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JANUARY 1979

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radio control MODELER

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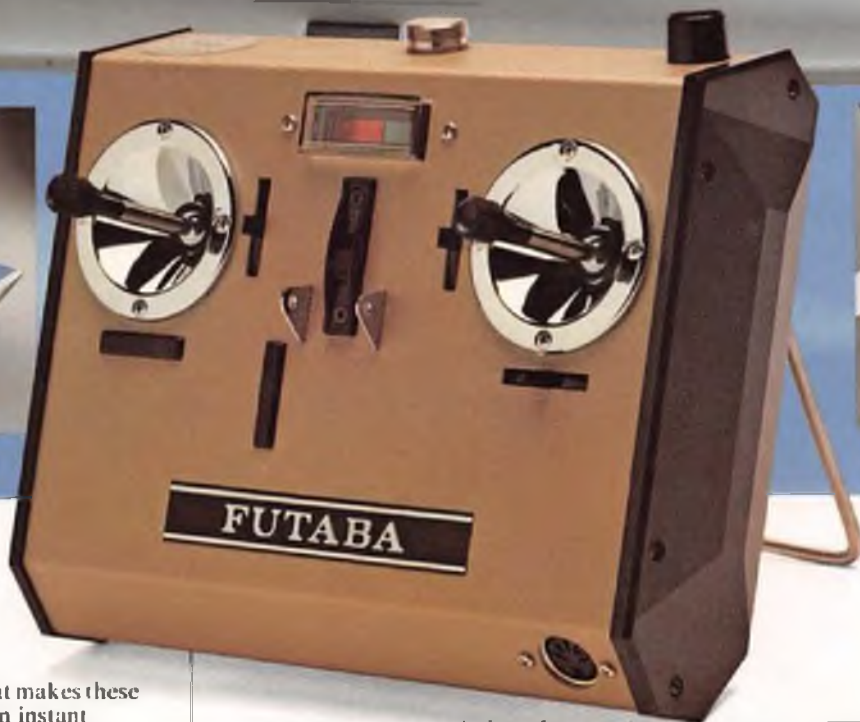


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The Futaba "Silly Savage" Trainer, pre-finished and ready-to-fly.



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

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



Model	Transmitter	Receiver	Servos	Battery	Price
Trainer K&B .19	3FN	R3F	3 S18	NiCad	429.95
Trainer K&B .19	3S	R3F	3 S18	Dry/NiCad	319.95
Trainer K&B .19	3S	R3F	3 S18	Dry	359.95
Piper Cub Testor .049	3S	R3F	2 S18	Dry	189.95
Piper Cub Testor .049	2GS	R2F	2 S18	Dry	159.95
Z-60 Maibuchi	2GS	R2C	2 S18	Dry	18A

Futaba

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

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MODELER

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Editor and Publisher

Don Dewey

Executive Editor

Patricia Crews

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Assist. Editor

Dick Tichenor

Graphics Editor

Barbara Richardson

Assist. Graphics Editor

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**This Month's Cover**

features Miss Kathy Lamb displaying George Albright's new pattern ship, the Utopia. The transparency was taken in front of a picturesque fountain in Columbia, Missouri by Greg Heifner.

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From the Shop

DON DEWEY

The unsung heroes... that's what I've always considered those valiant individuals who edit the club newsletters throughout the country. This is, without a doubt, the most thankless job in any organization. When you take on the job of "editing" a club's monthly newsletter, you generally find that you end up writing the whole thing yourself. And may the the Toy Airplane God help you if you don't approach the quality and content of a commercial publication with regards to the material contained in each issue. Of course, getting anyone in the club to write a "how-to" article, or anything else for that matter, is somewhat akin to flying a thermal soarer in a monsoon. And, when the newsletter editor would rather be out flying with the rest of the club, he's stuck behind the typewriter trying to figure out how to fill up the pages for the monthly issue with non-existent material. Yet, it is the club newsletter that is the catalyst for most radio control clubs. So, it takes a special breed of cat to fill this all important job.



And, I have found one such editor who is truly a guy after my own heart. I'm referring to George Privateer, Editor of the "Star Dust", the monthly publication of the Southern Tier Aero Radio Society, Inc., of Allegheny, New York.

As George explains, he is the president of the club and, about six or seven years ago, took on voluntarily the job of newsletter editor. The "Star Dust" has grown like Topsy over those years and, rather than being technical in nature, is more of a diary of the club's activities.

What endeared George to me forever was his editorial philosophy, which is --- "never give a sucker an even break --- when he's down --- kick him!" In addition, as editor of the club publication, George refuses to be sued for libel, defamation of character or perjury. Referred to as "Mr. Clean", George Privateer refuses to castigate himself as editor of their newsletter, thus he comes out clean all the time. We understand he is also called "Popsicle" by his club members since he always freezes on the stick!

The Southern Tier Aero Radio Society, Inc., has over thirty members in their club composed of professionals which include engineers, college personnel, an oral surgeon, draftsman, utility workers, and others. The club feels a sense of pride in the fact that they have not only gone to Quarter Scale ships to a large extent, but believe that they are the first to have a complete squadron of Quarter Scale ships --- in this case, Bristol Scouts.

The STARS have established a crash point system and, each year, a Bonehead of the Year Award is made to the member who acts the most stupid in one given year. Here, for your edification, are a couple of excerpts from the STAR publication, the "Star Dust":

"It is your editor's considered opinion that in view of the events that took place on our weekend in K-W as well as previous events that have taken place, the STARS is totally and completely comprised of the greatest assemblage of B-B brains this writer has ever seen or ever will see. That so many absolutely absurd events can take place so frequently and so casually belies everything one considers normal for the human race. Daring to be repetitious I can only say that, excepting me of course, STARS is the greatest collection of dolts, morons, imbeciles, idiots and cretins, ever known to



The RCM staff was sent to Las Vegas to cover the Quarter Scale Association of America Fly-In. How can they explain the goofing off evidenced in this post-flight photo of their ride in Scenic Airlines' Ford Tri-Motor? L to R: Dick Kidd, Pat Potega, John Brodbeck, Walt Schroder, Capt H.C. Borgesding (pilot), Lee Taylor, and Dick Tichenor.

mankind. How any one group can make so many mistakes is absolutely unbelievable."

Here's another. . .

"Last but not least is Al Foxall. Your leader and editor was amazed at how fast he has gone downhill in a year's time. Thin and scrawny with a nervous tic and bags under his eyes, he looked like the epitome of the walking dead! Than, as I found out, the reason why he looks like death warmed over is that this is his third year as president of the Flying Dutchman."

Or, how about this one . . .

"Now for the Awards. To 'Inverted Including His Brains' Messer, who stood around with an expression not usually seen on a glazed doughnut, goes 5 crash points for being responsible for wiping out the very first Quarter Scale ship in STARS. In addition, 'Micro Brain' gets 2 crash points for the damage to his ship --- a grand total of 7 crash points. But wait, that's not all. To our present Bonehead of the Year --- please take note that the damage to Bristol Scout 7057 was not the result of the mid-air collision with the Sopwith Triplane. Rather, he just plain forgot to bolt his engine to the firewall securely. Mr. Bonehead Nellis, we respectfully submit that 'Inverted (you fill in the rest)' Messer be placed in the running for this year's Bonehead Award."

Like I said . . . a guy I can really identify with. And, for all you other newsletter editors, take heart --- the day of retribution is coming. For an ideal text on how to get even with your fellow club members for their monthly non-contributions and their never ending gripes about what wasn't in the newsletter this month, get on the exchange newsletter program with the STARS. Just drop a line to George Privateer, Fortune Drive, Allegheny, New York 14705.

Keep up the good work, George . . .

The following is an amusing tale from Tracy Losh of Concordia, Kansas.

Four Mice Hijack Plane

It was August 30th when I took my new red radio control airplane out to the club's flying field of Concordia. I had just built a Headmaster by Top Flite and, being a new member of the North Central Kansas Region Control Club, I was out on

to page 184

15,000 choosy RCers studied this very special radio and decided it was the one to buy.

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There is a 6 month guarantee. Repairs are done right here at Hobby Lobby.

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Because our 4 main servos have no electronics inside them they are very low priced... only \$14 each! You can equip a second four channel plane with 4 servos for just \$56!

Did you ever need a servo that rotated in the opposite direction? You can change the direction of rotation of our servos in less than a minute!

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We use Deans Gold-plated connectors. They're more reliable because you can retighten them.

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 Great Trainer. For 3 channels, .19 to .39 engine, 57" span.



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 45" span foam wing, 3 channel trainer. For .09 to .15 engine.



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10-1/8x4x36	\$8.88
10-3/16x4x36	\$9.99
10-1/4x3x36	\$7.77

There are three things wrong with this wood: It still has the sawdust on it; it's a little longer than 36"; it doesn't have anyone's name stamped on it.

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This is the ideal field box accessory. With your 12 volt battery you can run your starter, your electric fuel pump and fill or defuel right from the Panel! It will also fast charge your airborne Nicad pack and your transmitter battery right at the flying field. It will power your 1 1/2 volt glow plug on the "HI" plug position and a 2 volt plug on the "LO" position... or you can use it to burn off too much fuel prime on your 1 1/2 volt glow plug on the "LO" position. The meter gives indication of glow plug condition and current flow during fast charging. It won't fly the plane or clean it up when you go home, but it sure will just about do everything else you need in starting and getting your plane fueled, started and staying in the air. Size: 6" x 3 5/8".

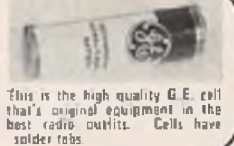
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Assembles in an evening—fly it the next day. Ready-built fuselage, foam wings that only need joining. Designed to be flown by a beginner with NO HELP FROM AN EXPERIENCED RCer. 2 channels required and a Cox Babe Bee.

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 1.2 volt 500 mah. Pencil size
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NO ADAPTERS NEEDED!
These will fit any engine!
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1 1/2" (40mm) diameter	\$4.80
1 3/4" (45mm) diameter	\$5.10
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2 1/4" (55mm) diameter	\$5.70
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The deeply in-set flange is held directly against the prop by the prop nut eliminating adapter bolts. You can use a socket wrench or the Kavan 4-way wrench to tighten the prop nut. A soft rubber plug caps the spinner. Spinners are cast and polished aluminum that'll last when used with an electric starter.

Clean engine parts quickly!
SONAC CLEANER \$24.95



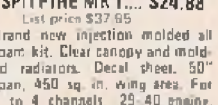
SONAC vibrates at a low frequency. It uses R&S Engine Cleaning Solution as the cleaner (odorless, water soluble, and not harmful to plastic parts). 30 minutes cleaning will usually clean the dirtiest parts.

R&S Engine Cleaning Solution, 8 oz. \$2.50

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55" wing span 4 Channels .29-.50 engine



You've got no way to go wrong on a deal like this . . . Even if you don't WANT this plane, it'd be worth \$19.99 to have it: It's a very easy-to-build plane, and it's a fine sport flyer or stunt pattern trainer depending on engine size.



This kit is terrific: Foam wings, durable gloss stock sheeting, one-piece balsa fuselage sides, super clear plan, simple sheet balsa stab & fin, and **HARDWARE** that's darn near **COMPLETE**—metal engine mount, hinges, control horns, clevises, reinforcing tape, pushrods, with all fittings, truly deluxe canopy, beautiful decals, even a spinner!

Better call or write quickly because there are only a limited number of these Love Machine Kits available.

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The aluminum engine mount portion is our regular \$15 mount with the rear drilled and tapped to fit 4 Lord Shock Mounts which are included. The 4 Lord rubber Mounts have a 1/20x1/4" stud on their firewall side.



All full scale aircraft engines are shock-mounted to the airframe by rubber mounts. We have copied this. The reduction of vibration to the model's airframe when using this shock mount is spectacular. With the engine running at full speed or turning through its maximum vibration RPM it was hard to detect any vibration at the firewall!

This shock mount enables use of our huge Evra 190 engine on large RC aircraft of very light weight and delicate construction. Fragile scale vintage models are now a possibility in the 1/4 scale (and larger) category.

Individual Lord Shock Mount \$1.25



Rubber cylinder is 3/4" long, 1" diameter. Studs are 1/4-20, 1/2" one end, 3/4" other end.

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This is a straight cast aluminum exhaust pipe which you simply hacksaw off where it exits from the cowling.



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A simple and lightweight muffler that looks like a fish scaler.

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DEANS . . .

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Hobby Lobby JUNIOR TELEMMASTER **\$33.94**
List price \$42.95

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



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List price \$89.95

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

Here's a plane for .09-.10 engines!



One of the EASIEST TO BUILD balsa & plywood kits you'll ever see! One piece fuselage sides, machine cut wing ribs, dropout die-cut plywood fuselage formers for strength, dual landing gear, and plywood & balsa wheel pants. 42 1/2" span, 317 sq. in. wing area, for 2 or 3 RC channels. Words can't do this kit justice—you've got to see it!

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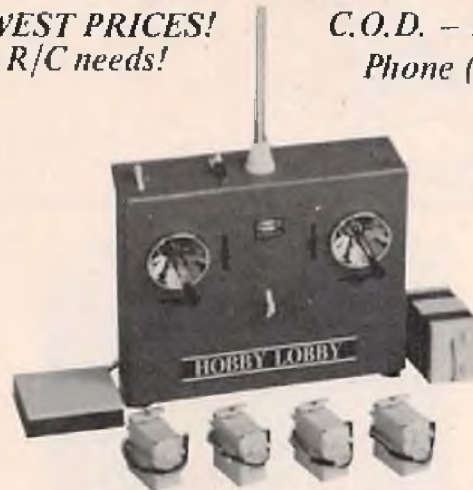
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Before we get into the real "meat" of this month's column, I would like to pass along something that I think would be of interest to a lot of my fellow RC'ers. I have been reading a book by Len Deighton, "Fighter, The True Story of the Battle of Britain." This is really an outstanding book, written by an outstanding writer, and one that almost all of us will find very fascinating. Mr. Deighton goes into the events in Germany and England leading up to WWII, with main emphasis on the development of fighter aircraft in the two countries just prior to the war. I learned many things that I did not know about the design of the fighters, construction of them, armament, and so on. For example, did you know that the design of the Hawker Hurricane was taken directly from the earlier biplane Hawker Fury? Did you know that the Hurricane, unlike the other main fighters of WWII was mainly built of wood, with fabric covering? Did you know that the Messerschmitt Bf 109 was an extension of design philosophy developed by Willie Messerschmitt while designing gliders in Germany after WWI? Or, did you know that the wings of the Bf 109 were too thin to mount machine guns, so had to be re-designed when the German high command found out that the British were building eight guns into the wings of the Spitfire and the Hurricane rather than the two guns in the nose of the Bf 109?

I am only half through the book due to the press of business lately, but I have found in half of the book enough fascinating information to keep me digging my nose into it every chance that I get.

★

This fall the flying weather in our part of the country has really been terrific, warm days, but no Texas wind, which plagues us most of the year. Just about every Saturday has been beautiful, with light and variable winds --- perfect flying weather to teach beginners how to get started in the air.

I have been helping a couple of friends of mine to learn to fly, and also have found a few beginners at the field who needed a helping hand, and this brings me to a story that I want to tell you. It is not intended to embarrass the man who is the focal point, but to point out to



Lazy Ace & Claus Van Den Moek wearing wooden shoes to keep feet dry in soaked Holland.

beginners some of the pitfalls of doing it yourself, and to an instructor some of the pitfalls of helping.

We were out a couple of Saturdays ago doing our thing. I had my Lazy Ace out for my flying enjoyment and the Lucky Lady out for Steve to get some stick time on. Another car pulled up and a man and his young son began unloading airplanes, etc., into the pit area. I asked him what his frequency was, and told him mine, and then went ahead refueling and talking to Steve. The newcomer set about his work with a business-like approach, so I didn't pay any more attention to him. He fired up his engine, started to taxi down to the runway, but the aircraft (a Sig Kouger) turned, came at the tail of my big Lazy Ace biplane, and then turned off of the taxi way, hit a clump of weeds, and the prop stopped. By this time I was just a little bit interested in what was going on. The man walked over, picked up his airplane, looked at me and said, "Well, that was the maiden flight on the aircraft, and on me too." So, here it is all over again, a beginner, trying to teach himself, not asking for help, with an aircraft not designed for the rank beginner, and an aircraft that was designed to fly with a .40 but sporting a Kraft .61 in the nose. Exactly all of the wrong combinations.

Here I've spent the past fifteen years writing about the problems of newcomers, and how they should seek help, how to start, what type of aircraft to buy, etc., and it suddenly dawned upon me that the man who wants to start makes his purchases first, and sometime later gets hooked on reading magazines, and will take some advice

from me, or the many, many others who are now dishing out similar information. How to get the information to the beginner before he begins is really a problem. But, back to our man.

I asked him if I could help him, and he thought about it for a minute, and decided that a little help wouldn't hurt. He was ready to fire up the engine again, but I asked him to wait until I could check over the controls and the aircraft. First, I pulled up elevator on the stick, and the ailerons moved. Whoops! Running through all of the controls, I found out that the only thing that worked correctly was that the nose gear turned correctly with the rudder movement, but this took place when you moved the throttle stick. My man told me that he wondered how you knew what to do, so he had put strips of adhesive tape on the transmitter face, and marked in ink what stick did what to what surface. Also, he had taken the aircraft to the hobby shop where he had purchased the equipment (over much protest I found out later, they tried to get him into a trainer, but he started out wanting an F-51 with retracts, etc.). They had checked out the balance on the aircraft, and looked at the pushrods and hinging and had pronounced it okay but, since he had not brought his transmitter to the shop they could not check out the control movement. We removed the wing, plugged the servos into the correct spot on the receiver, checked over all of the innards of the aircraft, and the hinging, which was all good, checked the movement of each surface, set the ailerons at neutral to each other, and put everything back together again. The aircraft was a bit nose heavy, so I increased the elevator throw to help lift the nose on landing. We fired up the bird, and taxied down to the runway and took off. The Kouger is a nice airplane, especially so with a .40 in the nose, but with a Kraft .61 it moves out like a scalded-tail cat, just a bit fast for a trainer in anyone's book. Flying about half throttle made it okay for my new friend and his son to get some stick time, so several flights were made that day with them, all of the time I preached that it would be much better to start building a trainer, and save this bird for a later day. I have heard from several of my friends since that time, that our newcomer is around the field seeking help, and

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Peace and Goodwill

MAY THE SPORT OF RADIO CONTROL
CONTINUE TO CONTRIBUTE TO UNDERSTANDING
AND FRIENDSHIP THROUGHOUT THE WORLD

KRAFT SYSTEMS INC.



This past month I received a phone call from John Brodbeck, Sr., who most of you already know is the "B" of K & B Manufacturing. John had received a letter from a fellow who was a bit upset over what he considered to be the short life of two K & B 3.5 (.21) inboard marine engines. Since the letter was sent to K & B and not Engine Clinic, I will not run it but, in short, one engine had 20 hours of running time and the other 16½ hours before both suffered rod failure. The gentleman was quite distressed at the short life span of these engines as they had only been run on standard fuel containing no nitro, since he resides in England where their National MPBA racing rules prohibit nitro.

In actuality 16 to 20 hours of competition racing time for a high performance engine is quite a bit of running and considerably longer than what might be expected. Many engines last only a few hours and, in some cases, only minutes before something lets go. John thought a discussion on exactly what could be expected in the way of life expectancy for a high performance racing engine would be good material for the column, so let's kick around this life expectancy business this month. I am sure many of you readers, at some time or another, have had an engine that did not last as long as you had hoped for and were a bit unhappy — especially if you were into Formula 1 racing, boats or cars. These three events subject engines to their hardest form of use.

It is very strange, but fellows just do not seem to realize the amount of horsepower our small engines are developing and the loads being imposed on the internal parts. Many of the competition .40's, for example, now approach 2½ horsepower. This is over 5 horsepower per cubic inch — something no other internal combustion engine can come close to equalling with the exception of some of your full scale blown dragsters. And these, like our model engines, have a pretty short life expectancy when subjected to the high stresses encountered when you are after horsepower.

Even though the best materials are used in the manufacture of a model engine, when you get into high

horsepower/rpm, the loads and stresses are beyond the ability of the material and something is going to give. In a racing engine this is usually the rod or crankshaft. All model engine connecting rods are fabricated from aluminum — usually 2024-T4 or 7075-T6. These have proven to be the strongest aluminums available for rod use. If a rod fails there is no other choice of material — the only solution being to beef the rod up. However, a point is reached where size and weight become a factor and, if the rod is too heavy, vibration enters the picture. So a compromise has to be reached between weight and strength. There is one material that would solve the rod breakage problems but it is extremely difficult to machine and prohibitive cost-wise. That is Titanium. To put a titanium rod in an engine would increase the cost of the engine \$35.00-\$45.00. Many of you would gladly pay the price for a titanium rod, but a manufacturer has to think in terms of quantity distribution. For the handful of guys who would pay the extra price, there are thousands of others unaware of the advantage of titanium and would only know that brand A engine costs \$45.00 more than brand B and even though brand B broke, a rod once in awhile, the \$45.00 savings would justify its purchase. Manufacturers have to keep their prices competitive with their competition. To bring out a specialized item or engine and only sell a few hundred would soon put the manufacturer out of business.

If our model engines were always operated under ideal conditions and always treated with tender loving care they could be expected to last many hundreds of hours. However, not one out of a hundred model engines ever sees this kind of treatment and shorter life is the result. The glow plug and fuels we use are a large contributing factor. Unlike your automobile engine that has fixed jets in the carburetor so you cannot tamper with the mixture, and spark ignition that fires the combustion cycles at exactly the right time, our model engines are semi-diesel in operation. Compression pressure and heat aided by the glow plug ignite the mixture. This is uncontrolled ignition at its best. In humid weather, or if too much nitro is

being used for the rpm the engine is turning, you will experience pre-ignition. That is the "frying egg" sound most of you have probably heard at one time or another and was caused by too hot of a heat range glow plug, too much nitro, hot humid weather, etc. Unfortunately, although glow engines are the ultimate in simplicity they are also affected in operation by an unlimited number of variables. Because changes in weather and temperature affect the ignition timing and mixture we have to have a means of adjusting the mixture — hence the needle valve. Naturally everyone tries for every bit of power they can get so most engines are always run slightly on the lean side. This means higher operating temperature — many times close to the breaking down point of the lubricating oil used in the fuel. Then throw in dirt and holes in the fuel line that lean the engine out so that it practically melts, dirt going down the carburetor lapping and grinding away the internal parts, etc., and it can well be understood why an engine might not last as long as might be desired.

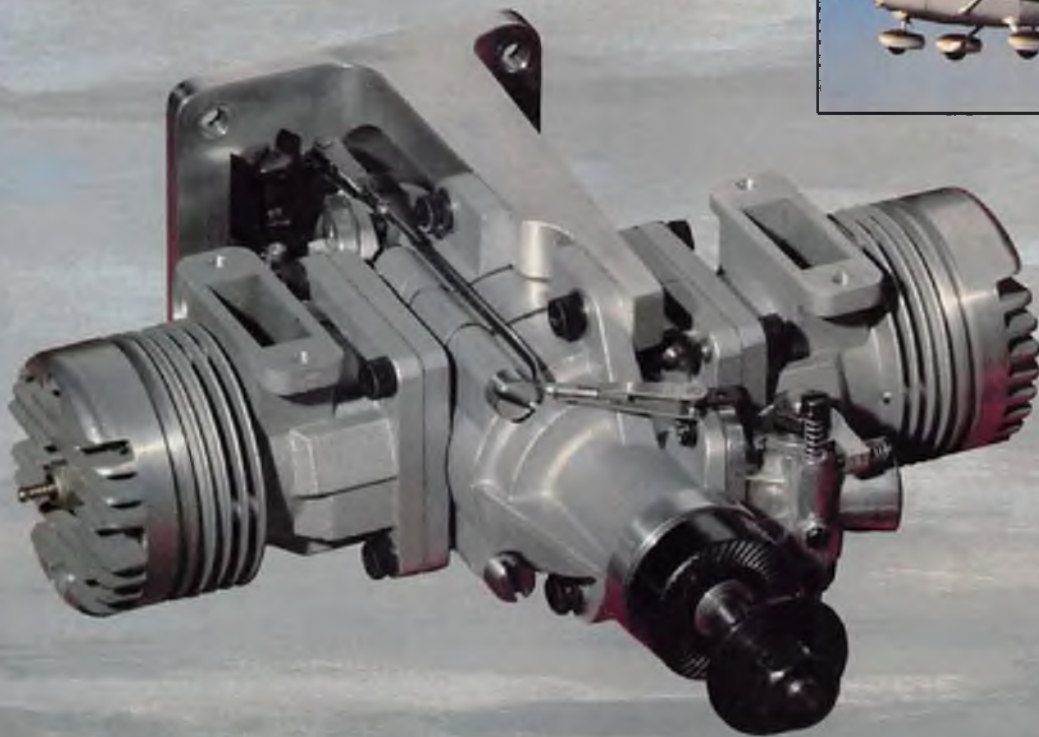
The above problems are ones common to all model engines. When we get into specialized events like Formula 1 and Quarter Midget racing, boating and R/C cars, there is a whole new crop of engine killers involved.

All internal combustion reciprocating engines have to be operated under load, i.e., they can not be allowed to wind up to maximum rpm running free. If you were to start up your automobile engine and floor board the gas pedal, how long do you think it would run before a rod came out the side of the block or out the bottom of the the pan? Not very long I can assure you. How often is your car operated at full throttle? Very seldom, and yet your model engines are operated at full throttle the majority of the time. If nothing more was done than to operate our model engines at half throttle they would have an unlimited life expectancy if an air filter were used to keep rocks and dirt out of the intake.

Of all forms of model activity, model boating is probably harder on engines than any other event. The engines are fired up on the beach with no cooling whatsoever — the engines peaked out

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THE ULTIMATE IN RC FLYING FOX 20CC OPPOSED TWIN



The Fox Twin is the finest two cylinder model airplane motor ever produced. Every design consideration and manufacturing care has been taken to make the Fox Twin a really practical power plant.

The two cylinder opposed simultaneous firing configuration was selected because equal and opposite piston motions cancel each other out vibration wise and produces a smoother running configuration than the alternate firing in line motor. In addition, the opposed cylinder configuration cools better and fits most scale models better.

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Each Fox Twin is factory run at full power, assuring you that when you buy this and put it in your model, you can fly. The carburetor has been adjusted and synchronized for atmospheric conditions at the factory. Unless you are at a rather high altitude, no further adjustments should be necessary.



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The red lead is positive and should be connected to the positive terminal of your battery, the black, negative, connects to the negative terminal of your battery. To operate the charger connect both leads to your battery before plugging the charger into a

110-120 volt A.C. outlet. The charger will then charge your battery until the battery voltage is the proper value. The charger then stops and lights the L.E.D. If you plug the charger into an outlet before connecting to your battery the charger will not operate. Unplug the charger from the outlet, connect the charger leads, replug the charger to reset the charge circuits.

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LIST

ENGINE CLINIC

from page 10

for maximum rpm — just winding up free with no load with the rpm often touching 30,000, then dropped in the water where the red hot cylinder is now quenched with cooling water and subject to thermal shock. If the boat should flip the engine gets to wind up free before becoming immersed and filling with water. Water in the combustion chamber results in a hydraulic lock that does great things to the connecting rod with the sudden stop from 20,000 rpm plus. Naturally a few runs later when the rod lets go there is no association with prior treatment the engine has received. Of course this is true in all the other events as well. Fellows will nose their Formula 1 ships up on take-off letting the prop and the engine run free for many minutes before finally getting it shut off. A flight or two later when the crank breaks or the rod lets go no thought is given to the previous free running. The same thing with R/C cars — how many times are cars flipped on their backs with the engine winding up free for several minutes before shut down?

So guys, when it gets down to this life expectancy bit there is no set of figures that can be given. I receive letters from readers all the time wanting to know how many hours of running time they can

expect from an engine. They would like me to come back with 100 hours, etc. However, there is no way that this can be done. Life expectancy of our model engines can be from only a few minutes (if you fire it up and let it die lean a few times finding the initial needle valve setting when new), to hundreds of hours if the engine is always run slightly on the rich side, fuel used with ample lubrication, no dirt or rocks ever go down the intake, etc. In the case of competition engines, the story is a bit different. When you get to turning high rpm and using high nitro fuel you are placing stresses and loads on the engines that the material cannot take. I know this will come as a big shock to many of you but if you are going to use your engine, whether it be in an airplane, boat or car, and run it at high rpm — usually with more nitro than can safely be tolerated, then you can expect a life expectancy of only a few hours. The fact that the gentleman whose letter initiated the idea for this article this month had run his engines 16½ and 20 hours respectively in boat racing competition is surprising — surprising that they lasted that long. Naturally I have no way of knowing if the engines were ever allowed to wind up free, submerged in the water, run just a little on the lean side a time or two, etc. Chances are pretty good that they were at one time or another.

If you are going to race, then you are

going to have to pay the consequences. This is true in all racing events whether model or full scale. How about the Rolls-Royce engines used in the P-51's and hydroplanes for Unlimited class racing. They are probably the finest engine manufactured today, however, when used for Unlimited racing and pushed beyond its design limitations, parts start letting go. The same thing is true with blown fuel drag racers, Indy cars, etc. If you are going to race then be prepared to accept short engine life as part of the game.

Dear Mr. Lee:

I read your column regularly with great interest. I would like to assemble two .60 size engines directly opposed using gears to drive a common prop shaft. This unit will power my 1/3 scale Pitts S1. I would like to have both exhaust ports pointing down. On my old Super Cyclone, I can rotate the cylinder casting 180 on the vertical axis and throw the exhaust left or right.

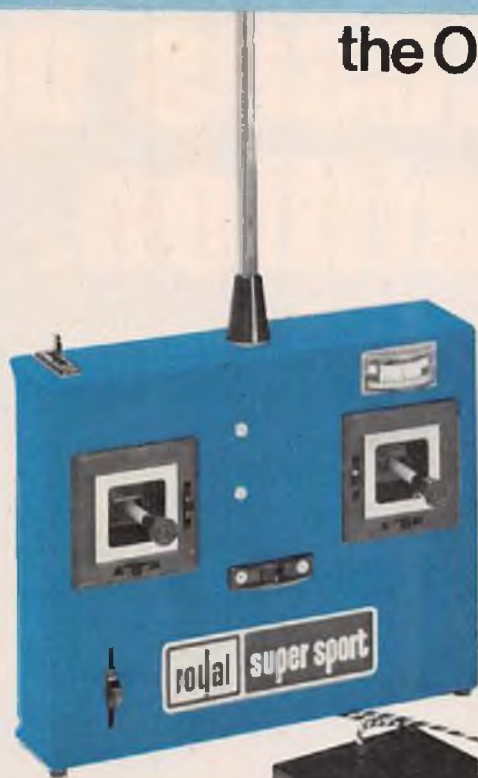
Could you tell me which of the new .60 engines can be rotated this way? I am especially interested in the .56 and not interested in a high speed racing engine.

Thank you,
Bob Shores
Plant City, Fla.

I don't know of any present day .60's
to page 170

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Sunday Fliers, arise! No longer need ye hide your head in shame for your dum-dum actions. You have been vindicated. In fact, you have reason to proclaim that even the best of professionals have their Sunday flier days!

As is my wont, each September, I enjoy going to Morgan Hill Air Museum for the Annual World War I Western Front Jamboree, staged by the Hill Country Flyers. This year I could only attend on the first day, because of a scheduled slope race hosted by the South Bay Soaring Society on the Sunday, and in which I wanted to test my new Sportsman Class racer. But I figured the loss of a day's practice wouldn't change things too much, and I especially wanted to go to the Western Front Jamboree.

So I did.

On arrival, I made a quick tour of inspection of the fabulous models. Some thirty-seven were entered by thirty-two fliers, and the workmanship was outstanding in every case.

But the one I wanted to see most hadn't arrived. I inquired — and was told that it probably wouldn't be there. It was a Bleriot monoplane, complete with all the virtual birdcage of guy wires, turnbuckles, delicate framework, and intricate cockpit detail. But the day before the Jamboree started, the model crashed on a test flight — its first flight after months of painstaking effort. There was no way it could be repaired in time.

Wrong. Along about mid-morning it showed up. Admittedly, there were wrinkles here and there in the covering, but it was in flying condition. I even observed that the wrinkles should serve to give it more scale points — because the original airplane also had them. In any event, it was a Herculean effort on the part of the builder, who admitted it took fourteen hours of frantic effort (with an occasional soothing dose of vodka — about a fifth's worth) to get it back together in time.

"So what happened on the test flight?" I inquired.

"It flew out of range."

"Boy, that's too bad. Must have been that your transmitter wasn't properly tuned to the receiver, eh?"

"Uh-h-h, not exactly. The receiver

antenna was too short."

"What did you do? Cut it off so it would fit the plane?"

"No. I forgot to uncoil it when I installed the radio!"

Stunned silence on my part. Here was the guru, the high priest of professional R/C flying, with uncounted hours in sport R/C, Formula 1 racing, and contractor with both governmental agencies and private industry in the flying of multimillion dollar RPV's, — — — Mr. Dum-dum!

Unfortunately, the contest ended last July, so he didn't qualify in time. Matter of fact, he didn't even enter. But, for a performance well calculated to win high honors, I hereby give a special award to my friend Gary Korpi — the title First Assistance Chief Sunday Flier!



And Photo No. 1 is a picture of Gary's beautifully detailed Bleriot monoplane, with its intricate wiring, and crate-like engine mounting structure. Also, note the realistic strain lines on the covering on the side of the fuselage.

Here's another example of the real spirit of the true Sunday flier. Erv Solberg of Seattle, Washington, came all the way down to Morgan Hill to fly his Fokker Eindecker. Picture #2 shows Erv with his airplane — and his flying costume — boots, flight coat, helmet,



medals (including, of course, the Blue Max) — all the trappings! Now, can you imagine trying to fly a model in that outfit, with the temperature hovering around 100°? Well, he tried — and tried — and tried. Finally, in total exasperation, he bellowed "Howinell do you **expect** me to get this thing off on a Saturday? I'm a Sunday flier!"

Maybe so, but he certainly did a job of building with the detailed machine gun under the cabane structure. And that cowl — made right from a cooking pot that he picked up at K-Mart! The pilot was made by his daughter Nancy, using a Barbie Doll as the basic figure. A true Sunday flier — great builder, not much of a flier, but has more fun than any of the contest winners in racing, precision, or whatever!

Photo #3 shows two of the greatest scale modelers in the sport — the Williams brothers, Granger and Larry.



Granger's Nieuport 28 is the same aircraft with which he won AMA scale at the Nats in 1968 — ten years ago, and still flying! Larry's Pfaltz B3a is powered by a K & B .40. The real power plant is buried in the intricate motor detail. That's what I mean when I say they're great scale builders. Put that together with their flying expertise, and you can easily see why they have trophies coming out the gazoo.

Picture #4 depicts an 8' span model of the SE-5. At 8' span, the model is somewhere in-between Quarter Scale and One Third Scale of the real thing. The builders, Dwight Hale, Norm Jensen, and Joe Vierra, from Fremont, brought it to the Jamboree just for a demonstration, and it was a sensation, naturally. It weighs 34 pounds, is powered by a Quadra engine swinging a

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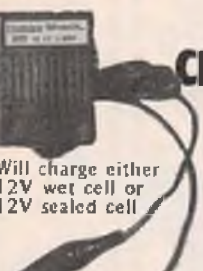
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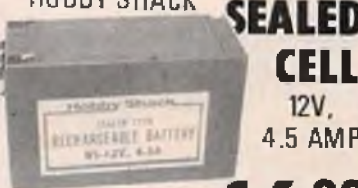
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In the land where the humidity and temperature race for top honors, and the humidity generally wins, Mr. FAI held his finals to determine a winning team to represent the United States at Belgium in July 1979.

Confronted with the task of twelve flights of picture perfect performance, four men survived the heartaches of broken sailplanes, misjudged turns, radio problems, bad tows, and plain old down air. In attendance were Steve Work with his Bird of Time (see page 40 for construction article), Terry Koplan and his Viking, Skip Miller and his Aquila and Jack Hiner as an alternate and team worker. As of this writing a team captain has not been selected.



Terry Koplan with his Viking he used to place on the U.S. FAI team.

Not being able to attend this conclave of superior sailplane pilots collected from all corners of the U.S. I interviewed many participants to arrive at my statements concerning the FAI trials.

Rae W. Fritz, Contest Director appointed by Ray Marvin, FAI coordinator, did a magnificent job with what he had to work with. The instrumentation and surveyors equipment used for the speed run and distance runs were excellent; procedures were good.

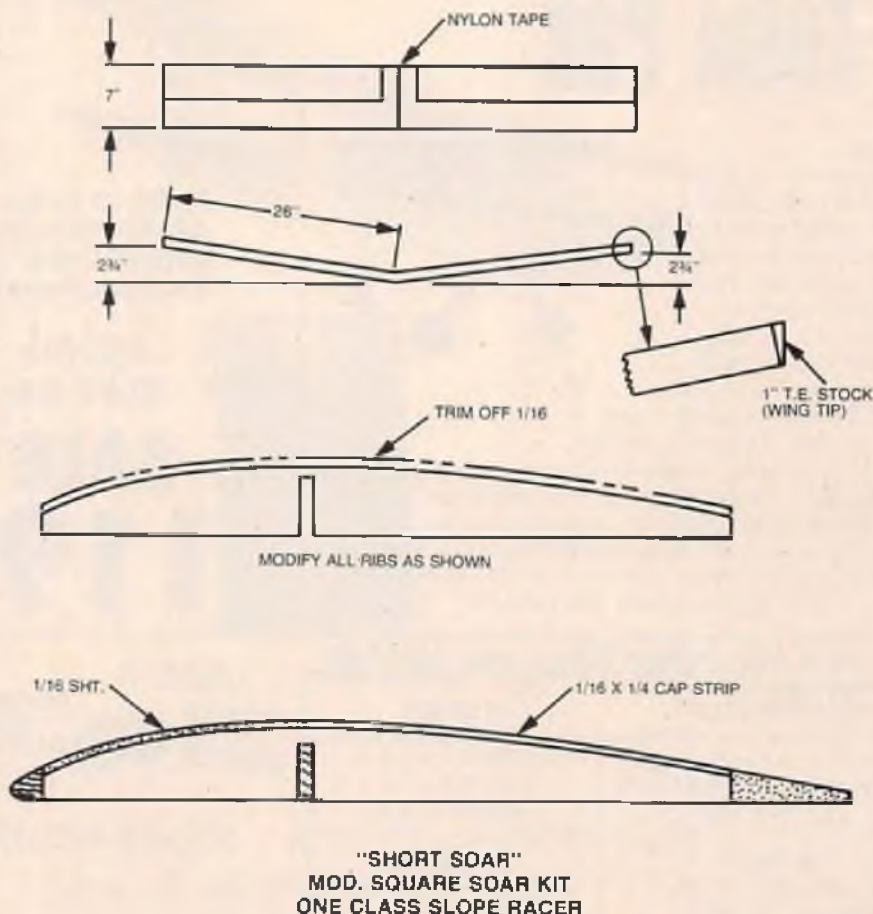
The rubber stamp method of model identification is a very poor way to identify model parts; a slicker should be affixed to model parts and signed in ink. This sticker should be inspected and recorded before and after every flight. Preparation time could be started for the waiting group of pilots, while the working time is being counted off for the group that is flying. Sure this is great you say, but what about help? A contest or trial of this magnitude should have lots of it. Without enough help the contest director is spread too thin - - - he cannot be every place at one time and cannot make decisive decisions when bombarded with requests and questions. The rule of thumb for this caliber of trial - - - one official (not just a body with a pretty hat on) for each contestant entered, and each official has a specific job to do and he does it.

Most of all is the true understanding of all FAI rules, presented on a level so that every pilot understands.

I lift my lid to all of the 41 pilots who made it to the finals, the helpers that Rae had, the Hurricane that bypassed Florida, and all of the wives and friends who helped make this memorable affair, and to wish our U.S. team all of the best air possible in Belgium in 1979. The rest of us will go on building and flying hoping to come across the "Utopian" sailplane that will stand up under the rigors of speed, distance, and thermaling, to enter in the FAI tryouts in 1980.

The Soaring Union of Los Angeles, (SULA) a member of (SC)² has published a handbook for a pilot/modeler who is interested in sailplaning. It discusses all of the most asked questions, terms used, ground rules, suggestions on which sailplane is best suited for a beginner, and contest types and rules. It is very well done and required a lot of thought. If interested, send a self-addressed, stamped envelope to Don Simon, 13900

to page 22





— Meet CURTIS CROKER, National AMA Champion at 11!

If you asked young Curtis Croker what he does just for fun, he'd probably say, "Fly my helicopter." And fly he does! . . . well enough to outscore all contestants in the Novice Class at the 1978 AMA Helicopter Nationals. Flying a stock Rev-olution, aided by an HB .40 engine, Futaba radio, and his pal, Snoopy, Curtis' highest point round was 875 out of a possible 900 points, proving once again that practice pays. Curtis had a ball, and we feel it couldn't have happened to a finer young man. Now 12, he is still quiet and unassuming, but don't let that fool you; if our guess is correct, you'll be hearing a lot more about this young champion!

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SOARING

from page 20



Alex Mladineo and Chris Adams have that fierce look of competition. You guessed it, speed run.

Marquesas Way, Marina Del Ray, California 90291, and I'm sure he would send you a copy.

★
Mike Burke of the South Bay Soaring Society has come up with a very good modification of a standard sailplane if you are thinking about slope racing.

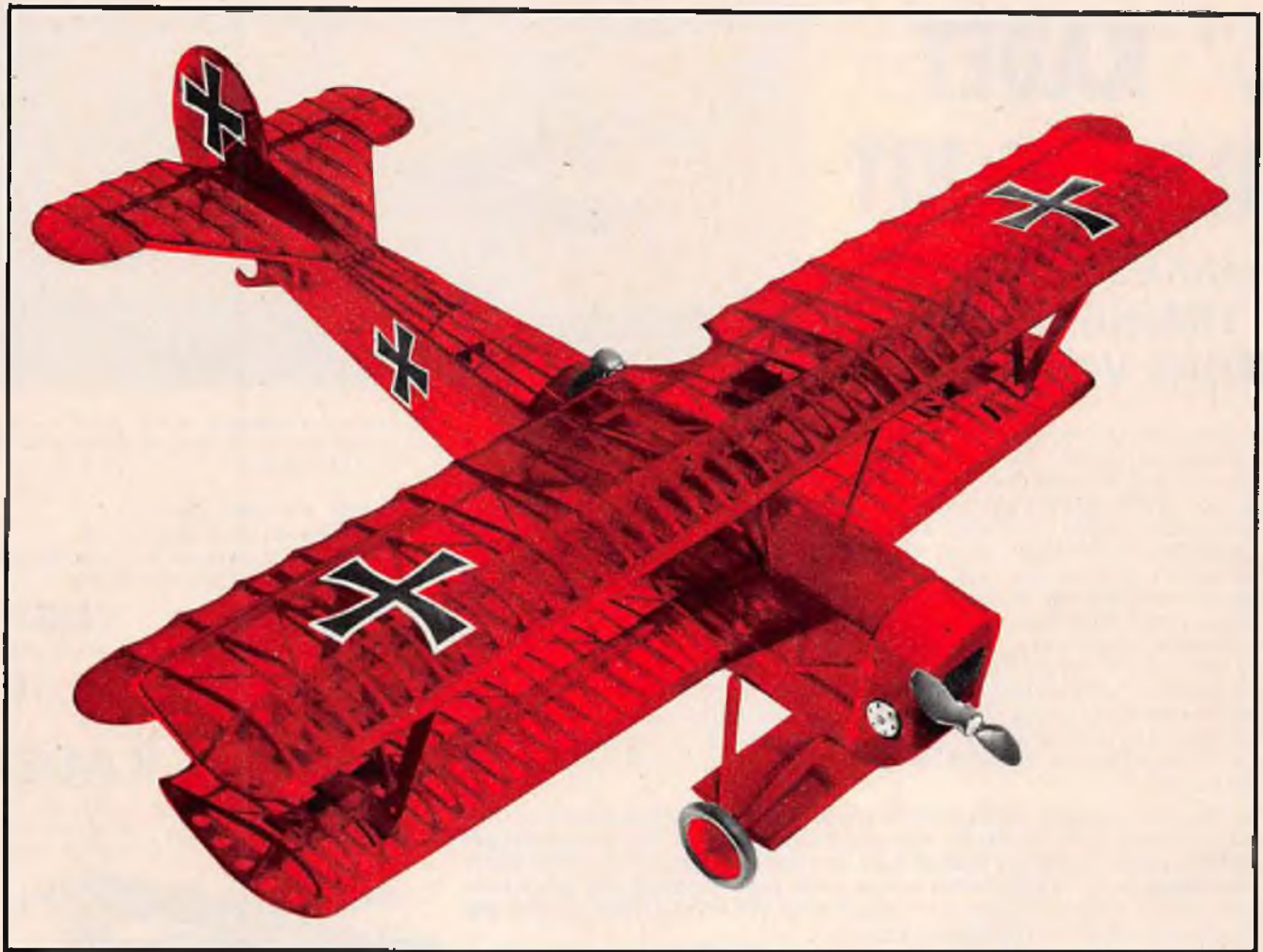
"Approximately two years ago, I entered my first limited slope race. The race was overrun with Hobie Hawks and thermal sailplanes, but there were a few brave souls who had built racing ships. These racing ships won the top three places in the race.

"During the next two years, limited class slope racing evolved into a very sophisticated form of racing but, in doing so, it has lost many of the fliers who are needed to make the race successful.

"In my opinion, the main reason for this is the great amount of time involved to build a racer and the fact that, with all the time and effort, the airplane may turn out to be a dog! Enough of this; here is my idea to get more people into slope racing:

"One design slope racing using a strong, easy to build, and cheap airplane is the way to go. The airplane with all of these qualities is the Short Soar. The Short Soar, is a clipped wing Square Soar with the front half of the wing sheeted. It builds very fast and has a hardwood spar, a hardwood leading edge, and a plywood fuselage for strength. The best part of it is that it's fun to fly. It loops, rolls, spins, yet it is very

to page 164



Semi-big fun scale Fokker D VII



Gentle and stable, a trainer that looks like an airplane with performance to suit the discriminating flyer.

Quick build up

Engines .60 - .80

Wing span 72"

Wing area 1488 sq. in.

Weight 10 lbs.

4 channel radio required

Kit features: 2 full size rolled plans (wing and fuselage) • Step by step instruction manual with photographs • Quality die stamped balsa parts • Machine cut hardwood parts • Machine cut and pre-sanded plywood parts • Pre-formed balsa blocks • Pre-formed leading and trailing edges • Heavy duty one piece ABS cowling • Pre-formed landing gear and cabins.

KIT OL 781

\$9750

See your dealer
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Hardware package includes: Aluminium motor mounts • Plinned hinges • Snap-links • Control horns • Nylon bolts • Landing gear straps • Socket head bolts and blind nuts.

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New! **KADET AILERON KIT**

**MAKES A GREAT
TRAINER EVEN
MORE VERSATILE**



In the few years since its introduction, the Sig Kadet has become the standard by which other RC trainers are judged. Sig dealers have sold ten's of thousands—proof of the acceptance of our "Learn To Fly RC The Sig Way" program, which suggests that beginners start with rudder control on 3-channels and the Kadet. The use of the Kadet rudder on the transmitter aileron stick prepares the student pilot for easy transition to our next step aileron trainers, the Komander & Kavalier. Some club instructors prefer to teach beginners using aileron control from the start and have recommended to us that the Kadet be equipped with ailerons for those who wish to use them. So, for several years we have observed with interest and have check flown aileron equipped Kadets that have been brought to Montezuma or to Fun Fly events. These had a variety of dihedral amounts and both strip and barn door ailerons. It was evident that the Kadet was a "natural" for ailerons. Some high wing, flat-bottomed models don't perform well on ailerons, but not so in the case of the Kadet. The standard old-faithful Kadet design with unchanged dihedral turned out to be ideal for a simple installation of strip ailerons. The handling characteristics are just right for the novice flier and we feel all builders of the Kadet will want to consider installation of ailerons at the time of construction.

We are still going to recommend starting with 3 channels and rudder control, but now an easy half step up in learning to fly RC can be accomplished by plugging in the ailerons and getting in some easy, gentle, forgiving 4 channel flight time before moving on to a faster aileron trainer. Our feeling is that the transition will be much easier following this progression. Also it should greatly reduce the amount of personal time and attention from an instructor since the novice can advance farther safely on his own.

A secondary advantage has been found by builders of aileron Kadets—they are simply fun to fly! So even after the owners have advanced to fast, low wing pattern designs, they keep their aileron Kadet in action for relaxing Sunday flying sessions. It is great for hauling loads like smoke cartridges or bombs, does fine on floats, will even fly inverted!

Jim Woodard of Oskaloosa, IA was one of the fliers who brought their aileron equipped Kadets to Montezuma and let us fly them.

AILERON KIT INCLUDES:
Full Size Aileron Installation Plan
(To be used in conjunction with Kadet plan)
Illustrated Step-By-Step Instructions
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Formed Wire Aileron Horns
Molded Plastic Hinges
Die-Cut Plywood Parts

SIG
RP-AK-331
\$3.50

**HERE'S THE
OTHER PART
OF THE COMBO!**

KADET

Length: 42"
Wing Span: 57"
Engines: .19-.35



RC-31
\$34.95

KIWI

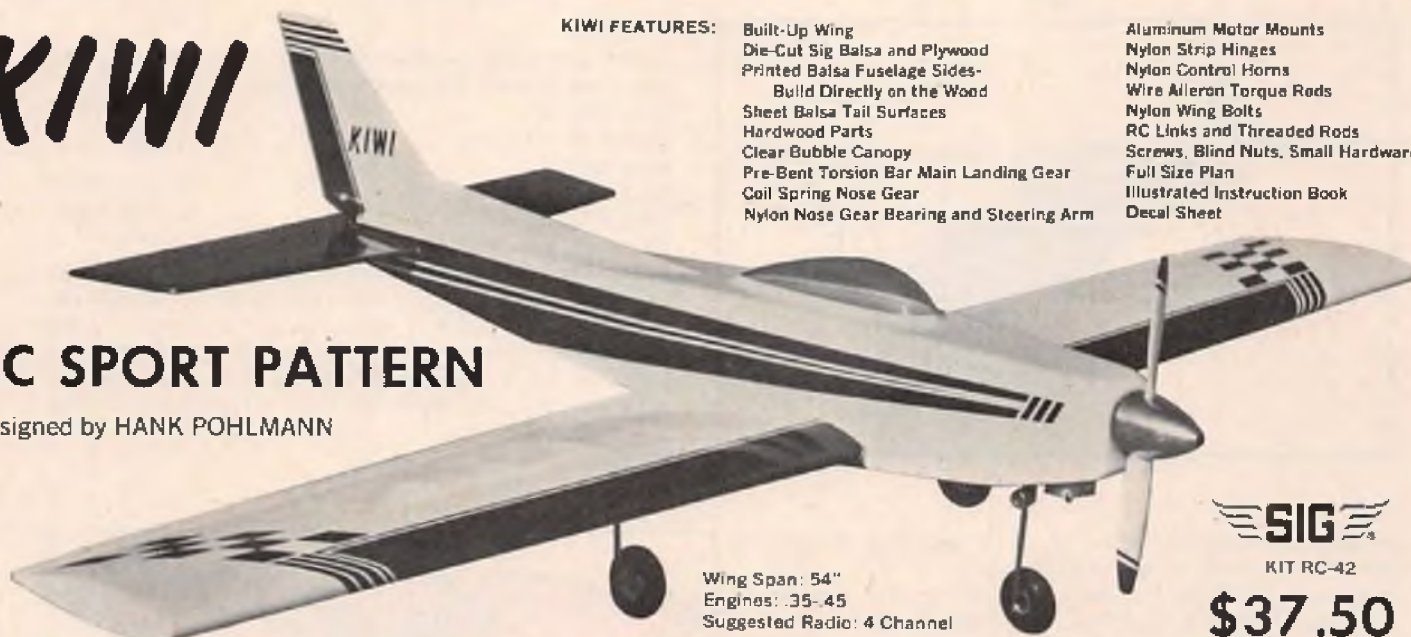
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Designed by HANK POHLMANN



Wing Span: 54"
Engines: .35-.45
Suggested Radio: 4 Channel

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KAVALIER RATED "EXCELLENT" IN MAGAZINE REVIEW

The Following Is Exerpted From The September Issue Of RC Sportsman

THUNDER FROM DOWN UNDER

by Tony Stinson

... When Sig first asked me to field test the Kavalier in Australia, I was delighted since at the time I had three students all trying to learn on different types of models—none of which could be called good basic trainers. Sig also said that the basic trainer for R/C in kit form must be capable of being successfully put together by a person who has no experience at all with modeling. So we put that objective to the test.

I asked Col Phelps, a complete newcomer to R/C (but eager to learn) and neighborhood friend, to build the Kavalier. Col had been making some early flights with a plastic A.R.F. trainer and had not met with much success. We decided to equip the Kavalier with a new MRC radio rig and power it with an Enya 40.

The Kavalier is an all-balsa and plywood kit with the exception of a very well molded ABS plastic cowl. The kit contains a 31-page instruction manual in which Claude McCullough carefully explains each step of the way. The hardware package is very complete and includes pieces for mounting the wing either with bolts or by rubber bands over dowels. Col chose the rubber band method since that tends to do less damage to the ship in the event of a "sudden arrival." The Kavalier design is very solid and built to take a reasonable amount of punishment.

The first indication of good design quality was the generous proportion of area for the tail feathers. When we came to test flying the ship its stability on all axes and lack of bad habits showed the wisdom of providing the trainer with large tail surfaces.

The plans which come with the Kavalier kit are very detailed with cut-away sections being used to clarify construction. All the parts are drawn out on the plans, which makes it very easy to identify components from the kit.

A real effort has been made to keep the tail section light by having the stab made up as a frame with 1/16-in. balsa sheeting on both sides. I'm sure this factor contributed to the ship balancing out correctly on completion with no ballast required.

Now, ye keen budding student Col whilst being inexperienced at model construction also happens to be a very meticulous guy. I gave him the kit, asked him to read the instructions then go build it. The fact that Col was able to do this and produce a model which flew right off the

deck with no trim changes required says loads about Sig's skill at producing top grade model airplane kits. . . .

The Kavalier has plenty of room for installation of radio gear. There is one less slot to cut in the fuselage by the routing of the elevator pushrod straight out the tail. The Enya 40 was mounted at a 45-degree angle and fitted very neatly in the cowl. Incidentally, the way in which the cowl and canopy blend in with the rest of the ship on the Kavalier design really help to give the professional look.

FLYING (the best part)

So, with our freshly trimmed and painted Kavalier carefully loaded, your Downunder scribe and Col headed for the local flying field. On assembling the Kavalier, we were surrounded by onlookers with comments that would gladden the hearts of Sig and Claude McCullough. Wish I'd had a tape recorder on the spot. The basis of the comments was that "a trainer looking that good just has to fly well." Fortunately for us they were right. I just couldn't face Sig on his home ground next month and tell him the first Kavalier to reach Australia is a re-kit job!

Anyway, after checking the controls and fuel flow in the nose-up position, we decided to head for the sky. The Kavalier lifted off in about 20 feet and flew out smoothly as if it had been long-since sorted out trimwise. It showed no tendency to tip stall at any time and only needed the elevator moved down another notch on the pushrod to soften it a little for Col to handle with ease.

The Kavalier not only proved an extremely easy ship to handle for the student but was a general delight to fly through all maneuvers. The choice of the Enya 40 might have been a little on the strong side, with the ship weighing out at 5 lb. 4 oz. If you are looking at a Kavalier as your first model, it would handle well with a 29 or 35. It flew vertically almost out of sight with the Enya 40 opened up. The MRC radio performed faultlessly on the new 29 Mhz frequency band now operating in Australia.

It is important to stress here that the Kavalier is very much an "instructor's airplane." In other words, referring back to what I said earlier this is one trainer on which the instructor should be able to keep the student out of trouble. After all, it is stick time—not building time—that teaches a student to fly.

To sum up the Sig Kavalier, I think it would be true to say that, considering the amount of material which comes with the kit, the quality of the design and completeness of the instructions—all for \$39.95—you could be forgiven for wondering how some kits with less of these things are on the market for almost double the price.

Glen Sigafosse and Claude McCullough are to be sincerely congratulated on an excellent product. RCS

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Engines: 29-40



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CHOICE OF NYLON BOLT OR
- RUBBER BAND WING MOUNTING
PLUS MUCH MORE!

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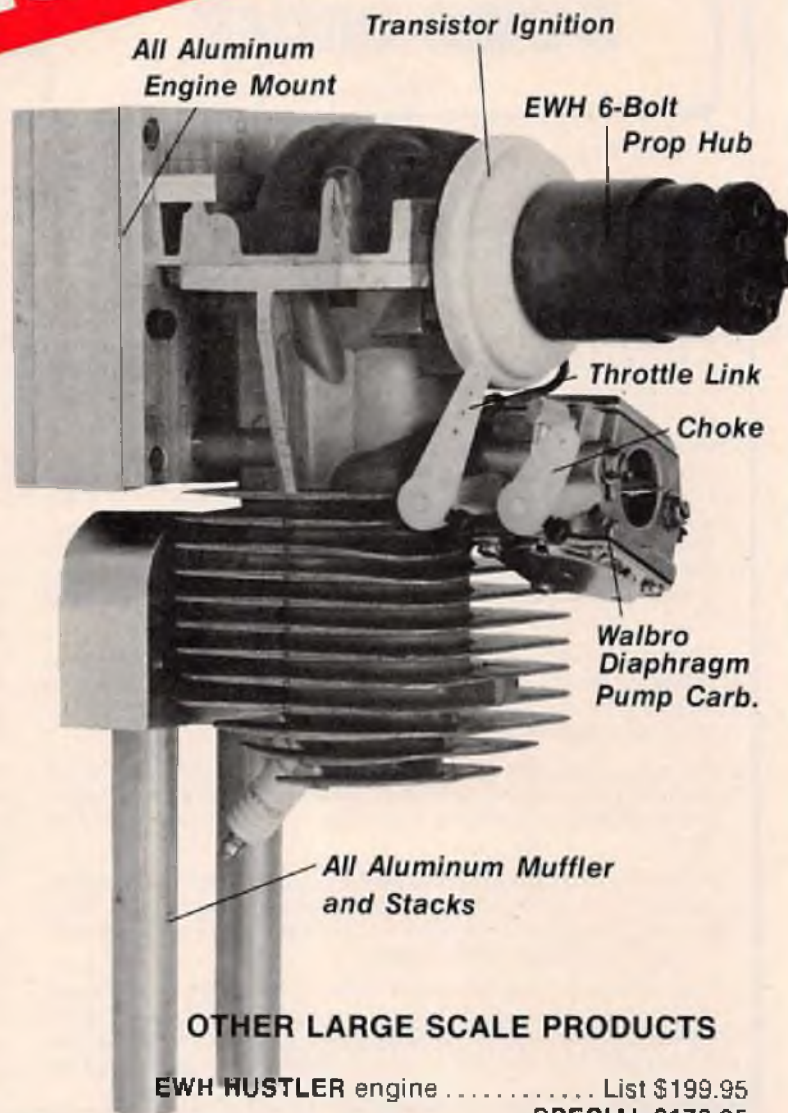
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After all the hours and all the dollars you put into your large size aircraft, don't gamble on what's-their-name's engine.



OTHER LARGE SCALE PRODUCTS

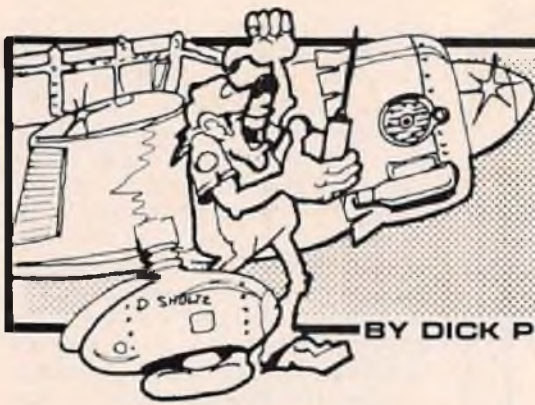
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BIG is Beautiful

BY DICK PHILLIPS



More good things this month for the Super Scale enthusiast. William Brothers, who have been around the scale scene for many years with good things, have come out with some great items for the Super Scaler:

The engine cylinder (may it be the first of many!) is for the Gnome Rotary in Quarter Scale. It, too, is styrene, but my information does not indicate whether or not it requires painting, or is colored correctly and requires only assembly. Price is \$1.95 each.

potential answer comes from Thermecote Welco Company, 32311 Stephenson Hwy., Madison Heights, Michigan 48071. Their package contains 6 ounces of #10 alloy and 4 ounces of #10 flux, and the idea is to solder (or braze if you like) aluminum. Instructions come with the kit available for about \$5.00 at your local welding supply house. You may have to fool around with the right heat a bit. I'm still playing with my first batch (using an acetylene torch) and to date I have made molten lumps out of quite a collection of aluminum parts. However, I know it can be done as I've seen samples. Strength is up into the 30,000 pounds plus area, so it should stand up to our big birds. I must admit part of my problem is that I don't have any experience with a torch and my next move is to get some professional help and, I hasten to add, from a welder, not a psychiatrist!



A Quarter Scale pilot figure measuring 4" in height is made from high impact styrene. The figure can readily be painted to your needs and the goggles are removable if you wish. Price is \$2.95 at your local hobby shop.



The vintage wheels have semi-pneumatic tires and brass bushed hubs. They're 6 5/8" in diameter and match the Golden Age wheels which are similar in design, the same size, and should dress up your Super Scale job. Both are \$17.95 per pair.

Bill Hannan mentioned in his letter to me that The Williams Brothers have been receiving many requests for accessories to suit the larger models and the above items are the initial results. While Bill did not actually say so, I'm hoping these are the forerunners of many more Quarter Scale accessories from this same firm whose products have become so well known over many years.



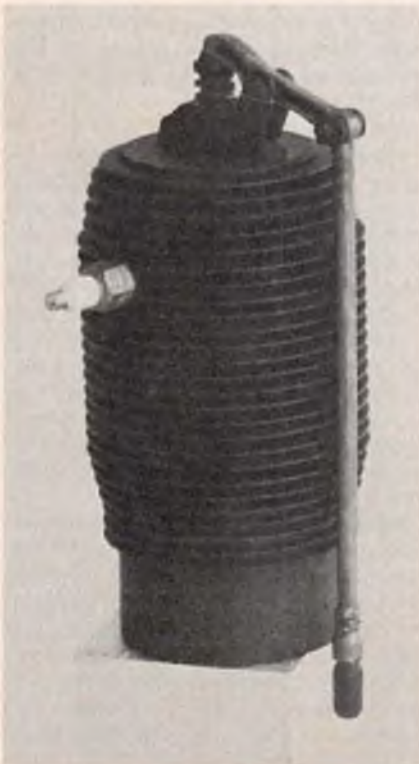
Have you ever had a problem when needing to fasten aluminum together for some part of a model? A good friend in Seattle solved the problem for me and I wanted to pass the information along in case it might be of help to others. I don't know many of us who have been willing to tackle aluminum welding as it is apparently a pretty sophisticated procedure requiring loads of skill and experience. There have even been a few attempts to glue aluminum joints but I've never seen a successful one. One

By the way, be sure to observe the warning regarding the flux itself. It is potentially harmful as are so many products we use, but with proper care and observation of the cautions, no harm should come to you.

Landing gear have been a problem with the larger birds. It's darn difficult to make a gear strong enough to take the landing loads of our much heavier than usual models. If we do make them really strong, then on a hard landing, something has to give and we end up with either the gear broken, or more likely, the gear ripped out of the bottom of the model.



Don't forget the wheel geometry that will make your model handle well on the ground. The wheels should be toed-in which will give much better steering on the ground and the wheels should be mounted so the top of the wheels are further apart than the bottoms. Most large models tend to float and, ground effect is usually appreciable so that a little excessive toe-in tends to slow the model down a bit more rapidly than might be the case with less toe-in. It doesn't seem to bother the model much when power is applied, but does help a bit to get some of the speed bled off on landing. When you first fly one of these



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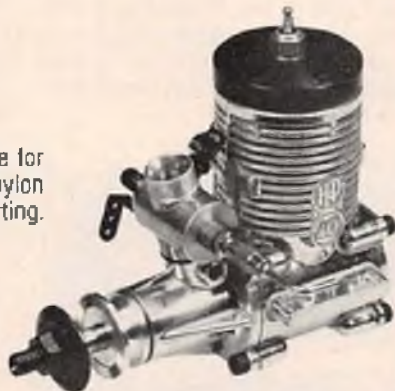
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larger birds, especially if the length of your strip is restricted, you'll find yourself doing lots of go-arounds as you'll misinterpret your altitude on final and fly past your eyes about the middle of the strip, at which time you'll realize you're going to be much too long on the strip and another crack at it is going to be necessary. When you do get down low enough to get in 'on the numbers' you'll feel as if you are far too low. It takes a while to get used to but it makes touch and goes loads of fun (as well as frequent!). The extra toe-in mentioned above will help slow you down when you do get the aircraft down to altitude zero. Too much toe-in can cause noseovers so you'll have to use the toe-in thing judiciously.



I had some news of Bud Nosen's activities second hand recently and I must say I'm delighted to pass along the news. Bud recently flew his P-47 using a Quadra engine. The Jug flew 'effortlessly'. Bud has been using a standard airfoil on his large models for some time now and the Jug is a departure from that practice in that he has tried a new airfoil (sorry, purists, I don't have the number for the new one). On the second day of test flying, Bud made seven flights all without any problems. Bud claims the 47 is even better than his P-51 because of the power of the Quadra.

Bud has a couple of Evra 190's on the way from Hobby Lobby and I'm sure we'll see some more large, gas powered models from the Nosen stable in the months ahead. The Evra is a 1.9 cu. in. gasoline fueled engine with electronic ignition and electronic advance as well. It is a beam mounted engine as our model glow engines have been for many years. Bud has a couple of these on the way and they are selling in the U.S. at \$97.50



Now that we are in the middle of winter, those of you who don't stop flying just because there is a little snow on the ground may be interested to hear of a set of skis being marketed for the larger models. The main gear ski is 4" x 20", made of a very sturdy plastic material which requires no care or maintenance and no waxing. The claim is that it will handle any snow condition with ease. A full set of two mains and a tail ski retails at \$39.95 from Minoru Model Ltd., P.O. Box 23142, Vancouver AMF B.C. V7B 1V6 (Canada).

Minoru will also have a kit for the Gute Fahrt (Good Trip) which is a Stand-Off Scale approximation of the Fokker Eindecker. This kit should be along in the near future. Minoru is also planning floats for the Super Scale model.

Minoru will also be marketing the Bud Barkley Super Scale Tiger Moth kit, designed and flown by fellow Canadian Barkley this past summer. □

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RCM PRODUCT TEST

Midwest Models KLAMPON KAI



The Klampón Kai is a sport trainer tunnel hull boat that can also be used for racing. The most outstanding aspect of this model is its angular aspect — a little disturbing at first, but very pleasing once the model is built up. It is certainly different from the "run of the mill" streamlined model, and the lines have no adverse effect on handling. Because of the line, it was decided to decorate the model in Team Lotus colors; black with a gold trim, and as the photo shows, it really does look sharp.

Construction follows traditional method, except that the model is built up on a foam block, which ensures that the hull comes out absolutely symmetrical, a very important point where high speed boats are concerned. The base of the tunnel is pinned to the foam block, the formers glued in place together with the inner tunnel sides, and all the stringers added. At this stage, the model was left 48 hours to dry out completely, and then taken off the block to chamfer all the stringers, in order to provide ample seating for the skins. The skins were fitted, as far as possible, on the foam block, since it is at this stage that

SPECIFICATIONS

Name	KLAMPON KAI
Boat Type	Tunnel Hull Hydro
Manufactured By	Midwest Products 400 S. Indiana Street Hobart, Indiana 46342
Mfg. Suggested Retail Price	\$44.95
Available From	Both Mfg. & Retail
Mfg. Rec. Usage	Sport & Racing
Length	31 Inches
Beam	13 Inches
Height	5 Inches
Mfg. Rec. Engine Range	K & B 3.5cc Outboard
Mfg. Rec. Fuel Tank Size	8 Ounce
Recommended No. Of Channels	2
Recommended Control Functions	Steering & Throttle
Basic Materials Used In Construction:	
Hull	Ply and Spruce
Plan Size	See Text
Kit Includes	Pre-Cut Parts & Strip Wood

RCM PROTOTYPE

Finishing materials used	See Text
Engine Make & Disp.	K & B 3.5cc Outboard
Muffler Used	Integral
Radio Used	Not Given
Tank Size Used	8 Ounce
Weight Ready To Run	66 Ounces

warps can easily appear, and the block keeps the alignment nicely. Once the majority of the skins have been fitted, there is little danger of warping, due to the torsion-box effect. All skins were fitted using a 30 minute epoxy glue, to allow plenty of time to shuffle each skin exactly into position. Pins and masking tape were used to hold them in place while the glue set. No difficulty was experienced in fitting these skins, which are very accurately cut out.

The hatch was built as per the plan, but without the forward hold-down on the hull top. This was because the servos used, being very large, would not permit the use of the radio box provided in the kit in parts form. It was, therefore, decided to use the whole of the forward compartment as a radio box, and so thin sponge rubber tape was glued to the underneath of the hatch, and held in place with two Allen bolts screwing into two blocks of hardwood located at each end. There is no doubt that for the average modern radio there would be plenty of room in the radio box provided.

The inside of the boat was given two thick coats of epoxy paint, in order to thoroughly waterproof the wood, before fitting out. The outside was rubbed down and given two coats of sanding sealer, followed by seven coats of acrylic black paint, rubbing down with 240 wet and dry paper for the first four coats, and 600 for the last three. The gold mylar self-adhesive trim was applied, and this was followed by three thin coats of epoxy clear varnish.

The K & B Outboard was mounted by drilling four holes in the transom, after making quite sure that it was at exactly the height indicated on the plans. This is most important, since it is difficult to change the height afterwards. Once bolted in place, the two control runs were installed, after fixing the servos in place in the radio compartment in quick-release trays. The rudder control used two short Kwik-Links soldered securely into a 3/16" diameter brass tube, to avoid any bending under load. The throttle control is a motorcycle throttle cable inside a Sullivan flexible outer, with soldered Kwik-Links. This set-up is

to page 162

Pity the poor guy who hasn't tried Super MonoKote™ and EconoKote™



If you're tired of the fuss, mess, bother and hair-pulling you get from painting, now's the time to switch. The next time you want a really great looking bird but want it faster, easier, stronger, and lighter, remember these winning ideas from Top Flite.

● Super MonoKote

There are a lot of good reasons more modelers choose SUPER MONOKOTE than any other iron-on covering. Super Strong Yet Lightweight — Long Lasting — Fuel And Moisture Proof — Puncture Resistant — Odorless — Won't Induce Warping — Quickly Cleaned — Built-in Finish — And A Wide Selection Of Colors To Choose From.

● EconoKote

The perfect companion to Super MonoKote, ECONOKOTE has many of the same outstanding features but, since it requires a lower iron-on temperature, it's the perfect covering for foam wings. EconoKote is an excellent trim material for any covering or finish. Its easy handling also makes it ideal for covering fuselages and other

compound curved surfaces . . . and EconoKote's low cost is a real advantage, too.

● Trim Sheets & Markings

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For the best and most professional looking finish possible apply Super MonoKote and EconoKote with a Top Flite IRON and HEAT GUN. Both work great on other heat sealing coverings, too.

More good reasons why Top Flite continues to be the choice of champions.



Top Flite Models, Inc.
1901 N. Narragansett Avenue
Chicago, Illinois 60639



TUBE - O - ROO

By William W. Baldiga

Maybe --- just maybe --- if you have the spirit of adventure and the desire for something different, the Tube-O-Roo will fly. It takes a Sullivan foam wing, a mailing tube, and a sense of humor to construct. Top it off with a .45 to .60 engine, and . . .

I think it will fly!! If you share a spirit of adventure, a desire for something different and a sense of humor when you first think about it, find a mailing tube, a Sullivan wing and let's share a unique modeling experience together --- the Tube-O-Roo.

I have toyed with the idea for some time of a highly swept wing airplane, and the Tube-O-Roo was built for experimentation on this type of model --- and just for the fun of it.

Herein are the detailed instructions and plans, along with helpful suggestions to assist in eliminating potential problem areas. The narrative will follow the actual construction sequence, which begins with the wing.

CONSTRUCTION

Wing:

A Sullivan wing is a nice complement to the Tube-O-Roo fuselage. This wing is strong, but light, and very easy to work with as far as installing aileron guides, sheeting, etc.

TUBE-O-ROO

Designed By : Bill Baldiga

TYPE AIRCRAFT
Sport & Pattern

WINGSPAN
48 inches

WING CHORD
12 1/2" at Root

TOTAL WING AREA
610 Square Inches

WING LOCATION
Low Wing

AIRFOIL
Symmetrical

WING PLANFORM
Swept 30°

DIHEDRAL, EACH TIP
None

OVERALL FUSELAGE LENGTH
46 inches

RADIO COMPARTMENT AREA
(L) 11 1/8" x (W) 3 1/2" x (H) 2 5/8"

STABILIZER SPAN
24 inches

STABILIZER CHORD (incl. elev.)
7" (Avg.)

STABILIZER AREA
168 Square Inches

STAB AIRFOIL SECTION
Flat

STABILIZER LOCATION
Mid-Fuselage

VERTICAL FIN HEIGHT
6 1/4 inches

VERTICAL FIN WIDTH (incl. rudder)
7 1/2" (Avg.)

REC. ENGINE SIZE
.45-.60 Cubic Inch

FUEL TANK SIZE
12 Ounce

LANDING GEAR
Tricycle

REC. NO. OF CHANNELS
4

CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Cardboard mail tube & ply
Wing	Foam & Balsa (Sullivan Wing Kit)
Empennage	Balsa
Wt. Ready-To-Fly	104 Ounces
Wing Loading	24.5 Oz/Sq. Ft.

Begin by cutting a 30° sweep into each wing half. To cut the 30° sweep, lay a 30°-60° triangle against the leading edge of the wing. Push both up against a wall or anything flat and mark a line in the center section where a cut will be made. I jugged my wing halves up on a table saw and simply pushed them through at the proper angle. If a saw of this type is not available, follow the center section mark carefully with a saw, knife or hot wire.

Since the wing spar slots now have an angle of 30° on both wing halves meeting in the center, I used a piece of 1/8" aluminum bent to fit the angle. Glue it in later when ready to join wing halves.

To install NyRod or other aileron guides, temporarily tape wing halves together. Plan to lay the aileron servo on its side as far forward as the spar will allow; next marking where the arm of the servo and control wires will meet. (I have my servo buried low in the wing with control wire connected to the top of the servo arm.)

To have a smooth, no-bind aileron movement, it is essential that the wire and guides be run straight out from the servo before bending back to the trailing edges, as shown on the plans. To install aileron cable guide tubing, simply mark the top of any intersecting foam ribs and spar with a pen, notch the foam and insert tubing. After proper alignment and fitting, it can then be glued in place.

Next, turn your attention to the landing gear hardwood blocks. I installed these at an odd angle to take advantage of gluing it next to the molded rib that is now at a 30° angle. When the landing gear blocks are first laid in place and resting beside the rib to which it will be glued, you will notice that the back side will be high so mark with a pen the shape dictated by the rib and sand to shape. The slots in the landing gear blocks to hold the landing gear wires are the same



ABOUT THE AUTHOR

William W. Baldiga was born in Dayton, Ohio and currently resides with his wife in Alexandria, Virginia. He is a Production Artist for an exhibit firm (graphic art, models, technamation, silk screening, drafting, etc.). Bill became interested in model planes at the age of 8, starting out with solid balsa airplanes and progressing to a control line A.J. Fireball in 1941. Due to numerous moves during WW II due to his father's occupation as an aircraft engineer, his interest waned. He pursued his interest in real aircraft, and obtained a private pilots license in 1952. Bill's interest was renewed in 1967, when he attended an R/C contest at Andrews Air Force Base. He started building in that year and has been enjoying the hobby for the last 10 years.

as all others, except that they are at a different angle. You will find that bending the main gear wires takes a little more planning, but it is not difficult.

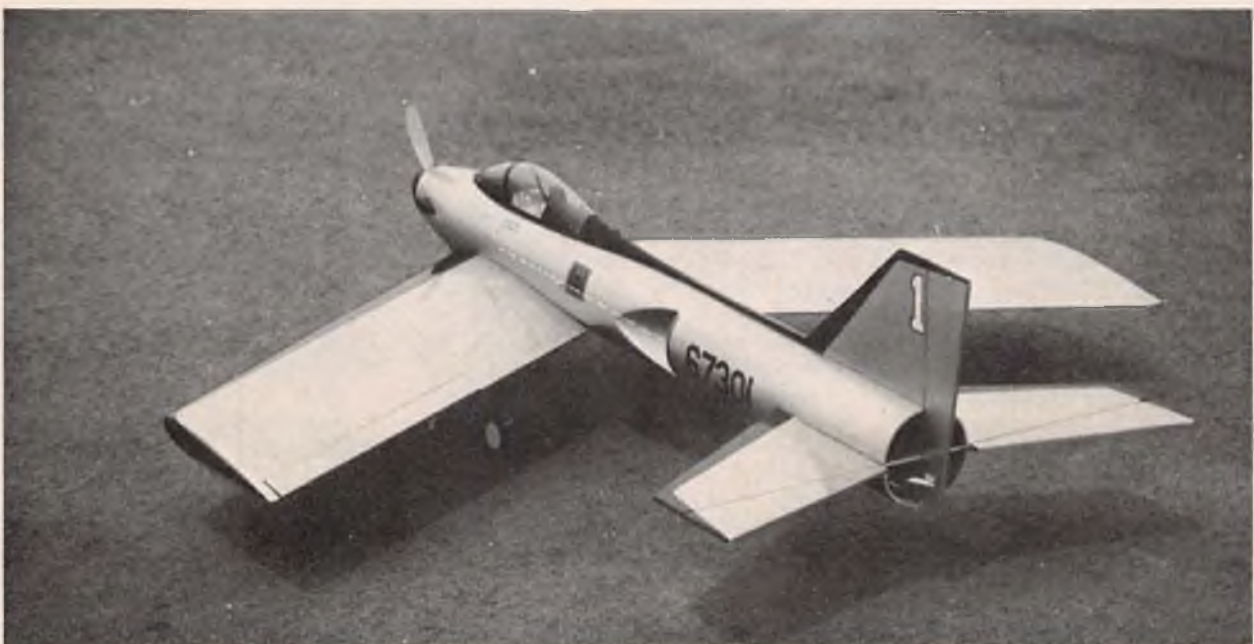
After the landing gear blocks and aileron cable guides are installed, you are ready for wing sheeting. You can sheet the wing halves according to the plans, or in any fashion you like best.

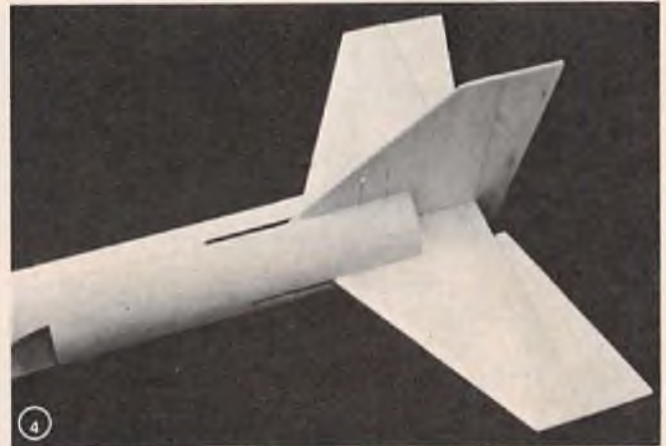
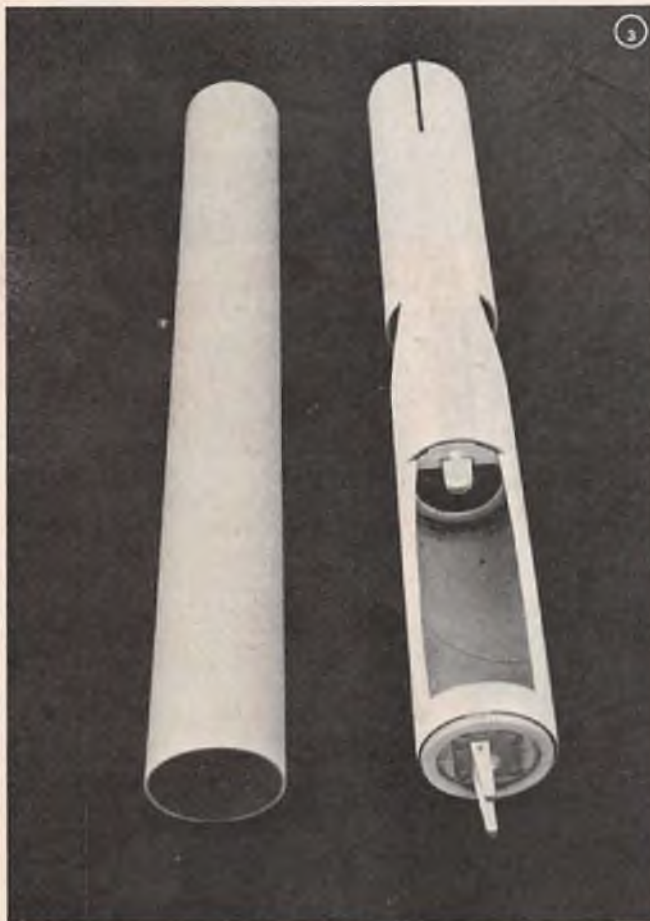
On the plans you will notice an air space between the trailing edge of the foam wing and where the top and bottom trailing edge sheets meet. I thought it would be tricky to fill in the void with expandable foam, but it caused minor problems, and I hesitate to recommend

this. Instead, glue a trailing edge balsa filler to the back of the foam trailing edge and sheet over it.

Before the wing halves are glued together, tape them together again and cut off the front part as shown on the plans to eliminate the point. Next, cut out a notched section at the trailing edge.

After taking the wing halves apart, lay one on each side of the fuselage and mark the airfoil contour that will have to be cut in the fuselage later. Since the contour marks represent the center section of the wing, the leading edge will drop down a little steeper than indicated because of the width of the fuselage and





(#1) Cut slots in bottom of ailerons, cut bottom off aileron horn and glue in place. (#2) Main landing gear slots run at an angle perpendicular to wing rather than parallel because of rib mouldings being at a 30° angle. (#3) Glimpse of wing hold down rings. Glue in place along with hard wood hold down before firewall is glued in place. You will get a good fit because of being able to look inside fuselage. (#4) Slide stab, then fin in place like a 15c glider model. Determine where you want control horns placed before anything is glued in place. Elevator horn is made from brass tube flattened in vise and then drilled.

the wing sweep, so take a carpenter's contour gauge, if handy, and move out on each wing half the distance each side of the fuselage would take and re-mark the slight change in contour.

After cutting out the ailerons to the dimensions shown on the plans and temporarily hinging and installing the aileron horns, the wing can be glued together.

I had a small opening in the leading edge where the hold-down dowels were to be glued in place, due to the hollow moldings made into the wing kit itself, and due to its being cut at an angle. Fill the void with expandable foam or other material, and the dowels will hold nicely. Seal the leading and trailing edge center sections with a thin piece of 1/8" plywood.

Fuselage:

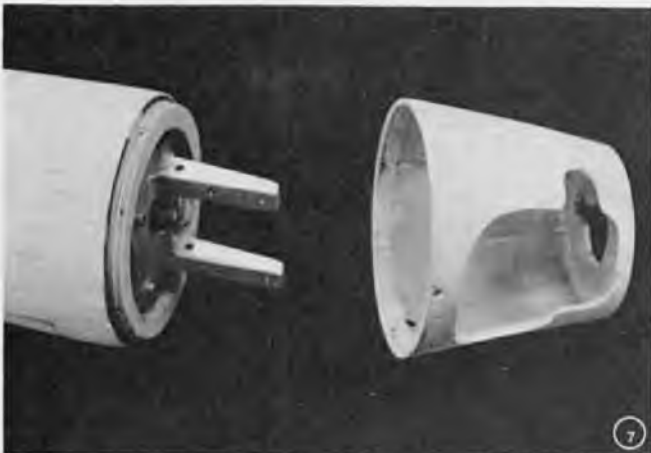
A 4" inside diameter cardboard mailing tube serves as the fuselage for the Tube-O-Roo. Paper packaging or carpet warehouses should have a tube to suit your needs. Look for a hard, but thin, paper tube not over 1/8" in thickness to hold weight down.

If you have decided to use MonoKote covering on the fuselage, then first sheet the tube with 1/16" or 1/32" balsa before marking the airfoil center section on the side of the fuselage as described in the last part of Wing Construction. **Note:** Use water base type contact cement on the foam wing only and lacquer-type contact cement on the balsa sheeting. If water base contact cement is used on balsa, it tends to bend and curl.

To cut out the wing saddle area, I used

a band saw. To keep the tube from rolling, I cut out two square pieces of foam core with holes the diameter of the fuselage and slipped them on the fuselage, taped them tight, and made my cuts. If a band saw is not used, then either cut the wing saddle area with an X-Acto knife or a small coping saw.

Next fit the fuselage over the assembled wing and make any small adjustments to the wing saddle contour. Now is a good time to look inside the fuselage from the front opening and glue in the wing saddle doublers and the trailing edge hold-down rings and hardwood pieces. By looking inside the fuselage you can adjust everything for a perfect fit. Now is also a good time to finish the wing saddle area in whatever manner you choose.



(#5) Do not glue firewall in place until last, gives more room to reach inside to fit doublers, hook-up wing hold down, etc. (#6) Install engine, then cut a round 1/8" plywood piece to fit behind spinner back plate, make it 1/8" smaller in diameter than spinner to allow for two (2) wrap around sheets of balsa 1/16" each. Allow 1/16" space between back plate and plywood nose piece. Now make a paper pattern to fit between cowl hold ring and plywood piece behind spinner back plate. Cut two (2) pieces of 1/16" balsa to pattern shape, wet and wrap around forming cowl, hold in place with rubber bands until dry. Give final trim and glue first one in place to plywood behind spinner only if you want cowl removable. Then glue second sheet on top of the first. Fiberglass both inside and outside and drill four or five hold down screw holes. (#7) Cowling complete and ready to attach to firewall.

Next draw air intakes on each side of the fuselage and cut out with an X-Acto knife. To help guide the knife, cut out a hard paper or thin aluminum pattern and hold in place while cutting. After cutting out the air intakes, I soaked them in lacquer thinner to separate the balsa sheeting from the cardboard and simply reversed the contour of the balsa cut-outs and glued in place to create air intakes.

Before you can cut slots in the back of the fuselage for the vertical fin and horizontal stabilizer, tick marks must be made on the back of the fuselage to make sure that the tail section will, in fact, be horizontal and vertical in relation to the wing. To do this, simply cut out a circle of heavy paper to fit within the inside diameter of the fuselage, mark a

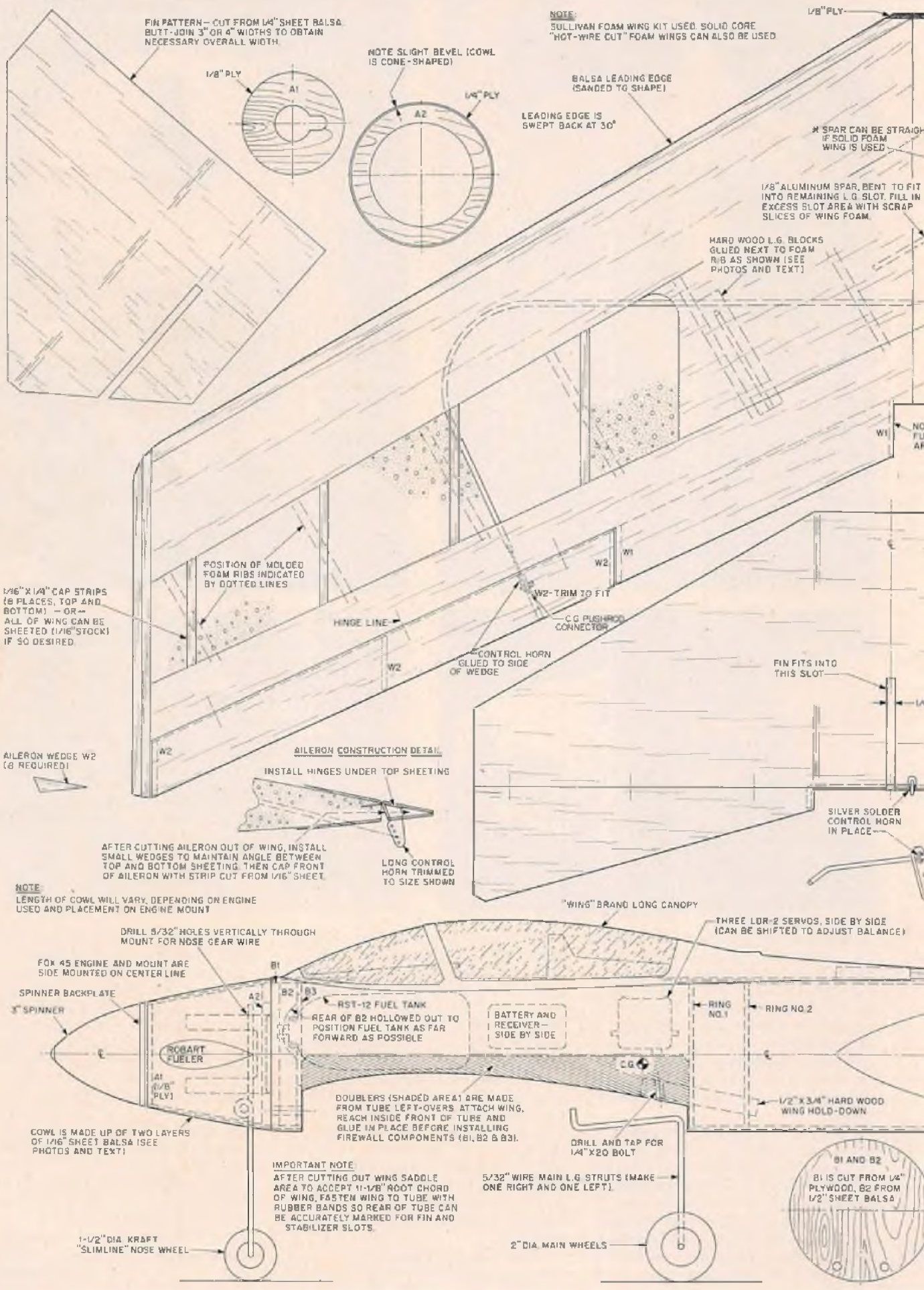
vertical and horizontal line at dead center, slip the paper gauge in the end of the fuselage and then, holding a triangle against the end of the fuselage, adjust the vertical line on the round paper gauge to match the vertical line of the triangle. Make sure that the fuselage is resting snugly on the wing while doing this. Transfer the vertical and horizontal lines to the end of the fuselage; repeat the same thing to the front end of the tube so that the firewall, with attached engine mount, can be glued at the proper horizontal angle. Before gluing the firewall in place, make sure the engine mount (which is side mounted) has been previously drilled for landing gear wire.

Using this technique, the engine mount serves two functions: to hold the

engine and to hold the landing gear wire. Make sure the plywood firewall has vertical and horizontal lines marked on it with the engine mounted dead center at a horizontal angle. Glue on the extra pieces behind the firewall as shown on plans. This gives extra gluing area and bearing to front hold-down dowels. Cowl hold-down ring can be glued on the firewall after the firewall is glued in place. With the firewall glued in place and the wing taped in position, drill two holes through the firewall and into the wing to install the leading edge hold-down dowels. Next drill through the centerline of the trailing edge to tap and thread a 1/4" x 20" nylon hold-down bolt.

To cut the slots in back of fuselage to accept the fin and stabilizer, I used a

text to page 161



FIN PATTERN - CUT FROM 1/4" SHEET BALSA BUTT-JOIN 3" OR 4" WIDTHS TO OBTAIN NECESSARY OVERALL WIDTH.

NOTE: SULLIVAN FOAM WING KIT USED. SOLID CORE "HOT-WIRE CUT" FOAM WINGS CAN ALSO BE USED

1/8" PLY

NOTE SLIGHT BEVEL (COWL IS CONE-SHAPED)

BALSA LEADING EDGE (SANDED TO SHAPE)

LEADING EDGE IS SWEEPED BACK AT 30°

* SPAR CAN BE STRAIGHT IF SOLID FOAM WING IS USED

1/8" ALUMINUM SPAR, BENT TO FIT INTO REMAINING L.G. SLOT. FILL IN EXCESS SLOT AREA WITH SCRAP SLICES OF WING FOAM.

HARD WOOD L.G. BLOCKS GLUED NEXT TO FOAM RIB AS SHOWN (SEE PHOTOS AND TEXT)

1/16" X 1/4" CAP STRIPS (6 PLACES, TOP AND BOTTOM) - OR - ALL OF WING CAN BE SHEETED (1/16" STOCK) IF SO DESIRED

POSITION OF MOLDED FOAM RIBS INDICATED BY DOTTED LINES

HINGE LINE

W2 - TRIM TO FIT

C.G. PUSHROD CONNECTOR

CONTROL HORN GLUED TO SIDE OF WEDGE

FIN FITS INTO THIS SLOT

AILERON WEDGE W2 (6 REQUIRED)

AILERON CONSTRUCTION DETAIL

INSTALL HINGES UNDER TOP SHEETING

AFTER CUTTING AILERON OUT OF WING, INSTALL SMALL WEDGES TO MAINTAIN ANGLE BETWEEN TOP AND BOTTOM SHEETING. THEN CAP FRONT OF AILERON WITH STRIP CUT FROM 1/16" SHEET.

LONG CONTROL HORN TRIMMED TO SIZE SHOWN

SILVER SOLDER CONTROL HORN IN PLACE

NOTE

LENGTH OF COWL WILL VARY, DEPENDING ON ENGINE USED AND PLACEMENT ON ENGINE MOUNT

DRILL 5/32" HOLES VERTICALLY THROUGH MOUNT FOR NOSE GEAR WIRE

FOX 45 ENGINE AND MOUNT ARE SIDE MOUNTED ON CENTER LINE

SPINNER BACKPLATE

3" SPINNER

SMART FUELER

RST-12 FUEL TANK
REAR OF B2 HOLLOWED OUT TO POSITION FUEL TANK AS FAR FORWARD AS POSSIBLE

BATTERY AND RECEIVER - SIDE BY SIDE

THREE LDR-2 SERVOS, SIDE BY SIDE (CAN BE SHIFTED TO ADJUST BALANCE)

RING NO. 1

RING NO. 2

1/2" X 3/4" HARD WOOD WING HOLD-DOWN

COWL IS MADE UP OF TWO LAYERS OF 1/16" SHEET BALSA (SEE PHOTOS AND TEXT)

DOUBLERS (SHADED AREA) ARE MADE FROM TUBE LEFT-OVERS ATTACH WING. REACH INSIDE FRONT OF TUBE AND GLUE IN PLACE BEFORE INSTALLING FIREWALL COMPONENTS (B1, B2 & B3).

DRILL AND TAP FOR 1/4" X 20 BOLT

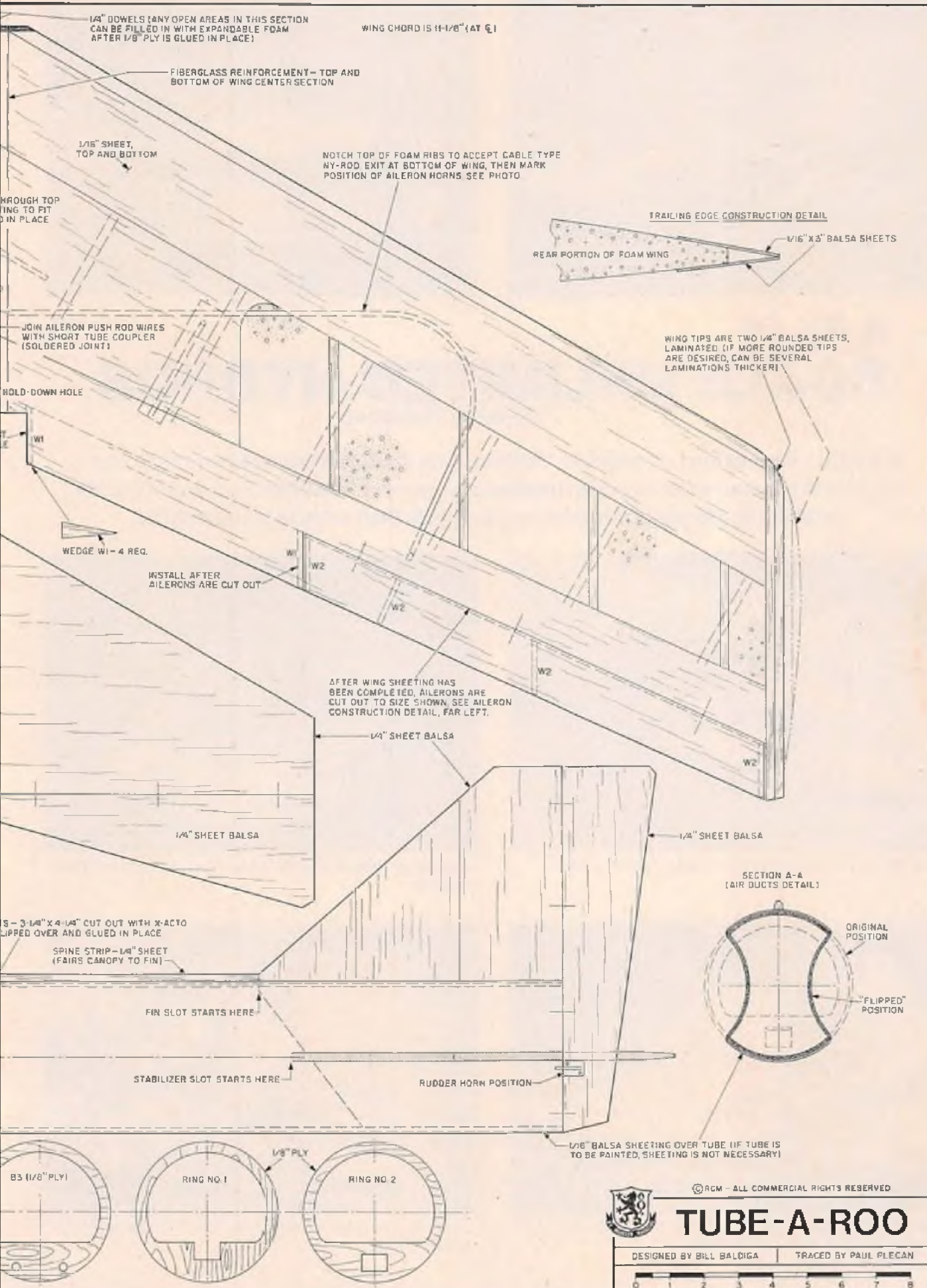
IMPORTANT NOTE
AFTER CUTTING OUT WING SADDLE AREA TO ACCEPT 11-1/8" ROOT CHORD OF WING, FASTEN WING TO TUBE WITH RUBBER BANDS SO REAR OF TUBE CAN BE ACCURATELY MARKED FOR FIN AND STABILIZER SLOTS.

5/32" WIRE MAIN L.G. STRUTS (MAKE ONE RIGHT AND ONE LEFT).

1-1/2" DIA. KRAFT "SLIMLINE" NOSE WHEEL

2" DIA. MAIN WHEELS





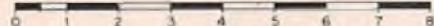
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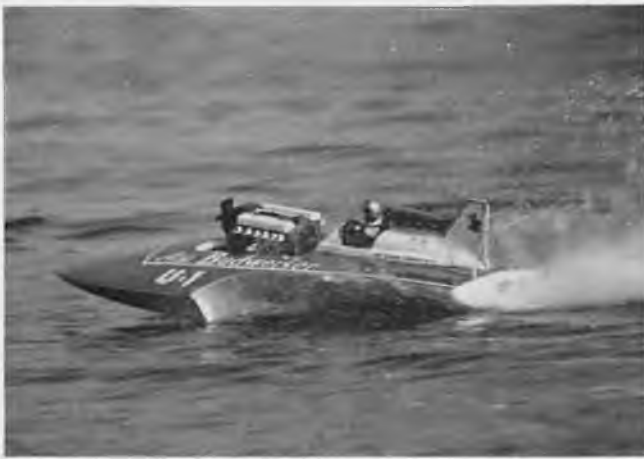


TUBE-A-ROO

DESIGNED BY BILL BALDIGA

TRACED BY PAUL PLECAN





A Bit Of **SCALE UNLIMITED HYDROS**

By Dick Tichenor

A visit to Legg Lake in Los Angeles, California, for a NAMBA District IX monthly race, caught the glamour event of power boat racing in action. The Unlimiteds feature scale detailing and fantastic finishes that duplicate their full size counterparts.



Joe Monohan has a transport trailer for his U-80.



Lynn Miller tinkers with his Atlas Van Lines among these beauties.



Pal Jennings drives Miss Bardahl. Ira Cotton was 1977 champion with Miss Technicolor.



Leonard Feedback is NAMBA Dist IX scale registrar, placed Third.



U-74 Valu-Mart is Red Blackford's pride and joy.



Jack Garcia gives John Brodbeck's U-12 a good launch.



U-7 Notre Dame owned by Russ Kominitsky was Second Place winner.



CA-3 is driven to First Place by Les Ruggles.



John Perry has set a new NAMBA world record of 66.60 mph with his U-31 Circus Circus.



Ralph and Jim Henry run the U-77. Small U-77 is a sport .40.



Don Reutlinger's Miss Budweiser has an impressive track record.



And the scale boaters look almost as sharp as their boats.

BIRD OF TIME



The indomitable and intrepid Dave Thornburg strikes again with the final version of a competition sailplane that has made its mark in contest circles. Despite Dave, the Bird of Time helped put Steve Work in the number one slot on the American FAI team - - -



Here's the "final" version of a sailplane that's done fairly well on the west coast contest circuit for over three years, and helped put Steve Work, of New Mexico, in the number one slot on the new American FAI team. Steve flew his Bird just one-tenth of a second slower than the fastest time recorded at the team Finals, and did it at only 9.4 ounces per square foot, while the other competitors were having to ballast up to over twelve just to stay in the race.

What was his secret? Besides very smooth flying, which Steve is master of, it took a few simple tricks of aerodynamics: a thin airfoil (9%) with a lot of Phillips' Entry, a rearward CG, and a clean machine. All these characteristics (except the piloting skill) are built into the Bird of Time. The design is based on the simple principle that full scale glider folk stumbled onto way back in the fifties: **the only thing more important than minimum sink is maximum go.**

The reasoning behind this principle is that virtually anything --- hang gliders, bumblebees, Ugly Sticks, magazine editors --- will soar like an albatross in good lift; the real challenge is to develop planes that are clean enough and fast enough to outrun the sink! Once you find your thermal, you're home free --- what you need is a plane that will get you to it with maximum speed and efficiency.

Well and good. So you need a nice fast cruise speed, then. It sounds like all you have to do is add lead to your "Whistler 900," and presto! you have a modern design. And that works pretty well --- until . . .

Until you try to slow it down for a precision landing. Then you begin wishing you could spray your ballast out in a fine mist, the way the big boys do. Or until that early morning contest round when you have to ride 6' diameter

Photos this page show Steve Work assembling his Bird at the Pensacola FAI Finals. Black hat is a must: Thornburg always takes his off on the last flight, and loses.

bubbles down a 15 mph wind for seven long, cold minutes! Then you wish you could drop your ballast in the lift, and pick it up again when it's time to move back upwind!

So raising your wing loading isn't the all-round solution --- as anyone who's flown the Graupner "Cumulus" can tell



you. (The Cumulus was one of the most efficient designs to come out of the sixties, an airplane that "flew better than it oughta" --- but its 11 oz./ft. wing loading finally dragged it out of the skies, as far as U.S. competition goes.)

We need a higher cruise speed without a sacrifice in weight, then. So what does the "Bird of Time" do about this quandry? Just what the big boys did: it goes after a better airfoil and a cleaner profile.

The cleaner profile comes easy: get rid of excess frontal area, square corners, protruding dowels and skids and switches. Find a wing tip shape that's still quiet at 50 mph. Move the stab up out of the wing wash as far as practical, because down wash characteristics vary radically with airspeed, and nobody knows what the hell really happens to the air around our wings under actual flying conditions.

The "better airfoil" is something else. I've suspected for a long time that our sailplanes generate far more lift than they need. (What?! Heresay! Too much lift? Thornburg's finally gone bonkers!) But even the slide rule disciples among us will admit that you pay a tremendous penalty in drag for every ounce of lift you extract from an airfoil --- that's one of those rare points on which full scale theory and modeling practice seem to agree.

And if, like me, you're naive enough to think that, in normal sport or contest conditions, the difference in sink rate between a high-lift airfoil (i.e., the Windrifter section) and a relatively low-camber section (i.e., the modified 374 of the Windfree) is small enough to ignore, then you're ready to take the Two Giant Steps to a better sailplane airfoil:

(1) Build it as skinny as possible. In the thirteen aircraft built so far in the "BoT" series, I've been down as low as 8% thickness. (This is hardly radical: the "Legionaire" flies at 8%.) But the "BoT" shown on the plans is back to 9% --- I just couldn't "feel" any real advantage to the thinner wings, and the sacrifice in structural rigidity wasn't worth it to me.

(2) Raise the entry point of the airfoil. This is the big "secret" to the airplane

BIRD OF TIME

Designed By : Dave Thornburg

TYPE AIRCRAFT

Competition Sailplane

WINGSPAN

118 Inches

WING CHORD

Center --- 10"

Tip Taper --- 11 3/4 to 3"

TOTAL WING AREA

1070 Square Inches

WING LOCATION

Shoulder Wing

AIRFOIL

Flat Bottom

WING PLANFORM

Constant Chord Center

Tapered Tips

DIHEDRAL, EACH TIP

1 1/2" polyhedral - 5" at tips

OVERALL FUSELAGE LENGTH

49 1/4 Inches

RADIO COMPARTMENT AREA

(L) 9" x (W) 1 1/2" x (H) 2 1/4"

STABILIZER SPAN

29 Inches

STABILIZER CHORD (incl. elev.)

4" (Avg.)

STABILIZER AREA

130 Square Inches

STABILIZER AIRFOIL SECTION

Symmetrical

STABILIZER LOCATION

Fin-Mounted

VERTICAL FIN HEIGHT

11 Inches

VERTICAL FIN WIDTH (incl. rudder)

8" (Avg.)

REC. ENGINE SIZE

NA

FUEL TANK SIZE

NA

LANDING GEAR

NA

REC. NO. OF CHANNELS

2 or 3

CONTROL FUNCTIONS

Rud., Stabilator, (rel. low hook)

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa, Spruce, Ply

Wing Balsa, Spruce, Ply

Empennage Balsa

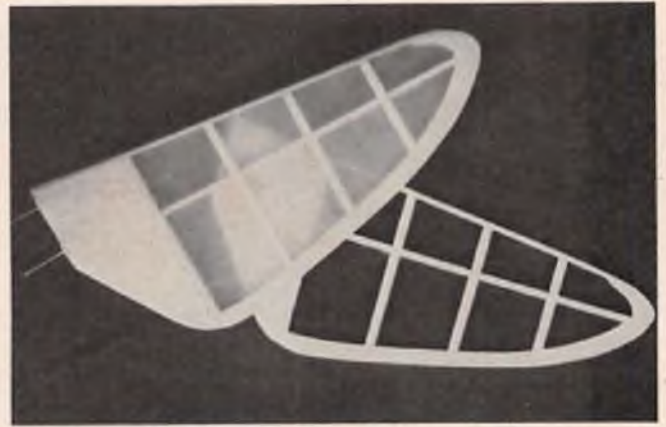
Wt. Ready-To-Fly 41 Ounces

Wing Loading 5.5 Oz/Sq. Ft.

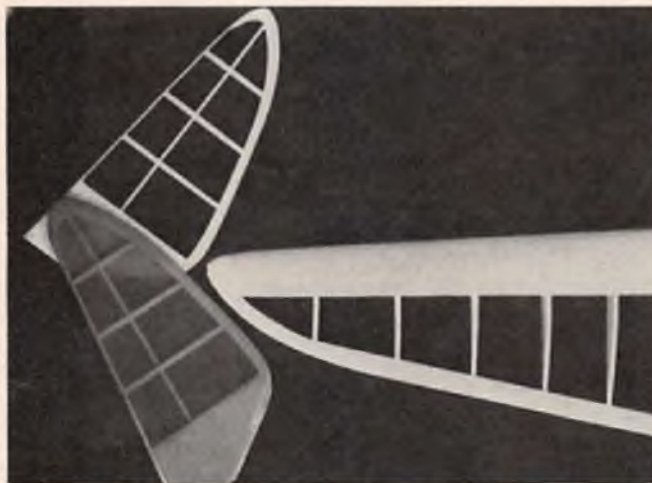




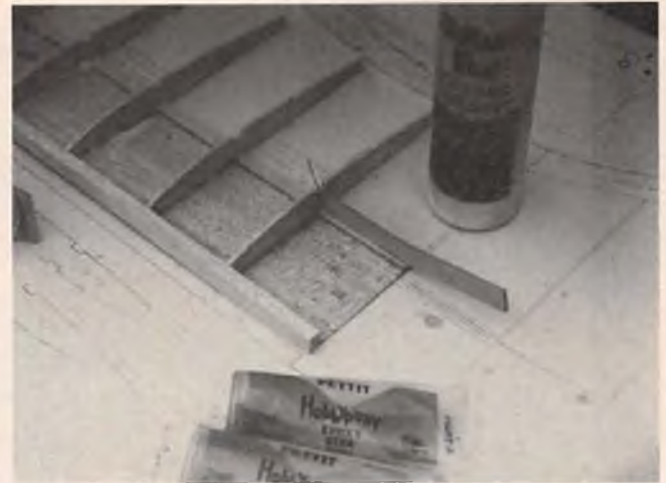
The fuselage is assembled from sheet and blocks. Not shown in photo is the noseblock and bottom block. Shaping is easy with a razor plane.



Stabilizer halves, covered and uncovered. Transparent MonoKote is a must to show off the Bird's structure.



The wing and stabilizer tips have that classic "Wolf Hirth" look from the thirties. Don't be fooled — it's not simply a floater, but a carefully designed speed plane as well.



Takes courage to build a wing over the plans without using waxed paper between. Not recommended for folks who go heavy on the glue.



Wing construction is conventional, no tricks. Cyanoacrylate and baking soda good for gluing ribs to bottom sheeting.



Wing is sheeted with 1/16" C-Grain balsa back to the spars. Cap strips on top only.

that turned 12.8 seconds in the FAI speed run at the 1976 L.A. Semi-finals, while loaded to only 9.6 ounces/ft. It's the basis of the famous "Miller Mod" to the Aquila airfoil.

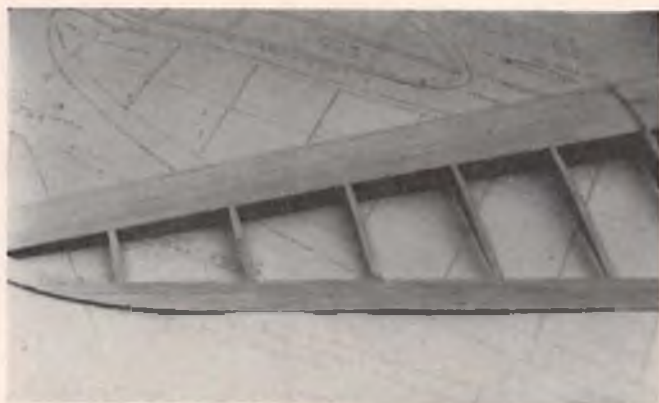
Raising the entry point (adding "Phillips' entry") effectively lowers the mean camber of the airfoil. You do this, and you're going to sacrifice some lift, agreed. But you get a tremendous decrease in the induced drag,

particularly at very low angles of attack. In short, you get a wing that moves quick, even at very low wing loadings. And that ain't a bad banana.

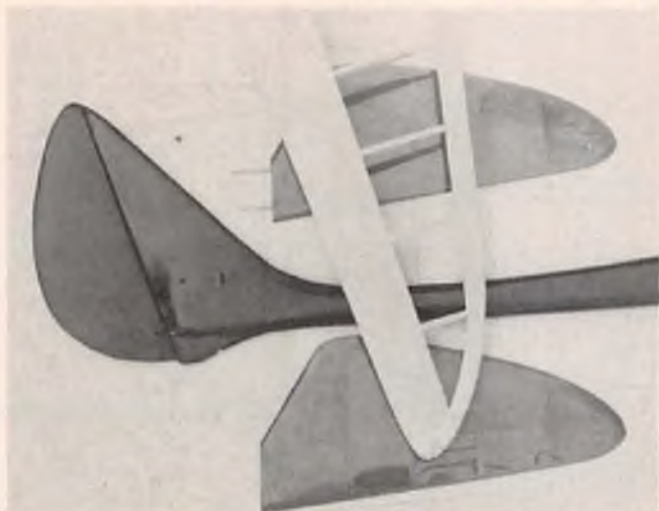
(You still fretting about that lost lift? Then take another look at the lift formula: lift varies with the square of velocity. And I just gave you an increase in cruise speed, right? So you actually got back more lift than you threw away. I told you we had lift to burn.)

So much for esoterics.

People ask about the appearance of the Bird. "Why does it look so funny?" The fact is, if your aerodynamics are sound, you can wrap most any shape you choose around them. The "Bird of Time" is a kind of "copy from memory" of a Nordic glider from the early 'fifties called "Big Time". It appeared in *Model Airplane News*, but my ragged copy had its plans pirated by a razor blade



LEFT: The wing tip shape is classic, makes the plane stand out immediately in a sky full of today's popular kit designs. May disappear in a flock of buzzards, however. BELOW LEFT: The Bird has some classic shapes, right out of the Golden Age of soaring. Designer's debt to Wolf Hirth and Frank Zaic is obvious. BELOW: Four early Birds shown, two with radios installed. Plans show wider-fuselage version, more popular with folks who have fat fingers.



decades ago.

The wing shape was originated by Germany's most famous pre-war soaring pilot and designer, Wolf Hirth (who invented thermals, on a trip to America in 1930). The Hirth wing shape was popularized in the U.S. by Frank Zaic, unquestionably the dean of model soaring in the States. I could tell you what I suspect the trailing edge shape does to reduce interference drag at the polyhedral joint --- but I promised an end to esoterics.

So I'll just say this, instead: Build yourself a "Bird of Time," and trim it to the rearward C.G. position shown on the plans. I think you'll find it to be the quietest sailplane you've ever flown.

And that's the only measure of efficiency we currently have.

CONSTRUCTION

Wing:

I usually begin with the wing, because once the ribs are cut, the plane is half built! There are a number of ways of duplicating the ribs: Xerox them off the plans, spray-glue the Xeroxes to plywood or aluminum and cut masters (this if you can foresee building more than one plane, or have friends who might want one). Or spray-glue the Xeroxes directly to balsa and cut the ribs out two at a time. Or lay the balsa under the plan and "pinhole" the outlines onto it. Or use carbon paper. Or cut up the plan.

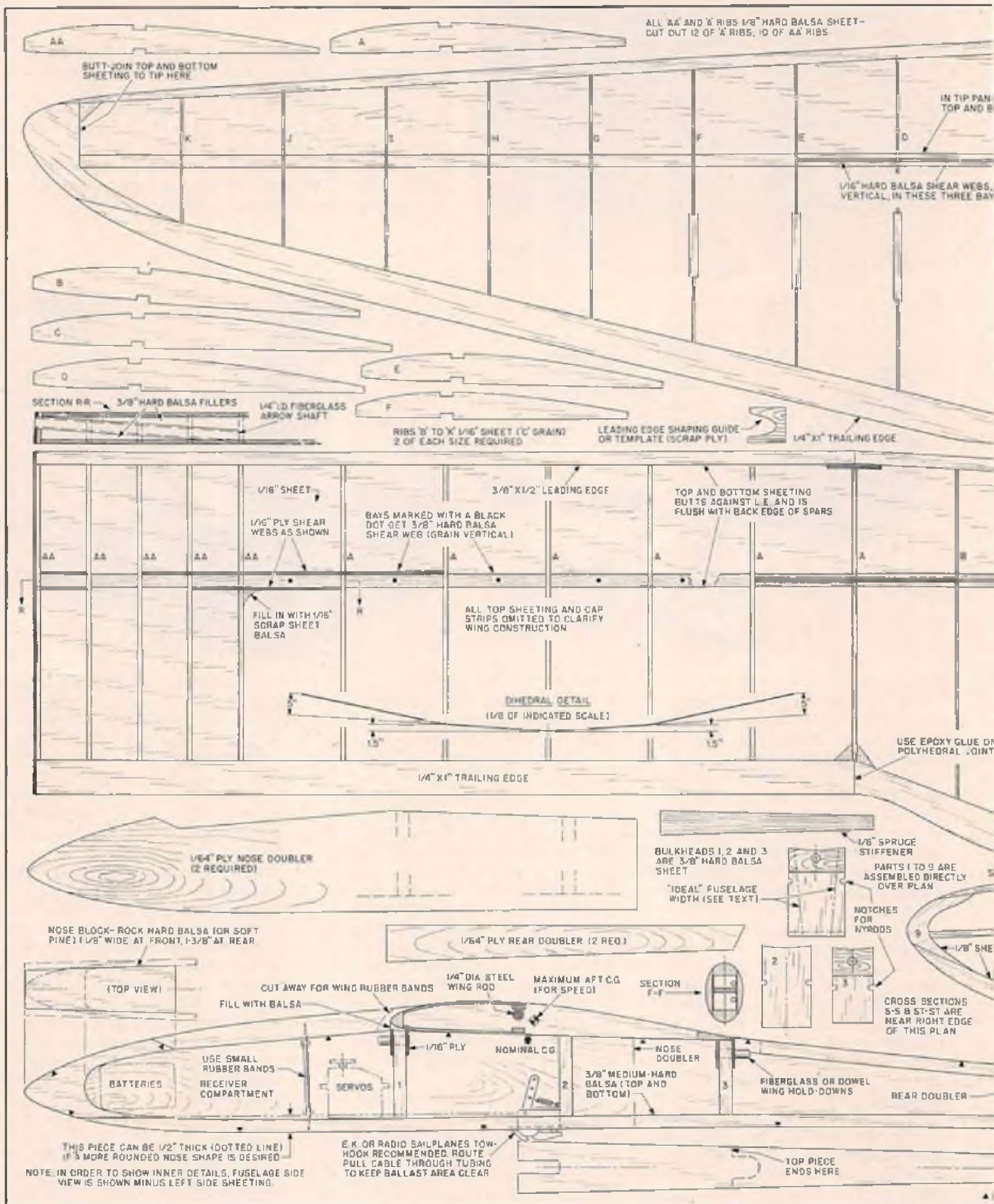
Cut from hard, C-grain, 1/16" x 4" balsa four pieces 24" long and 3 5/8" wide (that's a top measurement; the bottom sheet is approx. 1/16" narrower). These are the top and bottom leading edge sheeting for the inboard wing panels. Glue the spruce spar in place on one of the pieces. Using masking tape, glue a leading edge to this same piece. Note that the leading edge doesn't join the sheeting at exactly 90°. Use a rib to get this angle correct. Pin this assembly lightly in place over the plan. Add the "A" ribs (but not the "Circle AA" ribs) using cyanoacrylate and starting at the spar. Roll each rib forward as you glue it, to be sure that the curve of the Phillips' Entry is maintained. Now pin the assembly solidly in place over the plan and add the bottom center sheeting and the trailing edge. Use Titebond to join the ribs to the trailing edge.

From hard 3/8" balsa cut the filler wedges that go above and below the fiberglass arrowshaft. Roughen the shaft with sandpaper and glue in place with 24-hour epoxy. Add all "Circle AA" ribs and the four plywood shear webs immediately. (You may want to shear-web the two middle bays of the shaft, just to hold the epoxy in place until it dries. Use 1/16" balsa, vertical grain.) Slice away portions of the polyhedral joint rib and epoxy in the leading edge brace and the polyhedral brace. Add the 3/8" shear webs in all remaining bays, then glue the top spar in place.

Installing the leading edge to sheeting is about the only tricky step in the wing construction. Here's how I do it: Block up the leading edge with 1/8" scrap balsa, so it will bear weight. Fit the top sheet to it and sand as necessary for a tight joint. Before gluing, run a piece of masking tape down this joint, but don't stick the tape to the leading edge yet --- stick it only to the 1/16" sheeting.

Now we're ready for glue. Using Titebond, lay a generous bead down the top spar, but don't spread it. Run a quick bead down each rib, then lay a thin bead across the 1/16" sheeting, trying not to get too much on the masking tape. Put the front of the sheeting in place and tape it to the leading edge. Now spread the big bead on the spar, remove the excess, and quickly pull the sheeting down onto it. Use an inch of masking tape in each rib bay. Two good straight-edges are invaluable at this point: one down the front edge of the 1/16" sheet, the other right down the spar. Both need to be weighted with about three to four pounds. Be certain the sheet doesn't bow up in the middle as it dries --- make it follow the rib contours exactly.

Add the center section sheet and capstrips, and you're ready to shape the leading edge. I make a simple female template from scrap plywood, and spend a little time getting a uniform shape to the entire leading edge. The first 10% of this airfoil is about as



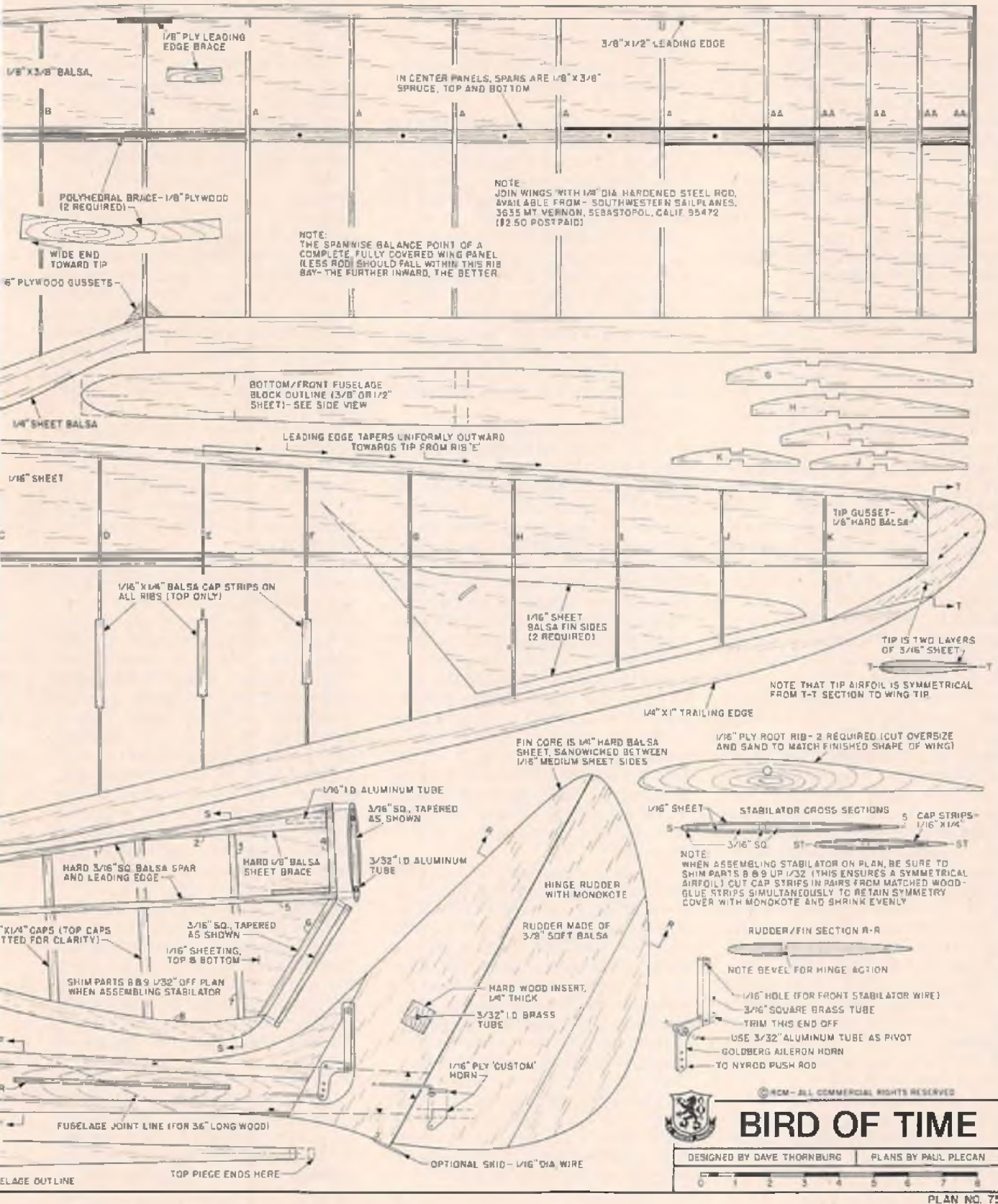
important as the last 90%. Don't make the L.E. radius too small, if you want to go fast.

Add the plywood root plate, and use the completed panel and steel rod to help align the root rib and arrowshaft of the second inboard panel during

construction. Try to keep the dihedrals fairly close to what is shown on the plans. Exact dihedral angles are just solid numbers for insecure folks to cling to, but the dihedrals shown (1.5" plus 5.0") seem to be a good all-round compromise for the Bird.

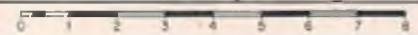
The tips go together about like the inboard panels. Note that the top sheeting has to go "up and over" the larger ribs B, C, and D -- so its leading edge won't be a perfect straight line.

If you plan to land on the wingtips very often, shear web them all the way out,



BIRD OF TIME

DESIGNED BY DAVE THORNBURG | PLANS BY PAUL PLECAN



PLAN NO. 75

but be careful of weight build-up. Maybe I'm too fanatical about light tips, but when I breathe on my rudder stick I want that plane to turn **now**; and only properly placed dihedral breaks, plus very light tips, give me this kind of response on a 10' airplane.

The stabilizer needs little explanation. If one panel comes out warped or asymmetrical, toss it away and try again --- stabs are cheap. I glue my wires into one side permanently; this saves the weight of one pair of tubes, and keeps me from going to contests without them.

The stabs, with wires and covering, should weigh 25 to 32 grams. Don't skimp on the main spar --- it carries most of the flying stresses.

Fuselage:

Some basic decisions have to be made here. Do you want the fastest,

cleanest possible Bird, or are you more interested in ease of radio installation and maintenance? If you're looking for top speeds, then you might want to consider slimming the fuselage down until it's only "battery pack wide" --- and that's a battery pack with the plastic case removed, wrapped in one or two layers of electrical tape! The vertical dotted lines on F-1 show the fuselage width as I build it for speed.

Don't be misled by full scale formulas for length to width ratios; they simply don't apply to models. The top slope-racer designers will tell you: **skinny planes go faster than fat ones, at the same wing loadings.**

The fuselage structure is very conventional. Use Titebond to glue the ply doublers to the sides, unless you have a very slow acting cyanoacrylate. Clamp them flat under a set of encyclopedias, or your fat aunt, until they're thoroughly dry. Afterwards, go around all the edges with cyanoacrylate, just to be sure.

Glue both sides to the noseblock with Titebond or epoxy; clamp them with masking tape. Build up F-1 and F-3 and install the wing hold-downs before epoxying them in place. Don't omit the plywood doublers; I did that once, and pulled a wing off at a rather important contest. It was embarrassing.

Glue the fin in place with Titebond, so it can be shifted for fuselage alignment. Try to build the fuselage fairly straight; I rarely do, myself, but that's no excuse for you to be sloppy. All you have to do to insure good alignment is lay the nose (forward of F-1) flat on a flat surface and measure up to the centerline of the fin. Now flop it over on its side and measure the centerline again. Make both these measurements the same and your fuselage is straight. Epoxy in the 1/8" spruce stiffener and it will stay straight.

Add the NyRods and the elevator bellcrank assembly. Use the cable-type pushrods; Du-Bro, Sullivan and Su-Pr-Line all make them. Epoxy the nylon every 3" along the fuselage sides, and keep them as straight as possible. Pin the square brass tubing to the bellcrank with zero slop, and drill the 1/16" hole for the front stab wire very accurately.

At this point you may want to bury a piece of light plastic tubing down the inside of the fuselage to feed the antenna through later. Personally, I use one of the pushrod cables for an antenna, clipping off an equivalent amount of the factory antenna and soldering the remaining pigtail on with a short section of heatshrink, so that the servo doesn't flex the solder joint when it moves. I don't do this in my power planes, but I've flown glider competition for four years this way, and I've never had a glitch.

If I catch you running your antenna out from under the wing and straight back to

the tip of the rudder or stab, I will personally jump up and down on your Bird of Time until it is no more. Antennae go **inside** fuselages, out of the slipstream. The last radio I owned that needed a vertically polarized receiver antenna was a Berkeley Super Aerotrol, in 1956.

Glue the 3/8" top and bottom balsa in place with Titebond. Install the towhook of your choice. I have used both EK and Radio Sailplanes releasable hooks, and both are 100% reliable. People who tell you otherwise are mistaken.

Mark the bottom/front fuselage outline on hard 1/2" balsa (or 3/8" stock, if you want to save weight); cut it out and glue it in place with Titebond or epoxy. Rough out the hatch from block balsa or two layers of laminated 3/8" soft, and spot glue it in place while you carve the fuselage to shape. I start with a block plane, then move to 60-grit sandpaper on a block.

Before you can finish carving the tail, you'll want to add the hardwood block for the stabilizer main bearing. If at all possible, use a drill press to make the hole for the brass tube --- stabilizers always look better when they're square with the rest of the plane. (They probably fly better, too. I wouldn't know.) Remember that stabilizer neutral should be about zero degrees to the bottom of the wing, aft of the spar. This gives you a few degrees of positive decalage, and is a safe place to start trimming from.

Use cyanoacrylate to install the 3/32" ID brass tube. Make sure the stab fits, and works smoothly through its full range (at least 1/2" total throw, measured at the front wire). Then add the 1/4" dorsal fin and the 1/16" sheeting to both sides. Shape the fin and blend it into the fuselage. Use a little Dap Spackling Compound to fill, if necessary.

If you're a real weight fanatic, you'll want to build up the rudder, using ribs and open bays --- or at least drill the one shown full of lightening holes. In the past, I've done both. If you make it as shown, find absolutely **punk** 3/8" stock, stuff so light and weak that even the indoor builders have passed it by: styrofoam with a grain. I mean **light**.

Most folk who've built Birds have covered the fuselage with MonoKote. They all agree that it's easier than MonoKoting a golf ball, but not **much** easier. I use silk and low-shrink Sig dope, back to the elevator bellcrank, then Japanese tissue. If you decide to use glass cloth, you're on your own --- just remember that the entire plane should weigh right at 41 ounces, and the wing is almost twenty ounces of that.

The more flexible plastic films (Solarfilm, Econocote) will make life easier on the fuselage, but I wouldn't recommend anything but MonoKote for the wings.

For a nose skid, I buy a cheap floormat

from the auto department of K-Mart, and cut it perpendicular to the "treads." Cut away the MonoKote and cyanoacrylate it directly to the wood.

Flying:

Balance your Bird 1/4", or a little less, behind the spar. Hand glide it to see that the elevator setting is in the ball park. With the C.G. in this range, you'll find that the plane will **fly** at a wide range of elevator settings, but it will only **perform** at one. To find that magic setting, you need flat, cool, morning air, preferably dead calm. I can't tell you where the setting is, but I guarantee you'll know it when you find it: the plane will speed up just a little and "go on step," and the L/D will appear to double. I can tell you this much about looking for the setting: it's way off on the down elevator end of the spectrum. It's much closer to zero-zero trim than anything you've ever flown, unless you're an old hand launch glider flyer.

When you find the magic setting, mark it on the side of the fin with a pen, so you can get it back when you want it. Remember, it will vary slightly with C.G. changes, and with extreme air-density changes, so you may need more than one mark.

Now let's talk ballast. In flat, early-morning contest air, I usually fly dry, even up to a 15 mph wind. Sometimes this is the only way to max, and other times it's a mistake. The Bird penetrates better at 5.5 ounces/foot than any plane I've ever flown at that wing loading, and I often let this superior penetration go to my head. A clean design is no protection against turbulence, especially the sort of wind shadows cast by trees and hills and tents and cars and pilots (like me) who stand directly upwind of a landing spot. The only sure protection against this kind of turbulence --- and against large patches of cold, sinking air -- is inertia, and inertia takes weight.

I strongly recommend that you make up two white pine blocks that fit exactly into the open areas in front and behind Former Two. Drill them out on top and pour molten lead or beebees and epoxy into them, both, until you bring the total weight of your Bird up to 52 ounces, **without changing the Center of Gravity**. Mark these two blocks "7 oz./ft." and stow them in your field box.

Learn when to use them. Don't be a dummy, like Thornburg, and go up into hot, violent afternoon air at 5.5 ounces. Ballast up to seven, and when you find yourself in a "square city block" of pure sink, you'll have inertia enough to get out of it, before it sucks you into the ground, tail first.

Then, when the contest calls for a speed event, make up another pair of blocks and load them to about 9.5 ounces a foot (70 ounce flying weight). Practice the speed course with them to

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RCM PRODUCT TEST

Mark's Models WANDERER 99



The Wanderer 99 is the latest effort of Mark's Models. It is hard to find the collective noun to cover all the Smiths. Most of you glider guiders have flown with Mark, you also know the head of the family Rod, but do you know the other Smith? He is Al Doig Smith, he wrote the book, the instruction book, that is. This is the bunch of Smiths that got together and put out the great Wanderer 99 kit.

There are times when you are aware as you stand out there in the middle of the launch area, your plane in one hand, the transmitter in the other and a high start strung out to its maximum across the field that this plane is going to fly and fly well. In the Smith tradition (see page 16 of the instruction manual), it was never tested by hand launching out over the well-known field of soft grass. Here in Southern California the soft grass which grew so profusely during our past wet spring has now turned golden brown and the ground is the consistency of adobe bricks. It was just confidently attached to the high start and heaved into the air. It went straight up like an arrow without a single touch of the rudder control. The lift was not spectacular and in about 5 minutes it was low enough that it was deemed necessary to bring it back to the proximity of the field. Still too high she swept across the landing strip and gained a few feet, a quick turn brought her back over the field where more height was gained. By working the field, enough altitude was gained to go looking for another thermal. A fantastic plane, heavy enough to penetrate and light enough to soar on the weakest lift.

When building the plane, we discovered how easily it went together, it is a plane that can be built by a beginner as well as the expert. We were particularly impressed by the manner in which the dihedral was constructed into the wings using the

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

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

SPECIFICATIONS

Name	WANDERER 99
Aircraft Type	Glider
Manufactured By	Mark's Models P.O. Box 2134 Escondido, Calif. 92025
Mfg. Suggested Retail Price	\$35.99
Available From	Both Mfg. & Retail
Mfg. Recommended Usage	Sport & Competition
Wing Span	99 Inches
Wing Chord	9½ Inches
Total Wing Area	869 Square Inches
Fuselage Length	44 Inches
Radio Compartment Dimensions	(L) 8¼" x (W) 2" x (H) 2¼"
Wing Location	High Wing
Airfoil	Flat Bottom
Wing Planform	Constant Chord — double taper 2nd panel
Dihedral (each tip)	2½ Inches
Polyhedral	3 Inches
Stabilizer Span	23 Inches
Stabilizer Chord (incl. elev.)	7" (Avg.)
Total Stab Area	161 Sq. In.
Stab Airfoil Section	Flat
Stabilizer Location	Top of Fuselage
Vertical Fin Height	8 Inches
Vertical Fin Width (incl. rud.)	7½ Inches
Mfg. Rec. Engine Range	NA
Recommended Fuel Tank Size	NA
Landing Gear	Skid
Recommended No. Of Channels	2
Recommended Control Functions	Rudder and Elevator
Basic Materials Used In Construction:	
Fuselage	Balsa, Spruce, Ply
Wing	Balsa, Spruce, Ply
Tail Surfaces	Balsa
Hardware Incl. In Kit	Wing wires, brass tubing, towhook
Plan Size	49" x 36" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (17 pages)
Construction Photos	Yes
Kit Includes	Shaped & Die-Cut Parts
Mfg. Rec. Flying Weight	46 Oz.
Wing loading based on rec. flying wt.	7.6 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly	46 Ounces
Wing Loading	7.6 Oz./Sq. Ft.
Covering & finishing materials used	Super MonoKote, MonoKote Trim and EconoKote
Engine Make & Disp.	NA
Muffler Used	NA
Radio Used	Kraft
Tank Size Used	NA

BASIC ACROBATICS FOR TRAINERS

By Maj. Ed Moorman

When I first started flying R/C, I couldn't wait to start doing acrobatics. All that flying straight and level was for the birds; I wanted to loop and roll. Now that I am instructing R/C, I find that most of my students like to learn a little acro as soon as they can, even before they can land, so I show them a few basic maneuvers that they can do with their trainers. All these maneuvers, loop, roll, Split-S, Immelman, Cuban-8 and spin, are ones that virtually any trainer can do, whether it is an aileron trainer or just a 3-channel one. Let me list a few trainers that I have performed basic acrobatics with: Falcon 56; Sig Kadet; Sr. Falcon; Klipper; Super Sport; RCM Trainer; Ugly Stick; Middle Stick; Sweet Stick; Little Stick; Lanier Comet; Fledgling; A-Ray; Esquire and Headmaster. There are certainly other trainers that will perform acrobatics, but as you can see, this list covers the full range of aileron and rudder planes.

If you have that urge to try some acro like I did, don't wait until you graduate to a pattern ship, read on and I'll explain how these maneuvers are done with trainer type planes.

Before you take-off and start into acro, it is a good idea to give your plane a quick once over. Flying acrobatics will put more stress than normal on your plane, so give the wing and tail a check to see if they have any cracks. Most planes call for fiberglass and epoxy reinforcement on the wing's center section. If your plane doesn't have this, or at least all of the reinforcement called for on the plans, then don't attempt acrobatics as you may break the wing. It's better to be safe than sorry. You also need to give your engine a check to make sure it will hold full power, especially if the engine size is down near the lower displacement recommended for your plane. Let's face it, a .19 will have a much harder time pulling a trainer designed for the .19 to .40 range than a .35 or a .40 will. The .19 will still take you through the maneuvers, but you'll probably have to get a "running start" by diving for some speed first. Now that your plane checks, let's get to the acro . . .

Your first and easiest acrobatic maneuver is the loop. It, along with the roll, is what you might call a base maneuver, since many acrobatic maneuvers are made up of loop and roll combinations, as you will see later. Enter the loop at full power, with your wings level, at an altitude you feel comfortable flying

at, and on a course parallel to the runway. By the way, you'll use this set-up, full power, wings level, comfortable altitude, and parallel course, for all your maneuvers, so keep it in mind when you read about and try the others. To do a loop the easiest way, smoothly pull the elevator stick to full up and hold it there until the plane makes a full loop back around to level flight, then release it. This should be a fairly tight loop and probably not too round. As you practice and become more confident, you can use less than full up and "play" the control to make the loop round. You'll have to ease off some up control as the plane approaches the inverted position, then add the up control progressively back in as you go down the back side of the loop. See Figure 1.

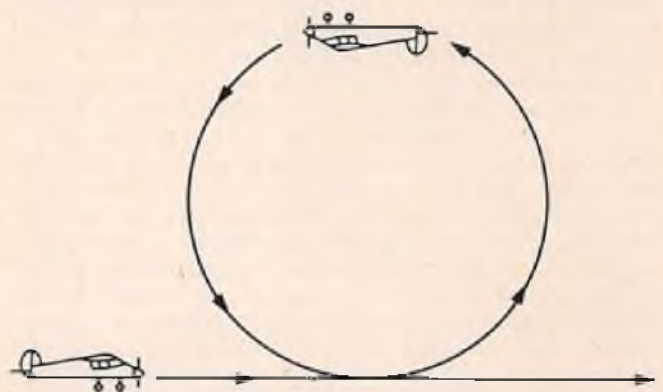


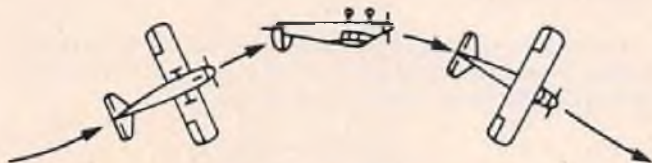
FIGURE 1. LOOP

If your loop is very big at full up, or the plane doesn't make it over the top, you may need greater elevator movement or more speed. Move the clevis one hole closer in on the horn and try it there. You may also need to dive the plane slightly to increase speed for the maneuver. Don't overdo it, however.

Your next maneuver is a roll. Remember to set up for the roll as you did for the loop: full power, wings level, comfortable altitude, and parallel course. You should learn the roll as a three-part maneuver, with three distinct stick movements. Take a look at Figure 2.



STEP 1: RAISE NOSE AND RELEASE ALL UP



STEP 2: FULL AILERON AND HOLD



STEP 3: APPLY UP TO LEVEL OFF

FIGURE 2. ROLL

In step 1 you raise the nose about 20 degrees and release all the up elevator. For step 2 you put in full aileron stick and hold it until the roll is completed and the wings are back level, then release the aileron. Finally step 3 is to add some up, to level the plane off. Notice that Figure 2 shows the plane flying through an arc as it performs the roll. This is because a trainer, not being designed for inverted flight, tends to nose downward when inverted. As a matter of fact, all planes do to some extent, and pattern fliers, to keep their planes level while rolling, add a slight amount of down elevator as their planes reach the inverted position. If you had started your roll from level flight, at the finish your plane's nose would be excessively low. That's the reason for starting the roll nose high.

A couple of errors you can run into are holding up during the maneuver and not holding enough aileron. If you don't release all the up before you roll, your plane will end up in a screaming dive because when you get inverted the up elevator will pull the nose down. Be sure you do the maneuver as a 3-step one: (1) up, release; (2) roll, release; (3) up to level off. The second error you can make is not holding enough aileron or rudder during the roll. You will probably put it in and then let it ease out and tend to stop near inverted. If you do this and get confused, pull in full up until you get back to level flight, then set up and try again.

Your third maneuver is the Split-S. The Split-S is a turn around maneuver. It reverses your direction while keeping the plane's flight path the same distance from you. You'll see many pattern fliers using a Split-S to turn around in-between their maneuvers. Like the roll, the Split-S is a 3-step maneuver. Look at Figure 3 as you go through the maneuver.

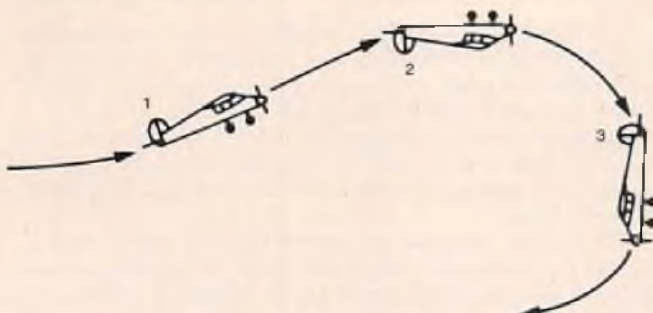


FIGURE 3. SPLIT-S

(1) Pull in up to raise the nose approximately 20 degrees, and release all the up control. (2) Put in full aileron to roll inverted and release. (3) Pull in full up to bring the plane through a half loop to upright level flight. If you make a mistake and don't get exactly inverted, you'll get a crooked Split-S, but by holding up you'll still come back to upright flight. As you gain confidence with the maneuver you can use less than full up in step 3 to level off at the altitude you want.

You probably noticed that the Split-S is a combination of a loop and a roll, or more precisely, a half roll followed by a half loop. As I said earlier, many acrobatic maneuvers are combinations of loops and rolls. All you have to do is put them in the right order. Now notice that the next two maneuvers are also loop and roll combinations.

The fourth maneuver, which is the reverse of a Split-S, is the Immelman. It is also a turn around maneuver. The Immelman differs from the Split-S in that it puts you at a higher altitude at the end of the maneuver. It is a 2-step maneuver, as shown in Figure 4.

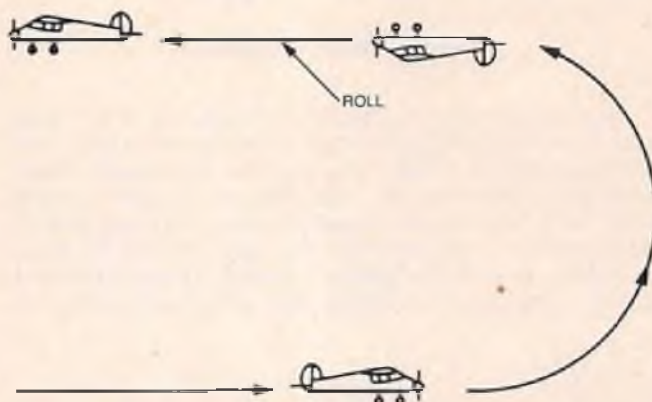


FIGURE 4. IMMELMAN

In step 1 you pull in up control like you are doing a loop. At the top of the loop, when you are inverted, release all the up. Step 2 is to put in full aileron to roll right side up. You will find that the roll is usually very slow and sloppy. This is caused by the plane being very slow, having lost most of its speed in the half loop. A higher powered plane that maintains its speed better as it goes through the pull up will do a nicer looking Immelman. If you want to finish the Immelman in level flight then you should not do a complete half loop, but release the up elevator slightly early, with the nose 10 to 15 degrees high. See Figure 5.

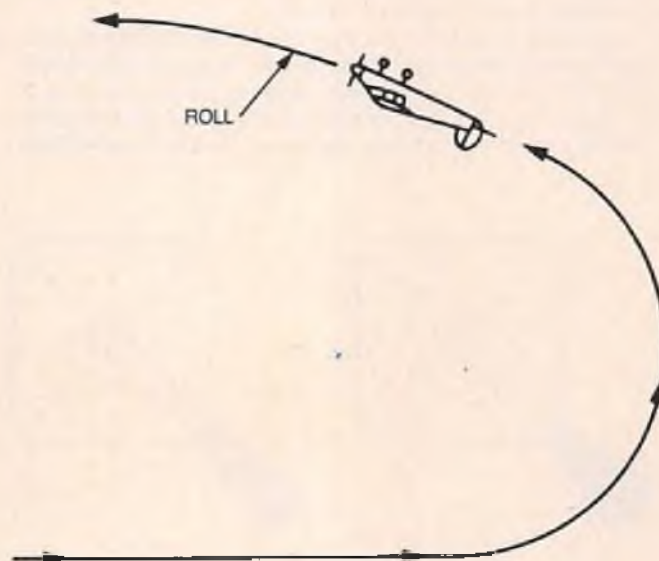


FIGURE 5. IMMELMAN

If you got your nose too far down before you rolled in the Immelman, you probably did half of a Cuban 8 without realizing it. Study Figure 6 and notice how half of the Cuban 8 is just about like an Immelman.

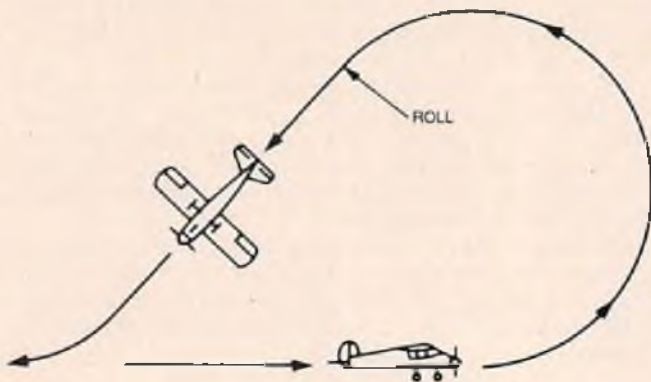


FIGURE 6. HALF OF CUBAN 8

Like the Immelman, half of the Cuban 8 is a 2-step maneuver. Step 1 is to pull in up control to start a loop. Just after you pass inverted with your nose about 20 degrees down, release all the up. Step 2: Use full aileron to roll back to upright flight. Your nose will now be about 45 degrees down. Pull up again as though you are starting a loop, and do the whole sequence again for a full Cuban 8. The full Cuban 8 is shown in Figure 7. Follow the numbers through the complete maneuver.

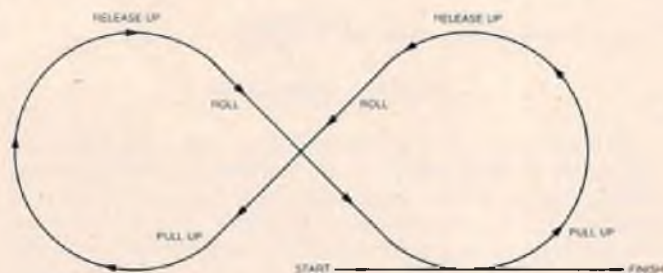


FIGURE 7. CUBAN 8

I think the Cuban 8 is a more impressive maneuver than the Immelman. The rolls look nicer since they are done at a higher speed, and you also describe a path in the sky that looks like something — an 8 laying on its side.

I am going to describe one more maneuver that some of the trainers will be able to perform: the spin. Many trainers are too nose heavy or don't have enough elevator travel to spin. Give this one a try, if you like, but be careful about changing the controls or C.G. if your plane won't spin. You may make it too

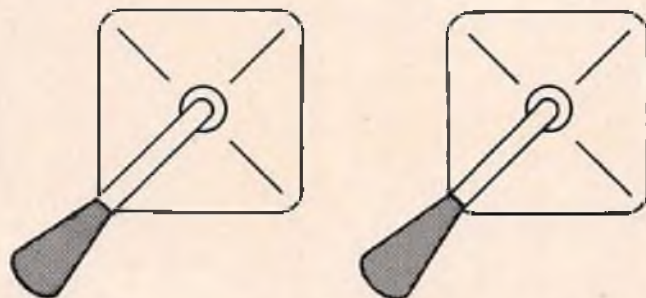


FIGURE 8. LEFT SPIN CONTROLS

sensitive for your normal flying if you change things too radically.

To enter the spin, climb up to a reasonably high altitude and throttle back. Keep adding up elevator to hold altitude as the plane slows. When the plane stalls and the nose drops, or you get to full up, put both sticks to the corners and hold them there. That means for a left spin you should be holding full up elevator, full left aileron, full left rudder, and idle power. See the sketch in Figure 8.

For a right spin you, of course, reverse the aileron and rudder. If you are using a single stick radio, you move the controls in the same manner. See Figure 9.

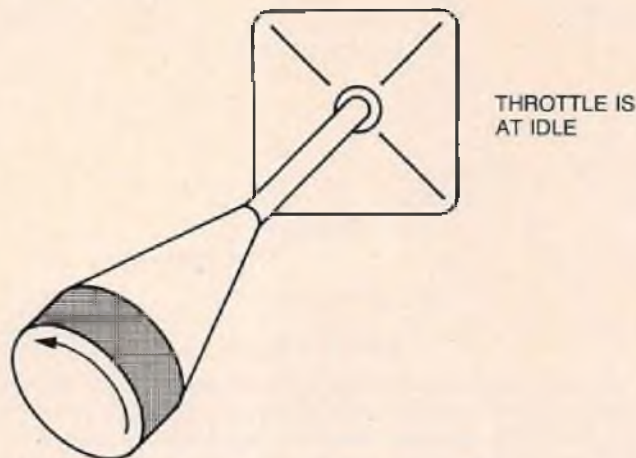


FIGURE 9. SINGLE STICK LEFT SPIN

When your plane starts down, watch it closely to see if you are in a spin or a spiral. In a spin the plane should be rotating rapidly and dropping down a nearly straight line. See Figure 10a.

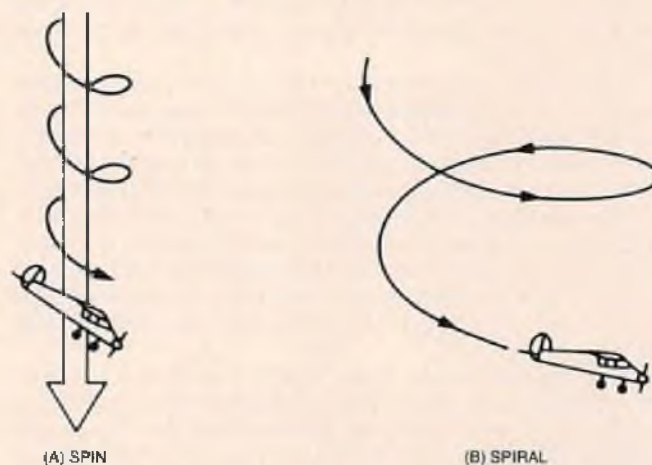


FIGURE 10.

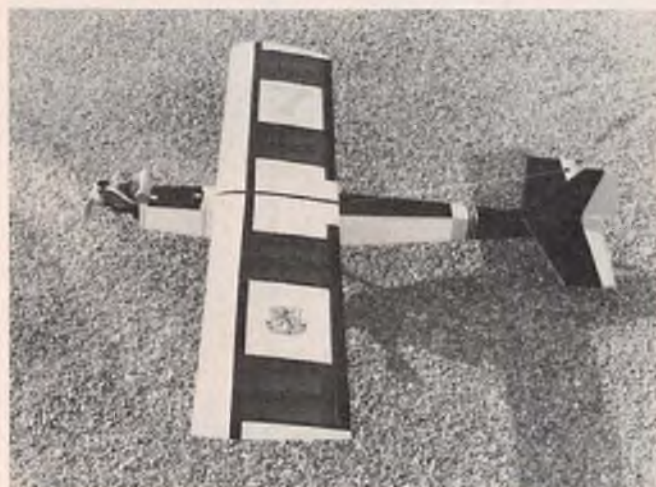
In a spiral, the plane flies around slowly in a descending circle. See Figure 10b. If you have any question as to whether it is a spin or a spiral, ask an experienced flier at your field to watch your plane and tell you which one it is.

To recover from a spin, you just release the controls. The plane will stop spinning and the nose will drop, ending up in a vertical dive. Use up control to level off and add power to return to cruise speed.

That covers the basic acrobatics that you can do with a trainer. Try these until you can do them, then practice every chance you get. When you move up from your trainer to a faster, more responsive plane you'll enjoy the acrobatics even more. □

RCM PRODUCT TEST

**Bridi Hobby Enterprises
QUICKEST 500**



The "Quickest 500" is a sport pylon club racer, which was designed by Joe Bridi, and is kitted by Bridi Hobby Enterprises, Inc., 1611 E. Sandison Street, Wilmington, Calif. 90744. Our first peek inside the kit box left us a little doubtful that there was enough wood and hardware to do the job. "How can there be enough stuff in that box to build the beast pictured on the front?" we thought. After taking a second, more thorough look, we decided there was just about exactly enough wood and it was obvious the hardware included had been chosen very carefully by the kit designer.

The wood in our prototype was either bandsawed or hand cut and of very good quality.

The hardware package includes an aluminum landing gear which is pre-bent and drilled for the axles but not for mounting to fuse, nylon elevator horn, brass rudder horn, steerable tail wheel assembly, aileron torque rods in brass tubes, mounting bolts and a Bridi glass filled nylon engine mount.

To complete our prototype we built the kit exactly as the instructions said. We would, however, recommend changing the glass mount provided with one made of metal. There is nothing wrong with the mount included in the kit. It is a high quality nylon engine mount. We feel though, in order to extract the maximum from our K & B 6.5, a metal mount would be more rigid and transmit more power to the props, and that means we go faster. That also means less vibration to our radio and we like that idea almost as much as going faster!

Assembling the "Quickest 500" was very straightforward and should be quite easy for anyone with a couple of aileron models to their credit. All the parts fit together extremely well.

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

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

SPECIFICATIONS

Name Quickest 500
 Aircraft Type Sport Pylon
 Manufactured By Bridi Hobby Enterprises
 1611 E. Sandison Street
 Wilmington, Calif. 90744

Mfg. Suggested Retail Price \$42.95
 Available From Both Mfg. & Retail
 Mfg. Recommended Usage Sport — Club Racing
 Wing Span 51 Inches
 Wing Chord 10 Inches
 Total Wing Area 501 Square Inches
 Fuselage Length 35½ Inches
 Radio Compartment Dimensions (L) 9½" x (W) 3" x (H) 2½"
 Wing Location High Wing
 Airfoil Symmetrical
 Wing Planform Constant Chord
 Dihedral (each tip) ¾ Inches

None recommended for competition racing

Stabilizer Span 16¾ Inches
 Stabilizer Chord (incl. elev.) 6¼ Inches
 Total Stab Area 89 Square Inches
 Stab Airfoil Section Flat
 Stabilizer Location Top Of Fuselage
 Vertical Fin Height 4¼ Inches
 Vertical Fin Width (incl. rud.) 5½ Inches
 Mfg. Rec. Engine Range 29-40
 Recommended Fuel Tank Size Not Given
 Landing Gear Conventional
 Recommended No. Of Channels 4
 Recommended Control Functions Rud., Elev., Throt., Ail.

Basic Materials Used In Construction:

Fuselage Balsa and Ply
 Wing Balsa and Ply
 Tail Surfaces Balsa
 Hardware Included In Kit See text
 Plan Size 48" x 28" (1 sheet)
 Building Instructions on Plan Sheets Some notes
 Instruction Manual Yes (7 pages)
 Construction Photos No
 Kit Includes Shaped Parts
 Mfg. Rec. Flying Weight 56-72 Oz.
 Wing loading based on rec. flying wt. 16.1- 20.7 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly 63 Oz.
 Wing Loading 18.1 Oz./Sq. Ft.
 Covering & finishing materials used See Text
 Engine Make & Disp. K & B 6.5
 Muffler Used Yes
 Radio Used Kraft
 Tank Size Used 6 Oz.

Shock

The Shockwave is an .049 powered two channel airplane designed for the Ace tapered foam wings. The wing loading of this aircraft is a bit higher than your normal Half-A trainer so it is definitely not recommended as a beginner's project!

With the sale of ultra-miniaturized radio gear, you can now concentrate on designing the cleanest possible airframes around it.

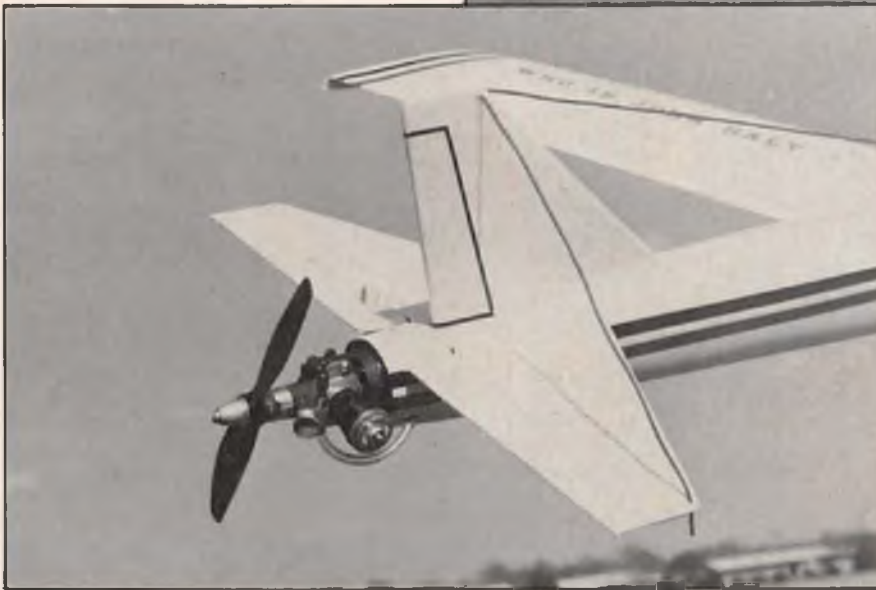
Any of the celebrated Cox engines can be used, of course (including the reeds) but the most potent combination is the Tee-Dee .049 or .051 with the tank under pressure.

The prop I ended up with, after much experimentation, was a 5½/3 Tornado pusher (available from Sig).

CONSTRUCTION

First, cut out all of the parts as specified on the plans. Mark off the bulkhead locations on the inside of each 3/32" fuselage side. Contact cement the triangular stock to the fuselage sides.

Using a 90° cardboard jig to insure precise alignment, glue bulkheads F-2 and F-3 to the right fuselage side.

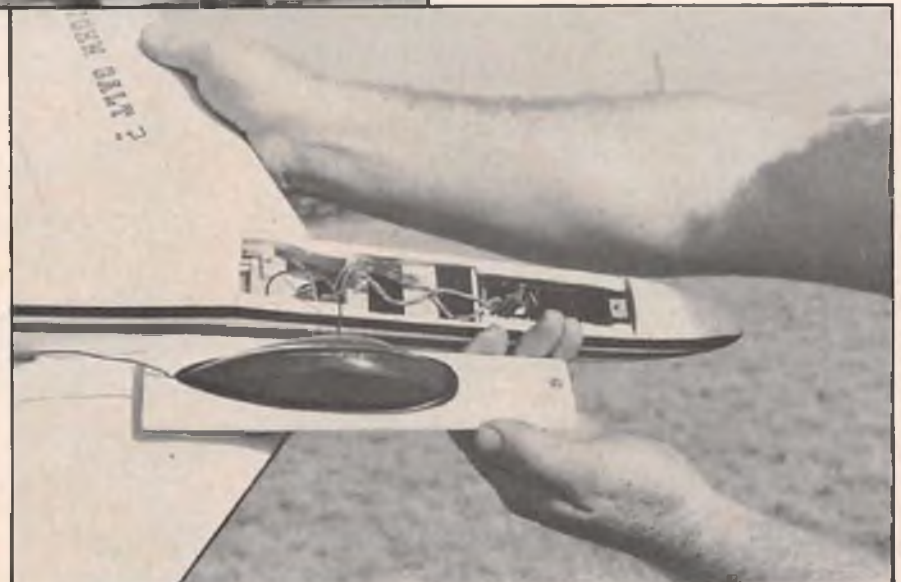


By James Prell

Now, lay the fuselage on its back on a flat surface. Line up the left fuselage side with F-2 and F-3 and glue in place. Using rubber bands to bow the fuselage sides together at both front and rear, wedge bulkheads F-1 and F-5 into place. After carefully checking for any misalignment or distortion of the fuselage, glue F-1 and F-5 into place. (I used 5-Minute epoxy on all the bulkheads.) Carefully check for built-in warps here --- they are hard to get out once the glue has cured.

The elevator servo is now mounted on 1/4" square pine beams and S-1 and S-2 are epoxied to the beams. Line up the bottoms of both S-1 and S-2 with the bottom of the right fuselage side and epoxy in place. The receiver is mounted in the same way.

The nose piece is cut out of some hard
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SHOCKWAVE

Designed By : James Prell

TYPE AIRCRAFT

1/2A Pattern/Sport

WINGSPAN

34 $\frac{3}{8}$ Inches

WING CHORD

5" (Avg.)

TOTAL WING AREA

176 Square Inches

WING LOCATION

Low Wing

AIRFOIL

Semi-Symmetrical

WING PLANFORM

Swept-Taper

DIHEDRAL, EACH TIP

1/4 Inch

O. A. FUSELAGE LENGTH

35 $\frac{1}{8}$ Inches

RADIO COMPARTMENT AREA

(L) 9 $\frac{3}{4}$ " X (W) 2" X (H) 1 $\frac{3}{4}$ "

STABILIZER SPAN

12 Inches

STABILIZER CHORD (Incl. elev.)

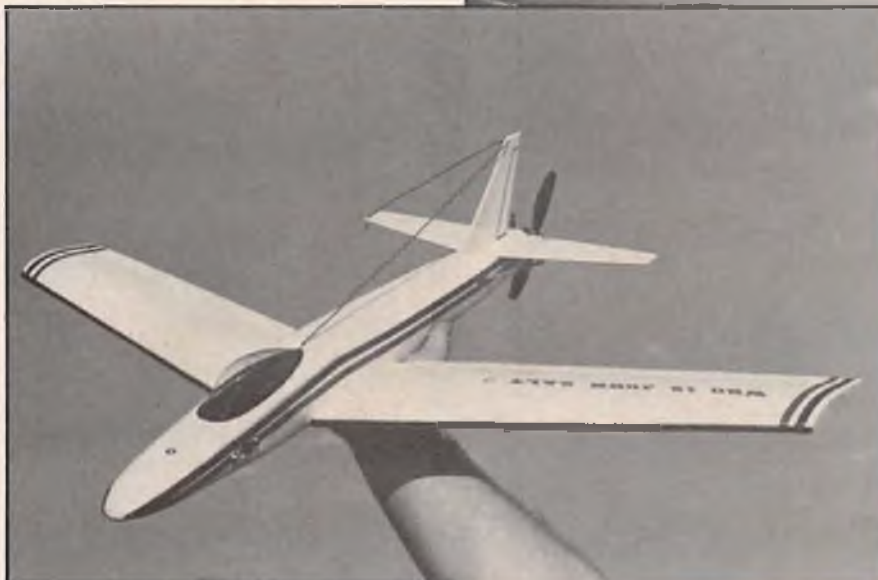
3" (Avg.)

STABILIZER AREA

33 Square Inches



The Shockwave is a 1/2A powered, two channel airplane designed for fast construction using the Ace tapered foam wing. Although designed for both sport and pattern flying, the Shockwave is definitely not for the beginner!



STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

3 $\frac{1}{2}$ Inches

VERTICAL FIN WIDTH (incl. rud.)

3" (Avg.)

REC. ENGINE SIZE

.049-.051 Cubic Inch

REC. FUEL TANK SIZE

1-2 Ounces

LANDING GEAR

None

REC. NO. OF CHANNELS

2

CONTROL FUNCTIONS

Elevator and Ailerons

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa and Ply

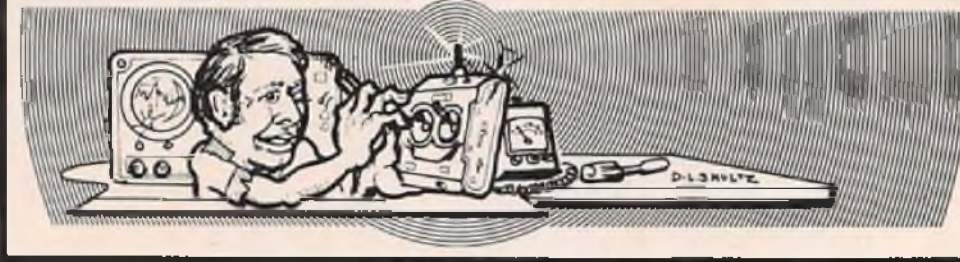
Wing Foam & Balsa (Ace Mini

Foam Wing No. 50L 101)

Empennage Balsa

Weight Ready-To-Fly 26 Ounces

Wing Loading 21.3 Oz./Sq. Ft.



In the last few issues we have dwelled on the art of keeping your radio equipment in good working order. I've had quite a few verbal compliments regarding the coverage of this subject matter but not too many letters. Many of the guys admitted the reason they liked these articles was because they were easy reading. Before we leave this subject, I'd like to pass on what I think is a great idea. I've previously discussed the problem of receiver and servo wiring becoming brittle and cracking.

Almost all of the wire used in R/C systems has vinyl insulation. It is used because it is flexible when new. How do you keep vinyl like new? Armor-All! I'm sorry I don't remember who gave me this input, but it was one of the guys at the Hitachi Desert Classic in California City. I had to try it first thing when I got home, but I knew it would work based on previous experience on my car's vinyl.

By the way, the Desert Classic was one outstanding contest again this year. Dick Russ, his family and the Antelope Valley Tailwinds can be mighty proud. I'd like to see about four of these biggies each year in different parts of the country. A guy could catch the one in his area and then pick where he wanted to spend his vacation. I'm not knocking Lake Charles, but there are other places I'd rather see.

By the time this issue is out, the 1978 flying season will be over in most parts of the country and many people will be planning their 1979 campaign. It is a time for a lot of dreaming and bull sessions. I'm sure many enjoy this part of the hobby as much or more than the frustrations that come with building, trimming and competing. I remember when I lived in Indiana, where the flying season was short. I couldn't wait for the magazines to come out so I could find out what the latest developments were in R/C. Particularly from the West Coast because they always seemed to be ahead. That was in the day of Orbit with their eight channel simultaneous reed systems, Bonner's relay-less servos, then Space Control and Digicon, the first proportional systems with position feedback servos. It was an exciting time. Things have slowed down somewhat, as far as the end results, but every year there are subtle changes introduced

resulting in the equipment becoming better and yet less expensive, particularly when you consider inflation.

With this in mind, I thought I'd give you a preview of some things I think will have a major impact on R/C systems probably as early as next year. The first I hinted at back in February when we talked about encoder circuits.

Signetics NE5044 Encoder

Some time ago I had a discussion with Gary Kelson who had a hand in developing the Signetics NE544 servo amplifier. Gary was asking my opinion of an integrated circuit to perform many of the receiver functions such as I.F. amplifiers, detector, pulse amplifier and decoder. I suggested holding off because I thought FM was coming, and what he should do instead, is build an integrated circuit that does what the Kraft Signature Series encoder does. Gary went out and drummed up enough interest in the R/C industry to convince Signetics to participate. The first samples are off the line and if the circuit does what it is advertised to do, it would

be silly to use anything else. Therefore, I wouldn't be surprised if virtually all the manufacturers used this encoder in the future. I assume it will also be available to home builders and should make it a little bit easier for almost anyone to put together a first class transmitter. Here's what it is and does:

It is a 16 pin dual inline integrated circuit that contains a multiplexer voltage regulator, linear ramp generator, comparator, frame oscillator, and one shot. It will operate on from 5 to 16 volts and draws 15ma. It can be used with 3 to 7 channels operating.

To build a seven channel encoder you need very few external parts. The inputs (3 to 7) would be connected directly to your control or auxiliary pots. You need a couple of capacitors to filter the input voltage and the regulated output voltage. Another capacitor is required for the ramp generator. One pot and resistor adjusts the neutral pulse width of all channels. Another resistor network allows adjustment of the pulse width range, typically 1.0 to 2.0 milliseconds.

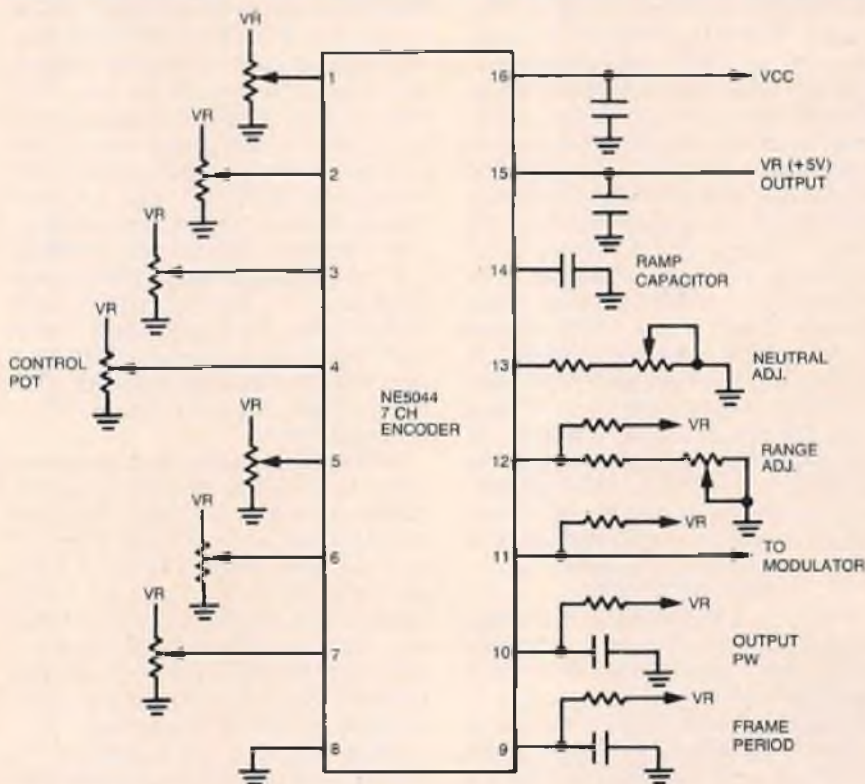


FIGURE 1

An R-C network allows setting the output pulse width typically 350 microseconds and another R-C network sets the frame period, typically 15 to 20 msec. In its simplest form an encoder would look like Figure 1.

External circuits can be added to have a variable frame with a fixed sync pause. External circuitry can easily be added to give dual rates, variable trim, mixing, exponential, reversing, etc.

Pulse width stability is .01%/°C. Crosstalk is less than 2μsec. Gary says it uses a dual linear ramp technique similar to Sid Kaufman's Omega design. This results in excellent linearity.

All the electronics you would need to build your own transmitter would be an RF section like the Kraft plug-in module or the little RF board in the Proline and Ace equipment and the circuit shown in Figure 1. I would think that would be exciting even to a few guys in Mishawaka, Indiana.

Signetics NE5045 Decoder

Just because Gary went to work on an encoder doesn't mean he gave up on the decoder idea. He did leave the I.F. amplifier and detector out so you can use it with AM or FM receivers. It provides a voltage regulator to run your receiver, a high gain op amp amplifies and shapes the incoming pulse train before it goes to a counter/decoder. A sync separator detects the sync pause generated in the transmitter and resets the counter. Once again very few external parts are required. Three capacitors are used for filtering the input and regulated voltages. An R/C network is used to set the sync pause detector to the desired time, and another R/C network allows you to set the minimum pulse you want to go through the circuit. Then if a noise spike comes in it will be rejected. Other than that all you need is some type of coupling from the receiver detector or discriminator. The NE5045 can be used for up to seven channels and will work on voltages from 3.6 to 8.0 volts. It draws about 10ma and its regulator will supply 25ma. It is packaged in a sixteen pin dual in-line package. There is also a two channel version coming called the NE5046. It is basically the same except for the fewer number of channels with the advantage that it is packaged in an 8 pin minidip. All this neat stuff almost makes me want to get back in the radio business in earnest. I can picture an FM receiver with three integrated circuits and no transistors. It ought to be very produceable.

Kraft KPT 7C/FM

Received a nice package in the mail the other day for evaluation. It is the new Kraft FM System which will be compatible with many systems now in circulation. A new plug in module is compatible with earlier Kraft seven channel and Signature Series transmitters. The receiver is all new and is compatible with the servos for the

systems mentioned above. Previously, Kraft only offered the FM in a six channel sport type system. Now you can have the best of both worlds. Good pots, linear encoder, and all the things that go with the seven channel and Signature systems and the advantages of FM. The transmitter module is a little bigger than the AM module and sticks up about 1/2", but this causes no problem. The frequency is displayed on a big sticker staring you right in the face so there is no excuse to not know what frequency you are on. The circuitry is similar to what is in the six channel set only more compact. RF output power is very good. The receiver has super sensitivity. We have a standard empirical test we run in our shop where we set the transmitter with the antenna off in the next room. This simulates a long range condition. Most of the systems we test have an antenna stub sticking out on top, so when I saw a large signal to noise with the Kraft with the antenna disconnected and no stub, I was quite impressed. Then I discovered that I hadn't even uncoiled the receiver antenna. Now, that's impressive. But the thing I really liked is that there were no weak spots as I walked from one room to the other. Normally with an AM system you can expect some pretty sizeable fluctuations in the received signal amplitude which occasionally cause the servos to jitter. What I think this means is that there won't be so many of those weak or dead spots in the sky when you fly with FM. Just for kicks I turned on my AM transmitter on the same frequency. I do believe you would have no trouble flying the FM set under this condition. So as long as you have the only FM set on your frequency you don't even have to worry about guys turning on on you. The receiver is still subject to blocking if you get a very strong signal into it, but someone would have to put his transmitter antenna right on your receiver antenna to cause this problem.

The receiver is similar to the prototype we discussed except they have eliminated the last transistor. Four integrated circuits do all the work. The IF transformer that was used to tune the discriminator has been replaced by a ceramic filter. I assume this results in improved stability.

Peter Berg who developed the system at Kraft reports that they are flying with 10KHz separation in Europe. With that performance we could put forty RF channels where we now have five in the six meter band. By the way, if you haven't been keeping up to date, FM is only legal on the amateur frequencies in the U.S. at the present time. However, I believe it won't be too long and it will be available on all R/C frequencies.

While we're on the subject of six meters, I would like to suggest that everyone obey the FCC rules or we may not have any frequencies. Don't sell a six

meter radio to a flyer unless he has a proper license. Don't let a guy fly in your contest unless he has a proper license and most of all don't you fly without the proper license. The FCC does check and the penalty can be quite severe.

I'm going to put the FM set in a plane and give it a whirl. Peter said they already flew it all over with the antenna collapsed, but I'd like to try it myself.

CD Plug Driver

A number of fancy electronic gadgets have come along to do the seemingly simple job of lighting glow plugs on model engines. I've always been pretty content with my "D" size nicad battery. However, I must admit there have been times when it is cold, the battery is low, and the engine is flooded that I could have used a hotter plug. However, the thing I really have been missing is an indication that the plug is good before you get out to the starting line at the big contest. For awhile I was actually removing the plug between flights until I wiped out the threads in the head of the Rossi.

The CD driver appears to have all the answers. To start with, it has its own self contained 4.8v battery. You don't need to lug your 12v battery out to the starting line which at Sepulveda Basin is 200' from the pits. By starting with 4.8 volts, the temperature of the plug is not dependent on the state of charge of the battery as it is in the usual nicad or dry cell set-up. The 4.8v level also lets you use your existing slow and/or fast chargers and battery testers (same as used for airborne pack although charging time will be greater). One thing the CD driver has that others don't is a meter that allows you to check the plug without removing it. One thing it doesn't have is an adjustment that allows you to burn up a few plugs before you get it set right. I watched a demonstration where it was used on a wide variety of plugs, including 2v plugs, without any adjustment.

So if you are considering a new starting battery/plug driver for next season, take a look at the CD driver, it looks like a winner (Showcase p. 100).

Jam Proof RC System?

Just about everyone in this hobby has at one time or another thought about ways to prevent getting "shot down" by someone turning on a transmitter on the same frequency while you are flying. I mentioned that the FM system looked like it would probably fly okay if you turned on an AM on the same frequency, however, when the other guy gets FM you are right back in the same fix. With this in mind, read the following very interesting letter from France.

Dear R/C Friend,

I enjoy very much RCM and I find in it many ideas, but here is a suggestion:

We see a lot of radios with many gadgets and gimmicks (and I must say

much more in Germany than U.S.: narrow band, replaceable crystals, FM, non-linear sticks, mixers, etc.), but for most flyers, it is just gadgets. The main problem is interference by another transmitter!

How many beautiful models have been destroyed because another pilot has just switched on his transmitter, to check the engine for instance!

Is there a radio with which you can fly, even if somebody switches the transmitter on on your frequency? Just imagine a superb scale model, 2 years of work, and a boy who has just been given a small Cox radio for Xmas can crash it in a second! Such a radio would sell like crazy, and I am surprised to see that no commercial builder has an answer . . . Utopia you will say . . . no, I fly with such a radio.

Well, it is quite a story. Here at the Flight Test Center (I am a test pilot), we organized a small "Working Group" on that project. Lots of discussions, brainstorming and experimentation on very complex systems (PCM system, dual PCM, of course F.M., real digital systems with numeric coding a.s.o.). Why make simple when you can make complex? (Shaddoch Maxim number 1).

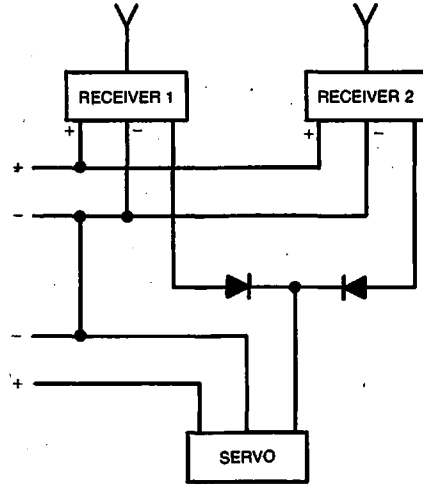
Leaving my fellow electronics specialists working on PCM/FM, I worked first on a two HF channel AM radio, with very usual material. Experimentation began by a study, both in flight and in the lab of "what happens when you are jammed by another transmitter." It is too long a story, so I'll sum it up. Most receivers just go "crazy" with the decoder desynchronized, and the servos go from one stop to the other. Some receivers on the contrary work differently, and the decoder stops working, nothing goes to the servos, which stays where they were.

So, using this type of commercial receiver (French build Lextronic), after many complicated systems, I arrived to this awfully crude and simple system, so simple that I am ashamed of speaking of it . . . it is like Christopher Columbus' egg . . .

In the transmitter, I have a second HF PC board, a second crystal (27.025 and 27.175) with a usual coder, one antenna and that's all.

In the plane, it is even simpler. I have two commercial receivers and a special

harness putting the two wires for the servo in parallel, that's all - I also use a different power supply for the receiver (225 nicad) and for the servos (1 amp nicad), it is much better.



Operation is simple . . . you fly and a "friend" turns his transmitter on one of your frequencies. This HF channel is blocked and nothing comes out of the receiver but you go on flying, with the second HF channel, without even noticing it --- great --- wonderful!

I think it is a very big step for reliability of our radios. If you are interested, I can send you more accurate information and schematics.

I can tell you that when I came flying at our field with this system, everybody was interested and stopped flying, asking lots of questions.

Of course I have to use 2 frequencies, but it is not a problem because we have split frequencies here in 27 band, and 72 MC, and of course I will now use this system in FM where we have 32 frequencies in 27 and in 72 MC. With 1 HF on 27 and 1 in 72, this will solve the problems of propagation "holes", antenna patterns, etc.

Sincerely yours,
Francis R. Plessier
Bveligny, France

Congratulations for some very innovative thinking Francis. However, I don't think it is utopia. The scheme might work better than what we have now, but not a whole lot unless we had many, many frequencies available. But even then you would need a computer to figure out if you could fly simultaneously with the various combinations of other guys on the field. Let's examine a case with three flyers and three frequencies. See Table 1.

FLYER	FREQUENCIES
1	A AND B
2	B AND C
3	A AND C

TABLE 1

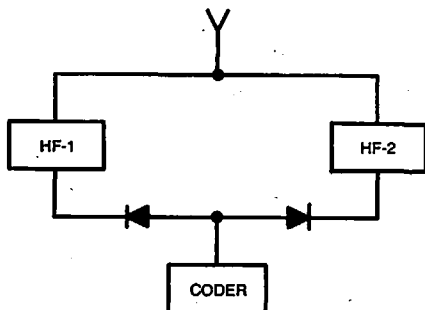
Any flyer can fly with any other one flyer but not both. If all three turn on, everyone is out of business. Even if we have twenty-six frequencies available, Flyer 1 must make sure that he doesn't go up with a combination of guys that have A and B frequencies. Obviously one frequency per flyer is a more efficient use of the radio spectrum and is easier to manage from a compatibility standpoint. Therefore, I don't think it is commercially viable. However, if you have a high value project where frequency control is a problem, I think the idea is great. For example, you may be making a cross country record attempt. A two frequency system would offer considerable protection. However, the best thing you can do is not tell anyone else about your system, because if everyone else has it too, it has lost some of its value. Not too different than FM.

I also seem to remember something about it being illegal to transmit on two frequencies simultaneously, but keep thinking you guys, we can always change the rules if we can show an improvement in safety.

Micro Processor Encoders

Got a call from Al Irwin the other night. Al is the guy who designed the constant speed governor for helicopters. He had read a couple of the letters that we published on micro processor encoders and wanted to relay his efforts in this field. Al's approach is not one of pre-stored maneuvers but one of converting the stick motions to the pulse format needed to modulate the RF. It is going to be hard to beat the Signetics NE5044, but the micro processor could give some versatility we haven't thought of yet. One thing came to mind while talking to Al. Many of us use retractable landing. To activate the landing gear we use one channel of our radio. We use this channel for one or two seconds when we take off and again for a couple of seconds when we land. Yet, we are continually sending information via our control system during the entire flight. Every twenty milliseconds we are telling the landing gear "stay retracted." This is very inefficient. This same discussion could be applied to flaps and even throttle. In fact, I can picture a system in which you would only transmit information if you wanted to change a servo position. What you save could be used for better resolution in the channels where you could use it. Al had many ideas on how to use the micro processor. Thumbwheel switches could be used to change modes, directions, gains, etc.

I'm still not opposed to the pre-stored maneuvers and I hope you guys are still working on it out there. Prices are still a little high, but they are coming down.



ELECTRIC POWERHOUSE

By James V. Zarembski



PHOTOS BY RON BELTZ

The Astro 25 mechanical speed reducer was developed by Bob Boucher of Astro Flight to enable electric power to be used successfully on large R/C models. This precision-made ball bearing speed reducer lets you swing a big propeller for more thrust and aerodynamic efficiency. The unit utilizes a high quality timing belt and precision timing pulleys. It is designed to turn 3000 rpm to 4000 rpm, when fully loaded. Propellers recommended by the manufacturer include 16/7, 16/10, 18/8, 18/10, and 20/8. Top Flite, Grish, and JZ Products are now making large propellers, suitable for this unit. These propellers on the whole should be sanded to 10% thick with a sharp LE and TE for maximum efficiency. Assembly of the unit to an Astro 25 motor is simple. The propeller adapter is removed from the motor shaft and the speed reducer is loosely mounted on the motor using four 6-32 screws which are provided with the unit. The mounting holes are cast into the motor front casing but they must be tapped for these 6-32 screws. After the small pulley is mounted on the motor shaft, the belt is loosely slipped onto the two pulleys and then the entire housing is moved away from the motor shaft to tighten the belt. (The mounting brackets on the gear reducer are not round; they are rectangular and allow the entire unit to be shifted for belt installation.) Finally, when the belt is fully tight (about 1/16" deflection of belt when pressed in the center), the four screws are tightened to secure the unit.

I received a unit early in the 1978 flying season and spent a great deal of time looking for a suitable model in which to try it out. I looked for an old timer; since an old timer with a large wing and a long landing gear would be perfect for the large propeller and the weight of the Astro 25 unit. Bob Boucher has quite successfully flown a Super Buccaneer with this system. The Quaker and the Dallaire Sportster were considered, but I finally chose the 1938 Powerhouse by Sai Taibi.

The Powerhouse was originally powered by a Forster 99. With a wing span of 84" and 1100 square inches of area, it was felt that a decent flying test bed could be made for the new gear reducer. The result is the "Electric Powerhouse."

My model was built from a P & W Model Service wing rib, former, and

outline kit. This consisted of wing ribs, wing tip, stabilizer, and rudder parts, cut out of the proper thicknesses of balsa. This saved a great deal of time and since the quality of the parts was excellent, I highly recommend P & W kits.

The Electric Powerhouse was built as close to the original design as possible. However, the following changes were made for the electric version:

(1) A 1/8" lite ply fuselage form was added from the trailing edge of the wing, forward.

(2) A 1/8" lite ply fuselage bottom was added from the trailing edge of the wing, forward.

(3) Three 1/8" lite ply rectangular fuselage formers were added at the wing LE, TE and just behind the battery for the Astro 25.

(4) The cowl/canopy was made removable.

(5) The forward wing spars were made of 1/4" square spruce and 1/8" balsa shear webs were added.

(6) The stabilizer and fin were modified for R/C by adding a movable rudder and elevator.

The finished model alone weighed 2 lbs., 10 oz., with Trexler airwheels. Transparent yellow MonoKote was used with red MonoKote trim. The motor was

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ENGINE REVIEW

Two new engines designed expressly for 1/8 R/C car use have just recently been released. The HB 21 PDP #2200, manufactured by Helmut Bernhardt in West Germany and imported by Bavarian Precision Products Co., P.O. Box 6, New Canaan, CT 06840; and the HGK 21 SFC CAR, manufactured by HGK Products Co., Ltd., in Tokyo, Japan, and imported by Exportations Ltd., 17835 Sky Park Circle, Suite E, Irvine, CA 92714.



The HB 21 PDP #2200 engine is very similar to the reliable Veco-McCoy engine, in that it uses an aluminum piston and ring. The basic porting is also similar except the HB also includes Perry Directional Porting.

HB 21 PDP #2200

The HB 21 engine looks like a Veco-McCoy engine, that most 1/8 scale racers are familiar with, but with Perry Directional Porting added. The crankcase is similar inside to the Veco 19, except the HB engine does not have a removable backplate. Instead, it has a removable nosepiece, very similar, but not identical to the K & B 21. The inside of the crankcase has two machined slots, at the upper end of the transfer port, extending about 5/16" towards the exhaust port, to feed the Perry Ports.

The nosepiece has two ball bearings, identical in size to the Veco 19. The nosepiece has a Perry 19 carburetor installed. The full circle crankshaft is a perfect slide fit into the ball bearings. The crankpin is the same size as the Veco 19 and it appears the HB, Veco 19 and McCoy crankshafts would be



The HB engine has a removable nosepiece and comes standard with a Perry 19 carburetor.

interchangeable in this engine.

The fully machined aluminum piston looks almost identical to the McCoy piston, complete with a Dykes type ring. The piston has a .651 O.D., placing it between the standard size McCoy piston and the McCoy O.S. piston. The piston pin floats in the piston with two teflon buttons on the end of the pin. The forged rod is a little lighter than McCoy's, but it is bronze bushed on both sides.

The steel sleeve is not chromed. There are three square intake ports and four exhaust ports, similar to the Veco-McCoy sleeves. In addition, there



The secret to the exceptional horsepower output of the HB engine is the 2 small Perry Ports on either side of the 3 main intake ports. It brings the performance of the HB engine, up to the same performance of Schnuerle ported engines.

are two Perry Directional Ports, on either side of the three square intake ports. The Perry Ports are about .040 wide, and are cut on an angle, in relation to the outside of the sleeve, so that the incoming fuel charge is directed in the "dead area", at the exhaust side of the piston baffle. The normal fuel charge comes in through the three intake windows, hits the baffle on top of the piston, and is directed upwards in the cylinder. This leaves a "dead area", right behind the baffle on the exhaust side. This is naturally not very efficient. The Perry Ports direct a portion of the incoming fuel charge to the "dead area", displacing the burnt charge, making the engine more efficient and increasing its horsepower. And it works surprisingly well. Perry ported engines are amazingly close to Schnuerle ported engines in performance.

HB also includes a special R/C car head/heatsink which is very similar to McCoy's new head. Both of these came out about the same time, so I don't think it was a question of one copying the other. But it does show the extent of specializing the engines for R/C car use, that HB took. Another special item, that I believe is one of the smartest things that HB did, was to include a paper air filter, with a foam cover and a carb adaptor with the engine. Somebody at HB has been paying attention to the needs of the R/C car racer. I firmly believe the paper air filter is an absolute must to keep **any** and **all** dirt out of the engine. The engines with paper air filters show absolutely **no** signs of abrasive wear. On the other hand, I've known guys who have worn out their engines to such an extreme, that they've completely lost all compression in one half hour's running time, because they ran without any air filter. Take your choice.

HGK 21 SFC CAR

The HGK 21 engine is of Schnuerle design but it is not an ABC type. It would have to be called an AAC type. The ABC type, meaning Aluminum piston, Brass sleeve, Chrome plated, is used by K & B, OPS, Super Tigre, and others. But the HGK engine uses an Aluminum piston, with an Aluminum cylinder that has been Chrome plated — hence AAC. Chroming aluminum is a rather new development that apparently HGK has mastered.

The crankcase is in two pieces, similar



The new HGK engine has been winning a lot of races in Japan. It is Schnuerle ported with a chromed aluminum cylinder.



The upper part of the engine, shown on the left, is all one piece aluminum. The Schnuerle intake ports are cast in, as well as the cylinder bore, which is chrome plated.



The HB aluminum piston, on the left, uses a Dykes ring, and forged rod that is double bushed. The HGK aluminum piston has a fully machined rod that is bushed on the big end only.



The HB crankshaft, LEFT, is almost identical to the Veco-McCoy cranks. The HGK crank has a smaller bore with a threaded end that screws into the crank.

to the old Taipan 21 engine, except the HGK does not use a sleeve as such. Instead, the upper case, which contains the fins, also contains all the Schnuerle ports. The port area is rather small when compared to the K & B 21. The upper case also contains the cylinder wall, which is chrome plated.

The aluminum piston is conventional ABC or AAC type with one wire clip

holding the wrist pin in place. The rod is fully machined with a brass bushing in the big end.

The crankshaft is a little different, in that the threaded end screws into the crankshaft, which requires a larger shaft on the small end which, in turn, also requires the smaller ball bearing to have a larger I.D. The hole in the crankshaft is rather small, probably adequate for a 21 size carb, but it would be useless to put a pumper carb on the engine, because the fuel-air mixture couldn't get through the crank.

The engine also comes with a very good one piece heatsink, and an air filter of the sponge foam type.



HGK head, on the left, is Heml shaped with squish band. The HB head has a little less compression and is slotted for the piston baffle.



This is probably the ultimate air filter for R/C cars. The HB unit features a paper air filter which is covered with a foam sleeve. Plastic adaptor attaches to carb.

PROP TESTS

There are nine prop tests shown in the accompanying chart. Test #1 and #2 of



All of the engine tests were done on this test stand, which is securely fastened to the inside of the garage wall. All the exhaust fumes and noise are expelled into a hose, which goes through the garage wall, into a 5 gallon can on the other side. Fuel metering is done with a remote needle valve, right below the fuel can. An Accutac is used which can reliably make readings, within 50 rpm, in 3000 rpm ranges, all the way up to 30,000 rpm. The large drum, on the left, is removable and slides over the props when testing.

the HB & HGK engines were run on the same day, with the same props and with the same can of K & B 1000 fuel, with castor oil. All nine tests used the K & B 1000 fuel. Always use castor oil fuel in your R/C cars. I also used Fox R/C Long plugs in all the tests. As you can see in the chart, the HGK engine was a little stronger on the bottom end, but the HB engine was better on the top end. I was a little surprised at these results, for two reasons. For one, I thought naturally the Schnuerle porting would have to be better than the PDP porting, and also the AAC piston sleeve combination should be better than the piston, ring sleeve combination. But the prop tests called them very equal indeed. As a comparison, I included some prop tests #3, #4, #5, & #6, which were done a few months earlier. The HB and HGK compared very favorably with the Webra 20, OPS and Super Tigre 21 car engines, and these last three engines had Perry 40 size carbs!

Test #6 was of a K & B 21 with a Perry 19 carb. This was not a stock K & B 21, but a reworked one that I used for racing, but it does show the possible power which can be had with a 19 size carb.

Tests #7, #8, & #9 are rather

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TEST	ENGINE	CARB	TOP-FLITE PROPS		
			7/4	8/4	9/4
1	HB 21	Perry 21	20,600	17,700	13,400
2	HGK 21	Stock 21	20,200	17,800	13,600
3	Webra 20	Perry 40	20,000	18,100	13,000
4	OPS 21	Perry 40	21,000	17,800	13,000
5	ST 21	Perry 40	20,500	16,800	13,400
6	K & B 21	Perry 21	21,600	18,800	13,800
7	K & B 21	Pumper	24,100	18,500	13,800
8	K & B 21	Pumper	22,800	16,400	
9	K & B 21	Pumper	24,100	17,400	

RCM PRODUCT TEST

Jack Stafford Models TWIN COMANCHE



Wow, what a kit! As supplied from your local dealer or direct from the manufacturer, the Stafford Twin Comanche is impressive. Not only is the box big, but it is filled with all sorts of goodies that make the job of building an airplane of this type quite a bit easier.

The first thing that is evident are the accessories supplied, from molded cowl bowls (that's what they call them) to wing tip lights. Everything needed to finish the exterior of the airplane in a minimum of time. Stafford did not stop here. Included is a complete cockpit interior, also seats, arm rests, instrument panel and all the other items needed to finish off the cabin area. The molded parts all fit, too! Another plus is that they are very close to scale.

The preformed hardware package contains everything needed except the scale specially formed retract struts for the landing gear. They are available direct from the manufacturer for \$5.95, a three strut affair. Standard struts can be used, but the ones from Stafford add a "certain" look to the finished product and should be considered by anyone building the kit. When ordering, request either a Rhom Air or Goldberg, depending on what gear you intend to use. The plans show installation of both. Also, there is a complete shopping list for additional items not included in the kit.

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

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

SPECIFICATIONS

Name	TWIN COMANCHE
Aircraft Type	Stand-Off Scale Twin
Manufactured By	Jack Stafford Models 12111 Beatrice St. Culver City, California 90230
Mfg. Suggested Retail Price	\$139.95
Available From	Both Mfg. & Retail
Mfg. Recommended Usage	Sport & Competition
Wing Span	72 Inches
Wing Chord	11" (Avg.)
Total Wing Area	775 Square Inches
Fuselage Length	50 Inches
Radio Compartment Dimensions	3 Compartments
Wing Location	Low Wing
Airfoil	Semi-Symmetrical
Wing Planform	Swept T.E.
Dihedral	2 $\frac{3}{4}$ Inches
Stabilizer Span	25 Inches
Stabilizer Chord (incl. elev.)	5 $\frac{1}{2}$ " (Avg.)
Total Stab Area	137.50 Square Inches
Stab Airfoil Section	Flat
Stabilizer Location	Mid-Fuselage
Vertical Fin Height	9 $\frac{3}{4}$ Inches
Vertical Fin Width (incl. rud.)	8 Inches
Mfg. Rec. Engine Range	Two .40's
Recommended Fuel Tank Size	8-10 Ounce
Landing Gear	Tricycle
Rec. Number of Channels	6
Recommended Control Functions	Rud., Elev., Thro., Ail. Flaps & Retract Gear

Basic Materials Used In Construction:

Fuselage	Balsa
Wing	Balsa
Tail Surfaces	Balsa
Hardware Included In Kit	See text
Plan Size	86" x 36" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (18 pages)
Construction Photos	Yes
Kit Includes	Shaped Parts
Mfg. Rec. Flying Weight	144-176 Oz.
Wing loading based on rec. flying wt.	26.7-32.7 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly	160 Ounces
Wing Loading	29.7 Oz./Sq. Ft.
Covering & finishing materials used	See Text
Engine Make and Disp.	K & B .40
Muffler Used	Tatone No. 29355
Radio Used	KraR/KPS-14 servos
Tank Size Used	10 Ounce Sullivan

RC MODEL PROTECTOR

An On Ground In-Air Battery Tester Using
An Auxiliary Channel and the Throttle

By Gale Christensen

Photos By Roger Hatch

It's a calm, beautiful spring morning; only a few fliers are out and none of them are on my frequency. I'll have a great day of flying, right? Wrong. Battery failure has just re-kitted my first .60 size full-house plane on its second flight of the day. The crash could have been prevented if I had been using my new RC Model Protector.

This crash happened several years ago when I first started radio control. Despite many years of schooling and experience in electronics, I had never been aware of the memory and shelf-life discharge problems associated with nickel cadmium batteries.

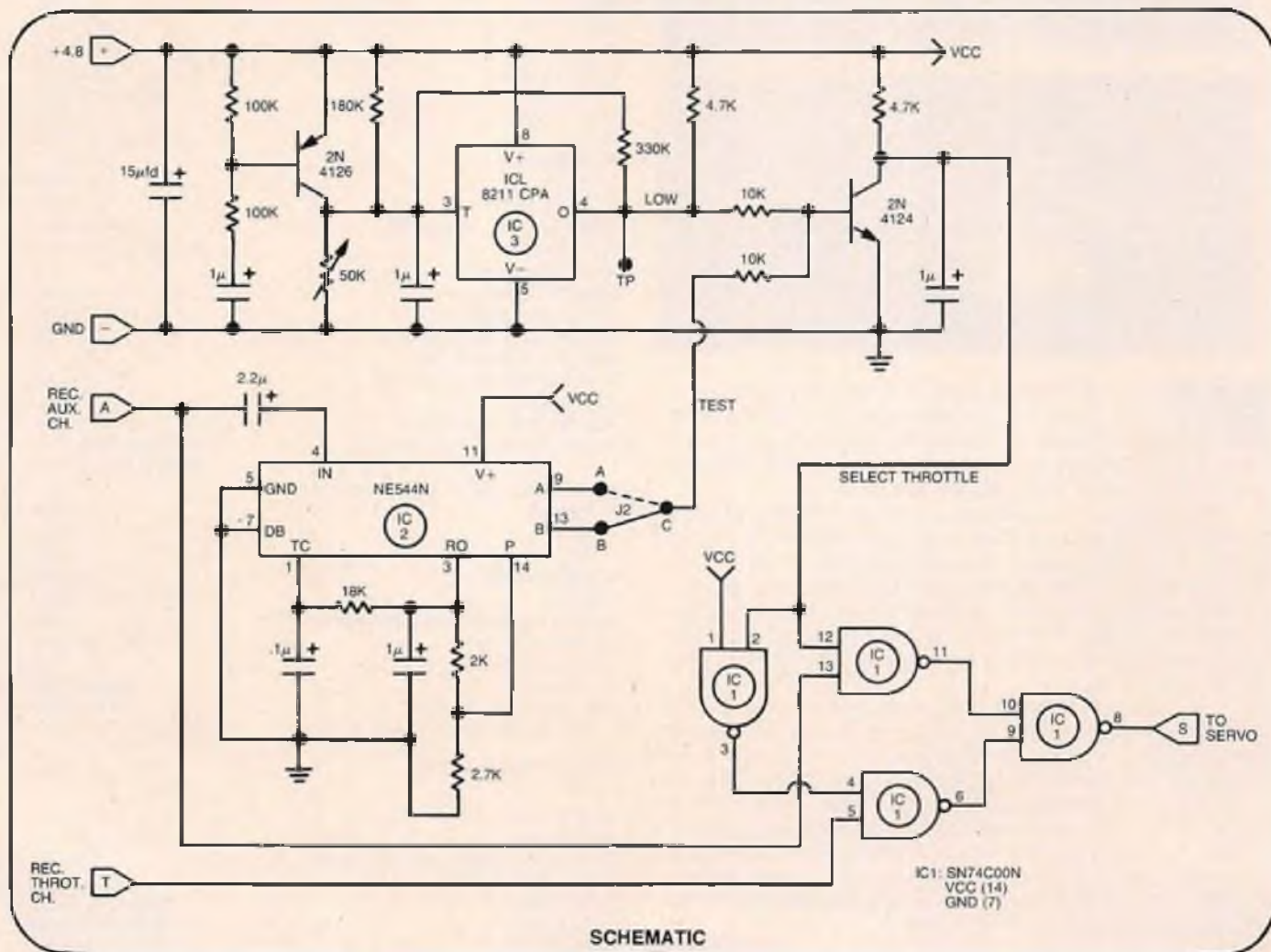
After talking with many people and researching nicad batteries, I want to offer a new type of tester. I highly recommend the use of expanded scale voltmeters for assessing the remaining

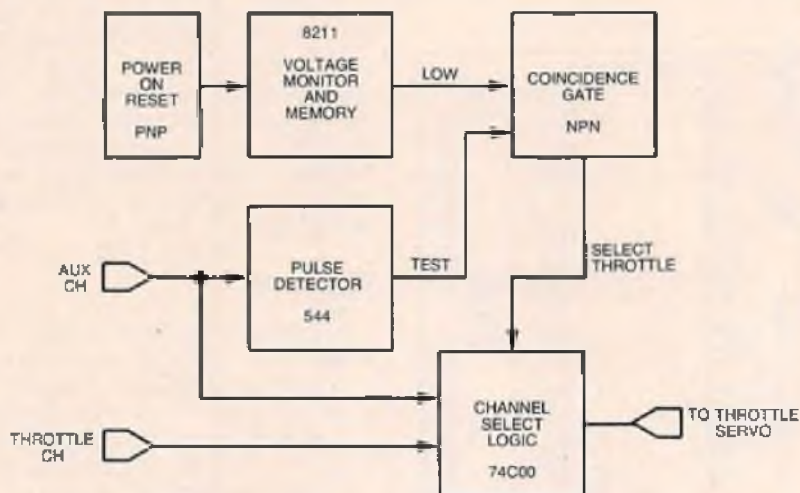
charge in battery packs along with load resistors to cycle our batteries every several months. The use of the ESV and cycling will increase the reliability of the battery packs and will also show us a ratio of the charge capacity with respect to our flying time. There are also LED voltage monitors that show when the battery pack voltage is low.

But the LED monitors and ESV's also have their problems. The LED's are hard to see in direct sunlight. The ESV's are too frequently left lying in the flight box or on the bench at home. Since LED monitors need to be located on the exterior of the model and ESV's entail jacks, both may detract from the beauty of the model or ruin its scale appearance if it's a scale model. Most importantly, LED monitors and ESV's are useful only during the time the model is on the

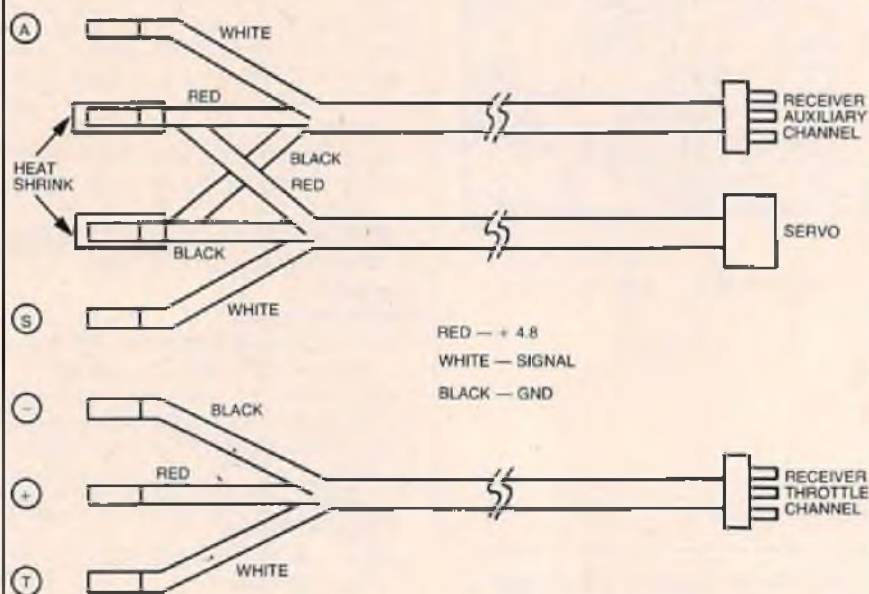
ground. The model is most susceptible to battery failure or discharge when it's airborne. Therefore, I feel in-flight testing is necessary.

My RC Model Protector will test the battery pack voltage on the ground or in the air by using the model's throttle. It's so small it fits inside a Royal Electronics Corp. 1/2A receiver case; it's light and can be mounted in most RC models without special requirements (pack in foam). The Protector has no external jacks, lights or other components so even scale buffs can use it. The design, however, utilizes the model's throttle and an auxiliary channel, thereby restricting its use to models where these are available. The current drain is only 30 milliamps and it has a voltage range of 3.2 to 6 volts. It can be used on any positive pulse, three or four wire radio

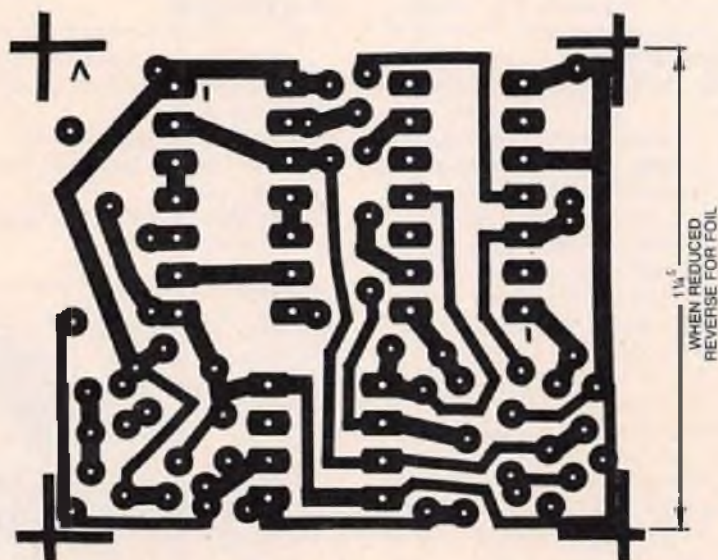




BLOCK DIAGRAM



CABLING DIAGRAM



P/C BOARD
SHOWN 2X SIZE

system. The threshold voltage of the Protector is adjustable. I recommend it be set for 4.7 volts. The Protector will remember if the battery pack voltage drops below the threshold voltage by either slow discharge or by a power glitch, and it will be remembered until the model's power is turned off, then back on again.

Testing and Usage — Testing is done by using the two extremes of the auxiliary channel. One extreme is the control position and the other extreme is the test position. In the control extreme, the modeler has full control of the throttle no matter what the battery voltage is



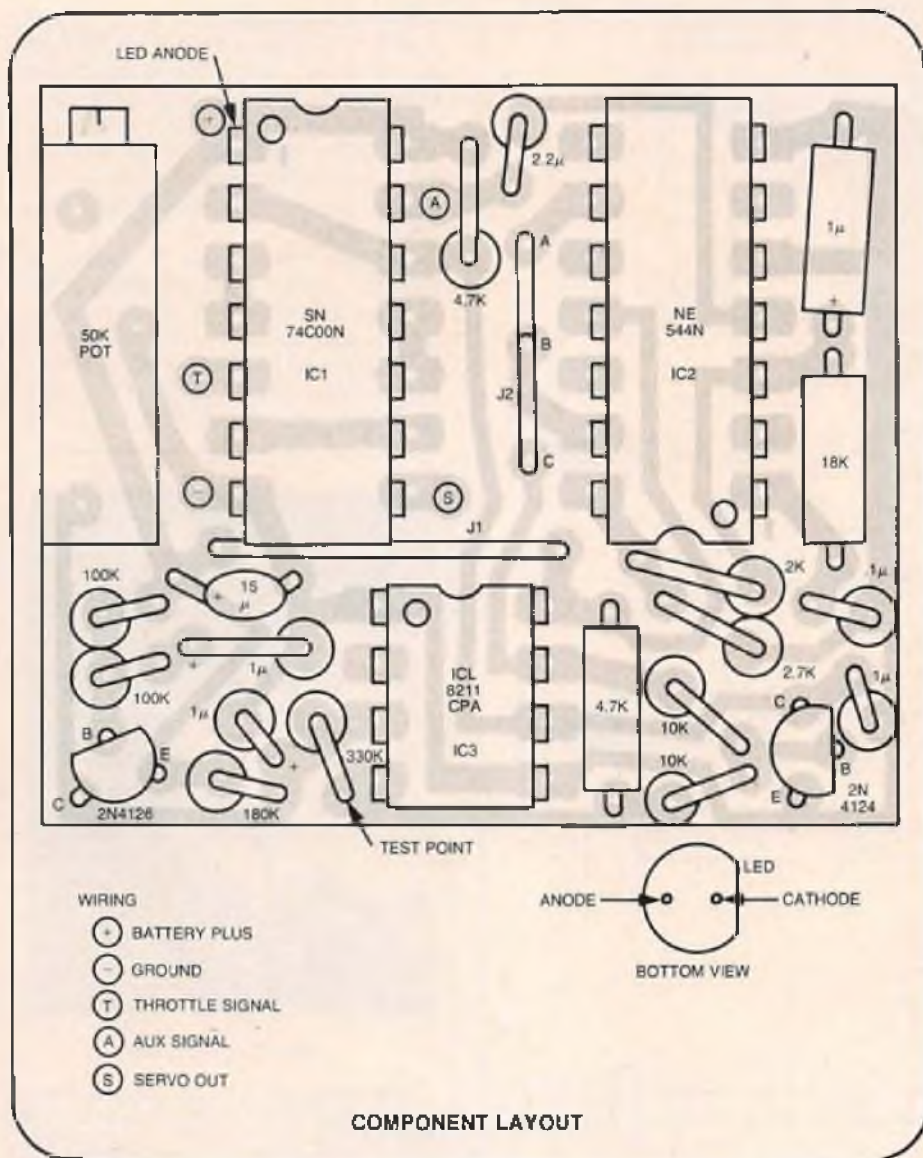
ABOUT THE AUTHOR

Gale Christensen is 29 years old and resides in Orem, Utah with his wife and three children. As a teenager he tried to fly U-Control planes with no success. His involvement in RC began about seven years ago when he designed and built his first transmitter and took his first plane to the Bonneville Salt Flats to crash. He later joined the Utah Valley Aeromodellers of which he is now the secretary treasurer. He enjoys designing accessories including his own radio systems, battery chargers, an RC tachometer, and recently helped his RC Club build ESV's of his own design. Gale holds an Associate Degree in Electronic Engineering Technology from Brigham Young University where he is employed as a supervisor of computer systems maintenance, having ten years working experience in electronics.

(unless radio control is lost due to the battery voltage being too low).

Testing the batteries involves setting the throttle between mid and full. The auxiliary channel is then moved to the test extreme. If the batteries are low or have previously glitched low, the throttle stick will lose control of the throttle servo and the servo will cut back to idle. After the test, the auxiliary channel can be moved back into the control position and full control of the throttle servo will be restored to the throttle stick.

Since the Protector has a memory capability, testing can be performed at random or continuously when the power



COMPONENT LAYOUT

is on. If the continuous mode is preferred, the user must be aware that he can immediately recover throttle stick operation, if the throttle cuts, by moving the auxiliary channel's position out of test. Also, whenever the Protector is used in a plane, testing should be disabled when landing to prevent losing control of the throttle during this critical time.

Theory of Operation — For an in-depth view of how the Protector works, let's refer to the block diagram. The Voltage Monitor and Memory block uses the Intersil ICL8211CPA integrated circuit which measures the battery voltage at all times. The output "Low" goes to zero volts if the battery voltage drops below the threshold voltage and will remain there until power is turned off and on.

The "Power On Reset" circuit is used to eliminate switch bounce when the Protector is turned on; it also clears the Protector's memory. The IC's threshold is pulled to the batteries' plus voltage whenever the power is turned off then on. The threshold remains at the batteries' plus for about .3 seconds.

The "Pulse Detector" is simply a Signetics NE544A integrated circuit which checks the pulse width of the auxiliary channel. Its output "Test" goes to zero volts whenever the auxiliary channel is at one extreme. "Test" goes to a voltage greater than +3 volts whenever the channel is in the other extreme.

The "Coincidence Gate" puts a voltage greater than +3 volts on its output "Select Throttle" whenever both the inputs "Low" and "Test" are at zero volts. If either or both of the inputs, "Low" or "Test" have a voltage greater than +3 volts, the output "Select Throttle" will have zero volts on it.

The "Channel Select Logic" works in conjunction with the signal "Select Throttle" that comes from the "Coincidence Gate." If "Select Throttle" goes to zero volts, then the receiver throttle channel signal will be gated to the throttle servo by the "Channel Select Logic." If the "Select Throttle" signal voltage ever exceeds +3 volts ("Test" and "Low" both equal to zero volts), the "Channel Select Logic" will gate the auxiliary channel to the throttle servo,

causing the throttle to cut to idle.

To further understand how the Intersil ICL8211CPA and the Signetics NE544A integrated circuits work and how they accomplish the above functions, I will refer you to R/C Modelers October and November, 1977 issues. In Jim Oddino's feature, "Radio Spectrum," these integrated circuits and their operation are discussed in detail.

PARTS LIST

Capacitors:

- 1 ea. — .1µfd, 35 volt; Sprague 162D104X9035BC2 or equiv.
- 4 ea. — 1 µfd, 35 volt; Sprague 162D105X9035CD2 or equiv.
- 1 ea. — 2.2 µfd, 35 volts; Sprague 162D225X9035DD2 or equiv.
- 1 ea. — 15 µfd, 20 volt; Sprague 196D156X9020JA1 or equiv.

Resistors:

- 1 ea. — 2K; red, black, red, gold.
- 1 ea. — 2.7K; red, violet, red, gold.
- 2 ea. — 4.7K; yellow, violet, red, gold.
- 2 ea. — 10K; brown, black, orange, gold.
- 1 ea. — 18K; brown, gray, orange, gold.
- 2 ea. — 100K; brown, black, orange, gold.
- 1 ea. — 180K; brown, gray, yellow, gold.
- 1 ea. — 330K; orange, orange, yellow, gold.

Note: all resistor values are specified in ohms and are 1/4 watt, ±5% tolerance.

Semiconductors:

- 1 ea. — 2N4124 Transistor; most any silicone NPN general purpose.
- 1 ea. — 2N4126 Transistor; most any silicone PNP general purpose.
- 1 ea. — SN74C00N Integrated Circuit; National or Texas Instruments substitute: Radio Shack, RS74C00 part #276-2301.
- 1 ea. — NE544N Integrated Circuit; Signetics Corp.
- 1 ea. — ICL8211 CPA Integrated Circuit; Intersil.

1 ea. — Light Emmitting Diode.

Miscellaneous:

- 1 ea. — 50K ohm trimpot; Bourn model 3006P or equivalent.
- 1 ea. — 1/2A receiver case; Royal Electronics Corp.
- 1 ea. — Printed circuit board.
- 1 ea. — Female connector for mating with servo.
- 2 ea. — Male connectors for mating with receiver.



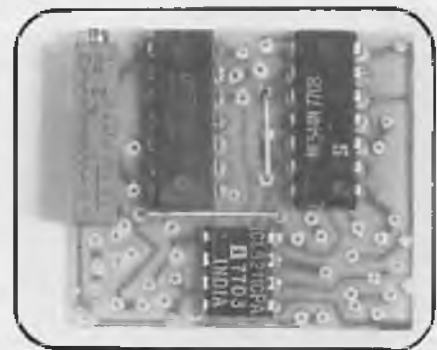
Tools required.



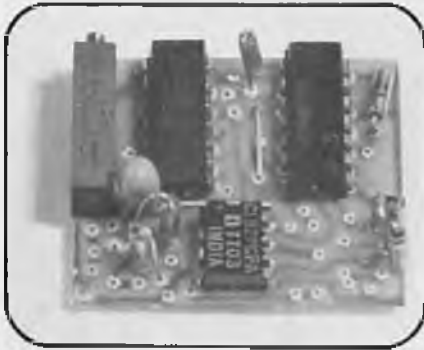
Parts before assembly.



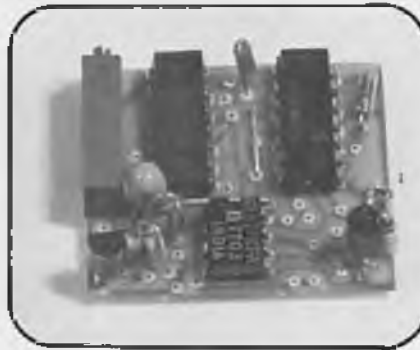
Drilling the P.C. Board.



Integrated circuits, jumpers and trimpot.



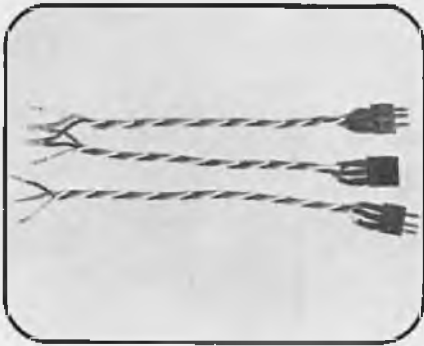
Capacitors added.



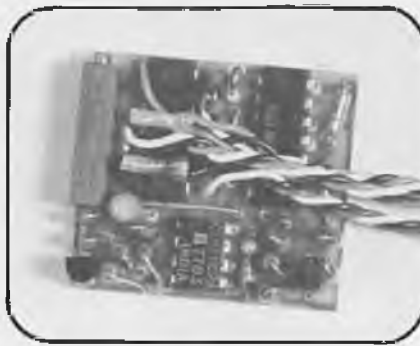
Transistors added.



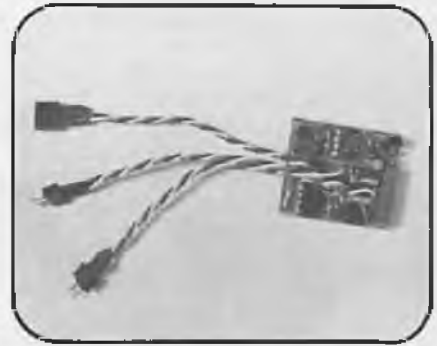
Resistors added.



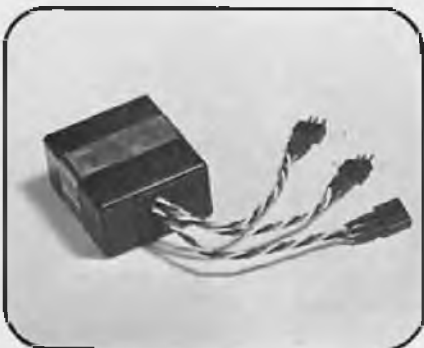
Cable and wiring.



Cable and wiring attached to unit.



Assembled unit without case.



Completely assembled unit.



Completed unit attached to RC system.



Author doing final checkout of unit.

For those who would like a complete parts kit for the "RC Model Protector," Royal Electronics Corp., 3535 S. Irving, Englewood, Colo. 80110, has made one available. The price is \$15.95 including P/C board and case. Connectors and instructions are not included.

Assembly:

Assembly of the Protector requires

very few tools. They include wire strippers, small diagonals, small needle nose pliers, a small screwdriver, solder and a 15-60 watt soldering iron. (Kwik-Wick solder braid and an ESV are also helpful, but not necessary. Kwik-Wick is used to soak up solder from traces if a component is installed incorrectly or if a solder bridge must be

removed.)

To guarantee success in assembling the Protector, the following points should be heeded:

(1) All parts must be installed exactly as shown on the component layout.

(2) All capacitors should be installed with the red (+) end up or laid in the

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Several times in recent years, modelers attending the Toledo Show have been intrigued by the big Mustang and other large models displayed in the booth of Byron Originals. If you've wondered what became of them, your curiosity will soon be satisfied. Byron Originals is the creation of Byron Godbersen, founder and president of Midwest Industries of Ida Grove, Iowa, a large manufacturing concern. The story begins many years ago when farmer Godbersen had some ideas for better items of farm equipment. He began to make and sell them. As an ex-farmer myself, who bought and used Midwest products, I can attest to their ingenuity and practicality, factors which contributed to the steady growth of the company. In more recent years, Midwest has branched out into products not related to farming.

Along the way Byron became interested in models and R/C flying as a relaxing hobby. About 5 years ago he decided to produce some big R/C kits of the large type of model he found most interesting. At that time, he was well ahead of the current "mammoth scale" phenomenon. In retrospect, some will ask why it has taken so long for the idea to reach the market. The explanation is contained in his statement about the project: "I decided that I'd do it right or not do it at all." So when he was not satisfied with something, it was re-done or a new approach tried. In fact, the Mustang is still under development, though proceeding, and another model, a 1/3 Scale version of the Pitts Special, will be available first, possibly in December.



The major parts of the kit. A very complete kit is planned, with everything furnished except radio, engine and covering.



Dean Copeland and Dwayne Zimmer check out the yellow Pitts prior to the demonstration.



As can be seen in the accompanying photo, it is mainly composed of molded foam parts. In itself enough to classify the Pitts as a quick-building ARF, the ready-made components theme is carried further with injection molded nylon cabane struts and outer wing struts, a stamped metal landing gear and fiberglass cowl and wheel pants. These features were accomplished by making a large investment in tools, molds and dies. The pay-off to the kit buyer is in work time saved. It can be assembled in one day!

The top of the wings and the fuselage have molded-in rib and stringer effects. The factory recommends covering the model with Top Flite's EconoKote, which can be ironed on at a low enough temperature that the foam is not melted. Upon first examination, the finished model looks like a built-up type and it's hard for viewers to believe it actually is an all-foam model. It could be flown unfinished, though it would be unattractive that way. Presumably it could also be painted with finishes that are compatible with foam.



Byron Original's prop unit, equipped with an O.S. .60 FSR. In the Pitts it turns a 20/8 prop.

The factory prototype models were featured during the lunch break at the Annual All-Sig Kit Fun Fly in Council Bluffs at the Cobra's field on Sept. 24th. Spectator's jaws dropped as Dean Copeland, District IX's AMA Scale Contest Board representative, put on a sparkling demonstration of the flying qualities of the foam biplane. Here, another advantage of the construction method became evident. The flying weight is just over 13 lbs. On 1440 sq. inches of wing area and with a power unit producing more static thrust than the weight of the model, not only are aerobatic qualities top drawer but the low speed stability and handling characteristics appear to be outstanding. Since an ARF model like this will attract purchasers who have little R/C flying experience, it had best be a forgiving design. The Pitts admirably fills the bill in this respect. It gets airborne with only a short run. On landings, Dean would slow it down to a walk and almost stop in mid-air before setting down gently on the runway --- another confirmation that in modeling, the way to turn a tiger into a pussycat is to get the wing loading down.

The Pitts is so light in the rear fuselage area that it qualifies as an almost unheard of rarity --- an exact scale model that is not tail heavy. The receiver batteries were placed behind the wing in order to arrive at the desired C.G.! The weight reduction program carried out

during development cut about 10 pounds off the original test beds. This reduced the load on the structure and, coupled with the naturally strong configuration of two wings tied together in a box-like assembly, the result seems to be an airframe with plenty of reserve strength.

After testing many chain saw and similar industrial engines, Byron is convinced that the better power/weight ratio and low vibration of standard model airplane engines make them the best choice of power unit. So, he will be producing a prop reduction unit suited for the Pitts and it will be available soon also.

Real innovations in the hobby are rare. My observation is that the Pitts qualifies for this category.



Angelo Tosti flew this blue and yellow Nosen Gere Sport to demonstrate the Jenkins V-Power unit.



The Jenkins V-Power unit.

A Krafty Arrangement

Another performer at the Annual Sig Fun Fly was Angelo Tosti, who brought up a Nosen Gere Sport from Kansas City to show off the potential of a new belt drive unit called Jenkins V-Power. Two Kraft .61's have been harnessed together to produce a formidable power plant that makes the big pipe, with all its built-in drag, a lively stunter. The engine (or do we call it engines?) loops the 27 lbs. of monster model from level flight with ease, repeatedly. There is little vibration and the 24/10 Grish Tornado prop turns at 6,000 rpm.

The drive belts run in toothed pulleys with a lot of surface. Very long belt life is claimed. Construction is rugged and it looks very strong.

With a displacement of 1.2 cu. in., the

unit is legal for competition under AMA rules if it were put in a 15 lb. airplane. (Though a number of proposals have been submitted to the AMA Scale Contest Board for higher engine and weight limits, these will not take effect, if passed, until 1980.) For further information on Jenkins V-Power, write: Jenkins RC Aircraft, Inc., 1127 Swift, N. Kansas City MO 64116, or call: (816) 474-9919.



Got A Screw Loose?

Quadra owners sometimes have trouble keeping their jittery hunk of vibrating engine on the fire wall. To prevent mounting screws from loosening, they've resorted to welding nuts to metal straps or to a backplate. For those without welding equipment there is an easier way. It involves use of the familiar blind nut technique. You can't get them at hobby shops as yet, but just about every hardware store carries larger sizes of blind nuts than modelers use. Generally they are called Tee-Nuts, but there may be other brands. The photo shows a Quadra mounted with 1/4" cap screws (with Allen head), 1/4" lock washers and 1/4" Tee-Nuts. To get into the tight places behind the carburetor, etc., the Allen wrench has been shortened by cutting it off with a motor tool silicone wheel. This combo can be cinched down tight enough to stay.



Tougher Tail Wheel

CB Enterprises make a shock absorbing steerable tail wheel assembly that many builders have used on scale biplanes and lightplanes. It works fine on the usual 5 or 6 foot span jobs but really wasn't intended for the heavy pounding provided by a 20 lb. Quarter Scale. Mike Gretz made up a heavy duty tail wheel by using the leaf springs from two CB tail wheel packages. This gives 8 leaves instead of 4 and doubles the carrying capacity. To prevent end play, a small

guide bracket was bent around and soldered to the leaves at the bottom near the tail wheel bracket. This is quite similar to the bracket seen on automobile leaf springs. Note that it is only fastened to the bottom leaf of those it goes around and the rest are left free to flex back and forth inside the bracket. Instead of using the tail wheel fork supplied by CB, Mike bent up a similar one sized for a larger wheel. The nylon horns for the rudder and tailwheel supplied in the CB package were used and are strong enough. The springs supplied, though, are too light so he replaced them with heavier springs. Various sizes of springs can be found at hardware stores and machinist's supply houses.



Big Dummy

Span Aero, one of the pioneers of Mammoth Scale with their Cubs, have introduced a dummy engine in Quarter Scale size. This is suitable for Cubs of course, but will also work out for other airplanes with exposed flat four engines. Cast in black plastic, additional details can be added for a fine scale effect. Cost is \$16.95 from Span Aero, 4 Beverly Place, Norwalk CT 06850, phone (203) 847-7861.



An ABS sheet plastic cooling shroud and a carved balsa exhaust pipe add the finishing touch to this Span Aero dummy cylinder installation on a 1/4 Scale version of Hazel Sig's Clipped Wing Club.

Footnotes

If someone is looking for a good specialty item, my suggestion would be dummy engine cylinders for exposed flat fours in sizes smaller than Quarter Scale. It is one of the most asked "where can I get . . ." questions that come in the mail. □

RUN WHATCHA BRUNG!

By Walt Wilson
Photos by Duane Blow

A couple of years ago many Spirit of St. Louis R/C Flying Club members wanted very much to do some pylon racing. The problem was that the members couldn't agree on what to race. Most agreed that we weren't ready for Formula I. Some wanted to race Quarter Midgets, some wanted to have one-airplane events like Spirit of St. Louis Quarter Midget racing. Others wanted to race Skooter II's and 15-500 types, while still others wanted to race Quickie 500's. Some members just wanted to race whatever they had. We established a Spirit of St. Louis Quarter Midget event, and interest is still running high in that area.

I was a new contest director at that time and, to please as many people as possible and encourage as much participation as possible, I worked out a handicapping formula to equalize the various sizes and types of planes and engines so that people could race whatever they had.

Using the AMA open pylon wing area and airfoil thickness rules as a base, I handicapped planes with up to 50 square inches less area than specified one-half lap; planes with 51 to 100 square inches less area were handicapped one lap. Planes with wings more than 100 square inches undersize were not allowed. Planes with more than 50 square inches too much wing area got one-half lap head start. Planes with more than 100 square inches too much area were given one lap head start. Planes with less than 15% airfoil thickness were handicapped one-half lap. One lap was the maximum handicap or head start. Only front rotary valve engines were allowed, with the exception of the K & B .15, and engines were required to idle slowly enough so that the plane wouldn't roll at the starting line.

At the first race we found that Quarter Midgets didn't have a chance under these rules. They were handicapped a full lap, and most .60 powered pattern ships were given a one-lap head start. Art Biehl, flying a pattern ship, won the first race, followed by .40 powered 15-500 planes. These were fast enough to have won, but had various problems in the heats they flew against Art.

Joe Naber was contest director for the second "Run Whatcha Brung," and we



Walt Wilson with typical Run Watcha Brung racer. O.S. .40 FSR powered Skooter II with wingtips extended to comply with 500 square inch requirement.



A pair of Spirits in foreground patiently wait for third Spirit with balky engine as starting time runs out.



Al Poole's winning Mach 1 with piped Webra .60.

collaborated to correct some of the obvious deficiencies. We eliminated the handicap for legal Quarter Midgets and started them heads up with the 15-500 types. Ray Sargent, flying a K & B .40 powered Skooter II with the wing



Author Walt Wilson and son Larry with Cox and Rossi powered Spirit of St. Louis Quarter Midgets.



Dick Teneau's Spirit Quarter Midget rounding Pylon No. 1.

extended to 500 square inches won the second race. Quarter Midgets fared much better than previously, with one placing third.

I was contest director for the third "Run Whatcha Brung." Quickie 500 racing was gaining popularity, and some of the other clubs in the area had Quickie races scheduled. I eliminated the handicap for airfoils thinner than 15% to encourage building of Quickie airplanes that would be competitive elsewhere. Some strange looking wings appeared, but the third race was won by Al Poole, flying another large pattern ship with a piped Webra .60. Nobody could overcome the one lap head start. Times recorded indicated that some Quickies and Quarter Midgets could have caught Al, but they had so many problems in the heats they flew against him that they couldn't win.

Joe Naber was contest director for the fourth "Run Whatcha Brung," and again we evolved the rules to make the underdog more competitive. Pumpers, pressure, and pipes were not allowed. Quickie 500 and other planes with airfoils thinner than 15% were

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LOGBOOK:

A Woman's First Year in R/C

By Phyllis Moorman



April, 1978. It's been one year since I started building my first R/C model, and six months since my husband started nagging me about writing this article. We had been talking about the fact that I am the only woman flier in our club, and he insisted that I write an article to share my experiences in learning to fly R/C.

First of all, let me say that I think R/C modeling is more difficult for most women than for men. Now before I'm stoned to death by women wearing "ERA-Now," T-shirts, let me explain.

The reason I say that R/C flying is more difficult for a woman is that most of us women start out without the mechanical and modeling background most of you guys have built-up from boyhood. Very few of us girls spent our time building U-control models, plastic ones or, for that matter, doing much of anything in the building line. Very few of us tinkered with engines like our boyfriends did. Very few of us know even the basic fundamentals of how airplanes fly. And again, very few of us know enough electronics to be able to understand the functions of our R/C systems. All these factors go together to make most women enter with a handicap; a lack of some of the basic understandings most men start out with.

The main reason I mentioned this at all is to give some of you guys who tried to teach the wife, but gave up, something to think about -- she might not understand the uses of a **blind nut**, let alone a differential aileron connector . . . or even an aileron. And that's not from lack of intelligence, but from lack of experience and knowledge. It's like a man not knowing how to sew. Imagine that!

When I started building my first R/C plane, an RCM Trainer .40, it was the first model kit I'd ever laid my hands on. I couldn't read the symbols on the plans, I didn't know the names of some of the parts (vertical stabilizer?!?), and I didn't know the basic techniques involved in building a straight, strong, light airplane. Luckily, the RCM Trainer .40 came with a complete and relatively basic set of plans and instructions, and I had a good friend to help me. I finished the plane

and my instructor tested and trimmed it in mid-April, 1977. Great. I flew it for short parts of five flights, then lack of experience told. Seems that, on the plans, way up in the corner, in smallish print, was a little note: Reinforce the center section of the wing with fiberglass cloth and epoxy. Whoops!! As I recall it was a split-S that snapped the wing in half and turned the Trainer .40 into chips. The guys called it the best crash of the year.

Okay, pick it up, send off the radio, buy

parts for the OS .40 and get a new RCM Trainer .40 kit. The old wing was fine; I just glued it back together --- with fiberglass cloth and epoxy this time.

Working night and day --- literally --- I had the new plane ready to fly the next weekend, and I settled down to learn how to fly. As I learned to steer the plane round the sky, I also picked up, from the great bunch of conversationalists out at the field, as well as from the model magazines and my instructor, some of those fundamentals of flight, building, and electronics I'd started without initially.

I learned my Figure 8's, and started take-offs. At this time I was, as I guess most beginners are, amazed at the number of things you must think about at once; rate of climb, power setting, roll control, elevator. It's a lot to keep on top of, all at one time. Finally, with a lot of practice and a very patient instructor, who managed to hide his surprise when I made some amazingly naive errors, I went on to low approaches and then, in early August, he coaxed me into my first solo landing. I kept practicing, making 2 or 3 landings in a day's flying, until the end of August. By that time, the old Trainer .40 was getting pretty banged up. Just too many hard landings.

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THE AUDIO FLIGHT TIMER

By Alfred I. Anderson



I really enjoy flying model planes. I mean I enjoy it to the extent I seem to forget exactly how long I've been boring holes in the sky. The other day was a perfect example . . . I was several hundred feet out and less than "one mistake" high. In the prior minutes I had been looping and rolling in preparation for a smooth inverted low pass. Now the time had come, secretly hoping that all my buddies were watching, I double checked my position. Perfect! Now just a tad of aileron for a nice 180° roll (remember the down elevator) — Whoops! What was that sputter? Gosh darn it, I must be out of gas. Those remaining seconds (seeming like hours)

resulted in a most undignified three-point landing (that is wingtip, tail, and one gear) in the tall weeds that surround our field. In retrospect, I am truly grateful that I didn't start that roll five seconds earlier — upside down landings are rather rough on tails and cockpits!

Back in the shop that evening, I concluded I needed some sort of indicator to let me know how long I have been flying. I have seen electronic fuel gauges before and gave serious thought to building one. However, they have one serious disadvantage. You have to look at them! Since I usually watch my undulating plane, I figured I would just forget to look at the meter after the novelty wore off. The next idea was the

pre-settable timer. This device will produce one tone so many minutes after it is turned on. Clever idea but it really wasn't what I wanted. I can just see myself in another inverted low pass with my engine sputtering and a timer that has just begun to buzz incessantly.

Being an electrical engineer by profession, I thought it would be a fine idea to combine the fuel gauge concept with the audio timer idea. In this manner the Audio Flight Timer (or AFT for short) was born. The specifications were simple. Every minute, the AFT should tell me the elapsed flight time. That is, after one minute the AFT should beep once. One minute later it should beep twice indicating two elapsed minutes.

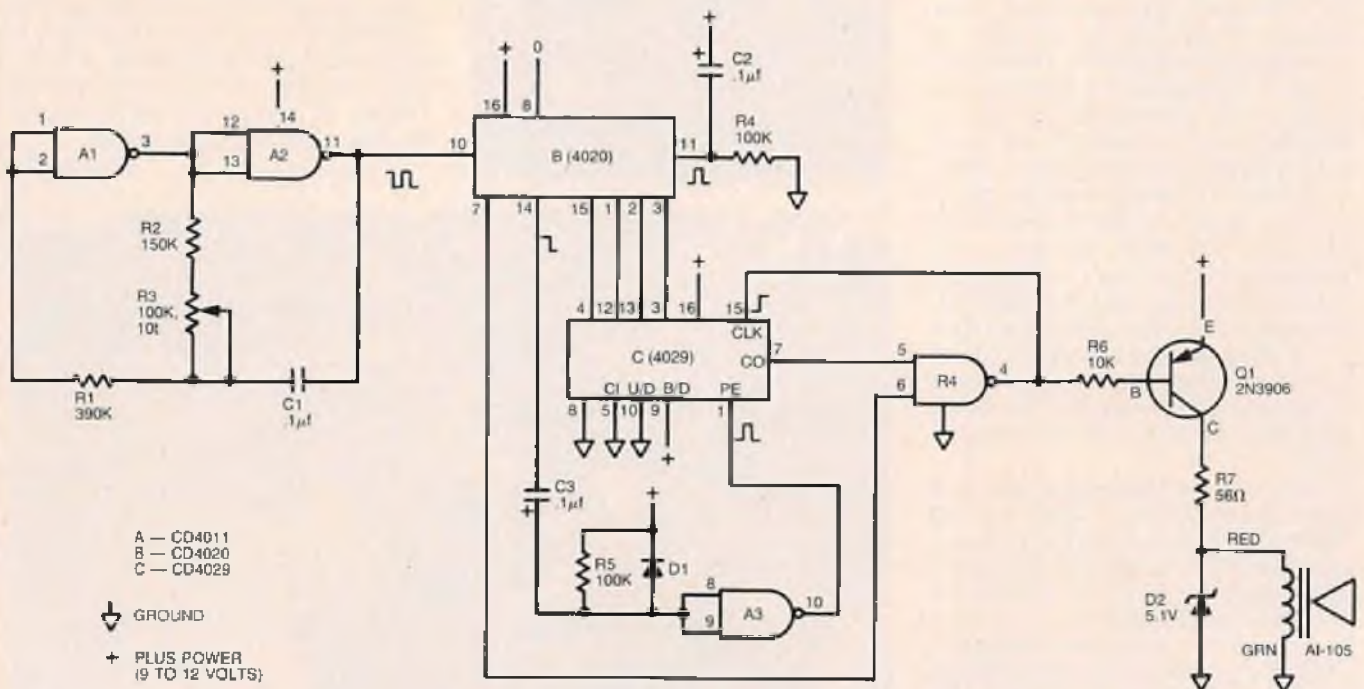


FIGURE 1
AUDIO FLIGHT TIMER SCHEMATIC

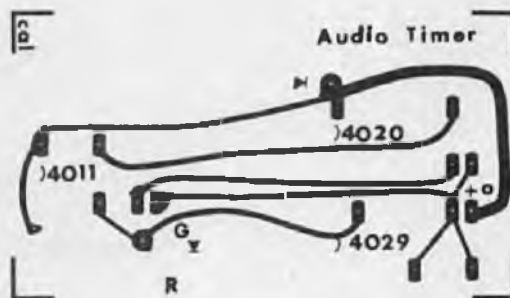
Eight beeps would mean eight minutes and so forth. These one minute updates will act as a constant in-flight reminder. Also, because it would specify the elapsed time every minute, I won't have to remember how many times it has beeped before. The final specification may well be the most important. I never want to adjust it, look at it, or even turn it on. I just want to use it. Since the AFT is powered by the transmitter batteries, whenever I'm transmitting I am also timing. By the way, this side benefit has eliminated by infamous "left on transmitter no batteries left" syndrome.

This AFT is simple and straight-forward to build. It is all made possible by a small Audio Indicator that is manufactured by Projects Unlimited. This transistorized buzzer does not have contacts that will arc and interfere with your transmitter. The buzzer works by causing a small reed to vibrate against a plastic diaphragm resulting in a loud (80 db) 400 Hertz tone. In actual operation, with the AFT hidden deep inside of the transmitter, the tone is easily heard (and felt) over the roar of a nearby engine. The AFT is also fairly inexpensive. I built the prototype back in 1976 at a total cost of \$13.37. Since then, it has more than paid for itself in convenience alone, not counting the elimination of damage from inopportune deadstick landings.

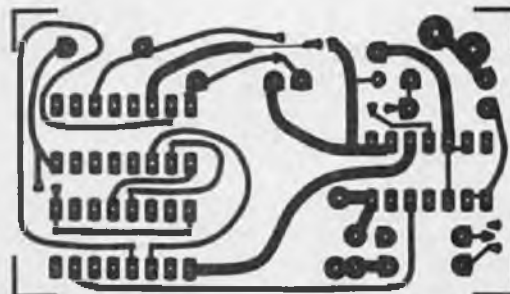
THEORY OF OPERATION

Before building (or designing) a circuit, it is best to understand what it is supposed to do. The AFT is no exception. It consists of four separate sections: time base, counter, sequencer, and audio output. Each of these sections is independent, which simplifies the design and maintenance. The circuit makes use of three inexpensive CMOS digital integrated circuits. This results in very low power consumption (a negligible 0.5 milliamps) and can run directly off the transmitter batteries.

The time base is generated by two NAND gates inside a CD4011. The output is a square wave whose frequency can be adjusted by R3 (see the schematic in Figure 1). The particular component values were chosen to reduce sensitivity to temperature changes. These square waves are fed to a CD4020 ripple carry register (binary counter). This IC divides the input frequency by multiples of two. We will make use of the four outputs that toggle at 1, 2, 4, and 8 minute intervals. Each time the 1 minute output changes (indicated by a high-to-low transition on the 30 second output), we transfer these minute outputs into an up/down counter (CD4029). This counter is then used to drive the tone generator by making the IC count down with a one-second square wave (also from the CD4020).

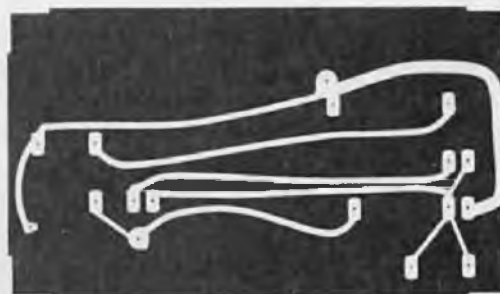


TOP

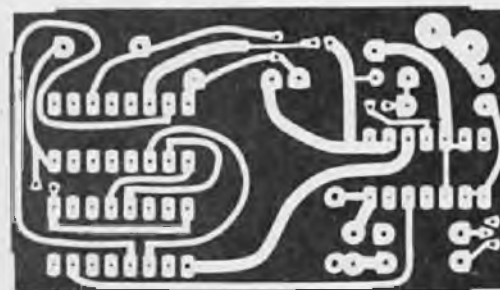


BOTTOM

FIGURE 2
AUDIO FLIGHT TIMER
PC BOARD POSITIVE IMAGES



TOP



BOTTOM

FIGURE 3
AUDIO FLIGHT TIMER
PC BOARD NEGATIVES

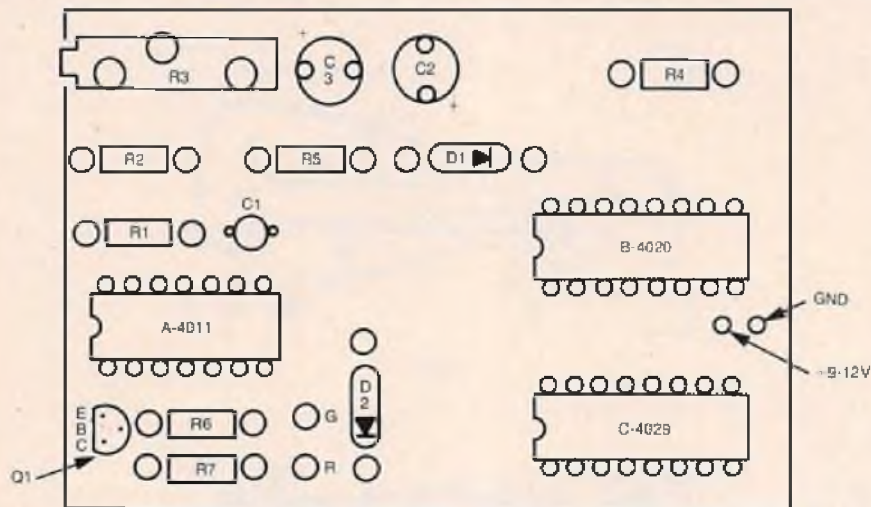


FIGURE 4
AUDIO FLIGHT TIMER
PARTS PLACEMENT

The counter drives a transistor which, in turn, supplies current to the transistorized buzzer thus producing a tone that lasts about 1 second. When the counter has counted down to zero, it inhibits itself until the next 1 minute update comes along. Whenever power is applied to the circuit, a reset pulse passes through C2 insuring the timer starts counting from zero.

CONSTRUCTION

I usually build small circuits like this directly on a printed circuit board. The artwork is included (a positive in Figure 2 and a negative in Figure 3) for those who would like to make their own boards. Although this is a double sided board it is no more difficult to make one of these than a single sided board if you are careful. If you would rather not make a PC board, the circuit can be assembled on Vector board or any other medium you are familiar with. Remember to keep it small so it will fit inside your transmitter. With the exception of the buzzer, all components are standard and can be purchased from many sources. For reference, I have included the names of the vendors I purchased my parts from (see Table 1). These people have always served me well and I take pride in recommending them to you. The prices do vary from time to time. A quick check in the back pages of an electronics magazine or a letter to the vendor will provide accurate data.

The general rule to follow when assembling a circuit is to mount the smallest components first. This allows them to be pushed down tight against the PC board when they are soldered. Following the parts placement diagram (Figure 4), mount and solder all of the fixed resistors and the Zener diode. These should be followed by the Molex

pins that will hold the integrated circuits. Install the capacitors, the transistor, and the variable resistor next. Complete the construction by soldering the red and green wires from the AI-105 to the PC board and inserting the integrated circuits into the Molex pins. I mounted the transistorized buzzer with a piece of double-sided carpet tape. I wouldn't recommend servo tape or silicone because these will act as a sound insulator and reduce the volume of the buzzer. We want the darned thing to be as noisy as possible so give it a solid mounting.

ADJUSTMENT

The calibration of the AFT is real tough — apply power and turn the screw

on the potentiometer (R3) until the tones are one minute apart! If you have access to an oscilloscope or a frequency counter, adjust the pot for a frequency of 17.07 Hertz (58 milliseconds) at the input to the CD4020 (pin 10). This will properly calibrate the time base so that tones will be generated at one minute intervals.

INSTALLATION

The finished unit is so small it can usually be inserted inside your transmitter. This is really the best place as it is shielded from dirt and the outsides of your box aren't disfigured. The exact mounting technique depends upon your transmitter, but I have successfully used tape to hold it against the back cover in one box and miniature L brackets in another. After mounting, run wires from your power switch (or encoder board, whichever is more convenient) to the power pins of the AFT. That completes the installation.

USE

After two years of use, it is hard to imagine what it is like to fly without the aid of this device. Unlike other indicators, it doesn't require any intervention for proper use. After starting the engine and taxiing to the runway I may "blip" the transmitter power switch briefly to re-set the AFT back to zero. I then proceed to take-off and chase any unwary sparrow that comes too close. After 5 to 12 minutes of flying (depending upon the plane I've got up) I simply circle and land. The whole flight was monitored by the AFT and every minute I was reminded of my elapsed time. What could be simpler? □

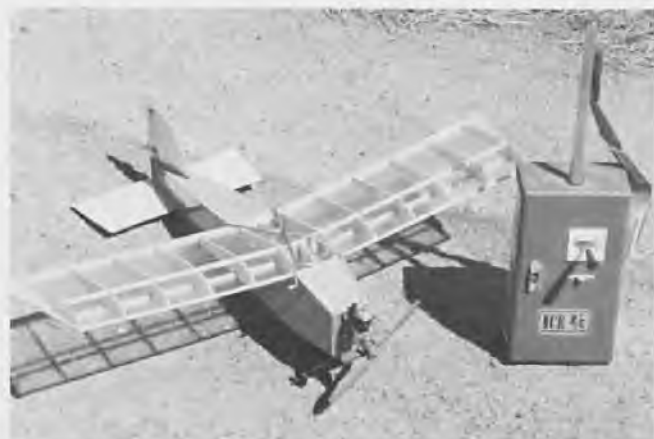
TABLE 1
PARTS LIST

Qty.	Type	Source	Cost	Total
1	56 ohm, 1/4w, 5% resistor	Digi-Key	.05	.05
1	10K ohm	Digi-Key	.05	.05
2	100K ohm	Digi-Key	.05	.10
1	150K ohm	Digi-Key	.05	.05
1	390K ohm	Digi-Key	.05	.05
1	100K, 10 turn trimpot	James	1.35	1.35
3	0.1 mid tantalum caps	James	.28	.84
1	1N914 (1N4148) diode	Digi-Key	.05	.05
1	1N5231B, 5.1v Zener	Digi-Key	.15	.15
1	2N3906 transistor	Digi-Key	.16	.16
1	CD4011	Digi-Key	.23	.23
1	CD4020	Digi-Key	1.14	1.14
1	CD4029	Digi-Key	1.14	1.14
46	Molex pins	Digi-Key	.009	.41
1	AI-105	Projects U.	5.95	5.95
1	PC Board	on hand	1.00	1.00

Digi-Key, P.O. Box 677, Thief River Falls, Mn. 56701.
James Electronics, 1021-A Howard Ave., San Carlos, Ca. 94070
Projects Unlimited, 3680 Wyse Road, Dayton, Ohio 45414

RCM PRODUCT TEST

Ace R/C LITTLEST STICK



The Littlest Stick is a sport model for the advanced rudder only flier. As an added distinction, with a 19½" wingspan and 5¾ oz. weight, it probably qualifies as one of the smallest models. I know, at \$3.95, that it must be the cheapest R/C model. The kit comes packaged in a clear plastic bag about 1/2" x 3" x 15". Unbelievably, the kit includes all of the accessories necessary to build the model except wheels --- wire for the torque rod and gear, nylon bearing, shrink tubing, and hinge thread.

The instructions are simple as is the model construction. With the exception of the firewall and one other former of 1/16" ply, the fuselage is built exclusively of 1/16" balsa. The only modification that I made while constructing the kit was the replacement of the 1/16" ply firewall with one of 3/32" ply. I wanted more bite for the wood screws used to mount the engine. Rather than build in the trike gear as shown, I bent the supplied wire into a two wheel configuration and mounted it to the firewall with thread and epoxy. Ace 1/2" nylon wheels (35¢ pair) were used. This not only made construction easier, but it also saved the cost of a pair of wheels. The wing is all balsa with two 1/8" square balsa spars and a 1/8" square leading edge. There is no sheeting. A 1/16" ply brace is used to set the dihedral.

My Littlest Stick was covered with clear Topcote on the horizontal and vertical stabilizers and the wing. The fuselage was covered with orange MonoKote. The firewall was brushed with epoxy and the Pee Wee .020 was screwed into place. Total building time was two evenings using Titebond and Ambroid. Hot Stuff was used to tack the glued parts so work could proceed. With the radio installed as per the plans, only a few lead BB's were needed in the nose to balance the model exactly on the spar. If you can believe it, my model weighed 5¾ oz. Exactly the manufacturer's recommended weight.

Because of its fragile appearance and no deep grass to test glide it, I decided to jump right into flight tests. My technique for test flying is to hold the model until only about 15 seconds of fuel remain. That way, if it is seriously out of trim, I won't have to fight it too long. As it turned out, one washer under each upper motor mounting screw was all that was necessary to trim it.

My first impression was that it climbed like a rocket compared to other pulse rudder models that I have flown. This means that precious fuel isn't wasted in a climb to maneuvering altitude. Speaking of maneuvering, this model responds to rudder commands **right now**. This is the only pulse rudder model that I have flown that will do a roll from level flight --- and it is a fast roll, not a sluggish wallow.

All is not roses, however. When the engine quits, the glide is

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IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging		●				Pre-Shaped Parts			NA		
Plans		●				Parts Match to Plans		●			
Written Instructions		●				Overall Parts Fit	●				
Quality of Hardwood			NA			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 LITTLEST STICK
 Aircraft Type Sport --- Rudder Only
 Manufactured By Ace R/C
 116 W. 19th St.
 Higginsville, Missouri 64037

Mfg. Suggested Retail Price \$3.95
 Available From Both Mfg. & Retail
 Mfg. Recommended Usage General Sport
 Wing Span 19½ Inches
 Wing Chord 4½ Inches
 Total Wing Area 83 Square Inches
 Fuselage Length 15½ Inches
 Radio Compartment Dimensions (L) 4½" x (W) 1¼" x (H) 1¼"
 Wing Location Shoulder Wing
 Airfoil Flat Bottom
 Wing Planform Constant Chord
 Dihedral (each tip) 1¼ Inches
 Stabilizer Span 7 Inches
 Stabilizer Chord (incl. elev.) 2½ Inches
 Total Stab Area 16½ Sq. In.
 Stab Airfoil Section Flat
 Stabilizer Location Bottom of Fuselage
 Vertical Fin Height 2¼ Inches
 Vertical Fin Width (incl. rod.) 3 Inches
 Mfg. Rec. Engine Range TD .010-Pee Wee .020
 Recommended Fuel Tank Size On Engine
 Landing Gear Tricycle
 Recommended No. of Channels 1
 Recommended Control Functions Rudder
 Basic Materials Used In Construction:
 Fuselage Balsa & Ply
 Wing Balsa
 Tail Surfaces Balsa
 Hardware Incl. in Kit See Text
 Plan Size 8½" x 11" (3 sheets)
 Building Instructions on Plan Sheets Yes
 Instruction Manual No
 Construction Photos Yes
 Kit Includes Die-Cut Parts
 Mfg. Rec. Flying Weight 5¾ Oz.
 Wing loading based on rec. flying wt. 18 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly 5¾ Ounces
 Wing Loading 10 Oz./Sq. Ft.
 Covering & finishing materials used See Text
 Engine Make & Disp. Cox Pee Wee .020
 Muffler Used No
 Radio Used Ace R/C Pulse Rudder
 Tank Size Used Not Given

ARIZONA FLY-IN

By Bill Laskar

Luke AFB Auxiliary Field #2, Phoenix, Arizona. The early morning sun ricocheted off the bubble canopy of the P-51 as it zig-zagged down the taxi strip and turned into the light breeze blowing across the desert. After a short hold to check for landing aircraft, the trim fighter accelerated rapidly down the runway, made a tight 180 and roared back across the field for a high speed pass. March 18, 1943? Nope. It's 1978 and the start of the 3rd Bi-annual RC Fly-in for Biplanes and Sport Scale.

Sponsored by the 1/8 Air Force (more about that later), the Fly-In was the kind of meet you dream about but seldom find. For instance, no entry fee, awards for both static and flying skills, air show aerobatics and flying demonstrations (all RC), plenty of open and fun flying, over \$1000 worth of donated prizes, distinctive trophies and lots of nice, friendly southwestern hospitality.

The fun started about 9 a.m. Saturday with Kent Walters, Contest Director, "Big Al" Casey on the P.A. system, Kathi Casey and Lorna Linne handling the registration chores, Mike Rust in charge of frequency control, and with Bob Sortor as flight co-ordinator, it wasn't long before the first plane was airborne. And before the weekend was over, 67 pilots and 95 aircraft of assorted vintage and configurations were signed up to take part in the festivities.

By 10 a.m. the sky over the field looked like O'Hare International at high noon. Fokkers, Corsairs, Cessnas, Fan Jets, Twins, Aeromasters, and even a miniature parachutist competed for air space. But it wasn't as chaotic as you might imagine. Actually, it all went pretty smooth, and here are some of the reasons.

The 1/8 Air Force (whose insignia is the famed 8th Air Force emblem of WW II, with the word **one** placed at the top of the emblem) is a ten man committee made up of members from the Sun Valley Flyers, Miniature Aircraft Pilots Assn., and the Arizona Radio Control Society, all based in the Phoenix area. The committee's main function is to promote all RC Scale aircraft activities. Hard working members Kent Walters, Bob Frey, Dave Linne, Bob Sortor, Jack O'Dell, Frank Bigelow, Walt Pribble, Al Casey, Larry Lemons, and Dan Parsons, from Albuquerque, came up with a neat concept for running a fly-in.

For example, selecting judges for the flying competition was simplicity itself. You merely told the chief judge that you were ready to fly off your required nine



LEFT: Walt Pribble, Arizona, made the Outstanding Flight Award trophy presented to Gerald Martin and Ted White, Texas.

Trophy Winners, Phoenix Biplane & Sports Scale Fly-In March 18-19, 1978

Flight award winners for Biplanes

- 1st. Ted White, Texas. Pitts S-1S biplane
- 2nd. Gerald Martin, Texas. Aeromaster
- 3rd. Art Marshall, Arizona. Sky Bolt

Flight awards for Military aircraft

- 1st. Kent Walters, Arizona. FG-U Corsair
- 2nd. Hank Hansmann, Arizona. P-51 Mustang
- 3rd. Bert Baker, Calif. SN-J2
(Bert is the Sqdn. CO of the Scale Squadron in Calif.)

Flight awards for General aviation

- 1st. Jack O'Dell, Arizona. Fairchild F-27 twin
- 2nd. Bob Frey, Arizona. 1/4 Scale Mr. Mulligan
- 3rd. Art Marshall, Arizona. Pielenpol

Static Display winners

- 1st. Dave Linne, Arizona. Pitts S-2A
(Also the Peoples Choice winner)
- 2nd. Allen Arnold, Calif. FW-190
- 3rd. Dan Watkins, Calif. T-28 Trainer

Outstanding Flight Achievement Award won jointly by Ted White and Gerald Martin, both from Texas.

maneuvers (and you could choose the ones **you** liked the best), and he picked, at random, two other pilots who were not flying and available to judge you. Then, when **you** were not busy flying, you would be called upon to judge your fellow pilot while he did his bag of tricks. The plan worked great and there were no protests. Ever been to a fly-in like that?

The static judging was equally unique. Each registered pilot was given a judging form for one of three categories: Military, Biplane, and General Aviation. Each aircraft had an assigned number displayed on its wing, and the judge could award up to 30 points to each

plane in his category sheet, including his own plane if it was on his sheet. The judges were encouraged to judge the plane on overall impression as well as scale detailing. This made for fair and objective judging and everyone seemed happy with the system. Even the spectators became active participants by being allowed to vote on the plane of their choice.

The static display area, located away from the flight line and the hazards of prop blast and blowing oil spray, was arranged to afford maximum viewing and photo angles for the spectators. There was plenty of room to walk around the planes, with plenty of room for the photo fans, and they loved it.

Meanwhile, back at the flight line, the pilots were assembled for a briefing by Kent to explain the few necessary rules and to put special emphasis on strict safety regulations.

After a last sip of free, fresh Arizona orange juice, the pilots rushed to the impound area to get their transmitters and frequency clips --- then back to their planes for qualifying flights or just plain fun flying. Again, their choice. No pressure, no hassle. Great.

And such fun flying! Like Marty Moad from Las Vegas, Nevada, flying his all red ME 210 twin through a series of maneuvers that would have gladdened the heart of Oberst Adolph Galland himself. Or Dan Parsons with his brand new scratch-built Martin-Baker 5, a beautiful flying replica of a little known British fighter of WW II. He flew it for the first time at the meet, and it performed like a winner. Then, there was Bob Frey from Phoenix, doing slow rolls and loops at scale speed with his 9' wingspan Mr. Mulligan. And Larry Wolfe making high speed rolls and passes with his fantastic Mirage fan jet. Larry Lemons flew an Aeromaster in front of the crowd, towing a 12' banner proclaiming to all that this was an RC fly-in, in case anyone might be in doubt. And, mingled in with all the sound and fury, was the soothing voice of Casey at the mike, giving the folks a fly by fly description of all the action. Cool pilot skill and the watchful eye of that **great pilot** above prevented any mid-air collisions in a scene right out of a 1930's air epic movie.

There was more to come, but there was also a big Saturday night party at Bob Frey's house which everyone was looking forward to with much anticipation. So along about sunset (and they are glorious in Arizona) the pilots and crews packed up, wiped the castor oil off their hands and headed for Bob's.

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ABOVE: Bob Frey's 1/4 Scale Mr. Mulligan. BELOW: Guy Lains Big John with smoke trail.





Static display area.



Charles Beverson adjusts wing strut on 1/4 Scale Mr. Mulligan. Charles is from Phoenix.



Dan Parsons, Albuquerque, with Marty Moad, Las Vegas, peaks up engines on P-38 before fatal last flight.



Parsons & friends return with remains of ill fated P-38.



Pit area.



Close-up of Albatros pilots after crash landing. Rick Westlake's Albatros B-1.



Kent Walters & Corsair, held by Gerald Martin, Air Force pilot who flies a Corsair in TV show "Black Sheep Squadron."



Alan Arnold & son Greg, California, work on nose gear of A-4 Skyhawk for jet.



Jerry Hermanek, Phoenix, adjusts wing on static display entry SE-5 (Top Flite).



Rick Westlake, Calif., checks his Albatros B-1, a modified Proctor Antic Bipe.



Al Casey's P-51 being photographed by camera fan (Oscar Medina).



Fred Foster, Arizona, with his scratch built Fleet Bipe & Parachutist.



Photo fan takes close-up of tail pipe on Larry Wolfe's Fan Jet Mirage.



Dan Watkins and his trophy winning T-2B.



Dan Parsons taxis his scratch built MB-5 British Fighter.

RCM PRODUCT TEST

Skymaster Ind. LUCKY LADY



The Lucky Lady is a basic trainer and general sport aircraft designed by Chuck Cunningham and produced by Skymaster Industries. The kit is available direct from the manufacturer. Kit packaging is excellent with a compartmented box suitable for shipping. Wood parts are good quality, straight, and match the plans closely. Shaped parts are machined cut. A minimum amount of trimming is required during construction. Parts are grouped into fuselage pack, tail pack, etc., for easy identification. The hardware pack consists of pre-bent landing gear, control horns, hinges, nylon nose gear bracket and wire, nylon tailwheel bracket, nylon tank hatch screw and aileron bellcranks.

Construction of the fuselage sides is straightforward and done on the plan. Three shaped pieces of 1/4" balsa sheet are joined to form the section forward of the wing trailing edge. The aft section is balsa truss construction with spruce lower longerons for strength. The forward sections are reinforced internally with 1/4" x 1/2" balsa diagonal bracing in the cabin

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

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

SPECIFICATIONS

Name LUCKY LADY
 Aircraft Type Sport Trainer
 Manufactured By Skymaster Ind.
 2440 Colonial Parkway
 Fort Worth, Texas 76109

Mfg. Suggested Retail Price \$80.00
 Available From Direct from Mfg.
 Mfg. Recommended Usage General Sport
 Wing Span 72 Inches
 Wing Chord 12 Inches
 Total Wing Area 860 Square Inches
 Fuselage Length 49 Inches
 Radio Compartment Dimensions (L) 11" x (W) 3 1/2" x (H) 7 1/2"
 Wing Location High Wing
 Airfoil Flat Bottom
 Wing Planform Constant Chord
 Dihedral (each tip) 3 Inches
 Stabilizer Span 24 Inches
 Stabilizer Chord (incl. elev.) 8 1/2 Inches
 Total Stab Area 204 Square Inches
 Stab Airfoil Section Flat Bottom
 Stabilizer Location Top Of Fuselage
 Vertical Fin Height 8 Inches
 Vertical Fin Width (incl. rud.) 9 1/2 Inches
 Mfg. Rec. Engine Range45-.61
 Recommended Fuel Tank Size 12-16 Ounce
 Landing Gear Tricycle or Conventional
 Recommended No. Of Channels 4
 Recommended Control Functions Rud., Elev., Throt., Ail.

Basic Materials Used in Construction:

Fuselage Balsa, Spruce, Ply
 Wing Balsa, Spruce, Ply
 Tail Surfaces Balsa & Spruce
 Hardware Included in Kit See text
 Plan Size 34" x 62" (1 sheet)
 Building Instructions on Plan Sheets No
 Instruction Manual Yes (4 pages)
 Construction Photos No
 Kit Includes Shaped Parts
 Mfg. Rec. Flying Weight 104 Oz.
 Wing loading based on rec. flying wt. 17.3 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly 119 Oz.
 Wing Loading 19.8 Oz./Sq. Ft.
 Covering & finishing materials used See Text
 Engine Make & Disp. O.S. 45FSR Schuerle
 Muffler Used Closed
 Radio Used Kraft
 Tank Size Used 12 Oz.

showcase '79

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



PRO-CISION'S RACEABLE QUARTET

Pro-Cision's eagerly awaited 400 series of radio controlled raceable cars are now on retailer's shelves. Two Maserati Boras and two BMW 3.5 CSL's make up the 400 series. Each is an incredibly detailed 1/16th scale model of the original full-sized car and, since each car has its own frequency, they can be raced together. All have variable speed control, and true proportional steering is made easy by a steering wheel control on the transmitter. Trim adjustments on the transmitter assure exacting wheel alignment. All cars have a reverse function. Pro-Cision recommends nicad batteries for long life and low cost operation. A Pro-Cision charger is available which plugs into the car so you can charge nicad batteries for more than a thousand times without removing them from the car. Pro-Cision president, Joe Baer, reports that his famous 18 Wheeler truck which hitches and unhitches its trailer on radio controlled command has made such a hit with truckers that it is being sold in truck stops across the country.



K & B 7.5cc READY-TO-RUN DUCTED FAN ENGINE

This engine was specifically developed and engineered for ducted fan operation. Equipped with Perry pump/carb., it features the ABC combo

— chromed brass sleeve and low expansion aluminum piston; con-rod — machined from 7075-T56 solid aluminum bar stock — bushed both ends; ball bearing; high performance head — machined from solid aluminum bar stock; K & B's quintuple porting. Manufactured by K & B Mfg., Co., 12152 Woodruff Ave., Downey, Calif. 90241.



1/2A STEERABLE NOSE GEAR

The Du-Bro Products 1/2A Steerable Nose Gear is the finishing touch for your 1/2A model. Small, lightweight and easy to install, it features an adjustable steering arm and straight 3/32" nose gear wire which can be bent to your specifications. Complete with mounting screws. Price \$2.25 from Du-Bro Products, 480 Bonner Road, Wauconda, Ill. 60084.



SERVO GARD

A new fail safe device has been introduced by R.F. Enterprises. It is an electronic device to help promote safety for R/C enthusiasts. The device called a Servo Gard is encased in a KPS 14 servo case and is connected between the receiver and the throttle servo. It constantly monitors the battery voltage and the radio frequency signal. If the battery reaches a critical pre-set voltage where there is a 10% to 15% reserve, the Servo Gard automatically returns the throttle to an idle position. The aircraft can then be glided to a safe landing with all the controls except the throttle. If the radio signal is lost in the transmitter or the receiver, the Servo Gard will bring

the throttle to an idle position. Since all control is lost during radio failure, then the aircraft will still crash but it will be at an idle instead of a high throttle setting. The Servo Gard is ideal for spoilers on gliders and is a must for radio controlled cars and boats. Price \$49.95. Servo Gard is available direct from R.F. Enterprises, 106 N. Main, Arlington, Ohio 45814.



ENGINE CYLINDER

William Bros. universal dummy engine cylinder is molded of high-impact styrene and is intended to ease the task of duplicating in miniature, air-cooled engines. For many years, models have either avoided such scale subjects, or resorted to such crude methods as wrapping thread around dowels in an effort to simulate cylinders. These 1" scale items are suitable for "Schoolyard Scale" R/C models, and are marketed in packs of five, with a retail price of \$1.30 per pack. Also available are similar cylinders in smaller scales, including 3/8", 1/2", and 3/4". Available from Williams Bros., 181 Pawnee St., San Marcos, Calif. 92069.



40-60 SCALE HYDRO

Futuraglass Design, One Cannon Dr., Nashua, N.H. 03060, presents their 40-60 Scale Hydro. This boat features a fiberglass hull, stringers, and forward bulkheads installed, fiberglass cowl, stringers drilled for motor mount location; and brilliant white Gelcoat finish on the hull and cowl. The hull design is suitable for many scale hydros. Length of the hull is 36 1/8". A hardware kit is available for the Hydro.

MINIATURE MOTOR CONTROL

Astro Flight, Inc., 13377 Beach Ave., Venice, Calif. 90291, introduces their miniature motor control. This new

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

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

priced systems, but at a realistic price! Instead of offering a radio system and having the manufacturer make a profit, the wholesaler make a profit, and the dealer make a profit, we offer the Aero Sport system to you and eliminate the "middle man". Instead of trying to make a large profit on a few hundred systems, we reduce the prices and make a smaller profit on thousands of Aero Sport Systems. Aero Sport is the kind of radio system which is inexpensive, good looking, and will give you outstanding performance — Aero Sport can make your dreams come true!



\$109.95 VALUE

SUPER SAVER

75⁰⁰

Hobby Shack

aero sport two 2 CHANNEL, 2 SERVO

Offered to you in the highly popular single stick configuration, this system has already proven itself to thousands of modelers as being an outstanding system worth much more than \$75.00! This system includes a two channel transmitter with ratchet trim, a two channel, triple tuned front end receiver (only one other manufacturer offers this), two NS-ICR servos, a dry airborne battery pack which only needs four pencil batteries, switch harness and the 180 day Hobby Shack warranty.

LOW COST-HIGH QUALITY

\$269.95 VALUE

PRICE BUSTER

169⁹⁹

Hobby Shack

aero sport four 4 CHANNEL, 4 SERVO, ALL NI-CADS (WITH DUAL CHARGER)

The Aero Sport Four is the lowest priced fully deluxe four channel system in America — But it is not cheap, and will stand up to comparison with other systems costing twice as much. You get the same type of triple tuned front end receiver for high image rejection, which has made our Cirrus brand a leader in America. You get the same stick assembly as in Cirrus, without the chrome plating. You will get a first class radio system that is reliable and dependable, and one that you trust flight after flight, year after year! Aero Sport Four will become the buy of the year — get yours today at this very special low Hobby Shack price.



There's only one place to get it!

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**Hobby
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CALIF. 92708

ORDER BY MAIL
OR CALL US

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

BUD NOSEN MODELS

INCORPORATED

BOX 105, TWO HARBORS, MINNESOTA 55616

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

9' PIPER J-3 CUB



Standoff Scale
Formed ABS
cowl Kit -

\$119.95

3 or 4 Channels
Flies like a
trainer Kit -

\$99.95

9' CHAMPION CITABRIA



9' AERONCA "CHAMP"



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

\$99.95

3 or 4 Channels
No foam or
plastic Kit -

\$79.95

102" BUD NOSEN TRAINER



8' CURTISS JN-4D JENNY



Standoff scale
4 Channels
required Kit -

\$129.95

1/3 size Standoff
scale 4 Channels
required Kit -

\$129.95

8' 1933 GERE SPORT



9' "MR. MULLIGAN"



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

\$139.95

1/4 size Standoff
scale Molded
cowls Kit -

\$169.95

10' CESSNA 310 TWIN



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

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

**OVERSEAS
DISTRIBUTORS**

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

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

Bud Nosen's spectacular

102" P-51 D

KIT \$169⁹⁵

- Stand-off Scale
- 2.75" equals 1'
- 102" Span
- 16.5# flying wt.
- 1800 sq. in. wing
- 26 3/4" chord at root

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

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



BUD NOSEN MODELS, INC.

Box 105

Two Harbors, MN 55616

catalog 50c



electronic miniature motor control provides on-off operation of the electric motors in your plane, boat, or car. The unit is controlled directly from your radio receiver eliminating the need for an extra bulky and expensive servo. A deluxe version is available which also contains a voltage regulator which powers the radio receiver from the motive battery. This is especially useful in smaller planes since it allows you to eliminate the weight of the heavy receiver battery. A special electronic circuit automatically turns the motor off when the battery gets low so that control of the model is always maintained. Priced at \$29.95 for the standard model and \$39.95 for the deluxe model.



GLIDER SKID

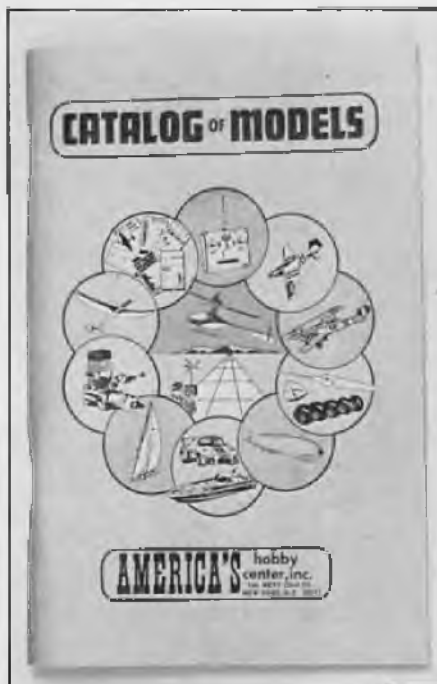
DJ's Multistripe, Box 9382, Glendale, Calif. 91206, introduces their new Glider Skid --- a vinyl skid with adhesive backing. It is used to protect the underside of the fuselage or wing tips to prevent scuffing and abrasion on landings. Available from your dealer and priced at \$1.59.

.90 MOTOR MOUNTS

The new CB .90 motor mount is made especially for the Webra .91 and other large size engines, with retail price of \$9.95. Also available are their new 1/2A mounts --- the short mount retails at \$2.45, with \$2.55 for the long one.

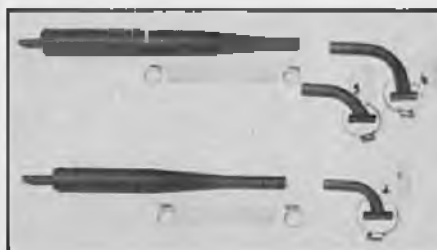


Available from C.B. Associates, Inc., 21658 Cloud Way, Hayward, Calif. 94545.



CATALOG OF MODELS

America's Hobby Center, 146 W. 22nd St., New York, N.Y. 10011, is offering their new catalog of everything in the model field a real modeler could want. It has 176 pages and is \$1.50. For this catalog showing thousands of pictures of their items in stock, write to America's Hobby Center.



TUNED PIPES AND ADAPTER KITS

Now available from Bavarian Precision Products Co., the U.S. distributors of H.B. Engines, are tuned pipes and Adapter Kits to fit the HB .40, HB .50 and HB .61 engines. The Pipes and Adapters are supplied with a

distinctive black finish. This finish not only looks good but the black color gives a more effective heat dissipation quality that conventionally finished pipes lack. The pipes and adapters come complete with all necessary hardware and a more than adequate amount of silicone tubing. The H.B. Tuned Pipes may be adapted to any engine with appropriate displacement and porting and should give a significant increase in power and performance. For additional information, write, Bavarian Precision Products Co., P.O. Box 6, 22 East Avenue, New Canaan, Conn. 06840.



SELF ADHESIVE BALANCING WEIGHTS

Techni-Models, 6130 Roy St., Los Angeles, Calif. 90042, introduces their self-adhesive balancing weights that contain 6 convenient 1 ounce blocks, scored into 1/4 ounce segments. Makes balancing an airplane simple. Sticks to any clean surface. Conveniently sized for the modeler, conveniently packaged for the dealer. Price: \$1.98 per 6 ounce package.

MAGNIFIER LAMP

A new eye-saving 22-watt portable fluorescent magnifier lamp with a 3 Diopter magnifying lens 45° pivotable steel arms reach with 360 degrees rotation, is being introduced by Dremel Mfg. Co. The Dremelite™ Model 1320 provides extra illumination and magnification for do-it-yourselfers, model makers, etc., . . . lots of light and magnification for anyone who does close and exacting work. A 22-watt fluorescent circline lamp surrounds the magnifying lens. The overall diameter of the lamp reflector is 10". A lifetime



tension adjustment at all pivot points is provided on the 45" reach, 360 degrees rotatable pivot arms. A high quality reflector directs the light for easy viewing. No fluorescent lamp starters are needed with the Dremelite 1320. A touch switch is built in the shade which accommodates a 22-watt fluorescent circline lamp. It has a suggested retail price of \$79.95 and is available from stock at local hardware, hobby and crafts stores. For further information, write to Dremel, Division of Emerson Electric Company, 4915 — 21st St., Racine, Wisc. 53406.



MULTI CHARGER

Multi Charger, a new nicad charger provides a safe, convenient method of charging up to two R/C transmitters and receivers individually or simultaneously, thus eliminating the inconvenience of finding sufficient outlets to plug in individual chargers for each of your R/C systems, or buying extra chargers for additional receiver packs. L.R. Taylor & Co., the manufacturers, who also manufacture Power Pacer, recommend a full 14 to 16 hour charge, pointing out that the low 45 to 55 ma charge rates are safe rates that could be left on considerably longer with no damage to your batteries. Multi Charger is compact and has long leads, permitting charging your battery packs in your R/C aircraft or boats. Red LED's monitor charging action and show you when the unit is operating, or if a battery has failed and refuses to take a charge. Multi Charger works with nearly all R/C radio systems on the market. At \$24.95, Multi Charger

is an economical, convenient, and safe source for charging your R/C systems. Each Multi Charger is shipped with operating instructions and carries manufacturer's warranties for 90 days. Ask for Multi Charger at your favorite hobby dealer or write or call L.R. Taylor & Co., 20831 1/2 Roscoe Blvd., Canoga Park, Calif. 91306. (213) 360-1178.



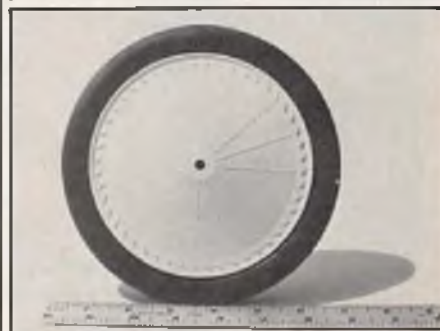
HAWKER HURRICANE

The 1/6th scale Hawker Hurricane kit manufactured by Mick Reeves Models is now being imported from England. The kit goes together quickly and while not quite in the "monster scale" category, it's a large bird at 80" span. Designed primarily for Stand-Off Scale, the model, with minor changes can be a contender in AMA scale. The kit includes plenty of goodies and accessories not usually found in kits. Those nice extras include a full set of fittings for linkages, metal engine mount, fuel tank, molded plastic parts for cowl, spinner, tank hatch, canopy, radiator, wing fillets, landing lights and pilot. Also included is a complete set of decals, a copy of "Camouflage and Markings" to aid color schemes and an eight page, clearly detailed construction book, and scale wheels. Construction-wise, foam wings are pre-covered with hardwood veneer and require only joining and cutting out ailerons and landing gear bolts. The fuselage is built up of die-cut plywood, shaped balsa parts and stringers. Finished out at 10 1/2 pounds, the Hurricane needs a .60. Available for \$145.00 through dealers or direct from Pontchartrain Dist., Inc., 901 Veterans Blvd., Metairie, La. 70005. Dealer inquiries are invited.

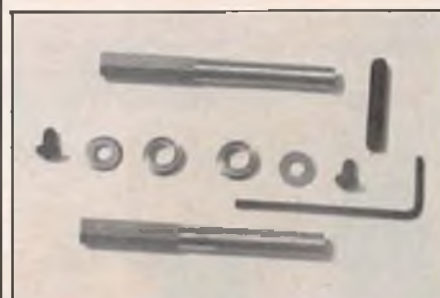


WILLIAMS BROS. ACCESSORIES

Williams Bros., Inc., 181 Pawnee St., San Marcos, Calif. 92069, introduces



the "Mammoth Scale" model accessories which were produced in answer to many requests from "Quarter Scale" aircraft enthusiasts. The Vintage Wheels represent the type employed during World War I and on through the mid-1930's. They feature semi-pneumatic tires and brass-bushed wheel hubs. Measuring 6 1/2" diameter, they are priced at \$17.95 per pair. The Golden Age Wheels are the type used on aircraft of the 1920-1930 period, and also feature semi-pneumatic tires and brass-bushed wheel hubs. These are 6 1/2" diameter and sell for \$17.95 per pair. The Giant Pilot, measuring approximately 4" tall, is molded from easily paintable high-impact styrene. Furnished are separate goggles. Note that the torso is large enough to accommodate a receiver or servo, for applications requiring such an installation. Price: \$2.95.



BALLBEARING AXLE KIT

BoLink's Ballbearing Axle Kit to fit hex axle cars. (BoLink, JoMac, Electro-Craft, Leisure, Workrite, etc.) Includes ballbearings and two piece axle with BoLink's exclusive quick change feature. For further information, write BoLink, P.O. Box 80653, Atlanta, Georgia 30366.

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A happy Hanno Prettner wins the 1st Place prize money for the 5th consecutive year. Mr. Wm. G. Bennett, Miss Sue Kepler, and Mr. Walt Schroder, presented the largest prize ever awarded in model aviation competition.

1978 INTERNATIONAL TOURNAMENT OF CHAMPIONS FIFTH CONSECUTIVE WIN FOR HANNO PRETTNER

Hanno Prettner, from Austria, wins the 1978 Tournament of Champions at Las Vegas, Nevada, by a large margin. This year's victory by the talented Prettner captured the \$15,000 First Place cash award to bring his total winnings for the five Tournaments to \$50,500.

Dave Brown from Cincinnati, Ohio, placed Second with Ivan Kristensen, Ontario, Canada, taking Third Place.

The Las Vegas Tournament of Champions is sponsored by the Circus Circus Hotel and Model Airplane News, and is an invitational competition of R/C pattern champions from nation's around the world. The 1978 Tournament was an entirely new and exciting departure from conventional R/C contests. The planes were larger semi-scale models of famous full size aerobatic aircraft. New model designs were required, with more powerful engines, to perform the continuous schedule of maneuvers within a prescribed window.

Prettner selected the Dalotel DM-165 aircraft as his subject and the completed model weighed 20 pounds with 2700 square inches of wing area. His ingenious power plant consisted of two Webra .61 engines coupled through a clutch gear reduction (2 to 1) drive system to a single shaft mounting a 20/11 Zinger propeller. The realistic flight performance was enhanced by a sound usually associated with twin engine models.

Complementing the august international panel of aeromodelling judges were five world famous full size aerobatic pilots. The prescribed maneuvers were basically those flown in full size aerobatic competition which combined the judging expertise of both worlds.

The number of spectators attending the Tournament is increasing yearly. Accommodations for spectators at the model airport is first class, as is all aspects of the event. It is one nice place for a winter vacation.

Recognition must be extended to the superb talent who plan, organize, and conduct the most professionally managed model contest ever conceived. These are Mel Larson, Jerry Nelson, Jim Edwards, Sam Crawford, and Alan Bennett. Naturally, a big thanks to Bill Bennett and Walt Schroder. □



LEFT: Dave Brown captured Second Place and \$7,000.



RIGHT: Ivan Kristensen took Third Place honors worth \$5,000.



Hanno Prettner and his championship Dalotel DM-165.



The famous team of Dave and Sally Brown.



Ivan Kristensen flew his CAP 10 to Third Place.



Harold Necker's Zlin Z-50-L, a total of five Z-50-L's were entered including one by Dave Brown.



Dean Koger had a pair of Laser 200's.



This beautiful Zlin 526 AFS belongs to Benito Bertolani.



A neat Spinks Akromaster by Fred Kugel.



Gunter Hoppe's Cranfield A1 has a jazzy pilot.

**1978 TOURNAMENT OF CHAMPIONS
WHAT THEY WERE FLYING**

#	Pilot	Aircraft	Radio	Engine	Prop	Fuselage	Wing	Tail	Finish
21	Berfolani, B. (Italy)	Zlin 526-AFS	Simprop	OPS	Mantua	Balsa	Foam/Balsa	Foam/Balsa	Polyurethane
19	Bonelli, T. (USA)	Super Fil	Kraft Signature	Webra .91	Modified TF 11/5	Balsa	Foam/Balsa	Wood	K & B
8	Brand, R. (Rhodesia)	Zlin Z-526	Kraft Signature	Webra .91 Robart	Top Flite 12/8	Balsa	Foam/Balsa	Foam/Balsa	Polyurethane
28	Bridi, J. (USA)	Spinks Akromaster	Kraft Signature	OS .90	Zinger 14/4	Balsa	Foam/Balsa	Foam/Balsa	K & B
25	Brink, J. (S. Africa)	Stephans Acro	Pro Line Custom	Webra .91 Perry	M&D Handcraft 13/7	Balsa	Balsa	Balsa	K & B
26	Brooka, R. (USA)	Hiperbipe	Kraft Signature	Quadra	Zinger 18/8	Wood	Wood	Wood	MonoKote
2	Brown, D. (USA)	Zlin Z-50-L	World Expert	OS .90 FSR Perry	Top Flite 14/6	Balsa	Foam/Balsa	Foam/Balsa	MonoKote
23	Cassella, N. (USA)	Skybolt	Kraft Signature	Webra .91	M&D Handcraft 15/5	Fiberglass	Foam/Balsa	Balsa	Acrylic
18	Chidgey, R. (USA)	Spinks Akromaster	Fulaba AB Pro Line Tx	Webra .91 Perry	M&D Handcraft 14/6	Wood	Foam/Balsa	Wood	Aero-Gloss
20	Donohue, D. (USA)	Stephans Akro	Kraft Signature	Webra .91 Robart	Top Flite 14/6	Fiberglass	Foam/Balsa	Foam/Balsa	Curathane
17	Giezendanner, B. (Switzerland)	Zlin Z-50-L	Pro Line	Webra .91 Perry	14/6	Fiberglass	Foam/Balsa	Foam/Balsa	MonoKote
7	Helms, S. (USA)	Spinks Akromaster	Fulaba Competition	Webra .91 Perry	M&D Handcraft 14/6	Wood	Foam/Balsa	Foam/Balsa	Lacquer
6	Hoppe, G. (W. Ger.)	Cranfield A-1	Micro Prop	Webra .91 Perry	Poxyglas 13/7	Fiberglass	Foam/Balsa	Foam/Balsa	Sikkens Autocryl
24	Keck, E. (USA)	Spinks Akromaster	Kraft Signature	OS .90 Perry	M&D Handcraft 14/6	Balsa	Balsa	Balsa	K & B
4	Koger, D. (USA)	Laser 200	Pro Line	Webra .91 Robart	Kolbo 16/13	Balsa	Balsa	Balsa	MonoKote
9	Kraft, P. (USA)	Super Fil	Kraft Signature	Webra .91	Modified TF 11/5	Wood	Foam/Balsa	Wood	K & B
3	Kristensen, I. (Canada)	Cap 10	Pro Line	Webra .91 Perry	M&D Handcraft	Wood	Wood	Wood	Coverite
12	Kugel, F. (USA)	Spinks Akromaster	Pro Line/ Fulaba	Webra .91 Robart	Top Flite 14/6	Wood	Foam/Balsa	Foam/Balsa	MonoKote
27	Lockwood, J. (USA)	Sportmaster 150	Fulaba Competition	Webra .91 Robart	Top Flite 14/6	Balsa	Balsa	Balsa	K & B
14	Lowe, D. (USA)	Zlin 526-AS	Fulaba Competition	Webra .91	M&D Handcraft 14/7	Balsa	Balsa	Foam/Balsa	MonoKote
15	Matsui, I. (Japan)	Zlin Z-50-L	Fulaba Competition	OS .90	MS 15 1/2/5 1/2	Balsa	Balsa	Balsa	Dope
5	Matt, W. (Liechtenstein)	Zlin Z-50-L	Simprop SSM	Webra .91 Perry	Webra	Wood	Wood	Wood	Coverite
10	Naruke, G. (Japan)	Chipmunk	Fulaba FP-8-TN	YS 1.2	MS 14/6.5	Balsa	Balsa	Balsa	Dope
22	Neckar, H. (W. Ger.)	Zlin Z-50-L	Vari Prop/ Graupner	Webra .91	Top Flite 14/6	Polyester	Styropor	Styropor	MonoKote
1	Pretner, H. (Austria)	Dalotel DM-165	Simprop SSM	Webra Perry	Zinger	Balsa	Foam/Balsa	Balsa	MonoKote
11	Radcliff, M. (USA)	Super Fil	Kraft Signature	Webra .91	Top Flite 14/6	Wood	Foam/Balsa	Balsa	K & B
13	Tracy, J. (Australia)	Cap 20 L	Kraft Signature	Quadra	Zinger	Fiberglass	Foam/Balsa	Foam/Balsa	Acrylic
16	Waltz, D. (USA)	Spinks Akromaster	Kraft Signature	Webra .91 Perry	Top Flite 12/8	Wood	Foam/Balsa	Foam/Balsa	K & B

* Number in first column denotes final place position



Giichi Naruke entered a Chipmunk.



Richard Brand brought his Zlin 500-26 Akrobat from Rhodesia.



Ralph Brooke's Quadra powered Hiperbiplane was a change of pace.



John Brink's entry was a Stephens Akro.



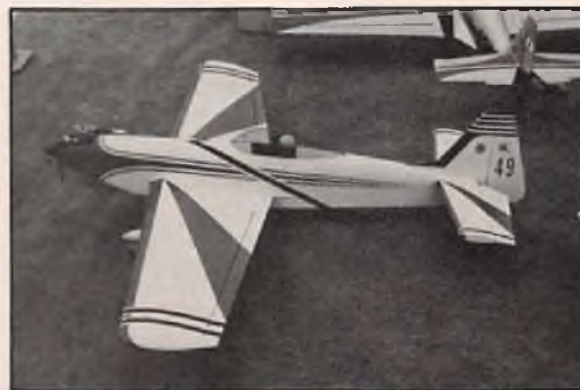
Don Lowe and his Zlin 526-AS take a refueling break.



John Lockwood's Quarter Scale Sportmaster was smallest entry.



Super Fli by Mark Radcliff was one of three entered.



Ron Chidgey flew this Spink's Akromaster.

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ILLINOIS
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INDIANA
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IOWA
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KANSAS
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KENTUCKY
Beaver Dam, Columbia, Elizabethtown, Danville, Owensboro Springs, Frankfort, Glasgow, Henderson, Hickman, Hopkinsville, Leitchfield, Madisonville, Mayfield, Murray, Okolona, Paducah, Richmond, St. Matthews, Scottsville, Somerset, and Winchester.

LOUISIANA
Abbeville, Bogalusa, Eunice, Franklin, Hammond, Monroe, Natchitoches, Opelousas and Thibodaux.

MAINE
Augusta, Belfast, Biddeford, Brunswick, Caribou, Houlton, Millinocket, Old Town, Rumford, Saco, Sanford, and Waterville.

MARYLAND
Catonville, Columbia, Damascus, Dundalk, Edgewood, Frederick, Joppetowne, Lexington Park, Parkville, Randallstown, and Reisterstown.

MASSACHUSETTS
Adams, Athol, Fitchburg, Leominster, Lowell, Marlboro, New Bedford, Northampton, North Adams, and Plymouth.

MICHIGAN
Adrian, Alma, Burton, Cadillac, Charlevoix, Coldwater, Fenton, Hillsdale, Ludington, Midland, Monroe, Owosso, Tawas City, and Three Rivers.

MINNESOTA
Benaji, Brainerd, Cloquet, Hibbing, St. Cloud, Virginia and Rt. 94 from Moorhead to Minneapolis. All along Rt. 90.

MISSISSIPPI
Baldwyn, Brookhaven, Calhoun City, Clarksville, Cleveland, Corinth, De Kalb, Greenville, Greenwood, Grenada, Indianola, New Albany, Pearl, Verona, Vicksburg, Water Valley, Winona, and Yazoo City.

MISSOURI
Carthage, Chillicothe, Columbia, Excelsior Springs, Fulton, Independence, Kansas City, Kirksville, Maryville, Mexico, Moberly, Rolla, and Rt. 70 from Kansas City to St. Louis and all along Rt. 55.

MONTANA
Baker, Borzeman, Butte, Glasgow, Havre, Kalispell, Lewistown, Livingston, Miles City, Red Lodge, Sidney, and Wolfish.

NEBRASKA
Alliance, Holdrege, Lexington, North Platte, and Plattsmouth.

NEVADA
Reno, Winchester, and all along Rt. 80 from Reno to Elko.

NEW HAMPSHIRE
Berlin, Concord, Franklin, Laconia, Portsmouth and Rochester.

NEW JERSEY
Atlantic City, Bridgeton, Camden, Freehold, Hammonton, Irvington, Lakewood, Marlton, Phillipsburg, Pleasantville, Princeton, Ringwood and Sayreville.

NEW MEXICO
Artesia, Carlsbad, Farmington, Gallup, Grants, Las Vegas, Los Alamos, Portales, and Tucuman.

NEW YORK
Endicott, Greece, Johnson City, Kingston, Niagara Falls, Olean, and Troy.

NORTH CAROLINA
Asheboro, Burlington, Durham, Elizabeth City, Gastonia, Monroe, Morehead City, Reidsville, Roanoke Rapids, Sanford, Washington and Wilson.

NORTH DAKOTA
Bismarck, Devils Lake, Dickinson, Grafton, Mandan, Valley City, and Williston.

OHIO
Ashland, Ashtabula, Barberton, Bellair, Bellefontaine, Boardman, Bowling Green, Chillicothe, Circleville, Coshocton, Cuyahoga Falls, Delaware, Dover, E. Liverpool, Fostoria, Fremont, Gallipolis, Georgetown, Girard, Logan, Marietta, Marion, McConnelsville, New Philadelphia, Niles, Norwalk, Oberlin, Ravenna, Shelby, Toronto, Troy, Van Wert, Wadsworth, Washington Court House, Waverly, Wellston, Wellsville, and Whitehall.

OKLAHOMA
Ardmore, Blackwell, Clinton, Duncan, El Reno, Elk City, Enid, Harveta, Miami, Muskogee, Norman, Okmulgee, Ponca City, Sapulpa, Seminole, and Stillwater.

OREGON
Ashland, Baker, Coos Bay, La Grande, Ontario, Oregon City, and Pendleton.

PENNSYLVANIA
Beaver Falls, Bradford, Chambersburg, Connellsville, Ellwood City, Johnstown, Meadville, Mercer, New Castle, Oil City, State College, and Washington.

RHODE ISLAND
Cranston, Providence, and Woonsocket.

SOUTH CAROLINA
Aiken, Anderson, Charleston, Conway, Georgetown, Greenwood, Myrtle Beach, Newberry, Orangeburg, Rock Hill, Sumter, and Union.

SOUTH DAKOTA
Hot Springs, Mitchell, Pierre, Sioux Falls and Yankton.

TENNESSEE
Athens, Clarksville, Cleveland, Columbia, Cookeville, Dyersburg, Fayetteville, Gallatin, Humboldt, Jackson, Lebanon, Milan, Shelbyville and Tullahoma.

TEXAS
Beville, Big Spring, Childress, Denton, Gainesville, Galveston, Greenville, Huntsville, Kingville, Lamesa, Laredo, Marshall, McKinney, Paris, Sulphur Springs, Temple, Tyler, Vernon, and Victoria.

UTAH
Bountiful, Cedar City, Green River, Nephi, Orem, Richfield, St. George and Tooele.

VERMONT
Barre, Essex Junction, Montpelier, Randolph, Rutland, St. Albans, and St. Johnsbury.

VIRGINIA
Chesapeake, Colonial Hts., Hopewell, Martinsville, Newport News, Petersburg, Palmdale, Radford, Salem, S. Boston, and Williamsburg.

WASHINGTON
Aberdeen, Brien, Ellensburg, Ephrata, Kelso, Kennewick, Lacey, Medical Lake, Olympia, Opportunity, Parkland, Port Angeles, Pullman, Richland, and Wenatchee.

WEST VIRGINIA
Charleston, Dunbar, Elkins, Morgantown, Moundsville, Princeton, and Weston.

WISCONSIN
Antigo, Ashland, Chippewa Falls, Fond du Lac, Janesville, Manitowish, Marinette, Merrill, Rhineland, Sheboygan and Rt. 94 from Eau Claire to Milwaukee.

WYOMING
Buffalo, Douglas, Gillette, Lander, Lovell, Rawlins, Riverton, Sheridan, Thermopolis, and Worland.

If you live in or near one of the cities or towns listed on the left, it may be more convenient for you if a World Engines dealer was in that location. If you know of a hobby dealer or a hardware and paint store that sells model airplane products, we would like to have their name and address. Given this, we will send said dealer the World Engines catalog, price lists and a World Engines dealer application.

Where did we get this list of towns and cities? Our Madge Patrick carefully spotted all of our dealers on a Rand McNally Road Atlas. To the left is a list of towns and cities in which World Engines does not have an active hobby dealer. Actually, World Engines is servicing about 3500 dealers scattered all over the United States. Most of the major urban areas in the United States do not appear in the list on the left, which says something for the continuing growth of the World Engines distribution system.

World Engines is the exclusive distributor in the United States for the OS engines, R/C systems and live steam trains, Supertigre engines, and World Engines Expert R/C systems and World Engines kits. We have pride in these products; but, we are not too proud to ask you, the customer, for some help in locating some good hobby dealers in an area where we do not have one. Also, we hope that our dealers will know that we are not soliciting new dealers in areas where we are being served by our present organization.

John Maloney





Pictured above are some of the exclusive products available from World Engines. The Expert Dual Stick is a successful competition radio. Mr. Mulligan, manufactured by World Engines, is a sport, 3-channel airplane. The OS 45 Marine is a popular engine among racing boat enthusiasts. Shown immediately above, is Supertigre's latest entry into the Schuerle ported, large pattern type engine — the ST X-60 side exhaust.


World Engines

8960 ROSSASH AVE., CINCINNATI, OHIO 45236 TELEPHONE (513) 793-5900 TELEX 214 557

HERE IS A LIST OF FINE MODEL DEALERS...MANY HAVE SOLD WORLD'S PRODUCTS FOR YEARS

 On the facing left hand page is a list of towns and cities where we do not have dealers. Most of the major urban areas of any size presently have one or more World Engines' dealers.

 Below is a list of excellent World Engines' dealers. Most of them have been with us for years. Also listed are experts who service our Expert Series and other W.E. R/C systems.

 We still have a little room on this page for more hobby dealers. If you are a new hobby dealer, or if you are one of our older accounts, you can have your hobby shop listed on this page.

ARKANSAS
Sherrill's House of Hobbies
3904 West 13th St.
Little Rock, AR. 72264

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

Everett's Model Shop
1636 Ocean Park Blvd.
Santa Monica, CA. 90405

Francisco Hobbies
1835 Ocean Ave.
San Francisco, CA. 94127

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

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

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

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

Smith Bros. Hobby Center
16217 Victory Blvd.
Van Nuys, CA. 91406

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

COLORADO
Custom Hobbies
2408 E. Platte Ave.
Colorado Spgs., CO. 80909

Tom Thumb Hobby Center
7028 E. Colfax Ave.
Denver, CO. 80220

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

Bristol Hobby Center
641 Farmington
Bristol, CT. 06010

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

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

Farmers Sundries & Hobbies
4826 E. Broadway
Tampa, FL. 33606

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

Garand Hobbies
605 Wood Rd.
Seffner, FL. 33584

The Hobby House
380 Hwy. 17-92
Meltrand, FL. 32751

HAWAII
The Hobbietal
1423 Tenth Ave.
Honolulu, HI. 96816

ILLINOIS
AI's Hobby Shop
121-123 Addison St.
Evanston, IL. 60126

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

Slot & Wing South
1814 Round Barn Rd.
Champaign, IL. 61820

Stanton Hobby Shop
6738 Milwaukee Ave.
Chicago, IL. 60630

West Side Hobby
2829 W. Main St.
Belleville, IL. 62221

INDIANA
Hauberger's Hobby Shop
3 Bks. W. US 6 on Ind. 331
Bremen, IN. 46506

Mutichler's Hobby
4820 Crandell-Lanesville Rd.
Corydon, IN. 47112
PH: 812-356-3141

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

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

IOWA
Randall Craft & Hobbies
1628 E. 7th St.
Atlantic, Ia. 50022
PH: 712-243-3137

KANSAS
Campbell Electric & Hobby
1003 E. 11th St.
Concordia, KA. 65901

Modeler Hobby Shop
1728 S. Hillside
Wichita, KS. 67211

LOUISIANA
Hub Hobby Shop
2818 S. Broad Ave.
New Orleans, LA. 70125

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

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

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

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

MICHIGAN (cont'd)
Joe's Hobby Center
33419 Grand River Ave.
Farmington, MI. 48024

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

MICHIGAN (cont'd)
Rider's Hobby Shop
115 W. Liberty St.
Ann Arbor, MI. 48108

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

MICHIGAN (cont'd)
Trackside Hobbies
418 Main St.
Rochester, MI. 48063

MINNESOTA
Medical Center Cycle
5840 W. Broadway
Minneapolis, MN. 55428

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

MISSISSIPPI
H & B Models
318 W. Main
Tupelo, MS. 38801

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

NEW HAMPSHIRE
Fitzz Photo & Hobby Shop
Kings Hwy. Plaza
Stratham, NH. 03885

NEW JERSEY
Hobby Hut
587 Rt. 23
Pompton Plains, NJ 07444

Paul's Hobby Sport & Marine
540-648 Peterson Ave.
E. Rutherford, NJ 07073

NEW YORK
Brown's Hobby Center
6031 Broadway
Bronx, NY 10471

Mardi Hobbies
351 Altamont Ave.
Schenectady, NY 12303

NORTH CAROLINA
The Hobby House
1617 Ashville Hwy.
Hendersonville, NC 28038

NORTH DAKOTA
McGiffies
1228 8th Ave. S.
Grand Forks, ND 58001
PH: 701-772-5311
772-5380

OHIO
Airport Hobby Shop
1869 Triplets Blvd.
Akron, OH. 44312

Hobby Stop
4007 Summit St.
Toledo, OH. 43611

National Hobby Inc.
5238 Ridge Rd.
Cleveland, OH 44129

Mark Riba Cabinets
32094 Detroit Rd.
Avon, OH. 44011

W-K Hobbies
18 N. Main St.
Centerville, OH. 45459

Wife's Hobby Shop
712 Bristol
Lima, OH. 45804

PENNSYLVANIA
Gross's Hobby Shop
115 E. State St.
Quarryville, PA. 17566

J.C. R/C Hobbies
23 Easton Rd.
Willow Grove, PA. 19090

Skelly Sporting Goods
2227 W. Market St.
York, PA. 17404

TEXAS
H. Hobbs
4615 Banister Le.
Austin, TX. 78745

VERMONT
The Hobby Shop
RFD No. 1, Rt. 7
Swanton, VT. 05488

The Hobby Shop
Burlington Square Mall
Burlington, VT. 05401

Mid-Way Shop
57 Main St.
Middlebury, VT. 05753

VIRGINIA
Bob's Hobby Center
3002 W. Cary St.
Richmond, VA. 23221

WASHINGTON
B & B Hobbies (Bruce Hatch)
907 E. Francis
Spokane, WA. 99207

Firgrove Model Supply
10611-135th St., E.
Puyallup, WA. 98371

Stewart Enterprises
429 W. Chelan St.
Wenatchee, WA. 98801

WISCONSIN
Pope's Hobby Land
640 S. 3rd. St.
Wausau, WI 54401

CANADA
B & B Wholesale Alberta, Ltd.
1902-27 St., SW
Calgary

Calgary Hobby Supply
3920 Edmonton Trail NE
Calgary, Alberta

Can-Air Hobbies
2383 Beaubien St., E.
Montreal, Quebec

LeModèle Reduit Enr.
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Arvida, Quebec
PH: 548-2136

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Via A. DA Mestre, 31
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The Champ is a popular 3-channel, sport airplane. Features include a vacuum formed cowling, dovetailed plywood sides and bulkheads, shaped balsa sheet tail group, and sturdy aluminum landing gear. Power requirements: from a .25 to an easy running .40. In stock and ready to ship from WORLD ENGINES.

RETAIL - \$39.95

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GEORGIA
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Avondale Est., GA. 30002

ILLINOIS
Stanton Hobby Shop
4734 Milwaukee
Chicago, IL. 60630

MASSACHUSETTS
N.E. R/C Service
497 Central Ave.
Seekonk, MA. 02771
PH: 817-761-5268

MICHIGAN
Pete Waters
R/C Service Midwest
41889 Joy Rd.
Canton, MI. 48187
PH: 313-455-1380

MISSOURI
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5409 Woodson Rd.
Raytown, MO. 64133

NEW JERSEY
J.A. Denike
526 Corenus Ave.
Glen Rock, NJ 07452

OHIO
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12450 Amity Rd.
Brookville, OH. 45309

Mr. G's Hobby Shop
4409 Mahoning Ave.
Warren, OH. 44483

PENNSYLVANIA
Warren Hobby Shop
1027 Pleasant Drive
Warren, PA. 16365

TEXAS
Wilson's Hobby Shop
2205 W. Bessegard
San Angelo, TX. 76901

CANADA
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Dundas Hobby Supply
16 Steeple Hollow
Dundas, Ontario

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Sawdown Rd.
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GERMANY
World Engines of Germany
Helmut Noll
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World Engines



8960 ROSSASH AVE., CINCINNATI, OHIO 45236 TELEPHONE (513) 793-5900 TELEX 214 567

HERE'S HOW

Protecting our servos from engine vibration is something many of us don't think about. After all, the radio manufacturer has provided us with rubber mounted servo trays and rubber grommets for mounting the servos. However, the amount of vibration dampening these grommets afford depends largely on you and how much torque is applied to the screws that retain them. Unfortunately, many of us have a heavy grip on the screwdriver and the poor little grommets get squashed to death. Kraft, in guidelines for installation of their system, makes it very clear. In fact, it is printed in red letters so you won't miss it. "Do not overtighten mounting screws or use servo tape when installing servos. This tends to increase vibration which is a major cause of intermittent loss of control in flying." Phil Kraft has spent considerable time and money developing his radio system and would certainly not give us bum advice. He is in business to sell radios and they had better work or we'll move along to another manufacturer. It's as simple as that.

Dr. Joe Beckner, a dentist in Loveland, Colorado, has come up with an idea that is a step in the right direction for those who insist on using servo tape to mount their servos. I'll let him tell you about it.

"After reading 'The Servo Mounting Myth' by Al Alman in R/C Modeler, September 1977, the flexibility of mounting the servos on the sides of the fuselage appealed to me. So, in spite of the dire warnings in my Radio Control Instruction Manual and my Flight Training Course, I decided to give this type of mounting a try!

"Instead of 1/16" ply and balsa sheet for the Stand-Offs (neither of which I had in supply at the time), I elected to build up my mounts with 1/8" corrugated paper board from a large soap container that held my wife's washing machine soap. I put the layers together with contact glue and covered the mounting surface with 5-minute epoxy per Al Alman.

"When completed, the mounts looked good. But I was still worrying about the vibrations that would be coming through to my servos. The corrugated paper board has a little give, but not that much! Suddenly, it occurred to me, why not put a layer of 1/8" foam rubber in this build-up to dampen the vibrations? So I did my mounts over, putting a layer of foam rubber under the corrugated paper board plate on which the servo mounts. This foam rubber came as packing around some denture teeth I'd ordered and seems to be rather common."

to page 92

If you must insist on using servo tape to mount your servos, why not use it to hold this easy to build servo vibration isolator in place. Your servos will love it.



Simple vibration isolator that will give your servo a smooth ride. Isolator on right has 5 mm foam rubber from scuba divers wet suit providing firmness required for larger servos.



Readily available materials needed to construct isolator. Contact cement, 1/8" foam rubber and thin cardboard. Servo tape will hold it all in place.



SERVO ISOLATOR MOUNT

THIN CARDBOARD, 1/16" PLY OR Balsa
TOP AND BOTTOM.

1/8" FOAM



SERVO VIBRATION ISOLATOR

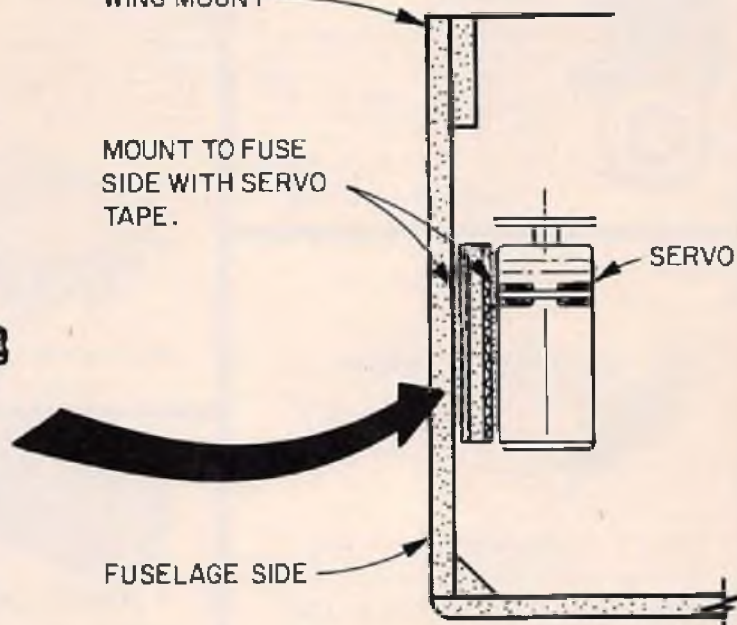
BOND TOGETHER WITH CONTACT CEMENT.

WING MOUNT

MOUNT TO FUSE SIDE WITH SERVO TAPE.

SERVO

FUSELAGE SIDE



ENGINE ISOLATOR MOUNT

QUADRA
ENG. MOUNT

ISOLATOR ASSY
4 REQD

HAND TIGHTEN NUT
AND SAFETY WIRE
(LOCTITE OR HOTSTUFF -
SAFETY WIRE NOT REQD)

3/8" TO 1/2"
PLY FIREWALL

SNUG FIT
THRU FIREWALL

FIREWALL

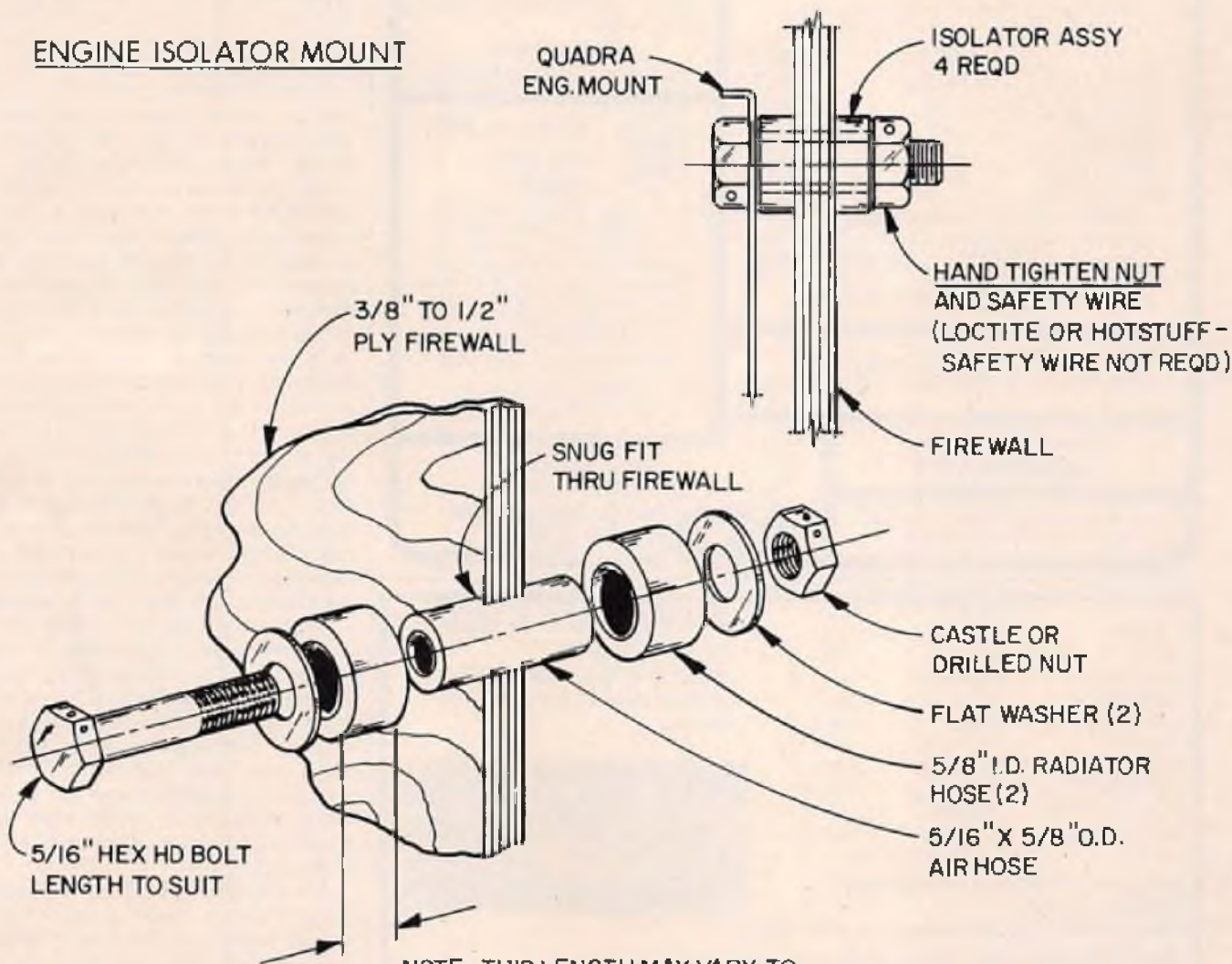
CASTLE OR
DRILLED NUT

FLAT WASHER (2)

5/8" I.D. RADIATOR
HOSE (2)

5/16" X 5/8" O.D.
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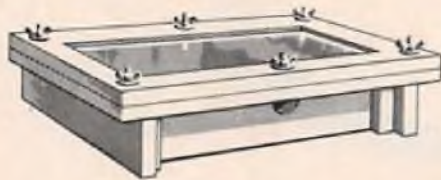


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HERE'S HOW

from page 90

Joe sent along some samples of his idea which demonstrated the different firmness of each servo isolator depending on the technique used in construction. For example, the layers are put together immediately after painting contact cement on the surfaces. The cement penetrates the foam rubber, diminishing the movement of the plates (medium). Or, allow the contact cement to dry on all surfaces before putting the mount together. More movement between the plates results (soft). Finally, instead of foam rubber, use 5 mm neoprene rubber from a scuba diver's wet suit. This, of course, will give you a much firmer mount. Wet suits come in thicknesses from 3 mm to 6 mm.

Of course, the servo isolator mounting plates could be made of 1/16" ply or even balsa, however, the thin cardboard looked very usable --- at least cheap and plentiful. Joe's servo isolator is an excellent idea. You might do a little experimenting on your own and decide for yourself which of the three firmnesses suit your taste. As for me? I found putting the surfaces together with wet contact cement made an excellent medium isolator. I would never think of mounting my servos with servo tape alone. It simply isn't the way to go.

As long as we are on the subject of vibration transfer, let's take a look at another problem plaguing those using converted chain saw engines. Actually, the problem is greatest from mid-range rpm down to idle. Especially idle. There has been much talk about what should be done, however, most of the ideas presented have been nothing more than a shotgun approach with no technical engineering brought to bear. The problem is not insurmountable if some competent mechanical engineer would take it on. Yes, it would take time and experimentation on his part, however, at the present these big engines are putting airframes and radio gear through pure torture. We must find an answer.

The idea shown was sent to me by Bob Constance of Scottsdale, Arizona. Bob has used this method of controlling the transfer of destructive forces from the engine to the airframe with the use of readily obtainable materials. He has personally used this method on his Quadra powered biplane for several hours of flight with not so much as a single adjustment or tightening of the mountings.

The installation is simple. The original Quadra engine mount is used having only to enlarge the four mounting holes for 5/16" hex head machine bolts. The bolts are not welded or brazed to the

to page 94

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HERE'S HOW

from page 92/90

mount to allow a more flexible action. They are drilled, as are the nuts, for the use of safety wire. The washers are standard flat washers. The center piece of hose is standard airhose while the outer lengths are automotive radiator hose. The length of the center hose is equal to the sum of the two outer hoses plus the firewall thickness. The assembly is hand tightened only, then safety wired. Bolt both heads and nuts. Mounting holes in the firewall should be a close fit to the O.D. of the center piece of airhose.

I have not personally tried Bob's idea, however, it is some protection and much better than firmly bolting your engine to the firewall. Many thanks for your idea Bob. Maybe others will start thinking and we'll mutually solve this problem. □

SHOWCASE '79

from page 83/78



DEEP VEE DAY CRUISER

A new Deep Vee Day Cruiser has been released by Steve Muck's R/C Boats. The boat is designed for fun or competition. The hull, when completed, is both IMPBA and NAMBA legal for Deep Vee competition. The Mighty Dolphin kit features pre-cut frames, formers and sheeting made of high quality aircraft plywood. This boat will

to page 100

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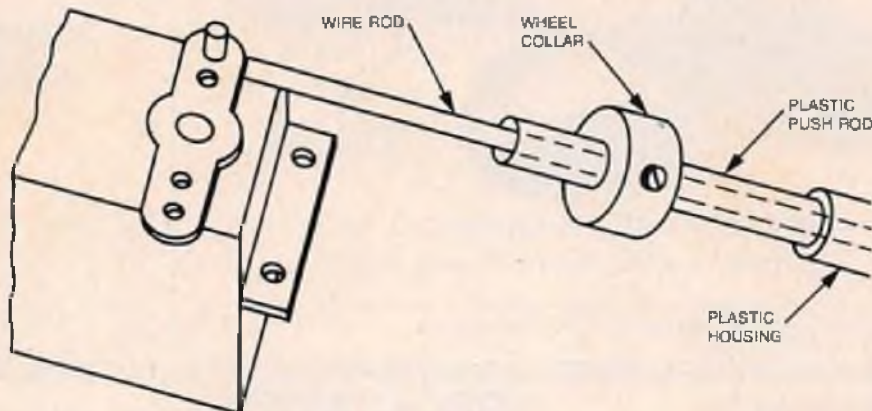
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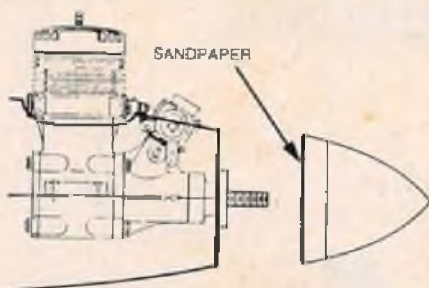
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FOR WHAT IT'S WORTH

The following suggestion for connecting metal pushrod ends to nylon control rods is from L.W. Standley of Del Mar, Calif. As shown in the sketch, this method is especially useful where the servo is not accessible for rod removal and is also convenient for easy rod adjustment. It provides a positive connection when the set screw of the collar is tightened through the nylon pushrod into the metal rod. A small hole drilled through the nylon rod for the set screw to pass will ensure a slip-proof connection.



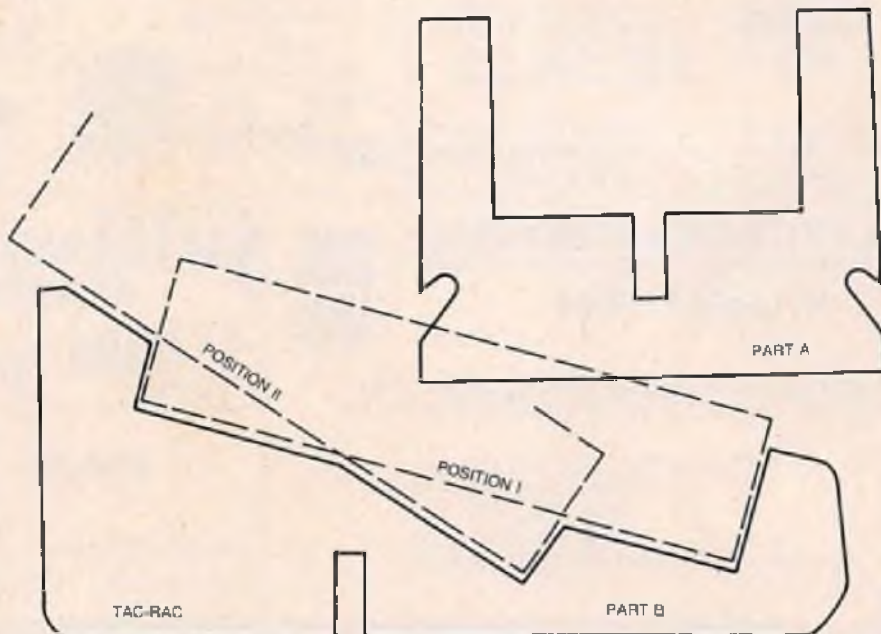
If, after building a new aircraft and installing the engine, you find that there isn't enough spinner clearance, the solution is as close as your electric starter according to John Lusk of Madison, Wisconsin. Mount the engine, add spacers in front of the thrust washer if needed. Next "Hot Stuff" or "Zap" a piece of 80 or 120 grit sandpaper to the backplate of a Goldberg spinner. Cut out center to clear the thrust washer. Place spinner on motor shaft and apply electric starter. This will sand the nose plate to the proper degree of Right, Down or zero thrust. (See sketch.) The thrust washer may be removed and spacers of less thickness may be put on the prop shaft for the tightest spinner fit.



While the plastic film coverings are great for getting you in the air quickly, eventually they start to lift due to fuel soaking after continuous use. Refinishing presents a challenge due to the oil residue and, after trying the known procedures and almost giving up, Dino Di Giorgio of Oakland, New Jersey, stumbled upon a procedure which is quick, inexpensive and will restore the balsa to its original condition. Try applying some Red Devil Sanding Liquid to the affected area, making sure that it penetrates deeply. After 30 minutes, apply direct heat from your heat gun and all oil residue rises to the surface, enabling you to wipe the oil off with a clean rag or paper towel. Repeat the procedure until all oil is removed, re-sand the model and recover with any covering material of your choice and it will adhere perfectly.

If you own a Royal tach, on occasion the need may arise to set the tach down, since two hands are required for engine adjustment, necessitating propping up the tach in some way. Ed Betancourt of San Diego, California, has designed and built a stand for his to set in. The drawing shown can be used as a guide for making the full size templates. Both templates A and B were cut out of 1/4" ply using a table jig saw. Part A is interlocked with Part B (egg carton fashion). The tach is cradled across the two templates. If so desired, a rubber band can be used to hold the tach in place using the two notches on Part A. Positions I and II are to suit different engine installations. Parts A and B were not glued together; preferring that they be easily separated for flat stowage in the flight box. For the dimensions, just measure the overall size of your tach. With a little modification the Tac-Rac can be cut to fit any tach.

Scale R/C aircraft need authentic colors. The dope/epoxy colors are limited, so Kevin Savage of Chicago Heights, Ill., is using plastic hobby kit paint. After sealing and filling the plane with polyester resin, spray the color coats on using military color enamels normally used for plastic kits. Apply the decals and let the model dry for 48 hours. Then, top coat the plane with three thin coats of clear flat epoxy. The advantages are: (1) color availability — over one hundred correct shades from WW I through Vietnam; (2) economy — bottles range from 25¢-65¢; and (3) ease of application — almost no build-up, will not gum up spray equipment, and mistakes are easy to correct since paint is dry in 3 to 30 minutes and re-coats add no appreciable thickness. The disadvantage is that epoxy thinner and acetone eat plastic model paint alive! The trick when using thinned epoxy as a



One Third Scale **PITTS** **S-1A**



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All planes shown are mylar-covered Byro-Foam. Total ready-to-fly weight, less fuel, is 13.5 lbs.

Byro Foam PI

Exact one third scale - *13½ lbs. of

After three years of research, development and rigid testing procedures, the revolutionary new Pitts S-1A from Byron Originals is ready to make its impact on the modeling world. Everything from its rugged, lightweight airframe to its unique Byro-Drive power unit has been designed with simplicity, authentic scale design and performance in mind. Whether you're a veteran pattern ship builder or a newcomer to the R/C world, building a super scale biplane in a week of evenings is now a reality.

Thanks to recent advances in foam technology and a special pressure molding method, Byro-Foam modular construction ensures controlled building accuracy and fast construction. Not only do these high impact modules possess high compressibility and recovery characteristics, but they also prove to be excellent shock and vibration absorbers. The smooth yet tough and resilient surface areas are ready for direct foam finish material. No shaping required whatsoever.

When it comes to accurate, authentic scale features, except for its 1/3 size, the Pitts is an identical twin to the real thing. Even the sags between all rib details have been included in the foam injected parts.

The servo mounts are also preformed as are the

areas for exact positioning of reinforcing blocks at critical stress points like cabane and strut attachments, landing gear blocks, aileron torque tubes, etc. Simplicity is also evident in the well-engineered control linkage systems and hinges that eliminate flutter, making it possible for only one servo to effectively drive the four ailerons.

Authentic scale design and ease of assembly are only part of the Pitts story. Spectacular performance, made possible with Byron Original's own power system is the rest. (Turn page for details). Unlike all other reduction systems on the market, the Byro-Drive produces enough smooth, dependable power to easily put the Pitts through all AMA maneuvers. Power loading actually exceeds 1:1. (Based on a max. 18 lbs. of thrust achieved with a dependable high performance 60 burning 15% nitro, tuned pipe and a ready-to-fly weight of only 13½ lbs.).

The power, stability, and quick responsiveness demonstrated by this big, beautiful biplane are truly a first for the industry. A first we're sure you want to be a part of. So take a good look and see for yourself why the Pitts from Byron Originals has already been tagged a new and exciting dimension in scale modeling.

"Byron Originals have designed it right."

"Never did I expect to find myself praising a 'foam' constructed plane for its superb performance and scale beauty. That was before I was introduced to this Pitts. By combining new foam technology and 25 years of manufacturing experience, 'Byron Originals' has at last devised a sensible approach to authentic scale modeling. They even designed a matched power unit to swing a full scale prop. It's called a 'Byro-

Drive'... and does it drive! Up to 18 lbs. of thrust with a Schnuerle ported .60. Teaming it with the Pitts creates a performance bird you have to fly to believe. Quite frankly, nothing else on the market comes close to comparing with these units. Myself, I consider the intriguing concepts behind these products a milestone in the evolution of scale modeling."

Dean Copeland

AMA Scale Contest
Board member
District IX with 16 years
of both scale and pattern
competition.

- ◆ Byro-Foam modules for fast construction and excellent weight to strength ratio.
- ◆ Warp free wings and control surfaces.
- ◆ Scale details molded in.
- ◆ Fiberglass cowling and wheel pants.
- ◆ Rugged, aircraft stressed-formed aluminum gear with built-in shock absorber.
- ◆ Pre-formed servo mounts with die-cut wood servo trays.
- ◆ Scale nylon cabane struts completely eliminate work of setting up location and incidence of wing.
- ◆ Wing disassembly requires removal of only 4 nylon screws and two nylon nuts.

Factory Direct

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(Iowa residents add 3% sales tax.)

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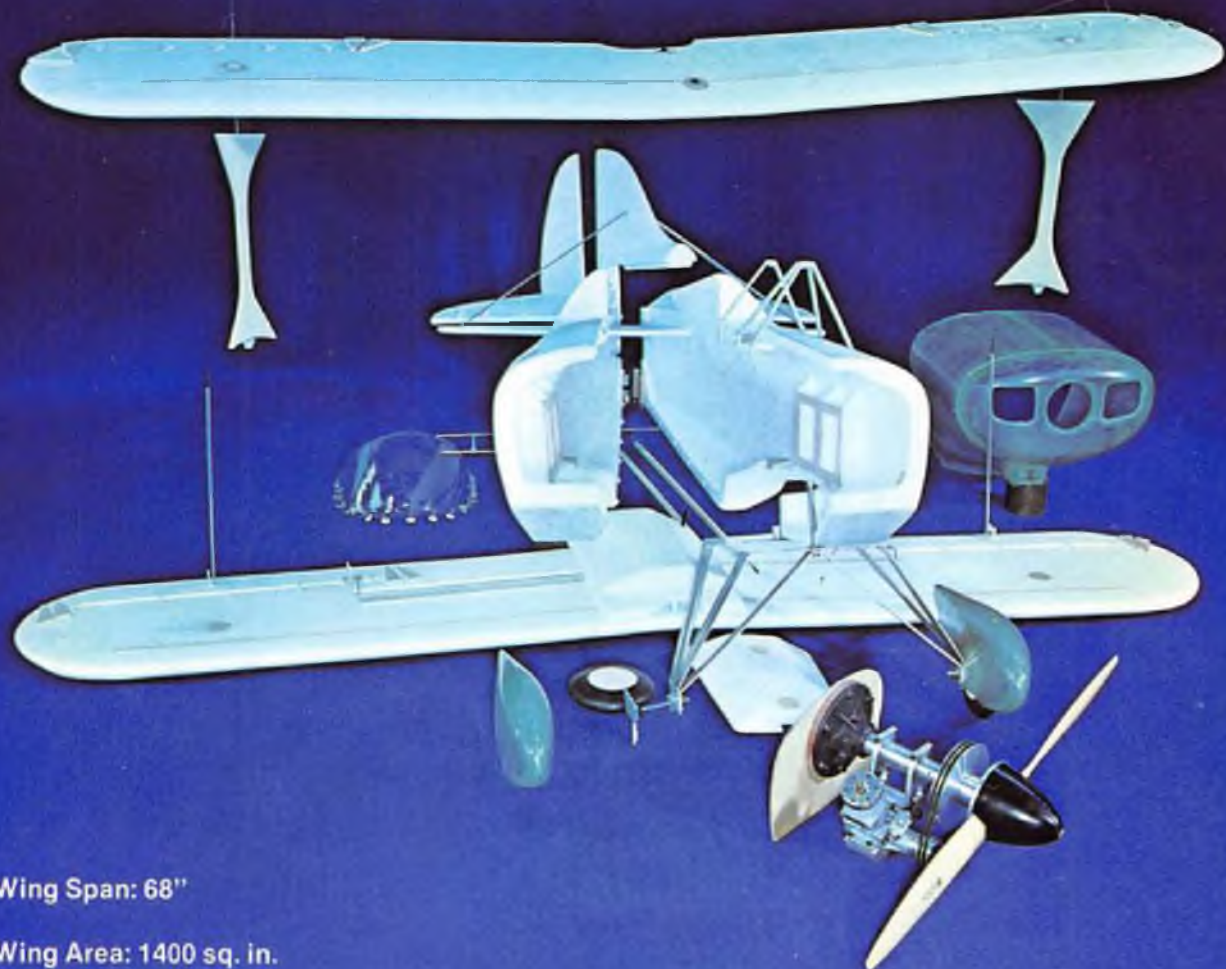
Use the handy order form



Pitts S-1A

perfection & performance

* Ready-to-fly, less fuel.



Wing Span: 68"

Wing Area: 1400 sq. in.

Length: 62"

Limited warranty available upon request. Write: Byron Originals, Box 279, Ida Grove, Iowa 51445.

The exploded view of the Pitts S-1A (above) graphically illustrates the basic simplicity of the kit as well as its unique labor-saving design features. Partial assembly has been done for the sake of illustrative clarity. Note: engine, drive unit and prop are not included in kit.

Optional carrying rack (right) makes transporting your pride and joy a simple operation. Eliminates the need to disassemble and assemble wings. Adapts to most any trunk deck.



\$34.50 plus \$2.00 shipping.

Form or call 712-364-3165. Kits shipped in two crush-proof boxes via UPS.

ByroDrive^{T.M.}

The RIGHT approach to PROP REDUCTION

At last... a practical reduction system that performs. That's right! After three years of development and testing, the Byro-Drive has finally been judged more than ready to meet even the most critical belt drive critics head on. Specifically developed for our new Pitts S-1A and soon-to-be-released P-51 kits, the Byro-Drive is also designed for universal adaption. This is achieved by mounting the engine on eccentric brackets which in turn can be rotated to any desired position around the central shaft. The engine itself even pivots on these eccentric brackets, making it possible to position the cylinder head either closer to farther from the central shaft. This offers you a unlimited number of positions to choose from when positioning engine or exhaust equipment beneath the cowl. The entire power unit is supported by a lightweight yet rugged glass-filled nylon firewall mount.



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Plus
\$2.50 for shipping

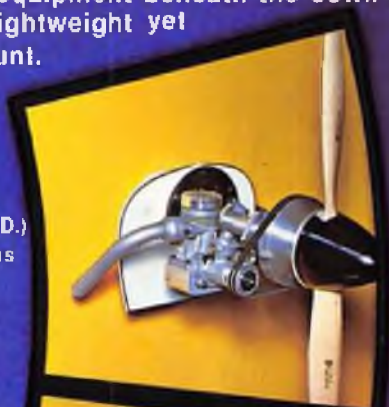
As Shown
Less
Engine

Performance? You Bet!

Throughout our testing procedures, turning a 20-8 prop between six and seven thousand rpms produced the best results... up to 18 lbs. of thrust with a Schnuerle ported .60. What's more, the Byro-Drive's extremely low vibration level minimizes vibration damage to both airframe and radio equipment.

What about belt failure?

Many of the original V-belts used on our first prototypes are still used today after three years of extensive testing. Thanks to our exclusive use of Polyflex-belts, slippage, wear and stretch are virtually non-existent. Adjustment is required only during initial assembly.



Specifications

3 1/2" spinner
Poly-flex V-belts.

Wt. - 2 lbs. 3 oz. less engine

Injection molded, glass-filled nylon firewall mount

Power output - up to 18 lbs. thrust w/Schnuerle ported .60

Lightweight extruded aluminum engine mount

Stamped aluminum mounting brackets

Recommended prop size with Schnuerle ported .60 - 20-8

BYRO-DRIVE (Engines not included)

ByroDrive^{T.M.}
DESIGNED FOR
UNIVERSAL
ADAPTATION

MODEL NO'S. FOR USE WITH THESE ENGINES

MFR-10	.60 & .65 O.S. MAX, front and rear valve
RR-11	.61 & .65 Rossi, rear valve
RF-12	.61 & .65 Rossi, front valve
WFR-14	.61 Speed Webra, front & rear valve
TFR-13	X.60 Supertigre, front valve, rear exhaust
KF-15	.61 Kraft

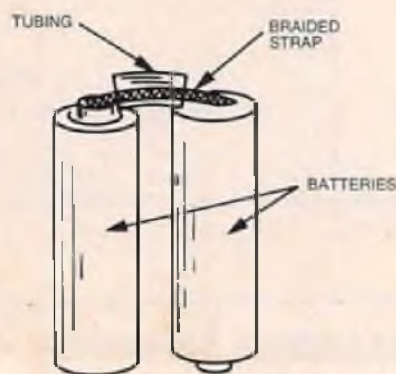
ByroDrive^{T.M.}

Complete with 3 1/2" spinner,
20-8 prop, pulley, belts and
drilled/tapped engine mount.

FOR WHAT IT'S WORTH

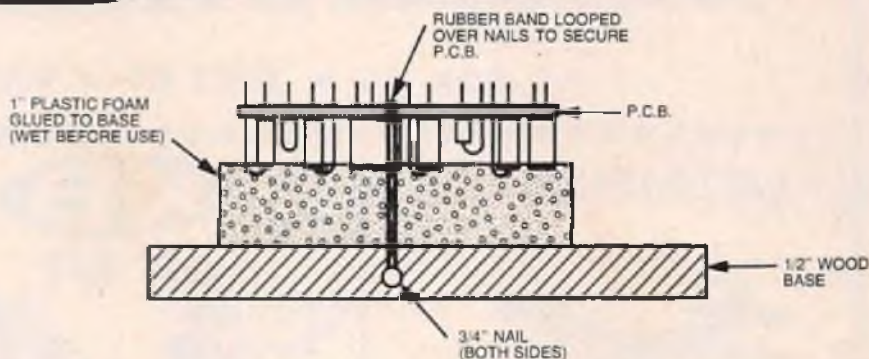
fuel-proof top coat is it **must** be sprayed on and the first two coats must be applied as even "dust-coats." Thin coats avoid soaking the color coats with epoxy which not only cause runs in the clear epoxy, but also runs the color since it is liquified by the initial coat of epoxy.

Robert Fields of Norman, Oklahoma, was building a battery pack with nicads and discovered that you could use solder wick to connect the cells. Solder wick is a braided copper strap normally used to soak up excess solder. It's heavy enough to not cause any resistance in the charging circuit; it tins easily (naturally) and is flexible between the cells. If touching and shorting the sides of the cells is a problem, some heat shrink or other tubing could be placed around the strap to keep it from touching the battery. The accompanying sketch shows the finished results. Solder-up is available at most any radio or electronic stores. Radio Shack has it under Cat. #64-2090.



Invariably, when using finishing resin, you usually end up with a run or a drip. When you try to sand it off, all you succeed in doing is to sand into bare wood around the run. Barry Mattingly of Hacienda Heights, California, found a way to prevent this. Barry surrounds the run with masking tape and sands the run with #320 wet or dry paper until the run is level with the surrounding finish. This method works great when you have to glue two broken fuselage sides together when they don't match up even.

From B.T. Lennox of Lincs, England, comes a handy idea for those who are active in building electronic projects. As shown in the sketch, when soldering small printed circuit boards, such as receivers, decoders and servos, mount them upside down on a piece of damp plastic foam. Secure the P/C board with a rubber band looped between (2) 3/4" nails driven into the 1/2" wood base. His



method offers three advantages. (1) The wet foam acts as a heat sink and keeps components cool. (2) The foam holds in the components without the necessity of bending over the leads. This makes the replacement of parts much easier to change. (3) The P/C board itself is securely mounted and cannot slip about.

Art Johnson, Editor of the Gold Coast Flyer newsletter, Delray Beach, Fla., stumbled onto a way to save labor in the production of a new plane. Art just saved hours of sanding on the latest plane he finished with the fiberglass resin and glass cloth system. The time saver is a set of plastic squeegies sold in the automotive sections of K-Mart stores. These gismos are sold for work on fiberglass auto repairs. He figures that they should also work on planes and they do! A couple of passes with the plastic squeegee after the resin is on the glass and the brush marks are gone. The excess resin is removed and very little sanding is needed when it dries. Just wipe the plastic with acetone and it is good for a hundred finish jobs. The squeegee technique also works on the final resin coat producing an almost ready to paint surface.

The following two excellent hints are reprinted from the Tropic Aeros R/C Club of Miami, Florida:

"Hint Of The Month" — For insured safety, put a dab of silicone seal on your servo-arm screws; it will prevent the loss of the screw through vibration and can easily be peeled off when necessary.

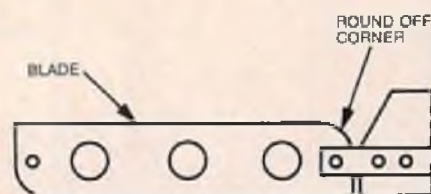
"Another Hint" — A quick way to finish that prop you just sanded off one blade to balance, is to take some paste wax and rub both blades very briskly. The wax protects the bare wood and does not change the balance.

If you have a nylon bolt break off flush with the wing mount block, there is an easy way to remove the broken piece. Just drill a small hole in the center of the bolt, then heat the tip of an Allen wrench which is slightly larger than the hole,

press it in the hole and let it cool, then just unscrew the bolt. This idea was submitted by Jack E. Lewis of Riverdale, California.

Pin stripes cut from one of the iron on plastic covering materials and used on a model for trim is not new. However, after being in service for sometime, it may loosen and come off. Even after sealing the edges with clear dope, Hobbydope, etc., didn't seem to help much. It didn't want to stick to the plastic very well. One day Richard L. Shirey of Sewickley, Pennsylvania, tried using some Zap to see if it would stick to the plastic. Wow! Did it ever. Now, how to put the Zap along the edge of the pin striping was a problem because the applicator tubing was plugged with cured Zap. A small brush would quickly become a "stick" if it was used. So why not try a "stick"? A short length of music wire was dipped into the bottle of Zap and then moved along the edge of the pin stripe. The Zap, clinging to the music wire, flowed down onto the covering and made a nice fine line along the edge which quickly cured. The areas that were done this way were always a problem before and they have held up better than anything previously tried. The "wire stick" has been used for other applications and has also proved to be quite useful.

For those who break rotor blades on their HeliBaby due to bad or bouncy landings, Joseph Ehrich of Browns Mills, New Jersey, has found the following modifications to be useful. Simply round off the corners of the see-saw as per the sketch. This will allow the blade to swing to the rear as the blade comes in contact with the ground. It has saved many a blade for Joe and should do the same for you. □



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SHOWCASE '79

from page 94/78

handle any 6.5cc engine on the market today. The kit includes radio box, plexiglass radio box lid, turn fin, screws and step by step building instructions and photographs. A stern drive hardware set has been designed to complete the construction of this fine kit. The hardware set includes ride plates, stern drive and rudder brackets, rudder, water pick-up, screws, and 3/16" flex-cable drive line assembly. Manufactured by Steve Muck's R/C Boats, 6003 Daven Oaks Dr., Dallas, Texas 75248.

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LUCKY LADY

from page 77

... area. Plywood doublers provide the support for the wing mounting dowels. The forward sections of the fuselage sides are joined by a plywood firewall and 1/4" balsa formers. The aft sections are joined by balsa frame crossmembers. Built-up balsa blocks were carved to form the nose shape. The bottom was sheeted with balsa and, in the landing gear area, plywood. The addition of spruce servo rails and fitting the 3/8" balsa sheet fuel tank hatch completes the basis fuselage structure.

Lucky Lady is designed to be built as a taildragger or with tricycle gear, at the option of the builder. A nose gear assembly and support blocks are included as well as main gear wires. We chose to go the taildragger route; however, we changed the method of mounting the main gear slightly from the plan. The plywood landing gear stops were installed per plan but the rubber band dowels were omitted. Instead, two 1/4" plywood clamps were cut to fit tightly between the stops and were grooved across the ends to accept the landing gear wires. The grooves are shallow so the wires are clamped tightly to the fuselage. The clamps were attached to the plywood bottom with 4/40 flathead screws and nuts. This

gives a much cleaner appearance and early flight tests show adequate clamping of the wires to prevent shifting.

The wing is constructed in three sections — two outer panels and a center section, joined by two 3/16" plywood dihedral braces. Triple spruce spars and balsa planking on top and bottom surfaces at the leading and trailing edges result in a strong wing assembly. The only pre-cut parts that we found did not match the plan were the 1/8" balsa webbing pieces between ribs. These were only slightly shorter in length than the plan but would have accumulated into a significant rib spacing error had all the bottom rib caps been pre-glued in place according to the instructions. Change the sequence of the instructions to assemble the bottom caps as part of the rib-web-rib ... procedure. The larger space at the center is covered by sheeting.

The tail fin, rudder and elevator are pre-shaped sheet balsa. The stabilizer is built-up rib construction.

Our model was assembled with Titebond and Devcon epoxy. The entire plane was covered with white Coverite Permagloss. Fuselage trim was painted with R/S Perfect Paint.

The recommended engine size is .45 to .61. We installed an OS .45 Schnuerle with the stock closed muffler, on a Kraft fiberglass engine mount. To provide adequate clearance from the fuselage side, a 1/2" muffler extension had to be installed. A 12 oz. Sullivan fuel tank was used. The weight of the finished model at 119 ounces was somewhat heavier than the recommended 104 ounces.

After rechecking the equipment installation one last time, we cranked over the engine and made throttle adjustments. The aircraft taxied into position and headed across the field. Quickly up to speed, tail up and she was in the air. A few trial runs proved performance was responsive, very smooth and stable and with ample reserve power. Even hands-off did not shake this bird --- she flew straight and steady. Land, refuel and off again. In our test runs we encountered some aileron flutter during high speed maneuvers. This same condition was noted by several other builders we know of. Skymaster Industries is aware of this problem and is changing the aileron design to prevent flutter. For those planes already in the field, the designer recommends tapering the outboard 18" of each aileron to a width of 1/2" at the tip.

Several flights more and we were through for the evening, convinced we had a fine trainer aircraft for learning the basics, with reserve power for more advanced maneuvers. This reviewer recommends Lucky Lady for anyone just beginning in RC and for general sport flying. □

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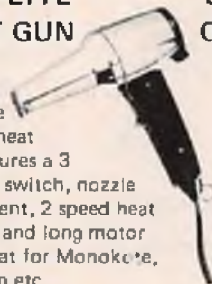
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**TOP FLITE
SEALING IRON** **30%
OFF**



This sealing iron is great for covering with Monokote, Solarfilm, etc. It features adjustable temperature, teflon shoe, and a handy shape. Excellent quality.

RETAIL **NOW ONLY \$13.28**
\$18.95 RCM202

**DREMEL
MODEL 381
MOTO-TOOL
WITH FULL
ACCESSORIES** **43%
OFF**



The Model 381 is the ultimate in hand grinders. It features variable speed control, ball bearings, and full accessories.

RETAIL **NOW ONLY \$39.98**
\$69.95 RCM015

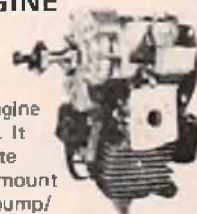
**MILLER
No. 2017
SPRAY SET** **40%
OFF**



Complete set includes a 12 foot air hose, compressor, spray gun, air brush, and nozzles.

RETAIL **NOW ONLY \$46.78**
\$77.95 RCM016

**QUADRA 2 CUBIC
INCH ENGINE**



The perfect engine for the biggies. It comes complete with muffler, mount and Tillitson pump/carb. Longlasting.

RETAIL **NOW ONLY \$99.98**
\$139.95 RCM017

**DEVCON
5 MINUTE
EPOXY IN
ECONOMY
9 OZ. SIZE** **40%
OFF**



Now in squeeze bottles for your convenience. Limit of 3 per order.

RETAIL **NOW ONLY \$3.48**
\$5.80 RCM018

**DREMEL 572
MOTO SHOP** **35%
OFF**



This deluxe saw features a complete accessory set of blades, discs, etc. and flexible shaft. Limit of 1.

RETAIL **NOW ONLY \$58.88**
\$89.95 RCM019

**GOLDBERG
FALCON 56** **40%
OFF**



This all time best seller is now redesigned with ailerons. 56" span. Uses a .15 - .35 engine, all balsa construction. An excellent trainer.

RETAIL **NOW ONLY \$26.98**
\$44.95 RCM020

**ZINGER
WOOD
PROPS** **35%
OFF**

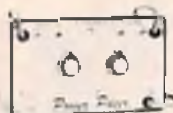


Two popular sizes--Stock up now on these high quality props!

10X6 WOOD PROPS(6)
RETAIL **NOW ONLY \$5.48**
\$8.40 RCM021

11X7 WOOD PROPS(6)
RETAIL **NOW ONLY \$6.28**
\$9.60 RCM022

**POWER PACER
BATTERY
TESTER** **20%
OFF**



A new ni-cad battery tester, cyclor, and charger. Works great!

RETAIL **NOW ONLY \$47.98**
\$59.95 RCM023
9.6 volt RCM024
6 volt

**GOLDBERG
SKYLARK 56
MK II** **40%
OFF**



Fun to fly sport airplane with pattern capabilities. 56" span. .30 to .40 size engine, all balsa construction. New improved design!

RETAIL **NOW ONLY \$29.98**
\$49.95 RCM025

**SULLIVAN
ELECTRIC
STARTER** **35%
OFF**



The Sullivan electric starter is a high torque, high R.P.M., 12 volt starter. Limit of 1 per order.

RETAIL **NOW ONLY \$23.98**
\$36.95 RCM026

**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 **NOW ONLY \$79.98**
\$99.95 RCM027

**CRAFT-AIR
FIELD BOX** **33%
OFF**



It's ready to use, not a kit, made of lightweight indestructible polyethylene. 22" long & holds everything. A SUPER BUY!

RETAIL **NOW ONLY \$19.98**
\$29.95 RCM028

**CRAFT-AIR
HI-START
HEAVY DUTY** **35%
OFF**

Features reel, tubing, towline, parachute, stake, tow ring, and strong construction. For sailplanes of 100" wingspan and larger.



RETAIL **NOW ONLY \$27.98**
\$42.95 RCM029

**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 **NOW ONLY \$34.98**
\$49.95 RCM030

**S&O BATTERY
TESTER** **35%
OFF**



Test all aspects of your batteries with this high quality tester.

RETAIL **NOW ONLY \$19.48**
\$29.95 RCM031



TOWER

217-384-1010 P.O. BOX 778 CHAMPAIGN, IL

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DA ENTERPRISES 36%
SERIES IV OFF
POWER PANEL



The all-in-one power panel!

Supply power to starter, plug, pump, etc., as well as fast charge your radio at the field!

RETAIL NOW ONLY \$22.48
\$34.95 RCM033

BRIDI RCM 34%
TRAINER 40 OFF



This popular all balsa trainer has a 52" span and takes a .35 - .49 engine. A high quality kit.

RETAIL NOW ONLY \$36.28
\$54.95 RCM034

COX TD .049
STD. ENGINE



38%
OFF

A super hot 1/4A engine ideal for free flight, control line, 1/4A R/C, and more.

RETAIL NOW ONLY \$ 12.98
\$20.95 RCM035

DUNE 25%
BUGGY OFF



This is the Sigma-Ace .19 size dune buggy distributed by Leisure Electronics. 17" length.

RETAIL NOW ONLY \$149.98
\$199.95 RCM036

12 VOLT
MOTORCYCLE
BATTERY 50%
OFF



These are high quality, heavy duty motorcycle batteries that are perfect for all electric starters. Brand new.

RETAIL NOW ONLY \$13.48
\$26.95 RCM037

12 VOLT
BATTERY
CHARGER

To go with your 12 volt motorcycle battery, or any other 12 volt battery, we now have this high quality charger that does a perfect job. Safe and easy to use. Works great with battery at left. UL approved.

RETAIL NOW ONLY \$6.98
\$13.95 RCM038

NOSEN GERE 28%
SPORT BIPE OFF



This all wood stand off scale bipe has a 96" span. Uses a .60 engine and a 4 ch. radio. Necessary hardware is included. 18 hour assembly time.

RETAIL NOW ONLY \$93.58
\$129.95 RCM039

K&B .35 RC 35%
ENGINE OFF



A front rotor type engine featuring a light aluminum piston with the dykes ring. High quality!

RETAIL NOW ONLY \$22.78
\$34.95 RCM040

MARK'S MODELS 35%
WANDERER OFF



This easy to build and easy to fly glider has a 72" wingspan. So stable it will fly free flight without a radio. Great for the beginner!

RETAIL NOW ONLY \$12.98
\$19.95 RCM041

K&B .61 RC W/PERRY
PUMP & CARB & MUFF



Equipped with a Perry Pump/Regulator and a larger Perry Carburetor specifically designed to be used with the Pump/Regulator system. Easy to start. Number 6535

RETAIL NOW ONLY \$68.98
\$115.00 RCM042

BRIDI RCM 34%
TRAINER 60 OFF



This popular all balsa trainer has a 58" span and takes a .40 - .60 engine. High quality. Flies great.

RETAIL NOW ONLY \$41.58
\$62.95 RCM043

40%
OFF **FOX .45 RC**
BALL-BEARING
SCHNEURLE



Tests show this to be one of the most powerful .45's on the market. Puts out over one horse. Starts easily- idles well- extremely durable.

RETAIL NOW ONLY \$38.98
\$64.95 RCM044

VK CHEROKEE 30%
OFF



This semi-scale model features a 65" span and uses a .40-.61 engine. Full length die cut sides. A good-looking high quality kit.

RETAIL NOW ONLY \$48.98
\$69.95 RCM045

K&B .19 40%
RC ENGINE OFF



Features "squish band" head machined from solid aluminum bar stock; precision ball bearings.

RETAIL NOW ONLY \$29.98
\$50.00 RCM046

LANIER 36%
COMET II OFF



This popular almost-ready-to-fly features a 63" span and takes a .50 - .61 engine. Great trainer.

RETAIL NOW ONLY \$39.98
\$62.50 RCM047

ASSOCIATED 35%
RC 200 KIT OFF



See Tower Hobbies Catalog P. 118 for available bodies. 22" body length. Features ballbearings for rear axle & clutch, glass chassis, disc brakes. Kit comes complete less engine, body, and radio. Best gas car anywhere!

RETAIL NOW ONLY \$126.78
\$195.00 RCM048

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**K&B .40 RC W/
PERRY PUMP &
CARB NO. 8360**

**40%
OFF**



Features Perry Pump/Regulator and a larger Perry Carb specifically designed to be used with the Pump/Regulator system. Adds 1000 RPM's!
RETAIL NOW ONLY \$56.98
\$95.00 RCM049

**KRAFT .61 RC
SCHNEURLE
WITH MUFFLER**

**28%
OFF**



This high performance schneurle engine comes with a perry carb and special muffler. This is the highest quality engine you could want!
RETAIL NOW ONLY \$71.98
\$99.95 RCM050

**PICA
DUELIST 2/40**

**35%
OFF**



This all balsa twin is easy to fly and safe handling. It has a 67" wing span and requires two .23-.40 engines.
RETAIL NOW ONLY \$58.48
\$89.95 RCM051

**JENSEN
UGLY STICK**

**36%
OFF**



This all-balsa kit is the ideal trainer. It takes a .45 to .61 size engine and has a 60" span. Very stable.
RETAIL NOW ONLY \$39.98
\$62.50 RCM052

**ANDREWS
BIG H-RAY**

**40%
OFF**



This 3 channel trainer has a 56" wing span and takes a .19-.45 engine. Super performance and strength.
RETAIL NOW ONLY \$29.98
\$49.95 RCM053

**MIDWEST
ATTACKER**

**40%
OFF**



This all molded styrofoam kit builds fast and flies great. 48" span. Uses a .19-.35 engine. Very popular.
RETAIL NOW ONLY \$25.98
\$42.95 RCM054

A-JUSTO-JIG

**33%
OFF**



This complete wing & fuse jig holds alignment within .1%. Allows you to make up to a 6 foot wing. Fuse jig fits on without tearing down your wing jig.
RETAIL NOW ONLY \$39.98
\$59.95 RCM055

**DREMEL 580
TABLE SAW**

**35%
OFF**



Multi-purpose table saw especially designed for hobbyists. Rips, cross cuts, miters, straight cuts, dados. CUTS UP TO 1" THICKNESS!
RETAIL NOW ONLY \$58.88
\$89.95 RCM056

**MIDWEST
CARDINAL
A.R.F.**

**41%
OFF**



This all foam trainer has a 46" span and takes a .049-.15 size engine. Rugged and flies great.
RETAIL NOW ONLY \$19.48
\$32.95 RCM057

**STERLING
PUDDLE
JUMPER MK II**

**35%
OFF**



This airboat has a plastic hull and cabin with balsa and plywood parts. It uses a 2 channel and a .15 to .35.
RETAIL NOW ONLY \$25.98
\$39.95 RCM058

**JEMCO
CORSAIR**

**30%
OFF**



This beautiful stand-off scale favorite has a 54" span and takes a .40-.60 engine and a 4-6 ch. radio. This high quality kit has foam wings.
RETAIL NOW ONLY \$47.98
\$68.50 RCM059

**BUD NOSEN
P-51 D**

**28%
OFF**



FOR MODELLERS WHO THINK BIG!! 102" span! Uses a .60 engine with prop driver. Uses a 4 ch. radio. Very stable flyer.
RETAIL NOW ONLY \$122.38
\$169.95 RCM060

**BRIDI
UFO**

**33%
OFF**



The ultimate in pattern! This new release is .60 size with fiberglass fuselage and foam wings.
RETAIL NOW ONLY \$87.08
\$129.95 RCM061

**STAFFORD
TWIN
COMMANCHE**

**30%
OFF**



This museum scale twin engine favorite is always in high demand. It's all-balsa, has a 72" span, and needs two .40 engines.
RETAIL NOW ONLY \$97.98
\$139.95 RCM062

**DUMAS BIG
SWAMP BUGGY**

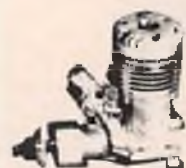
**36%
OFF**



This rugged and stable airboat runs on water, dry grass, or snow. Really moves out with a .40 and speeds with a .60. Lots of fun!
RETAIL NOW ONLY \$19.88
\$31.00 RCM063

**SUPERTIGRE
.35 RC PDP
ENGINE**

**30%
OFF**



For the value-conscious flier, this powerful .35 is moderately priced. Ideal for the medium-sized RC ships.
RETAIL NOW ONLY \$33.58
\$49.95 RCM064



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217-384-1010 P.O. BOX 778 CHAMPAIGN, IL

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<p>ANDREWS AEROMASTER 35% OFF</p>  <p>The most popular Biplane in R/C!! 52 1/2" span, 910 sq. in. area, .60-.78 engine. All balsa construction.</p> <p>RETAIL \$79.95 NOW ONLY \$52.48 RCM065</p>	<p>WES CRAFT B-17 FLYING FORTRESS 21% OFF</p> <p>THE ULTIMATE RC PROJECT!</p>  <p>This stand off scale kit includes an all glass fuse, wing cells, and engine cowlings. Complete balsa sheeting for wing and stubs. Pre-formed plastic canopies and gun turrets. 120" span. Uses a 5 ch. radio and four .30 size engines. Flying site assembly is quick and simple.</p> <p>RETAIL \$495.00 NOW ONLY \$389.98 RCM066</p>	<p>MRC RTF CHEROKEE 25% OFF</p>  <p>Professionally built, uncommonly attractive. Made for the sport flier. 57.5" span. Comes with an Enya .40 engine with muffler installed. Uses a 5 ch. radio. Fiberglass fuselage.</p> <p>RETAIL \$419.95 NOW ONLY \$314.98 RCM067</p>	
<p>MRC RTF CESSNA 25% OFF</p>  <p>MRC's fine fiberglass Cessna trainer comes completely ready-to-fly. Requires a 5 ch. radio. An Enya .35 RC engine and fuel tank are already installed. 55" span. It can be in the air within one hour.</p> <p>RETAIL \$369.95 NOW ONLY \$277.48 RCM068</p>	<p>MRC RTF HAWK TRAINER 25% OFF</p>  <p>You can be ready to fly this foam trainer within one hour. Comes with an Enya .15 engine already installed with muffler. Uses a 2 or 3 ch. radio.</p> <p>RETAIL \$98.00 NOW ONLY \$73.48 RCM069</p>	<p>MRC FMC COMBAT VEHICLE 20% OFF</p>  <p>This 1/12 scale electric RC vehicle has 2 forward & 2 reverse speed control. Big output electric motor for indoor or outdoor quiet running. Excellent detailed scale! Requires a 2 ch. radio. 15" length.</p> <p>RETAIL \$74.98 NOW ONLY \$59.98 RCM070</p>	<p>MRC SHERMAN TANK 20% OFF</p>  <p>Building is simple due to a complete manual containing about 50 photos, and exploded views. Requires a 2 ch. radio with 2 servos and 6 "D" size batteries. 14" length.</p> <p>RETAIL \$134.98 NOW ONLY \$107.98 RCM071</p>
<p>MRC LEOPARD ELECTRIC TANK 20% OFF</p>  <p>18" length. Takes 40 degree inclines with ease. Movable latches, swiveling periscope, and authentic decals. Operates forward, reverse, left or right. It turns on a dime.</p> <p>RETAIL \$174.98 NOW ONLY \$139.98 RCM072</p>	<p>MRC MARTINI PORSCHE 20% OFF</p>  <p>This 1/12 scale RC electric racer has 2 forward & 2 reverse speed control, big output electric motor, and scale detailing. Requires any 2 ch. radio. Batteries not included. 15" length.</p> <p>RETAIL \$67.98 NOW ONLY \$54.38 RCM073</p>	<p>MRC PORSCHE 934 TURBO 20% OFF</p>  <p>This electric RC favorite is 1/12 scale and 15" long. It features a big output electric motor, 2 forward & 2 reverse speeds, precise scale detailing, and rugged ABS plastic body. Requires any 2 ch. radio.</p> <p>RETAIL \$64.98 NOW ONLY \$51.98 RCM074</p>	<p>MRC TYRRELL 6 WHEELER 20% OFF</p>  <p>This 1/10 scale electric RC car is 16" long and has the following features: 2 forward and 2 reverse speeds, big output electric motor, rugged ABS plastic body and excellent detailing. Requires a 2 ch. radio.</p> <p>RETAIL \$67.98 NOW ONLY \$54.38 RCM075</p>
<p>O.S. MAX .60 RC BLACKHEAD 30% OFF</p>  <p>A front rotor ball bearing RC engine that comes complete with a muffler. The .60 Blackhead is also known as the H60F. It has conventional porting. An economical, fine quality engine!</p> <p>RETAIL \$89.95 NOW ONLY \$69.98 RCM076</p>	<p>SOFTGLAS 22% OFF</p>  <p>NEW</p> <p>The new, complete sealer-filler, primer for balsa wood models. Sands as easily as primer! Easy to apply. Dries hard, fast, and flexible.</p> <p>RETAIL \$8.95 NOW ONLY \$6.98 RCM077</p>	<p>MIDWEST SWEET STIK 42% OFF</p>  <p>54" span. Uses a .19 to .45 size engine. Requires a 4 channel radio. The Sweet Stik is an ultra simple trainer by Larry Leonard and Bud Anders.</p> <p>RETAIL \$42.95 NOW ONLY \$24.78 RCM078</p>	<p>GOLDBERG SR. FALCON 40% OFF</p>  <p>The Sr. Falcon is the standard big trainer. 69" span. Uses a 4 ch. radio and a .35 to .60 size engine. Every design element is engineered for simplicity and fast - building.</p> <p>RETAIL \$69.95 NOW ONLY \$35.98 RCM079</p>

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*Radio
Sale!*

MODEL	RETAIL	NOW ONLY	STOCK NUMBER
KRAFT	KRAFT	KRAFT	KRAFT
KP-2AW (Wheel)	\$129.95	\$88.98	RCM080
KP-2A (2 stick)	129.95	88.98	RCM081
KP-2AS (1 stick)	129.95	88.98	RCM082
KP-4A	299.95	189.98	RCM083
KP-6A	329.95	214.98	RCM084
KP-5C	375.43	269.98	RCM085
KP-5CS	375.43	269.98	RCM086
KP-7C	515.43	369.98	RCM087
KP-7CS	515.43	369.98	RCM088
KPS-14II	44.95	34.88	RCM089
KPS-15II	44.95	34.88	RCM090
FUTABA	FUTABA	FUTABA	FUTABA
FP-2GS	99.95	69.98	RCM091
FP-2F	149.95	94.98	RCM092
FP-2E	149.95	94.98	RCM093
FP-3S S-17	134.95	94.98	RCM094
FP-3FN	209.95	132.98	RCM095
FP-4FN S-17	279.95	179.98	RCM096
FP-4FN S-16	309.95	194.98	RCM097
FP-5FN S-16	359.95	229.98	RCM098
FP-6FN S-17	329.95	214.98	RCM099
FP-6FN S-16	369.95	239.98	RCM100
FP-7GN	589.95	389.98	RCM101
S-17 Servo	29.95	22.48	RCM102
S-16 Servo	39.95	29.98	RCM103
S-7 Servo	39.95	29.98	RCM104

MODEL	RETAIL	NOW ONLY	STOCK NUMBER
SANWA	SANWA	SANWA	SANWA
2 Ch. No. 8020	99.95	69.98	RCM105

STOCK NUMBER	DESCRIPTION	RETAIL	NOW ONLY
RCM106	Airtronics Q-Tee	\$21.95	\$15.38
RCM107	Airtronics Aquila	69.95	48.98
RCM108	Andrews S-Ray	34.95	22.68
RCM109	Andrews H-Ray	39.95	25.98
RCM110	Andrews Trainermaster	52.95	34.38
RCM111	Associated RC100 Car	125.00	87.48
RCM112	Badger 200-3 Deluxe Spray Kit	29.95	26.98
RCM113	Bolink Car W/Futaba 2F	239.95	174.98
RCM114	Bridi Dirty Birdy 60 - Wood	84.95	55.98
RCM115	Bridi Sun Fil 4 20	29.95	17.98
RCM116	Bridi Super Kaos 40	55.95	36.98
RCM117	Bridi Kaos	66.95	44.18
RCM118	Bridi Super Kaos 60	69.95	46.18
RCM119	Bridi AT-6 Texan	134.95	89.98
RCM120	Bridi Basic Trainer	39.95	26.38

STOCK NUMBER	DESCRIPTION	RETAIL	NOW ONLY	
RCM124	Coverite Balsarite	\$2.95	\$1.98	
RCM125	Cox Electric Ferrari	99.95	83.98	
RCM126	Cox T.D. .051	20.95	13.68	
RCM127	Cox T.D. .09	24.95	16.18	
RCM128	Craft Air Butterfly II	49.95	32.48	
RCM129	Craft Air Windrifter	47.95	28.78	
RCM130	Craft Air VM-2 Voltmeter	24.95	13.98	
RCM131	Dumas Atlas Van Linas U-1	47.95	31.18	
RCM132	Fox .15 RC Schneurle	37.95	22.78	
RCM133	Fox .19 RC	34.95	20.98	
RCM134	Fox .25 RC	34.95	20.98	
RCM135	Fox .36 RC	37.95	22.78	
RCM136	Fox .40 RC Schneurle	45.95	27.58	
RCM137	Fox .45 RC Schneurle	51.95	31.18	
RCM138	Fox .60 RC Eagle	69.95	41.98	
RCM139	Fox .60 RC Hawk	84.95	50.98	
RCM140	Globee Fire Plug	26.95	18.88	
RCM141	Goldberg Skylane 62	59.95	35.98	
RCM142	HB .40 RC PDP	75.30	54.98	
RCM143	HB .61 RC PDP	104.70	73.28	
RCM144	Hobbypoxy Formula 2 Epoxy	4.00	2.58	
RCM145	Hot Stuff Blue Line .5 oz.	4.95	2.98	
RCM146	Jemco 66F Hallicat	68.50	51.38	
RCM147	Jemco P-51 Mustang	58.50	40.98	
RCM148	Jemco ME 109	54.50	38.18	
RCM149	Jemco FW 190	58.50	40.98	
RCM150	Jemco AT 6 Texan	58.50	43.88	
RCM151	K&B .40 RC Sport Marine	75.00	44.98	
RCM152	K&B .21 outboard		Call for price	
RCM153	K&B .21 RC Inboard	59.50	41.68	
	Kwikcote - All Colors	8.00	2.98	
RCM154	Latrax Alpha w/radio	56.10	45.98	
RCM155	Latrax Mustang w/radio	70.60	49.98	
RCM156	Marks Bushwacker w/accessories	52.95	31.78	
RCM157	Men Trainer (.15 - .25)	31.95	21.38	
RCM158	Microflame Dix. Welding Kit	35.95	23.28	
RCM159	Midwest Axiflo RK-40	48.95	34.28	
RCM160	Midwest Strikemaster	69.95	41.98	
RCM161	Midwest Little Stik	32.95	20.38	
	Monokote Reg & Trans 6" rolls	9.00	4.98	
	Nosen		All Kits 28% Off Retail	
RCM162	Pacer X-30 Adhesive	3.50	1.78	
RCM163	Pacer Zap 1 oz. Econopak	5.95	3.28	
RCM164	Pica T-28 B	79.95	53.58	
RCM165	Pica Waco	79.95	53.58	
RCM166	Robert Wing Incidence Meter	15.95	10.98	
RCM167	Scozzi AX-1 Ducted Fan	59.95	41.98	
RCM168	Sealactor Custom Iron	25.75	17.28	
RCM169	Skyglas Phoenix 5	50.00	32.48	
RCM170	Skyglas Phoenix 6	65.00	39.98	
RCM171	Skyglas Cureare	65.00	39.98	
RCM172	Skyglas Vertigo II	65.00	39.98	
RCM173	Slimline Muffler for K&B .35-.40	8.95	6.28	
	Solarfilm - Reg & Trans Colors	7.98	3.98	
	Sonic GR-3A Retract System	55.90	36.38	
RCM174	RCM175	Spickler Quickie 500	43.95	29.98
RCM176	Southern RC Bootlegger (Glass)	89.95	58.48	
RCM177	Southern RC Compensator (Glass)	109.95	76.98	
RCM178	Steffard Comanche	69.95	45.58	
RCM179	Sonictronics 12 V. Fuel Pump	14.95	10.48	
RCM180	Sterling Fledgling	41.95	26.48	
RCM181	Sterling Stearman PT-17	89.95	55.78	
RCM182	Sullivan Dix. Starter	39.95	25.98	
RCM183	Sureflite Foam Skylane 182	37.95	24.68	
RCM184	Sureflite Foam J-3 Cub	37.95	24.68	
RCM185	Sureflite Foam Spitfire	37.95	24.68	
RCM186	Top Flite 10x6 (12) Super Maple	13.80	8.98	
RCM187	Top Flite 11x7 (12) Super Maple	15.60	9.98	
RCM188	Top Flite Freshman Trainer	44.95	29.18	
RCM189	Top Flite P-51	57.95	38.88	
RCM190	Top Flite P-40	59.95	40.18	
RCM191	Tower 12 V. Gell-Cell	26.95	18.98	
RCM192	VK Cherokee Babe	39.95	27.28	
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from page 74

The action started with roasting hot dogs over an open fire in the living room (the fire was contained in a fireplace). Then you got a side order of baked frijoles (you folks from the East call them beans), plus lots of other goodies, washed down with assorted liquid refreshments. Then came the live entertainment. "Fast Fingers" Casey strummed folk music on his amplified Fender guitar, while slightly out of tune but enthusiastic vocalists joined in with the lyrics. Gerald Martin, a gentleman of many talents displayed the same impeccable skill on the guitar as he does on the flying field, playing a variety of

ballads. Noel Rozelle of Albuquerque provided a background of soft rhythm chords on another guitar. Topping off the entertainment was Buzz Watson from Los Angeles, who flipped the crowd with his imitation of W.C. Fields. Wearing a bright red nose, (plastic) a black top hat (also plastic) and shiny red cheeks (real), Watson had a line of chatter and ad-libs, along with gestures that rivaled the old man himself.

It was a great gathering, but there was still a lot of flying to be done the next day, so the party finally came to a close and all the gang headed their separate ways for some much needed rest and sleep.

Sunday was another perfect day for

flying, and the pilots and spectators took full advantage. The competition flying ended early, so the rest of the day was devoted to more fun and demonstration flying. Here are some of the highlights.

Ted White and Gerald Martin put on a spectacular team aerobatic show, using Aeromasters and showing flying skill unmatched anywhere in the country. Their formation stall turns were sheer magic! Memories of the old County Fair Air Shows (remember the great Waldo Pepper?) were brought back by Guy Lains from Phoenix, flying a 6' span Big John biplane equipped with a homebrew smoke generator which left fluffy white

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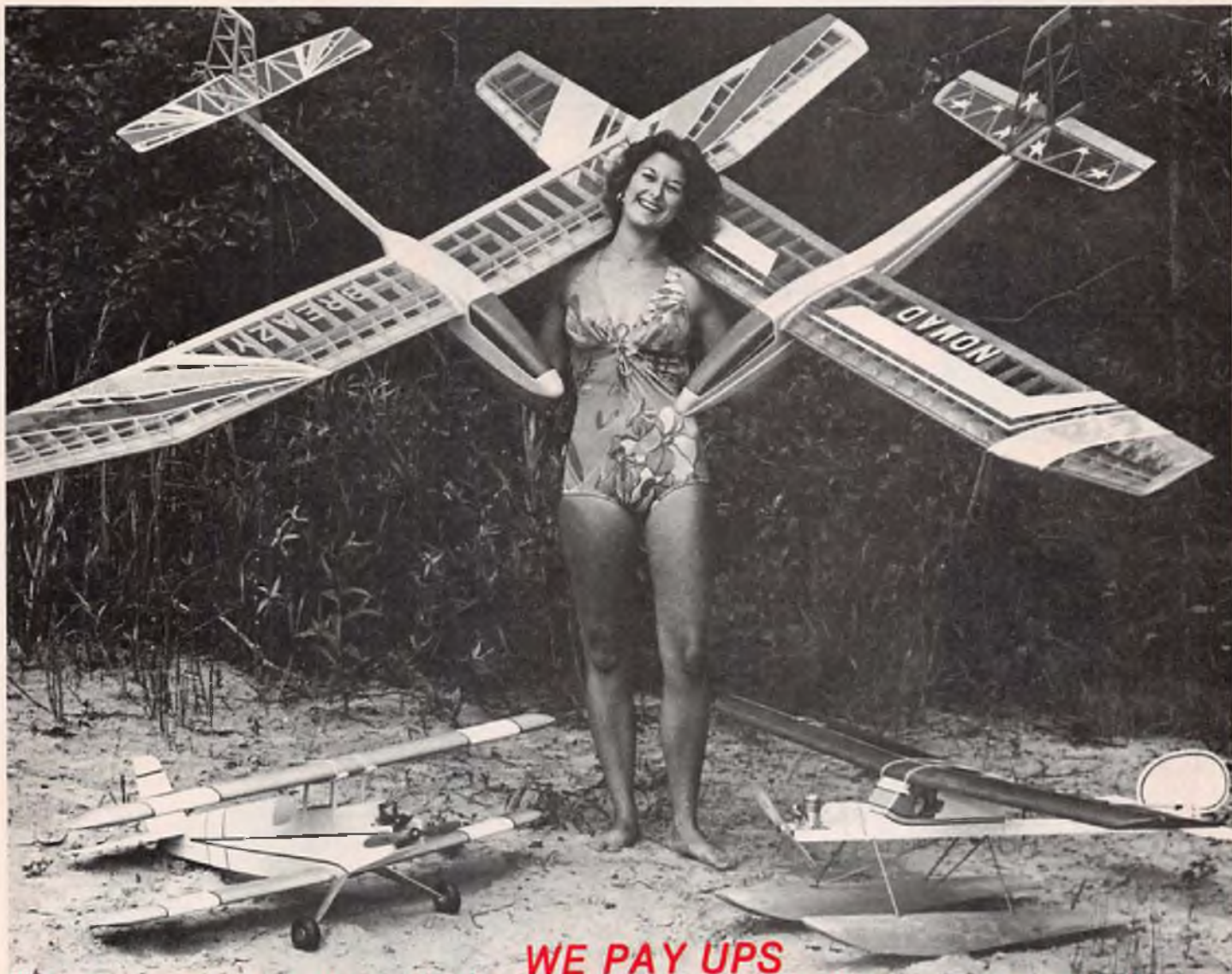
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from page 112/74

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plumes of smoke against the dark blue sky as he rolled, looped, and dived the plane over the field in front of the crowd. Fred Foster of Glendale added to the fun by having a parachutist bail out of the rear cockpit of his Fleet biplane as it rounded the top of a loop.

World War I buffs were treated to a wildly gyrating Fokker tripe flown by Frank Von Bigelow. While the crowd was still cheering, Rich Westlake of Costa Mesa, Calif., made a slow fly-by with his majestic looking Albatross B-1, modified from an Antic Bipe.

General aviation fans were impressed by the smooth performance of a twin engine Fairchild F-27. Painted in the Hughes Aircraft paint scheme, it was built and flown by Jack O'Dell, an employee of Hughes. Noel Rozelle of Mile High Models in Albuquerque, flew the prototype model of a 1/2A twin Partenavia P-68, which is available now in kit form. Jim Leonard of Slim Line Mufflers showed up and flew a dandy Cessna 172.



Noel Rozelle, Albuquerque, with his prototype 1/2A Partenavia P-68.

World War II types got their kicks out of watching Kent Walters wring out his scale Corsair with full working flaps and rotating retracts. It looked super realistic in flight and got the attention of Gerald Martin who flies real full scale Corsairs in the TV show Black Sheep Squadron. It was Marty Moad again, this time flying his twin ME 210 in combat against Dan Parsons and his blood red P-38 with Yippee emblazoned across the bottom wing. The .60 powered P-38 was built by the late Tom Mickey of Albuquerque. Tom was a superb craftsman and did a beautiful job on the plane, his first RC.

Even the little gremlins of WW II fame got into the act and before the weekend of flying was over, they had caused Bob Frey's staggering Beech to spin into the ground; killed an engine on Parson's

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P-38, forcing it to land at a 45° angle, 5' too late! They also wrenched the horizontal stab from a fast flying P-51, with catastrophic results. They got into Rich Westlake's Albatross and made an unscheduled landing, terminating the flight rather abruptly, causing the wings to depart from the fuselage, and the crew to have a close encounter with the instrument panel.



Dave Linne with prize winning Pitts Bipe.



Don Rice from Borger, Texas, with motorized Nikon installation in .61 powered 16 lb. RC model which he used to take aerial photos.

But, finally, it was awards time, and with the points all tallied, Dan Parsons, honorary C.D., called the pilots to front and center and announced the winners. Each received a beautiful hand-built, work of art trophy, built by Wait Pribble of Phoenix. A complete list of the winners is

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included, with Ted White and Gerald Martin picking up the "Big One" for the outstanding flight achievement award.

Over \$1000 in prizes, donated by local and national sponsors, were awarded free to all registered participants. The prizes consisted of scale and sport kits, engines, mufflers, and dozens of accessories. Raffle tickets were sold to help pay for the cost of the fly-in, with the first prize being a 5 channel Pro-Line donated by Pro-Line of Phoenix. Two hand-built Aviator statues by Kathi Casey and Lorna Linne were also awarded to the raffle winners.

After the last prize was claimed, the out of towners from Texas, California, New Mexico, Colorado, Nevada, and other far reaches, packed up their planes and headed for their cars and campers and the long drive home. Gerald Martin headed back to his home on the range (in Texas) in real style. He climbed into his Beech Bonanza, parked in the static display area (no points were awarded for full scale) and after a breathtaking low level fly-by, headed East into the darkening sky.

It was the grand finale to an unforgettable fly-in. □

LITTLEST STICK

from page 73

. . . fast, and so is the sink rate. This isn't a powered glider. There are only 83 sq. in. of wing. The only other problem that I encountered was due to the model's size. Keep it close! At 100 yards it is very hard to see.

As mentioned earlier, the Littlest Stick looks fragile. I had a chance to find out how rugged it really is. At about 75', after the engine quit, I had a transmitter malfunction. The rudder went hard over, and the model spiraled into a hard, dry, plowed field. After cleaning off the dirt, I found that internal damage consisted of a broken actuator. Externally, I found a cracked firewall and a lot of dirt in the engine. That was it! It is not as fragile as it seems.

If you've put away your pulse rudder equipment because it bored you, dust it off. For an investment of \$3.95 you can have a ball. □

A WOMAN'S FIRST YEAR IN R/C

from page 69

All this time the guys in our R/C club were great, greeting me with applause after a good flight, and teasing after a squirrely one, as well as giving me help with the mechanical things I couldn't handle. I'd bet they're like that throughout the hobby. It's true there

aren't many women who fly R/C - - - I'm the only one in our area - - - but I don't think it's because the men wouldn't welcome them.

I didn't do any flying from September to late December. During this "time off" I married my instructor, Ed Moorman. (That's one way to get lots of stick time.)

When I got back into R/C, I took out my old RCM Trainer and, that first day after nearly four months off, I flew fairly well. The second day, Christmas Day, on a low approach, I had one thing too many to think about. My turn to final, roll out, and rate of descent were all fine, but I wasn't over the runway. When Ed said, "Add power and go around," I did - - full power and full up elevator, making a nice loop . . . Smash! Into the ground. Merry Christmas. We took the plane home with a broken nose, and I undertook to repair it. I cut off the nose even with the rear of the wing, and grafted on a new front fuselage. I got it done, but it really looked banged up.

We test flew that Trainer again in early January 1978, and it was just so patched and glued it didn't fly very well at all. I was getting pretty discouraged with it, so Ed suggested we retire it and build a new plane. We went to the hobby shop and I picked out a Sweet Stick. He built the wing, and I built the fuselage, in a crash construction program. We bought the kit on Monday night, and I flew it on the following Saturday. After the crooked old Trainer .40 it flew like a dream. I put Charles Shultz's character, Peppermint Patty, on the front hatch as my pilot called the plane Peppermint Stick, and really began to improve my flying. My Figure 8's became more controlled, and Ed started teaching me acrobatics. (As the author of RCM's article, "Hot Dog Flying", it figures.)

I worked low approaches weekend after weekend, until Ed got impatient with me to hurry up and "set her down." No Way! That crash on the low approach had scared me, and I wasn't going to land until I was certain I wouldn't make another fatal error. I practiced until I no longer made "big" mistakes, like correcting the wrong way with ailerons near the ground, and then, one day one of my approaches looked good, and I landed. From then on it was refinement, learning to play the power on the approach, learning to handle different wind conditions, learning to land the plane more gently and precisely.

In the meantime, back in August I had begun building a cute little biplane, the RCM Basic Biplane. A friend enlarged the plans from the March 1977 R/C Modeler, and I cut out the parts and built it. I didn't bother to build the wings, because I felt I was a long way from flying a biplane. But, in February, Ed went out of town to a conference, and while he was gone, to have something to do, I built a set of wings. I called the plane Chubby, because as a rank novice at

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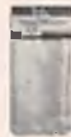
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scratch-building, and being worried about strength, I glued and reinforced to the point where it became funny. The plane ended up so heavy I just started calling it Chubby. I covered the wings, installed a radio, and it was ready to test. I was genuinely concerned about how it would fly, because of my lack of experience, as evidenced by the crooked pylon, but when Ed tested it, it flew great. It was everything the article built it up to be. The next day I took it off --- a little wobbly, to be sure --- and landed, in a stiff wind, in only three bounces.

So that's where I am after a year in the hobby. I'm perfecting my landings and general flying on my Sweet Stick, and learning acrobatics. On the side I play around with Chubby, the RCM Basic Bipe. I still use up more than my share of props, but I've learned a lot about my strengths and limitations in this year, and I've met a great bunch of fliers who really make R/C a great hobby --- for men and women. □

RUN WHATCHA BRUNG

from page 68

handicapped one-half lap. It was agreed that club fuel (15% nitro) would be used by all, and each entrant furnished his own. Ray Sargent arrived with a not quite finished K & B .40 powered Formula I Rickey Rat with an 11.25% 500 square inch wing and won this one, followed closely by three Skooter II's. There were Quickies, and Quickers that were fast enough to run with Ray, but they lost out due to crashes, cuts, no starts, etc.

Our first three "Run Whatcha Brungs" were flown on a Quarter Midget course, but the fourth was stretched out to a Formula I course. We can't normally fly a full sized Formula I course because our field isn't large enough. At the time of the fourth race, neighboring farm land was between crops, so we expanded onto it.

All of the races have been Class "B" — limited to club members. This has become our most popular flying competition. At every race this year there have been more entries from within our own club than other clubs in the area have had at Class "A" Quickie 500 races open to the public. Our members will come out and race with other club members in our easy going, but competitive, atmosphere, while most won't even consider going to open races at other locations.

We think the rules are fairly equitable at this time, and I don't plan to change them for our spring race, except to make club fuel mandatory and supplied. Here are the rules as they now stand:

to page 120

Maserati races BMW!



...in a parking lot!

The BMW leads but comes out of the curve too wide! The Maserati corners perfectly, hits the hammer and the cars fly down the straight neck and neck!

In a parking lot?

You bet! And it could be in your driveway or even on your kitchen floor! Because the cars are from Pro-Cision's 1/16 scale racing stable. Four fabulous cars in all! Driven by Pro-Cision's famous high-speed battery powered engines!

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Futaba FP-2E S17	129.95	87	2 no
MRC 732	118.95	88	2 no
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Futaba FP-2F	149.95	100	2 no
Futaba FP-2F S17	129.95	87	2 no
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Futaba FP-35	159.95	106	2 no
Futaba FP-35 S17	139.95	93	2 no
Logictrol LRB-3	159.00	100	2 no
Logictrol Ranger	170.00	113	2 no
3 Channel Dual stick			
Cox 8033	229.95	148	3 yes
Futaba FP-3FN	200.95	138	2 yes
4 Channel			
Cox 8040	299.95	189	4 yes
Cox 8044	279.95	178	4 yes
Cox 8048	449.95	285	4 yes
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Futaba FP-4FN S17	279.95	182	4 yes
Logictrol Nimbus	300.00	187	4 yes
MRC 735	279.95	189	4 yes
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Cox 8054	299.95	190	4 yes
Futaba FP-5FN	359.95	225	4 yes
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Logictrol Champion	369.95	225	4 yes
MRC 735	379.95	231	4 yes
5 Channel Single stick			
Logictrol LRB 1-5	110.00	193	4 Really
6 Channel			
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Cox 8068	479.95	305	4 yes
Futaba FP-6FN	369.95	234	4 yes
Futaba FP-6FN S17	329.95	210	4 yes
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RUN WHATCHA BRUNG

from page 118/68

RULES

(1) The following rules regarding engine displacement vs. wing area will apply.

Total Engine Displacement (not over)	Min. Wing Area
.61	610
.56	590
.51	575
.49	550
.46	525
.40	500
.35	475
.29	450
.23	400
.19	350
.15	300
.10	250
.049	200

(2) Planes not conforming to the wing area rules will be handicapped as follows:

- 1 to 50 square inches undersize will be handicapped 1/2 lap.
- 51 to 100 square inches undersize will be handicapped 1 lap.
- Planes with wings more than 100 square inches undersize will not be allowed to participate.
- 51 to 100 square inches oversize will get 1/2 lap head start.
- 101 square inches or more oversize will get 1 lap head start.

(3) All planes, except Quarter Midgets, must have a minimum of 15% airfoil thickness throughout the span or they will be handicapped. Quickie 500 type planes with 11.25% airfoil thickness will be handicapped 1/2 lap. Airfoils thinner than 11.25% will not be allowed (except Quarter Midgets).

(4) Planes will be started in order of handicap. All planes are to complete 10 laps and will be timed for that distance. Laps or partial laps will be added to, or subtracted from, the time for the distance to assure proper handicapping. Each plane will fly three heats, and points will be awarded as follows:

- 4 points for first place.
- 3 points for second place.
- 2 points for third place.
- 1 point for fourth place.

(5) After a pre-determined number of heats, the winner will be determined by point standing. Ties will be flown off if a prize is in the balance. In case of a frequency conflict, the best average time for the previously flown heats will determine the winner.

(6) Each cut pylon will cost one additional lap added to the time. Two cut pylons will cause disqualification.

(7) Front intake engines only, except in the .15 engine size (K & B .15's will be allowed).

(8) Engine must idle slow enough so that plane will not roll in the grass at the starting line.

to page 122

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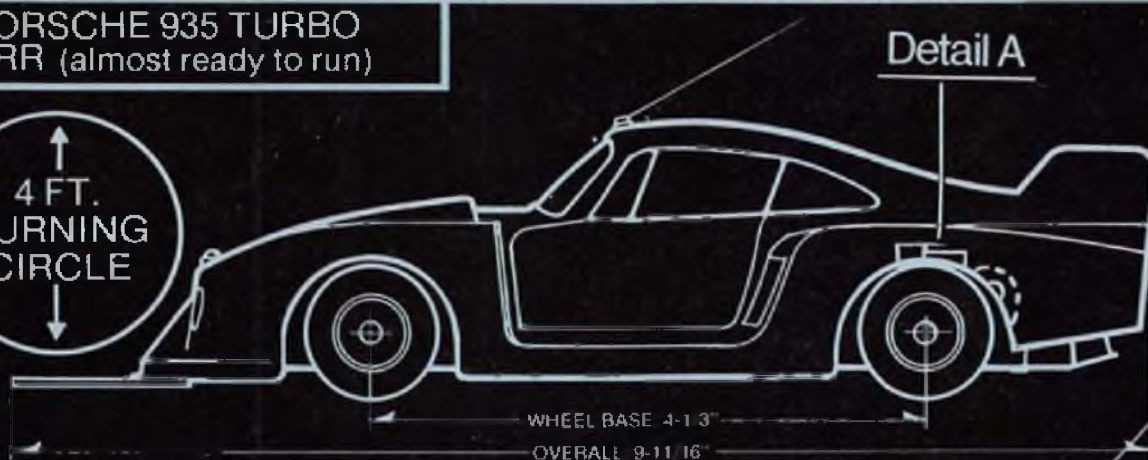
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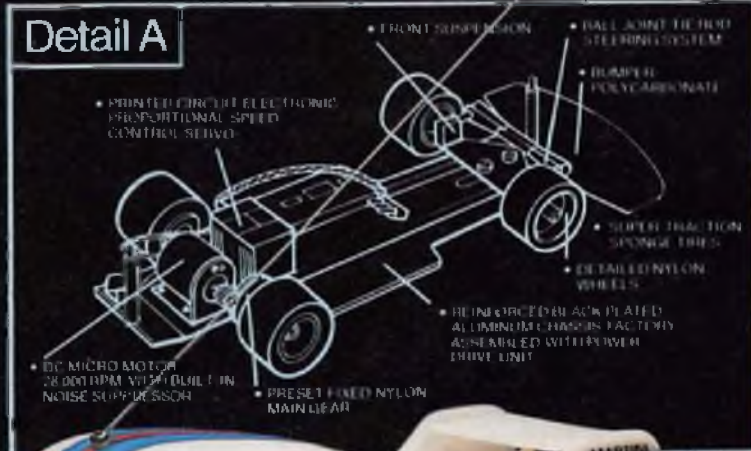
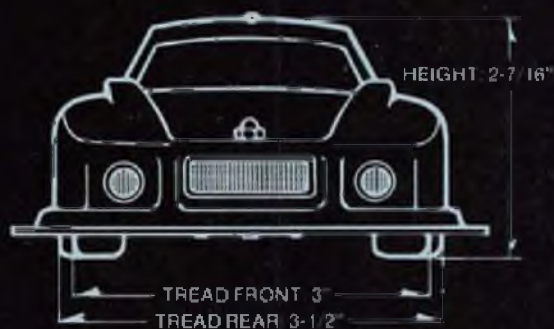
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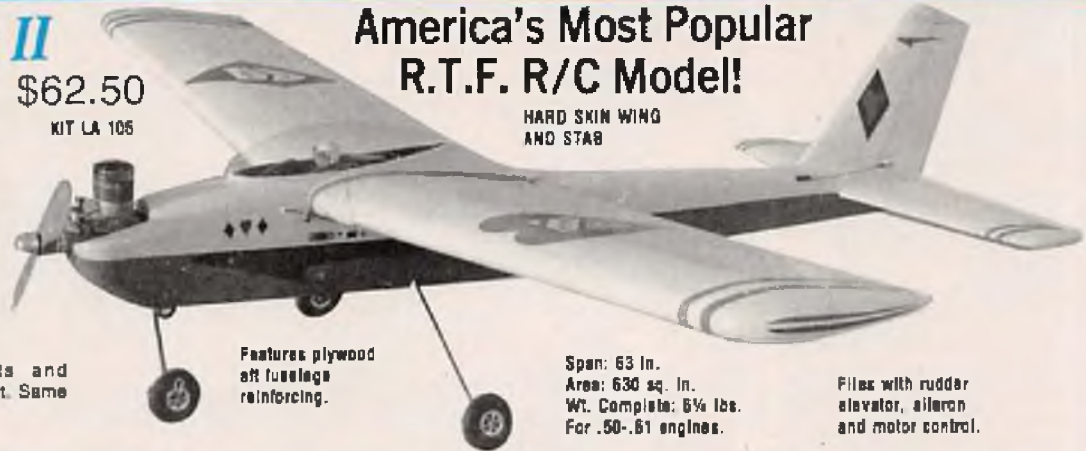
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RUN WHATCHA BRUNG

from page 120/68

- (9) Tuned pipes are not allowed.
- (10) Fuel pumpers are not allowed.
- (11) Pressurized fuel tanks are not allowed.
- (12) Club fuel (15% nitro) will be mandatory and will be supplied.

(13) Fixed landing gear required. Planes must take-off from the ground. Planes with retractors will be allowed to compete if gear is not retracted.

(14) In case of a crash, a back-up plane will be allowed for the balance of the heats.

The purpose of this race is to give everybody who wants to try pylon racing a chance to do so without building a specialized plane or buying an exotic racing engine. The handicapping is an effort to equalize unequal airplanes. □

from page 65/62

direction of the + in the layout.

(3) For 4-wire systems the receiver's auxiliary channel - 2.4 volts wire and the servo's +2.4 volts wire should be connected at the Protector with heat shrink over the ends.

(4) No leads should be soldered or cut until all adjacent holes on the same circuit board trace are full.

to page 126



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 - Nylon D&R case
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RC MODEL PROTECTOR

from page 122/62

(5) All resistor values should be crossed between the values on the component layout and the color code on the parts list before being installed.

(6) Attention should be paid to the direction of the indent and the pin "I" identification circle on the integrated circuits and special care taken to align them as shown on the component layout.

The following order for installing the parts on the printed circuit board is recommended:

(1) The jumpers, trimpot, and integrated circuits should be installed first. Jumper J2 should be between points A and C.

(2) Next install the capacitors, transistors and resistors.

(3) The connector cables should be wired and the two receiver ends should be labeled as throttle and auxiliary according to the cabling diagram. Next push the wires through a rubber grommet and then attach them to the circuit board.

Set-Up Instructions:

(1) Turn the potentiometer clockwise 20 turns or until it begins to click, whichever occurs first.

(2) Plug the Protector's cables into the receiver and connect up the throttle servo.

(3) Turn on the radio system and move the throttle stick. The throttle stick should control the servo and the auxiliary channel should have no effect. If the reverse happens, the throttle and auxiliary channel connectors need to be reversed at the receiver. Label the cable connectors if they haven't been or re-label them if they're incorrect.

(4) Turn off the radio and connect an LED (light emitting diode) with the anode to the battery plus (IC1 pins 1 and 14) and the cathode to the test point (TP). Clip leads are preferable.

(5) Turn on the radio system and run the flight pack batteries down until the voltage across the pack reads 4.7 volts. Use an expanded scale voltmeter if possible. If one is not available the following procedures are recommended: (a) Run the batteries down until the radio just begins to malfunction (jitter or loss of control). (b) Then charge the batteries for 1/10 the milliamp-amp-hour (mah) rating for only 1/4 the time. For example, normally a 500 mah pack would be charged at 50 milliamps for 16 hours. This pack should be charged with the same current but for only 4 hours. (c) Next, operate the radio for about three minutes to remove the surface charge.

to page 128

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RC MODEL PROTECTOR

from page 126/62

(6) With the radio turned on and the battery pack voltage at 4.7 volts, slowly turn the potentiometer counterclockwise until the LED barely turns on — no further. If you feel you are not at the turn-on point, turn the pot back clockwise until the LED turns off; then turn it counterclockwise. Leave the pot with the LED turned on.

(7) Disconnect the LED from the Protector without turning the power off, being careful not to short-out any part of the circuitry.

(8) Set the transmitter's auxiliary channel to one extreme. Is there full control of the throttle servo with the throttle stick? If not, label this position of the auxiliary channel "T" and the opposite side of the channel "C". If there is control, label this position "C" and the opposite side of the channel "T".

(9) Put the auxiliary channel in the "C" position and set the throttle stick to full throttle (the throttle servo should go to full throttle).

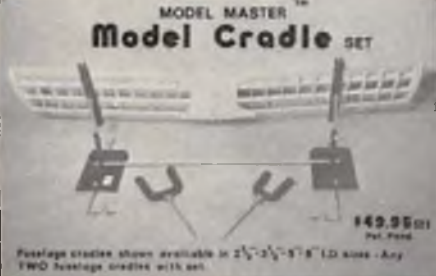
(10) Move the auxiliary channel slowly to the "T" position and watch what the throttle servo does. The throttle servo should remain at full throttle until the auxiliary channel moves half-way, then the servo should suddenly cut to half throttle and slowly move the idle. This is the correct operating mode. If the throttle servo suddenly cuts to half-throttle then slowly moves back to full throttle, turn off the power and remove the jumper J2 from between holes A and C then reinstall between holes A and B (refer to the component layout).

With the completion of the above, the set-up and testing of the Protector and the radio system are complete.

Finishing:

The Protector can now be wrapped in foam rubber and installed in the 1/2A receiver case. Tape the case shut. The foam rubber will prevent the circuit board from rattling and vibrating inside the case which could lead to component and wiring fatigue.

The Protector is now ready for use. It can be installed in the radio system by simply plugging it in and removed by unplugging. If it is installed in another radio system you must run the batteries down and perform steps 8 through 10 of the set-up instructions. If it is to be used on different radio systems, adapter cables can be made if the connectors are different. Since the Protector guarantees only the receiver's battery pack, care must be taken, by cycling, to ensure that the transmitter's batteries are maintaining their charge. May we never crash again due to low batteries. □




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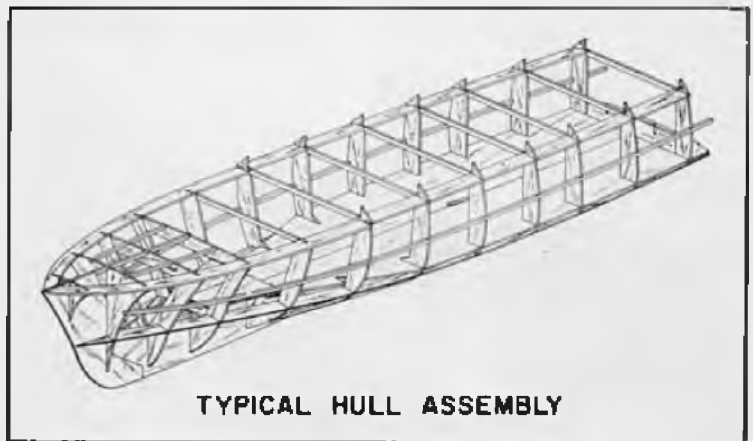
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IF WE DON'T GOT IT WE'LL GET IT FOR YA'

from page 61

Unfold the plans (they are huge), read the excellent construction manual and study the photo sequence prior to any actual building. The plans are full of hints and proper building sequences. Identify all the parts while you're at it. The 17" x 15" scale three-views are a big help. No need to go looking for material to satisfy the judges. At this point, I went to the local airport and found a real twin Comanche with a nice color scheme for my model. After taking a roll of color pictures, I had everything needed concerning documentation and could start gluing wood.

The construction of the model is quite

conventional if the manual is followed. Stafford has done his homework and every item is covered in the eighteen page "yellow" book. You check off each step as it is completed and the airplane is built. Sometimes it seems as though the steps are not in sequence, but they are! Read the book and follow the instructions. The airplane is not difficult to build, but does take time. No foam in the kit, all balsa and hardwood. The pre-shaped wood parts will require some fitting here and there, but it assures you of a strong, true frame and besides, it's fun.

The fuselage and nacelles are built on jigs which are fashioned from the top of

the box. It takes about an hour to set up the jig, but once done, the construction rolls right along. Keeps everything straight on a fuselage of this size. There's plenty of room in the fuselage for any sort of radio desired. The rudder and elevator servos go in the aft section of the fuselage and are hidden by the rear seats. All of the rest of the R/C installation is in the nose section under the removeable front. A very neat installation that hides everything.

The wing construction is quite conventional except for the extra bellcranks required for the throttles. It, too, is built on jig blocks and, when

to page 136

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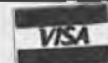


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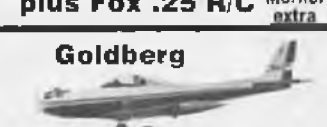
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ECONOMY OF A .40 ENGINE WITH THE PERFORMANCE OF A .60 AIRPLANE
Designed by Bob Smith



Kit Price **\$89.95**

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- Engine Size .40
- Wing Span 57"
- Wing Area 540 sq. in.
- Weight 3 1/2 - 6 1/2 lbs.
- Will adapt to all makes of retractable landing gear

KIT CONTAINS:

18 oz. epoxy glass laminate with filler & canopy molded in. Precision cut foam wing & stab. 1/4" ply wing/stab covering supplied.
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- Engine Size .61
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Epoxy fiberglass laminate with molded-in vertical fin & molded-in canopy.
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24 Hour Assembly



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4 oz. epoxy glass laminate
Machine cut ribs
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- Weight 30 oz.

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completed, has the proper dihedral built in. Takes out all of the guess work. The flap installation and hinging are ingenious, a credit to Stafford. They are hinged and work just like the real airplane, a modified Fowler type. As you progress in building the airplane, it becomes very evident that a lot of engineering went into the kit.

The nacelles, when completed, slip right on the wing with a little sanding here and there. I used Robart incidence gauges here to insure proper thrust and incidence measurements. The construction manual was followed regarding muffler and fuel tank installation. Make sure the throttle pushrods work free as the servo has to move two bellcranks and throttles.

Goldberg retracts with the special struts were installed and actuated with Sonic System cylinders. Fliteglas pneumatic restrictors were used on all of the actuators to give scale-like gear operation and with the doors all hooked up, the gear is most realistic. No bang-bang up and down. The addition of landing gear detail, including the gear doors, is all on the plans and sure improves the overall appearance.

The ship was finished in fiberglass resin and lightweight cloth with acrylic lacquer color used to duplicate the real airplane finish. The wing walk was done as per the construction manual and looks real. The "yellow" book is full of all sorts of tips such as this.

Overall finished weight was 10 lbs. on the nose, which is quite light for a scale twin engine airplane. No weight was needed to balance the ship. In fact, it is a little nose heavy but flown that way.

If you have never experienced the thrill of a "twin", you are in for a treat! True, they are a lot of work, but well worth it. Check the engines out on the high rpm side first. I used a tach but you can tell with a good ear when they come in together. Settle for a rather fast idle with high engine trim and use low trim if you have to kill the engines after landing. The mid-range of the engine while flying does not seem to be very critical at all.

When satisfied with everything, go fly! The airplane is a joy to fly and the twin 40's will light your fire. Not an Ugly Stick, but the airplane does everything you want it to and is most realistic in the air. The flaps help slow it down on landing and you can grease it on. Remember, airspeed is the secret with an airplane such as this. No power-off thermal flying, please. As usual, the "yellow" book has a complete section on flying the model. Follow it and you will not get in trouble.

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CESSNA 150

ARF Semi Scale Sport Trainer

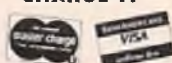
SPAN: 52 in. AREA: 426 sq.in.
ENGINE: .20 RADIO: 3 - 4 channel



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TWIN COMANCHE

from page 136/61

Overall, there is nothing that I would downgrade the kit on. Follow the instructions, which are excellent, and you will have an outstanding "twin", capable of winning anywhere. This kit is not only A-one in quality, but fun to build and fly. □

from page 60/59

interesting and enlightening. Test #7 is a K & B 21 with a Perry pumper carb, R & A rod, R & A head-heatsink and the engine reworked for racing. The results are rather typical for the modifications, not outstanding.

Dick McCoy had just released his new can type muffler, which is super quiet, like the European type mufflers, and I was anxious to prop test it. I did not have

a fresh engine to test it on, so I used the engine shown in test #7. Except that test #7 was run six months earlier, when the engine was new. Since then, its had quite a few hours racing time on it, so I ran another test on it, with the stock MC44M muffler, to see how much racing had worn it out. As you can see in test #8, the engine lost a lot of power, from when it was new.

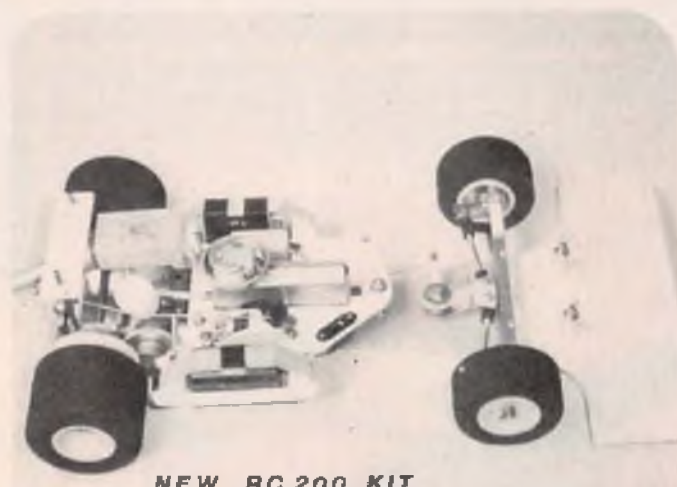
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. absolutely nothing else needed except glue, covering, and radio.

6 FOOT WING

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

2 METER WING *

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

*material for 2 meter modification listed but not included.

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SP-5 \$139.95

Designed by
TOM WILLIAMS



Wing Span..... 140 in.
Wing Area..... 1643 in.2
Flying Weight..... 5 lbs. to 11 lbs.
Lifting Surface..... 1931 in.2
Airfoil..... Craft Air - 12% flat bottom
Wing Loading..... 7.0 to 15.4 oz./ft.2
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L/D (measured)..... 21.3:1
L/D with spoilers deployed..... 1:1

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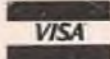
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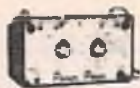
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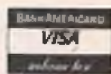
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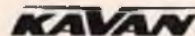


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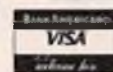
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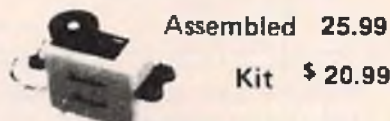
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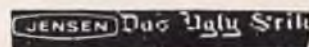
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ERIC MEYERS



I AM SURE GLAD THAT YOU GOOD FOLKS MAKE AN AUTO MIX AND SUPER PUMPER. WHEN I RECEIVED MY WEBRA 91 WE COULDN'T GET THE ENGINE TO RUN OVER HALF THROTTLE. IT SIMPLY WOULD NOT DRAW FUEL AS THE CARBURATOR DIAMETER WAS TOO LARGE. I THEN INSTALLED A SUPER PUMPER AND AUTO MIX AND THE PROBLEM WAS SOLVED. I PLAN ON USING THE WEBRA 91 CARBURATOR ON MY PATTER AIRPLANE NEXT YEAR BECAUSE THE WEBRA 91 CARBURATOR HAS A GOOD MIXTURE CONTROL. AS THE WEBRA CARBURATOR IS UNPRESSURIZED YOU MUST USE THE SUPER PUMPER / AUTO MIX.

FRED KUGEL



JUST A NOTE TO LET YOU KNOW HOW MY SUPER PUMPER / AUTO MIX COMBINATION IS WORKING OUT. I HAVE INSTALLED IT IN MY LAS VEGAS TOURNAMENT OF CHAMPIONS AIRPLANE WHICH USES A 91 ENGINE. RESULTS ARE OUTSTANDING. IT WORKS PERFECTLY AT ANY RPM AND IN ANY POSITION AND TRANSITIONS FROM LOW TO HIGH SPEED ARE VERY SMOOTH. ALSO I HAVE LOCATED THE FUEL TANK FAR TO THE REAR AND BELOW THE ENGINE WITH OUT ENCOUNTERING ANY PROBLEMS. IN SUMMARY I AM VERY PLEASED WITH THE TROUBLE FREE PERFORMANCE OF THE SUPER PUMPER / AUTO MIX.

DEAN KOGER

robart
310 N 5TH ST ST CHARLES IL 60178

PIT STOP

from page 138/59

I didn't change anything on the engine for test #9, other than to take the MC44M muffler off and replace it with McCoy's new MC47 can type muffler. As you can see, the results were rather amazing! More like what you'd expect with a tuned pipe! Because the results were rather mind blowing, I re-ran both #8 and #9 tests. Both of the re-run tests were within 50 rpm of the original tests. Proof enough for me.

I plan to run McCoy's can muffler on a fresh engine to see the difference between mufflers so you'll be hearing more on this. Both OPS and Super Tigre have since improved their engines since

my earlier tests, so we'll try to bring you tests on the latest models to compare with a stock K & B 21. It should be interesting. □

ELECTRIC POWERHOUSE

from page 58

friction-fit in the Astro Flight plastic 2 piece motor mount, bolted to maple engine bearers using 1/8" stove bolts. The battery was installed and wired. An RS 3 channel was used for rudder, elevator and motor on/off. The motor battery is cooled by an air intake under the leading edge of the wing, with exhaust out the fuselage bottom.

The unit was test flown with an 18/8 propeller. It flew, but would not climb more than 100'. An 18/10 was tried, but

to no avail. I called Bob Boucher and asked him what the problem was. When we discovered that my unit was only running at 3100 rpm, while his tacked at 3600 rpm, we then stumbled onto the answer.

My motor was a 1977 Astro Flight motor. The only identification was a green blob of material on the armature used by Astro Flight to balance the 1977 units. The 1978 version of the same motor greatly improved by adding 2 more winds on the armature. However, since the gear reducer was introduced at the same time the new Astro 25 was; and since Astro Flight sold all of the 1977 motors before this, the combination of old motor and gear reducer was never tried in the shop.

When a new improved Astro 25 was tried in the Powerhouse it tacked 3600 rpm with an 18/10 propeller. It now flew to page 146



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ELECTRIC POWERHOUSE

from page 144/58

like a dream. Slow, rock steady, and very majestically, it climbs to about 1000' in 6 minutes and gradually begins to sink as the batteries wear down. The sound of the motor is lost... all you hear is that big propeller. At 200' of altitude it looks just like the Jabberwock rubber band model I flew 15 years ago. It will take off the ground, but I generally hand launch. Overall duration lasts about 12 minutes.

The all-up flying weight is 6 lbs. 14 oz. However, by using 1/64" ply instead of lite ply and using a lighter radio with a 225 ma pack receiver battery instead of the 500 ma pack I used, it's conceivable that a 6 lb. 8 oz. electric Powerhouse could be made. The climb would be even better!

Regarding the gear reduction unit — it seems to be a natural for certain 1/4" scale and old time models. If you are having noise problems at your R/C field try an electric. If you like big props and big planes, this is one nice way to try it.

In closing, it should be mentioned that a new speed reducer for the Astro 10/15 was recently introduced. This unit will turn 3500 rpm to 5500 rpm with props ranging from 12/6 (5500 rpm for the Astro 10) to 16/8 (4000 rpm — Astro 15). This unit should be suitable for a plethora of designs. I intend to install one in a Buzzard Bombshell. With a total system weight of 28 oz. for the Astro 15 system with gear reduction, the Buzzard should fly well with a 14/10 prop, at 4000 rpm. How about a Comet Clipper, or a Mercury or a Sig J3 Cub, or...

Powerhouse Rib and Former Kits are available at: P & W Model Service, P.O. Box 925, Monrovia, CA 91016.

Old Timer plans are available through: John Pond, 4269 Sayoko Circle, San Jose, CA 95136.

Astro Flight System and Gear Reducer available at: Astro Flight Inc., 13777 Beach Avenue, Venice, CA 90291. □

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Step No. 1. Here's how Balsarite eliminates bubbles and sags.

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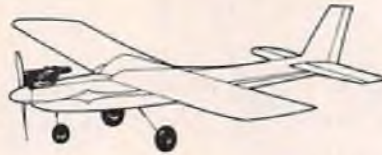


Step No. 2. New tool called TRIMIT ends wood gouges. The Trimit is designed to cut Coverite, Monokote, tissue, nylon, silkspun.

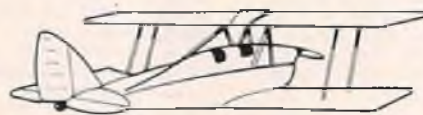
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Step No. 3. There's a Coverite for every type of model.



Silkspun Coverite looks like tissue, costs only 55c/sq. ft. A roll of Silkspun Coverite contains 2052 sq. inches —almost 200 sq. inches more than Monokote. Yet list price is \$7.75 against \$9.00. It's stronger than Monokote yet weighs the same. It needs no paint, but if a glass finish is required, it takes only 1/3rd the amount of paint required for silk or tissue. At 55c per sq. ft., it's the most economical covering available.



Super Coverite is lighter than Monokote but 10x stronger. It has a built-in filler coat, so it requires only 1/3rd the amount of paint. It won 7 top prizes at the last Toledo Show. Guys like Moucha, Ellis, Platt Roth, Vandever, Pearson swear by it. New color called "Antique Fabric" — just iron on any old-timer and it looks like the real thing.



Permagloss Coverite has 4 coats of no-scuff paint, but only weighs 1/3rd ounce/sq. ft. That's light. If a typical plane requires 15 square feet of covering, Permagloss would add only 5 ounces. Considering that the plane with engine, fuel, prop, controls, etc. would weigh about 60 ounces, the covering weight really isn't all that important.

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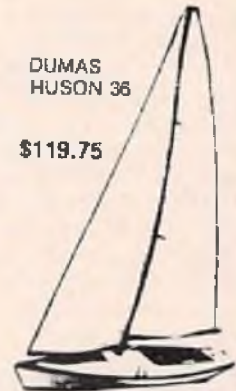
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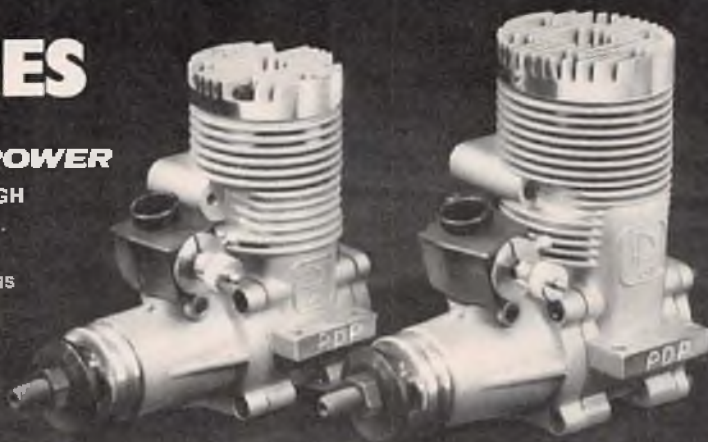
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.40 PDP* Model 4200

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DEALER INQUIRIES INVITED



RADIO SPECTRUM

from page 57/55

Rate Switch For Kraft KPT 7C

I don't know if most people are aware of the fact that the Kraft KPT 7C has an encoder that is electrically equivalent to the Kraft Signature Series. Obviously, you don't have the control panel with all the switches and pots, but these could be added if you can find a place for them. The printed circuit board does have a place for the reversing switches, and in my opinion this is the place to have them—inside where you must make a

conscious effort to throw it. To add an elevator rate switch, all you need is a pot and a switch in series with the wire from the elevator control pot as shown in Figure 2.

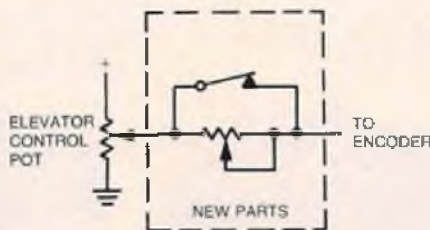


FIGURE 2

With the rate switch closed, you will get the same elevator throw you get now. With it opened you will get a reduced throw which is a function of the pot setting.

An aileron rate switch is not that easy because the trim function is accomplished mechanically on aileron. This would cause the trim to change when the rate switch was thrown.

What you need to do is add a separate aileron trim pot. I understand the necessary parts are available from Kraft Systems.

Well, I better knock it off or I won't have anything to talk about next month. □

SHOCKWAVE

from page 52

balsa and hollowed out. If you need ballast to bring the C.G. within limits, you now have a place to put it. (I epoxied 3.75 ounces of lead pellets into it.) With



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the modifications I have made (a longer nose moment arm and moving the elevator servo forward) you will probably not require as much. (Build the tail "light".)

Glue the 1/4" soft balsa on the fuselage from F-4 to where the dowel-pin is inserted for the radio access hatch. The 1/4" balsa, which forms the access hatch for the radio gear, is now tack glued in place. Start gluing the 1/16" crossgrain balsa to the bottom of the fuselage. Now, glue the 1/16" balsa to its 1/32" stiffener. Glue this assembly to the 3/8" triangular stock on the bottom of the fuel tank compartment. (Don't glue this assembly to either F-4 or F-5.) Glue both the nose piece and F-6 (the firewall) to the fuselage (epoxy both).

Using coarse sandpaper, you now have a bit of sanding to do! You want your final fuselage shape to resemble

the dotted lines shown going through the upper left hand corner of bulkheads F-1 and F-2 on the plans. Round off all four corners so they look like this.

Measure 3/8 up from the bottom of F-4 and F-5 and draw a line between them. Using a very sharp X-Acto knife, cut through the fuselage sides to form the fuel tank access hatch. A 1/16" dowel pin is glued to the 1/32" ply stiffener which will slide through a pre-cut notch in F-4. A small wood screw will secure the aft end of the hatch to F-5. The vent tube for the tank will exit from a 1/4" hole shared by both the access hatch and fuselage side.

The mounting of the tail surfaces are self-explanatory. The 1/16" wire elevator connector is epoxied into place only when the horizontal stabilizers have been glued into place and the elevators have been hinged. When this is done, very carefully glue a piece of 3/32" balsa

between the 1/16" wire and F-6. Now, glue a 3/16" piece of soft balsa between F-4 and F-6. Sand this down until it follows the contour of the fuselage in front of it.

The canopy is a 7" size cut down to 6". It is epoxied in place and 1/8" pinstripping tape is contact cemented around the base of it. The fuselage is covered with white Solarfilm and red and black pinstripping tape was used as trim. Of course, final finish is entirely in the hands of the person building it, so give your imagination free rein!

Wing:

The wing is built from an Ace Pacer wing kit. The instructions are followed exactly in regard to trailing edge installation. The aileron linkage was purchased at the local hobby shop. The leading edge is a piece of 3/8" x 5/8" balsa.

to page 154

Utopia

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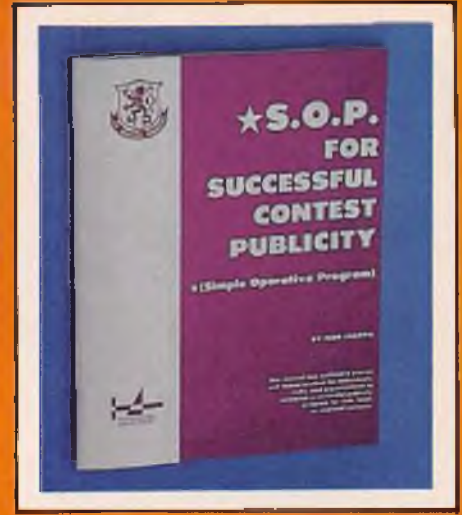
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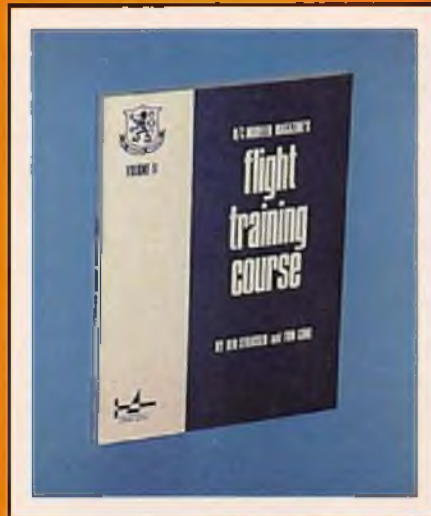
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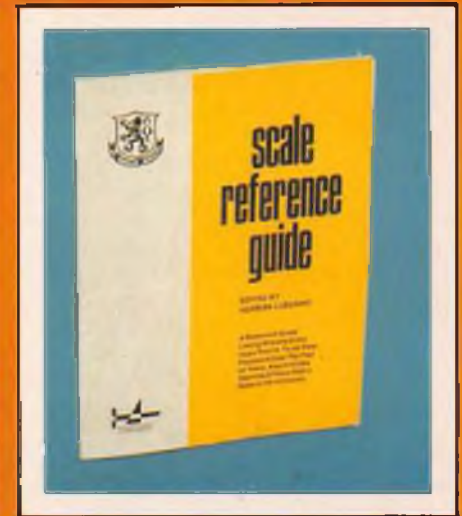
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SHOCKWAVE

from page 151/52

The sweep in the wing was made by lining the leading edge up with the plans and marking, with a ruler and pen, the places to cut at the root and tip of the wing. I cut the right wing first, and took the left wing and laid it upside down over the right hand panel as shown on the plans. It was cut with the same procedure as the first. The trailing edge stock shown between the aileron and tip spill plate is 1/4" x 3/4". The method of hinging the aileron and elevator is up to the builder. I used my nylon thread sewn in a Figure 8 pattern. After sanding the wing, I covered it with white Solarfilm.

The wing is held on with a 1/8" dowel and two 4/40 nylon bolts which tap into hardwood blocks epoxied to the inside of the fuselage just above the wing. In order to prevent deformation of the foam by the 4/40 bolts, I drilled the holes through the wing oversize, and epoxied brass tubing inside.

The 2 1/2" wide center section of the wing is made out of a constant chord section which is part of the Pacer wing kit.

Remember, the only dihedral is that which is built into the wing by the root-to-tip taper. Make sure the top of the wing is built absolutely flat.

Flight Characteristics:

If all you have flown before are trainer-type aircraft, approach the first flight of this one very carefully.

I would recommend that you have at least five or six hours at the stick with other Half-A pattern ships before attempting this one.

Believe it or not, that pusher prop will not touch your arm when you hand-launch it. Get a firm hold on the fuselage, just behind the wing. Have all control surfaces trimmed in neutral.

Now you don't exactly have to be Marty Liquori, but you do have to be able to run! Run forward about 30' and launch it flat, level and **hard!** Just pretend you're throwing a fastball from about 2' over your head. About 20' after you have let go of it, ease in a little "up" on the stick.

In the next twenty seconds --- until you start to get ahead of it --- you are going to think you just launched a Fourth of July bottle rocket! After trimming the Shockwave out, you can begin to explore its aerobatic capabilities. It will do consecutive inside or outside loops, four point rolls, will climb inverted, and does the neatest hammerhead stalls under power I've ever seen. Inverted flying is limited only by how long your engine will run.

When the engine does die, don't let your plane get too far away. This airplane glides flat, but **hot!** □

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... The assembly instructions were very understandable and made sense without too much head scratching. Plans are excellent.

One very interesting feature of this kit is the method of wing attachment. Instead of the old rubber band method, or the two bolt-dowel pin key method, it was designed with four 1/4-20 bolts to hold the wing on. The wing is very easy to align the first time and the only tricky part is watching the angles the bolt holes are drilled on. Draw center lines on the wing and fuselage. Line up the center lines and drill the pilot hole in either front location. Remove the wing, drill a clearance hole for a bolt in the wing. Tap threads in the hold-down block, and re-mount the wing with bolt lightly snug. Now, take a string tied to a pin and stick it in the center of the fuselage where the tail feathers are. Use the string and adjust the wing tips equal distances from the tail. Take your time here as precision insures a good flying plane. When you are satisfied the wing is square, drill the opposite side rear hole. Remove the wing once again and drill a clearance hole in the wing, tap the mounting block hole and re-mount the wing with bolts. Re-check for alignment. If everything is still on the money, drill the other two holes and you're done. Not only is it an extremely strong and accurate way to hold the wing on, but it is also aerodynamically clean.

We finished our model with heat sensitive mylar films. In certain applications, there is no substitute for this material when time, weight, and good looks are prime considerations in finishing. Before ironing down the covering, it is recommended that the frame be given a coat of Balsarite. Our first experience with this product left a good impression and the results are truly a wonder to behold! Balsarite actually makes the mylar a part of the structure and adds quite a bit of rigidity.

The day we flight tested our model was just about perfect. The K & B 6.5 lit off on the first flip and the test pilot gave the controls a final check at full throttle. Take-off roll was minimum and the ship clawed for sky like it was JATO equipped. Because of the power to weight ratio, she will go straight up and be out of sight in about ten seconds. After initial trim adjustments, loops, rolls, inverted, and even a knife edge was performed. Landings were very smooth and most were done dead stick as a six ounce tank doesn't last too long when feeding a high revving forty. Six ounces is more than adequate to get around the pylons, but not quite enough for sport flying. There is room enough for both 6 and 8 oz. tanks in the tank compartment, though.

Although Bridi Hobby does not recommend this plane for anything except sport pylon racing, we found it to

be quite good at aerobatics and very easy to fly when throttled back to a more sane sport flying speed. As with most non-scale designs, the "Quickest 500" can be made to fly as one wishes. By adjusting throws to minimum and using a non-racing .35-40 engine, it could even serve as an aileron trainer. What the "Quickest 500" does best though is go fast when used as intended — as a club pylon racer. As stated in the beginning of the article, "things are kept to a minimum by design." That goes for both wing area and cross sectional area, etc., with respect to established club racing parameters. The instruction sheet even says not to get too heavy handed with the sandpaper or you might sand yourself under those minimum requirements.

In the hands of a consistent pilot, the "Quickest 500" has all the potential necessary to win; it is quick to build and quick in the air --- it is truly "The Quickest 500."

If you have a yearning to try competition and like the idea of having a potential winner without too much deflation of the wallet, then trot on down to the hobby place and get the "Quickest 500." Quicker than you can imagine you'll be on the flying field and, most importantly, you'll have a very competitive aircraft in the process. □

WANDERER 99

from page 47

... wing wire tubing.

The wing wire tubes are imbedded horizontally into 6 layers of 1/8" ply pieces which are cut to the dihedral angle. This sandwich is epoxied into one piece using clamps that are included in the kit. When the epoxy sets, this sandwich is cut in half and each half is then again imbedded in epoxy between the spars of each mid-wing section. Don't concern yourself about this wing folding in the middle — it won't.

In the past, when construction was completed on a glider, it was necessary to look around for something out of which to make the skid. The skid is included in the kit. Two pieces of hardwood are bent to the shape of the bottom of the plane and glued together in this position. When dry, they will remain in the curved shape and may be attached to the bottom of the plane with strips of servo mounting tape. If would be advisable to give the skid a coat or two of epoxy in case you are flying from a hard surface.

Al Doig wrote the instruction book, it is not dull like most, Al has a way with words — it is interesting, humorous and well done. Do read it from cover to cover, as he directs, before you start on the plane. Build the kit as he says, he is right.

to page 159

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Each month Dremel 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. If you would like further information concerning the winning models, write to us giving us the winner's name and what month he won, and we will forward your letter on to the winner. For rules of Model Of The Month Contest, see the October 1978 issue.



JANUARY WINNERS

SECOND PLACE

**Lucien Desmarais
Joliette, Quebec**

A Fairchild Hiller F-227 with 97" span, weighing 18 lbs., was built from Exhibit Airkit using plywood frames and balsa sheeting. Finish is Dupont Imron for the white base coat and Pactra Polyurethane for the colors. It is powered by two O.S. Max .60 FSR engines and uses a ProLine Competition 7 for control. The model was built in approximately 7 months.



THIRD PLACE

**Bob Temple
Boca Raton, Florida**

Scratch-built 2 1/2" scale Cirrus Moth has fuselage covered with 1/64" plywood. Entire model is covered with silkspan and is doped. An O.S. Max 4 cycle .60 powers the 10 lb. model. Uses a Kraft radio and has been flown extensively in the Florida Air Show Team demonstrations.



FIRST PLACE

**Jerry Bugni
Leavenworth, Kansas**

A totally scratch-built Piper Seneca II was scaled from factory drawings. It has a 7" span, weighs 16 lbs., and uses Kraft Multicon retractors. The plywood and balsa structure is covered with K & B 3/4 oz. glass cloth and is finished with the K & B matched finish system of resin, primer, and Super Pox. Power is provided by two K & B .40 engines fitted with homemade exhaust manifolds. Two years were required for the research, drafting, and construction.



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WANDERER 99

from page 157/47

There is one additional bit of information that for some reason was omitted from the book, be sure, and SURE is emphasized, that you seal your plastic covering material to every rib and spar, top and bottom. Don't just seal the covering to the leading and trailing edges then shrink with a heat gun. Oh! yes, it does make a beautiful covering, no bumps, no lumps, and absolutely no STRENGTH. Seal the ribs and spars then shrink the rectangles formed, this will give maximum strength.

After sanding the die-cut sheets on both sides, use the centerfold layout of the instruction book and mark the numbers on each wing rib before you punch them out. This will help immeasurably when you are building the wing. We would like to recommend a 1/8" x 3/16" balsa doubler on the top and bottom of each former. The grain is vertical and they tend to bend if you squeeze the fuselage too hard.

The triangular doublers used on the empennage really put strength where it is needed. When you epoxy the elevator and fin to the fuselage, punch many small holes in the two contact surfaces — do the same for the doublers. When

the epoxy sets, it is like using epoxy nails to hold the two surfaces together.

It is going to take some weight to get the plane balanced out at the Center of Gravity no matter where you put your equipment. Be sure to cut out the center of the first former and hollow the nose block as instructed then put your battery as far forward as possible. The RCM prototype weighed out at 39 ounces and it took 7 ounces of lead to bring the C.G. forward to its proper position --- this brought the total weight to 46 ounces, which is the recommended weight for the kit. Don't worry about the extra weight, the airfoil is thick enough to handle it. □

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BIRD OF TIME

from page 46/40

find out where the Center of Gravity wants to be for the average dive angle you need to complete the speed run. The "max aft C.G. for speed" shown on the plans is about where I flew my best FAI speeds at sea level --- at Denver I flew my practice runs at dawn, in the cold morning air, and never once got on step in the heat of the day. Practice a bit under the actual conditions of the contest, and I think you'll find your Bird of Time is easily competitive with other designs loaded much heavier than you are.

If you have any questions or comments, I'm at 3635 Mt. Vernon, Sebastopol, Calif. And if you can't bear the thought of all that cutting and hacking, I'm planning to put out twenty or thirty hand-cut kits this fall, to help pay the rent. Rattle my cage for prices and details. □

TUBE-O-ROO

from page 35/32



table saw and bolted two circular blades together to give me a 1/4" cut. This worked beautifully, but if you do not have such an item at your disposal, lay the fuselage on a flat surface, put a pen on a block of wood and mark a 1/4" wide slot down the side of the fuselage where the tick marks are located. Make sure to mark 1/8" on each side of the tick marks to give a 1/4" slot, then tape a steel rule or other straight edge to serve as a guide for the knife or the saw and cut the openings in as far as necessary for the fin and stab to slide in place.

Tail sections are made from 1/4" balsa. I rounded off the leading edges and left the trailing edges flat. Since the tail sections slide in place, I covered them with MonoKote, left a 1/8" space of wood open where the fuselage would fit to serve as a glue joint area, and glued them in place last.

Cowling:

I designed the cowling to be removable. It is held down with five wood screws. Refer to construction photo #6 for

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information on the cowling construction. If you don't mind more open space around the engine to facilitate getting the engine in and out, I would recommend gluing the cowl in place permanently, since I have never had reason to remove it after many flights.

Canopy:

To install the Wing Mfg. canopy, tape sandpaper, rough side up, on top of the fuselage. Cut the canopy close to the depth desired and then rub back and forth until it seats itself to contour of the fuselage. Draw an outline of the canopy on top of the fuselage and cut a narrow groove to sit the canopy in and glue in place.

Finishing:

The Tube-O-Roo is finished in MonoKote covering all the way, except for the cowl.

Finished weight is approximately 6½ lbs.

Flight Characteristics:

The plane flies rather fast for a .45 size airplane. Rolls and inverted flight are great! I am not a pattern flyer, so I cannot judge it on precision maneuvers, but for an advanced Sunday flyer, I think you will truly enjoy its performance. Since the Tube-O-Roo lands somewhat faster than a straight wing airplane, just hold the nose up on approach like a real jet airplane for a nice landing. □

KLAMPON KAI

from page 30

... free-running, and also allows very little stop — and hence lost movement — in the action.

The tank was set up in the rear compartment, with a filter in the fuel line inside the boat, and the vents taken out by fuel-tubing through the transom, to avoid spilled fuel in the hull. Finally, the antenna was fitted on the transom, to the

to page 164

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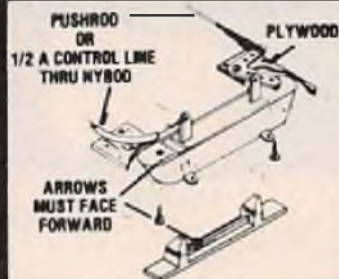
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KLAMPON KAI

from page 162/30

right of the engine viewed from the rear of the model, since I always start boats from the left.

First impressions on running were that the boat is very docile and easy to handle at low speeds, and the turning circle is about 7 feet, which is good for a hull of this kind. On opening the throttle, the hull lifts easily onto the two sponsons, and the wake is fairly clean. The speed is most impressive with the engine flat out, but sharp turns are to be avoided, to prevent the prop from cavitating. It was necessary to play around with shims under the mounting plate of the engine — made from thin pieces of brass plate with holes drilled in them — in order to optimize the running

angle, but this is only necessary if the boat is to be used for racing. It is best to start off with the mount flat on the transom, since this is not likely to provide enough angle to make the model flip at speed, and so is safer. The nose can then be lifted progressively by adding shims under the lower half of the mounting plate, but do it by slow stages.

Summing-up, an easily-built model with all the wood in the kit being of very good quality and accurately cut. The foam building block is an excellent idea, and even a pure beginner will end up with a true hull this way. The boat is easy to handle at moderate speeds, but also has a lot of potential as a pure racing model. Because of the jig construction, there is no plan as such, just a big sheet with a series of sketches and explanations which are quite explicit for anyone with a little building knowledge. The finished boat looks different from

the usual model of this type, and is all the better for that fact. The Klampson Kai is produced by Midwest Products Co., 400 S. Indiana St., Hobart, Ind. 46342. □

SOARING

from page 22/20

easy to fly and almost indestructible.

"To build a Short Soar, all you do is get a Square Soar kit and build the fuselage and tail as per the instructions in the kit. To build the wing, take all of the ribs and sand them down in back until they are flush with the trailing edge material. Now trim 1/16" from the top of the ribs. Build up the wing using the drawing provided. Use 1/16" sheeting in front and 1/16" x 1/4" cap strips in back. Use a piece of spar material for a knee brace in the center section and a piece of trailing



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edge stock for wing lips. The total frame up time is 4 to 6 hours."

★

Valley Forge Signal Seekers has published a short note on the selection of pilots. Very humorous, and with some of the pilots I have seen, could be fact.

The applicant is called through a doorway. If he gets to the next room, he qualifies as a navigator. In this room, he is handed a lead weight and told to drop it. If he hits the floor or either of his feet, he qualifies as a bombardier. He is then handed a gun and told to shoot it. If he hits the walls, ceiling, floor, or himself, he qualifies as a gunner. The only ones who go on to pilot training are the ones who fall the test.

★

Larry Fry of Arcadia, California, has come up with a good idea for mixing epoxies. He saves the backing from his mylar covering material. He cuts this into

about 8" squares and then places this on an embroidery hoop. The backing material stretches very nicely, is firm, yet has enough give to make mixing much easier than a hard surface. Larry likes to use the plastic hoops because if any epoxy gets on the outer hoop, it is easily flicked off when changing to a clean piece of plastic. I tried it and it works well. The epoxy has just enough weight to cause the plastic to sag slightly and keeps it from running onto the work bench.

Good lift.

SUNDAY FLIER

from page 15

19" diameter, 6" pitch prop and the flight speed is so realistic you'd swear there was a man in it. However, looking



closely at the pilot, you can see he would have to be a midget --- since the only one they could get was a Quarter Scale version. Also, that machine gun must have been a .22 caliber. Picky, picky, picky! But if you're gonna go scale, you gotta be consistent. Even so, it was a very impressive model.

The 1978 Western Front Jamboree was the largest yet, and there is no doubt that the 1979 version will set a new entry

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record. The popularity of this type of event, compared to pattern contests, is growing by leaps and bounds. And the quality of the models also keeps improving.

★

Speaking of quality of models, I had the opportunity to see two of the most outstanding examples of workmanship I've come across in a long time shortly after the Western Front Jamboree. Jim Georgeson, who does a lot of photo work with me, is also a very skilled and meticulous modeler. He recently completed a Citabria Stand-Off Scale job, using the Sig kit for the basic structure, but adding many little innovations of his own. Then, a few days ago, we arranged to go out and test fly it. Naturally, I took along my camera.

Picture No. 5 shows Jim with his pride and joy — and he has every right to be proud. I test flew it for him, and on the



very first flight, the performance was flawless. Snaps, rolls, spins, Cuban Eights, inverted flight — just like the big job. I don't know about you, but I get a big thrill out of watching a new plane go through its initial test without faltering. And I might also say that it's a good testimonial to the Sig kit. Nobody asked me to say that, either.

This final photo also gives me a certain smug feeling. Lemme tell you why.

Seems we've got another columnist on this magazine, guy named Chuck Cunningham. Designs airplanes, and stuff like that. Well sir, he came up with a nice, but sorta run-of-the-mill design for a biplane, and called it the Lazy Ace.

to page 170

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Reread the above paragraph then consider the fact that the Midget offers a servo that is in the micro-miniature category but also has the power and strength for .60 powered pattern ships! Truly a universal servo.

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All of our flite packs and complete systems are available with the Midget option; please write for details.



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Size: Height—1.125" Length—1.43" Width—0.705"

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R/C Modeler Magazine, August 1975



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Flying Models, May 1976

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SUNDAY FLIER

from page 166/15

Turned out to be a pretty popular model, too. Somehow, though, it lacked that little spark of "character" to some of the guys who built it. But they did like the way it flew.

Tom Dunnington, of Palo Alto, California, one of United Airlines top service personnel, built a Lazy Ace (RCM Plan #706) and flew it. Great. But he figured it needed "Character". So he built another. Modified it just a bit, but kept the aerodynamics the same.



Eat your heart out, Chuck Cunningham. The Lazy Ace has become an Albatross two seater fighter bomber of World War I vintage, and absolutely reeks with character. Better yet, it retains the good slow flight characteristics of the Lazy Ace, so the flight pattern is so realistic you get nervous when it's overhead for fear the crew will drop a bomb on you!

Take a leaf from Tom's book, all you Sunday fliers. Create your own individual design. However, unless you are a pretty good student of aerodynamics, when you do modify a kit, stay close to the force settings and dimensions. They've been proven out in flight.

But even if you didn't make the basic design, I can guarantee you that when your model flies, you'll have a sense of accomplishment, and a thrill, which only comes from creating your own personal concept of a truly beautiful airplane.

It's one of the true pleasures — and privileges — of being a Sunday flier. □

ENGINE CLINIC

from page 12/10

that have a separate cylinder block ala the Super Cyclone, Hornet, Anderson Spitfire, etc. However, any of your present day .60's that have both a removable front and back plate can have the case reversed so that the exhaust points out the other side providing the case is symmetrical, i.e., from the

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vertical center line to the back cover face is the same distance as from the center line to the front cover face. Most engines are, but there may be one that I am not aware of. However, you are out of luck as far as using the S.T. .56 since this engine does not have a removable front plate. In the S.T. line you would have to use the G 60.

Dear Mr. Lee,

I would appreciate your advice with a problem I am having with my O.S. .40 FSR engine.

I bought the engine new a little more than a year ago and have used it to power an Ugly Stik. After only about four or five Sunday afternoon flying sessions, I put the engine away for the winter.

This past summer, I noticed that the engine feels stiff when turned over by hand. It doesn't turn freely by hand as do my other engines. However, it starts easily, idles very well, and runs well at all throttle settings with good throttle response. After a few minutes in the air though, the engine quits. It may quit in a loop or in level flight at partial or full throttle. Lately, it has quit during every flight.

I have disassembled the engine but have been unable to find any sign of a cause for the problem. While apart, the crankshaft assembly turns very freely and the piston travels very smoothly inside the cylinder. Wrist pin and connecting rod bushing are all apparently unscratched and operate freely. When re-assembled, it rubs as before, even at bottom dead center. Experienced flyers at the field seem to think that the stiffness will go away in time and advise me to run it on the rich side.

I would be grateful to you, Mr. Lee, for your help with this problem. Thank you.

Yours truly,
Warren V. Gureghian
Watertown, Mass.

Warren, yours is one of those problems that is pretty hard to diagnose without seeing the engine. Tightness after storing an engine for awhile is quite common due to congealing of the oil; particularly if a castor oil based fuel is used. This is why an engine should always be run out dry by pulling the fuel line the last flight of the day and then loading the engine with 3-in-1, etc.

However, after putting the engine back in service and running awhile, the tightness caused by congealed oil should have cleared up. Evidently you have another problem. Since the lower end is free and also the piston/sleeve fit when the engine is disassembled, I can only guess that something is distorting when you tighten the head or back plate. With the engine assembled, but with the head loose, do you still have the bind? If the engine is free with the head loose,

to page 174

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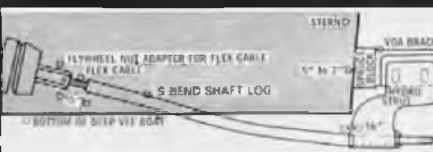
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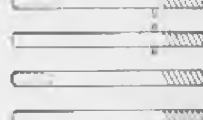
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OS 20 R/C	42.95	34.40			
OS 25 std	37.95	30.40			
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OS 25 FSR R/C	59.95	48.00			
OS 25 FSR std	52.95	42.40			
OS 30 std	45.95	36.80			
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OS 35 R/C	53.95	43.20			
OS 35 std	47.95	38.40			
OS 40 R/C	74.95	60.00			
OS 40 FSR R/C	89.95	72.00			
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5FN	349.95	219.00			

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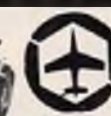
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S 1 X40 R1 STD	81.95	49.20
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ENGINE CLINIC

from page 171/10

but binds when tightened, you probably have a warped head. If this is not the trouble then there is something else causing the bind --- the rod rubbing on the back cover, etc. Many times tight spots and binds will go away with additional running but it is always better if you can locate and eliminate them beforehand. The slightest bind or drag can cause overheating and leaning out of the engine which is the reason your engine is quitting in flight. By the time the

bind wears itself in, there may be other potential damage done to the engine.

Dear Mr. Lee,

I have a question regarding operation of R/C engines at higher altitudes. I've been using an O.S. 40 FSR in a Heli-Baby here where our field elevation is 5500! Needless to say, reserve power is always welcome! I'm wondering if using a larger bore carb, say going from the stock O.S. 4B to a 7B would help compensate for altitude effects. Muffler pressure is being used with 15% nitro fuel. Any general suggestions for operation of engines at this altitude? I will appreciate your comments.

Enclosed is a SASE.

Yours truly,
John Van Hassel
Fort Collins, Colorado

A larger bore carburetor should give some improvement in performance, however, muffler pressure is not strong enough to allow the use of a larger bore carburetor. I would suggest using a Robart pump which, in turn, would allow you to use the larger carburetor. 25% nitro fuel should give you a few more rpm also. Raising the compression at your elevation would also be beneficial but you would need access to a lathe to do this.

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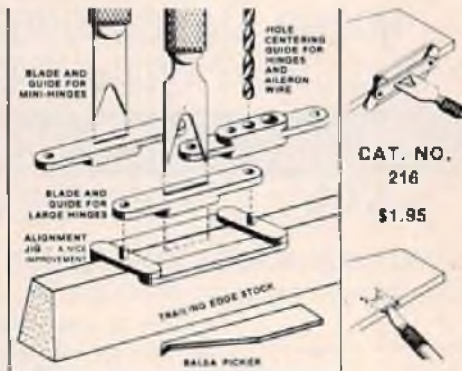
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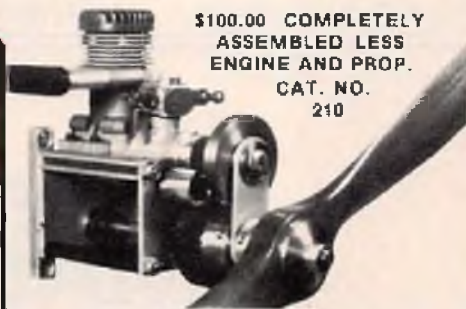
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ENGINE CLINIC

from page 174/10

Dear Clarence,

Thanks for your reply regarding the use of a larger bore carb on the O.S. .40 FSR in a Heli-Baby helicopter. You suggest using a Robart pump, and this had been my original intention on this set-up. However, the back plate on this engine is extremely thin and I'm not sure it is possible to successfully install the pressure tap here. I've checked with World Engines and they don't make a back plate with a post for pressure

tapping as they do for the stock O.S. .40. So, an additional question: Is it possible to tap into the thin back plate and use a sealer or epoxy to reinforce the installation? Or can the engine be tapped elsewhere on the crankcase? As a last resort, I can probably have a friend turn out a new back plate with thicker wall, but wanted to check out other options first. I really appreciate your help with this.

Yours truly,

John Van Hassel

Fort Collins, Colorado

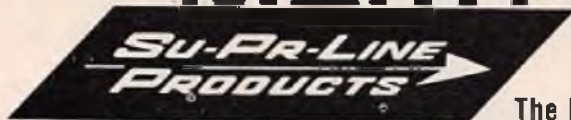
The crankcase of an engine can be tapped for pressure any place that there is a thick enough wall --- directly through

the bottom of the case, through the side of a mounting lug, etc. Actually the back plate is the easiest place of all. The wall does not have to be very thick --- .040"-.050" being sufficient as there is no load on the fitting. Screw a nut over the fitting and then screw the fitting into the back plate until flush on the inside and tighten the lock nut. A drop of Loctite applied to the fitting before installing will make an air tight seal.

Dear Mr. Lee,

I am a novice to the R/C world, but I love it! By the way, I am a high school student, so I don't have plenty of money to buy the accessories for my model, so

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I try to make them myself. One big problem is the fuel, since it is too expensive to buy in Canada (\$2 = 10 oz.). Please help me find a formula for it. Can I run the model engine on regular gas for cars plus a battery constantly attached to the glow plug? Because this is the cheapest way to fly. If possible, please give me all the formula you know that is good to make at home and cheap, too. And lastly, is alcohol in model fuel the same alcohol you use to smear on your external cut?

Thank you
Norman Trudeau
Toronto, Canada

Regular gasoline will not work too well

in a glow engine even if a battery is left connected to the glow plug. The addition of nitro propane will help but even then you will not have an engine with good idle, acceleration characteristics, etc. Also the cost of nitro propane would bring your fuel cost up close to that of regular glow fuel. The cheapest glow fuel you can mix is four parts Methanol alcohol and one part oil. Either Bakers AA or synthetic such as Klotz Special Formula. The addition of 5% nitro methane will help performance considerably. High grade (dry) Methanol must be used. Rubbing alcohol (Iso-Propyl) that you apply to cuts, etc., cannot be used. □

CUNNINGHAM ON R/C

from page 8

getting it, but everyone is telling him the same thing --- learn to fly on something else. And, I'll bet that one fine evening he's going to go out to the field, fire up that fire breathing monster, and take to the air, all by himself, and smash it and the radio all to heck. Just hope that there are no people or things in the way when it happens. But, the question remains,

to page 179

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CUNNINGHAM ON R/C

from page 177/8

how can you really help a beginner. If you beginners out there have any ideas, write to me in care of the magazine, and perhaps we can come up with a good, long lasting solution. And, on the same subject, it is very hard for me and the other columnists to send back a personal reply. Often, if it is something of interest to all, we will publish the letters, but each of us works full time at another job or occupation, and we turn out our columns at odd hours of the day or night. None of us are employed at the magazine, and we don't have a secretary to answer our correspondence. Many, many letters I try to answer, but very often it is impossible. We all want, and need, the input of ideas from you readers, but to answer each of you is just an impossible task, and still get our own modeling done.

★

Last month we were talking about defensive flying, and I mentioned that this month we would continue our examination of it. Okay --- so we will. Defensive flying is just what the name implies, be on the defense all of the time, look for trouble before it happens, and know what to do, or at least think about what to do, when you get into a tight spot. A good part of defensive flying is in knowing who else is at the flying field, and what type of aircraft they are flying. You don't have to know everyone's name, but it's a pretty good idea to know what frequency they are flying on. Most fields have some type of frequency control, but the control is only as good as the people who are using it. A well run flying field is one in which the frequency is closely monitored, as well as the flying etiquette. But, let's go back to your checking out the field first. Are you flying a slow moving, trainer type aircraft, while someone else is going to test out a Formula 1 racer? Best to stay on the ground when this is going on --- let the racer have the air, and keep out of the way --- after all, most racers only make a few test flights, not chewing up the sky in pass after pass. Also, are there any hot shot pilots who like to make low, high speed passes over the field from any direction? After a time you will learn who is comfortable to fly with, and who to stay away from. If you're learning, try to do all of your flying high up in the sky, and leave the lower levels to others.

Another facet of defensive flying is to observe who and what is in the air at the same time, so that you can try to avoid a mid-air collision. If you stay out of the normal flight path of the other fliers, and call out to warn other pilots when you are

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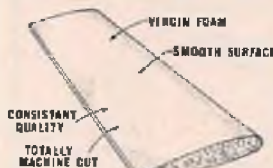
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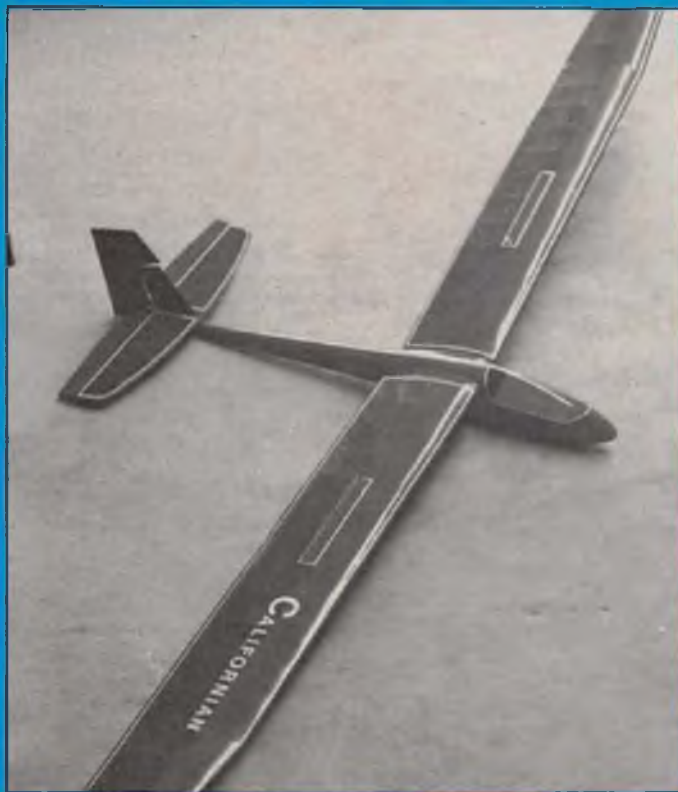
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Specifications

Wing Area 834 Sq. In.
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 Length 44½ Inches
 Flying Weight 44 Ounces
 Radio 2 or 3 Channels



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 PIONEERS IN SILENT FLIGHT
 13377 Beach Ave., Venice, CA 90291

CUNNINGHAM ON R/C

from page 179/8

landing, you will minimize the problem of the mid-air bash.

A couple of weeks ago a young friend of mine damaged his leg quite severely while playing soccer. He will be in a cast for about four months, and then restricted to what he can do for sometime after that. So, to help him pass the time, and to try to hook another person into R/C, I got him started building a Lucky Lady kit. I very quickly found out that he was having trouble understanding the terms, or language

that we use to define a member of the airframe. The first word that he came up against was "longeron." Well, okay, what the heck is a longeron? "Spar" wasn't too bad because it is a more common word. "Ply"? What is ply? Sure, it's short for plywood, and most of us know this but, to the non-modeler, the word ply just didn't mean anything. And so it has gone during his building. I asked him to write down all of his questions, as this would be a help in making an information sheet for the pure beginner sometime in the future. Just as in any other sport, the language of that sport makes it difficult for the outsider to understand. How about "tight end"? Is

that the drunk one on the football team? Or, how about "bump and run"? Does the player dash out, stop, do a belly dancers bump, and then run on? See what the language problem can bring up. Most of us have been exposed to models and modeling for a long time, but when we try to help a non-modeler or non-flier get started, we need to take the time to make sure that they understand what we are trying to tell them.

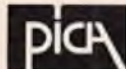
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Part of flying is landing, and for the wind-up this month, I'd like to talk a bit about this all important part of flying. One of the questions that I am frequently

to page 183

THE WACO

We chose the Waco F-3 as our biplane flagship because it best represents the "Golden Era" of the 1930's, when flying was an adventure. Add to this, easy, snag-free building and safe, gentle flying—the result of the thorough kit engineering and careful prototype development that are features of all Platt Kits—and you have a satisfying building and flying experience ahead of you. **Kit features:** Top-quality diecut and machined balsa and plywood. Full size plans. Separate instruction book with isometrics. Decals. Injection-moulded (Not vacuum-formed) plastic cowl, cowl blisters, and wheel pants. All required nylon fittings. Formed wire landing gear & struts. Span: 60". Area: 950 Sq.; 4 to 6 channel. Engine: good .40 to .60



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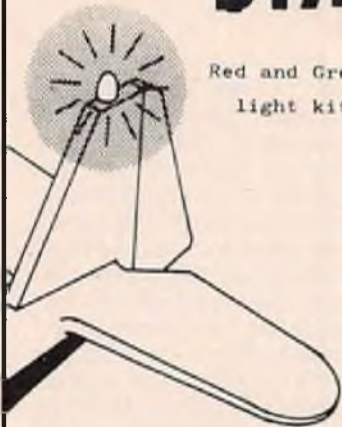
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CUNNINGHAM ON R/C

from page 181/8

asked when helping a beginner to fly is, "How do I set up to land?" Good question. First, let's assume that you are flying an aircraft that is trimmed out, and it is a steady flying plane. Naturally, all landings are made into the wind, not downwind, or crosswind, though sometimes you simply can't help a crosswind landing. A left hand traffic approach is normally best, and is the same as is done at most private, full size flying fields. You come down the runway at somewhat reduced throttle, about 100' in the air. At the end of the runway, or a bit beyond, you do a 90 degree left turn, fly out about 200', make another 90 degree left turn, come back on the throttle just a bit, and allow the aircraft to begin a slow descent, fly parallel to the runway, on past the end of the runway for another couple of hundred feet, make another 90 degree turn to the left, fly for a bit, make one last 90 degree turn to the left. If you have been accurate, you should be on a heading that will bring you right toward the end of the runway. Reduce power again until the aircraft is losing flying speed. Keep the nose slightly down so that you do not stall out, not down much, just a bit. When you are over the end of the runway you should be about 5' to 6' above it. Chop throttle the rest of the way and let the aircraft settle down toward the ground. Don't stall it in, and don't dive it in. Watch the way good pilots make a landing --- not a controlled "dump" at the ground, but a real "landing," with the airplane just gently kissing the ground as it lands. You can practice the landing approach at an altitude rather than right on the deck, practice making your landings about 40' up in the air, then feeding in throttle and going around again for another pretend landing. This way you can begin to get the feel of landing before you have to make contact with the ground. If you will remember that you must keep flying speed up at all times, and to make any glide correction gently, you will go a long way towards making a successful landing. Once you have learned how to land, then do lots of practice on this, by making touch and goes time after time. When I have a new aircraft, or am working on a new design, I like to make lots of touch and go landings because you really learn the "feel" of the new aircraft in this manner. Some aircraft must be kept moving rather fast on landing, and with some aircraft you can bring up the nose and let it settle in like a duck landing on water. An experienced pilot can land many different kinds of airplanes with about the same technique, and this is something that you should strive for in your flying. Learn

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Once again it's time for Jan and me to take off for vacation, and again we are lucky enough to be heading overseas to England, France and Switzerland, so I hope, again, to bring back some information and ideas from overseas. See you when we get back. □

FROM THE SHOP

from page 2

... my own for an afternoon of flying. Or so I thought. On the second time up I lost radio control range and the plane disappeared into the sunny horizon. Hours of walking through the tall milo fields did not reveal the landing spot. I even went up in a 2-seater airplane hoping that a top-side view of the area would disclose the hiding place.

On October 9th, farmers, who had been alerted to the loss, began cutting off the ripe milo and found the plane over a mile from the original take-off strip. By now 41 days had past and the plane had found another use. Four small mice had taken up lodging in the tail. Reluctantly they gave up their winter home as I shook them out of hiding. Then I discovered the floor of the plane had been chewed through to the outer covering and an opening in the tail had been enlarged for their benefit. I am determined to get the plane back in flying condition by Thanksgiving.

Who knows, maybe those 4 mice plotted the hijacking and I really had radio control until they flew the plane out of my sight.

■

Let's Here It For Daddy Warbucks!!

From SAM Speaks, official publication of the Society of Antique Modelers (Pete Vano, editor), we learn that John Pond has been elected to the office of SAM President.

Our congratulations to John, and also to the SAM membership who have as their leader the world's most renowned and beloved Old Timer.

John succeeds Joe Beshar whose dynamic leadership through some rather stormy years has made SAM a strong and enjoyable organization.

■

From the Rocket City Radio Controllers, Inc., newsletter, is an item entitled, "Doomsday Device (for model aircraft)." Read on . . .

"I get lots of mail here at the TV station from all over the country and most of it, of course, is sales literature. The one that caught my eye today was an introduction to a 'technological breakthrough in broadcast security' the literature states. The name of the company is Autoalert, Inc., and they are located in Dallas, Texas. The device is

used to protect news vans or a camera vehicle from theft or vandalism. The systems use a transmitter at the vehicle and a portable pager in the newsman's pocket. The transmitter is authorized by the FCC to operate at 4 watts and has an effective range of over seven miles. When the vehicle is broken into, the transmitter sends out a two tone sequential pulsating signal.

This rather attractive little device is priced at \$100.00 to \$135.00 for a receiver and a transmitter pair. The most fascinating aspect of the device is the frequency selection you get: 26.995, 27.045, 27.095, 27.145, 27.195, 27.255. Now ain't that grand? I can just see it now — a news reporter opens his car door without first turning off the alarm and seven miles away my plane does a Lomchevak at a negative altitude!!

If that isn't enough to chill your heart, think of the other uses the Autoalert people suggest: A construction boss can be signaled to the phone from far distance or a rancher can be called from seven miles away!! How about that! Now haven't I made your dinner taste good? Thanks."

The August issue of "The Bee Line", the Official Capital Area Club Activities Monthly Report, contains some food for thought.

The Tate Family . . .

How many members of this family do we have in the C.A.R.D.S.?

There is old man Dic Tate, who wants to run everything, while uncle Ro Tate wants to change things around. Their sister Agi Tate stirs up plenty of trouble along with her husband Iri Tate. Whenever something new is suggested, Hesi Tate and his wife egi Tate want to wait until next year . . .

There is aunt Imi Tate who wants us to be like everyone else. Devas Tate is the voice of gloom, while Poten Tate thinks he is a big shot. But not all members are bad, though, Brother Facili Tate is quite helpful when something needs doing, and a delightful, happy member is Miss Felici Tate. Cousins Cogi Tate and Medi Tate think things over to keep us on the right track, and lend a helpful, steady hand. But, of course, there is the black sheep of the family, Ampu Tate, who has cut himself off from the club, altogether . . .

The following is reprinted from the "Birds Eye View", newsletter of the B.I.R.D.S. R/C Club.

How To Become An R/C Contestant

1st — You must have an interest or curiosity in entering model airplane flying contests.

2nd — Buy a bag of marbles.

3rd — Every time you enter a contest, drop a marble. When you have "Lost all your Marbles," you're a contestant . . . Bill Simpson — Editor. □

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By William W. Baldiga

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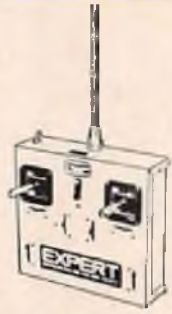
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Indy 3 Channel... \$89.95

Indy's servos have been such an overwhelming success that by popular demand we have introduced our own radio. This is a three channel radio being offered at this low price with two servos. Airborne pack uses four pen cell batteries and the transmitter uses eight pen cell batteries. We may in the near future offer an even less expensive three channel using a stick on one side for rudder or aileron and on the left side for elevator. Such systems are much easier to build;

therefore, are quite a bit less expensive than the high quality two axis stick which we are including with our set. We are offering this system - for openers - on the 72 MHz frequencies. These systems will be serviced by Indy in Indianapolis. Also, we are looking for service agencies around the country who have made a name for themselves servicing other radios. If you are interested, please write. 3 Channel, dry, with 2 servos (2 axis stick) List \$139.95. Introductory price only \$89.95

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Atlas

The Atlas is an almost ready-to-fly glider. This T-tail design has a span of 94.49" and a length of 45.08". The wing area is 897 sq. in. and the stabilizer area is 117 sq. in. Weighs from 2 to 2 1/2 pounds and from 2 channel to 4 channel proportional radio control. This is a beautiful almost ready-to-fly R/C glider. L: \$99.95 I: \$59.95



Cipolla

These engines are lapped piston type and are complete with glow plug. Satisfied customers are calling in and telling us that these really are little power houses.

We are now offering the following three versions. Cipolla .09 Std. U/C L: \$15.55 I: \$12.75. Cipolla R/C L: \$19.95 I: \$15.95. Cipolla R/C Marine L: \$34.95 I: \$23.95.



Indy Film

New colors similar to the K & B epoxy paint colors. Solids - White, Yellow, Orange, Blue, and Royal Blue.

L: \$7.50 per roll. I: \$3.99 or 3 rolls for \$9.99. This is an introductory offer.

Metallic red and green are coming soon. Prices slightly higher.



Como

Como engines are of a flat piston design with Perry porting. The piston carries one conventional ring. Crankshaft supported in two ball bearings.

Complete with muffler and ST carburetor. L: \$74.95 I: \$47.00. U/C version less muffler L: \$64.95 I: \$37.00. Taking orders for 48 R/C and 35 Combat.



Servos

INDY US-1 SERVO

Dunham mechanics. Rotary output plus rack. This is a small servo about the size of the D & R Batam. IC - 544 for use with systems like Futaba, Kraft and World Engines. Positive plus systems, Mitsumi connectors. L: \$28.95 I: \$20.95

INDY US-2 SERVO

This servo is built on the OS mechanics which are slightly larger and more powerful than the Dunham. Excellent for cars and boats. Electronic similar with same connector. Add \$2.00 for the standard World Engines connector or \$2.00 for standard Kraft connector. L: \$23.95 I: \$16.95



Curare

MK's all balsa kit of Hanno Pretzner's famous Curare. MK's quality really shows on this kit. 60 size L: \$98.50 I: \$79.00 40 size L: \$79.50 I: \$63.00



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When you buy a two channel

Don't miss the boat, compromise control of the glider or the car



Get an MRC system with open gimbal sticks

Don't for one instant put all two channels in the same category. They may all be priced within a few dollars of each other . . . but there aren't any within even a few features of our 772. Let's start with the sticks. MRC's 772 has open gimbals. They allow the control potentiometer to connect directly to the stick arm without linkages. This means maximum response, virtually free of play at neutral. It's a must on more expensive, professional multi-channel sets . . . a rarity on most other two channels.

We also make a full-size transmitter for solid feel and sure grip, not a toyish size designed to save us a few dollars. You'll also find Darsonval meter (not just lights) to monitor transmitter battery. And ITT Cannon "Centi-Loc" gold plated connectors, as well as an external servo potentiometer adjustment for centering. You won't find those on other two channel radios. Nor are you likely to see a combination of receiver features which include lead out wires for easy installation, double tuned RF front end and IC circuit decoder. In short, we didn't skimp on the 772, it's better all the way 'round. So whether you sail, fly, glide or take a spin, don't trust your pride to just any two channel. Buy the better one so you don't compromise control. Ask your dealer to show you the 772 with open gimbals.



772 comes complete with 2 servos, receiver, battery holder, switch harness. (At a small additional charge, select the servos best suited to your application).



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