly in Europe, and no two recommend the same fuel mix. Diesels will run on just about any combustible material including Vodka. The following is a good standard mix that will work well in most diesels with variable compression heads. Some diesels with fixed compression heads do require fuels tailored specifically for the engine. The diesel fuel sold by Davis is tailored for the Cox conversion. I do not know the ingredients used and the fuel may work better than the following standard mix when used in the converted Cox engines.

25% oil — either castor or synthetic
45% kerosene
30% ether
2% Amyl Nitrate added to the above total

You do not need an igniter in diesel fuel as the ether is all the igniter you need. Igniters are used in glow fuels — the most common being Propylene Oxide. Igniters are only helpful in very cold weather to help ignition — under normal conditions they are not needed. Igniters are used in racing fuel to help kick off the Nitro-methane. As the alcohol content is reduced and more nitro added, an igniter is sometimes helpful, but we are talking about 60% and higher nitro content. Below this you should not really need an igniter except in very cold weather. Igniters in hot weather can cause kicking back problems and pre-ignition when starting. □

CUNNINGHAM ON RC

from page 7

the right? Are you more relaxed making landings one way or the other? Okay, suppose that you're happier making landings that come from your left and land to the right. I am — I'm right handed. Are you? I can't think of any left handed friends who fly R/C, so I can't ask them their opinions, but I'll bet that most left handers are more relaxed when flying their aircraft moving from the right to the left, and most right handers are happier in doing little things like horizontal rolls flying from left to right. So what? So, if you're a beginner, and you're left handed, it may be just a bit harder for you to learn from a right handed instructor. And, if you're a right handed instructor teaching a left hander, see if he doesn't have a better grip on the situation when landing from right to left. It's worth thinking about if you help beginners learn to fly, and it's worth thinking about if you're a fledgling pilot. I don't mean that you can't learn from a right handed instructor, just that it may be a little bit more difficult. Ever give any thought to the direction the nose of the aircraft takes in the many plans shown in RCM? I always draw my aircraft with the nose pointing to the left. Even when I'm sketching a new design, my thoughts always work this way. I have tried drawing sketches the other way, and the aircraft come out quite different. So, a question - - - do most left handed model designers draw their plans with the nose to the right, and do most right handed designers draw with the nose (the aircraft's nose, Fearless) to the left? Beats me, must be fruit for a survey here.

★

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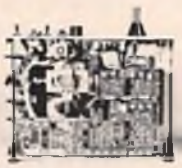

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CUNNINGHAM ON RC

from page 177/7

It seems that I have stirred up a hornets nest with my thoughts on using lifting airfoils for the horizontal stab sections on the larger models that I have been designing lately. In fact, in the December '77 issue, I mentioned that I was using a lifting stab on my low wing design, Miss Texas, and that, as yet, I had not made any test flights. As you know, in the past several issues, I have talked about the flying of this aircraft, and how well it flew.

I'd like to reprint one of the several letters that I received in early December telling me that there was no way that this would work. If I had not done a considerable amount of experimentation with this design, and others using lifting stab sections, I would have agreed with the letters and abandoned the idea. In fact, before I experimented with the lifting stab through umpteen flights on the Telemaster, Powerhouse, Dallaire Sportster, Lazy Ace, and, finally, Miss Texas, I would probably tend to feel just like Ray Gareau writing from Ville De Laval, Quebec.

Your article of December 1977 about the lifting stab on your low winger! As I have received my copy only on the 18th, by the time I read the article you probably crashed your new plane with that design feature . . . unless you didn't get off the ground at all, or you happened to have an awful lot of up elevator. So now we probably can award you with the Down Elevator Club Trophy.

You refer to the old time free-flight models using a lifting stab. This was necessary to counter the forces of the high set wing, or the location of the drag being so far above the C.G., and the center of lateral area. As the plane picked up speed, so did the drag, so, as the speed went up so did the increase in lift of the stab, sort of counter-balancing some of the up rotating reaction; the reverse happened as the plane slowed down in the glide, then the stab, having less strength, let the model attain a better glide angle.

Now in your proposed set-up you are, in fact, doing what a kit manufacturer did in the mid-60's, a shoulder wing model with a lifting stab, .19 power. The result upon launching (as this was either pulse or escapement single channel) dove into the ground. I had the ordeal of having to test fly that model. Fortunately, I had chosen a field with very tall grass, and we were able to try about 4-5 launches before I realized that the stab was the faulty design feature! The buil-

der was given a sketch of how to modify the stab into a symmetrical section, and the next weekend the model flew with the greatest of ease. Approximately three months after that event, the manufacturer advised, through the model mags, that this was the fault, and mentioned that all future kits would be modified to have a symmetrical stab section.

Now here is what your design will do as you release and apply power . . . the tail will lift in a hurry, probably enough to hit the propeller on the runway; your rudder will not have enough air at enough velocity to be effective, so your directional stability will not be improved. If it ever gets airborne, it will take almost all of the up elevator to keep the plane from diving into the ground, as you have all of the forces acting in the same direction, the stab lifting the low set wing (below the thrust), and its drag, plus the thrust of the engine, causing a rotation, of a nose pitching force. If the plane is not equipped with retracts, the action will be even more severe.

My suggestion, if you want easy take-off and leisurely flights, is to go another way, such as 63018 airfoil, with the nose or, if you prefer, border of attack, well rounded, or a semi-symmetrical section of 20%. Move the landing gear further back for better take-off steering, make your C.G. at its best location and apply power progressively on take-off. Never go further than half throttle before lift-off is achieved, then when the plane is off the ground at least 4-5 feet, apply more power for the climb. Now some designs require more right rudder at the beginning of the take-off and some less; my standard procedure is about 1/3 right rudder with the engine at low speed, then, as power is applied, the rudder is progressively moved to neutral. I have been flying tail draggers for years and I seldom have squirrely take-offs and, to boot, our runway is crosswind almost all of the time.

The lifting stab, being so far away from the C.G., has tremendous strength. As speeds change, so will the lift it will generate and even if you could, via trial and error, get the best thickness, you will still have to constantly trim the plane as it changes speeds - - - just like one has to do with a model with a flat section for the wing, but more so in this case.

Symmetrical sections were the greatest find in aerodynamics, for stabs and rudders.

I am sure that you probably have received many letters on this, but I just thought that my 1/2 cents worth might be helpful.

Yours truly,
Ray Gareau

As I said earlier, if so many experiments had not been conducted, I would have agreed with Ray and, even so, I viewed my first flights on the Miss Texas with concern, wondering if just the things that Ray suggests might happen. They didn't. Take-off and landing with Miss Texas are a dream. It does not tend to tip over when full power is applied, and the rudder is completely effective all during the take-off run. It gets off of our paved runway in about 60 or 70 feet roll out. Trim does not change during the flight, and I am flying it with an H.P. .62 that yanks it along about 70 miles an hour. Landings have been made in dead calm and in 20 mph winds and it handles all of the way down to the ground. I have purposely bounced a landing and fed full power to it at the top of the bounce, and off she goes, no sweat. The secret may be in a slightly lifting section, rather than what I may have implied by a lifting section, but the stab airfoil is the same as used on the Lazy Ace, and the flight characteristics are almost the same. Miss Texas can do any type of flying you desire, and come back for more.

The point of this is that sometimes theory and a bad experience might keep us from experimenting - - - and this is bad. One of the beautiful things about R/C is that it allows you to test out thoughts and ideas, and yet not get killed in the experiments. If I had read Ray's very helpful letter before I went out to fly, I probably would have yanked off the tail feathers and rebuilt them, because I too grew up flying free-flights and experimenting with lifting stab sections, and know what will happen if you generate too much lift at the aft end of the aircraft. Several other letters pointed out the same problem. It's kinda' the same thing that theory says that you cannot fly a model with a flat bottom airfoil inverted. But you can. Sure, you need a bit of down elevator (and sometimes a heck of a lot more than a bit) to keep it flying horizontal but it can be done. I have flown my Powerhouse with its undercambered high lift airfoil on its back for quite a distance, did this for Sal Taibi on his recent visit to Fort Worth and, though it does take all of the down elevator that I have to keep it there, it will do it. The Telemaster will stay on its back as far as you want to fly, and so will the Lazy Ace, and the Miss Texas, but she has a semi-symmetrical airfoil. But, part of the fun in R/C is to experiment. Give it a try. If you have an idea that others scoff at, try it out anyhow. I'm just about as guilty as anyone in saying that this or that probably won't work but, darn it, who knows until you try it out. Nobody thought that the inverted airfoil that came out a couple of years ago would work, but it evidently did, as it is now a patented section.

Time to close the soap box for now and check the temperature to see if it

looks warm enough to go out and fly. I can hear you northern types now telling me to quit fussing and go on out, 'cause you wish that you could. Well, gang, cheer up, spring can't be too far away . . . or can it? □

FROM THE SHOP

from page 2

gram. Dr. John D. Nicolaides, who is the developer of the parafoil and the inventor of the Royal Plus 6 golf ball, gave a talk and presented a movie program that kept all those attending very interested. Dr. Nicolaides is presently head of the Aero Engineering Department, California Polytechnic State University, San Luis Obispo.

Sunday's events went well with the same late start and early wind. Thermals were scarce but John Pond, who was one of the first Texaco flyers up, had a good flight underway while playing tag with the clouds and the remaining wisps of fog. He finally had to spin his Flamingo down to save the model, which kept getting lost in the clouds and this curtailed a very good flight. (He says the winning flight!)

Young fliers Chris Smith with his 6 ft. Sprigy II Buzzard Bombshell and Laurence Bekin's 6 ft. Playboy – both planes with .35 power plants. They came all the way from Belvedere, California. Laurence Bekins took home a trophy for 3rd Place Class C.

Marian Schmidt, Elk Grove, California and Niva Nichalou, Marysville, California, keep 84" Super Buccaneer balanced on scales for weigh-in, as Carl Gawens and Dick Enos do the official work. "Nick" Nichalou is a consistent competitor.

Karl Tulp, who had severely cut his finger during an engine start while practicing on Friday, managed top Texaco time in spite of his handicap of stitches. The last flight was completed prior to the deadline time and John Pond did the honors of presenting the awards.

The perpetual trophy, which had been donated by Phil Kraft, was awarded to the contestant with the highest cumulative point score based on event standings. Listed below are the happy winners:

Jack Jella primes his .020 replica Mark I Clipper. Flight timer is ready.

Perpetual Trophy
Bob Sliff
Runner-up
Don Bekins (he received a beautiful Merco .49 engine converted to ignition and donated by Otto Bernhardt, 77 Products).

Class A
Ignition and Glow combined

1st ..... Bob Sliff
2nd ..... Don Bekins
3rd ..... Ross Thomas
4th ..... Al Hellman

Class B
Ignition and Glow combined

1st ..... Bob Sliff
2nd ..... Don Bekins
3rd ..... Ross Thomas
4th ..... John Pond
5th ..... Tom Bristol

Class C
Ignition and Glow combined

1st ..... Bob Sliff
2nd ..... Ed Solenberger
3rd ..... Larry Bekins
4th ..... Don Bekins
5th ..... Ross Thomas

.020 Replica

1st ..... Don Bekins
2nd ..... Ed Solenberger
3rd ..... Ted Kafer
4th ..... Bob Sliff
5th ..... John LeSuer

Texaco

1st ..... Karl Tulp
2nd ..... Otto Bernhardt
3rd ..... John LeSuer
4th ..... Bob Sliff
5th ..... Don Bekins

Lanzo Record Breaker by Otto Bernhardt, Mr. 77 Products. He took 2nd Place in Texaco event. Thermal activity was spotty due to the wind.

John Lund gives Bruce McAvinew a helping hand during pit checkout of his 1936 GHQ Sportster powered by an ignition converted O.S. Max .40. John and Bruce came from Huntington Beach, California.

Don Bekins, SAM 21 Prexy, and planes. A steady flier, Don was Sweepstakes Runner-Up winner.

A great time was had by all who attended and many are planning to attend next year's meet. SAM 26 and SAM 21 alternate the contest director responsibility and many manufacturers contribute merchandise to this contest. Those contributing this year included RCM Magazine, Model Builder Magazine, R/C Sportsman Magazine, P & W Models, Cal Aero Models, Tatone, and M.E.N. (Model Engineering of Norwalk).

Plan now to attend next year and fly Old Timer R/C assist models in honor of John Pond. Each year this contest gets bigger and better. To obtain details and an entry blank for the 1978 meet to be held in October, contact either John LeSuer, 219 South Bradley Road, Santa Maria, California 93454, or Tom Bristol, P.O. Box 1091, San Carlos, California 94070. □

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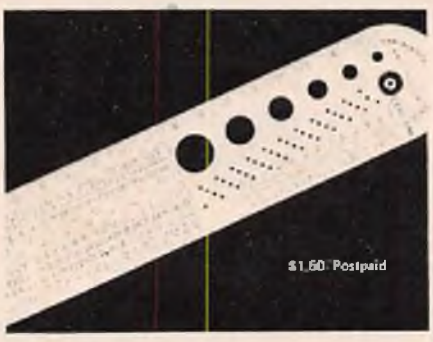

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Pump - 2 oz. per revolution so you can partially fill tank if you desire. Extra heavy duty gear train for rugged service. Fast pumping not necessary as with most hand pumps. These manual hand pumps are always ready to go - no batteries to worry about. List $12.50. Indy - $8.95.

INDY R/C, 10620 N. COLLEGE, INDIANAPLIS, INDIANA 46280

$1.00 handling on all orders. Prepaid domestic orders postpaid; foreign orders allow $10.00 (excess refunded) Orders - check, M.O. or C.OD. Also, Bank Americard or Master Charge (bank number) Ind. Residents add 4% Tax

INDY R/C

CALL TOLL FREE
1-800-428-4682
Indiana Res. - 317-846-0755

Indy R/C SALES

SEE INDY ADV. 3RD COVER

INDY R/C

Billy Lester of Johnson City, Tennessee won Indy's December 31st drawing for an OS 60 Four Cycle engine and a Miller spray gun. Congradulations from the gang at Indy.

THESE SPECIAL PRICES GOOD THRU 4-25-78 SUPPLIES MAY BE LIMITED

RADIO CONTROL SYSTEMS

WORLD EXPERT MARK II

	List	Indy
7 Ch. D.S. (5 servos)	$464.95	$279.95
7 Ch. D.S. (4 servos)	$432.95	$260.00
5 Ch. D.S. (4 servos)	$399.95	$239.95

NEW EXPERT RADIOS

3 ch. 3 servos, nicads	$239.95	$169.95
2 ch. 2 servos, nicads	$179.95	$129.00
4 Ch. Glider,S.S., 3 servos, all nicads	$234.95	$169.95

FLIGHT PACKS

7 Ch. 5 servos	$284.95	$188.95
7 Ch. 4 servos	$259.95	$162.95
5 Ch. 4 servos	$249.95	$157.96

SERVOS

S-10 & S-11	$45.00	$36.00
Retract	$52.00	$42.00

COX SANWA

2 Ch., 2 servos, all dry	$99.95	$73.00
4 ch. 4 servos, nicads	$289.95	$199.95
6 ch. 4 servos, nicads	$369.95	$245.00

KRAFT

KP-3C dual stick	$219.00	$175.95
KP-5C dual stick	$375.43	$295.00
KP-5CS single stick	$375.43	$295.00
KP-7C dual stick	$515.43	$399.00
KP-7CS single stick	$515.43	$399.00

NEW FROM KRAFT

KP-4A dual stick, 4channel, 4 servos, all nicads	$299.95	$214.00

SERVOS

KPS-11,12,14 & 15	$44.95	$36.00
KPS-15H & 16	$49.94	$41.00

RADIO CONTROL SYSTEMS

NEW FROM WORLD

4 channel, 3 servos, Transmitter takes dry batteries. Nicads and charger in airborne system.
L.$229.95 . . . . . I.$139.00

3 channel, 2 servos, Transmitter takes dry batteries. Nicads and charger in airborne system.
L.$168.95 . . . . . I.$103.00

PRO LINE ELECTRONICS
(SPECIAL SALE)

PLN-3C 3 Ch. S.S. closed gimbal, all nicads"$250.95 $169.95
PL-5-0 5 ch. dual stick, open gimbal competition $559.35 $369.00

MICHIGAN HOBBY HANGAR SMALL WONDER

MICHIGAN HOBBY HANGAR

Quickie	28.95	20.25
Quickie Bipe	35.95	26.17
Miss Vintage	54.95	38.47
Small Wonder	33.95	23.75

WORLD ENGINES KITS

MULLIGAN

GLASS HAWK

WORLD ENGINES
OAS BOX FLY SERIES

20-L (low wing)	34.95	28.00
20-W (Biplane)	39.95	31.00
10-MG (motor glider)	24.95	19.95
20-S (shoulder wing)	29.95	23.95
15-H (high wing	22.95	18.50
ARF BOX FLY	34.95	28.00
Miss World	49.95	38.95
Mr. Mulligan	47.95	38.95
W.E. Cub	39.95	31.00
Lil John (H wing)	54.95	43.00
Lil John (L wing)	59.95	47.00

GLUE & FILM

ADHESIVES

	List	Indy
Willhold R/C 56	1.50	1.25
GMP Styro Stik	2.30	2.00
Hobby Poxy II	4.00	2.95
Hobby Poxy IV	2.00	1.75
Willhold Aliphatic	1.80	1.50
GMP 6 mn. Epoxy	5.95	4.75
GMP ½ last	5.50	3.75
Devcon 5 mn. lg.	2.50	1.85
Devcon 5 mn. sm.	1.35	1.00
Devcon 5 mn. 9oz.	5.80	3.99
Devcon slo cure	5.80	3.99
Hot stuff	3.50	2.75
Blue Line H.S.	4.95	3.50
Giant Zap	3.50	2.75
X-30 Adhesive	1.15	1.00
Ambroid 4 oz.	1.15	1.00
Ambroid ¼ oz.	.60	.50
Super Cement	.55	.45
Blue Goo	2.95	2.59

COVERING MATERIAL

INDY SILK

1 yd. pkg	3.25	2.75
2 yd. pkg	6.50	5.00

COVERITE

Super 38 x 47	7.75	6.20
Silkspun	7.75	6.20
Permagloss	9.10	7.25
Day-glo permagloss orange, yellow, olive drab & aluminum	9.95	7.95
Camouflage 1½ and 2" scale	9.95	7.25
Balsarite ½ pt	2.95	2.75

MONOKOTE

Opaque	9.00	6.50
Transparents	9.00	6.50
Metallic	10.50	7.00
plain trim sheets	1.19	1.10
Checkerboard trim	1.59	1.50

SOLARFILM

Opaque	7.80	5.00
Transparent	9.00	6.50
Metallic	10.00	7.00

MIDWEST

MicroLon	1.95	1.75

BUTY – FLEX DOPE
22 colors

quarts, colors	4.95
quarts clear	3.95
Gallons clear	9.95
gallons Thinner	5.95

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AIRTRONICS

Std. launch pail	34.95	27.99
HD launch pail	36.95	28.00

CRAFT AIR

Del. Hi-Start	37.95	31.00
Std. Hi-Start	34.95	25.00
Para Pod	9.95	7.00

ASTRO-FLITE

HD Hi-Start (real heavy duty)	41.95	31.95
Astro-start	39.95	31.00

BOATS & CARS

JEROBEE CARS

CARS WITH RADIOS

MK-8B	177.50	142.00
Challenger	187.50	150.00
Alfa	226.95	181.00
Vette	215.95	172.00

CARS LESS RADIO

MK-8B	55.00	44.00
Challenger	65.00	52.00
Alfa	97.50	78.00
Vette	87.50	67.00

CARS LESS RADIO AND ENGINE

MK-8B	27.00	21.50
Challenger	32.00	25.60
Vette	50.00	40.00

JEROBEE – BODIES

MK-8B Body	7.95	6.50
Porsche	4.95	4.00
VW Bug Body	12.95	10.50
Vette Body	12.95	10.50

ACCESSORIES

Tank heat sink	2.50
wing with decals	2.95
brake kit	1.95
remote tank kit	2.95
Aluminum flywheel	2.95
mount for Tee Dee	6.95
Bumper	2.49
Chassis Frame	3.95
Lexan Chassis frame	7.95
Starter Rebuild kit	1.60
Eng. rebuild kit	7.65
Rear Axle kit	1.49
Clutch shoes	.98
drive shaft w/set	.89

HUGHEY

	List	Indy
20 Rigger	100.00	85.00
40 Rigger	110.00	93.50
19 Hydro	77.00	67.00

SAIL BOATS

Blue Sonic 900	129.95
Indy special	99.95

PUMPS STARTERS

STARTERS

Std. Sullivan	33.95	23.99
Del. Sullivan	36.95	26.99
Sonic Tronic	38.50	27.00
Kavan	45.00	32.00
Astro-¾A	15.00	12.00

FUEL PUMPS

Sonic Tronics MK II electric fuel pump	13.95	10.95

HAND PUMPS

Du-Bro	10.95	8.50
Six Shooter	10.95	8.50

HELICOPTERS

DUBRO	List	Indy
Shark 60	325.00	275.00
Tri-Star	229.95	189.00

ACCESSORIES

Conversion kit	75.00
Update Kit	34.95
Blade Set	15.00
Tri-Star Blades	12.00
Alum. paddles	10.00
Flybar	6.00

KAVAN

Bell Jet	320.00	275.00
Alouette II	160.00	139.95

ACCESSORIES

Instrument panel	12.00
T.R. blades	3.00
Reg. main blades	18.00
Expert main blades	19.95
Nylon tail cone	5.95
Comp. window set	20.00
window channel	2.95

RETRACTS
ROM – AIR

2 gear mains	85.00 57.75
3 gr. firewall	114.00 79.95
3 gr. belly	114.00 79.95
pressure gauge	13.50
Freon	2.75
1¼ oz. Oil	1.65
line coupler	1.90
quick disconnect	2.00

GOLDBERG

2 Gear	14.95	10.50
3 gear	24.95	17.50

POWER PANELS
OAE

Dual range	24.95	18.00
Mini panel	15.95	11.00
Series V	34.95	24.95
Std. panel	18.95	14.95

ELECTROSTAR SYSTEMS

Super Cycle	89.95	59.95

STEVE MUCKS

Lil Lightning	48.95	38.95
Buschwacker	109.95	74.95

Indy 40% OFF
OS 60 RSR U/C ENGINE
L. $119.95
I. $72.00

Indy 36% OFF
12-GLO BEE R/C LONG OR SHORT
L. $18.00
I. $11.52

Indy 30% OFF
OS 10 FSR STANDARD
L. $20.95
I. $14.66

Indy 35% OFF
KRAFT 5-Channel
L. $375.43
I. $247.79

Indy 30% OFF
COMBO C-101 & AXI-FLO ducted fan
L. $188.90
I. $132.21

Indy 38% OFF
CRAFT-AIR SAILAIRE
L. $129.95
I. $80.57

INDY R/C, 10620 N. COLLEGE, INDIANAPLIS, INDIANA 46280

prices subject to change without notice

FRANCHISED INDY DEALERS

We are still signing up some franchise dealers. Our franchise deal gives these dealers an exclusive franchise in the county in which their business is done. These dealers sell many of the Indy R/C items such as the Como engine, Mark II Indy film and many of the other items that you see in this ad. Often time the prices at the Indy R/C stores are higher than our advertised prices and this is understandable since they have the merchandise available without any wait. This is the same practice that is followed by many department stores that have big thick catalogs. Invariably the catalog prices are a little higher than the price in the retail store and for the same reason.

We would like to acknowledge some dealers this month that has been doing a terrific job. For instance, Ray's Hobbies Supplies in Uniondale, New York. Ray has sold over forty eight Como engines. Hangar 7 Hobbies in Atlanta, Georgia has also done a great job on Como engines. We would like to recognize the fine job that Action Hobbies in Fort Lauderdale is doing with Indy products. Also, a very special thanks this month to Matt Smith who operates Mercantile Park Hobbies in Dallas. Matt is going to man an Indy R/C booth at the Dallas Model Airplane Show that takes place 15th and 16th of January.

We want to thank all our Indy franchise dealers for being with us.

INDY R/C

CALL TOLL FREE 1-800-428-4682

INDIANA RESIDENTS call (317) 849-0768

INDY FRANCHISE HOBBY DEALERS

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Des Moines, Iowa 50315

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Clay Center Auto Parts
527-31 Court
Clay Ctr. Kansas 67432

The Modelar Hobby Shop
1726 South Hillside
Wichita, Kansas 67211
ph. 316-681-2941

LOUISANA
Ron's Hobbies
713 E. McNeese
Lake Charles, La. 70605
ph. 318-478-8651

MAINE
Pets & Pastimes
6 Central St.
Bangor, Maine 04401
ph. 207-942-9346

MASSACHUSETTS
Hobby Corner
70 Main Street
Houlton, Maine 04730

Bill's Hobby Supplies
600 N. Main St.
E. Longmeadow, Mass.
ph. 413-736-7711

MICHIGAN
Barry's Hobby House
3535 10th Avenue
Port Huron, Mich. 48060
ph. 313-982-1237

Aveo Model Supplies
1885 Dyson St.
Muskegon, Mich. 49442
ph. 616-726-3400

Hobbies Unlimited
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Kalamazoo, Mich. 49007
ph. 616-344-8711

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Charlevoix, Mi. 49720
ph. 616-547-9658

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1322 N. Rice St.
St. Paul, Minn. 55117
ph. 612-489-6060

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H & B Models
317 W. Main
Tupelo, Miss. 38801
ph. 601-844-7948

Creative Sources
1002 Jackson Avenue
Oxford, Miss. 38655
ph. 601-234-2475

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Joplin, Mo. 64801

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1745 E. Main
Billings, Mont. 59101

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AnMar Sporting Goods
RFD
Homesville, Neb. 68374

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Hobby Hill
1 Cannon Drive
Nashua, N.H. 03060
ph. 888-3576

NEW JERSEY
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28 Fairfield Road
Fairfield, N.J. 07006
ph. 210-227-1978

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Kingston, N.Y. 12401

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Ogdensburg, N.Y. 13669
ph. 315-393-2588

King Arthur Cermaics & Hobbies - Co. Bridge Road
Hudson Falls, N.Y. 12839
ph. 518-747-5818

Thompson Outboard S&S
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Oneonta, N.Y. 13820
ph. 607-432-5368

Rays Hobby Supplies
468 Jerusalem Ave.
Uniondale, N.Y. 11553
ph. 516-486-4047

NORTH CAROLINA
B & J Hobby Enterprise
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Raleigh, N.C. 27606
ph. 919-851-4492

Thornton's Hobbies
100 N. Main St.
Four Oaks, N.C. 27524

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1100 N. Ellis Ave.
Dunn, N.C. 28334
ph. 919-892-5946

Edros Hobbies
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Wilson, N.C.

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Crafts Etc.
Northport Shopping Ctr.
Fargo, N. D. 58102
ph. 701-293-7121

OHIO
American Modeler
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Berea, Ohio 44017
ph. 216-826-3088

Dad's Toy Shop
129 E. Auglaize St.
Wapakoneta, Ohio 45895

OHIO Cont.
Flight Box Hobby Shop
9909 Springfield Pk.
Cincinnati, Ohio 45215

Hobby Road Hobby Shop
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Columbus, Ohio 43229

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1414 S. Avenue
Toledo, Ohio 43609
ph. 419-385-8739

Lighthouse Hobby Supply
507 E. North St.
Prospect, Ohio 43342
ph. 614-494-2110

Lima Radio Control Spls.
307 N. Cole St.
Lima, Ohio 45805
ph. 419-229-5117

Paul's Hobbies
Route 4 Box 125
Lucasville, Oh. 45648
ph. 614-259-5298

S & M Print Shop
7154 Calvary Road SE
Amsterdam, Ohio 43903
ph. 614-543-4024

The Model Hanger
321 N. Market
Galion, Ohio 44833
ph. 419-468-7694

White Beech Tree Hobbies
114 Park Ave. West
Mansfield, Ohio 44902
ph. 419-526-4093

OREGON
Crabtree Store
37626 Crabtree Drive
Crabtree, Oregon 97335

Strictly R/C
7866 SW Capitol Hwy.
Portland, Oregon 97219
ph. 503-244-3356

Chezem's Enterprises
2495 Commerical NE
Salem, Oregon 97303
ph. 503-581-5276

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Great Shtrn. Shopping Ctr.
Bridgeville, Pa. 15017
ph. 412-221-2600

H & S Sales & Service
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Indiana, Pa. 15701
ph. 412-463-0191

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136 Main St.
Brookville, Pa. 15825

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Walterboro, S.C. 29488
ph. 803-549-7825

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Hobby Den Inc.
3347 W. Greenway Road
Phoenix, Arizona 85023
ph. 602-993-6630

Whistle Stop Hobby Shop
2241 Avenue "A" Space 7
Yuma, Arizona 85364

ARKANSAS
Family Hobby & Toy Ctr.
Route 5 Box 848
Conway, Arkansas 72032

Ron's Hobbies
300 N. Wright St.
Siloam Sprgs, Ark. 72761

Cash Auto Supply Inc.
P.O. Box 155
Cash, Arkansas 72421

CALIFORNIA
Dave's Custom Models
1844 W. Glenoaks Blvd.
Glendale, Ca. 91207
ph. 213-240-5810

Root's Hobby
6036 Telegraph Ave.
Oakland, California 94609

D & D Hobbies
8781 Cuyamaca St.
Santee, California 92071
ph. 714-449-5656

Active Hobby
717 E. Main St.
Santa Marie, Calif. 93454

The Hobby Shop
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Hanford, Calif. 93230
ph. 582-5571

COLORADO
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Musick Drug & Hobby
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Colorado Sprgs, Co. 80907

Jensen Cycle & Auto Parts
Box 182
Granada, Co. 81041
ph. 303-734-5337

FLORIDA
Action Hobbies
4301 A. North Dixie Hwy.
Ft. Lauderdale, Fl. 33334
ph. 305-561-5611

FLORIDA, Cont'd
The Hobby House, Inc.
360 U.S. Hwy. 17-92
Maitland, Fl. 32751
ph. 305-647-3442

A & J Models, Inc.
4527 Del Prado Blvd.
Cape Coral, Fl. 33904
ph. 813-542-8858

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Hangar 7 Hobbies
6125 Roswell Road N.E.
Atlanta, Ga. 30328
ph. 404-255-6033

INDIANA
ABC Hobby Craft
2155 E. Morgan Avenue
Evansville, Ind. 47711
ph. 812-477-9661

Craft & Hobby House
510 Main St.
Vincennes, Inc. 47591

Franks Hobby Shack
Highway 6
Hamlet, Ind. 46532
ph. 219-393-3845

Hobby Hangar
509 S. Monroe St.
Hartford City, Ind. 47348
ph. 317-348-1931

Hobby World
154-13A W. Hivaly AVe.
Elkhart, Ind. 46514
ph. 219-293-3715

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343 Lincolnway West
South Bend, Ind. 46601
ph. 219-287-0180

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117 E. Main
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ph. 317-282-4121

Wings N Rails, Inc.
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Plainfield, In. 46168
ph. 317-839-5363

IOWA
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2034 S. Saint Aubin
Sioux City, Iowa 51106
ph. 712-276-7086

Howards Hobby Shop
313 W. 5th St.
Waterloo, Iowa 50701
ph. 319-236-0695

JIM GOAD SEZ:

In February we have two holidays that we are going to be open here at Indy R/C on both days. These holidays are Valentine's Day on the 14th and Washington's birthday on February 20th. This does not mean that the boys from Indy R/C are not lovers or cherry tree choppers, they are just hard workers. Incidentally, we guard our Wats line or answer our telephones and are open for business from 8 AM till 7 PM Monday through Friday and 10 AM till 5 PM on Saturdays. We are closed on Sundays.

If you are in Indianapo or coming by you v note from you read m that there is a belt freew around Indianapolis nu bered 165. To get to Indy R/C go North on the N stone Exit up to 106 Street. Then go West 106th until you come College. We are almo on the corner and it a left turn on Colle

The formula has be improved on the In film adhesive so th it bonds at a lower te perature. Not only h the formula for t adhesive been improv so that it stick better, b also this low temperatu feature means that it c be used on foam w more success.

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Crossville, Tenn. 38555
ph. 614-484-6168

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Dixon Rt. FBC Bldg.
Plainview, Texas 79072
ph. 806-889-3541

Hobby Towne
1421 W. Houston
Sherman, Texas 75090
ph. 214-892-1821

Hobbies UNLTD
3031 Woodland Hills Dr.
Kingwood, Texas 77339
ph. 713-358-2224

Mercantile Park Hobbies
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Dallas, Texas 75228

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715 Porter
Dumas, Texas 79029
ph. 806-935-7422

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420 N. Main
Borger, Texas 79007
ph. 273-7037

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Rt. 100 North
Wilmington, Vt. 05363

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Lynchburg, Va. 24502

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Tacoma, Wash. 98444
ph. 206-531-8111

Hobby World, Inc.
70 Front St.
Issaquah, Wa. 98027

WASH. Cont.
Kitsap Hobby Center
Poulsbo Jct. & Hwy 3
Poulsbo, Wash. 98370
ph. 206-779-7676

Stewart Enterprises
at McCarey's TV & Radio
429 S. Chelan St.
Wenatchee, Wash. 98801
ph. 509-663-3232

WEST VIRGINIA
B &B Hobbies
222 Central Avenue
Beckley, W. Va. 25801

Mountaineer Shop
117 Court St.
Ripley, W. Va. 25271
ph. 304-372-8544

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New Richmond, Wisc.
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Calgary, Alberta,
Canada

Skycraft Associates
139 York Road
Dundas, Ontario, Canada

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BEST FROM INDY

Mount the Indy Power Panel in tool box. Operates from 12v. services your engine starter, field charger, and glow plug. S34.95. Indy: $23.50.

We have included this picture of remel tool to remind you that stocks a complete line of estic tools, kits, engines, and systems. See our other ad- nt two pages.

Como 40 engine. Twin ball ring, cast aluminum piston, me ring, special porting. Com- with Supertigre carburetor muffler. List: $69.95. Indy: .00. U/Control version less ller - List: $55.95. Indy: .95.

ndy US-2 Servo. OS mechanics, etics IC 544. For use with ems like Futaba, Kraft, Stan- , World - positive pulse sys- s. Mitsumi connector. List: .95. Indy: $16.95.

Snap-in servo tray for US-2 o. Center section is spacer h cuts out. List: $0.99. Indy: 9.

Round output arms for US-2. : $0.50. Indy: $0.35.

7. US-1 servo similar to above described US-2 servo except in Dunham mechanics with dual racks. List: $28.95. Indy: $20.95.

8. Capillo .09 Italian glow engine. List: $14.95. Indy: $11.95. Throttle. List: $3.50. Indy: $2.98.

9. Mills .075 diesel engine. Sentimental favorite. Excellent for small R/C. List: $19.95. Indy: $15.95.

10. Panasonic pencell nicads with tabs. New, (4) ea. $1.80 - $7.20. (8) ea. $1.65 - $13.20. (12) ea. $1.55 - $18.66.

11. 2 volt Gell Cell starting battery. List: $9.95. Indy: $6.95 and charger for battery. List: $9.95. Indy: $6.95.

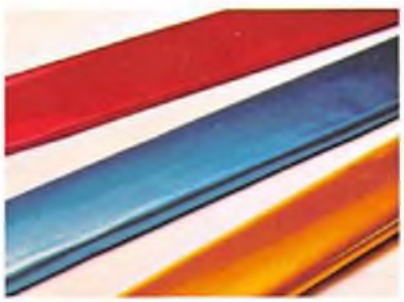
Notes - the bore in the Como 40 U/Control venturi will be about .275. We also offer a 12v. Gell Cell with 6v. and 2v. taps. Gives you power for your electric starter and your glow plug. List: $25.95. Indy: $18.50.

IZUMI RACE CAR

One each scale Porsche. Engine 15 to 29. Engine not included. One of the most popular Japanese race car products. Many have been sold to hobbyists and Indy dealers in the U.S.A. List: $129.95. Indy: $89.95.

MK (KATO) CURARE

MK's all balsa kit of Hanno Prettner's famous Curare. MK's quality really shows on this kit that Mr. Kato is building under an agreement with Hanno. 60 size - List: $98.50. Indy: $79.00. 40 size - List $79.50. Indy: $63.00.



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