

AMERICAN aircraft modeler



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RACING

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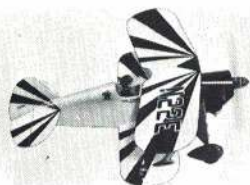
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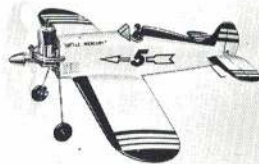
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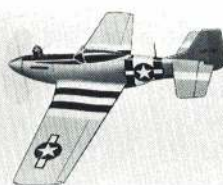
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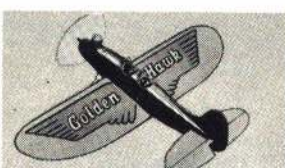
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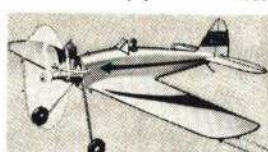
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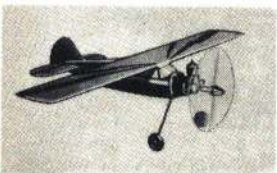
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AMERICAN aircraft modeler

VOLUME 76, NUMBER 4 — APRIL 1973

COVER PHOTO

Free-flight rubber model of Gee Bee R-1 held by Darcia Johnson. Model spans 50 in. and is 2" = 1' scale. Cowl is fiberglass but dummy engine is the Wasp from William Bros. Photo by Vern Clements.

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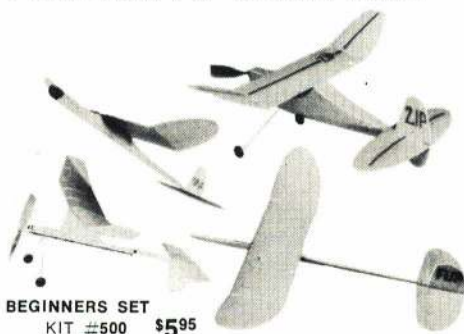
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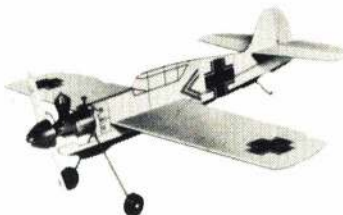
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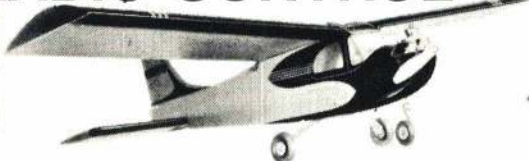
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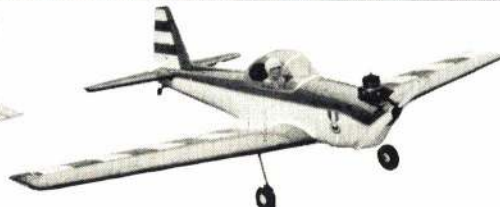
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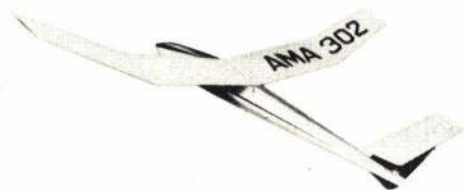
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EDITORIAL



Modeling's current attention-getter is RC helicopters. Only a very few years ago they were considered unsuitable and impossible for modeling. Free flight types had been around for some time, but not controlled models. We do know that about fifteen years ago, when RCers were still using reeds equipment, Lockheed Aircraft was testing their rigid rotor system in a McCoy 60-powered RC helicopter. It flew and proved their idea successful. We attributed this accomplishment to lots of money and engineers. Now, thousands of modelers are building helicopter kits and many are successfully flying them. I got bit by the "Chopper Bug," too.

The most successfully marketed (and not quite the first) RC helicopter is the Du-Bro 505 which sports a front rotor 40 engine atop the rotor system. It is a torque reaction model. AAM had one built by Bob Beckman who reported on it in a Blue Ribbon Review last year. Most modelers still think of that kit as not quite representing what a helicopter should be. Since it was first, most modelers also expected instant proficiency in building and flying. Very few tried hard enough to succeed in learning to fly it. Yet it does fly well—but with many limitations. (It is great for hovering, but useless for fast forward flight or maneuvering in a wind.)

So, I borrowed Bob's 505 for a weekend or two and tried to fly it. That was my undoing. The noise and mess were terrible, the upsets were frequent. Like many others, I learned that you don't gain instant flying success. The process took nearly 30 hours of trying! My neighbors did not appreciate it one bit.

The more I tried, the more it became apparent that the 505 was great as a basic trainer and had conversion possibilities to shaft drive through gears or belts. Doing so would probably make a realistic helicopter out of it and perhaps even give it some good forward flight performance. Several conversations with John Burkam and Gene Rock helped accumulate the basic data for such a model. The only fixed feature would be the Du-Bro body. A 19 engine seemed suitable. So it evolved. It was finished (???) and presented for flight at the gathering of heliophiles at the AMA Nats Glenview last year. Low and behold, it flew—briefly.

Now the fun began. Here's a proven flyable model good for brief liftoffs before something fails. It has taken these many months since then to perfect the design. It is now durable, dependable, and it really flies fine.

Why am I writing this? Well, it seemed that you might like to know about the kind of problems those nasty whirling winged things can require of its designer. Sheer frustration. Them things just mock their creators. There is no comparison with a fixed wing model plane. We know a regular model can fly right off the boards, perhaps not perfectly, but it flies nonetheless. A helicopter either does or does not.

You see, there are four basic functions in a chopper: lift (throttle or collective pitch); directional control fore and aft; directional control right and left; yaw control right and left. If any one of these are out of tune, that thing won't work. An airplane at least keeps its tail behind, but not a chopper when hovering.

A helicopter is a dynamic thing. When in trim it is usually quite stable. Comparatively speaking, an airplane is relatively static and not as stable in flight. My friend Dave Grey observed that a chopper is all mechanisms and propellers and a plane is all body and wings. It is not the internals that make a plane fly and a helicopter does not really need a body. Getting these mechanisms in the chopper to work dependably takes many hours of trying different materials, gears, belts,

(Continued on page 10)

beautiful

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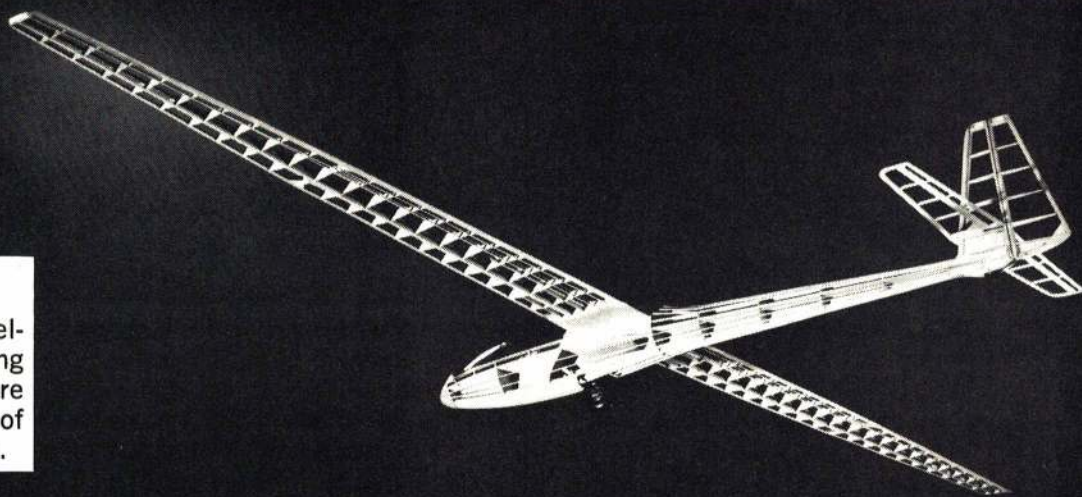
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MODELER MAIL

Plastic scale museum piece

I have enjoyed many years reading your magazine; because of it I have found a truly rewarding hobby. But I am not writing to praise you on your good work.

I started reading your magazine years back and became interested in RC Scale. Well, I still major in that field, but was also bitten by the plastic scale bug, and have spent several years perfecting wear and tear looks. Three months ago the work paid off. My model *SUPERMARINE SPITFIRE Mk la* was accepted into the Experimental Aircraft Museum, Hales Corners, Wisconsin, for its outstanding workmanship and realistic detail.

I don't want to blow my own horn, but I believe many young readers would be interested in accomplishing the same feat.

I was always amazed at the other guy's model. And it seemed the other guy was an old aviator who's been building for years. I hope others will now find this wrong because I'm only 17 and have become one of the very few who can claim this award.

Maybe it's not the age of the builder that counts, maybe it's how much *love* for building he has in the heart, for love of this hobby of aircrafts burns in everyone, sensing not the hands of a ticking time.

If anyone may be interested in this field or how to go about getting your model excepted by a museum, please write.

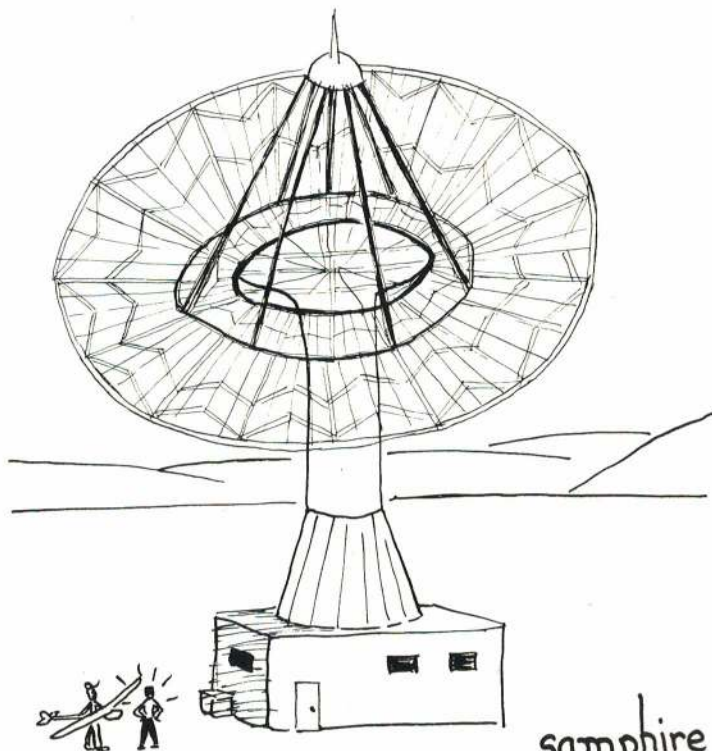
Gregory J. Urbanik
1019 Victoria St.
North Chicago, Ill. 60064

Canadian keen on boats

I am sixteen years old and greatly enjoy your magazine. Just this past Christmas I received my second yearly subscription of *American Aircraft Modeler*. I have read other magazines on modeling, but find AAM superior to all of the others.

I have only one request. How about some articles and pictures on RC racing boats? I like all aspects of modeling and recently have had a growing interest in model boats. It was then that I realized there was hardly any news as far as RC boating was concerned.

(Continued on page 10)



samphire

"There, it's finally finished. Now I'll never have to worry about losing another glider."



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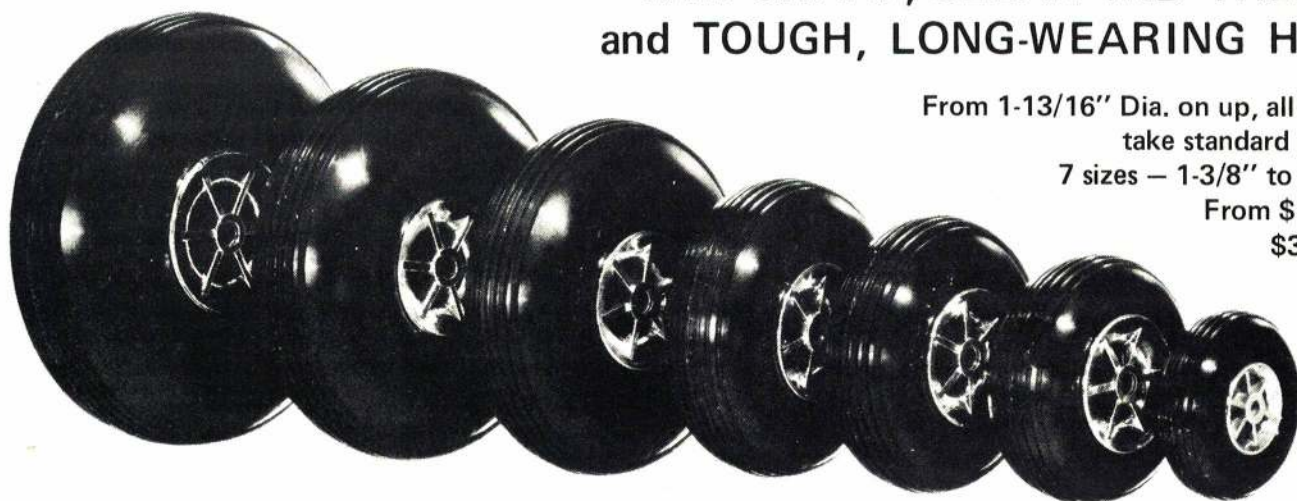


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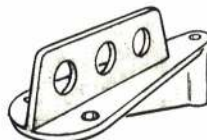
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I don't know how much of this form of modeling is done in the United States, but there must be some form of racing.

I soon hope to purchase a S.K. Dad-dle 40 speed boat and an OS MAX 40 to power it, so would it be possible to see a few more features or articles on RC boating?

Cam Dix, Don Mills,
Ontario, Canada

Coming this summer will be a large all-wood RC sailboat. Occasional non-aircraft articles are used and, if well supported, the subject will earn more space in AAM. —Editor

Reader takes exception

A feature entitled "Maybe It Stalled" appeared in the AMA section of the February issue. I agree with what Don Henry wrote with one glaring exception. Most of the forces he explains are true, but once an airplane (or balloon) leaves the surface of the earth, there is no such thing as "wind." The plane becomes a part of the air mass and is carried along with it and is flown in relation to this air mass.

The "subtractive" theory of "down-wind," etc. is for kite fliers whose craft is attached to the ground via string. If a plane stalls it is not because of "down-wind" or "upwind" once it is airborne, it is simply too low airspeed, wingload-ing, etc.

Paul D. Crabtree (Flight Instructor)
Norman, Okla.

Truth of SK-3's demise

The article "Folkerts Speed King" in the February issue was nicely done. There was an inaccuracy in the article, however, on the manner in which Rudy Kling "bought the farm." What did him in was what we have come to call a stall-spin accident.

The way it happened was like this: Miami Municipal Airport, in those days, more nearly resembled a square grass field than it did our airports of today. Except when there was a north wind, racers lined up abreast and took off to the south on what was the grandstand leg of a left-hand race pattern. However, if the wind was from the north, takeoff would be made in this reverse direction until the contestants reached and rounded a "scatter" pylon about a mile north of the airport. Then, a 180 was made to the left around the "scatter" pylon, and the normal race course assumed.

On the fatal day, the wind was from the north. Rudy and another pilot (whose name I have forgotten as he was not as well-known as Rudy) both racked up into vertical banks on that pylon—although it was much too close to take-off for such a maneuver. Neither survived. Steve Whitman took this first pylon much wider and shallower and went on to win the race. How do I know? I was there and, unfortunately, saw the whole thing from start to finish.

My purpose in writing this letter is the hope that it will be published for the information of future writers about the Folkerts' airplanes. Such articles, in the past, have always mentioned the demise of the SK-3 and have blamed "prop blast," gusts, or similar. That let Rudy off nicely, as bad luck rather than human element, was blamed. It was not bad luck, however, but the combination of competitive zeal and inexperience which demonstrated the unwise-ness of full-power, low-speed vertical banks near the ground.

George S. Jamieson
Orlando, Fla.

EDITORIAL

(Continued from page 10)

bearings, etc. The number of variables in just the mechanisms is bewildering. That 505 Whirlybird is simple, it does not have belts, gears (other than in the tail rotor drive and that's at low speeds), clutches, and such. The converted 505 takes eight ball bearings, which is typical of RC helicopters. I have used ten main rotor head assemblies and about 15 tail rotor drive systems until I found a workable version in each location. Dave Grey tells me that he tried over 100 main rotor blade sets before deciding on what's optimum for his Hughes 300 model. He varied width, thickness, length, weight, and airfoils. Visualize the manhours consumed in making these sets and trying them out. Every time we tried something that did not work, a crash happened. That meant building the beast over. Every rebuild resulted in new improvements. I started out with a frame and body but Dave started out with only an O&R Compact engine unit. His model "evolved" into the Hughes 300 appearance. Remember the body is only there for looks on a chopper.

I can't possibly imagine the work that Dieter Schluter put into his first RC helicopter. He was the pioneer who made the first really successful RC model without anyone else's success to guide him. Everything he tried was an experiment. Same is true for Ray Jarwosky and John Burkam as they developed their first models. Schluter's model is the large Hueycobra which he kitted for a while and now is produced by Hegi of Germany. A fine model—not exactly an ARF though.

Kavan tried to go one better during the last two years by adding the complexity of real mass production and collective pitch control. What an effort that was! I would imagine that Len Sabato found simplifying the Schluter type helicopter to manufacture here in the States was not easy either. He has a kit of a neat-looking Bell Jet Ranger. That's one of the best-looking real helicopters to model and several of the new kits use its shapes.

(Continued on page 87)

SPECIAL (and an idea you may want to try)

Midwest SUPER CHIPMUNK
foam A-R-F

and
McCoy 19 R/C ENGINE
Total List Value \$47.90
SPECIAL \$34.50



RCM Magazine says this Midwest plane is the best A-R-F ever. I heard of a very clever use of this plane that led me to write this ad. A certain ingenious RC club who had gotten perturbed by the climbing cost of 1/4 Midget racing items started a new class of racing aimed at low cost and ease of building—2 rules:

(1) Plane must be Midwest Super Chipmunk ARF,
(2) ANY engine up through size .20 can be used.
This meant that a guy COULD use a hot and expensive .15 racing type engine, but he'd probably be out-run by some penny pincher with a McCoy 19 or an OS 20. Clever? If your club or flying group wants to buy 6 or more of these Chipmunk-McCoy 19 combinations at one time we'll sell 'em to you for \$29.00 per combo.

NEW! Williams Bros. MARK II TWIST LOCK SPINNERS

1 1/2"	\$.95	2 1/2"	\$1.95
1 3/4"	\$1.05	2 3/4"	\$2.15
2"	\$1.35	3"	\$3.95
2 1/4"	\$1.55	3 1/2"	\$5.45

OK for use with electric starters, left or right hand rotation. No unsightly external screws or holes, nylon molded.



Not So New HOBBY LOBBY SPINNERS

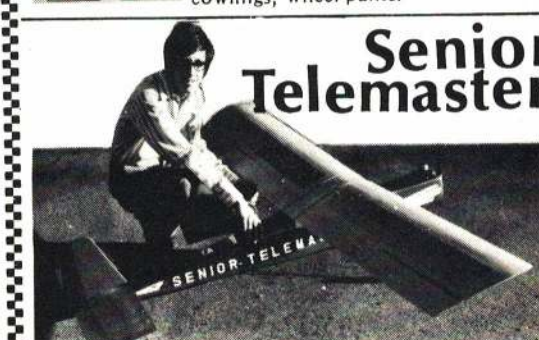
1 3/4"	\$.90
2"	\$1.00
2 1/4"	\$1.10
2 1/2"	\$1.25

OK for use with electric starters, left or right hand rotation. Cap is held on with "unsightly external screws." I'm not going to tell you that these are the world's greatest spinners, but there's nothing wrong with 'em, and they are cheap.



NEW! Midwest Products MICROGLAS

36" x 38" piece \$2.95
Ultra light weight fiberglass cloth weighing only 6/10 ounce per square yard. This cloth is treated with something called "volan" which gives better "wetting out" and bonding characteristics. Ideal for reinforcing, making cowlings, wheel pants.



A Super-desirable Kit:

\$57.95

1. Will not fit in your car;
2. Will not fit in your house;
3. Will infuriate your wife;
4. Has depleted Eucador's balsa;
5. Takes up all the parking space at your RC field;
6. Casts a shadow that threatens the ecology;
7. Registers 6.8 on Richter Scale when crashed.

NEW!**2 New "ELEVON-FLAPERON" Devices**

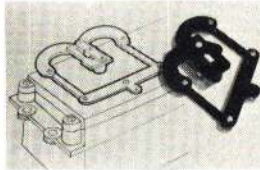
Both of these gadgets are solutions for the same mechanical problem; that is, how can you get combined elevator-rudder motion in a V-tailed airplane, or, how can you get STRIP AILERONS to also WORK AS FLAPS? (This is an especially intriguing use for these gadgets.)

Airtronics VECTOR DIRECTOR \$3.95

Can be used with any radio system and any type of servo. Has adjustable sensitivity to adjust the proportion of rudder to elevator control, or, the proportion of aileron to flap control. Comes complete with the 3 clevis rods shown in the picture.

**Kraft ELEVON LINKAGE KIT \$3.49**

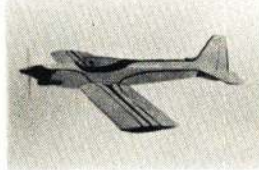
Fits only KPS-12 Kraft servos or Kraft 2 channel brick. Fits on top of the servos or brick taking up no floor space.

**NEW!****Strato Model Products STRATO 210**

List Price \$34.95

SPECIAL \$27.97

59" span, 572, sq. inch area, conventional balsa construction "advance trainer" for .35 to .50 engine. Unusual "tru-lock" construction; in fuselage all formers lock into backbone; in wing panels leading edge locks into wing ribs.



Series III HOBBY LOBBY 5 Digital Proportional \$209.

RC Modeler Magazine said that this radio

"...EQUALLED OR EXCEEDED SYSTEMS SELLING FOR TWICE THE PRICE."



if RCM's opinion sounds to you as if it's too good to be true, we want you to know that you can take a look at a Hobby Lobby 5 without risking a bit of money.

Series III HOBBY LOBBY 5 is the only radio made that carries TWO guarantees:

(1) Hobby Lobby's own guarantee says that when

you order and receive our radio you can send it back to us for an immediate refund if you decide you don't like it. As far as we're concerned you can order a Hobby Lobby 5 just to take a look at it, and then send 'er back if you don't like it.

(2) The manufacturer's guarantee covers any defects in material and workmanship that might occur within three months.

Series III Hobby Lobby 5 is a complete 5 channel digital proportional system with transmitter, receiver, 4 servos, rechargeable n-cads and charger, and it's available on all 27, or 72-75 mhz. frequencies.

Series III Hobby Lobby 5's are in stock now.

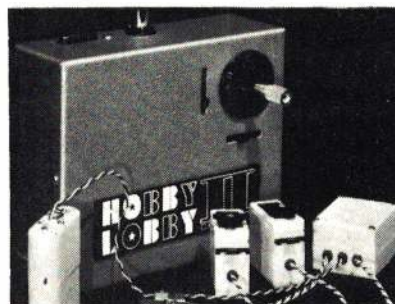
Send us (or phone us) your order and we'll send you our radio. If you're still hesitant write us for our

FREE SERIES III HOBBY LOBBY 5 BROCHURE.

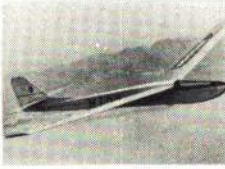
HOBBY LOBBY 2 Digital Proportional \$79.95

A complete, ready-to-fly 2 channel digital proportional system with excellent range for demanding uses such as RC gliders, and with the built-in ruggedness that beginners need.

The SINGLE double-axis stick for rudder and elevator will make your transition to 4 and 5 channel control much easier than if you should get used to using your left hand for elevator on a cheaper 2-stick two channel outfit.



Outfit includes; transmitter, receiver, 2 world engines S-5 servos (interchangeable with Blue Max Mark II systems), battery box and switch harness, 27 mhz. Outfit uses dry cells (not included). Add \$6.50 for 72-75 mhz. band.

NEW!**Marks Models****WINDFREE GLIDER****\$34.95**

The contest-winning under priced glider kit—99" span, all balsa construction.

NEW!**Marks Models****WINDWARD GLIDER****\$25.95**

72" span, easy construction. A good first glider.

HOBBY LOBBY ILLUSTRATED CATALOG \$2.00

CALL US FOR FAST C.O.D. or CREDIT CARD SHIPMENTS
Area Code 615-834-2323

NEW! Cannon 2 CHANNEL "TINI-BLOCK" Digital Proportional



The SUPER LIGHT WEIGHT 2 channel system—only 5.1 oz. airborne weight. See the article in January '73 RCM showing this mini digital in an .020 powered Guillows SE-5A. 27 mc. Please write or call for price 'cause we've been asked not to print our low price on this outfit.

TRY US OUT: S. B. did

"P.S. thanks for your remarkable service in the past year. No other company has ever been able to come even close to you in speed, efficiency, and that personal interest that you show on each order. That last quality is too often missing entirely from transactions with mail order firms. Thanks!"

S. B., London, Ky.

NEW!**Tatone No. 2615 MOTOR MOUNT for****K & B 15 RC Schnuerle \$2.50**

Fits the hot new K&B 1/4 Midget racing engine. Made of heat treated cast aluminum. Has fuel line hole in back.

BREITEN COMBINATION COIL & ANGLE BENDER for 5/32 wire

\$9.95**NEW!****Pettit Hobbyoxy****QUICK-PREP FINISHING RESIN \$3.75 Quart**

Includes catalyst—a fast new way to fill and pre-pare wood or fiberglass. Cures rapidly, sands easily. With just 2 coats and light sanding you're ready to paint.

**Breiten WIRE CUTTER**

for 5/32 and smaller wire

\$8.95

HOBBY

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DROP YOUR ORDER IN THE MAIL BOX, THEN JUMP BACK BECAUSE WE SHIP FAST!

We pay postage on all orders accompanied by check or money order. Satisfaction guaranteed or money refunded. Phone 615/834-2323 Store Hours: 9 a.m. - 5 p.m. except Sundays.

THE GIANTS OF FREE FLIGHT

BILL HUNTER

Photos by C. P. "Lucky" Moody



The San Valeers Annual (November 1972) was a very special meet. In terms of events and prizes, it was the biggest club-held Free Flight Contest ever, but there was more still. This contest had something for everyone. Twenty-seven events filled the Free Flight bill with 80 trophies and a half ton of merchandise. All Gas events were (J) (SO) with Hi Time Junior receiving a K&B 40 RR. Team competition was encouraged by trophies through third place team. Power, Non-power, and Overall Grand Sweepstakes trophies were presented. FAI events were directed by Bob Van-Nest and the S.C.A.T. Club (Southern California Aero Team). Old-Time classes were handled by Bruce Chandler and the S.C.I.F. Club (Southern California Ignition Flyers). They both did a great job! Thanks to both clubs for your co-operation. A special Commercial (foam) HLG class was flown just before the end of the meet for AMA contestants and spectators alike (J) (SO).

Blended in with our regular events and using official contest times was a money jackpot for each event. The highest time recorded by a jackpot entrant won the loot regardless of his placing in the event itself. Then to top it all off, the "Gold Coast Eliminations" for the big Gas classes, "C" and "D." The *Gold Coast Eliminations* were offered for those who felt their ships were hot enough for some real competition. After all, what better way to prove confidence in a particular design than to raise the stakes! The entry fee? "Fifty dollars each class." The fee had to be posted before official flying began for the day.

Our events originally were split up equally over Saturday and Sunday, but due to a very unexpected rainfall that lasted all of Saturday, the CDs, Chuck Thompson and I, were forced to postpone Saturday's flying until Sunday, and change to Cat. II. Rain stopped at 6 pm Saturday and Night Flying started at 7 pm.

For those who have never seen Night competition, I can tell you it's the greatest. To hear a C or D class engine roar to life in the dead of night, then to watch the big job disappear into a black sky with only one or two pen lights for visibility, is breathtaking. A ship must be well trimmed for this event. There is no room for adjustments from one flight to the next. Class C and D ships are most often flown in night competition as they are least affected by the added weight of batteries, and because of their size they have more inherent aerodynamic efficiency. Be sure your ship is well doped or use mylar—"A wet bird never flies at night!"

Unlike daytime flying, the air stabilizes after sunset. In other words, there is no help from big thermals. It's almost like flying indoors. Everything depends on a consistent climb and very low sink rate in the glide portion of the flight.

Official flying began Sunday at 7 am and was to last until 4 pm. Maxes came fast and furious from the start and, before the day's end, 451 maxes were recorded.

(Continued on page 74)



After an official flight, Schwartz's plane de-thermalized right onto the flag pole at the officials' tent.



Open spaces needed when flying the big ones. Ralph Prey releases the colorful "Hi Carumba" 1200 with its screaming ST 56.



Mike Schwartz releases the Class C-D record-holder, a Satellite, with an ST 65. Design was published last year in AAM's May issue.



A great thrill of the contest is night flying. Author's model blasts into the still night with only a small penlight strapped to fuselage for visibility.



Carl Taylor is known for his canard design flown in many sizes.

Facing page: An old but potent Johnson 35 pulls Bob DeShield's "Hawkeye" aloft.

Team Satellite member Hulan Matthies sends his Rossi 60-powered Satellite 1300 aloft.

GOLD COAST ELIMINATIONS

Class "C"—Bill Hunter Class "D"—Mike Schwartz
Satellite Satellite

Official Contest Results For Big Gas Classes: CAT. II

Night Flying

1st Bob Hunter, Satellite 1300, ST 65	12:00
1st Bill Hunter, Satellite 1300, ST 65	12:00
3rd R. B. McKenna, Matador 800, K&B 40	10:36

Class "C"

1st Walt Ghio, Witch Doctor, K&B 40	20:04
2nd Bill Hunter, Satellite 1300, ST 65	20:00
3rd Sal Taibi, Star Duster 900, K&B 40	17:35

Class "D"

1st Mike Schwartz, Satellite 1300, ST 65	20:10
2nd Bill Hunter, Satellite 1300, ST 65	15:00
3rd Bob Hunter, Satellite 1300, ST 65	14:04

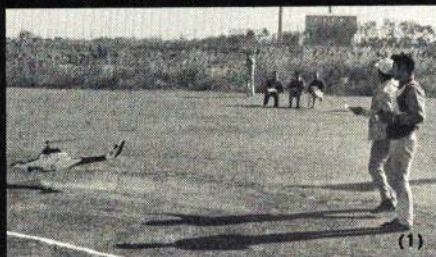


ON THE SCENE

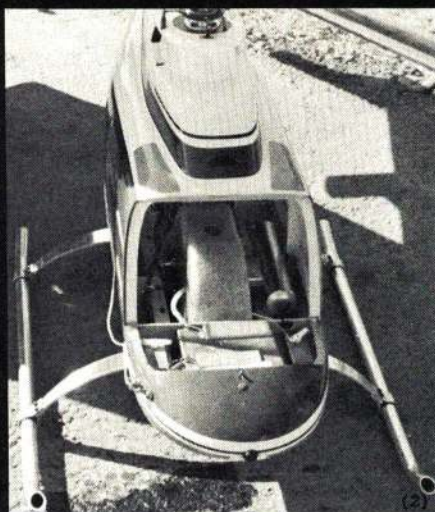
FIRST ALL-JAPAN HELICOPTER MEET

LARRY HOFFMAN

Photos by Larry Hoffman



(1) There were lots of pilot error crashes. The scene was not always as calm as shown here. Takashi Oyamada about to begin his flight. Note the judges are well away from the action for safety. (2) This is a Kalt helicopter but fitted with their new Jet Ranger body. Note muffler is entirely inside. (3) A well-known flier, often on Japan's World Championship teams, Isao Matsui clowns around, but did not attempt a real takeoff. (4) Another well-known modeler, Yuji Oki, skillfully flies his helicopter slowly into the waiting hands of his helper. They make it look so easy. (5) What? "Body English" in Japan? Isao Hirasawa lands acceptably but missed the spot. He scored quite high for the flight. (6) Twenty-two fliers entered. Of these, 21 were the Japanese Kalt Hueycobra design, each painted to look different—lotsa luck artists. It is purely a military design. (7) Contestant Takeshi Inoue takes off into the wind.



The 26th of November, Sunday, dawned on a crispy-dry, cold, typical Japanese winter's day with beautiful Mt. Fuji clearly visible to suburban dwellers.

After rousing my son and meeting his young friend we traveled about one hour by train to the site of the first All-Japan RC Model Helicopter Championship Contest. The location was the town of Irumagawa, home of the Musashi RC Model Club, situated about forty kilometers north of Tokyo City.

Registration hit 33, but actual contestants flying numbered 22. With the exception of one O.D. chopper, all were a scaled-down version of Dieter Schluter's Hueycobra made and sold by the Kalt Co., Tokyo. The O.D. was called the "Guppy, Mark I" by Shohei Fujimaki of Kanagawa, Japan. Fujimaki, a leading stunt flier, tells us his chopper houses an Enya 60 for power, weighs 4.7 kg., has a main rotor span of 1.6 meters, is controlled by a Digicon-5 radio, uses 400 cc of fuel for flights of ten to fifteen minutes duration and has collective pitch control.

Contest rules were quite simple: Seven minutes for engine start and flight; Pattern consisted of (a) Takeoff at approximately 10 to 15 degrees angle and climb out. (b) Right- or left-hand turn, return to the starting point and a five-sec. straight flight. (c) Left turn through 360 degrees. (d) Hover for five-seconds. (e) Landing pattern and off-the-spot landing. (f) Spot landing.

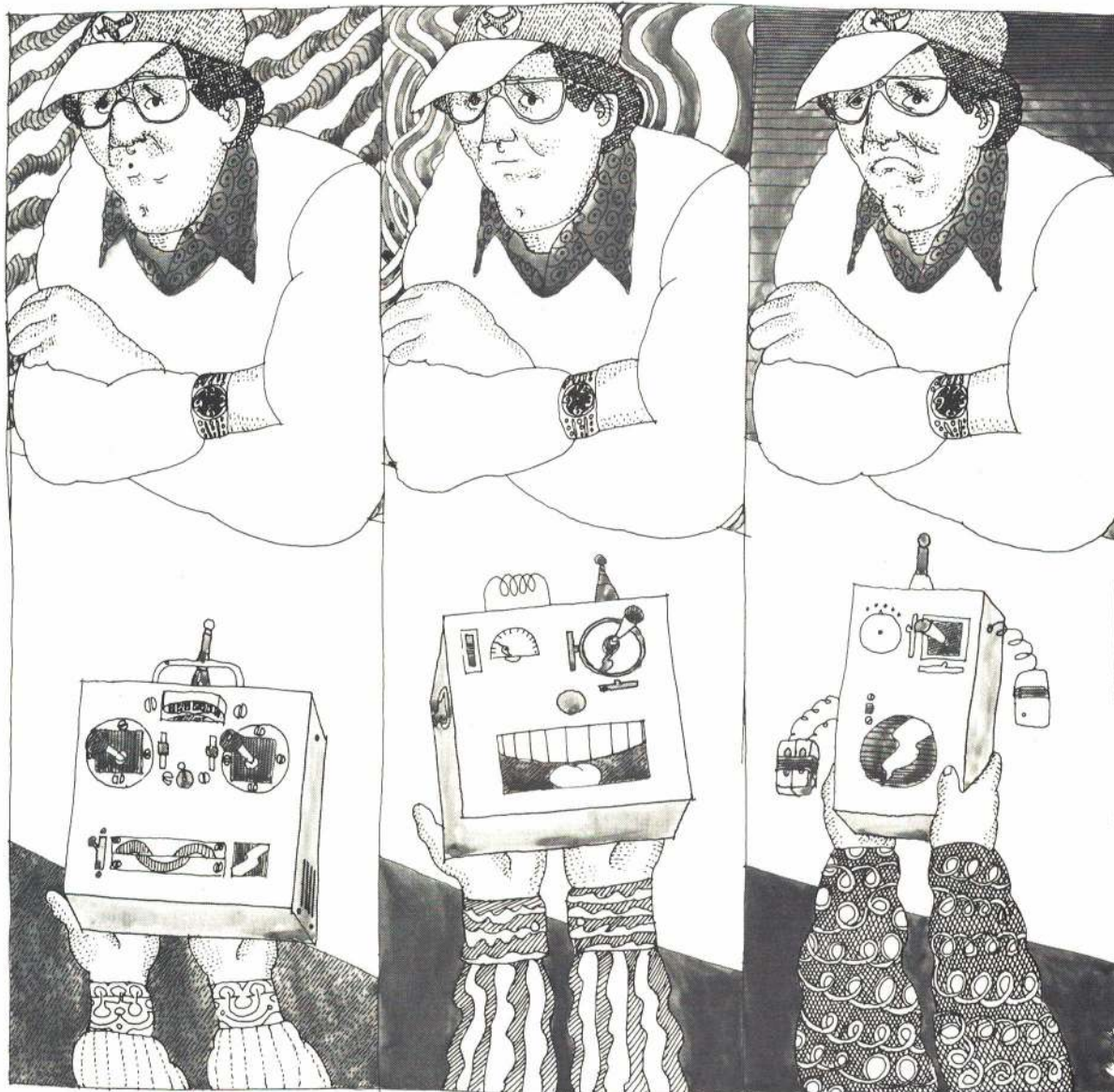
Two rounds were flown with the highest single score counting as the final score. Entry fee included lunch and came to about \$1.55. Trophies included one from Dieter Schluter for the 1st place winner with trophies from the U.S. sponsored for 2nd and 3rd. Several Japanese manufacturers put up trophies and goodies down to 7th place.

With good weather prevailing throughout the day and the wind behaving itself, the only crashes (and there were quite a few) were due to pilot error. As a matter of fact, this could be called a "class" contest since all but one bird were exactly the same except for the paint job. It was quite interesting to note the skill levels as the more experienced pilots took off and whipped through the maneuvers with relative ease, leaving the others to fight various degrees of tail pitch problems, uncertain engine vs. main rotor control, and all the other coordination difficulties that make helicopter flying a sport for the lion-hearted.

The final scores showed the big difference between the beginning pilot and those fortunate enough to be able to practice frequently. First place went to Kazuo Aoki from Osaka with 1760 points; second to Takauki Nomura, from Tokyo, with 1480 points; third-place was taken by Hisashi Ushio, also from Osaka, with 1460 points.

It might be mentioned that the fifth-place winner, Akihiro Itani, is only 16 years old. He put on a fine display of what can be done if you really put your mind to it. For general information, young Itani's father is president of the Sankyo Radio Co., maker of Sankyo digital control systems.

The experienced flyer is a pretty tough customer.



He demands power. He demands control. He demands reliability. He's the kind of flyer who can't accept failure and the Champion is his perfect companion.

The experienced flyer expects accuracy and selectivity. The Champion gives him full six-channel control, a tuned RF front end with four IF stages and a new I/C decoder. The servos are the smallest, lightest produced anywhere and use our specially-designed I/C full-power servo amplifier.

And because every flyer is an individual, all Champions feature precision mono-ball sticks, with the tension adjustable to the flyer's own individual preference, giving him maximum response and a smooth, sensitive feel.

There's no fat on a Champion, no fat in the Champion's price: \$349.95 for the two-stick Champion, \$369.95 for the one-stick Champion.

EK-logictrol Champion—the one unit that's won over a lot of tough customers.

Try it. Price it. Fly it.
And if you mean to
stay in the air, take
the controlled
approach.

EK-logictrol

The controlled approach

For our full-line brochure, write EK-logictrol, 3233 W. Euless Blvd., Hurst, Texas 76053



Hobby Shack

CIRRUS 2 CH.
Considering the quality,
the price makes it that
much more remarkable

\$69.95



Now get into radio control or add a 2 ch. system to your Sunday fun! Our Cirrus 2 features two separate servos, IC servo amplifier chip, IC decoder receiver chip, low battery drain, two wire battery pack, separate receiver, airborne pack weighs only 7 1/2 oz, plus full 90 day warranty.

In the RCM test report the Cirrus "is a top quality digital system that has virtually broken the price barrier". Also, "In all of our tests, in both powered aircraft and in sail planes, the Cirrus two channel digital proportional system performed exceptionally well and no malfunctions of any kind were experienced. The range of the system was exceptional and we were unable to fault the performance of the system in any way". We also offer a .250 amp ni-cad pack with which you can fly all day long, and your airborne weight is only 6 1/2 ounces. The ni-cad pack is optional at \$19.99. Warranty and repair is done right here at Hobby Shack, or if closer World Engines is equipped to offer expert service.

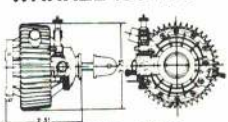
HOBBY SHACK Heat Gun



OUR
SPECIAL
PRICE
\$12.99

What can you say about our heat gun? How-a-bout its priced right! and it will do the job! The heating element is ideal for both *Monokote and *Solarfilm and its sturdy construction will hold up year after year. Enough said?

WANKEL .30 R/C



The new O.S. Wankel is one of the most talked about engines today. The Wankel is not only a remarkable collectors item, but also very practical for R/C model airplanes. Regularly \$87.50

WITH
MUFFLER
\$69.99

\$12.99



THE COX SAND
BLASTER with 049 gas engine, steering and real deep cleated tires!

Taipan

.21 (3.5cc)

Schneurle Ported
Twin Ball Race

Retail \$36.95



The crankshaft is suspended by front and rear ball bearings, Extra large, heavy-duty mounting lugs and Schneurle ported (3 port induction for maximum rpm's!). 3.5cc Legal for cars and boats (.21, 3.5cc)



Our
Price
\$29.99

\$34.99 WITH VENTURI
FLOW-THRU MUFFLER

Precision Engineered Engines

.09 DIESEL	\$16.95	OUR PRICE \$13.67
.15 DIESEL B.B.	\$28.50	OUR PRICE \$22.67
.15 R/C GLOW.	\$24.95	OUR PRICE \$19.96
.15 STD. GLOW.	\$15.95	OUR PRICE \$12.76
.21 STD. PLANE B.	\$18.95	OUR PRICE \$14.88
.21 R/C PLANE B.	\$29.95	OUR PRICE \$23.88

Top
Performance
Engineering!

Midwest SUPER CHIPMUNK & TAIPAN 15 R/C —COMBO—



NEW
\$49.90 VALUE!
SALE
\$36.99

MUFF-L-AIRE



The New neater looking and contest proven DuBro muffler for the Webra .60 No. MW-750 retail \$7.50 **\$6.29**
Model MU-7.95 fits a variety engine sizes. retail \$7.95 **\$6.66**

7 amp STARTER WET CELL AND CHARGER



With this powerful 7 amp wet cell you will never again worry about your battery going dead or growing weak causing hard starting. Once charged, you will always have a hot plug start month after month. Charger is included.

\$5.99

MACH 1 MIDWEST SLEEK PATTERN SHIP

reg. 49.95
\$39.99
\$79.99 with
O.S. 60R/C

SPAN: 62"
AREA: 725sq.
DISP: .60 cu."

Joe Bridi's RCM BASIC
TRAINER & TAIPAN's
.15R/C COMBO!



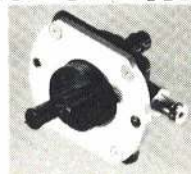
Beautiful trainer with 50" wing span. Perfect Sunday flyer !!!
Plus the Taipan 15R/C for lots of Go! **\$36.88**

9 HOLE ADJUSTABLE



TOWHOOK
Machined for solid aluminum bar stock! Glider Fan Special !!!
SALE **\$1.67**

Shut-Off VALVE



Pressurized or nonpressurized systems. Mounts on side of plane. Refuels directly to tank, turn valve to shut off engine, no flooding when off! **\$5.95**

TOTAL PAK

Midwest CESSNA CARDINAL, CIRRUS 2CH. Medallion .09, complete hardware, supplies, gas and battery.



ONLY
\$103

TOTAL PAK is our way of helping you get off the ground in R/C at the lowest price. The Cardinal is an ideal starter plane because of it's ease to build and great stability for beginner flying. The Medallion .09 is perfect for power and the CIRRUS may be used for elevator and rudder control. Everything-U-Need: Cessna Cardinal Cirrus 2ch. radio, 1 pr. DuBro wheels, 2", 1 1/4" nose wheel, Cox Medallion .09 engine, 1 SS-3 tank, 1 spinner, 1 pkg. fuel line, 1 pkg. DuBro collars, 1 3/4lb. box rubber bands, 1 pkg. Hobbyproxy, 1 pk. Perfect mounting bolts, 1 prop. Starting battery, fuel, glow plug and filler line for fueling.

Hobby Shack



- YOU CAN DO SIMPLE SOLDERING
 - YOU HAVE SOME MECHANICAL ABILITY, LIKE USING A SCREW DRIVER
 - YOU WANT TO GET INTO RADIO CONTROL AT THE LOWEST POSSIBLE PRICE
 - YOU WANT A FULL 6 CHANNEL SYSTEM
- YOU WANT OUR DEAL ON THE BLUE MAX MARK II IC 6 CHANNEL SEMI KIT.



A COMPLETE 6 CHANNEL SYSTEM...

Includes: 6 channel trans and receiver, all Ni-Cads and charger, 4 RS-5 servos, buddy box, switch harness, and servo trays!



WHAT A DEAL ON A SIX CHANNEL SYSTEM. It comes complete with four assembled S-5 servos, semi-kit transmitter, semi-kit receiver, charger, all nicad batteries, servo trays and switch harness. In the semi-kits, all components are FACTORY soldered to the PC boards and are then FACTORY checked before being sent to us. Simply finish the interwiring assemble the boards and your about done. A step by step building manual assures quick and easy assembly.

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CIRRUS Hobby Shack



SIX a good investment especially now . . .
SIX CHANNELS, TWO STICK
27 OR 72 MHZ.

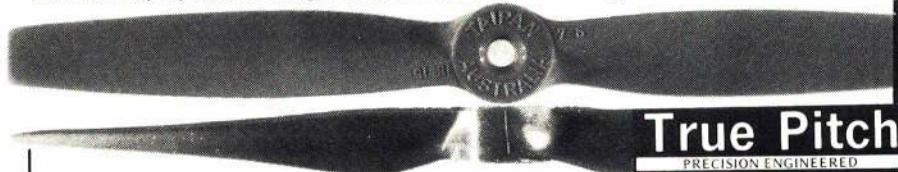
\$219.00

INTEGRATED CIRCUITS - VERY LOW BATTERY DRAIN - 2 WIRE BATTERY PACK, 3 WIRE SERVO - FULL 90 DAY WARRANTY, serviced by Hobby Shack or World Engines - BUDDY BOX - NICAD BATTERY BOX - 12 volt TRANSMITTER.

System includes; 6 channel receiver, 6 channel transmitter, 4 RS-5 servos, ni-cads, charger, switch harness and servo trays

The New Taipan true pitch propellers have been in the development stage for a long time and are now perfected. These are not just another propeller, . . . but one that has outperformed all others in extensive field testing.

TAIPAN TRUE PITCH for extra power (you would be amazed to find that most nylon propellers do not have the same pitch at every station as the size and pitch designate). GLASS FILLED NYLON does not flex or warp causing a loss of power or engine vibration. BALANCED FOR SMOOTH RUNNING - blades on both sides are exactly the same in length and thickness. EFFICIENT BLADES AND AIR FOIL right down to the hub! Taipan, the best thing to happen to propellers in a long time!



True Pitch
 PRECISION ENGINEERED

tail-dragging, fixed gear, aerobatic CHAMPION CITABRIA



Champion Aircraft manufactured the Citabria and brought it out when aircraft prices were steadily going up. The real Citabria is a fully aerobatic, staunch, rugged, fixed wing, tail dragging, fabric covered sensational little fun airplane. So is ours! The real Citabria comes from the factory with a brilliant sunburst on the top wing and has options like wheel pants and spinner. You can finish your semi-scale Champion Citabria like the real one and with a little extra work, add the wheel pants. In fact with a little extra effort, your Champion Citabria will pass easily for stand off scale. Like the real Citabria the front windscreen comes up over the top of the wing, and this really adds a lot to the scale appearance. The side windows are to be painted in. We use quality Micro-sanded balsa, and balsa and hardwood parts are beautifully die cut.

The Best Part is boy does it fly! For beginners, put a Cox .051TD in it. It will look small for the size of the plane but take our advice and you'll have almost docile trainer that looks good. If you already fly, you're in for a real surprise with an O.S. Max .10 or a good Taipan .15 (we're prejudiced). With this kind of power, hang on! Our Citabria is one of the very few, if not the only rudder airplanes that the rudder (with a hot engine) flies like ailerons.

SPAN: 43" / AREA: 290s"
 DISP: 051-15 / 1 to 3 Chs.

\$12.99

SIZE AND PITCH

SIZE AND PITCH	RETAIL
Prop 7X6	75¢
Prop 8X4	\$1.00
Prop 8X6	\$1.00
Prop 9X6	\$1.25

TAIPAN

OUR PRICE	BUY THE DOZEN
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79¢	\$7.90
99¢	\$9.90

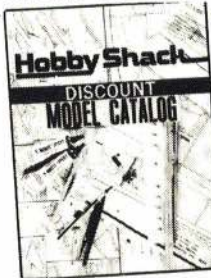
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CLAUDE McCULLOUGH ON RC

Rules Trial II: The Spaceport RCers (Cocoa, Florida) used Dave Platt's proposed new rules for AMA RC Scale at their 6th annual Scale Fly-In on November 26th. Some commotion was caused by the 0 to 10 complexity factor awarded. It appears very difficult to decide just where to place specific aircraft on this scale. What is complex to one judge does not seem so to another and their reasons hard to explain to the contestant involved. Contest was hampered by cold, wind and rain but had a variety of models attending.



Bob Temple (Boca Raton, Fla.) competed in the Spaceport RCers Scale Fly-In with his Nieuport II to take first place in AMA.

More On Flatteners: Recently in a column matte finish discussion additives for dope were mentioned. At that time they were not widely available but now the situation is improving with a return to distribution of Bud Atkinson's development called Camouflage Sheen, packaged by KRD and listed in the new Ace RC catalog. A similar liquid product is offered by Bud Nosen's Scale Sales. They can be mixed into all dopes and enamel to provide a good flat finish, the degree of dullness being determined by the amount added, usually 10 to 20%. One particularly easy method is to mix the flattener into clear dope and spray over a gloss color finished model. One coat of this combination is usually sufficient to achieve the desired result.

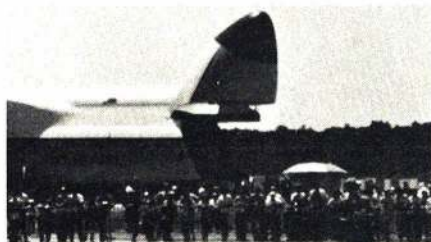
Museum Piece On Exhibit: Maxey Hester's 1971 Nats RC Scale winner and World Championship placing Ryan STA has been placed on display in the Antique Airplane Association Museum at Antique Airfield, Blakesburg, Iowa. The AAA Fly-Ins have seen many aerobatic demonstrations by John Gosney and his full size Ryan so the showing of the model duplicate at the organization's headquarters seems particularly appropriate.

BILL BOSS ON CL

Plastic Odds and Ends: From time to time a scale builder will ask "Where can I obtain a clear plastic nose cone or greenhouse type gun turret enclosure?"

Until now I have been at a loss as to just where these items could be found. But these items have been around us all the time in the

YMCA Circle-Airs (Wauwatosa, Wisc.) made a group effort to compete in many CL scale categories, several club members placed. Their parting comment: "Wait till next year."



Control line demonstrations at Transpo '72 were highlighted by USAF Sgt. Ford's gigantic C-133. Many of his other scale giants were on display. Photos by Jim Blanchfield.

form of plastic packaging used for hardware and household items, and, yes, even our own modeling supplies.

This startling fact was brought to my attention by Quinn Finta. Quinn suggested that if we look around long enough we could find just about every shape and size plastic bubble required by scale modelers. Some examples of the things we might find are: Gun turrets—the plastic cover from a door knob package; nose cone—the front half of a clear Easter egg; tail turret—half of the little plastic capsule that comes with the five-cent toy and gum ball machine prize; astrodome—the neat little plastic cover that comes with a new glow plug; landing lights—from a plastic car kit. All we have to do is keep our eyes open and we shall find. Why, we might even find a use for what's in the package.

Scale Modelers: Now that there is a brand-new format and a section dedicated to scale modeling, we have a great opportunity to show what we can do with some balsa and a set of lines.

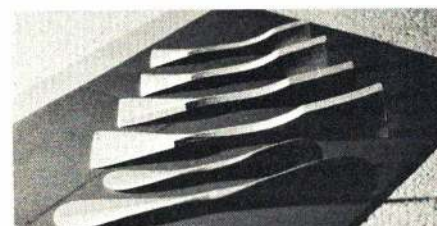
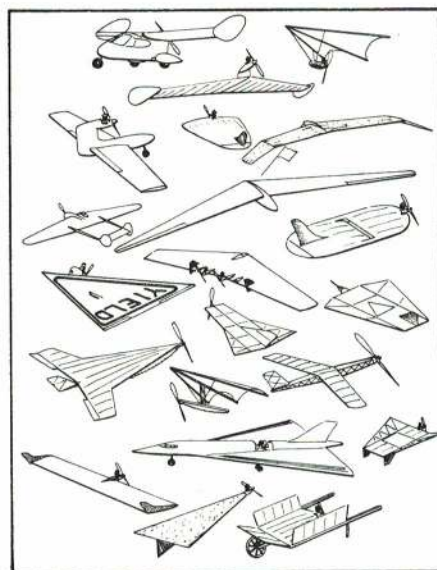
Do you have a scale project underway? Static? Flying? Stand-Off? Any club scale activities? If so, send us a few notes and some pictures of them. Let's show the other guys what we are doing. Our section can only be as interesting and informative as your submissions. Send info to Bill Boss, c/o AAM.

WALT MOONEY ON FF

Two Annual Scale Meets: The Northrop Model Club held their Annual Flying Wing Contest which has turned out to be one of the most popular contests around. There was absolutely no smog in the Sepulveda basin; the weather was calm and sunny. It was a perfect day for flying wings and for spectators of which there were almost as many as modelers.

Hero of the meet, as far as spectators were concerned, was Bill Watson who flew his gas-powered wheelbarrow out of sight over the diggings for the new freeway.

Villain of the meet, as far as the CO-2 entrants were concerned, was young Kenny Hannan who refused to compete in the Junior class because there was no competition, flew in Open and proved that none of us



New from Marlow is this line of machine-cut balsa rubber model props. Easily finished with a little sanding and dope.

Winner of the NAR Flightmaster's Annual Jumbo Scale meet is Ray Berens with the rubber-powered Skyfarer.



Hal Cover's very fine flying rubber jobs. The FW 152 is all foam and has retract gears.

were any competition either. His CO-2 powered Rogallo wing was consistently doing flights of over two and a half minutes.

The most impressive thing about this contest is the wide variety of configurations that can be made to fly. Most of them are flying very well this year and the quality of the overall competition has improved tremendously in the last two years. Shapes varied from Scale

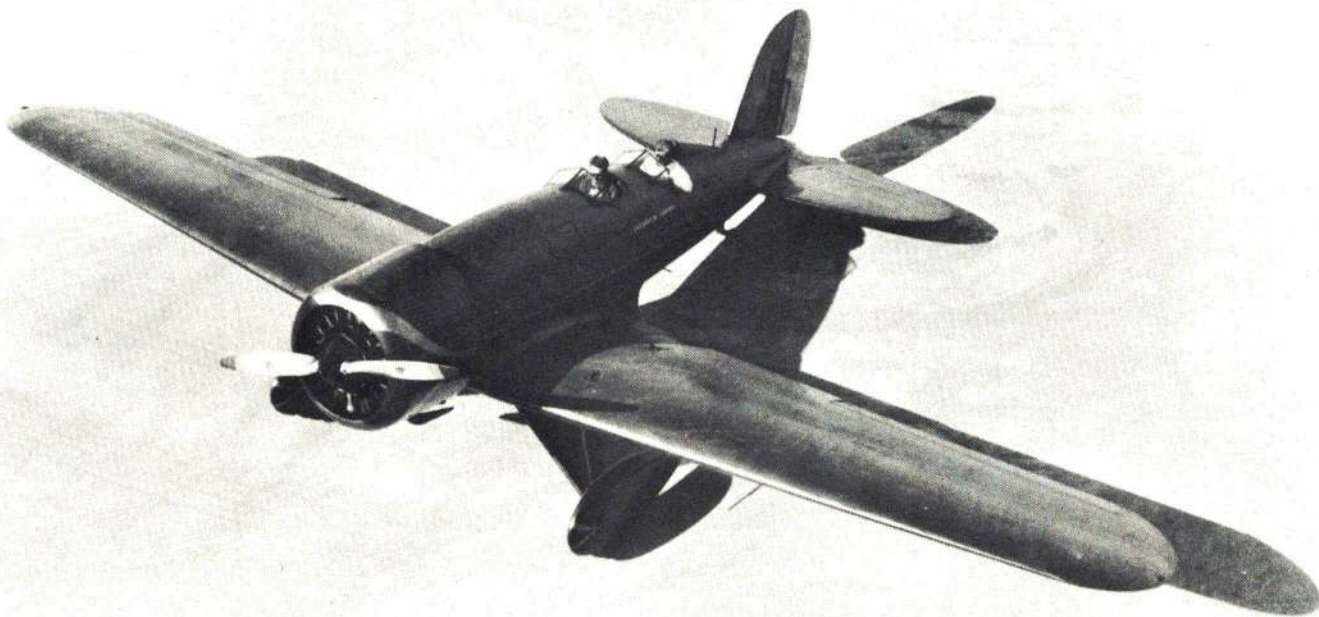
(Continued on page 104)



SIRIUS

Power Veco 61
Radio Kraft Sport Series
Weight 7 pounds
Scale 1½" to 1'

TO SIRIUS..



LOCKHEED SIRIUS

After Charles A. Lindbergh entrusted his beloved *Spirit of St. Louis* to the Smithsonian in May 1928, the Mahoney-Ryan Company generously replaced it with a brand-new Brougham B-2. In these and others whose owners or builders were eager to have him demonstrate, Lindbergh wound up as that year's most conspicuous user of airplanes. With the media reporting nearly every passing mile, America's No. One aviation booster did extensive personal and goodwill flying while managing to squeeze in the survey flights he was doing for several air transport companies. Buckled into a wide variety of airplanes, an outstanding (for 1928) 65,000 miles passed under his wings.

By summer 1929 Lindbergh was actively looking for an airplane of his own choosing that would be better suited to his current preoccupations. And, when he attended that year's National Air Races in Cleveland, he was still looking. Also at the August 27th to September 2nd meet was Jerry Vultee, the saucer-eyed chief engineer for the Detroit Aircraft Corporation's month-old acquisition, the Lockheed Aircraft Company of Burbank, California.

When the two met, Lindbergh mentioned his search for a high-performance, long-range plane. While noting the advantages and disadvantages of various

Many variations of one plywood fuselage were created by Lockheed. The most famous low winger is the Sirius.

PATRICIA T. GROVES

configurations, he stipulated the safety aspects of low-wing, wide-wheel base, quick takeoff and an all-around good visibility. Then with a current project in mind, Vultee whipped off a few preliminary sketches for Lindbergh to consider, and made arrangements with the popular flier to meet with Lockheed's new general manager, Carl Squier, under less hectic conditions than an air show.

As it happened, Lindbergh's specifications fit an airplane then being developed in the Lockheed shops. Earlier that year a young ex-flying service officer named Harold Bromley dropped in looking for an airplane capable of transpacific flight. The 29-year-old pilot was one of several hardy fliers who hoped to cop the \$25,000 *Tokyo Asahi* (newspaper) prize for the first non-stop flight (either way) between Japan and America. With Tacoma, Washington money behind him, Bromley toured

West Coast aircraft manufacturers, including the two-year-old aircraft company in Burbank.

At the time, Burbank was an obscure little burg surrounded by farmland which extended up to the nearby distinctive Verdugo Hills. On an industrial-zoned parcel of ranch land the tall, cone-shaped brick chimneys of the Empire China Company provided the most distinguishing feature around. The next largest building on the lot was jointly occupied by the Mission Glass Works and the Lockheed Aircraft Company. Scattered about the patch were several unimpressive sheds and out-buildings, a ranch house now serving as Lockheed's office and an airplane hangar which stood alongside an unharried gopher-infested dirt flying strip.

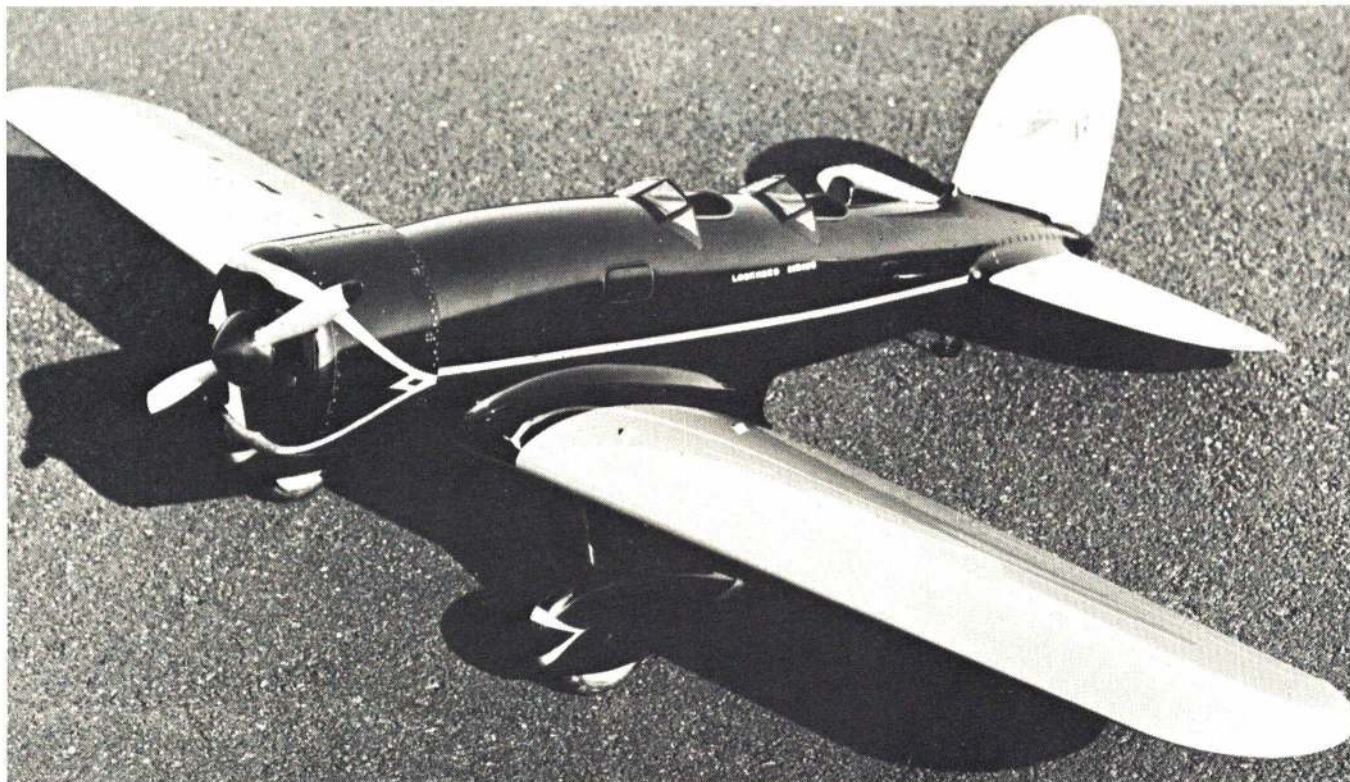
At this point Lockheed's advertised line of aircraft consisted of two model types: A high-wing Vega which was gaining in popularity with the flying fraternity; a parasol wing Air Express, designed as a mail and passenger carrier.

Bromley walked through the door of the small red brick "office" and into the kitchen cum Lockheed Engineering Department. Introducing himself to the entire department—Vultee and the company's two draftsmen, Jimmy Gerschler

Four-View on page 22

Text continued on page 24

. AND BEYOND



SCALE SIRIUS

The search for a suitable model to scale and to construct gets more difficult as modelers continually dig through the files of civilian and military aircraft. It was surprising to find that the Sirius hasn't recently been built. Many older modelers remember the famous plane that Lindbergh used to map out some of Pan Am's early airways. Admiration for the model of this grand old aircraft of the golden era was expressed by many of the spectators at the '72 Chicago Nats. Several mentioned that the model flew just like the full-sized plane they had seen fly in the 30s. It was pleasantly surprising to find spectator appeal so high.

There were two friends that influenced my decision to build the Lockheed Sirius—Monty Groves and Bob Palmer. Both, although separated geographically, have a common interest in Lockheed aircraft.

The Sirius model results from the combined unique talents of the three of us. Monty and his wife Patty have researched Lockheed aircraft for years and has a large file of photographs and technical data to support their documentation. Bob Palmer, a professional modeler, has produced several fiberglass fuselage kits of very high quality. This airplane was a natural for him due to his ability to reproduce the scale details in

Well-detailed and perfect scale RC version of the Lindbergh inspired Lockheed design uses foam wings and a glass fuselage. A docile flyer, too.

MAURICE F. PHILIPS

epoxy. In making the decision to combine our efforts, it was decided that fiberglass would more closely represent the original plywood mold construction than conventional balsa planking over formers. My contribution was to do the scaling, drawing, and inking as well as to design the construction characteristic to fiberglass and polystyrene foam.

The model can be flown in Super-Scale or in Stand-off Scale contests. The Sirius does not have either retractable landing gear or flaps, thus giving other models a slight advantage in regular AMA or FAI contests. However, its ability to perform contest stunt maneuvers does tend to be equalizing. Almost every author attests to his model's ability to fly on a string. A detailed description of the first few flights will follow later in the text.

Construction

In building the fuselage, a Dremel tool is used to cut out the cockpit open-

ings and the openings for the horizontal stabilizer of the fuselage. The tail cone should be cut off using the minimum kerf. When fitting the stab, it will be necessary to file the opening slightly. The fuselage tail cone will be epoxied back after the stab is installed. Mount the radial engine mount using blind nuts. Note that dimples indicate the centerline. *Do not* tap the mount for the engine until the engine is positioned at 0 degrees sidethrust and 0 degrees downthrust. A propeller was used to assist in the measurement. Measure the drawing to see how far the thrust washer protrudes past the cowl. Don't forget the spinner back plate. Construct the plywood brackets that hold the cowl to the fuselage. Use an extra strong epoxy such as 3-M Structural Adhesive. With an alignment jig position the cowl while allowing the epoxy to set.

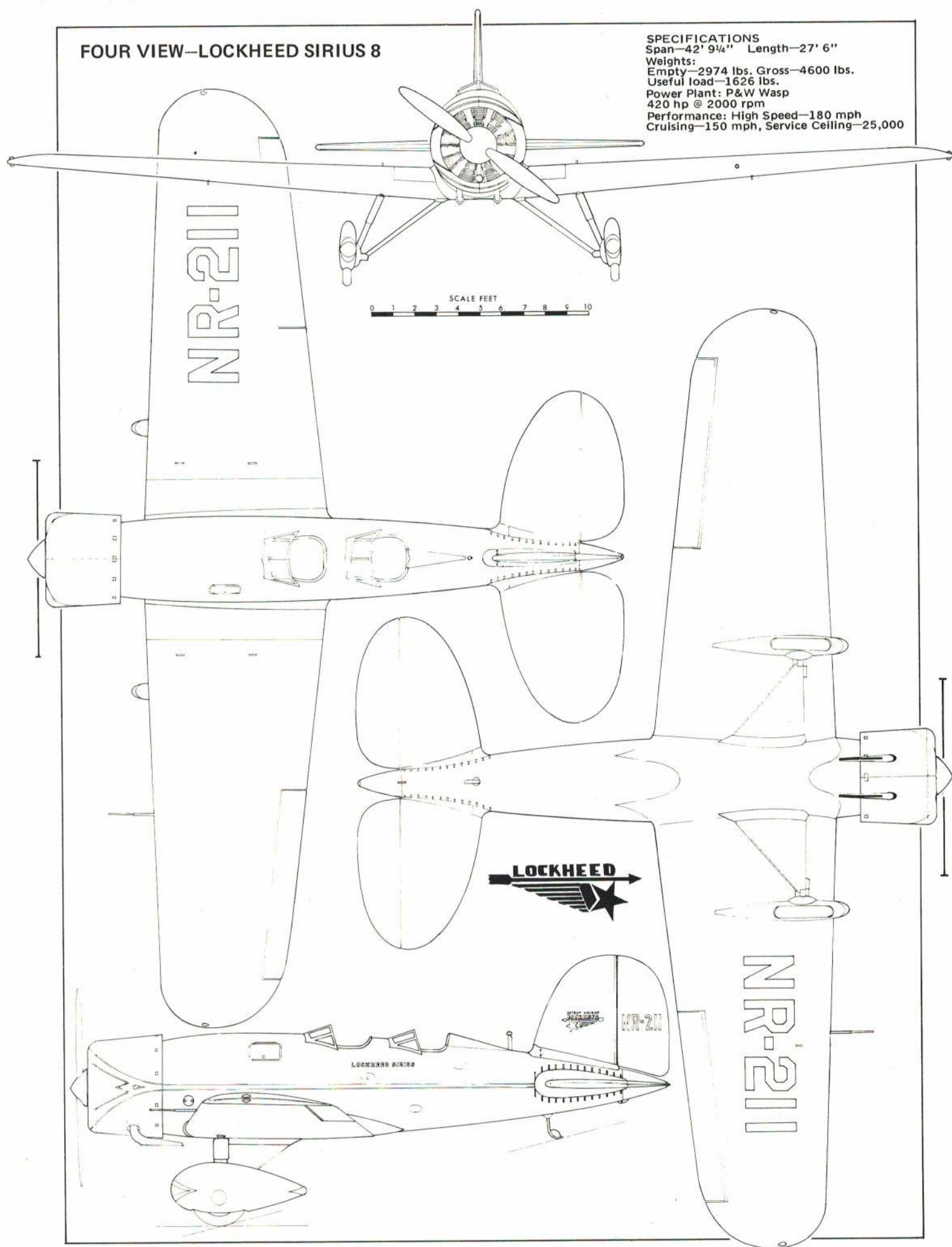
After the brackets have been attached to the cowl, fuel-proof them by coating with Hobbypoxy II glue. The battery and fuel tank location worked out well on my model. Cut out two windshields using the patterns. A strong material can be obtained by removing the copper from a thin fiberglass circuit board .030 inches thick for the windshield frames. Several jigsaw blades will

Plans on page 23

Text continued on page 25

FOUR VIEW—LOCKHEED SIRIUS 8

SPECIFICATIONS
 Span—42' 9 1/4" Length—27' 6"
Weights:
 Empty—2974 lbs. Gross—4600 lbs.
 Useful load—1626 lbs.
 Power Plant: P&W Wasp
 420 hp @ 2000 rpm
 Performance: High Speed—180 mph
 Cruising—150 mph, Service Ceiling—25,000



1. Generator Switch	13. Turn and Bank
2. Dash-Compartment	14. Manifold Pressure
3. Propeller Pitch	15. Compass
4. Vacuum	16. Airspeed
5. Volls	17. Tachometer
6. Amps	18. Oil Temperature
7. Starter	19. Oil Pressure
8. Air Temp	20. Fuel
9. Altimeter	21. Fuel Pressure
10. Rate of Climb	22. Fuel
11. Artificial Horizon	23. Switch
12. Directional Gyro	



NOTE: Fiberglass Fuselage Available From:
Bob Palmer
9161 Morehart Ave
Arleta, Calif. 91332

L.G. WIRE SOCKET
Scale 2/1

LOCKHEED SIRIUS

and Dick Von Hake—the flier laid out his requirements. Later, still discussing the possibilities, Vultee took Bromley in to meet Allan Loughead, the company's co-founder and general manager.

Afterwards, Bromley toured the plant's wood and metal shops, the assembly and service areas, all yet under the command of Tony Stadlman, another of the company's originators. While activity was apparent, it was hardly a high pressure operation.

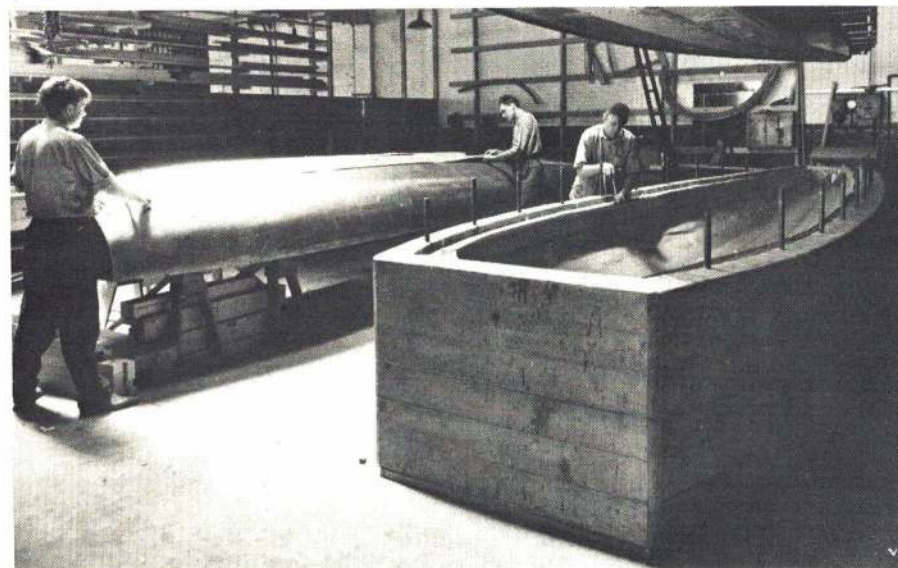
During the tour Bromley spied an unfinished fuselage stuck off in an out-of-the-way corner. Looking as though it had been cut out to accommodate a lower wing, he asked about it and was told that it was a relic of an experiment begun by Jack Northrop in the "old" Hollywood plant back in '27. The beginnings of a low-wing job for Hubert Wilkins, the project was abandoned when the Wilkins group unexpectedly ran out of money. Then momentarily considered the following year as a seaplane, it was hauled out only to be shoved aside again. Although designated an Explorer, there'd been little or no engineering done on it. And "thar she set" until Bromley walked in.

To Bromley the altered Vega fuselage had possibilities. And over the following weeks he, Vultee, Gerschler and Von Hake finished off the engineering. (More custom-built than mass produced, buyers of Lockheed airplanes, like expectant fathers, labored alongside the production crews.) By June 18, 1929 the first Lockheed Explorer rolled off the line with a low wing—extra long, broad and straight with no dihedral. (Basic fuselage construction was the same as with the Vega. See August 1970 *American Aircraft Modeler*, page 16ff.) A single-seat open cockpit was placed just forward the empennage which had undergone several cut-and-dry design changes. The tail unit at this point having a rounded fin and a squared-off rudder. Flight tests proved satisfying, and Bromley flew home to Tacoma to begin his dash across the complacent Pacific.

On Sunday, July 18, 1929, the big Explorer, its latent power buried under garlands of flowers, was christened the *City of Tacoma* by two little girls representing the U.S. and Japan. Finally, speeches over, leis removed and the cheers of thousands ringing in his ears, the young airman shoved the throttle to the firewall to begin his run. Within seconds cheers turned to screaming pandemonium as the glistening orange Explorer wobbled into the air—then crashed.

Overlooked in the joyous frenzy of the day, the fuel—topped off to capacity in the early morning hours—expended as the sun rose higher in the summer sky. When Bromley made his run, it slopped over in his face and blinded him. The aviator tried desperately to recover, but couldn't. Barely before impact Bromley managed to flick

(Continued on page 71)



Laura Ingalls emerges from her record-breaking Orion, near her Harmon-winning Air Express. To the far right is Sir Kingsford-Smith's beautiful Altair, the *Lady Southern Cross*.

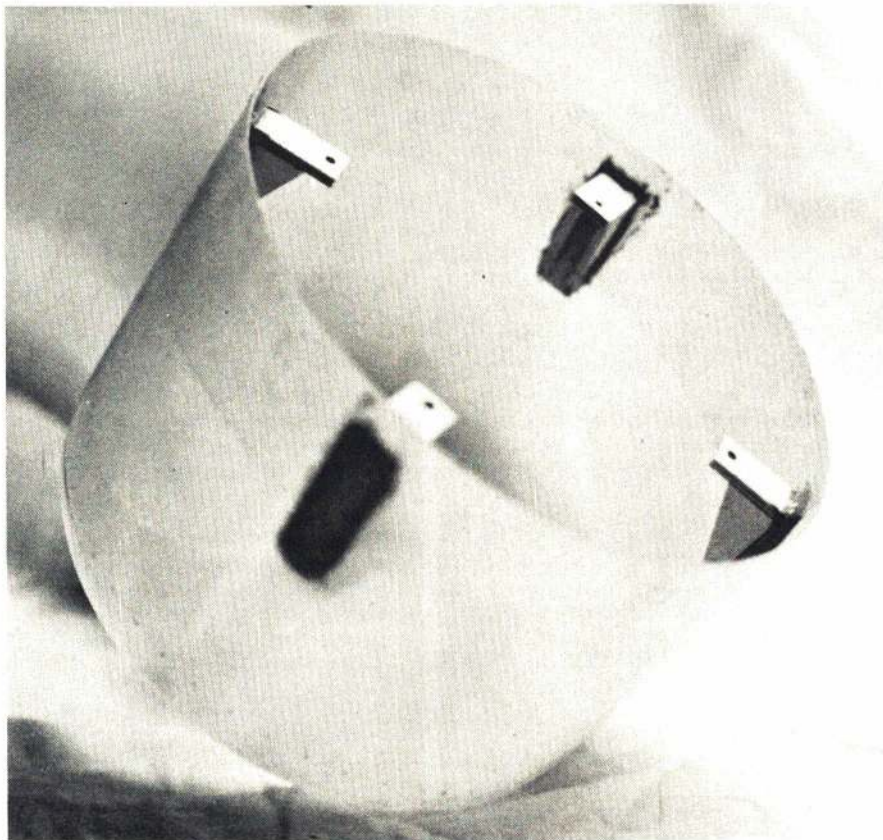
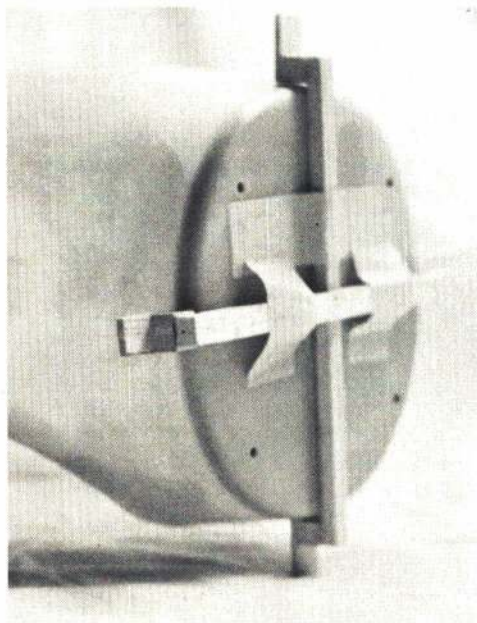


Above: Predecessor to the Sirius was the Explorer. This plane was developed for transoceanic flights but accidents marred its success. Left: Charles and Anne Lindbergh in their Sirius are followed by a Vega full of enthusiasts. Note the Vega is an especially early model. Below: From this concrete mold built in 1927 came Lockheed's wooden wonders—The Vegas, Air Expresses, Explorers, Siruses, Altairs, and Orions—among the great planes of the Golden Age of Aviation.

SCALE SIRIUS



Above: Fiberglass wheel pants come with the fuselages too and are quite durable. Note plywood fill-in between inner landing gear struts. Right: Cowl alignment jig taped in place. Below: Fiberglass cowl has tabs epoxied inside for attachment to firewall.



be dulled cutting them out. Epoxy them in place with the 3-M epoxy. A wet finger will form a fillet nicely. Set the fuselage aside and return to it after completing the rudder, elevator and stab.

Shape the ribs of the horizontal stabilizer as shown. When applying the sheeting, be cautious not to apply a warp. Fit the completed stab into the fuselage by filing the fiberglass and sanding the wood.

Select soft balsa for the elevators and shape with a razor plane. Install the horn and hinges matching them to the stab. Epoxy the stab in place. Install the elevator Gold-N-Rod at this time. A music wire through nylon tubing will possibly be less prone to change trim due to heat (if you are worried about that sort of thing).

Construct the rudder using the same techniques as for the elevator. After hinging the rudder to the fin and installing the Gold-N-Rod, epoxy the tail cone back on to the fuselage. A good filler for the joint is common body-fender fiberglass epoxy. It can be carved in the leather stage and sanded when hard.

Complete the basic construction of the fuselage including the tail skid, servo tray, hardwood wing hold-down blocks, and servo installation. Use Hobbypoxy II glue to secure parts to the epoxy fuselage. Micro balloons or CavaSill may be added to the glue when a thicker consistency is required.

Cut the three sections of the wing using the airfoils that are shown on the drawing. Deduct the skin thickness when making the templates for the hot wire cutter. Wrap a two-in. wide piece of four oz. glass cloth around the sheeted wing for a dihedral brace. Push the cloth against the wood with a roll of toilet paper absorbing excess resin from the glass cloth. Feather the edges with garnet paper.

Prior to the sheeting, install the aileron horns and linkage system. The aileron movement should be not more than 3/8" up and 3/8" down.

When making balsa wing skins use resin to join together the skin sheets. A thin strip of silkspan doped over the inner joint will prevent its raising after painting. Use a good contact cement for joining the skin to the polystyrene foam. 3-M No. 77 is very good, but be careful to allow the thinners to evaporate before attaching the skin or foam will melt a bit. The hardwood landing gear blocks worked very satisfactorily, but the plywood plate backing the shock absorber pivot failed to support rough landings. A proposed modification will be to insert a piece of No. G-Pad under the pivot to absorb the shock override. In general, the wing is straightforward foambalsa construction.

Landing gear—The aluminum brackets can easily be cut from bar stock with a hack saw. With a power drill and file, the bracket is completed in short time. Bend the 3/16" and 5/32" dia. music

(Continued on page 68)

JOHN BLUM ON CL CARRIER

Another Rules Approach: Following our last discussion concerning the appearance points and their relationship to the ultimate score, comes another one. Tom Niebuhr (Florissant, Mo.) promotes the idea of presenting two sets of trophies or awards in Stunt. The models could be judged for the appearance points aspect and the flying phases as two separate entities—one set of awards for appearance and the other for flying. This could be handled simultaneously by two sets of judges.

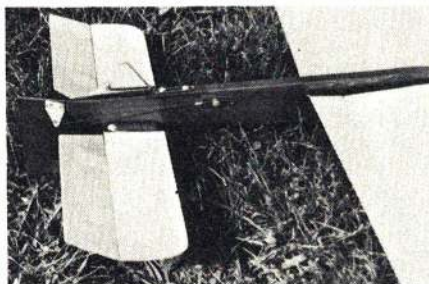
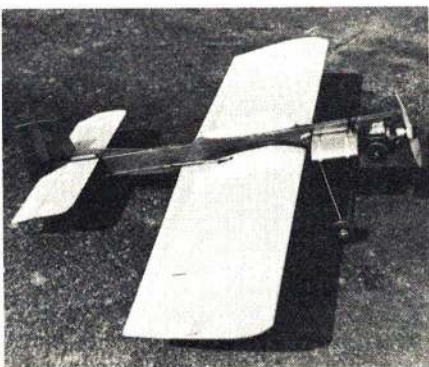
One thing for sure, all concerned could be satisfied and still retain the appearance points.

Proving That Landing: The controversy on the rule to prove that a Carrier design has made an arrested landing goes on. With your help this column will act as a clearing house for acceptable designs qualifying under AMA rules. If you cannot prove your model made an arrested landing or have some other question, send a three-view and we'll try to qualify it.

Start your list with the following: Guardian, Devastator, Mustang, Sea Fury, Corsair, Skyrocket, Martin MO-1, Mauler, Bearcat, Aerobonita, Sky Shark, Skyraider, Tiger Cat, and Wildcat.

Offset Letters: Frank Zarzycki (Leeds, N. Y.) offers the idea of shadowed letters and numbers using decals. Use two contrasting colors, black and white for example, of the same size and letter decal. Apply the black decal first and let dry. Then apply the white numeral or letter decal on top of the black one, but offset a quarter of an inch or so to give the basic appearance of a white number with a shadow. The white number can be adjusted to give a "shadow" at either top or bottom, or at the sides in varying widths.

Canopy Installation: Les McDonald (Miami, Fla.) offers the following suggestions in the Rebel Yell Newsletter (Marietta, Ga.): 1) Trim Canopy; 2) Tape canopy into position; 3) Place a small bead of epoxy around edge and let dry; 4) Remove tape and finish epoxy bead; 5) Mask canopy and fuselage to prevent smearing epoxy; 6) Apply epoxylite with spatula and smooth with wet finger; 7) Remove tape; 8) Let dry overnight; 9) Sand with 400 sandpaper, wet; 10) While performing Step 9 reflect light across fillets to expose low spots.

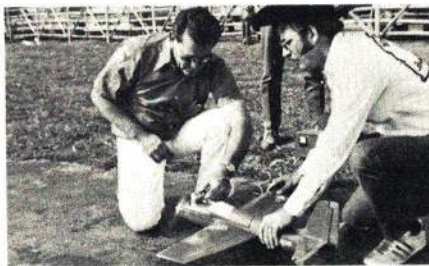


Top: Called the MO-HO II by Harry Higley this K&B 35-powered model features two-piece landing gear for easy transportation and adjustment, and completely adjustable lead-outs. Above: Higley's model also has an adjustable rudder. These features permit tuning to suit weather and wind conditions.

Engine Muffler: Dick Letrich, writing in the Aero Modelers Newsletter (Calif.) offers an interesting muffler idea for engines with 360 degree exhaust opening—a Cox .049 for example. He reports good results using a spring of adequate diameter to cover the height of the opening. The length of the spring is dictated by the circumference of the exhaust port. The spring should be made of small diameter wire of the close wound retraction type. When assembled to the engine, the spring windings must be spread only very slightly, just enough to hold it snug against the engine.

Someone want to rate springs for mufflers and offer the DB ratings?

Recent St. Louis All Carrier Contest with Jim Finley starting Marty Huston's Rossi 60-powered Guardian.



BOB STALICK ON FF GLIDERS, POWER, RUBBER, INDOOR

Watch Your Weight: The cry of the obese modeler? No! The cry of the competitive free flyer. We've all read how this design or that ship will fly best if it weighs under so many ounces. The designer goes on to tell you to use such-and-such a weight wood for this part and that. All well and good. How do you tell what such-and-such a weight is? Just what is five lb. stock? And how can you tell how much the ship is going to weigh before you even build it?

Well, don't despair, there is a way. First, select components that are the lightest available to do the job. Engine mount weights vary considerably. Use a fuse instead of a DT timer. How about balsa? A 1/16" thick sheet can vary as much as 300% and coexist in the same balsa rack in your hobby shop. That is the difference between five lb. stock and 15 lb. stock. For free flyers the five lb. stock is very useful—the 15 lb. is seldom used.

Ideally, one should have a gram scale to do a good job in choosing the right wood weight (Stanton's Hobby Shop in Chicago sells an adequate one for around \$4.00). But if you don't have access to one, check to see if it is

marked "contest balsa" or "special light-weight balsa." Balsa so marked tends to be more lightweight than the usual; contrary to some claims, it isn't always four to six lb. stock, but tends to run between five and ten lb. Go through the whole stack in the hobby shop, weighing them against one another in your hands. This way you can at least choose the lightest of those available.

To assist you, if you have a gram scale, a reprint of an early NFFS "Freeflight" chart is included this month. To use: Weigh each sheet in grams follow the correct size column until you reach the weight of that sheet, then read its pounds per cubic foot in the far left column. Mark that weight on the balsa for future use.

Coupe d'Hiver National International: For many years the French have hosted a Coupe contest in the dead of winter, which makes sense when you consider that the translation of Coupe d'Hiver is "Winter Cup." During the last ten years or so this event has gained popularity in many nations, including the USA, and is now an internationally recognized competitive event. US participants get into the French contest by sending their models overseas to be proxy flown by a sympathetic European. Now Dave Linstrum, who was one of the original organizers of the US proxy efforts in France, is promoting, through the Chicago Aeronauts and the IMAC, a contest for Coupe that will be held, at the same time as the European meet, in Illinois.

The present format follows Date: To tie in with the Coupe D'Hiver Internationals, either February 25 or March 4. Time: 9 a.m. to 4 p.m. Rules: FAI rules as printed in the AMA rules book for FAI events. Age Classes: Open, Junior and Senior Combined. Prizes: A winter cup trophy donated by the French Consul in Chicago, plus best high time on a rotating basis, and two matched sets of donated trophies, also a cash award split of the entry fees on a prorated basis. Entry fees: Not set at this time. Contest Director: Dave Linstrum (5840 Danforth Court, Hanover Park, Ill. 60103) Special Features: Proxy flying furnished by members of the sponsoring clubs.

If you consider yourself a competitive Coupe designer/flier, get in on the ground floor of this National International contest.

NFFS Supplies and Services: The National Free Flight Society operates an excellent line of hard-to-find free flight items for free flyers. Membership in the organization is a nominal \$4.00 for AMA members. For active free flyers the expenditure is well worth it—not only because of the boost membership gives the free flight movement in the USA, but also because of the availability of hard-to-find FF items. For more information on just what is new in FF supplies, drop a self-addressed stamped envelope to NFFS Supplies and Services, P.O. Box 322, Dallas, Ore. 97338.

The following charts were compiled by Louis C. Marlot, 9234 Rockwood Dr., St. Louis, Mo 63123. Louis is a member of the well known Kirewood Thermalers Model Club of that city.

Sheet	5/16" x 3/8"				5/16" x 1/2"				5/16" x 3/4"				5/16" x 1"				5/16" x 1 1/4"				5/16" x 1 1/2"				5/16" x 1 3/4"				5/16" x 2"				
	1/16"	1/8"	3/16"	1/4"	1/16"	1/8"	3/16"	1/4"	1/16"	1/8"	3/16"	1/4"	1/16"	1/8"	3/16"	1/4"	1/16"	1/8"	3/16"	1/4"	1/16"	1/8"	3/16"	1/4"	1/16"	1/8"	3/16"	1/4"	1/16"	1/8"	3/16"	1/4"	
1	4.62	5.19	5.76	6.33	6.90	7.47	8.04	8.61	9.18	9.75	10.32	10.89	11.46	12.03	12.60	13.17	13.74	14.31	14.88	15.45	16.02	16.59	17.16	17.73	18.30	18.87	19.44	20.01	20.58	21.15	21.72	22.29	
2	1.76	2.36	2.96	3.56	4.16	4.76	5.36	5.96	6.56	7.16	7.76	8.36	8.96	9.56	10.16	10.76	11.36	11.96	12.56	13.16	13.76	14.36	14.96	15.56	16.16	16.76	17.36	17.96	18.56	19.16	19.76	20.36	
3	2.21	2.94	3.67	4.40	5.13	5.86	6.59	7.32	8.05	8.78	9.51	10.24	10.97	11.70	12.43	13.16	13.89	14.62	15.35	16.08	16.81	17.54	18.27	19.00	19.73	20.46	21.19	21.92	22.65	23.38	24.11	24.84	
4	2.66	3.54	4.42	5.30	6.18	7.06	7.94	8.82	9.70	10.58	11.46	12.34	13.22	14.10	14.98	15.86	16.74	17.62	18.50	19.38	20.26	21.14	22.02	22.90	23.78	24.66	25.54	26.42	27.30	28.18	29.06	29.94	
5	3.11	4.14	5.17	6.20	7.23	8.26	9.29	10.32	11.35	12.38	13.41	14.44	15.47	16.50	17.53	18.56	19.59	20.62	21.65	22.68	23.71	24.74	25.77	26.80	27.83	28.86	29.89	30.92	31.95	32.98	34.01	35.04	
6	3.56	4.74	5.92	7.10	8.28	9.46	10.64	11.82	13.00	14.18	15.36	16.54	17.72	18.90	20.08	21.26	22.44	23.62	24.80	25.98	27.16	28.34	29.52	30.70	31.88	33.06	34.24	35.42	36.60	37.78	38.96	40.14	
7	4.01	5.34	6.67	8.00	9.33	10.66	11.99	13.32	14.65	15.98	17.31	18.64	19.97	21.30	22.63	23.96	25.29	26.62	27.95	29.28	30.61	31.94	33.27	34.60	35.93	37.26	38.59	39.92	41.25	42.58	43.91	45.24	
8	4.46	5.94	7.42	8.90	10.38	11.86	13.34	14.82	16.30	17.78	19.26	20.74	22.22	23.70	25.18	26.66	28.14	29.62	31.10	32.58	34.06	35.54	37.02	38.50	40.00	41.48	42.96	44.44	45.92	47.40	48.88	50.36	
9	4.91	6.54	8.17	9.80	11.43	13.06	14.69	16.32	17.95	19.58	21.21	22.84	24.47	26.10	27.73	29.36	30.99	32.62	34.25	35.88	37.51	39.14	40.77	42.40	44.03	45.66	47.29	48.92	50.55	52.18	53.81	55.44	
10	5.36	7.14	8.92	10.70	12.48	14.26	16.04	17.82	19.60	21.38	23.16	24.94	26.72	28.50	30.28	32.06	33.84	35.62	37.40	39.18	40.96	42.74	44.52	46.30	48.08	49.86	51.64	53.42	55.20	56.98	58.76	60.54	
11	5.81	7.74	9.67	11.60	13.53	15.46	17.39	19.32	21.25	23.18	25.11	27.04	28.97	30.90	32.83	34.76	36.69	38.62	40.55	42.48	44.41	46.34	48.27	50.20	52.13	54.06	55.99	57.92	59.85	61.78	63.71	65.64	
12	6.26	8.34	10.42	12.50	14.58	16.66	18.74	20.82	22.90	24.98	27.06	29.14	31.22	33.30	35.38	37.46	39.54	41.62	43.70	45.78	47.86	49.94	52.02	54.10	56.18	58.26	60.34	62.42	64.50	66.58	68.66	70.74	
13	6.71	8.94	11.17	13.40	15.63	17.86	20.09	22.32	24.55	26.78	29.01	31.24	33.47	35.70	37.93	40.16	42.39	44.62	46.85	49.08	51.31	53.54	55.77	58.00	60.23	62.46	64.69	66.92	69.15	71.38	73.61	75.84	
14	7.16	9.54	11.92	14.30	16.68	19.06	21.44	23.82	26.20	28.58	30.96	33.34	35.72	38.10	40.48	42.86	45.24	47.62	50.00	52.38	54.76	57.14	59.52	61.90	64.28	66.66	69.04	71.42	73.80	76.18	78.56	80.94	
15	7.61	10.14	12.67	15.20	17.73	20.26	22.79	25.32	27.85	30.38	32.91	35.44	37.97	40.50	43.03	45.56	48.09	50.62	53.15	55.68	58.21	60.74	63.27	65.80	68.33	70.86	73.39	75.92	78.45	80.98	83.51	86.04	
16	8.06	10.74	13.42	16.10	18.78	21.46	24.14	26.82	29.50	32.18	34.86	37.54	40.22	42.90	45.58	48.26	50.94	53.62	56.30	58.98	61.66	64.34	67.02	69.70	72.38	75.06	77.74	80.42	83.10	85.78	88.46	91.14	
17	8.51	11.34	14.17	17.00	19.83	22.66	25.49	28.32	31.15	33.98	36.81	39.64	42.47	45.30	48.13	50.96	53.79	56.62	59.45	62.28	65.11	67.94	70.77	73.60	76.43	79.26	82.09	84.92	87.75	90.58	93.41	96.24	
18	8.96	11.94	14.92	17.90	20.88	23.86	26.84	29.82	32.80	35.78	38.76	41.74	44.72	47.70	50.68	53.66	56.64	59.62	62.60	65.58	68.56	71.54	74.52	77.50	80.48	83.46	86.44	89.42	92.40	95.38	98.36	101.34	
19	9.41	12.54	15.67	18.80	21.93	25.06	28.19	31.32	34.45	37.58	40.71	43.84	46.97	50.10	53.23	56.36	59.49	62.62	65.75	68.88	72.01	75.14	78.27	81.40	84.53	87.66	90.79	93.92	97.05	100.18	103.31	106.44	
20	9.86	13.14	16.47	19.80	23.13	26.46	29.79	33.12	36.45	39.78	43.11	46.44	49.77	53.10	56.43	59.76	63.09	66.42	69.75	73.08	76.41	79.74	83.07	86.40	89.73	93.06	96.39	99.72	103.05	106.38	109.71	113.04	116.37

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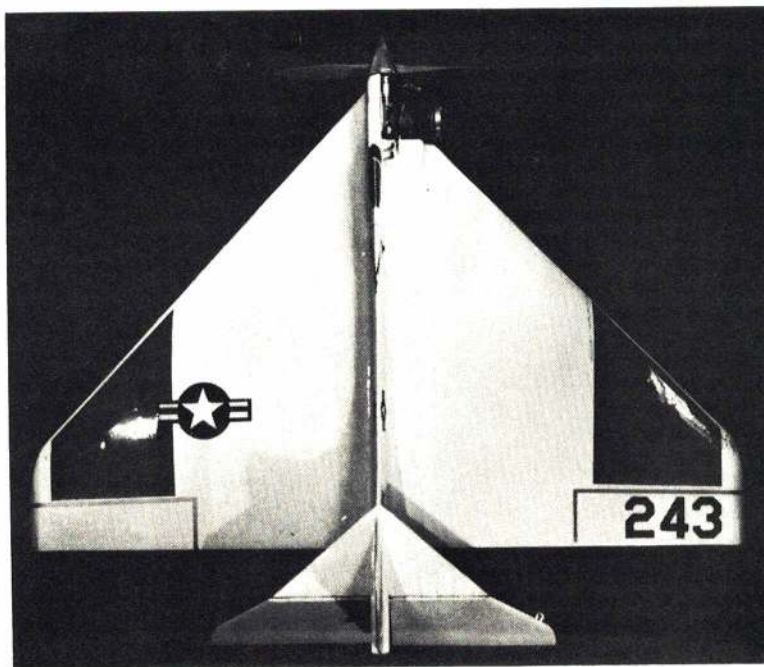
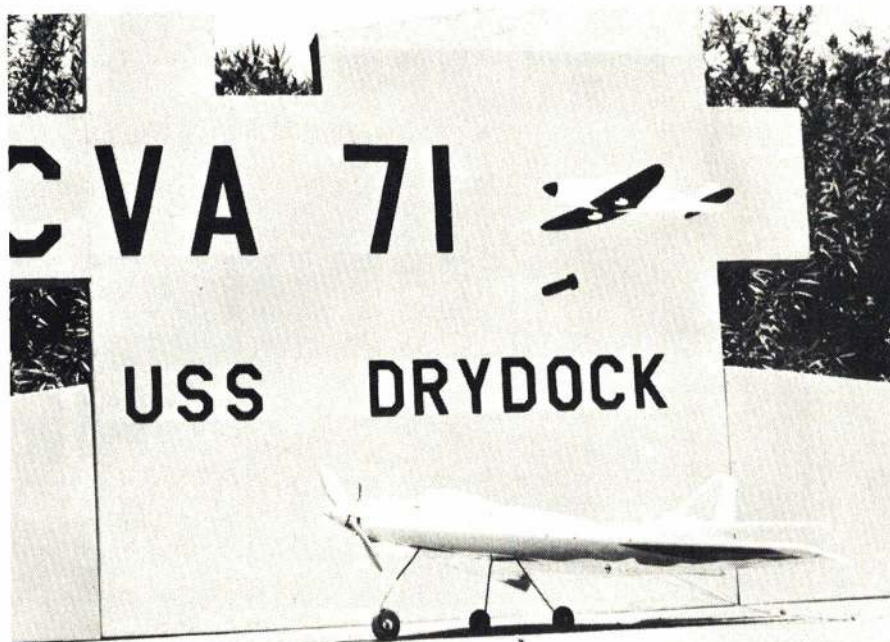


DU-BRO HUGHES 300
(prototype by Dave Grey)

Weight	14 lb.
Rotor Span	58 in.
Duration	10 min.
Payload Capacity	5 lb.

Many advantages of the delta wing and very little fuselage make this a real winner in Profile Carrier. Being light and clean, it really turns at high speed.

SKYHAWK



Obviously, the Skyhawks (model or real plane) are really delta-winged planes with separate elevators. Low-speed flight is amazingly steady with this wing planform.

When the Douglas A-4 Skyhawk was featured in the September 1971 issue of AAM, I was thinking about a new Profile Carrier plane to replace my veteran of the past season. I had thought about the Skyhawk before, since many Navy TA-4s come into Williams AFB, Arizona, where I am stationed, and the design appealed to me. The A-4 article and three-views convinced me that was the way to go.

My previous ship had been built to test my ideas on Profile Carrier design. My theories were apparently sound since that model received four firsts and one second out of six contests entered, but that model was not patterned after any particular Navy plane. In fact, it was downright ugly, and I always felt a touch of shame when seeing some of the other profiles that looked like real airplanes. With this touch of shame and my theories in hand, I set out to design the A-4P ("P" for profile). A quick glance at the plans shows that the wing and fuselage are not built to the same scale relative to the real aircraft, but the plane is easily recognized by anyone familiar with the real Skyhawk.

Since Carrier flying consists of both high speed and difference between high and low speed, there are two routes to increased scores: Increasing top speed or reducing slow speed. Improving top speed with the same slow speed capability will result in a four-point increase in score for every mile per hour added. Decreasing slow speed will result in only three points gained for every mile per hour decrease. Additionally, consider that a one mile per hour change in speed amounts to just over 1% change in top end but is more than a 4% change in slow speed. For these reasons, I like to concentrate on high speed and let slow speed come as it will. A look at the scores for the top finishers in a Profile Carrier event will usually show that slow speeds are fairly consistent while the top speeds determine the winners. This is particularly true on windy days when slow flight is most difficult.

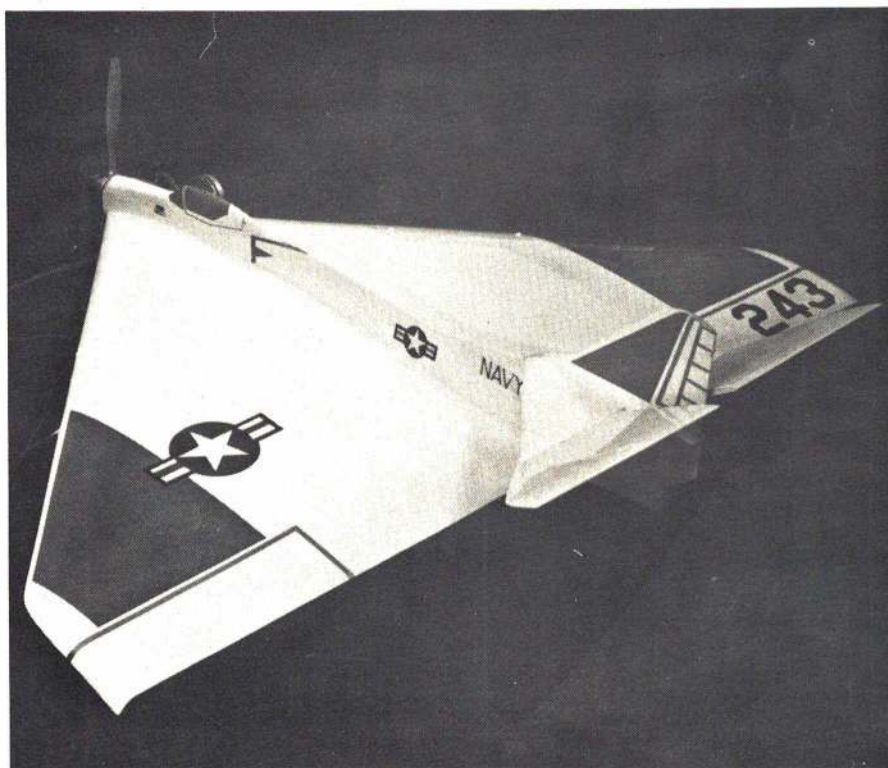
In the scale Carrier classes, speed is determined largely by the engine; in Profile, however, engine differences are fairly well legislated out. About all that can be done for a plain bearing 35 is to free up and polish the main bearing and mount the engine as securely as possible to reduce vibration. With engine differences reduced, the airplane is the next choice for increasing top speed. This is done by reducing drag and weight.

Since much of the high speed run depends on acceleration, the lighter model has a definite advantage. Additionally, a lighter model should be able to fly slower since the wing will have to produce less lift. Selection of wood is very important to reducing weight. In the A-4P the only medium weight balsa required is in the center ribs (R3, R4 and R5), the leading and trailing edges,

RICHARD PERRY



Plenty of elevator travel is needed for complete control of the delta wing. Note drooped wing tips for extra slow speed flight.



and between the engine bearers; all the rest can be light contest balsa.

The wings are enlarged on the A-4P to reduce the size and weight of the fuselage. With the wing as the main structural member, the fuselage can be made of very light wood since it is not required to damp engine vibrations or support a tailhook, tail-wheel or empennage at a great distance from the wing trailing edge. The very short nose, reinforced by the wing leading edge does not require large doublers to damp engine vibrations.

The maximum weight of a Profile Carrier plane should be two lb. with 28 oz. desirable. The original A-4P weighed in at 29 oz.

Drag is composed of parasite drag caused by friction and induced drag caused by the wing producing lift. Parasite drag includes frontal area, interference drag (at the wing-fuselage joint, etc.) and skin friction. Sandpaper and elbow grease will reduce the latter. Frontal area is reduced by the use of a small fuselage and a relatively thin wing which is 10% thick and only slightly cambered (1%). The engine and wing are aligned, and the tank is buried to further reduce drag. Interference drag is reduced at the wing-fuselage joint by using fillets and by having the fuselage on only one side of the wing.

Induced drag has little effect on a Profile Carrier plane because of its light wing loading, rapid acceleration, and level flight. Using high aspect ratio wings is one means of reducing induced drag, but the Skyhawk loses big in this area with an aspect ratio of approximately 2.5. To compensate for this during the short takeoff and initial acceleration, I tried using drooped anti-vortex wing tips on the original A-4P. Their effect on performance was negligible, and the only reward for the extra effort required was in appearance. They did take a beating on landings.

The other significant feature of this design is the lack of flaps. I feel that

(Continued on page 102)

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FIRST PRIZE



GOES TO THE EGGSHELL

MOTHER NATURE DID A TOP-NOTCH JOB WHEN SHE CREATED THE EGGSHELL.

IT'S WATERPROOF. COMPLETELY SEALED. LIGHTWEIGHT, BUT STRONG. SMOOTH AND UNIFORM. IT'S MOLDED TO CONFORM PERFECTLY TO WHAT IT COVERS. IT WON'T PEEL OR FADE. AND IT PROTECTS THE EGG FROM HEAT AND COLD.

BUT, WHEN IT COMES TO COVERING A MODEL AIRPLANE, MONOKOTE IS ALL THESE THINGS, TOO. IN FACT, THERE ARE EVEN SOME THINGS MONOKOTE HAS OVER THE GOOD OL' EGGSHELL.

FIRST OF ALL, YOU CAN COVER YOUR MODEL WITH MONOKOTE IN A LOT LESS TIME THAN IT TAKES A HEN TO MAKE A SHELL.

AND YOU WOULDN'T THINK OF REPAIRING AN EGGSHELL ONCE IT CRACKS. BUT, WHEN YOU HAVE A LITTLE CRACK-UP WITH YOUR PLANE, YOU CAN REPAIR MONOKOTE INSTANTLY AND ALMOST INVISIBLY.

THEN, OF COURSE, AN EGG ONLY COMES IN TWO COLORS (EXCEPT AT EASTER). BUT, MONOKOTE COMES IN 18 COLORS, INCLUDING METALLICS AND PAINTABLE CLEAR.

SO, WHEN YOU THINK ABOUT IT, BEING THE WORLD'S SECOND GREATEST COVERING ISN'T BAD . . . BECAUSE, IN THE MODELING FIELD, WE'RE NUMBER 1.

FLAT OPAQUES

Aircraft Aluminum
Dove Gray
Olive Drab
TRANSPARENT
Sapphire Blue

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FINISHES**

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THEM AT
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TOP FLITE MODELS, INC.
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TELL THEM YOU SAW IT IN—

NEW PRODUCTS CHECKLIST

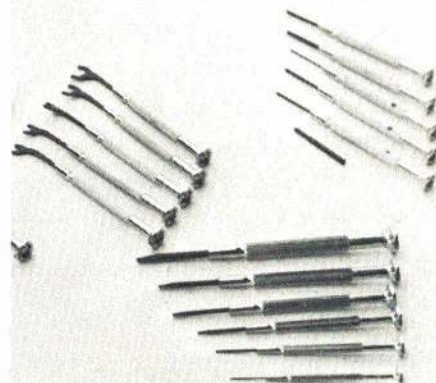
FRANK PIERCE



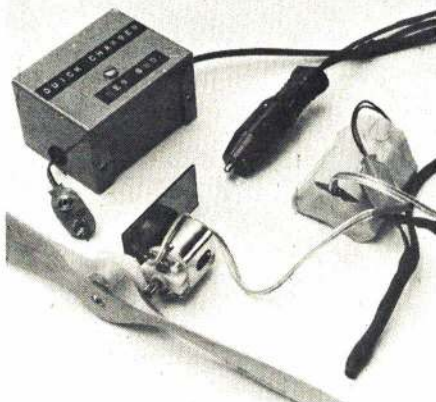
Tool Crib/Miniature vise. Two-part vise with 360-degree rotatable head, removeable jaw assembly so that work can be removed for close inspection, or you can use the top part as a hand-held vise. Fully hardened two-in. jaws open to 1½". \$11.95. The Tool Crib, 17 Thayer Circle, Randolph, Mass. 02368



Cannon/Tini Block. Billed as the world's smallest digital proportional system, Tini Block two-channel uses block-type servo-receiver plus C-E3 servo. Flying weight of 5.1 oz. is light enough to operate in 10-power 24" span aircraft. System uses 225 mah NiCads, transformer-type recharger, available on 17 frequencies on 27, 53, 72 MHz bands. \$119.95 for 27 MHz system, \$129.95 for 53 and 72 MHz. Only \$95 for the 27 MHz system minus the C-E3 servo. Cannon Electronics, 13400-26 Saticoy St., N. Hollywood, Calif. 91605



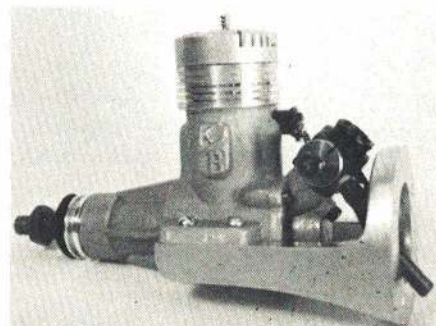
K&S/Precision Tools. Highest quality for most miniature and hobby applications are available and packaged in permanent heavy-duty plastic storage cases. Full line consists of five taps from 0-80 to 4-40, \$5.95; nut drivers, 5/64 through 5/32; open-end wrenches, 1/8 through 5/16; Phillips/Allen set, \$3.95; and miniature screwdrivers, 1/32 through 5/32, \$3.50. K&S Engineering, 6917 W. 59th St., Chicago, Ill. 60638



GEI/Alpha Power Unit. Serious fliers can use the all-electric Alpha for silent, powered flights up to five min. Rechargeable battery operates from 12-volt source. Basic price for motor, prop, battery, recharger: \$45.50. Quick-Charger also available for 20-min. recharges at \$8.50. Everything available and ready to fly, complete instructions for installation. ALSO: Two self-contained motor controllers specifically designed for Alpha; solid-state model provides 30-sec. to 4-min. pre-flight-selectable times, easily reset by simple screwdriver adjustment, \$14.95. MoControl has two-pronged sensor; hard full left on rudder kills motor, stays off until restarted by hard full right rudder. Normal rudder operation not affected. \$12.95. Galler Electronics Industries, Box 87, S. Walpole, Mass. 02081



Trid-N-True/Fun-type gas helicopter. Uses Cox 020 power, Mini-Chopper climbs at 700 ft./min. up to 1000 ft., hovers within a small radius for three min. flight duration and then safely descends. High-impact blades, rugged design allows warranty coverage. Fully assembled except for blades. \$24.50. Trid-N-True Toys, Inc., 1135 E. Truslow Ave., Fullerton, Calif. 92631

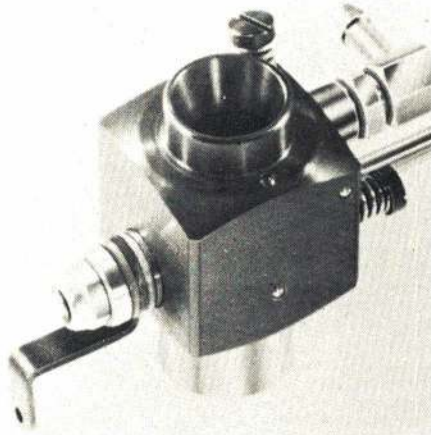


Tatone/K&B Engine Mount. For 15-series 1972 K&B engine, mount is made from cast, heat-treated aluminum alloy. Weight is only 1¾ oz. May be ordered undrilled if desired. About \$2.50. Tatone Products, 1209 Geneva Ave., San Francisco, Calif. 94112

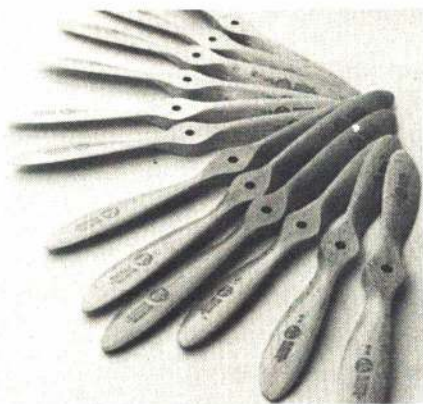


KIT E-6 PIPER SUPER CRUISER

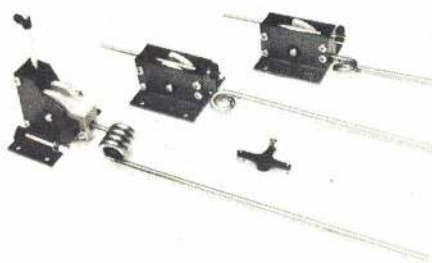
Sterling/Piper Super Cruiser. Another in the series of super-detailed stick models introduced by Sterling last year. Piper can be flown as free-flight using rubber, CO₂, 020, or 049 power, CL, or single-channel RC. Also, the detail of any of these kits makes them ideal for display as well as flying. Scale is 1" to 1'. \$7.95. Sterling Models, Sterling Bldg., Belfield Ave. and Wister St., Philadelphia, Penn. 19144



Tarno/Carburetor. Uses automotive-type butterfly throttle valve in place of drum-type throttle for greater efficiency. Manual throttle arm allows adjustment with transmitter off, engine shutoff operates instantly. For 40 to 61 engines. \$16.50 plus \$1 postage. Tarno Aero Engines, Box 695, Rousses Pt., N.Y. 12979. In Canada, 949 Grou, Montreal 379 Quebec.



AHM/Super Thrust Props. Made in England under the *Punctilo* label, propellers are machined from top quality beech and are extremely lightweight. Available in most popular sizes up to 11-7/8", soon to be available up to 18". 9-5, 80 cents; 11-7/8, 90 cents. Associated Hobby Manufacturers, Inc., 621 E. Cayuga St., Philadelphia, Penn. 19120



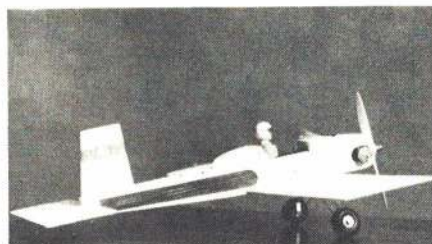
Violet Aero Modeling/Retracts. Extremely rugged but lightweight gears use aluminum, steel, nylon construction. Has improved nose gear actuating shuttle and steel shaft axle for extended life and smoother operation. 3/16" linear travel overlock in both up and down position keeps them where you want them. Non-sensitive linkage adjustments. Attractively finished in red and black, typical installation weighs only 8 oz. total. \$39.95. Mains only, \$24.95. Violet Aero Modeling Corp., 9176 Red Branch Rd., Columbia, Md. 21045



Maco/New entry in RC field. Mid-size high performance kit flies on 29 to 45 power. Die-cut fuselage sides, foam wing and stab with specially finished covering material which can be painted if desired. Custom quality material used throughout. 56" span, weight, about 5 lb. \$52.95. Maco Model Aircraft Co., 694 Shadow Wood Lane, Webster, N.Y. 14580



CB Enterprises/Motor Mounts. Shown is the complete line of machined and heat-treated aluminum motor mounts in 15, 30, 40FR, 40RR, and 60 sizes. So well made that each mount carries a lifetime repair or replacement guarantee. From \$4.25 to \$5.95. CB Enterprises, 21590 Cloud Way, Hayward, Calif. 94545



Aerospace Hobby/VP-1 UC. An unusual near-scale UC model of the VP-1 *Volkspiane* homebuilt. Not profile, uses full balsa fuselage and solid wing. Easily constructed, scale except for conventional elevator in place of stabilator. \$4.95. Aerospace Hobby, 559 1st Capitol St., St. Charles, Mo. 63301



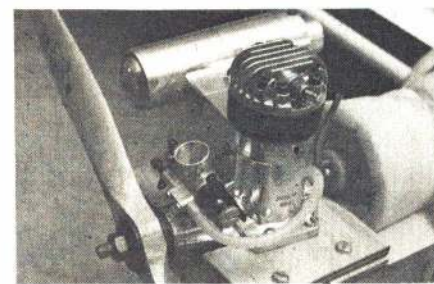
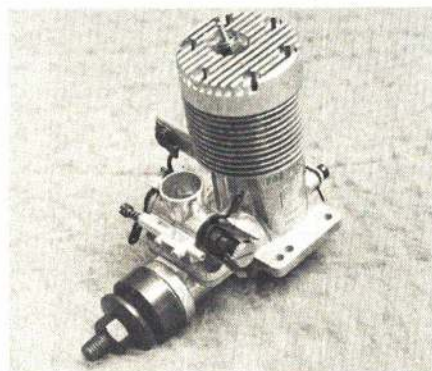
CMI/CL Stunt Trainer. Interesting "Old-Timer" 1/2-A kit uses 049 power, has 18" span for flying AMA stunt patterns. Precision die-cut parts separate smoothly. Decals, very detailed plans should make this kit an outstanding value. ALSO: In the same line (shown) are the *Speedster* and the tricycle gear *SST*, same quality but modern appearance. CMI, Box 79, Des Moines, Iowa 50301



Aero Sports and Crafts/Muffler deflector. *Vari-Adapt* allows installation of muffler at any angle relative to the thrust line of the engine, allows gasses to be deflected above or below wing. In boats, sends exhaust over the side rather than down into hull. About \$5. Specify engine and muffler make. Aero Sports and Crafts, Inc., 970 E. Northwest Highway, Mt. Prospect, Ill. 60056



MRC/Champion. Imported from Japan, plane is capable of flying all AMA/FAI patterns. For 60 engines, kit features new seamless plastic fuselage, balsa wings, glass-filled engine mount/nose gear. Length 51", span 61", flying weight, 6 1/2 lb. MRC, 2500 Woodbridge Ave., Edison, N.J. 08817



Fox/Two 60s. Eagle, powerful 60-series RC engine is beautifully finished, has low-vibration characteristics, turns 11,500 rpm with 11-8 prop. Recommended for top performance in pattern flying. 14 oz. \$44.95. Contrast top performing Eagle with Falcon (bottom), a budget-priced performance-oriented engine for the Sunday flier or beginner. Turns out a respectable 11,000 rpms with an 11-7 prop. Total weight only 12 oz. \$34.95 less muffler. Fox Mfg. Co., 5305 Towson Ave., Ft. Smith, Ark. 72901

CANNON "TINI BLOCK"

DUANE LUNDAHL



The review set: The Cannon Electronics "Tini Block" two-channel digital proportional system.

Features: Receiver and one servo are housed together, hence the name *Tini Block*. Servo-mechanisms are by D&R. Transmitter control stick is closed gimbal type by Rand. Both channels are trimable. Decoder and servo-amps utilize integrated circuits (two in decoder; one in each amplifier). Transmitter uses 9V dry batteries; flight pak is 225 mah NiCad. Separate shockproof battery charger for flight pak. Receiver utilizes a FET (field effect transistor) front end and is single-tuned. Transmitter has relatively high power output (600 mw on 27 MHz band). System is available on all RC frequencies. Available without second servo for rudder-only flying (only a servo need be added to upgrade to two-channels). Servo amps are bridge circuit type (three wire).

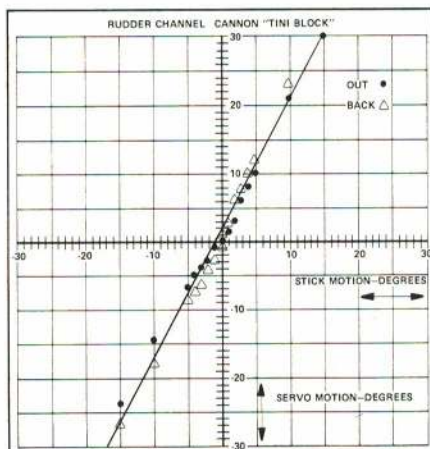
Tests: Temperature stability 0-150°F on flight system and 20-150°F on transmitter satisfactory. Flight tests were conducted in a Goldberg Ranger with no glitches and excellent range demonstrated. For servo resolution see graph.

Evaluation: An extremely compact, easy to install and well laid out system. Has excellent potential for use in very small RC aircraft. Small size does not limit use to small a/c since normal servo power is available. If "Feather-Light" Zinc-Air batteries are used, the airborne system weighs only four oz. for two channels and would only be 2.8 oz. for rudder-only!

Characteristics

Transmitter: 2 x 4 1/2 x 6 1/2", 32 oz.; **Receiver/Servo Block*:** 1-3/8W x 1-11/16H x 2-1/8L", 2 oz.; **Servo*:** 3/4W x 1-11/16H x 1-7/8L", 1.2 oz.; **Battery Pak:** 13/16 x 1-7/16 x 1-7/16", 1.9 oz.; **Transmitter Output**:** 600 mw on 27 MHz; **Receiver Sensitivity**:** 4 microvolts; **Servo Thrust:** 2.8 lb. at inner hole on arm; **Servo Torque:** .62 in.-lb.; **Current Drain**:** 21 ma—receiver, 6 ma—servo at neutral, 150 ma—servo running, 450 ma—servo stall.

* incl. mtg. lugs and output arms
** Mfgs. data



PILOT JUNIOR BOX FLY

STEPHEN KRANISH



The Pilot Junior Box Fly is a cross between an ARF and a standard kit. The wing is a set of precovered foam panels with spars and wing tips installed. They are joined by a plywood spar joiner, which is epoxied in place. The joint is covered by plastic center section covers which are affixed with plastic cement.

The fuselage is built up from plywood sides, hardwood engine bearers, and plywood bulkheads that dovetail into the sides and forward fuselage floor. This interlocking acts as a jig and greatly simplifies construction. All these plywood parts are neatly die-cut and readily pop from their sheets; only a little trimming is needed to make everything fit.

Balsa decking is provided for the rear part of the fuselage and should be installed with the grain running across the fuselage.

The tail surfaces and control surfaces are sheet balsa. The elevator is the two-piece type, joined by a wire joiner, provided, along with control horns and engine mounting hardware. No hinges are included, so I used Goldberg/Klett RK-2s. They easily fit into the cut made by an X-acto No. 24 blade. Semi-flexible Gold-N-Rods were used and held in place by silicone rubber.

The manufacturer recommends a 1.6 to 2.5cc engine, for which the micarta break-away plate is set up. Some filing would be required to fit an O.S. Max 2.5cc. We initially installed an O.S. Max 3.3cc which proved to overpower the plane, so we changed to an O.S. Max 1.6cc.

Since we were flying without a throttle, only a 60cc tank was installed. This easily fitted between the engine bearers, but needed a balsa support at the rear before it could be siliconed in place. There is, however, room for a larger tank.

I covered the fuselage with red Solarfilm. This heat shrink covering is really quite different from MonoKote. Solarfilm works at a much lower temperature, and shrinks and stretches very readily. However, covering a Little Stik wing with the rest of the roll showed that while it shrinks a lot, it does not tighten up as much as MonoKote and will loosen slightly under a hot sun.

Radio installation is no problem, as there is plenty of room in the fuselage. Our installation of an AAM Commander required the addition of an Austin prop wrench under the engine as nose weight. The balance of this plane is really quite critical. It should balance about seven cm behind the leading edge of the wing.

Flying with the O.S. Max 1.6cc engine showed the plane to be very docile and very slow to respond. While it would be good for a beginner, an experienced pilot would probably not like it.

The kit is quite easy to build, but the instructions are not very good. They are sufficient for an experienced modeler, but a rank beginner would need some help.

Manufactured by World Engines, Inc., 8960 Rossash Ave., Cincinnati, Ohio 45326.

Specifications: Pilot Junior Box Fly

12% Flat-bottomed Airfoil
1170mm Wingspan—46"
910mm Fuselage—35.8"
24.5dm Wing Area—376 sq. in.
Price—\$17.50

KRAFT FIVE-CHANNEL

FRED MARKS



The Set: Five channels, four controlled by two sticks, one by toggle switch (for retract gear, flaps, etc.). Available on all 27 MHz, 50-54 MHz, and 72-76 MHz frequencies.

System Features: Major feature is maximum use of ICs for encoder, decoder, and servo amplifiers. Uses extremely rugged, derated airborne battery pack designed for use in chain saws.

Transmitter: Encoder is free-running multi-controlled by an IC five bit shift register. Requires only control pots plus one pot to set sensitivity. Two closed ball sticks with electro-mechanical trim. Fifth channel controlled by toggle switch. No buddy box arrangement. Antenna collapses to 6 1/2 in. Derated 550 mah, 9.5 V battery pack. Internal voltage dropping charger for both transmitter and receiver packs.

Receiver: Single deck construction. Single conversion receiver. Double tuned front end. Three transformer IF. Moderately sensitive receiver. Decoder uses an IC for shift pulse and set pulse forming. Uses same five bit shift register for decoding as does the encoder.

Servos: Three-wire IC servo amp, plus two external transistors, for final drive and seven other out-board discrete components. Very powerful servo with good resolution.

Tests: Flight tests in original design airplane were completely satisfactory. Bench tests: 0°F to 150°F, satisfactory.

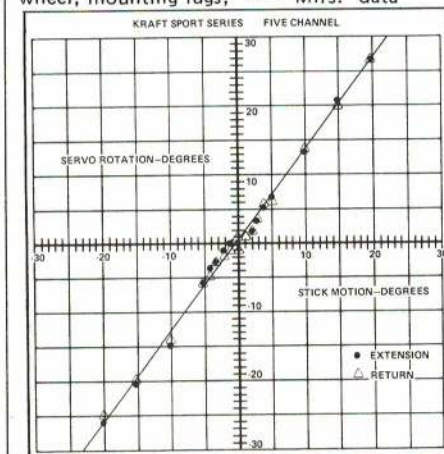
Overall Evaluation: Equal to the overall quality of all Kraft sets. Doesn't have the options of buddy box, sixth channel, collapsible antenna, double conversion receiver, or servo style selection. Considered an outstanding system for the sport flier. Servo is one of most powerful tested to date. Although available only with the larger servo, smaller servos can be purchased separately for special uses.

Criticism: Stick assembly has about one degree of "slop" at center. Plug arrangement which leads to pulling on wires and to putting pressure on them when inserting plug is not particularly satisfactory.

Characteristics

Dimensions*: Transmitter—2T x 7W x 6 1/2H; Receiver—13/16T x 2-1/8W x 2-9/16L; Servo***—7/8W x 2-9/16L x 1-5/8H; Battery Pack—1T x 1-7/8W x 2-1/4L; **Total Airborne Weight**—approx. 15 oz. with four servos; **Transmitter Output*****—300-350 mw; **Receiver Sensitivity*****—2.5 to 3.5 microvolts for full control of decoder; **Receiver, Image Rejection*****—3 db; **Receiver Selectivity*****—down 6 db at ± 3 kHz from specified frequency; **Servo Output Thrust**—4.4 lb. at 0:37 Rad; **Servo Torque**—1.63 in.-lb.; **Servo Transit Time**—0.7 sec. end-to-end.

* All dimensions inches; ** Includes output wheel, mounting lugs; *** Mfrs. data



AFTER 30 YEARS THE IRON DOG FINALLY MADE GOOD!



Nobody could claim the P-39 Airacobra was anything but a disappointment. Its singular lack of attributes earned it the dubious nickname "Iron Dog," and in the words of one Army test pilot, the P-39 was "suitable for low, slow, wide circles." Hardly the most enthusiastic judgement for a new fighter!

Strangely enough, though, the 'Cobra has always been a great *model* subject. Its outstanding combination of moments and areas give it flying qualities that are hard to beat.

So don't be surprised that TOP FLITE's latest balsa R/C stand-off scale kit is the closest thing yet to a scale model with *real* pattern performance. Like the P-51 and P-40 in this series, the kit features the same high quality materials and creative engineering. You can fit it with retract gear, flaps, or other details, but with or without such frills, this new model further enhances TOP FLITE's reputation for "the finest stand-off scale models in the world."



Wing Span 60"
Area 600 sq. in.
Eng. .40 to .60
Weight (average) 7 lbs. with retracts
Kit R/C-18 \$49.95



TOP FLITE MODELS, INC.
2635 S. Wabash Ave.
Chicago, Illinois 60616

BOB HATSCHKE ON FF

More Torque Talk: Last month, in discussing the relationships between the torque in a rubber motor and the torsion in a prop shaft, we noted that torque is A Good Thing. Another good thing for rubber modelers is to know how much torque that wound-up motor can deliver. Multiplying the number of turns a rubber motor unwinds by the constantly diminishing value of torque, tells us the amount of energy released by the rubber motor and converted by the propeller (allowing for various real-world deductions due to the impossibility of 100% efficiency) into altitude. Immediately convertible into duration—veritably the currency of competition—altitude, too, is A Good Thing. Hence all this interest in torque.

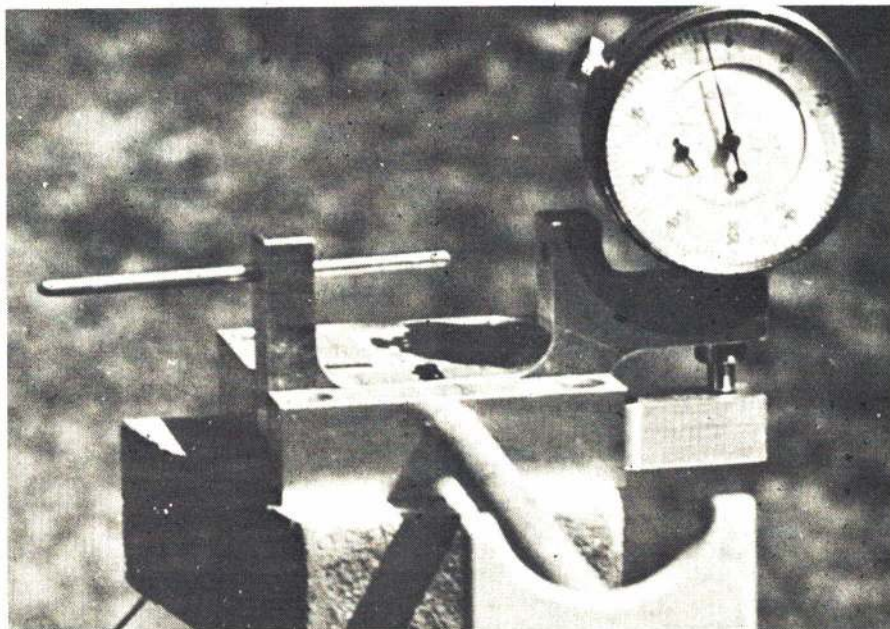
Bob Wilder (Wilder Machine & Model Works) commercially produces an excellent torque-meter for use with rubber models. Many top competitors use Wilder's torque meters to good effect. But for the techniques used by some other fliers, the Wilder meter has some drawbacks: Used between the winder and the motor, the user has to stop winding to take readings. Used at the anchor end, it's somewhat cumbersome and rather inconvenient to incorporate in any simple winding stooge.

Pondering upon these drawbacks, Wakefield-flier Carrol Allen came up with the torque-metering stooge shown in the photo, which provides continuous readings while the rubber is being wound and is easily mounted either atop a guy-wired stake (as shown) or on a fold-away fixture permanently installed in the trunk of Allen's car. The model is simply pinned in the vertical yoke by means of the horizontal 1/8-in. music wire rod. The yoke itself is held by a pair of set screws onto a 1/8-in. music wire torsion bar within the aluminum base block. As the motor is wound, the torsion bar twists and pushes down the industrial dial indicator mounted on the yoke against an arm projecting from the base. For every 1/1000 in. the indicator's plunger moves, its pointer moves one space on the dial. One full revolution of the large pointer equals 100/1000 of an inch (0.100). The smaller pointer counts full revolutions up to the maximum range of the instrument—1/2 in.

What Carrol did was to design and calibrate the unit so that 0.001 in. of travel on the plunger would equal one in.-oz. of torque. This makes the unit direct-reading for the ultimate in practical utility.

Since not everybody has access to the tools and materials Allen used, such as a Bridgeport milling machine, the principles and procedures are likely to be more useful to any potential builders of the gadget than a detailed drawing and dimensions.

Carrol Alley's torque metering stooge gives direct readings in in.-oz. while he is winding his rubber models.



As noted previously, the torque rod is 1/8-in. music wire. The rear end of this is bent in a U, with the end inserted in a tight hole to prevent any rotation. The active length of this torsion bar, from the U to the rear one of the two set screws in the yoke, is just about two in., but the bar goes completely through the yoke and is steadied on each side of the yoke by a ball bearing (1/8-in. ID, 1/2-in. OD). Distance from the centerline of the torsion bar to the centerline of the dial indicator's plunger is 2.2 in., and the point of this instrument bears on a surface at exactly the height of the torsion bar's centerline.

All of this is calculated to be a little stiffer in torsion than the desired 0.001-in. displacement per in.-oz. of torque. For final calibration, Carrol then "weakened" the torsion bar by filing one side flat—a little at a time, with careful measurements of actual torque vs. displacement in between. The yoke is blocked off at 0 and at 150 in.-oz. to prevent any overloads in either direction.

The most unfamiliar item in the unit, for most modelers anyway, will be the dial indicator. Some hardware stores carry them, as will industrial hardware supply houses. What's wanted is the type in which the plunger moves straight in and out for a distance of about 1/4 in. and reads in increments of 0.001 in. (They are also available reading in increments of 0.0001 in., but these are considerably more expensive.) Mitutoyo, a Japanese manufacturer, lists a suitable unit reading in 0.001-in. increments to a maximum of 0.300 in. in its catalog for \$11. If you can locate a used one, it can probably be had for about \$5.

Winding with a Torque Meter: Allen powers his Wakefield with motors made up of 16 strands of 1/2-in. Pirelli (6 mm). Nominally, he reports, these will take a maximum of about 100 in.-oz. torque. A good motor will go to 110 in.-oz., but he's broken some at only 75 in.-oz. While he aims at a specific torque figure, Allen also counts the turns he's cranking in. By observing value at specific numbers of winder turns, he gets a definite warning of a "dead" motor—so if it's a go-for-broke contest flight, he can unwind and install a better piece of Pirelli.

FRED MARKS ON RC

MARS Pulse Concept: So the weatherman predicts a nice sunny weekend and you decide to go flying. It will be the first time out after the long winter that we usually have around here in Canada and your radio may or may not have a properly charged battery to supply it with life-giving juice (otherwise known as electrical current). You may do one of two things. Plug it in for 24 hours on Friday night—that takes care of Saturday and you can go flying on Sunday. Or buy a new set of batteries which doesn't solve anything because your friendly battery manufacturer recom-

mends that you charge the new pack, you guessed it, for at least 24 hours—again Saturday is wiped out. Of course if you follow this little description, you may get into the air Saturday afternoon.

The technique described here was invented in 1954 by Ernest Beer of the Netherlands and was recently tested and proven by Donald Vargo (Lewis Research Center, Cleveland). Repeated charging has proven reliable and safe. Batteries can be left on charge for a week without harmful effects. The circuit is simplicity itself; all that is necessary beyond the usual diode rectifier and resistor found in a charger in many RX sets is an additional resistor across the rectifier. This second resistor allows some AC to flow through the cell and the technique is termed "Asymmetrical Alternating Current Charging." It was found to work best when about 10% of the forward current is allowed to flow backward in the circuit.

Resistor R-1 sets the forward charging rate; resistor R-2 the reverse current charging rate. To calculate R-1 for charging rate, take AC voltage from secondary at the transformer, e.g., 12 VAC, multiply by 1.4 x 12 equals 16.8, subtract normal battery voltage from 16.8V, e.g., 16.8V - 4.8V equals 12V. This is the available charge voltage for recommended charging current of 120mA. (Recommended charging current is based on this method and not on manufacturers charging rate). 12V divided by 120mA equals 0.1 x 1000 equals 100 ohm. Make this resistor a 2 watt. (The wattage figures as follows:

$$\frac{12V \times 12V}{100}$$

equals 144 divided by 100 equals 1.44 watt.)

Reverse charge: Voltage available 16.8V plus 4.8V equals 21.6V. Reverse current equals 12 mA (10% of the forward charging current). 21.6V divided by 12 mA equals 1.8 x 1000 ohm or 1800 ohm. Make this resistor a 1 watt.

It is difficult to measure the actual current, because of its pulsating nature. You may get a reading from 10 to 30 mA, on an ammeter put into the circuit. Therefore the resistors may be calculated as shown above.

The circuit, shown in Figure 1, is based on a 12 VAC supply, because that is what I happened to have handy, but any other AC supply will do the job; you just have to re-figure the resistor values accordingly. It would be a very good safety precaution to use a small 1:1 ratio isolation transformer instead of working through a resistor only, across the AC line. So please be very careful.

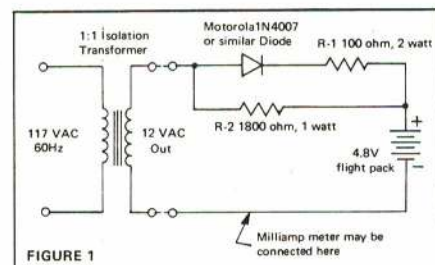


FIGURE 1

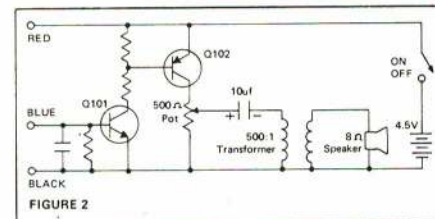


FIGURE 2

Now after all this rigmarole, what do you get? My friend, you will be able to charge your regulation 4.8V flight pack in about four hours with a very simple arrangement.

Before charging always (and particularly after a C-R-A-S-H) check the battery terminal voltage. If it is 1.1V to 2.5V below the nominal voltage, suspect a shorted or a reversed cell. If you are not sure a cell is defective, place the pack on charge and check the mA meter reading during the first half hour or so. If the reading suddenly rises or falls, disconnect the pack immediately. A rise indicates a shorted cell and a fall, a reverse one.

(Continued on page 105)



“LITTLE TONY”

Tony LeVier's original design
Built by Ted Prasol from Aero Modeller 3 views.

Scale 2½" to 1'

Span 48"

Power Fox 59 RC

Weight 7¼ lbs.

This plane has won the "Testor's Best Finish"
award at the AMA Nats. TWICE!

The Great Age of Sail . . . Lives Again in these Authentic Scale Model Kits

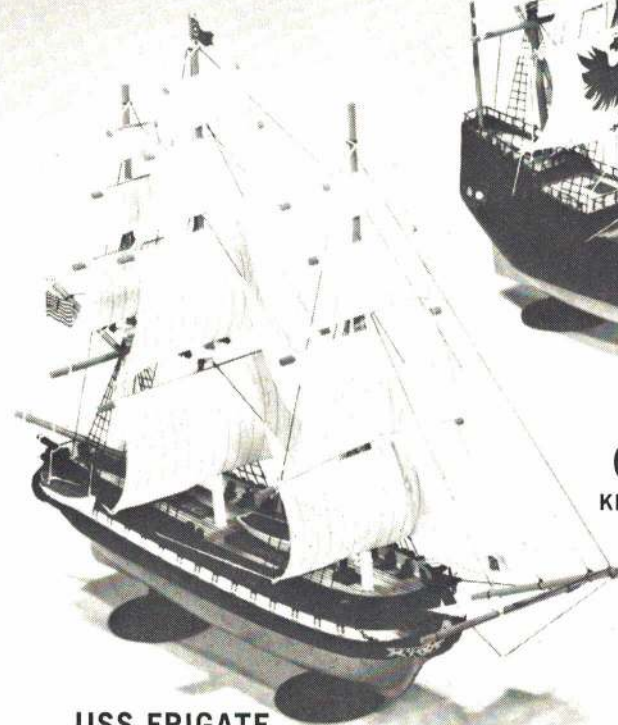
THEY'RE EASY TO BUILD

We know it seems unbelievable, but it's true. New techniques in the heretofore difficult rigging installation and ratline making, are simplified so that almost anyone can produce a craftsman-like job. Density selected prime balsa wood is a real pleasure to work with, and the step-by-step plan is simple and complete.

THEY'RE COMPLETE*

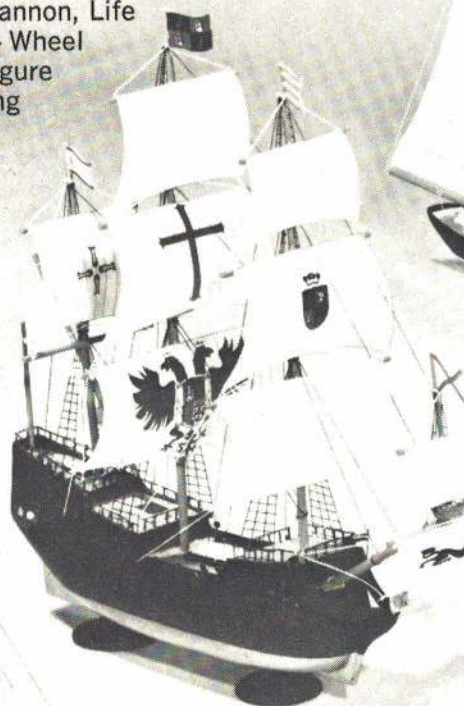
With machine carved hulls, that require only a little trimming and sanding. Kits include many finely detailed cast metal fittings (as required for each kit) such as: Cannon, Life Boats, Windlass, Anchors, Steering Wheel - Wheel House, Water Cask, Lights, Stern Castles, Figure head, etc. Brass Chain, Black and Tan rigging line, Printed Cloth Sails, Decals, Display Pedestals and much more . . .

* Dry Kit, paint and cement not included.



**USS FRIGATE
CONSTITUTION**

KIT G2 — Length 11"



**SPANISH
GALLEON**

KIT G1 — Length 10"



**SCHOONER
BLUE NOSE**

KIT G3 — Length 11¼"

THEY'RE UNIQUE

Because such amazing detail and authenticity is achieved in kits that are relatively easy to build. Plans include full size, as well as assembly drawings for each step of the way. Authentic color scheme shows on full color kit box lid.

THEY'RE HISTORIC

Plying the Spanish Main, the Galleons carried the treasures of the New World back to Spain. Outfitted with cannon they were used both as merchant men and warships . . . The Blazing Guns of the *Constitution* helped to establish our Nation. Now enshrined in Boston Harbor, it is the oldest commissioned vessel in the U.S. Navy . . . Built by Angus L. Walters the *Bluenose* was one of the finest Schooners to take the water. It came to world-wide fame racing against the *Gertrude L. Thebaud*. *Bluenose* captured the hearts of U.S. and Canada to such an extent, that today it is on the back of every Canadian Dime.

THEY'RE ONLY

6.95
ea.

- CARVED WOOD HULLS
- CLOTH SAILS
- CAST METAL FITTINGS

AND THEY'RE AT YOUR DEALERS NOW

GET OVER AND SEE THEM . . . BUY ALL THREE!

You don't have to STAND OFF to admire this

CITABRIA



KIT FS31

29.95

Span 54" Area 415 sq. in. Length 36" For Engines .23 to .35 Scale: 1.61" Equals 12.0"

SPECIAL THANKS

The beautiful Citabria is manufactured by one of the oldest and respected names in American Aviation, The Bellanca Corporation, who so graciously provided us with the plans, photos and details of the full size aircraft. With this illustrious lineage, it is not surprising that the Citabria is just about unbeatable as a fun plane. Primary trainer, or for Aerobatics.

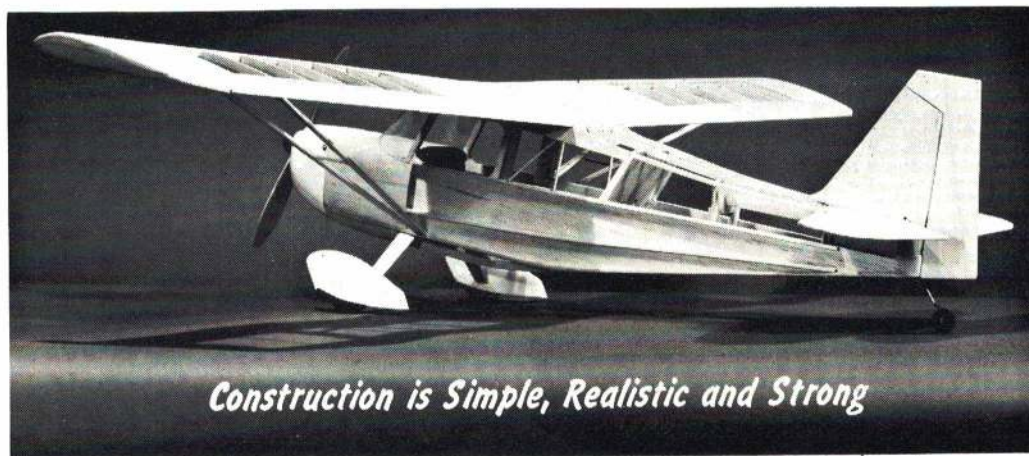
CITABRIA IS FOR YOU

If you're a Sport Flier, if you have a feeling for Scale, if you love R/C*, then this is your ship. It's a beautiful machine that builds easy—goes together fast—plenty of room for any equipment—rugged for hard use—flies great—and is just about the right size.

* Can be flown Control Line too—instructions on plan.

ABOUT THE KIT ITSELF

This kit is a real joy . . . Balsa Wood is the finest grade, density-selected and sanded to micrometer tolerance; as is the imported Finland Birch Plywood. Every part is numbered to insure fast and accurate assembly as shown on the easy step-by-step plans.



Construction is Simple, Realistic and Strong

WING AND TAIL SURFACES

Complete wing is built on work bench without having to remove it—so it's flat and warp-free. Parts are die cut and carved. Balsa sheet cover makes for tough wing. Wing is installed like it ought to be—with dowel pins and nylon screw in wood nut-block. No unsightly rubber bands to deteriorate, break or slip. Rudder and Stab are die cut sheet for simplicity and no warp. Included is all the linkage hardware: pushrods, aileron and elevator horns, bellcranks, clevis, connectors, etc., plus giant authentic decals, plastic windows, etc., etc.

THE FUSELAGE

Fuselage sides are die cut full length. Cabin sides and inner doublers are plywood as are the firewall and landing gear bulkheads. It's easily assembled with die cut balsa bulkheads, nose block, formed music wire landing gear, custom dural engine mounts, etc. Cowling and wheel pants are rugged plastic.

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- ☐ "Secrets of Control Line and Carrier Flying." Including preflight, soloing, stunting, Carrier rules and regulations, Carrier flying hints and control line installation instructions. 25c enclosed. No checks. Only U.S. money orders or currency accepted.

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ALUMINUM WINGS



The exotic lettering and colors on this wing show its origin. The aluminum is discarded after being used for offset printing as with your local newspaper. The printer will probably give it away.

For CL or RC here's a way to make light but durable wings.

ROGER and GLENN BOLICK

The desire to create something new, different yet useful, and unique but practical, drives modelers to search for that "gold mine" of ease of construction, low cost and durability. Not all of these can be obtained in most models, but to us the aluminum wing model meets many of these goals.

Since most full-scale aircraft utilize aluminum for construction, it is surprising that more use is not made of this material in the modeling world. Two primary reasons for this are the cost of suitable aluminum material and the difficulty in working it into model shapes without metal-working skills and equipment. Both of these problems are solved in the construction described in this article.

Cost is reduced because a readily available scrap product is used; fabrication is simplified because of the use of conventional balsa for the support structure to which the aluminum skin is bonded. An added bonus is that the aluminum requires no further finishing unless trim decoration is desired.

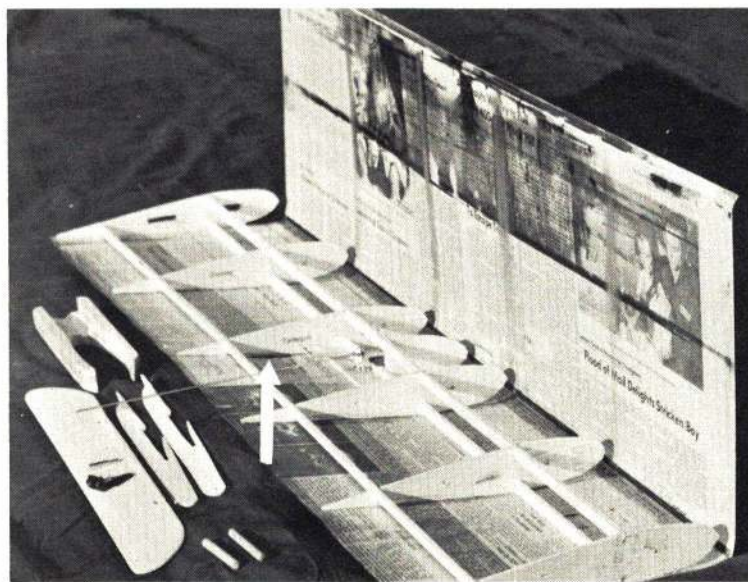
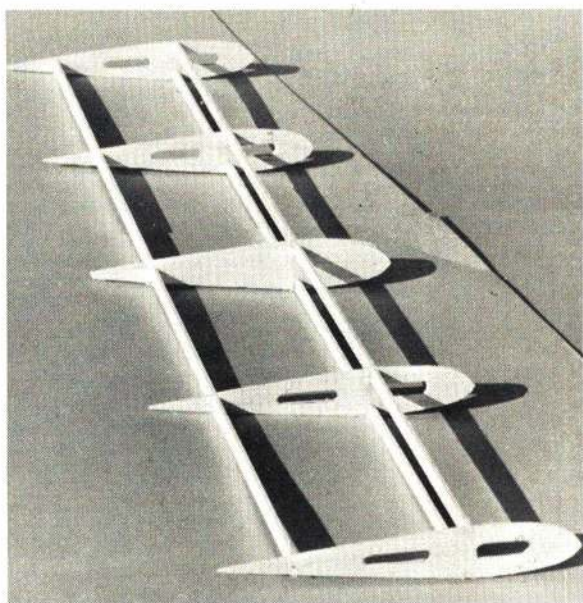
This is not a construction article of a particular airplane model. Rather, it is intended to give the modeler with some experience a new material which simplifies his building and gives him more flying time at a lower cost per plane. General guidelines are given to enable the builder to tailor the aluminum technique to his own model requirements.

The planes shown are of two types—combat and stunt. Each uses a symmetrical airfoil section and 35 size engine. Wings with other sections can also be readily fabricated using the same methods. The basic construction for all wing types is very similar. Differences between stunt and combat wing structures are required because of the tail supporting booms and the internal tank used on typical combat ships.

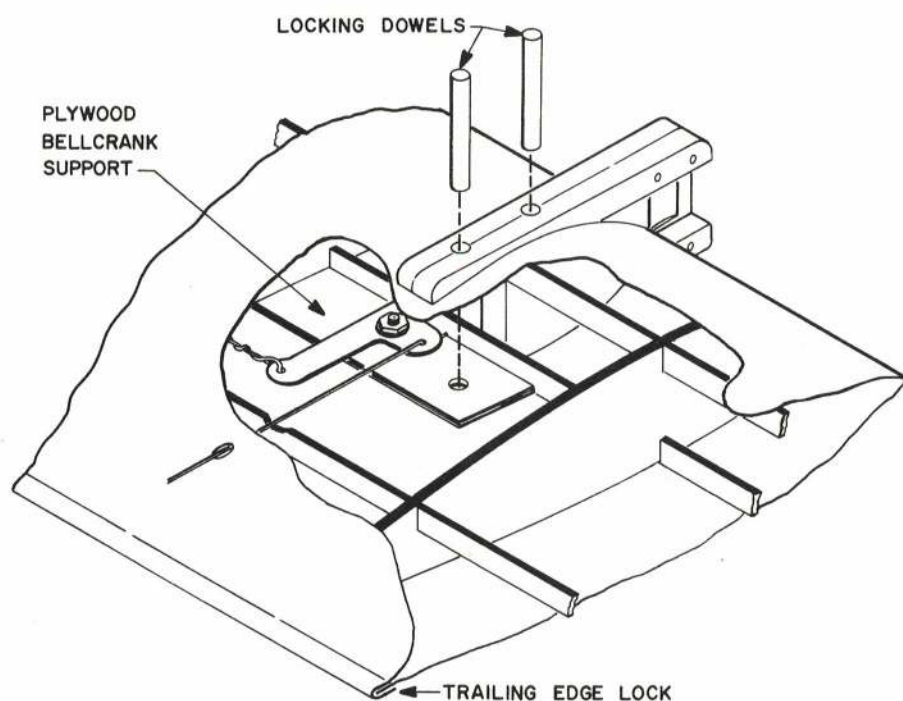
The aluminum sheeting material can be obtained from print shops which use offset printing methods. Newspaper print shops have sheets which are 33 x 22" and .009" thick. This is the size used on the models shown. The material is available at a very low cost per sheet, is readily worked, and can be easily cut with scissors or shears. In order to best use the material, the wings shown have a span of 33 in. less tips and chords of up to 10 in. Tips of conventional construction can be added if desired to increase the span and to improve model appearance.

Basic construction involves building up the support frame of ribs and spars as shown in the photographs. Use your

(Continued on page 77)



Above left: Beneath the aluminum is a very basic and simple balsa structure. It gives only shape, not strength. Shown is a structure for a fuselaged airplane. Above: Not much to do in making one of these tough but very light-weight combat planes. Arrow shows location of pushrod exit. Left: Here they are: Two aluminum-winged CL models. The technique is usable on other designs and in RC.



ASSEMBLY VIEW SHOWING CONSTRUCTION TECHNIQUES

AL RABE ON CL

Steady Control Line Stunt Engine Runs: One of the biggest problems faced by sport and novice stunt fliers is achieving a satisfactorily steady engine run. Making a stunt engine run well is somewhat like opening a combination lock. It's easy if someone gives you the combination, but difficult and frustrating if you must try random combinations until you finally "click." The elements of our combination are: Engine, glow plug, prop, fuel, tank, fuel system geometry, and break-in procedure. This month I'll cover the engine and glow plug. Next month we'll discuss break-in, sport and stunt fuels, fuel mixing and, if space permits, fuel system geometry.

To obtain a steady engine run, you must first select a suitable engine. In general, it should: be light (avoid heavy or rugged-looking engines); have a small, tight crankcase of minimum internal volume to improve fuel draw (usually a strike against ball bearing engines); have a long stroke to provide high torque at low rpm to swing fairly large props; have a low to moderate compression ratio for a good steady four-cycle type run; have conservative porting for best operation at low speeds (very few good Rat, Combat, Speed, Carrier or RC Pylon engines are satisfactory for Stunt); and it should be of good quality, with ample parts readily available.

Pick an engine big enough to do the job. If, for example, you have a big airplane or a heavy one, look for a good 40 instead of trying to find the world's best 35. In the long run you will have better success with engines having little or no modifications operating well below their maximum capability.

Consider having some custom engine work done. You don't want your engine "hopped up," just cleaned up. It is senseless to make three to five trips to the circle and burn a gallon or two of fuel at six bucks/gal. only to find that your new engine is a hopeless dog for lack of proper internal fit. A custom engine man will check the fit of all parts and replace parts as necessary to obtain good close tolerances. He will also free up the crankcase to crankshaft fit, clean up and deburr the inside of the crankcase and sleeve, and will probably hone and/or hand lap the sleeve. This work usually takes less than an hour and should cost \$5 to \$10. Actually, your engines not only run better, but last substantially longer so that the total cost per flight is somewhat less.

Consider minor modifications to your engine, such as a new, better, needle valve. I personally prefer O.S. and Enya needle valves because of their high quality, clean click adjustments, chrome plating, and finely tapered points for sensitive, accurate adjustments. A new venturi of different ID may help. A larger ID will usually give a more powerful although perhaps a little less steady run. A smaller ID will make the engine run steadier at the expense of some power. "Packing" the crankcase by using a deeper backplate or by filling part of the bypass reduces the internal volume of the engine and thereby improves fuel draw to steady the run. Filling a little metal off of the bottom of the exhaust side of the piston will cause a small space under the piston when it is all of the way up. This permits some flow of air through the exhaust port, under the piston edge into the crankcase. This is called "sub-port induction." This extra air intake under the piston reduces the volume of air to be drawn in through the venturi. With support induction you can use a smaller venturi ID which improves fuel draw without sacrificing power. Sub-port induction may, or may not, help your engine. Don't try it with mufflers though.

There are three checks which you can perform yourself to establish the condition of your engine. Watch for an excess of fuel leaking from the front of your running engine which may indicate a worn crankcase. Next, turn the prop until the piston is at the top of its travel. Wait a few seconds to let the compression bleed off, then wiggle the prop back and forth. A wide angle of free play indicates rod wear. Finally, and most importantly, place a few drops of light motor oil into the venturi and exhaust port and work it well into the engine by flipping the prop. Now, turn the prop slowly. Just after passing the point of maximum compression, an engine with a good compression "seal" will continue, by itself, to rotate the prop smartly. If it "bites" you, it is an excellent engine. If it seems slug-

gish, with the prop failing to kick far enough to open the exhaust port, you may need an overhaul or a new engine.

Use a fuel line filter and avoid needle valve adjustments. A good engine should never require any needle adjustments unless the temperature or humidity changes. Listen to the engine in the air and decide if one or more "clicks" rich or lean might improve the run on the next flight. Don't try to set an engine by sound on the ground except for the first flight of the day. If during a flying session, your engine speed changes, don't readjust the needle. Instead, clean the filter. If that doesn't fix it, then try replacing the glow plug. That's right, replace it because you can't tell by looking at a brightly glowing plug whether it's any good. Nine times out of ten, cleaning the filter or replacing the plug will return your engine to stable pre-set operation.

Experiment with glow plugs of different brands and heat ranges. The best all-around plug that I know of for stunt use is the K&B-1L. If the weather is cold or rainy you might get a better run from a slightly warmer plug such as a Rossi R-2. In any case, when you change plugs of the same brand and heat range and notice an improvement, then *throw the old plug away*. If you keep it around it will get mixed with the good plugs and find its way back into your engine.

DON LOWE ON RC

New Pattern Organization: John Agee, a well-known southern pattern flier and one of the top twelve finalists at the 1972 Nats has started a movement to improve the quality of pattern competition. John sees the need for a national organizational structure which would assist in formulating rules, improving judging and, in general, promoting and improving the quality of the activity. It would function in a fashion similar to the NMPRA and operate in an advisory capacity to the AMA. One of the unique features of the organization would be a computer service to provide statistical analysis and grading of the performance of pattern judges. The output of this would be a statistical basis for selecting the best judges for national and international competition in lieu of the present subjective basis. We'll hear more about this as plans progress.

The New Sport: Hey, you would-be chopper pilots! Don't give up so easily! I think I can sweat from the experience of one who has been there. I succumbed to the great temptation of the new helicopter fad and could hardly wait to get my Du-Bro Whirlybird together and into the air. After feverish activity of burning the midnight oil (it really does take more than eight hours!) I had her ready to go.

First attempts didn't amount to much—just quick hops up and down. Then a short tethered flight which is simply not for us



Above: Semi-scale model of the AVRO Vulcan by M.G. Steel has four-ft. span, weighs five lb. is powered with the O.S. H40P as a pusher. Said to be responsive, wonder if it is aerobatic? Below: Maynard Hill (center) of John Hopkins Applied Physics Lab examines electronics of pitch and roll stabilization circuits in his new autopilot system. It will even fly delta with terribly aft center of gravity.



"hell for leather" fliers! The contest season interfered and I didn't get back to it for several months. But then the next session, a disastrous attempt outside in a breeze—up and over and mangled blades! I was disgusted!

No activity for a while and then one evening I just happened to have it along for a quick try after a flying session. After a few quick hops up and down I said, "Nuts, either it flies or it doesn't!" So, I blasted off! Up it went—spinning to about 200 feet. Cautiously I nudged the tail rotor: Wow, it stopped rotating! Then I nudged it forward to move, then, tip and down it came onto firm unyielding concrete from 200 feet! Parts flew everywhere! I picked it up, threw it into the back of the car and it remained untouched for weeks while my blood cooled and temper receded. What a lousy hunk of...! It *must* be a poor design—grossly inadequate!

In the meantime my buddy, Jim Cline, has been struggling along with his bird battering blades and everything else! Boy, is he persistent! So he says: "Hey, Don, let me put that thing back together and we'll try again!" We finally get together one Sunday afternoon and survey the damage. For a crash onto concrete from 200 feet this thing isn't really that bad—straighten out the parts, make two new rotor blades, repair the carburetor, patch the fuse. In a couple of hours the monster is ready again, *now complete with training gear*. It hurt my pride to think that I needed one but by now I had decided that I needed all the help I could get!

So, we found a small inside engine test cell at Wright-Patterson AFB. Quick ups and downs to feel out the tail rotor, throttle and cyclic pitch. First one and then the other. Wow, it really did respond the way the book says! The only problem was figuring out which way to push the sticks—both of them simultaneously! And therein lies the problem: Hovering a helicopter, no matter what brand, unless it has some form of stabilizing assist is a very difficult job! It simply does not want to stay in one spot very long and wanders off in any direction! You simply must be trained to detect motion and apply the proper corrections. This is not something that you will learn in one or two, or even three of four short flying sessions. Practice makes perfect.

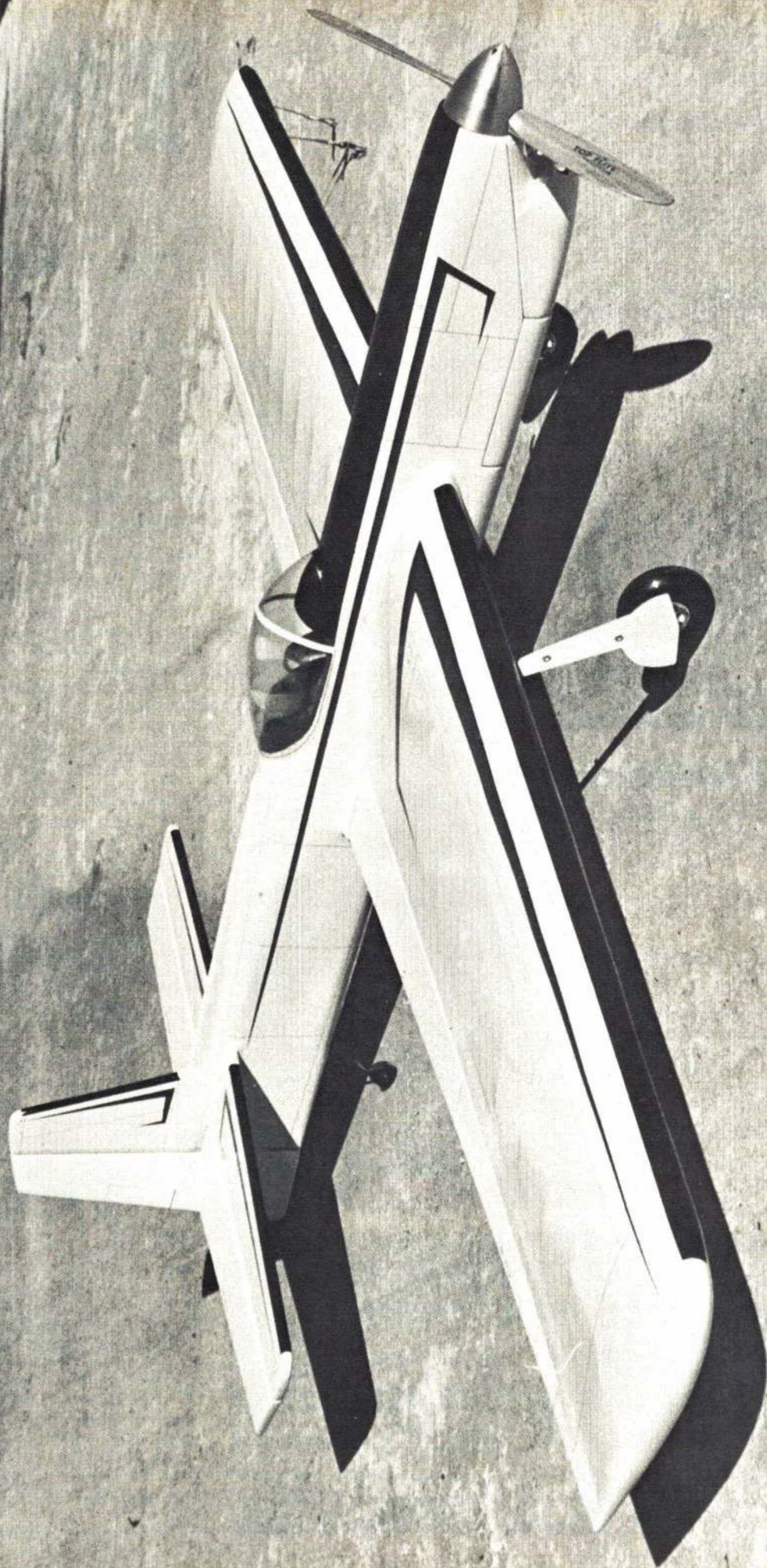
At this point I am far from perfect! One must think almost simultaneously about four axes of control: lateral (right and left), pitch (fore and aft), vertical (up and down throttle), and the tail rotor (right and left). It is much more difficult than flying a conventional aircraft, but, believe me, when you start getting the feeling that you are beginning to master it, it's a tremendous feeling! It is exhausting, exasperating, laborious, time-consuming, but tremendously rewarding in the satisfaction of accomplishment.

When you see some nut out there on a calm evening thrashing around with his Whirlybird trying to hover and you think, "Is that all there is?" regard the guy with a new respect, because what he is doing requires a higher skill than most RCers will have the guts to attain (I hear that it requires 40 hours to fully master some of the new choppers. Do you realize how many flights that represents? At ten minutes per, that's 240 flights and lots of petrol!

At the time of this writing I have burned about three gallons of fuel in my Whirlybird. At one gallon I could hover for one or two minutes without bashing with *terrific concentration*. At three gallons I can hover with confidence, fly forward, backward, sideways, up, down, and also fly in a slight breeze. One important thing: The Whirlybird doesn't like wind, so try to practice either indoors or when no wind or a very gentle breeze is blowing.

Since "mastering" the Whirlybird I have transitioned to a Schluter "Cobra." After two tanks of fuel I could hover the bird and fly it around with the necessary transition into and out of hover.

The "Whirlybird" is a tremendous trainer. At modest expense you can learn to master the most difficult aspect of RC helicopter flying—hovering—without risking a costly machine. The transition to a sophisticated bird is then easy and quick if you want to move up. The Whirlybird will not fly well in any significant breeze so you must accept that as a limitation. Conversely, wind hardly seems to bother the Cobra and it even hovers and transitions more easily with a breeze due to the "translational" lift effect.



Jim Bozeman's 57-in. span classic stunter. Powered by an ST 40, it features adjustable leadouts, tipweight, and removeable tank.

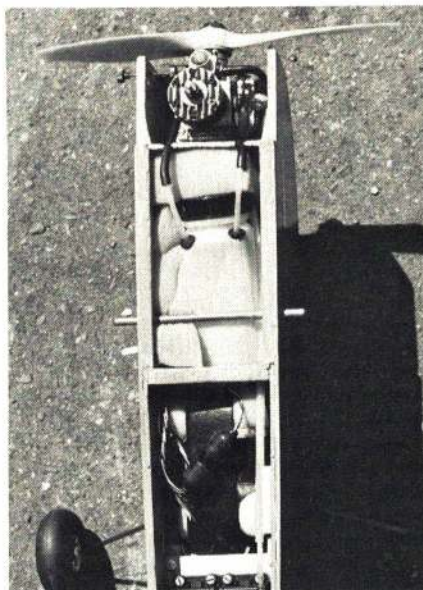
Lots of two channel radios around these days. Here's a plane for them, it's a fun flyer.

MONTE FINLEY

THOR

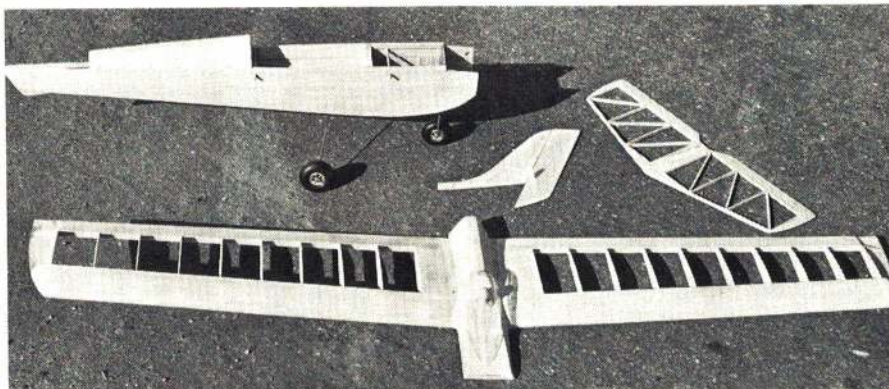


Above: Cheryl Ann Hayes with Thor on the day of its maiden flight. Right: Ample room for equipment. Those are the old large size O.S. servos. Rudder and throttle only are used. Below: Ready for covering. Unique here is extension of wing hatch to cover tank compartment area.



Editor's Note: This article was inadvertently dropped from the December issue in which it was to appear. Since then the model is kitted and advertised by the author and designer. Normally we would never publish a design after it has been kitted. Our sincere apologies to the author.

Photos by Terry Aldrich



Ever had your flying day interrupted by an overly exuberant individual? Sure you have, but here's one that turned out to be challenging over the months that followed.

While at the flying field with my new grown-up toy, a fellow named Terry Aldrich came rushing up to me. Smiling, he slowed his rushing approach only to break the silence with these profound words, "I have a new McCoy engine and a two-channel radio, but no wings to fly."

After long sadness, I took pity and burned some late hours, coming up with a design to suit Terry. Then it was off the drawing board and into the builder's hands. He looked and started drooling; this made me happy. But I had to leave when balsa chips started flying, for he became wreckless with that X-acto knife, and besides I had some gluing to do on my own plane.

Next day I got an excited phone call with a complete rundown on progress and a name for the plane—"Thor." After quieting my laughter, I realized it made sense. Both of us work on Vandenberg Air Force Base and that includes a lot of missiles. (Also, Terry's name starts with a "T".)

Three weeks later, we weekenders saw a new bird sitting on the field. Thor in her glory was ready for a test flight. We were all keyed up about what to expect, and a silent prayer was in order. I kept my cool, because a designer must have confidence, but it's funny how my knees kept knocking.

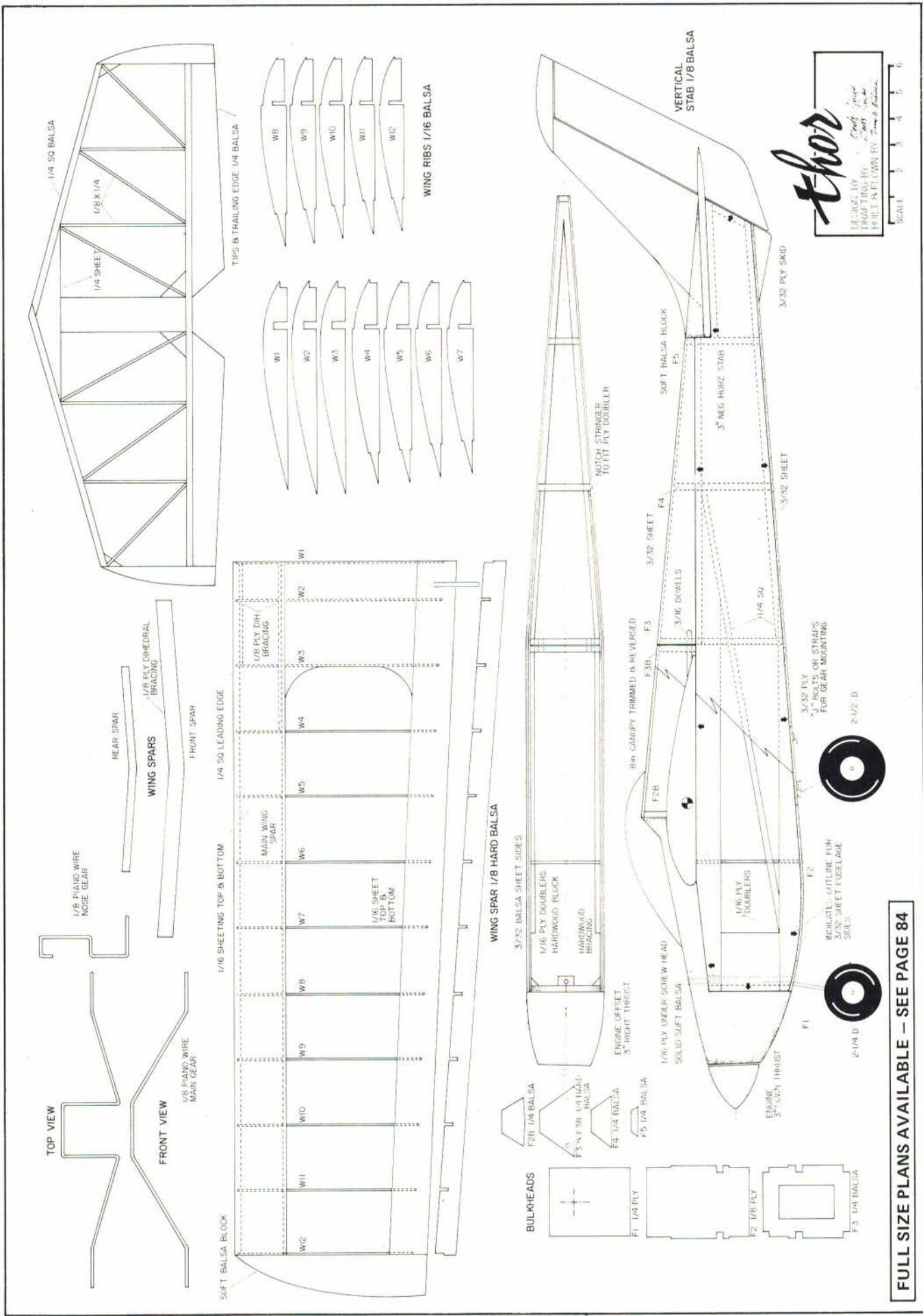
Deciding on a hand launch due to the rough cow pasture field, the plane was christened by filling the tank. One prop-bitten finger later the engine roared into life. Lifting it up in the long-admired stance of hand launch, I kept my fingers crossed. Adding full throttle, Thor lifted out of the hand and flew straight and true, seeking more altitude. It was a pleasant sight, and happy with the handling we settled down to some serious flying. Thor does a good job of that, leaving maneuverability to the man at the controls.

Let's hope you are interested, if so, get the plans and let's start the simple construction. It's a good plane and can take rough treatment—lots of easy flying in this little bird.

Get out a good sharp blade and start cutting ribs and spar. The flat bottom airfoil is a help in building.

Build the wing in two sections—one left and one right panel please, don't do as I have done. Pin leading and trailing 1/6 sheeting down on board, glue 1/4 square leading edge on top of sheeting. Install main spar; now is the time to position and glue those wing ribs. Next come the 1/8 ply dihedral braces. Cover leading, trailing and center sections of wing.

(Continued on page 70)



Thor

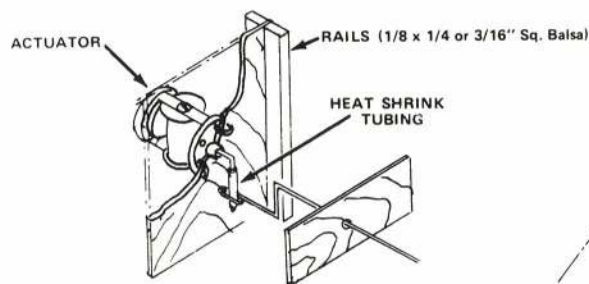
DESIGNED BY: *Thor*
 DRAFTING BY: *Thor*
 FULLY PLANNED BY: *Thor*

SCALE 1" = 4"

FULL SIZE PLANS AVAILABLE - SEE PAGE 84

R/C Flying Fun!

THE SIMPLE SYSTEM--



pulse commander

- WITH Nicads and Charger
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RUDDER-ONLY PULSE IS:

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10G17--Stomper System	\$74.95
26.995, 27.045, 27.095, 27.145, 27.195	

Please Specify Frequency

Flite Pak Weights & Recommendations

Unit	Weight	Recommended
Baby	2.5 oz.	Pee Wee .020
		Up to 48" gliders
Baby Twin	2.7 oz.	Tee Dee .010-.020
		Up to 72" gliders
Standard	4.4 oz.	.049 to .10
Stomper	4.8 oz.	Tee Dee .049-.23

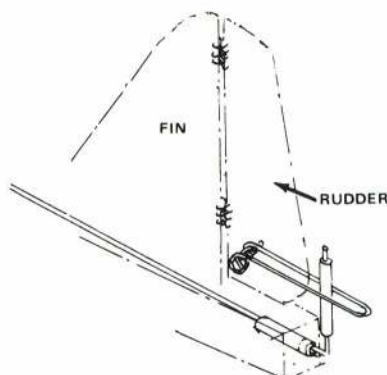
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† 34" Foam Wing sections. † Top grade die-cut wood parts. † For .020 engines. † Commander Baby or Baby Twin. *Owen Kampen design.

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ACE HIGH GLIDER KIT

† 70" Foam Wing sections. † Precision machine cut and sanded wood. † For .049--Power Pod parts supplied. † Recommended for Rudder-Only--Standard or Stomper. *Owen Kampen design.

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Watch for New Rudder-Only Plane Kits

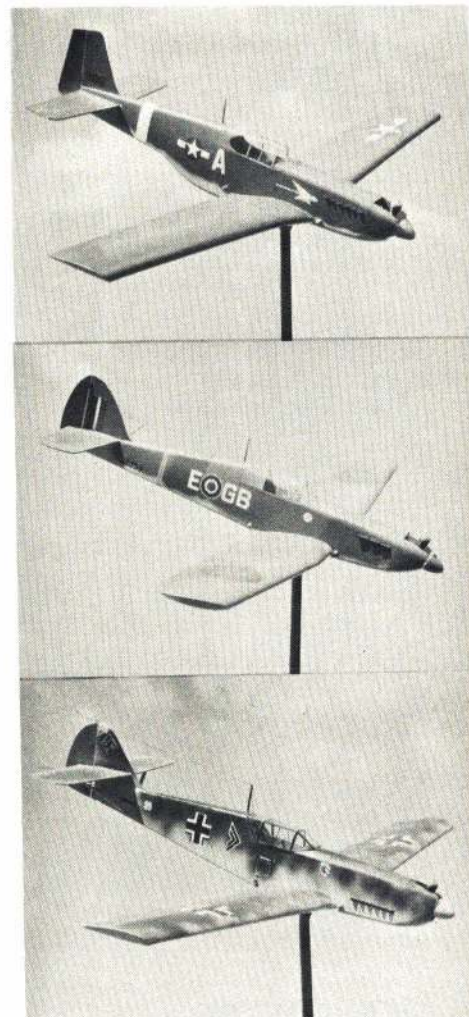
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WAR BIRD KIT

Design by Roman Bukolt

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Choose the WW II Semi-Scale bird you'd like to build--the Ace kit will make it a pleasure. Kit contains precision band sawed and machine sanded balsa and hardwood parts. Some portions of the wood is blank to let you make the variations required for model of your choice. This makes the flexibility to allow you to choose one of the three possible designs. Step by step details are shown on the plans.

Kit features the use of Ace Foam wing--two taper sections, and a constant section--to make for easy construction of any of the three wing configurations.

Each War Bird has a span of 42" and an area of 225 square inches. Designed for docile performance with a Cox Babe Bee or Golden Bee and Pulse Commander Rudder Only. Or use a Tee Dee .049 with a 2 channel digital for commanding characteristics. One secret to the War Bird is: Do NOT over power--for scale-like and realistic flying.

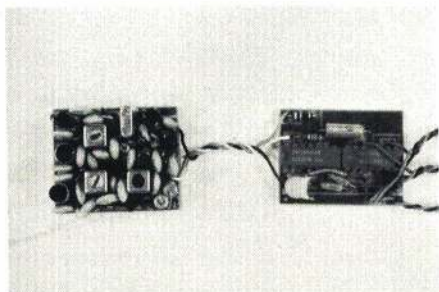
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- * Receiver-Decoder (2) offer inexpensive way to go with your present system for glider, plane, boat or car: use with extra servos you already have. Or use our combo flite pak: receiver-decoder, two servos, etc.
- * Available on the following frequencies: 27.995, 27.045, 27.095, 27.145, 27.195, 53.100, 53.200, 53.300, 53.400, 53.500

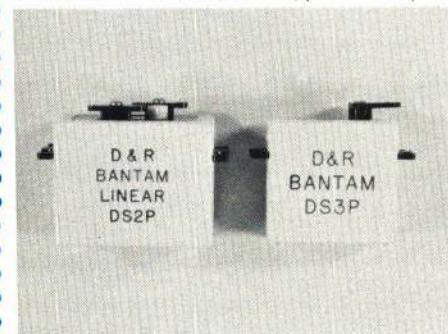


digital commander RECEIVER DECODER (2) KIT

IC's simplify wiring and set up of 2 channel decoder. Receiver is exceptional double tuned front end using discrete components. Complete with detailed step by step instructions.

- No. 12G20—Digital Commander Receiver-Decoder Kit (2) \$27.95
(Less case, connectors, switch)
Please Specify Frequency

- No. 19L50—Deans gold plated 4 pin connector set .95
(NOTE: See D & R connectors elsewhere)
No. 40L252—CW DPDT Slide Switch .59
No. 30L21—Switch Guard for above .39
No. 21K30—Formed plastic Case for Receiver-Decoder. (All models) 2.00



digital commander SERVO KIT

Housed in the D & R Bantam DS3P mechanics, uses WE 3141 IC for ease in assembly. Kit contains motor, pot, wiper and all components required, with step-by-step manual.

- No. 14G20—Digital Commander Servo Kit \$19.95
No. 14G20L—As above, except with D & R DS2P Linear Mechanics (Less connectors) \$20.95

digital commander FLITE PAK KIT COMBO (2)

If you intend to use Commander Digital (2) with your multi digital transmitter, all you need are the receiver-decoder and 2 servo kits. Combo offers savings over kits purchased individually. Includes 3 connectors, switch, hookup wire for cabling. Everything you need to make complete 2 channel-2 servo pack for your sailplane, boat or car, except batteries.

- No. 12G30—(2) Flight Pak Combo \$59.95
No. 12G30L—As above, but with D & R DS2P Linear Mechanics \$61.95

Please Specify Frequency

PIGGY BACK 4 CHANNEL KIT

If you've been successfully using your Ace Digital Commander 2 channel receiver-decoder combination, you can inexpensively convert this to 4 channel operation for use with your 4 channel digital transmitter.

The conversion consists simply of adding another IC, and "piggy backing" it on top of the present IC 2 channel unit.

By slight readjustment of the packing, this will fit into the present Ace case (metal or plastic). When you consider that our 2 channel receiver-decoder kit is \$27.95, and the additional components and instructions required for converting it to 4 channel are only \$3.25, you can see that you have quite an effective saving.

Our piggy back contains the additional IC, complete instructions, and extra hook-up wire. No connectors are furnished. You have the option of going to additional Deans 4 pin units, or going to the D & R Block type.

We recommend the Ace Digital Commander Servo because of high resolution, fast response, low current drain, and light weight. Kits are available as listed elsewhere.

- No. 12K22—Digital Commander Piggy Back 4 Channel Conversion Kit \$3.25

digital commander 4-6-8 CONVERSION KIT

You have been asking for this—a kit to let you convert your Digital Commander receiver and 2 channel decoder or 2 channel Flite Pak to more channels. Here it is!

The 4-6-8 Decoder requires a new PC board, new IC and some additional components. Simple to wire. An 8 bit chip is used (Cost is a bit more than a 4) but you are not limited to just a 4 channel expansion. You can go up to 8, if your transmitter will!

Use your Digital Commander Flite Pak for 1, 2, 3, 4, 5, 6, 7 or 8 channels—depending on your transmitter. Unused signals are simply ignored.

Kit consists of basic components. New IC, PC board, all other required electronic components with complete instructions. No connectors supplied.

- No. 12G8—4-6-8 Channel Conversion Kit \$12.95

DIGITAL SERVICE CENTERS

In addition to our service center located at the factory at Higginsville, Mo., two independent service centers have been established. One is on the East Coast, and is designed for customers living in the eastern half of the United States; the other on the West Coast is designed for customers in the western portion. Central states still will be serviced from the factory. This will expedite service, and return to you, and should eliminate as much down time as possible. We recommend either of these service centers very highly.

They are as follows:

Ace Service Center EAST
Electronic Model Systems
103 Bannister Drive
Hampton, Virginia 23366

Ace Service Center WEST
Hillcrest Hobby Craft
3921 Fifth Avenue
San Diego, California 92103

TRY YOUR DEALER FIRST—if he does not have it, order direct using coupon for fast and courteous service.



Add Another Command! --

ACE DIGI-POD SERVO

Been wishing you had another function with your 2 channel digital? It's simple and easy with the Ace Digi-POD servo.

The Digi-POD is a pulse omission unit, which is triggered when the pulse train from your digital transmitter is interrupted approximately .25 seconds. Is a 3 position sequencing device, going from one position to the next. Response is smooth and quick. Easily hooked up to either of your existing servos.

Transmitter modification is simple and full instructions are supplied for the Commander Digital 2 along with a simple kit of needed parts. NOTE: Kit also contains theory and procedure to enable experienced to make transmitter mods on Kraft and EK bricks, World Engines and units they manufacture under "house labels" for Hobby Lobby, Hobby Shack, Cirrus, etc. Factory conversion of your transmitter is also available at nominal cost.

The Ace Digi-POD is available only as a completely assembled unit. Housed in D & R Bantam case. Weighs 39 grams, less connector.

- No. 15G3—Assembled Digi-POD Servo \$28.95
No. 11G2—Digi-POD Parts and Instructions for Transmitter Conversion 1.75
No. 11E3—Digi-POD Factory Conversion of your Transmitter. 6.00

digital commander WEIGHTS

Nowhere in our Digital Commander ads or catalog literature have we listed the weights for the individual components or the total system. This is just a plain oversight. And we have been getting the questions!

Rather than answering each letter individually, we are listing a table which shows each individual component and then the various combinations that you can come up with. The final weight will be determined largely by your choice of the batteries to be used in your Flite Pak.

All weights are listed in grams. For easy conversion, 28.5 grams equals 1 ounce.

Digital Commander 2 Channel Flite Pak complete with 2 channel receiver/decoder in plastic case and outputs with connectors for 2 servos and 2 Bantam DS3P servos come to a weight of 122 grams. This is minus the battery pack.

If you choose to go with 225 mil batteries we recommend the SCL to be housed in the KR D Flat Pak. Four No. 38K33, 225 ma SCL cells and one KR D Flat Pak equal 56 grams. This will give approximately one hour of flight time.

For longer flying time we recommend the 450 ma SCL. No. 38K35, plastic tape wrapped pack, for a total weight of 75 grams.

Individual weights are as follows:

Digital Commander 2 channel Receiver/Decoder, 40 grams.

Plastic Case, 6 grams.

DS3P Bantam Servo, 38 grams.

DS2P Linear Output Servo, 43 grams.

Digi-POD Servo, 39 grams.

The Flite Pak weight at 122 grams is about 4.25 ounces. With the 225 ma SCL 4.8 volt pack in KR D case, total weight is 178 grams or about 6.25 ounces. With the 450 SCL weight is 197 grams or about 6 3/4 ounces.



JOHN SMITH ON CL

Let's Race: Now that the NATS have tentatively been scheduled again for Chicago (Glenview NAS) the Cleveland Aeromodel Society (CAS) is going ahead with plans to hold the first Formula V Challenge Cup Races at the NATS as an afterhours Unofficial Event. Classes would include 3/4" scale Goodyear powered with Cox Babe Bee, Golden Bee or QZ engines, 3/4" scale Goodyear powered with TDs, and an Unlimited event, 1/2" scale Thompson Trophy racers (Bearcats Corsairs Mustangs, etc.) powered by TDs modified or stock. They need ideas from other clubs running these models regarding their rules, so a fair set of regulations can be drawn up. Also if any club would want to help run the event or sponsor some awards, you are urged to write to CAS, 25903 Detroit Rd. Westlake, Ohio 44145.

"Dear Mr. Smith": "I am interested in getting started in Speed flying. I received a ready-to-fly for my birthday and now I want to start competition flying. I have never flown mono-line but feel that I can learn. I want to start out in C Speed. Please tell me what I need and how much it will cost."

A joke? Hardly, just a part of the type of letter I receive all the time. Modelers are getting very little help from their local hobby shop owner, not because he doesn't want to help them, but because he doesn't know what's available. If you talk to the average dealer rep he knows down to the last nylon wing fastener what's available in RC. But ask him about the availability of some CL Speed-related part and he gives you a puzzled look.

Maybe the manufacturers don't push this stuff, and maybe there isn't much to push, but we're out here. If you have someone in your area club who wants to start out flying Speed, Team Race, Rat or Goodyear, steer him right. If you aren't sure, send him to someone who is. We need these guys.

More on New Engines: Last month I told you about the new ST 15 Diesel. Have some runs on it now and all indications are that it has much more steam than the older model. Exhaust is much larger than before and the new

and larger bypass doesn't seem to affect fuel consumption.

It's not too early to be thinking about the FAI Team selection program. The '74 FAI CL Team will be picked this fall and this new engine might help to put you in the winners' circle.

World Engines, U.S. distributors for Super-tigre also announce the ST X29, X40, and the X60. All are three port, rear exhaust, built along the same design as the new X15.

Another camp heard from is Rossi. They also announce, through Bill McGraw (Bill's Miniature Engines, 1325 Carol Dr. Memphis Tenn. 38116) the addition of four new mills for 73. They include a 29, a 40, a 65, and a 90! All are Schnuerle ported with your choice of piped rear exhaust or a standard side stack. With reported speeds of 155 to 164 mph on alcohol and oil with the Tigre X15, it ought to be an interesting season. I can't remember ever seeing so many new engines announced in such a short period of time. Get your orders in now.

Building Tip-of-the-Month: Check with Big Frank Garcher, majordomo of Midwest Products (Hobart, Ind.) for some of his special African Wa-Wa wood. It's not a joke, but some very nice wood, almost as light as balsa, as strong as bass, and great for those 1/2A Profile Proto fuselages or bigger class wings. The samples he gave me last summer worked great. There is a story behind the odd odor, though. Ask Frank to fill you in on that.

BOB STOCKWELL ON RC

1972 NMPRA Grand Championship: It was no surprise to anyone when it happened, and it is no surprise now, that Bob Smith is the 1972 NMPRA Grand National Champion in Formula I racing. He ended up with a total of 771.7 points, a full 50 ahead of his nearest competitor, Larry Leonard. Bob flew in seven races, not counting the Nationals, and he was first in six of them, third in the seventh one. That is a truly extraordinary record. In 1970, when the Grand Championship was split between Larry Leonard and Terry Prather, it was only the fact that Bob Smith was disqualified for arriving late at Las Vegas that kept him from winning it that year—he lost 75 points in that one contest, but he had won five out of seven races including the Nationals that year. Terry Prather was equally brilliant in 1971, and like Smith in 1970, Terry won five out of seven races including the Nationals.

Larry Leonard and Chuck Smith about to start in Formula II event at the NATS with a clean Mustang. Photo by Walt Schroeder.



Leonard Waltemath attaches the MonoLine system to his Jet Speed sidewinder. Model and engine sport a mighty fine finish. U.S. Navy photo.

Rod Lyons puts his best foot forward. He's waiting his turn in the racing circles. At this time no one knows for sure if the NATS will be Navy or Air Force hosted. It will be near Chicago though. Official Navy photo.



Way out in front in the NMPRA Formula II standings is the new Champ, Garry Korpi with that unusual Paul White inspired design flown at the Internats. Photo by Walt Schroeder.

Father and son team in Pylon at the Nats were Dan McCan and his dad Dwight. Dan wound up in third place in NMPRA Season Standings, Formula I.



In the history of the NMPRA Grand Championship from 1968 to the present, this is the way it has gone in the overall standings and Formula I: 1968—Granger Williams (F I and overall); 1969—Whit Stockwell (overall) Jack Hertenstein (F I); 1970—Terry Prather and Larry Leonard (tied overall), Terry Prather (F I); 1971—Terry Prather (F I), overall championships discontinued; 1972—Bob Smith (F I).

As for Formula II/FAI, my records are incomplete, but as I recall it, Hal deBolt won Formula II every year from 1968 to 1971. He was finally dislodged from this extraordinary accomplishment by Garry Korpi in 1972, who not only won the Nationals FAI event but also came out ahead of deBolt by about 20 points in the final standings.

In the present year, 1973, the NMPRA point system will be continued as an emergency back-up measure, but it is the intention of the new NMPRA President Ed Rankin to arrange for a national Pylon Tournament of Champions. It will probably be held in the early fall at a site in the south, southwest, or on the west coast. It may possibly be held in conjunction with the Winter Nationals at Tucson. Only the top 10 or 15% of pylon competitors from each district will be eligible to attend, under arrangements that will be worked out and announced by the president and vice-presidents of the NMPRA. It is an exciting prospect, and AAM would like to congratulate Ed Rankin for pushing ahead with a concept that originated with the 1970 NMPRA President, Pete Reed. Because the NMPRA had no effective house organ that year, as a result of the unannounced termination of R/C News in April, Pete was not able to bring the tournament into existence. But it now appears to be well on the way to success.


The final standings in the NMPRA Formula I championships are listed below. It is interesting that even with the new scoring system, which had fliers from the southeast and Florida ahead during all but the last month or two of the season, except for Smith himself, it is once again Southern Californians who dominate the standings (7 out of the top 10, 13 out of the top 20). But in Formula II/FAI, except for the top position occupied by Garry Korpi, it is the Northeast which totally dominated the event. This reflects, more than anything else, the size and number of contests available in the two events. Clearly the performance of fliers like Jerry Wagner, who won the Formula I championship in the Northeast (for the fourth year in a row!), or of the Telford/Violett team, which was out of every-

1972 Final Standings Formula I (Best seven races excluding the Nationals)

1. B. Smith	771.7	11. J. Bertken	632.3
2. L. Leonard	722.6	12. H. deBolt	628.0
3. D. McCan	705.8	13. E. Hotelling	620.6
4. T. Prather	703.5	14. J. DeMerritte	618.8
5. K. Nogy	687.6	15. J. Hertenstein	615.0
6. O. C. May	672.4	16. W. Stockwell	606.5
7. C. Smith	664.3	17. A. West	565.4
8. H. Coleson	639.3	18. E. Weltock	550.5
9. J. Vartanian	637.5	19. C. Neufeld	547.7
10. E. Rankin	634.1	20. J. Bertoglio	539.9

Formula II/FAI (Best six races excluding the Nationals and Internats)

1. G. Korpi	558.0	11. B. Noll	328.5
2. H. deBolt	539.1	12. E. Nikoden	327.7
3. D. Glerke	493.7	13. B. Derrough	307.8
4. J. Foster	490.5	14. B. Zautner	302.7
5. K. Landefeld	458.8	15. M. Kowalewski	297.5
6. A. Sattler	440.3	16. R. Mayer	284.6
7. M. Helsel	384.4	17. T. Prather	272.0
8. B. Root	377.1	18. J. Schuy	268.7
9. P. Reed	368.9	19. S. Green	266.7
10. B. Barkowski	366.3	20. J. Hertenstein	266.5



A Wisniewski "Pink Lady" built by Chris Sackett. Wings are curved sheet aluminum and fuselage is mostly hardwood and aluminum. Speed is about 184.54 mph. Want to go fast? Read ABCs of Speed beginning on the next page.

ABC's of SPEED



Above: Author at left with Speed cohort B.J. Howard and all the gear for a day's flying. You don't often fly a Speed job for fun—you are always testing new props, fuels, engines, etc. Takes this much equipment to test effectively. Right: Starting a Jet. Release it quick, heat buildup is terrific. Article gives pointers on power. Below right: Speed merchant's other arm is the crank on the inertia starter, although electric starters are gaining popularity. Below: Monoline gear has long since replaced two-line CL systems. Monoline is faster because it causes less aerodynamic drag, control is positive.



Photos by Chris Sackett

The basics of CL speed flying. Only the stopwatch measures your performance. Winning takes the right equipment and some know-how.

CHRIS SACKETT

Due to the current interest in Speed among beginner and intermediate modelers, I have been asked to contribute a basic rundown on some of the intricacies of the sport. The material presented is complete, right from the designing to the flying ends of a CL Speed ship, and should interest all modelers who want some kind of performance from their models and engines.

Speed model design has not changed a great deal but since the recent introduction of the FAI size Speed model, all classes of airplanes have grown to generous proportions.

We fly Bill Wisniewski's "Pink Lady" designs throughout the classes and have had nothing but success since switching to them. They fly flat and stable at high speeds and glide well enough to permit soft, damage-free landings at most flying fields. The "Pink Lady" type designs feature a high aspect ratio wing and stab with a very slender fuselage permitted by the use of a half-pan. The stabilizers are 50% of the wing area (average on any Speed model should be 40 to 50%).

Below is a table of specifications for "Pink Lady" models.

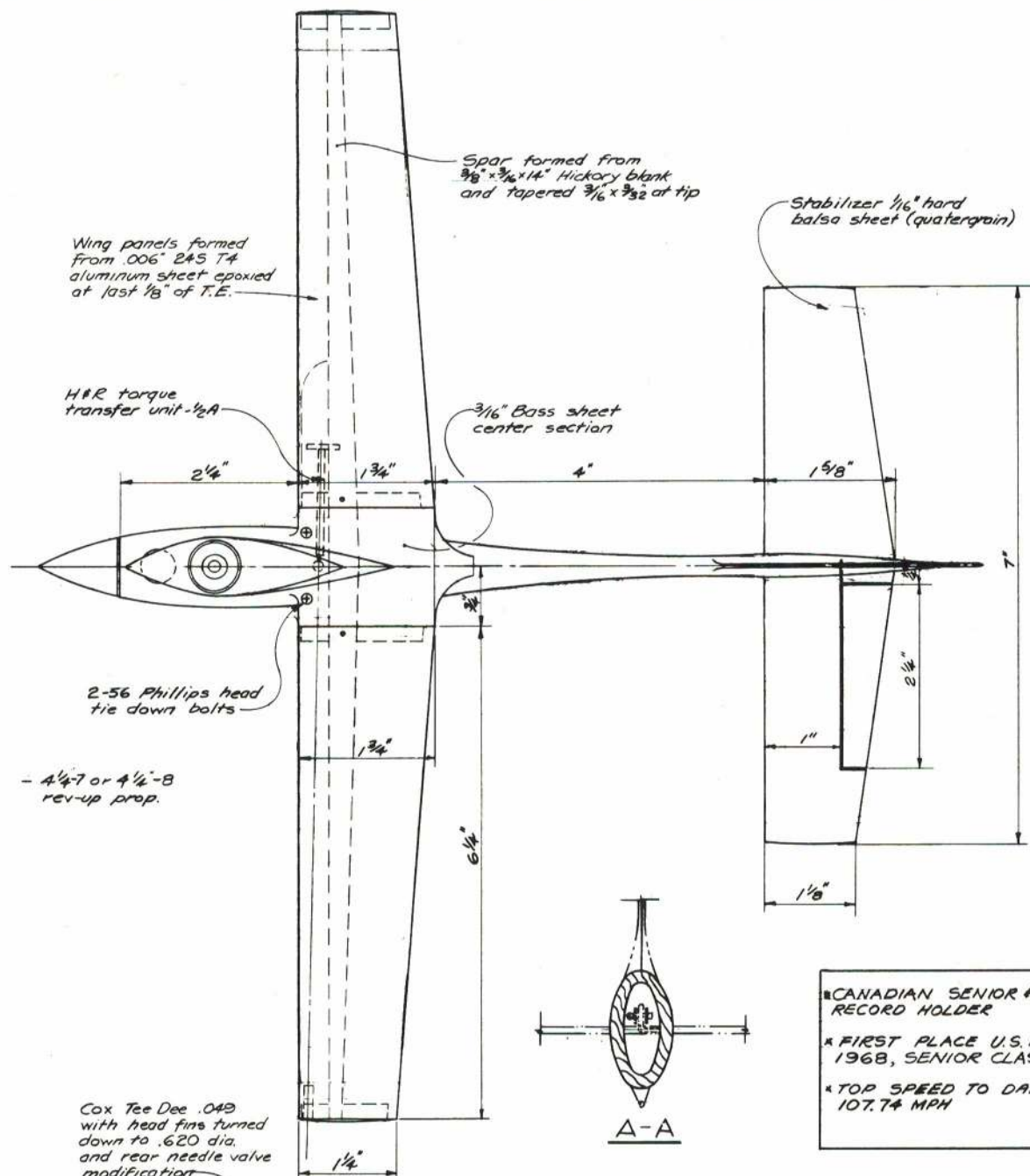
	Wingspan	Average Chord	Nose Moment	Length	Wing Area
1/2A	14.0"	1.50"	2.0	10.5	21.0
A	24.0"	2.125"	3.250	16.0	51.0
B	25.0"	2.375"	3.5	18.0	60.0
C	27.0"	2.625"	4.0	20.0	71.0
B-Proto	29.0"	4.375"	4.0	21.0	125.0 (min.)

Frontal area on all models should be kept to a minimum, leading and trailing edges should be sharp. The airfoil is semi-symmetrical NACA 6409 at root and fully symmetrical at tip—NACA 0006. A good basic rule is to have maximum lift of an airfoil at 33% of wing chord with the controls centered at this point.

Although mono-line or conventional two-line control systems can be used, it is advantageous to use mono-line for safety, reliability and performance. All the necessary components can be obtained from Bill's Miniature Engines (1325 Carol Dr., Memphis, Tenn. 38116). You will need a control unit (H & R type), line and handle—total of about \$10.00. Complete instructions and other data concerning the system is included.

Construction

A competition Speed model takes quite a bit of abuse if flown a lot. To survive it has to be tough. Usually the



BOUNTY HUNTER	
CONTROLINE 1/2 A SPEED	
Designed and drawn by: C.R. SACKETT, flown by C.R. Sackett and B. Hobkirk	
SCALE	

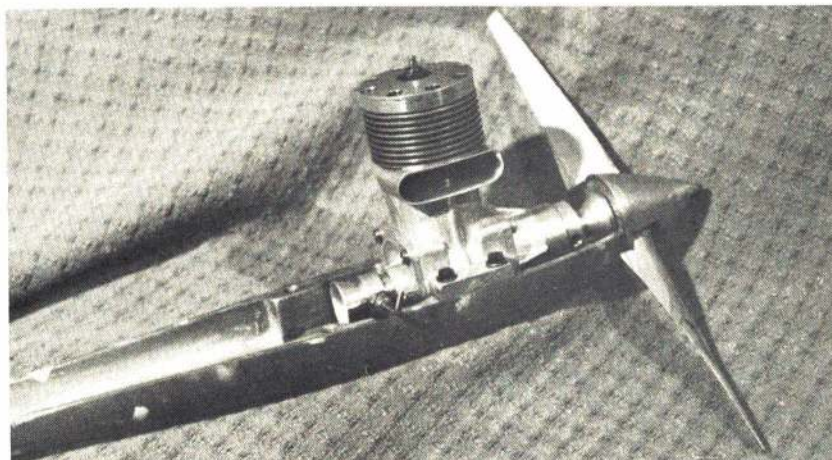
FULL SIZE PLANS AVAILABLE - SEE PAGE 84



Above: Most of the speed models used by the author are Pink Lady's by Bill Wisniewski sized for each class. Right: Stopwatch, barometer, thermometer, hydrometer, audio tachometer and mechanical tachometer.



Right: Most of what makes an engine go is careful freeing up. It takes a great power increase to go just a little faster. Below: Reworked Rossi 60 has hard chrome liner, chrome custom dykes ring, aluminum piston, phenolic rotor, and custom-made head. Has flown at 184.54 mph.



fuselage, stab, rudder and wing are basswood. On the "Pink Lady" models, the wing is formed from .010" 24 ST. aluminum sheet folded over a hickory spar. These wings are quick to build and are quite durable. All joints should be glued with epoxy and pegged. The model should be fiberglassed and finished with either enamel or epoxy resin to be really fuelproof.

The engine is probably the singularly most important item of Speed flying, because without a honking engine, you won't win. Many good engines are available but only a few will qualify for ultimate performance. The 1/2 A field is practically dominated by the Cox Tee-Dee .049. There is nothing else to compete with it so it is *the* engine today.

In Class A the K & B 15 R Series 70, Supertigre G15FV or RV are the best choices, although there are others such as Rossi 15, Bugl 15 and other limited European Racing 15s, but parts and availability confine the choice to the first two.

In Class B K & B 29 R Series 70, Supertigre 29 RV-ABC are where it's at.

In Class C Rossi 60, Supertigre 65 RV-ABC, O.P.S. 60 and H.P. 61 are excellent. There are quite a few others in this Class, again mostly European, which are suitable but are limited production items. Remember, if you do happen to blow something, it's nice to be able to replace the parts quickly.

As stated before, the aforementioned mills are of the ultimate variety. There are many other engines one can use to fly Speed but it's always better to start with a winner.

Okay, so you have selected your motor and you want a little extra power. If you decide you can handle reworking a good quality racing engine the following is for you—if you can't, it's far better and cheaper to have an expert do it.

Start by disassembling the engine and heating the case to knock out the bearings. Polish all areas of fuel flow to a high luster after contouring the bypass area. Polish the bearing journals so that the bearings are a *drop fit*. (This will align the shaft correctly and make it very free.) On rear intake engines, radius and lap the rotor to the blackplate using a .003 to .007" clearance depending on the engine. Smooth and polish the conrod, head and crankshaft counterweight. Lap piston to sleeve using a good cut polish such as "Speedy Rub" and oil, but be careful not to lap too much as you can ruin the assembly. Lap two and three min., rotating the piston in a figure eight motion.

A big hp increase can be realized by changing an engine's timing, but this is a critical move as the engines can become intolerable on needle settings if the timing is advanced or the intake or exhaust duration is lengthened beyond limits. However, adding shims under the liner of an engine, to raise its position in the case and therefore cause the ports to open earlier and longer, is a simple and effective way to increase power on certain engines. The other and more accurate method is to calculate all the dura-

(Continued on page 56)

FOR THE FINEST
IN R/C FITTINGS
USED THRUOUT
THE WORLD
LOOK TO
DU-BRO



MUFF-LAIRE®

NEW
FOR '73

Patent Pending
MADE IN U.S.A.

**Sound
Reduction Engineering**



Model MW-750 for .60 Webra

UNIVERSALLY ADAPTABLE!

Model MU-795 includes perforated steel clamping strap with worm-drive screw and fits a wide variety of engines. Also has hidden "no drift" positioning plates to hold muffler firmly in alignment on engine.

Patent Pending



MU-795
Shown mounted
on H.P. 60 engine.

PRICE **\$7.95**

MW-750

Varying the number of plates takes only minutes and controls noise level and back pressure to your desire. The ugly monstrous old fashioned muffler is now past history. Result—a much neater looking plane. Model MW-750 for .60 Webra engines fits on with only two furnished bolts.

PRICE **\$7.50**
MW-750



NC-39
2 FOR
39¢

**DU-BRO
NYLON KWIK-LINK**

THESE "SURE-LOCK" CLEVIS ARE THE SAME SIZE AS OUR STEEL "THREADED CLEVIS." DU-BRO NYLON KWIK-LINKS ARE MADE FOR SELF THREADING ONTO DU-BRO RODS AND "THREADED COUPLERS" OR ANY OTHER RODS HAVING 256 THREADING.

NL-12 12" ROD WITH NYLON CLEVIS .29¢

**DU-BRO KWIK GLOW
KG-200 GLO-PLUG CONNECTOR**

THE IDEAL GLOW PLUG R/C ENGINE CORD SET. SLIM 1 1/4" BY 3/4" ONE PIECE BRASS BARREL SNAPS ON TO PLUG. NO FLIMSY SPRINGS OR CONNECTIONS. WIRES FIRMLY ANCHORED IN TOUGH NYLON — CAN'T JERK OUT. EXCELLENT ACCESSORY FOR TODAY'S KIND OF R/C MODELER. ENGINES .10 AND UP. APPROX. 2 1/4" LONG.



KG-200 WITH ATTACHED BATTERY LUGS \$2.00

SEE YOUR
HOBBY DEALER



**DU-BRO
WHEELS**
featuring the
6 Spoke
Dura-Hub

NH-1	WHEELS 2 1/4"	2.59/pr
NH-2	WHEELS 2 1/2"	2.79/pr
NH-3	WHEELS 2 3/4"	2.99/pr
NH-4	WHEELS 3"	3.19/pr
NH-5	WHEELS 3 1/4"	3.39/pr
NH-6	WHEELS 3 1/2"	3.59/pr

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Newly styled, hand inspected,
top quality tires with treads

TREAD
OR
Du-Bro smooth surface tires
available!

MADE IN U.S.A.

175R	WHEELS 1 3/4"	2.19/pr
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275R	WHEELS 2 3/4"	2.99/pr
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350R	WHEELS 3 1/2"	3.59/pr

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Low Bounce "SLICKS"

225S	WHEELS 2 1/4"	2.59/pr
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300S	WHEELS 3"	3.19/pr

COMPLETE LEXAN BRAKE AND LINKAGE HOOK-UP AVAILABLE FOR ALL DU-BRO WHEELS

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Requires very little pressure to engage brake... is not affected by fuels.



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PB-295 ONLY \$2⁹⁵



ROUGH PROPS RUIN PLANES AND RADIOS
ELIMINATE THE PROBLEM WITH THIS FINE TOOL
MADE FOR LONG LASTING SERVICE
ANODIZED GOLD COLOR CASE; ALUMINUM SILVER CAPS

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SETS UP QUICKLY ON FLAT LEVEL SURFACE

A PROPELLER BALANCER YOU CAN CARRY IN YOUR POCKET!!!

THREE PIECES OF CAREFULLY MACHINED AIRCRAFT ALUMINUM PARTS CONTAINED WITHIN A SMALL CYLINDER 3/8" X 2 1/8" . . . SHOWS BALANCE ON LONG AND SIDE AXIS . . . EXCLUSIVE FEATURES

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SIG KITS OFFER YOU MORE FOR YOUR

PIPER J-3 CUB

AN IMPROVED KIT OF THE MOST POPULAR MODEL EVER PRODUCED



KIT RC-3

\$23.95

FEATURING A ONE-PIECE WING

UNIQUE WING MOUNTING FEATURE

Puts No Stress on Cabin Structure

A high value kit of one of the most popular scale models ever produced. Built up balsa construction produces a strong structure without excess weight. Light wing loading aids flying performance and stability. Without doubt the Piper Cub J-3 was the most popular airplane ever manufactured. The design is nearly perfect for R-C and makes a beautiful airplane that is easy to fly.

2" Scale

71" Wingspan

Engines: .19-.35

DIE-CUT SIG BALSA AND PLYWOOD
FULL-SIZE DETAILED PLANS
DIE-CUT WINDSHIELD
TRADEMARK AND NUMBER DECALS
BUILT-UP BALSA CONSTRUCTION
REMOVABLE WING STRUTS
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STABLE DESIGN
MOLDED ENGINE COWLING
FORMED LANDING GEAR
ALUMINUM ENGINE MOUNTS

AN AUTHENTIC R-



A Beautiful Model of a Truly Outstanding Airplane

The full-scale airplane is a Reed Clipped Wing Conversion, built up from a 1941 Piper J-3 Cub for Hazel Sig-ahose, co-owner of Sig Mfg. Co. The airframe was completely rebuilt and 3½ feet removed from each wing panel. With a 75 hp. engine, the result is a highly aerobatic airplane that is really a joy to fly. With its blue and white sunburst paint job it is a great crowd pleaser.

SIG KADET

UP TO 3 CHANNEL RADIO EQUIPMENT
FOR .15 -.29 ENGINES

EASY TO BUILD

Handy Printed Fuselage Sides — Build Internal Structure Directly On the Wood.

Molded Plastic Engine Cowling.

Formed Nose Gear with Shock-Absorbing Coil.

Torsion Bar Main Gear.

Hardware Package Includes Nylon Nose Gear Bearing, Nylon Control Horns and Molded Nylon Surface Hinges.

Die-Cut Plywood and Balsa Parts.

Top Quality Balsa and Hardwood.

Full Size Plans.

Complete Illustrated Building and Flying Instructions.

SIG
KIT RC-31
\$23.95



WING SPAN: 57"
LENGTH: 42"
WEIGHT: 4 LBS.

Designed by CLAUDE McCULLOUGH

Sturdy, built-up balsa construction and light wing loading combine in the Kadet to produce a perfect sport or beginners' model. The flying performance of the high-lift, flat-bottomed airfoil is responsive to control and inherently stable. A tricycle landing gear helps ground handling, take-off and landing characteristics. We predict that this compact bundle of dynamite will quickly become THE standard RC Trainer.

AKROBAT

Designed and Flown by MIKE STOTT

Semi-Scale Control Line

KIT CL-16



Formed Plastic Engine
Molded Plastic Canopy
Formed Torsion Bar
Leadout Wire

Heavy-Duty
Plated Fuselage
Nylon Engine
Complete

FOR ENGINES: .29 to .40

WINGSPAN 51"

550 Sq. In. Wing Area

Decals for Scale Markings
Two Big Plans Sheets
Isometric Views and
Die-Cut SIG Balsa on

EASY ACCESS TO ENGINE, BELLCRANK AND CONTROL

Czechoslovakia's Zlin Akrobat has been a star performer in full-scale World Aerobatic Competition for many years. Mike Stott has blended the classic, functional lines of this great aerobatic design into an ideal layout for control line stunting. Fast construction with light wing loading for top notch flight performance.

SEMI-SCALE CHIPMUNK

KIT CL-3
\$14.95

CONTROL LINE STUNTER

FOR ENGINES .29 to .40
WINGSPAN 54"

DETAILED FULL-SIZE PLANS
ONE-PIECE MOLDED ENGINE COWLING
MOLDED BUTYRATE CANOPY
MOLDED WHEEL PANTS
FORMED LANDING GEAR
DIE-CUT BALSA AND PLYWOOD



NATIONALS WINNER!

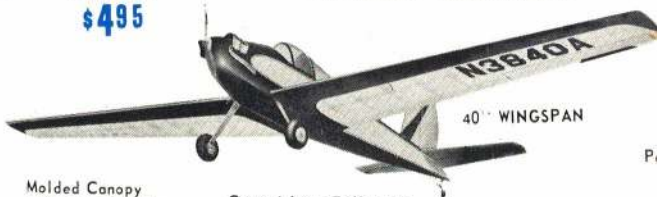
Mike Stott won 1st Place 1969 Sr. C/L Stunt
Dave Osdoba won 4th Place 1971 Sr. Precision Aerobatic
Mike Waldron won 4th Place 1971 Jr. Precision Aerobatic

SCHWEIZER 1-30

Combination Free-Flight or Control-Line Flying Scale
May be Converted to Miniature R C Single Channel Pulse Equipment

1" SCALE
KIT FF-19
\$4.95

ENGINES: .010 to .020 for Free-Flight
.020 to .049 for Control-Line Scale



40" WINGSPAN

Molded Canopy
Authentic Decals
Covering Material
Hardware Package
Formed Landing Gear

Control Line Bellcrank
Molded Plastic Cowling
Die Cut SIG Balsa and Plywood
Detailed Plan With Construction Isometrics

UR DOLLAR

-C SCALE MODEL

Sig's CLIPPED WING CUB



KIT RC-26

\$23⁹⁵

2" Scale

Length: 42"
Engines: .19-.35
Wingspan: 56"

- STANDARD Balsa CONSTRUCTION
- STRONG ONE-PIECE WING
- REMOVABLE WING STRUTS
- MOLDED ENGINE COWLING
- TRADEMARK AND NUMBER DECALS
- FORMED LANDING GEAR
- FULL-SIZE DETAILED PLANS
- ALUMINUM ENGINE MOUNTS
- DIE-CUT SIG Balsa AND PLYWOOD
- MOLDED NYLON CONTROL HINGES

KE STOTT

Stunter

\$14⁹⁵

Engine Cowling
Canopy
Bar Landing Gear

uty Bellcrank
lap Horn
levator Horn
e Hardware Pack

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ts
Instruction
nd Plywood

ROLS

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SUPER SINBAD

TOWLINE GLIDER
KIT FF-2

\$5⁹⁵



62" WINGSPAN
FREE FLIGHT OR RADIO CONTROL
A high performance towline glider of proven design.
Strong, Simple Construction.

SINBAD 40

TOWLINE GLIDER

BIG 40" WINGSPAN

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Kit Features Die-Cut Sig Balsa

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NATIONAL CHAMPION HALF-A FLYING SCALE

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CONTROL LINE - .049 to .099 Engines

FREE-FLIGHT - .020 to .049 Engines



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CAN BE RADIO CONTROLLED WITH LIGHT-WEIGHT EQUIPMENT

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36" WINGSPAN



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DESIGNED BY PAUL McILRATH



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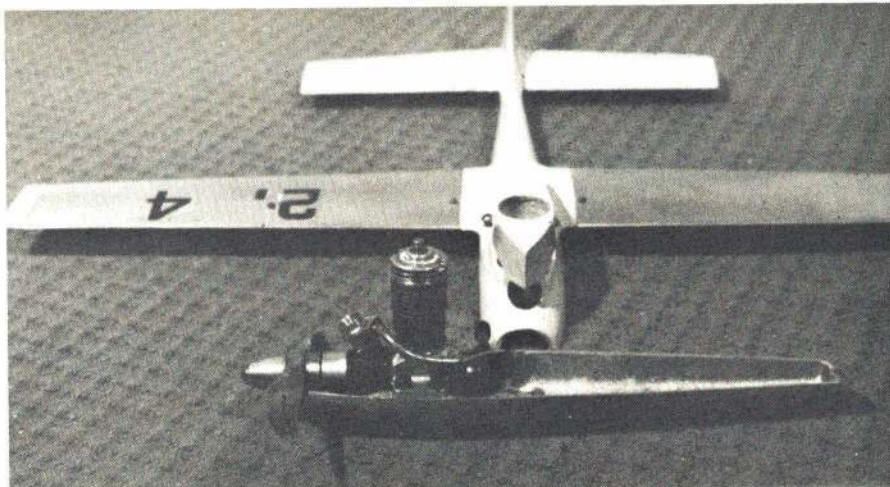
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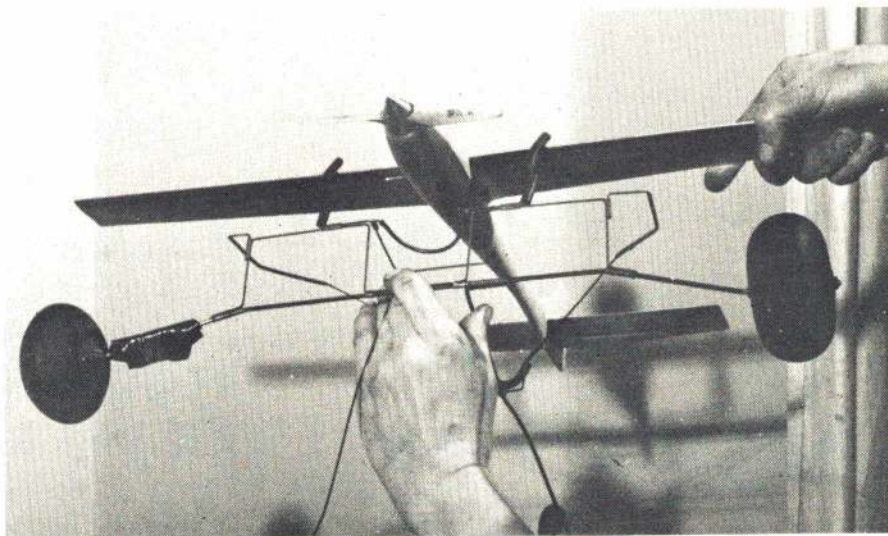
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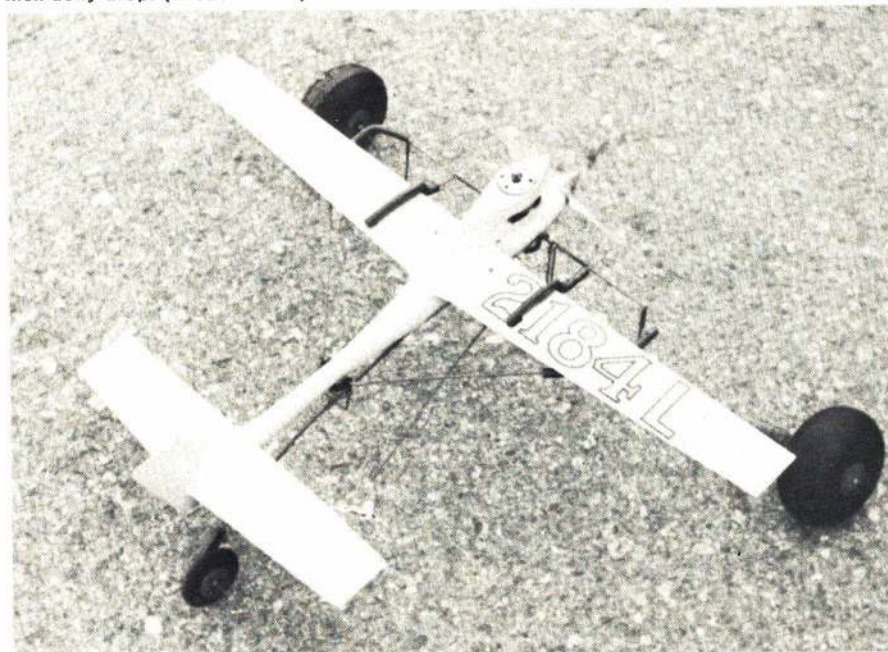


This 1/2A Speed model is a Sackett original. Bounty Hunter 049 has done 107.74 mph.



Safety and consistency are the reason for dolly. It must have the same CG as the model. Be sure to use a positive release system as described in text.

Pink Lady on dolly. Wire trailing on ground keeps wing clamps firm. Model lifts off with dolly, then dolly drops (about an inch).



ABCs OF SPEED

(Continued from page 52)

tions and opening and closing times using a degree wheel attached to the prop shaft and then milling off the desired amount from the intake and exhaust ports and the rotor or shaft if the engine is shaft timed. With intake timing, opening time is not as critical as the closing time, but more power can be obtained by prolonging the closing time.

Good commercial Speed fuels are: K & B Speed Fuel; Fox "Blast"; Wysong's "This Is It"; C & R Speed Equipment "Flower Power." All of these are a good deal hotter than the formulas given.

Two types of pressure systems are used these days—metal tanks and bladders. Both are pressurized systems. Metal tanks are rectangular in shape and are pressurized by the engines' crankcase volume; bladders are blown up with a syringe and exert tremendous pressure, the material being pen bladders or surgical tubing. (These tanks must be protected by an additional skin such as penny balloons.)

Speed models have no landing gear, so a method of takeoff must be devised. Hand launching a Speed model is best if you have the right man! It takes a very talented pit man to launch a "C" job, so consequently, dollies are the more logical choice.

Generally speaking, you can advance the opening time by 2° to 3° and lengthen the closing time by 4° to 5° but this will vary from mill to mill.

Freeing-up is the greatest asset to a racing motor I know of. When the engine is cleaned and polished after modifications, assemble carefully checking for binds as you go. A properly prepared racing mill should be loose enough for the piston to drop from T.D.C. under its own weight.

Remember, keep the engine clean by washing all parts in methanol and assemble with 3 in 1 oil.

There are only two brands of propellers worth considering for speed—Rev-Up and Top Flite. 1/2A: 4 1/2—6, 7 or 8. A: 6—7, 7 1/2 or 8. B: 7—10, 10 1/2 or 11. B Proto: 8—8, 8 1/2 or 9. C: 9—12, 12 1/2, 13 or 13 1/2.

Fuel is probably the most taboo subject of them all. Because of an incident that cost me the Nats one year, I will give basic formulas only. At the 1967 Nationals in Los Alamitos, California my Arch Rival, Jerry Thomas of Tacoma, Washington, beat me by three mph to take the championship for Jet Speed—174.69 to 171.36 mph. Earlier in the year at the Sand Point Meet I was knocking off 175 to 179 mph flights, Jerry was turning 162 to 165 mph flights, so I felt quite safe in giving him my fuel formula. *Bingo!* Two months later he beats me. The fuel is good for 15 mph over benzene, what Jerry was using. Need I say more?

The following are three basic fuel mixes: (1) Mild Brew—25% nitromethane, 20% castor oil, 55% methanol. (2) Sport and Test Mix—40% nitromethane, 10% castor oil, 10% polyoxide

(Continued on page 75)



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TWIN CYLINDER .60 RC ENGINE		
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6 FOOT ROLLS

OPAQUES: Red, White, Orange, Yellow, Clear, Aluminum, Gray, Blue, Dark Blue, Black, Chrome, Olive Drab

TRANSPARENTS: Yellow, Orange, Red

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NO MINIMUM
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METALLICS: Green, Gold

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- Focused Heat Beam

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FIFTY-SEVENTH IN A SERIES

getting started in R/C

Build or Buy a Radio—Part II

JIM McNERNEY

Last month we discussed some of the pros and cons of building your own radio. There's one area which we neglected to mention. Some manufacturers offer "semi" kits. These kits have the most intricate or critical components pre-assembled. This approach has some of the aspects of both a kit and factory-made unit. It would be well to determine if the manufacturer pre-tests his assembled boards. If he doesn't, you can be buying more trouble than you can create by yourself. If it doesn't work when you're finished, you don't know whether it's your mistake or his.

Before you leap into kit construction, examine all the parts. Check them against the parts list. This insures that all the goodies are there and allows you to familiarize yourself with nomenclature, resistor codes, etc. It's a good idea to segregate the parts for easy identification. An egg carton is handy for this because it provides separate bins for small parts and the top holds larger ones. Read through the entire construction manual a couple of times. This gives you a chance to plan ahead and schedule your work. Whether a novice or an old pro, when you start building follow the instructions exactly and check off each step. Don't stay at it too long; don't work if you're tired and stop if you start having eye strain. It's easy enough to make a mistake when you're fresh as a daisy. A diode installed backward or a wrong resistance will drive you crazy later when you're trouble shooting.

There are a couple of schools of thought on how to mount components on pc boards. Some advocate putting the base of the component tight against the board. This results in good vibration mitigation, but provides so much rigidity that the components are very vulnerable to the shocks of a crash. A good compromise is to leave about

1/32" between the component base and the board. Another choice in component mounting is whether to crimp the leads over on the lands or to leave them straight. Crimping the leads gives better rigidity and provides a larger surface for the solder bond. On the other hand, they are more difficult to remove from the board when a component must be replaced and crimped leads, if not dressed properly, increase the chance of solder bridges.

During construction or repair of your RC kit, you may require the ability to de-solder areas on the pc boards. This can become necessary because you must remove components or because you have bridged from one land to another accidentally. The crudest method is to melt the solder with an iron and tap the board or blow on it to remove the molten solder. There are commercially available solder suckers which use a rubber bulb or piston device to draw the molten solder from the board. For very small pc boards, the best method we have found is wicking the solder off the board by heating thin copper braid impregnated with flux while the braid is held in contact with the solder joint. The molten solder will flow into the braid, which also acts as a heat sink. This reduces the possibility of damaging the pc board.

And speaking of damaged pc boards, if you should tear or remove a short segment of the land, it can generally be repaired by soldering a short piece of wire across the gap. Take a piece of cut-off component lead, bend it at 90 degrees so that the bent portion gives about 1/16 to 1/8" overlap on the land on each side of the gap. Hold the wire in place with needle-nosed pliers at the other end and solder. Cut off the end sticking up from the board.

Next month—Test equipment and its uses.



CARL GOLDBERG

HOW CAN THEY BE ANY GOOD AT THOSE PRICES?

CG RETRACTS

The only problem is there's no snob appeal in CG Retracts—they just don't cost enough to really impress your fellow modelers. All they do is work great and last long. The number of broken or worn-out parts has been unbelievably low—because the materials they're

made of are so tough and resilient. You can pay more, but you can't get better gear. If you're looking for dependable retracts, read what expert flier Jim Grier says:

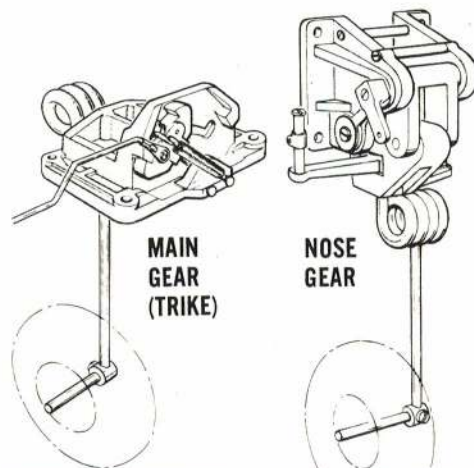


Dear Carl:
Just a performance report I would like to share with other modelers. In 7 months

of flying my 8 lb. Mach 1 with Goldberg retracts, the gear has never failed. A lot of the time was on our club's rough grass field. Sure is easy on the aircraft (and builder!) to make all gear-down landings. Congratulations on a fine engineering job!

Jim Grier

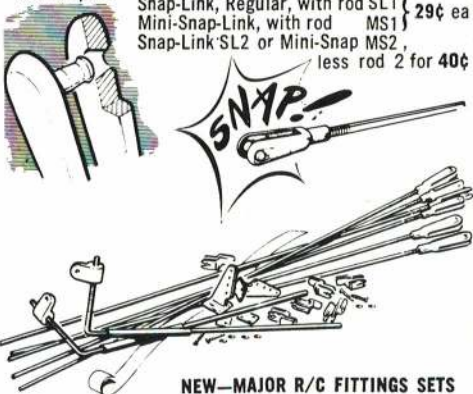
TWIN GEAR Retracts—RG2—\$14.95
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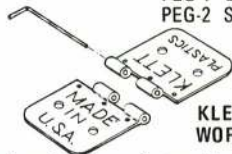
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PEG-1 LARGE 4 per pkg. 75¢
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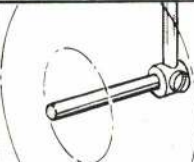
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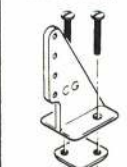
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Hardened steel collar and screw SA1 75¢.



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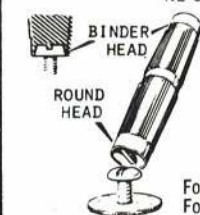
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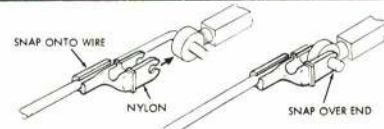
This nylon reinforcing tape is extremely tough when applied with epoxy around the center when joining wing halves. 2 1/2" wide x 5 ft.—N2 50¢. 3/4" wide x 5 ft. N1 25¢.



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SOCKETS DOWN ONTO SCREW HEAD — CAN'T SLIP OFF AND DAMAGE YOUR WING!
Takes Round Head Screws and Binder Head.

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For 1/4" Nylon Screws SD1 98¢ ea
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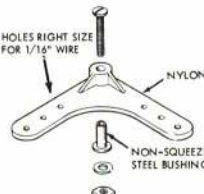
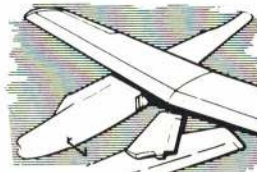


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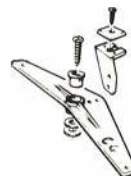


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TANGERINE



Top: Covering tissue can be bought in many delightful colors and even checkerboard patterns. The rubber band between the landing gear and the nose block retains the prop assembly when the power is expended. Above: Author launches Tangerine. You can really pack the turns into this model for very long flights.

If you want a rubber-powered free flight that has good performance and is simple to build, then Tangerine is for you! For five or six nights' work and about \$2.50 worth of materials, you can watch your very own Tangerine point its nose at the sky and drift down the breeze.

Start with the wing first, since it takes longer to build than the tail or the fuselage. While the glue on one piece is drying, you can start working on the others. By starting on the tail when the wing is set aside to dry, you will avoid sitting around waiting for the glue to dry and can start flying that much sooner. Don't skimp on the drying time—it can lead to joints that don't hold and flying surfaces that are warped. Joints that don't hold have to be glued over again and warped surfaces can lead to problems at the flying field. With Tangerine you won't have to travel far because all you need on a calm day is a football field.

Construction

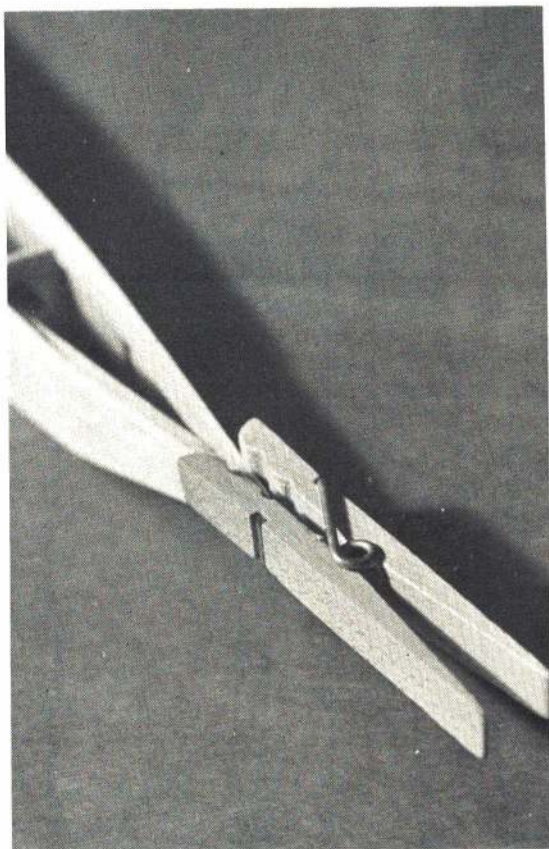
Start the wing by cutting out the ribs. Make a template for the ribs from tin can stock, 1/16" plywood, or some other material that is easy to shape yet strong enough to cut around. Place the completed template on the balsa sheet and use as a guide for your knife when cutting ribs.

When the ribs are all cut out, cover the plans with waxed paper or Saran Wrap so the glue doesn't stick to them. Pin the 1/4 x 1/16 balsa trailing edge to

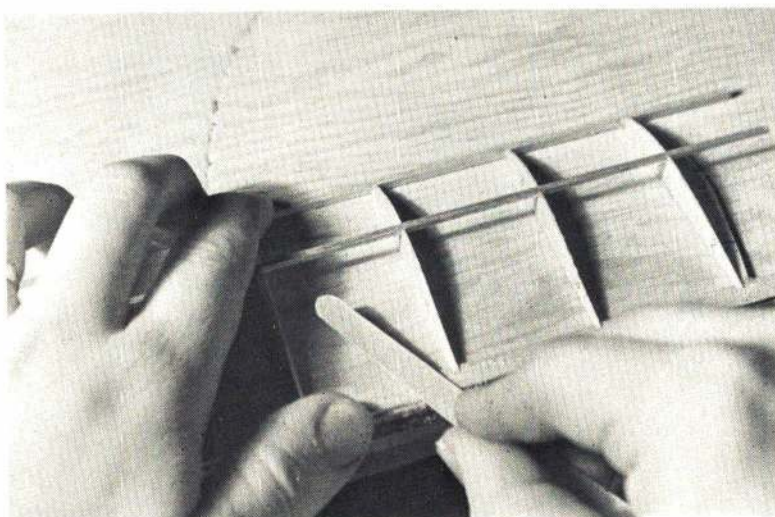
(Continued on page 79)

This really fine performing but simplified stick and tissue model should take the Tenderfoot about a week of evening work. It is ideal for a club project activity.

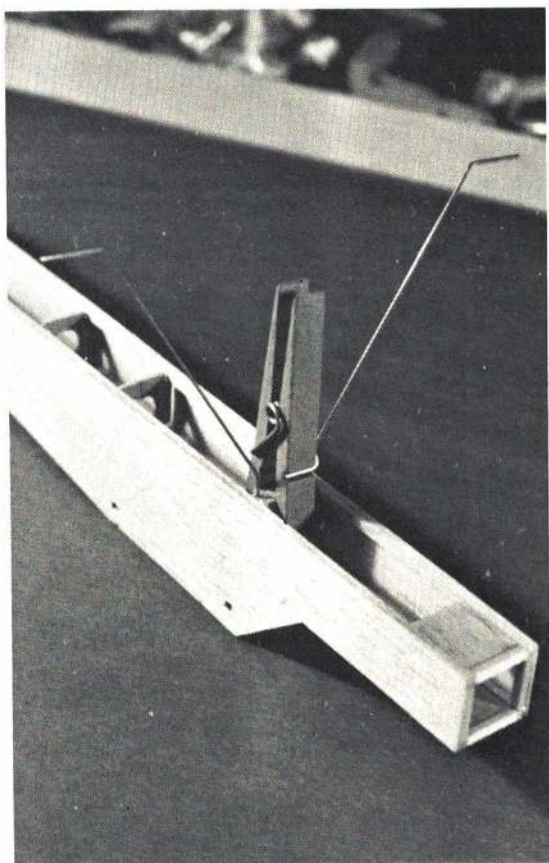
STEVEN C. LOVELY



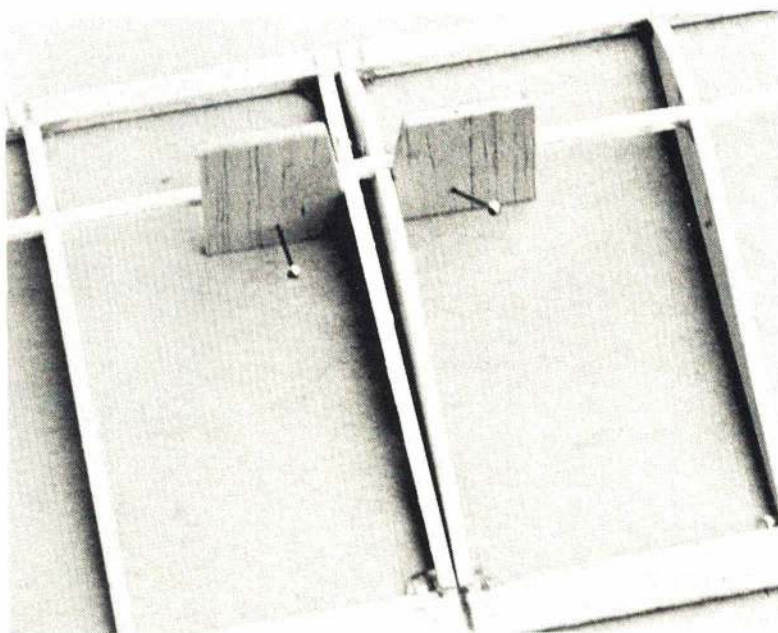
Left: Hold rear of fuselage together while glue dries with just a clothespin. Below: Trailing edge can be tapered with a nail file.



*PLANS ON NEXT PAGE
FULL-SIZE PLANS AND FREE TENDERFOOT
DECAL AVAILABLE—SEE PAGE 84*



Left: Clothespin again useful to sandwich the landing gear in place between balsa bulkheads. Below: Pinning the dihedral guides for the center ribs.



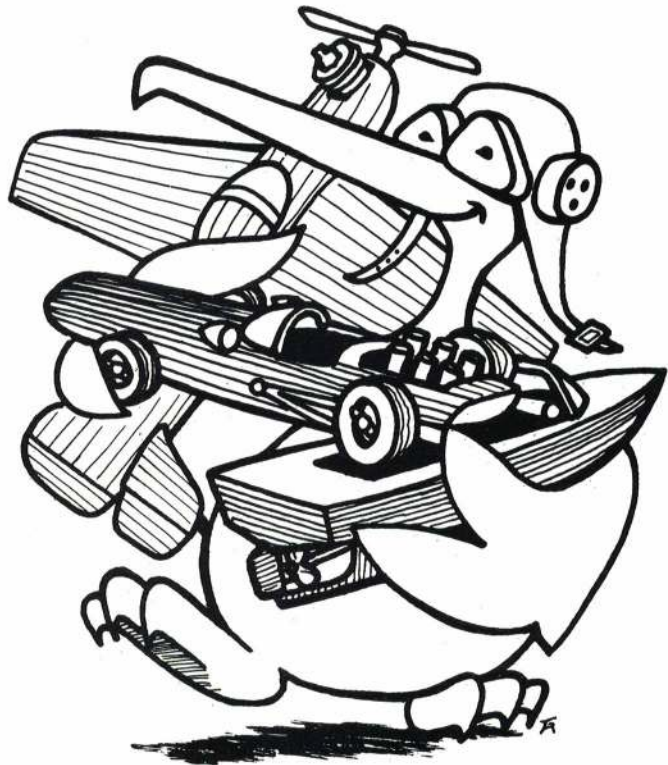


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CARL MARONEY ON RC

Announcing the *Thermic Sniffer*: This telemetric device is a highly sensitive rate-of-climb sensor that measures up and down motion of an RC glider to a few inches per second. The variation of the output tone is transmitted to a pocket VHF receiver. This permits a pilot to "hear" thermals since the *Thermic Sniffer* sends an audio tone via radio link to the receiver. A rising tone means "up" and a descending tone means "down." The first thermal sensor flown in an RC glider was an early prototype for the production unit. During the past several years, over twenty prototypes have been flown hundreds of hours by Maynard Hill, Walt Good, Don Clark, Ben Givens and others. Ray Smith set the existing World's Record for RC glider altitude at 5000 ft. which proves its range capability. The winner of the 1970 Nats RC Glider event used one, too. This background experience has really contributed to the development of a debugged production design.



Carl Lorber's ASW-12. Spanning 12' 8" with an aspect ratio of 25:1, the wing is carried by an imported German fiberglass fuselage.

The airborne unit, the *Thermic Sniffer*, weighs 1.9 oz. and consists of a tough plastic bottle for the standard size measuring 1-7/8" dia. by 3-3/4" long or an optional size of 1-5/16" dia. by 7" long, in which is mounted a sensitive thermistor bridge flow meter, an amplifier, a tone generator and a low-power transmitter. A change in air pressure causes air to flow into the bottle through the sensitive flow meter. The flow meter signal is amplified and converted to an audio tone which modulates the milliwatt transmitter whose signal is received on a small monitor receiver. An "up" motion of the glider causes the tone to increase in pitch and a "down" motion makes the tone decrease. The unit is designed for a constant voltage of 4.8V and a low current drain of 17 ma as obtained from 4 NiCad cells. This permits use of the RC flight pack and can be plugged directly to an additional connector on the battery pack or it can be plugged into a vacant servo receptacle on the receiver. Using a separate 225 mah pack, which adds less than two oz., will last 13 hours on a single charge. The *Thermic Sniffer* is unconditionally guaranteed for the first three months—it will be put in top condition (adjusted, repaired or replaced) regardless of the problem. The *Thermic Sniffer* is being sold and sent postpaid for \$79.00. This price does not include the monitor which runs approximately \$20.00 or a flight battery. This equipment is available from SOARING PRODUCTS, Box 117, Kensington, Md. 20795.

Soaring Meet in Italy: An extra bit of good news, for many AMA members planning to go to Italy next year for the RC World Championships, is that there will be an open international RC Soaring meet on September 9-10, just before the World Championships meet. Location is the Rieti Airport in the center of Italy. With a little extra travel, AMA's charter flight participants can take in both events.

BOB MEUSER ON FF SPORT

It Isn't Funny Anymore: When we showed the photo of Mike Atwood's foam-wing A/1 towline glider, which looked like a Hand Launch Glider that had been on a hormone pill binge, it was "Ho, ho, ho, how quaint." (August 1972 *AAM*, page 58). But the joke is over. Mike built a huge solid-balsa "HLG" to A/2 Nordic Towline Glider specs (527 sq. in. max. area, 14.46 oz. min. weight) and zings the monster up 400 ft. with an elastic "towline" used as a catapult. He gets four-min. flights in still air, while a Nordic built in the traditional idiom is lucky to get 2:45. And, it is probably legal. At least there is nothing in the letter of the rules to prohibit it; whether

it is within the intent of the rules is another matter.

Certainly those who drew up the rules never intended anything like this. But then, all towlines are somewhat elastic, and the Russians have been zinging their Nordics off the towline for several years. Mike's towline is just a little stretchier, and he zings it a little harder.

If declared legal, it is bound to cause a large fuss. Some will view it as a legitimate development of the event; others will say there ought to be a law against it. A few will even say that Mike is a bad guy for dreaming up the concept—before they did, that is. Certainly it can mean the end of the Nordic event as we know it. I would view that as a serious loss to Free Flight, so I'll sign up with the "There ought to be a law..." faction.

But how would you write rules to prohibit it? Simply saying "Catapulting is not permitted" wouldn't do it, for it is too vague, and it is virtually impossible to launch a Nordic into



Carl Taylor, Jr. launching for his dad. Model is one of series of canards flown in all FF events, this one in A/2 Nordic.

a strong thermal without catapulting it a little.

Prohibition of elastic towlines would not do it, for all towlines are a little stretchy, unless the rules specify just how stretchy the towline can be. Perhaps a rule that says the towline can be no shorter than 45 meters with no load would do it. (Present rules limit the max. length to 50 meters with a two kg load.) But then, it would take about three minutes for someone to figure out that he could accomplish the same thing with a fast-reeling winch.

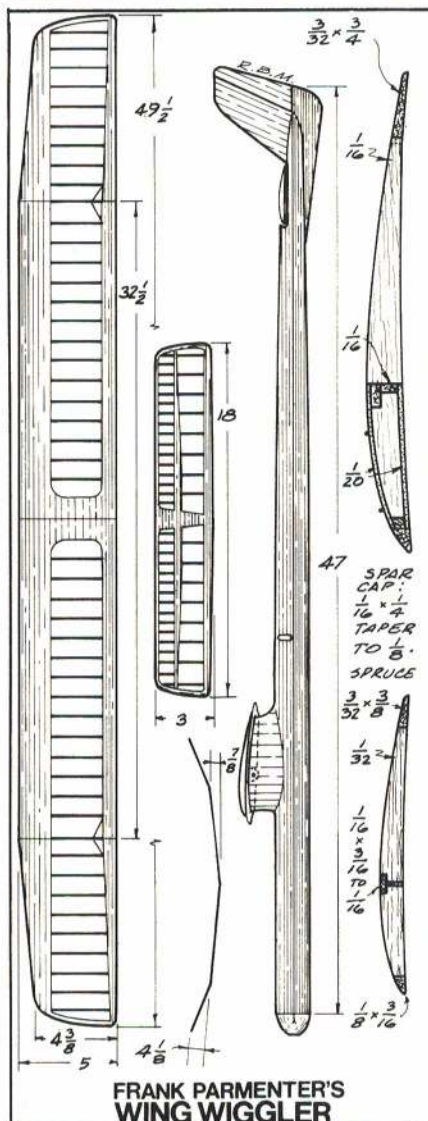
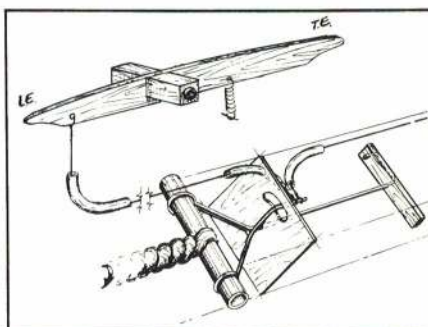
Reeling in the line with the model attached could be prohibited but that would prohibit the current practice of reeling in to gain control when the line goes slack—perhaps a tolerable nuisance. Ah, blessed are the rules makers, for they shall inherit the job of sorting it all out—and I'll bet they bungle it! Whatever comes of it, Mike deserves a medal for finding an innovative solution to an old problem, and for inventing what seems to be an exciting and challenging new form of Free Flight, even though he might have shaken up the system in the process. But, if the system can't stand being shaken up, and doesn't come out better for the shaking, we had better close up shop.

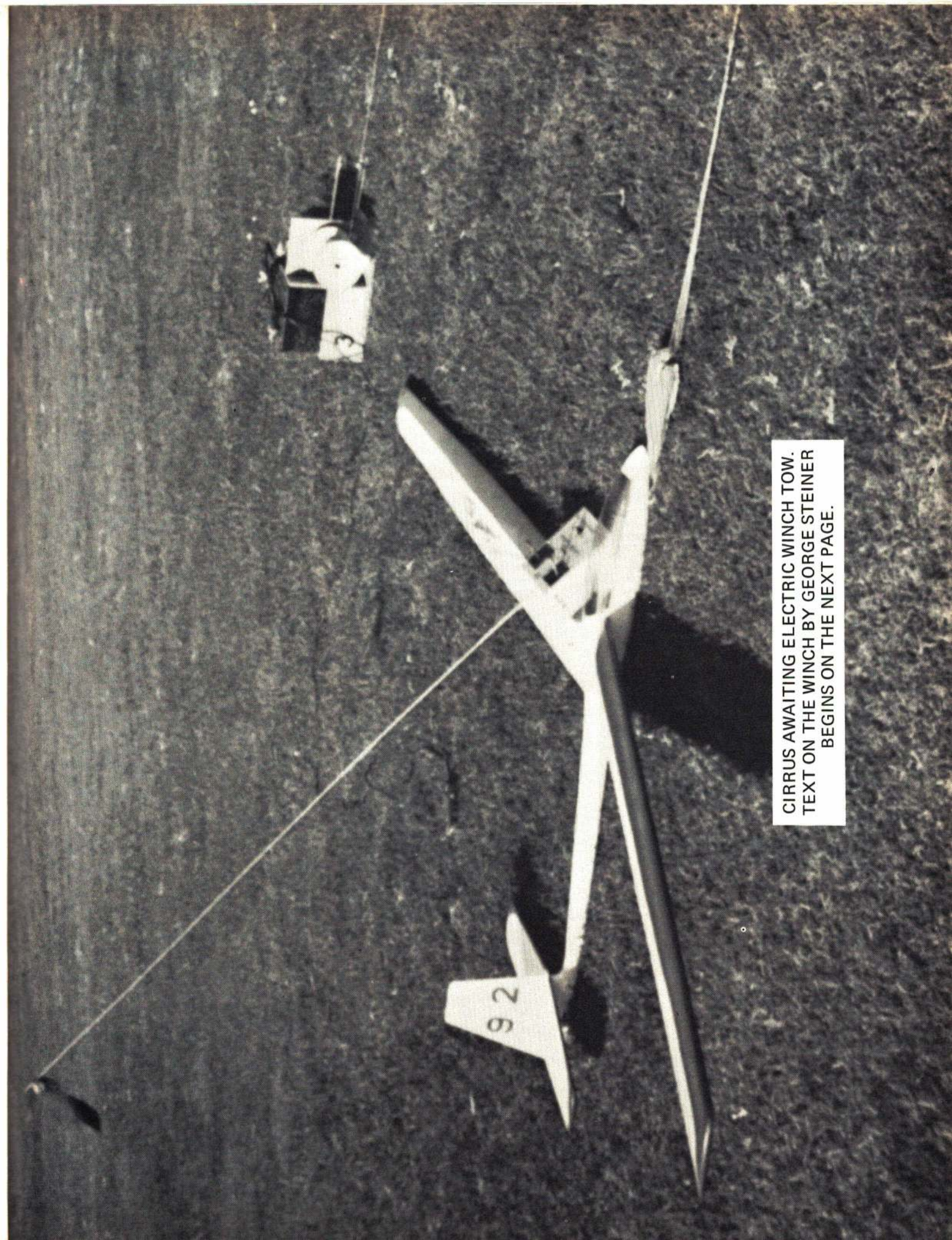
Wing Wiggler: This model is the latest in a series of models that got Frank Parmenter into four World Championships and won him the Mulvihill Trophy, in addition to numerous other triumphs. The series includes his famous Langley, a diamond-fuselage model, and the Charisma. All share the same prop design, and the same fuselage construction. The longerons are 3/16 square hard balsa, left square at the front, and tapered to a triangular cross section about an inch back from the nose. Covering is 1/16 or 3/32 balsa with the grain crosswise, making a structure that won't split, and is easily repaired.

Xenakis adopted that construction, and his rubber-torque actuated auto-stabilizer mechanism was well adapted to it. It was possible to build the mechanism as a unit and insert it through one side before the final sheeting was glued on. It is not that easy with a round fuselage. Frank's Charisma employs the torque sensing mechanism used by Xenakis, but the mechanism at the tail is different. *Wing Wiggler* has the same mechanism, but uses it to pull down the leading edge of the wing during the first part of the flight.

The sketch of the mechanism is schematic, and the details might be a little different from that on Frank's model. The variation in wing incidence angle is about two degrees. Charisma employed John Gard's very successful airfoil and *Wing Wiggler* uses a variation of it; top surface slightly less cambered, bottom considerably flatter, and trailing edge slightly flapped.

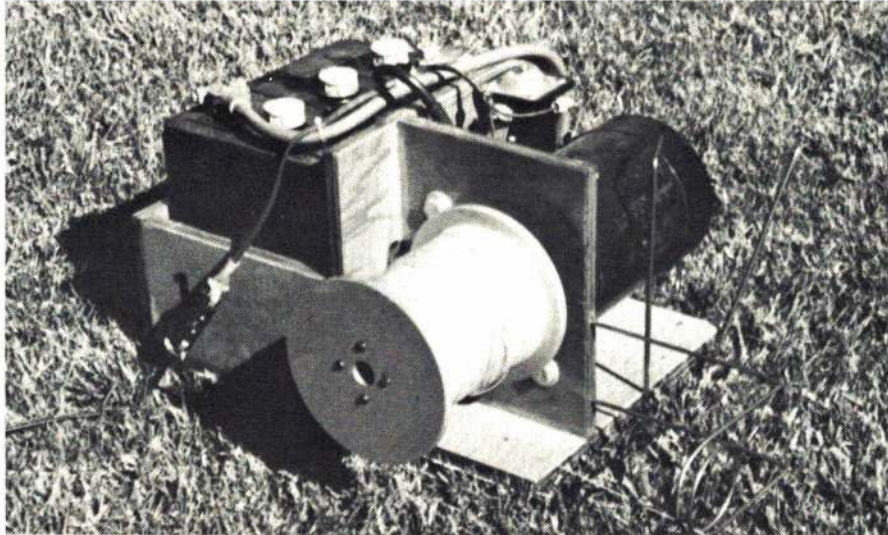
Gard's highly effective turbulator system is retained; 0.025 in. dia. nylon lines are glued to the top surface at distances of 7% and 23% of the chord behind the leading edge. Frank finds the lower-cambered airfoil is less likely to stall when the air temperature rises, but allows that Gard's airfoil is unbeatable in still-air conditions. The two Charismas Frank lost at the Cado Mills team selection finals have been repaired and re-trimmed, and a second *Wing Wiggler* has been built, which will give Frank four models to use in the 1973 World Championships. (References: Langley, July 1962 *AAM*; Diamond, July-August 1965 *AAM*; *NFFS Digest*: Charisma, Nov.-Dec. 1972; Xenakis's mechanism, May-June 1972 and Mar. 1970; Gard's airfoil, Feb.-Mar. 1971.)



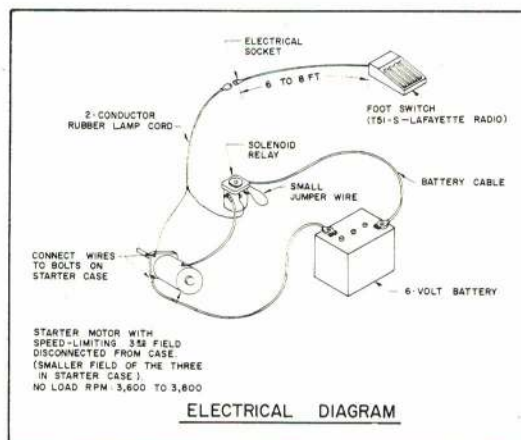
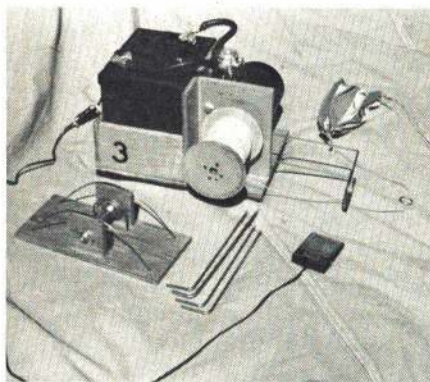
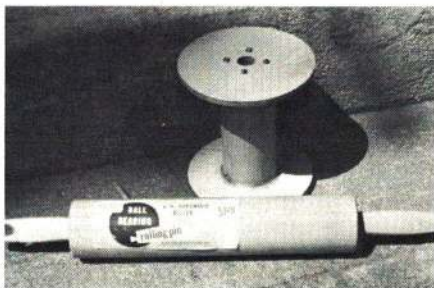


CIRRUS AWAITING ELECTRIC WINCH TOW.
TEXT ON THE WINCH BY GEORGE STEINER
BEGINS ON THE NEXT PAGE.

AAM GLIDER WINCH



Above: Complete winch. Note position of anchor pins balances the pull of the line during tow. This complete winch weighs only 53 lb. Right: Beginning final assembly of the system. Note the long shaft on the old starter motor which was resurrected from a junk yard. Below right: The complete system. Foot switch operated by the pilot. By pulsing the switch the tow strength can be modulated to suit wind conditions. Below: The heart of the lightweight all-wood pulley is a section cut from an ordinary rolling pin.



Winches, winches, winches. You see one, you've seen them all. This one presented here is what I consider a little more refined than the average run-of-the-mill type. This winch wasn't conceived by one person. I made observations for a long time at various meets and flying fields and then created what I believe are improvements. Many people with different ways have approached the idea of shooting a glider into the air. I have worked with Gerry Wolfram of the South Bay Soaring Society on winching problems and want to give credit to him and others for their basic ideas.

This winch is ideal for the Sunday fly glider buff—about as light a battery-operated winch you will be able to find (53 lb.). Most others are well over the 75-lb. range. It can be constructed in your own hobby workshop, as there is no machine work involved. If you are a modeler you shouldn't have any trouble with this project by using already available materials. Basic construction is straightforward and general information on materials can be taken from the drawing.

Specifications: (1) six volt battery. (2) 12 volt starter motor. (3) Speed (no load with starter motor modified, remove third field): 3400 rpm. (4) Speed (under average load, hoisting a three lb. glider): 2000 rpm. (5) Average current on no load condition: 45 amps. (6) Hoisting line speed under load (average three-lb. glider): 1316 ft./min. (7) Hoisting glider speed with a two- to three-lb. glider: 18 mph.

The basic layout of the 1/2" plywood is simple enough; decide at this time what size battery to use. I used a small VW type 6 3/4 x 8 3/4 square, the smallest auto battery to be found. It works fine but not for contest work. After nearly 35 to 40 hoists into the air it will need to be recharged. If in doubt, make the winch box the larger size as noted on the drawing; this will allow you to use almost any larger size battery and fly for several days without recharging. There will also be enough space to store the anchor pins and foot switch if desired.

After cutting out the basic framework, do the detail work on part "E" board before gluing and nailing it together. It will be much easier to drill the holes this way. In positioning the starter on "E" you may place the starter in any circular position desired. The position shown on the drawing will place the starter hot terminal on top. If you think you will have problems with the cables in such close quarters, I suggest you rotate it 180 degrees.

After making sure the starter will fit board "E" with the mounting bolts, remove and continue with the whole assembly, making sure not to use nails that are too large, as they will split the wood. Use a small finish nail such as No. 16 gauge 1 1/4 to 1 1/2" long.

Lightweight six volt winch for three-pound RC gliders uses turnaround pulley for convenient pilot operation. Can hoist the big gliders on 12 volts.

GEORGE STEINER

A couple of coats of urethane varnish on all woodwork is a good idea. It helps cut down on the splinters and gives a finished product look to your winch.

The wood pulley assembly is made up of a household rolling pin and a 6 x 12" piece of 1/4" birch plywood.

The end plates were rough cut on a jigsaw. Drill a 5/8" hole in the middle. Take a short piece of 5/8" dowel about eight in. long and place the two end plates through the holes. To true up the end plates, place the 5/8" dowel in a small vise near a bench grinder. Position the vise so the two end plates can be rotated against the grinding wheel. After several rotations around the 5/8" dowel and against the grinder, you will have very true rotating end plates.

The rolling pin from the hardware store will have to be disassembled by knocking off the handle at one end. Remove the steel shaft and keep for one of the anchor pins. Make sure the hole through the rolling pin is 5/8". Of the three kinds I had, the best one was made by EKCO Housewares of Franklin Park, Illinois. Cut to size using a power bench saw. Do not try to cut it by hand because it is almost impossible to get a square surface. You want as little wobble in the end plates as possible. Out of round and poor balance of this pulley will hinder your winch rpm as much as 50%.

Use the 5/8" dowel as a jig to center the end plates on the rolling pin while you epoxy and screw in place. This will assure more accurate alignment to give a better and more true pulley.

Drill a 1/4" hole 1 1/4" in from the side for your 1/4" dowel shear pin. This shear pin is a good safety feature in case the pulley becomes locked up. Only once did it break for me, and I was pleased that it did. If a steel pin is used it will more than likely split the wooden rolling pin in half and cause other damage to be sure.

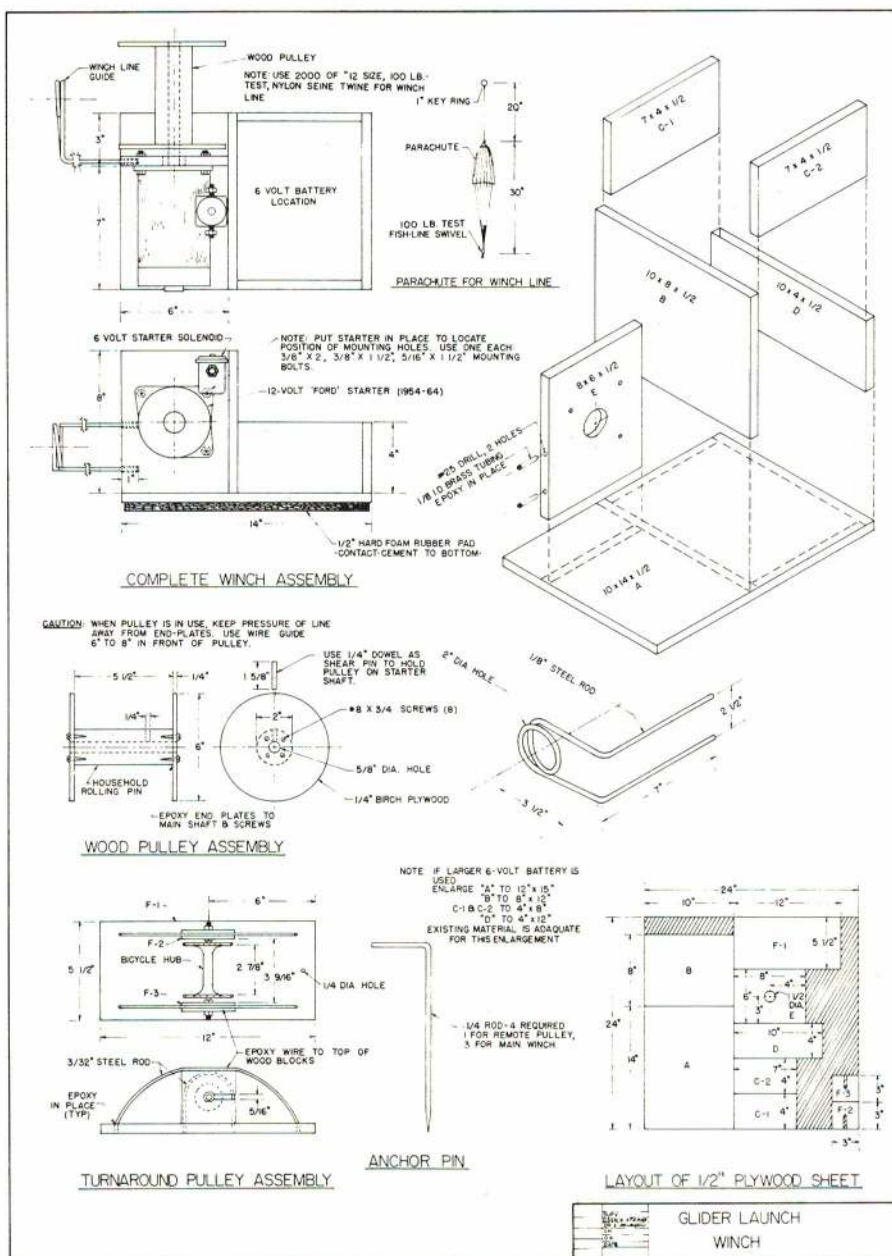
The remote pulley (otherwise known as the turnaround pulley) is made from a Schwinn bicycle front hub. It is ideal for this kind of application because it is so easy to mount. Having ball bearings and the sturdiness of its construction makes it perfect for this application. One shouldn't have any problem assembling this unit off the drawing. Be sure to epoxy the large 3/16" wire loops in place. Don't forget to cut the slots out for the hub axle in F2 and F3 before you glue the nail to F1. This will make a better fitting job.

The wire guides over the bicycle hub are necessary to keep the line from becoming tangled when some gliders veer off to left or right extremes under tow. The line falling back to earth will sometimes end up behind the turnaround pulley. When retrieving the line, it could get caught in the assembly if it didn't have some sort of protection to keep

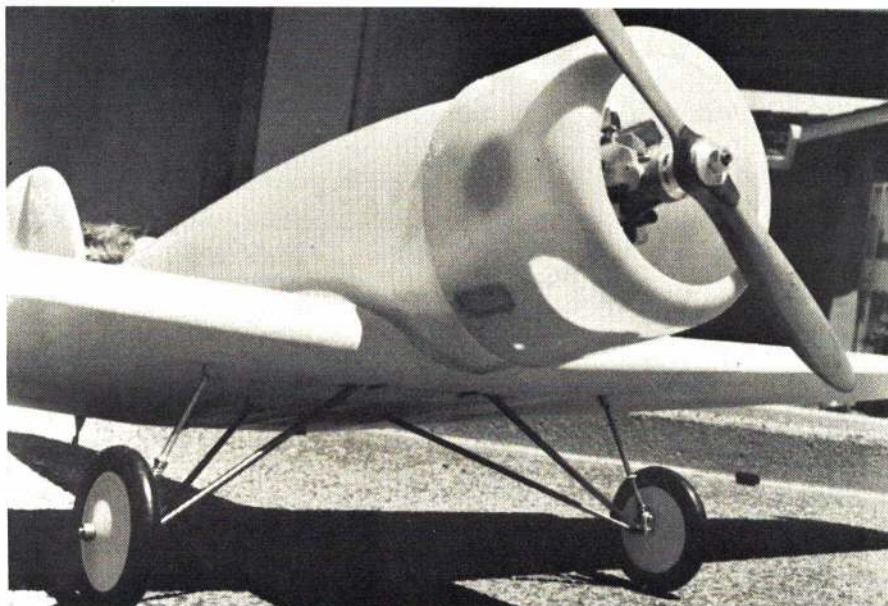
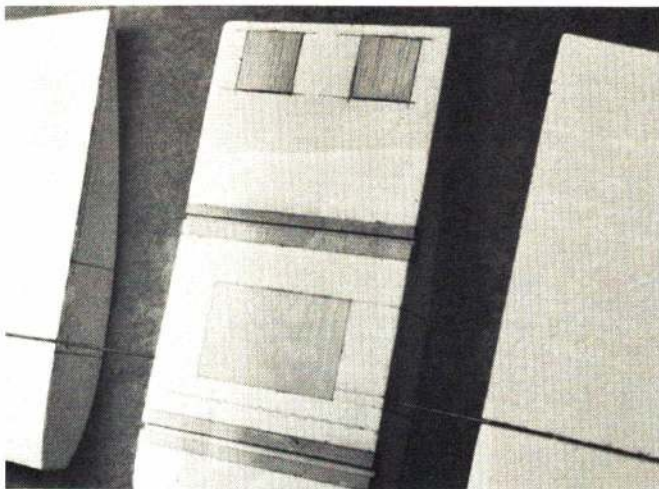
(Continued on page 86)



To bring the tow ring down after a release, a model rocket parachute is ideal.



FULL SIZE PLANS AVAILABLE — SEE PAGE 84



Above left: Wing center section has blocks for landing gear strut attachment and hold-down screws. There are two dihedral breaks. Above right: Rudder and elevator controls are internal and permanent. Tail cone will be epoxied in place. Left: Side mounted engine is lost in the big cowl. Muffler is housed inside entirely. Note shock strut on landing gears. Below: The symbol for Lockheed planes during the company's Detroit ownership.

Detailing on author's model is excellent. Rivets can be simulated by tiny pin heads.

SCALE SIRIUS

(Continued from page 25)

wire landing gears to exactly match the drawing (see front view for front strut).

The fiberglass wheel pants were not available for the prototype, therefore the first set was formed from balsa. Three pieces of wood were sandwiched and carved to shape. Plywood bearings were used for the axles.

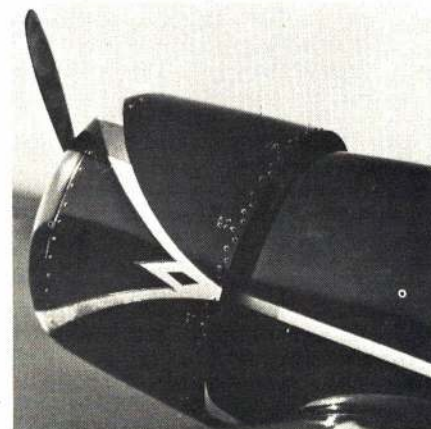
Epoxy Gel-Cote, unlike polyester, does seem to have a few pinholes. After cleansing the fuselage with acetone, spray the exterior with Dupont grey primer. Mix a small amount of epoxy body filler and push through the holes from the inside of the fuselage with your finger. After it hardens, sand with 280 wet and dry sandpaper. Small holes may be filled from the exterior with thick primer available from the auto parts stores. It may be necessary to repeat this procedure until all the holes are filled.

Surprising as it may seem, all the wooden surfaces are covered with fiberglass cloth and resin. This is an exceptionally light finishing method if done properly. Purchase the following mate-

(Continued on page 72)



Some of the details are molded into the fiberglass fuselage which is available commercially, see text.



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1/2

DIAMOND

So, here we are again, buried in the depths of a 2/3rd page black and white advertisement—but still trying to get over some meaningful info to the miniature aircraft sportsman. We have traditionally taken the newsletter approach in many of our (??) advertisements. Frankly, we have had more response to this type of advertising than to the four color approach. We will drop a four color cover ad on you from time to time, however, just to make sure Roy and Duke know that we are still alive.

HAWK 460

Last year we introduced our first kit—the Hawk 460 (.30 to .40 cu. in.). The concept here is ① Inexpensive; ② Different—foam reinforced with wood. ③ Durable—if covered with cloth and epoxy. ④ Flies great—especially in slow flight—landing approach. ⑤ A significant difference—the Hawk is almost an ARF but it is still a model that you can work on and patch if necessary.

Major John Woods, USAF, England, came up with an idea for this type of construction years ago. John is coming to work for World Engines in 1973 when he retires from flying jet flyers for Uncle.

The Cincinnati Radio Control Model Club took on the Hawk for a building project this past winter—68 members building 68 Hawks. You should see the variations in finishing techniques. Many fuselages are being finished with laminated balsa and/or veneer.

1/2 DIAMOND

The 1/2 Diamond is a crazy by-product of the Hawk. We used the top wing mold—the rest of the molds for the Diamond are new. The 1/2 Diamond is ① The first really expendable R/C plane. ② Very, very quick to build. ③ Strong wing and slab sided fuselage that can be reinforced. ④ Really flies good and will handle a hot .40. ⑤ Pylon—why not fly an expendable model in pylon so you can dare and tangle in the turns? We admire the guys who take their very scale Goodyear's to the



HAWK 460

\$24.98

battlefield. 1/2 Diamonds scoot along with their somewhat symmetrical wings and the gear permanently retracted.

World Engines took on the Hawk and 1/2 Diamond projects head-on. We decided to crap shoot and to make our own foam molds which turned out very successful and quite different than the type of molds generally used in foam molding. Why do we do this? The only one reason is that we had to prove model builders can do anything.

What's the 1/2 Diamond name bit? The upper side of the airfoil is conventional—lower side is diamond shaped. We checked

this out in a wind tunnel before we went to the mat with the mold. In actuality the 1/2 Diamond flies beautifully so the wind tunnel was correct.

NO WHEELS

How come no wheels? A landing gear complicates a model. Landing gears have drag. Landing gears rip out the bottom of fuselages. You can fly the 1/2 Diamond virtually from anywhere as it hand launches (no runway) and can be bellied in on its plywood belly in grass or weeds or, if you are in west Texas, into the mesquite. All this in a box with a string for \$16.98.



1/2 DIAMOND

\$16.98

THOR

(Continued from page 44)

The right wing panel is a repeat with the exception of joining the completed left panel before sheeting top right wing panel. Those dihedral braces must go in now for a good glue joint. Block up left wing. Right top wing paneling is now in order, and all the soft balsa top blocks.

Don't put stress on parts by using the hammer to make them fit. This only helps in making warps in the wing and that is a no-no. Now get ready for sanding. Don't make the cockpit area at this time.

Cut fuselage sides from 3/32 sheeting, add 1/6 ply stiffeners and stringers. Set aside and let dry thoroughly. While you're waiting for this part, cut fuselage formers.

Got more waiting time? Start on the tail feathers. It's self-explanatory so I'll say no more.

Back to the fuselage. Add the formers being careful of alignment. The firewall takes an awful beating especially on rough fields. (Look at what it does—it holds the engine and nose gear together for rough landings), so add the hardwood triangle block to help out. Sheet the bottom and top of fuselage.

The motor mounts are your choice. We had some aluminum ones laying around collecting dust so we used them. Mount engine to the fuselage so forming around it will be simpler. At this time the wing should be fastened down to the fuselage and lined up properly. Next, start building the cockpit and hatch area. It's a little difficult to form the balsa block over the wing, but it pays off in clean, rounded lines for the fuselage. Assemble stab and rudder to fuselage adding soft balsa filler to blend into fin area.

The landing gears can be made or a commercial gear used. Use "J" bolts or straps to hold the gear in place.

Not much left—lots of sanding, and for us lazier guys, MonoKote covering. Terry used silk and spray paint to finish it up. When I questioned Terry about the finish, his reply was, "For sheet balsa or block areas, brush three filler coats with 1/4 white dope added for white base coat, allowing overnight drying before sanding with 320 sandpaper. (Remember to use a tack cloth after sanding.)

"Spray three coats of desired color to all of the aircraft. I used Testor's new 1495 sapphire blue metal flake, with no sanding between coats. Spray three coats of clear dope (one to one thinner) for high gloss."

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LOCKHEED SIRIUS (Continued from page 24)



off power, thereby preventing a fire and saving his life plus those of the panicky spectators running toward him.

Still willing to back his efforts, the Tacoma group put up new financing, and Bromley returned to Burbank with enough salvage to mother-hen a second *City of Tacoma*. (Although Lockheed now was under Detroit's command, the same easy-going atmosphere prevailed.) Bromley and Vultee worked out several new changes to the second Explorer; however, this aircraft, too, came to grief. Subsequently, a third *City of Tacoma* was laid up incorporating engineering modifications that had come about as a result of the recent Lindbergh order.

The requirements of the Lindbergh aircraft had evolved enough, by now, to designate the new model name of Sirius. The same length as the Explorer, the Sirius, however, had a slightly shorter more slender wing with two degrees dihedral built in. Two single-seat open cockpits tandem were placed forward a classically high rounded tail which added a foot to overall height. Fitted with a 450 hp Pratt & Whitney Wasp, wheel pants and the NACA cowl, the airplane was painted in the high-contrast colors of black and orange.

Typically, Lindbergh was on hand every possible moment during the building of the Sirius. Then in January 1930, after testing by Lockheed pilot Marshall Headle, Lindbergh accepted it. Introducing the 2974-lb. bird to his petite wife Anne, the three got acquainted. Over the next four years, the Lindberghs and their Sirius were seen all over the world. And, although these survey flights presented some of their most demanding work, their flying missions together provided the couple their most precious moments of privacy. At this point in their lives the big Lockheed was a second home and sanctuary.

During 1934 the Sirius, by now known at the *Tingmissartog*, was donated to the American Museum of Natural History. When it later moved to the Smithsonian, the *Tingmissartog*—registered NR-211—joined the *Spirit of St. Louis*—registered NX-211. The following year Lindbergh's sentimental attachment for the 211 N-number was then transferred to a Lamberg D-145 Monocoupe which he kept for about six years before donating it to the Missouri Historical Society. Although it never participated in any particularly noteworthy flight and he wasn't overly fond of it, Lindbergh donated it to assure the preservation of a type of small aircraft

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*Unretouched photo duplicating Pat's demonstration.



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constructed in St. Louis during the Thirties. Referred to by him as "the Lambert," it's now on display at the National Museum of Transport in St. Louis.

Ultimately, 14 of the wooden Sirius were built more or less along the same lines as Lindbergh's model 8. A fifteenth was built in Detroit using an experimental all-metal fuselage.

Twin cockpits tandem provide the most noticeable difference between the Sirius and the single-seat Explorer. Sliding canopies added to the Lindbergh aircraft after a few month's trial became a standard accessory in all Sirius models. The slightly heavier Sirius 8A differed from the original 8 in having a larger fin and rudder area and an additional four in. added to the fuselage length. One aircraft in the 8A series was fitted with Lockheed's first fully retractable landing gear. Originally intended for the Lindbergh Sirius, the prototype gear turned out too wimpy. By the time the necessarily re-engineered wing (which later evolved into the Altair model Lockheed) was ready, Lindbergh had already exchanged the standard gear for Edo floats.

Construction of the Sirius C was typical of the methods of the day where each individual Lockheed was an individual built to individual specifications. The C differed in that forward the cockpits, a close two-seat cabin was included.

Nearly a year later the easily adaptable fuselage was again re-engineered into an air transport progression. First referred to as a Sirius six-passenger cabin plane, as the designs altered, the name was changed to Altair Model 9 before it too progressed enough to merit its own model name-type of Orion.

By making optimum use of the one basic design, Lockheed's 30-ton concrete mold turned out the distinctive, easily identifiable Vega, Air Express, Explorer, Sirius, Altair and Orion. With nearly every aircraft altered and changed, adapted and modified, stripped down or jazzed up to suit the requirements of their owners, each wooden Lockheed was an individual in an era of individuals.

SCALE SIRIUS

(Continued from page 68)



materials: K&B 1/2 oz. glass cloth, Francis Products surfacing resin, single-edge razor blades, a roll of toilet tissue. Cut a piece of the cloth slightly larger than the surface to be covered. Using a stiff brush, apply the resin over the cloth on the balsa surface. Roll out the toilet tissue over the cloth absorbing the resin. Tear off the end and peel the saturated paper away from the glass cloth. Be careful not to pull the cloth away from the wood. Trim the cloth after the resin

has hardened, sand slightly, and apply another full coat of surfacing resin. After the resin has dried, scrape the surface with a single-edge razor blade as far as possible without going through the cloth. Slightly sand the surface with varying degrees of garnet sandpaper. A coat of auto primer will show any defects to be filled.

The drawing shows the CG at 25%, although 32% is satisfactory. With the short nose moment, the difference required approximately six more ounces of lead in the nose. My model used about 14 oz. of lead mounted under the engine mount and in the cowl. The Williams Bros. dummy engine was cut up so badly that the weight was negligible.

Hobbypoxy was used to paint the model. The wing, rudder, fin, stab, and elevators were orange while the fuselage, cowl, wheel pants and fairings were black. Lindbergh's plane had gold trim on the cowl and fuselage bordered with red pin striping. Gold dope can be sprayed over the Hobbypoxy if the spray is mist-like. A heavy coat will cause the Hobbypoxy to blister and peel. Be very careful in removing the tape from the fuselage, as there is a tendency to peel the paint away from the epoxy fuselage. This can turn a mild tempered modeler irate, raving and swearing.

The first flying attempt was a disaster followed by many successful, pleasing flights. Dr. Les Stephenson, Ralph Yount and I decided to give the Sirius its maiden flight at the Hollister airport. A warm 102 degree day was chosen for the test. The Enya II engine and Perry carburetor performed flawlessly, idling at 2700 rpm for as long as required.

The tail picked up with the first burst of power and the model made a sudden turn to the left. The correction with my left thumb must have accidentally applied elevator and it cartwheeled. The nylon bolts sheared from the cowl mounts and the wing tips were scuffed. Other than a few small cracks, the damage was minor. Two adjustments were made. The elevator throw was decreased and full right rudder trim was used for takeoff. Once airborne, the trim was removed. This countered the torque, although there was a tendency to steer to the right.

The next five flights were made at the '72 Chicago Nats. where it flew even better than I had expected. The roll is slow and in loop it tracked perfectly. The landings were easy to control which is probably due to the thick Clark Y airfoil. The Gold-N-Rods tended to change trim in the black fuselage when the temperature rose. The next model will probably have music wire running through the nylon tubing.

When the engine was "honking," I found the nine-lb. wonder did not perform at all like a heavy model. It was an easy, fun to fly model. The director of the airshow, at the '72 Nats, asked me to fly it for the spectators. Many of the people showed their admiration by thanking me for taking part in the ex-

hibition. This was personally very rewarding.

After taking a dozen orders for the kit, I realized that this vintage aircraft model left a little nostalgia with the spectators. My time has been well spent.

The modeler wishing to purchase the fuselage may send an inquiry to Bob Palmer, 9161 Morehart Ave., Arleta, Calif. 91331.

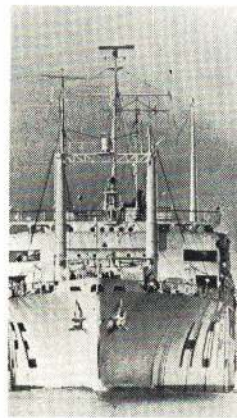
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GIANTS OF FREE FLIGHT

(Continued from page 12)

C and D competition was well represented by all the top California modelers. Jerry Dyer of Canoga Park (San Valeers), was quick to max out in D with his Torp 41-powered "Star Duster 900," and just for good measure put up a fourth max to take the early lead before switching to another class. Jerry was flying for the sweepstakes awards and had to move fast as all his events were being flown that day.

Mike Schwartz, also of Canoga Park (San Valeers, Team Satellite), began flying his ST-powered "1300 Satellite" official a little later and didn't quit until he had racked up six straight maxes taking the lead in D.

Bob Vinson of Costa Mesa (SHOC) was next to post three maxes. Lee Hunt of Canoga Park flying a K&B 41 on the business end of his "Condor 800" was stopped by an overrun on his fourth flight. Mel Schmidt of LaHabre (SHOC) powered his "Shocer Design" with an ST 46. The ship goes well.

Ralph Prey of Inglewood (San Valeers) had his beautiful mylar-covered 1200 sq. in. "Hi Carumba" trimmed perfectly. A pacifier burst on his second flight at five sec., but he still only dropped 44 sec. on the flight. From a VTO an engine cutoff would be disastrous for some ships, but Ralph pulled out right on top. He went on to max on his third flight.

Bob Hunter of Arleta (San Valeers, Team Satellite) with his "Satellite 1300" ST 65 put up four maxes before hitting a hole. I flew my "1300 Satellite" to the fifth max when I had to switch to Class C as it was 2:30 and I hadn't flown any C flights.

Sal Taibi of Lakewood, flying one of his famous "Star Dusters" had five maxes on the board. Great to have you back in contemporary Gas Sal. Jim Scarborough of Lakewood (SHOC) and his "Texan" had four maxes and a 2:07. Walt Prey of North Hollywood (San Valeers) flew his "Series 60 Satellite 800" to maxout. Johnson 35-powered.

Bob DeShields of Canoga Park (San Valeers, Team Satellite) had a new 800, but had pacifier trouble on the third flight causing a short run. He dropped only one second on this flight. Good show Bob. Dick Myers (Gridley, Calif.) just missed his fourth flight, but did win the ST 65 raffle later in the day.

Hulen Mathies of Lomita (San Valeers, Team Satellite) had a new "1300 Satellite" for C. The ship powered by a Turning Rossi 60 flew to the fourth max despite developing a cracked rotor which drastically reduced the Rossi's power.

While all this was going on, Walt Ghio of Stockton was sitting on a substantial lead of 20:24 with his C "Witch Doctor." A hard time to beat.

I put up my first C flight at 2:45 in the afternoon and, as fast as I could, put up four more. Then decided to switch to my new 41-powered "1000 C special

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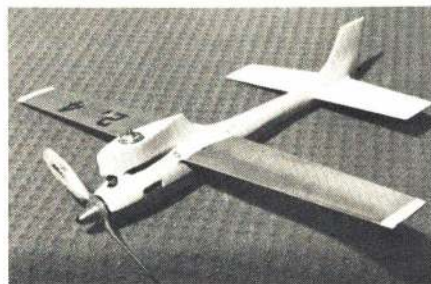
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Satellite" for the rest of the flyoff flights being five-sec. runs. The "1000" went up for the fifth and sixth max. On the sixth max however, there wasn't time to retrieve the ship, so the 1300 was used on the seventh flyoff. A four-sec. run on this flight caused me to come down four sec. short of Walt's winning time. Unfortunately Walt hadn't entered *Gold Coast Eliminations*.

ABCs OF SPEED

(Continued from page 56)



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Here is a chart on sizes:

	Overall Length	Wheel Base	Height
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A	14"	19"	4"
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C	17"	26"	7"

Use "Mouse Trap" type dollies that lock the model in place until flying speed is attained. Release of the model is accomplished by the use of a trigger (1/16" wire) that drags on the ground and releases the ship when the airplane has lifted 6 to 8 in. When constructing dollies, make sure that the airplane is tightly fitted and that the CG of the dolly is comparable to that of the airplane.

Flying

Take the model off with the controls in neutral and when flying speed is attained (¼ lap) apply *full up* until model is airborne, then level off. With flying speed models it is always advisable to keep the ship as low as possible (two to five ft.) off the deck.

Jets are a little different from standard Speed models and require a more "in depth" look to fully understand the complexities.

I have been using my original "Key Note" design for eight years now and have it refined to the state of a very consistent flyer. It, like my other ships, uses .010"24 ST aluminum wing panels. The stabilizer is 1/8" bass sheet and the fuselage is a 1/2" bass core with 1/8" balsa sides with block balsa fillers. The

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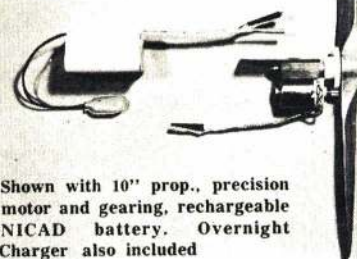
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tank is 1 1/2" dia. aluminum tubing with machined aluminum nose cone and rear cover. The tank also serves as the front of the fuselage. The tank itself is a very critical part of jet models and the piping must be of the correct size and in the proper location. I use 1/8" ID pipe for the pickup tube and 3/32" ID for the filler or vent. The tank should be soldered together or epoxied—in any event it must be leakproof. The entire model, except the wing, should be finished with three or four coats of epoxy paint.

Since AMA and MAAC rules limit the tailpipe cross-sectional area to 1.25 sq. in.—the size of a red-head Dyna-jet—this is what you have to use for a jet. O.S. makes an exact duplicate of the Dyna-jet so it could be used.

Many people believe that a jet is an awfully hard engine to start and operate. Actually the opposite is true; if the tank is correct it is the simplest and most desirable type of power imaginable. All the variables are preset before a flight so flights can be consistent all day long.

Basic modifications are as follows: (1) Lap tailpipe to positioning ring; (2) Lap valve area of head; (3) Lap flat the valves; (4) Ream out the ports to valve size limits; (5) Polish ports and venturi area; (6) Cut off pump attachments on flowjector; (7) Valve retainer modification detailed below.

Of course the real power increase comes in the form of changed timing.

This is obtained by increasing the curve of the valve retainer. The amount the valves open is what counts. To start a .040" cut of the retainer, will bring you up to 160 mph mark. Mark the .040" on the edge of the retainer and turn down the curve to mach. Make sure the curvature is smooth so the valve stems bend uniformly over the surface. I usually run four retainers cut in increments of .020", (.040, .060, .080 and .100"). My best flights were turned using the .080" retainer but valve life is short using these big opening figures, so the .060" is the most popular. The best flight turned on a .060" retainer was 179.93 mph and 183.60 mph on the .080" unit.

Jets burn almost any kind of fuel; the trick is to get the power out. So many combinations can be tried so the hot setup is to test fly them all. Some successful formulas are as follows: A—75% nitromethane, 10% propylene oxide, 15% methanol. B—60% methanol, 20% benzene, 20% nitromethane. C—50% benzene, 45% propylene oxide, 5% butyl peroxide. D—50% benzene, 25% nitromethane, 25% propylene oxide. E—50% methanol, 25% nitromethane, 25% propylene oxide. F—70% nitromethane, 10% propylene oxide, 10% nitro benzene, 5% butyl peroxide, 5% nitro propane.

With all the different fuel mixes imaginable it is no longer possible to just run a No. 4 metering jet as is supplied by Curtis. For example, benzene base

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fuels run No. 5 to No. 9 Jets. Methanol base fuels run No. 10 to No. 13 jets, and nitro base fuels run No. 11 to No. 15 jets.

The trick is to run the engine as rich as possible without cutting out. This is the most powerful way to run a pulse jet engine. In fact the lower the pitch of the engine, the faster you go—not vice versa!

Starting is obtained by use of "Model T" spark coil in conjunction with a 6V battery to create the necessary spark. With a tire pump, air is forced over the flowjector, syphoning fuel, and creating the proper charge required for combustion. A jet will only start when the correct air fuel ratio is obtained. This, of course, is adjusted by changing metering jets to suit. Take the model off with full up and keep walking backwards maintaining line tension until airborne. Always release the model quickly after starting as the heat build-up is terrific.

Because of the highly technical and scientific aspects of Speed flying, this article only scratches the surface. To properly understand the art, one would have to write entire books on engines alone. If the reader desires more complete information the following write-ups are excellent: "Winning Speed Models" by Dale Kirn (Jan.-Feb., Mar.-April 1966 American Modeler). "Tuned Pipes" by Bill Wisniewski (March 1967 MAN). *Control Line Manual*, Moulton (Model Aeronautical Press Ltd., 1961). *Model Aero Engine Encyclopedia*,

Moulton (Model Aeronautical Press Ltd., 1962).

Speed Equipment Specialty Manufacturers and Suppliers

Bill's Miniature Engines, 1325 Carol Dr., Memphis, Tenn. 38111. Sonic Speed Shop, Box 287, High Point, N.C. 27261. C & R Speed Equipment, 5150 Highgate St., Vancouver 16, B.C., Canada. Franny's Chrome Specialties, 513 Vesta Place, Hyde Park, Reading, Penn. 19605. International Hobbies, 2627 Lasalle Way, San Jose, Calif. 95130.

ALUMINUM WINGS

(Continued from page 40)

favorite wing rib pattern and make four from 1/8 in. balsa. Two additional ribs, total of six, are required for combat wings in order to provide support for the tail booms. For stunt wings two ribs are equally spaced either side of the center rib obtained from the fuselage cut out as shown. The ribs are assembled using three full-length spars. This simple structure is all that is required to support the aluminum sheeting. The necessary structural strength is obtained from the curved aluminum skin.

Once the rib and spar structure is built to the desired size mark a line down the center of the length of an aluminum sheet. Bend along this line to form the leading edge of the wing. A

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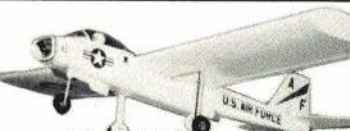
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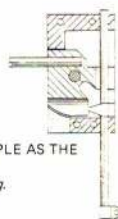
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simple method of getting a straight bend is to place the aluminum sheet between a door and the doorjamb at the hinge side, carefully align the marked centerline with the door edge, and slowly but firmly close the door. This will give you a good, sharp bend for the leading edge of the wing and alignment of the ribs. The direction of this bend determines whether the printed or clear aluminum side will show on the finished wing.

Next, place the bent aluminum sheet on the workbench as shown in the photograph. The support frame and the aluminum will be joined using contact-type cement. Mark the position of the rib and spar contact areas on the aluminum sheet. Clean these areas of surface film and ink using sandpaper. Apply the contact cement to the cleaned aluminum areas and to the bottom edges of the ribs and spars. When the contact cement is properly set up, place the forward tip of the ribs at the center bend and press into place. Work backward to the trailing edge keeping the tip ribs aligned with the edges of the aluminum sheet. The aluminum should easily follow the contour of the ribs and a good bend should be obtained.

Install the leadout wires bellcrank and pushrod. Be sure the plywood bellcrank platform block extends through the center of the wing. Cut the required hole for the elevator pushrod in the aluminum sheeting. Also, if a combat wing is being built, now is the time to cut the slots next to the appropriate ribs for the mounting of the tail support booms. Complete the entire installation of the control system at this time; once the other half of the aluminum sheeting is attached, further work is impossible. Trim off the excess bottom aluminum sheeting on a line marked 1/4 in. back of the trailing edge of the ribs.

Clean the interior of the other side of the aluminum with sandpaper where it will contact cement. Also, coat the top of the ribs and spars. Again, start at the leading edge and work back to the trailing edge with the aluminum sheeting. This closes the wing. The excess aluminum sheeting on the top half of the wing is cut off 1/4 in. back of the edge of the bottom sheeting. Using pliers bend this 1/4 in. piece down even with the edge of the bottom sheeting along the entire span. Put contact cement on the turned-down aluminum and fold forward so that it locks the bottom sheeting. The drawing shows this simple technique. The wing is now complete.

For combat type planes the plywood tail booms are now inserted through the aluminum next to the inboard ribs. These booms are coated with epoxy where they will join the ribs prior to insertion. Epoxy is also spread into the openings and used to form a fillet on the outside surface. This will insure a good joint and mechanical strength.

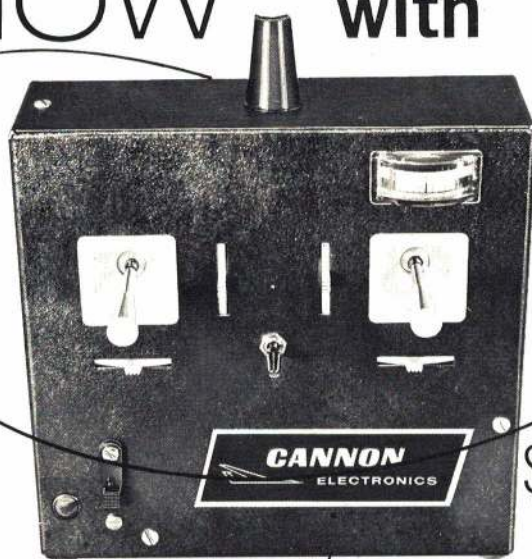
The fuselage for stunt ships and the forward engine support for combat ships are made from balsa plus the hardwood motor bearers and cut to fit the contour of the wing. The wing is slid into the fuselage opening and attached using contact cement. Two 1/4 in. dia. holes are now drilled down through the

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fuselage or motor bearers and through the wing skins with at least one hole through the bellcrank support platform. Two dowels, 1/4 in. in dia. are inserted through these holes after being coated with adhesive. These dowels bond the wing and fuselage together. This positive lock is recommended because good, lasting glue bonds to aluminum are difficult to obtain and safe construction is a must.

Installation of tail surfaces, plywood motor mounts, engine and tank follow conventional practice. Large tanks can be placed within the wing by cutting out a portion of the top or bottom sheeting and adding a bent-up aluminum cover. No problems have been encountered because of loss of structural strength due to these cutouts. Tips can be added if desired.

No finish is required on the aluminum wing sheeting. Interesting patterns can be had by leaving the inked design on the outside of the wing. This ink has a tendency to fade when first handled and subjected to fuel spillage, but after a few flights very little additional fading takes place. No protective coating has been used on our models except for the exposed wood and tissue areas. These should be covered with a fuelproof finish.

There you have it. It's quick, simple and low in cost. The material and techniques described produce rugged, durable models. When others want to know how you got such a hard finish with newspaper covering or such a perfect aluminum finish, tell them, and let them enjoy the benefits of an aluminum wing model!

TANGERINE

(Continued from page 60)

the plan. Without gluing, put the ribs, the 1/8" square leading edge, and the 1/16" square spar into position. Use the dihedral guides to establish the proper angle on the ribs at the dihedral break as pictured. When everything fits properly, take the wing apart and reassemble with glue. Let the glue dry 24 hours, then very carefully unpin the wing from the board. Using an emery board, round off the leading edge and taper the trailing edge to blend with the ribs.

The wing is now ready to be covered with Jap tissue. Spray the tissue lightly with water after the covering is on. (Don't soak the tissue—it seems to shrink better if just slightly damp.) Pin the wing down over several 1/4" (or double 1/8") thick pieces of scrap balsa—this will keep the wing flat while drying. Locate the pieces so they are under the wooden parts of the wing and touch as little unsupported tissue as possible. Use at least four pieces with one at each corner.

When the wing is dry, remove it from the blocks and rub wax on the blocks to keep them from sticking to the wing when doped. Dope the wing with a mixture of 1/2 dope and 1/2 thinner. Pin the wet wing down over the blocks again and let it dry 24 hours. Cut the tissue between the double ribs at the dihedral break and then carefully cut

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the spar, leading edge and trailing edge. Sand the cut ends smooth and rub them with glue. Now, if the ribs are glued to each other where they were cut apart, the proper dihedral will be the result. Pin one wing panel down on the building board and, using plenty of glue, glue the other wing panel to it. Place blocks under the wing panel to hold the tip at the proper height (be sure the dihedral is correct at both the leading and trailing edge). Once again let the glue dry 24 hours.

When the glue is dry, the wing is complete. It is possible to rush the various drying times, but by going on to other parts of the plane while the wing is drying, you won't lose time and a better wing will result.

The stabilizer and fin are cut from 1/16" sheet and the fin is glued upright on the centerline of the stabilizer. Use pins to keep the fin vertical while the glue dries.

For the noseplug, cut four 1 x 1" pieces of 1/8" balsa and laminate them into a 1/2" thick piece. Alternate the grain direction in the layers (as in plywood). Cut a piece of 1/8" plywood 3/4 x 3/4" and glue it to the laminated block so that 1/8" of the block shows on all four sides. Glue a hardwood thrust button to the center of the block on the side opposite the plywood (use a 1/4 x 1/4" piece of 1/8" plywood if you don't have a thrust button.) Allow it to dry overnight before working on it further. Drill a 1/16" hole through the centerline of the noseplug, sand it to shape

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and install the prop. A bead placed between the front of the noseplug and the prop will help the prop run more freely. A short piece of rubber tubing over the propshaft where it is looped to hold the rubber motor will result in longer motor life.

Cut out the fuselage sides and formers. Glue the 1/8" square stringers and the 1/16" sheet doublers to the sides (the bottom stringer only goes back as far as former 5). Be sure to make both a right and a left side. While the glue is drying, bend the landing gear from .045" music wire. Cut the holes for the two wing hold-down dowels and the motor mount dowel now. Place formers 2, 3, 4, and 5 in position on one of the fuselage sides, then add the second side.

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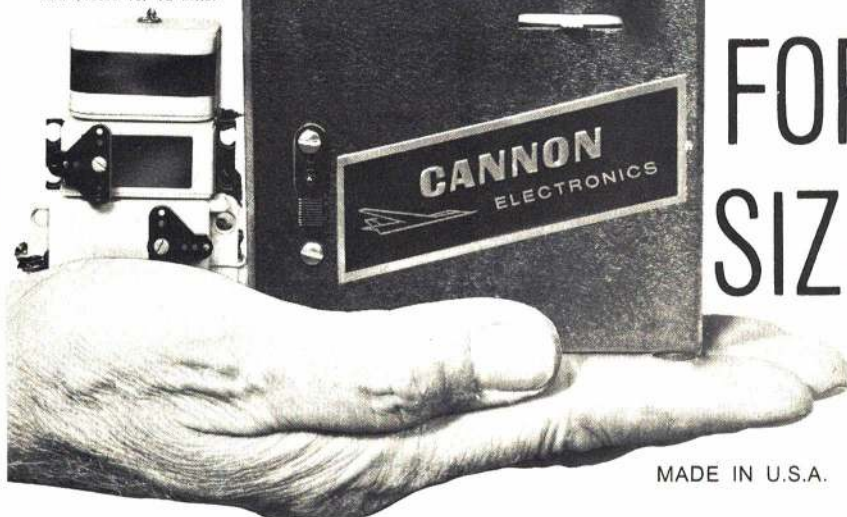
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Check to make sure everything fits satisfactorily. The grain should go from side to side on the square formers. When everything fits, put it together with glue. Fit 1/8" square cross pieces between the stringers at the nose and then glue in the 1/8" sheet braces. Cover the fuselage sides with tissue at this point. Next, bring the tail together, beveling the stringers so they join smoothly. When the fit is good, glue the joint. Using plenty of glue, fit former 1 into position in front of former 2 and the landing gear, then push it back and clamp it. This forms a sandwich with the formers on the outside and the landing gear and glue in the middle. Put the wing hold-down dowels in place, glue them to the formers as well as the sides. Cover the fuselage. The top between formers 2 and 3, the last two in. of the top where the tail will be, and the bottom in the back of former 5, should be left uncovered.

Glue the 1/16" sheet cabin roof onto the fuselage, put on the wheels, and glue the 1/8" sheet wing supports to the cabin roof. With some tissue that contrasts with the fuselage, cut windows and dope them on so the pilot can see where he is going. Next, glue on the tail. Make sure that the fin is straight and that the stabilizer isn't tilted.

Tangerine uses four strands of 5/32" rubber 18" long for the motor. To make the motor start with a six-ft. length of rubber, wash it with hand soap and warm water, rinse well and dry. When dry, tie into a loop, double this loop on itself and you have a four-stranded, 18"

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long motor. Be sure you lube the rubber. If you can't get regular rubber lube at the hobby shop, glycerin from the drug store can be used.

When inserting the motor, wind the prop a few times and the motor will shorten enough to fit into the fuselage.

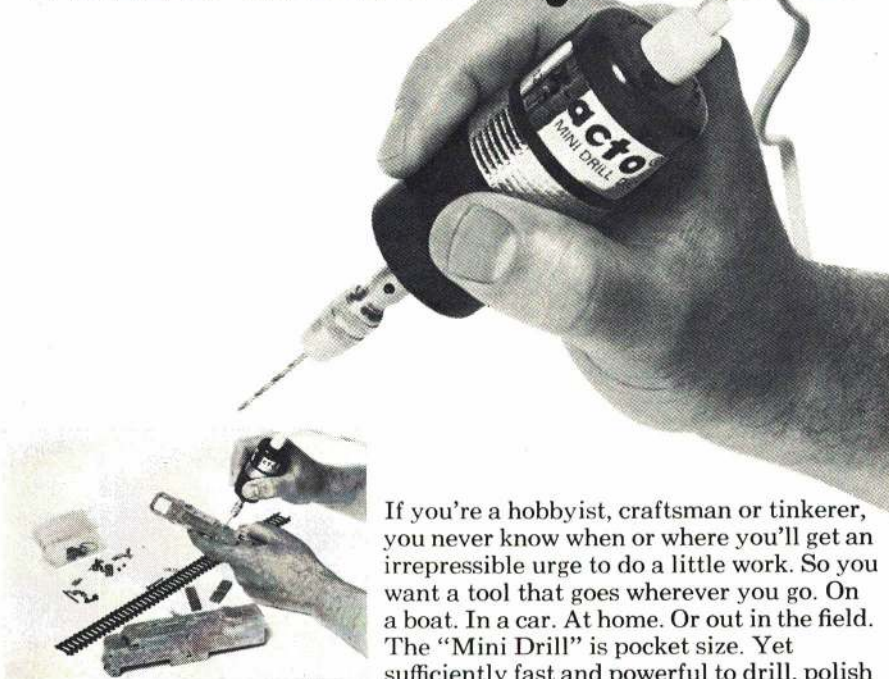
With the motor and prop in place, the model should hang level if you support it with one finger under each wing at the balance point. If it doesn't hang level, add modeling clay a little at a time to the high end until it balances correctly. Test glide by holding the model at about shoulder height, pointing it at the ground 15 or 20 feet in front of you, and launching gently. If Tangerine climbs and stalls, glue a 1/32" shim to the trailing edge for one in. on each side of the dihedral joint; if your model dives into the ground, glue the shim to the leading edge. When trimmed properly Tangerine will glide forward smoothly, with a slight left-hand turn.

Now is the time for a powered flight. Before winding the motor, add some downthrust by placing a 1/32" shim behind the top of the noseplug with a dab of glue. Be sure the noseplug is marked so that it always goes in the same way. Then, using a winder, put about 200 turns into the motor.

A winder can be made by putting a piece of bent wire in the chuck of a hand drill. Be sure that the wire is in securely so that the motor can't pull it out.

Release Tangerine straight ahead, into the wind, and level from about shoulder height. If the model stalls, add more downthrust by putting another shim behind the top of the noseplug. If it flies violently to the left, add a 1/32" shim to the rear of the left side of the noseplug to give righthrust. When flights are going well, gradually increase the number of turns in the motor to about 700.

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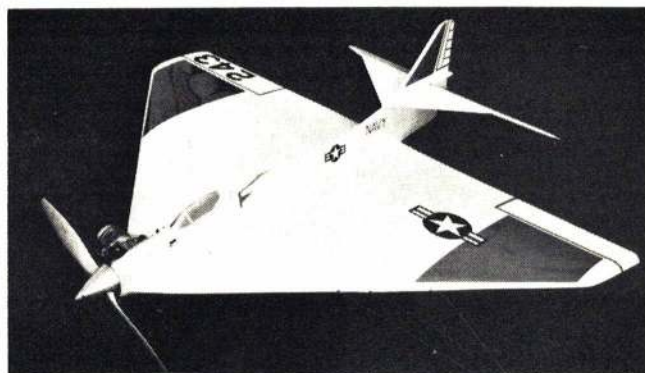
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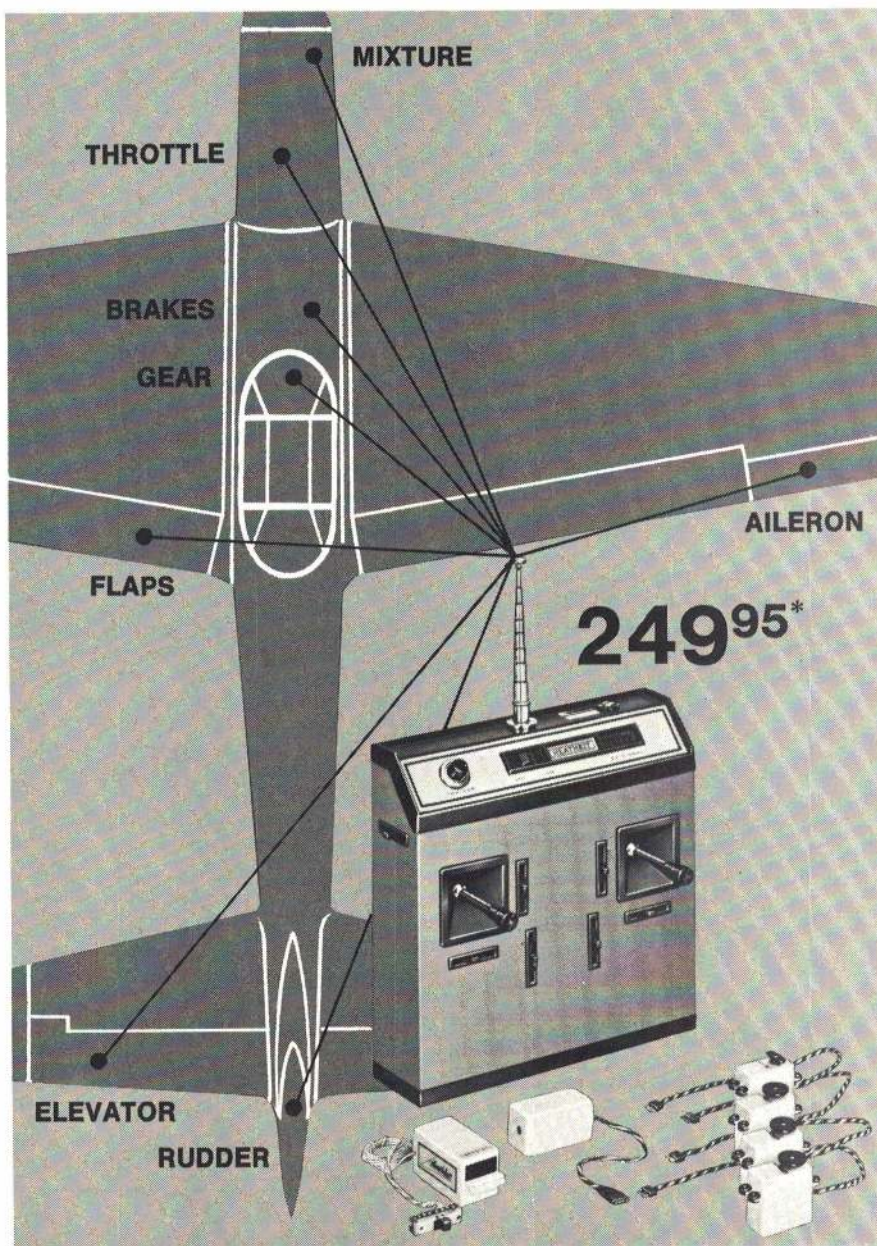
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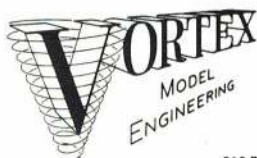
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STOCKWELL ON RC

(Continued from page 48)

one's class in FAI and proved it at Cranfield, would have qualified them near the top of either list had they been able to fly in contests of the size and numbers that were available to the Southern California group.

As for airplanes, the PB Products Miss DARA was flown by eight of the top 20, including four of the top five. And for engines, K&B had it all the way with the new Schnuerle. Only Terry Prather and Joe Vartanian managed to get a Tigre into the top 10.

There are interesting rumors floating around that both Rossi and Supertigre will be out with a rear-rotor .40 for the 1973 season which, combined with the ready availability of the K&B screamers, should make this the most exciting season ever.

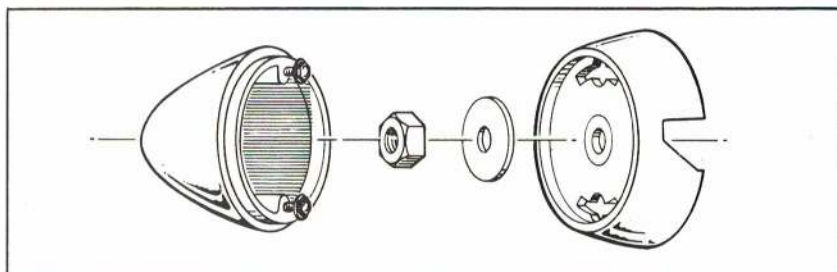
It will, unless Maynard Hill has his way. I find myself in a state of shock at the absurdity of his proposal that Formula I should be reduced to 19 engines. Assuming they would get off the ground at all with a 19, they would be so unstable as to be virtually unflyable. Since Maynard Hill is a physicist, a distinguished scholar at a major university, I would hope to appeal to him, also being a scholar and connected with a major university, to look objectively at the evidence. It is probably correct that Formula I should have some brakes put on it, but there are at least a dozen sensible ways to do so without killing the most exciting racing event in the history of modeling.

Some suggestions: (1) Make the airplanes more nearly true scale, at least with respect to fuselage cross section. (2) Require larger propellers, stock except for sanding one blade for balance. (3) Reduce the venturi size on the carburetors. (4) Require the use of colder fuel, maximum 25% nitromethane or less (but not straight alcohol because of the extreme variability of reaction that fuel has to climatic differences). (5) Lengthen the course to give the flier more time to set up for the scatter pylon, which is the hardest part of flying a safe course. (6) As a last resort, drop the engine size to 29.

Times in the neighborhood of two min. to two-and-a-half min. on the present course, which any two of the above suggestions would bring about, are simply not any more dangerous than routine Sunday flying, and probably considerably less dangerous than the kind of flashy pattern flying with heavy bombers that is characteristic of events like the Huntsville Tournament.

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EDITORIAL

(Continued from page 10)

Let me relate some of the fun things that happened during the birth of my small conversion. Learned how to make a kangaroo hop with an aircraft! That's when you have a tripod trainer type landing gear on your chopper and experience engine failure at 50 ft. altitude. It falls naturally, but on that landing gear it rebounds like a scared kangaroo back up several feet. Best thing for the pilot to do when the engine fails is hold "fore," get out of the way of the falling beast, and turn off the transmitter. You see, there is nothing you can do to stop the fall or control it. The helicopter tries to attack you. As a matter of fact, several times when cruising



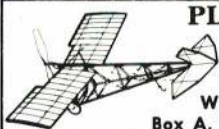
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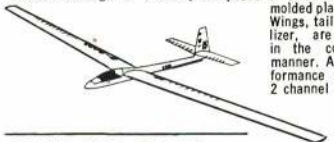
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around with the model, I've had it head right at me! I run. Only after it has passed do I try to keep flying it (remember, it is stable in forward flight).

Oh yes, and the time I went to Florida for a vacation taking the helicopter with me on the airline. You can picture the scene trying to carry a helicopter fuselage (sans main or tail rotor blades or landing gears) past the airport security guards. They were convinced I was some kind of weapon-carry nut. After assuring them that model planes are my business and this thing was rotors (in my suitcase) they allowed that the weird contraption was harmless—if it would fit under my seat on the plane. (I was glad I had copies of AAM with me.)

This kind of development effort is one of the great things about model planes. We can try so many things harmlessly. Our lives are not risked in these models. One of the model helicopter designers tells me that he does not want to ever ride in a helicopter for real. He's seen so many ways for the model to fail

he imagines possible failures in the real one. Yet, we do maneuvers with models you won't see a real helicopters pilot try. Helicopters can easily do stall turns just like an airplane. But only helicopters can do a full revolution in yaw before coming down again from the stall turn. You won't find the pilot of a full-size helicopter trying that. We will be seeing model helicopter meets for realism and aerobatics in the coming years.

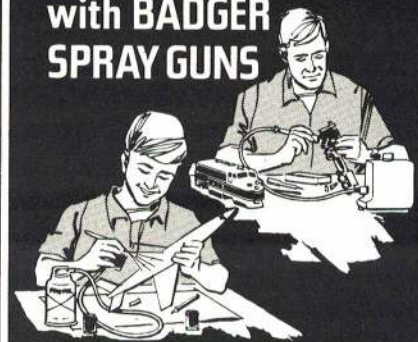
In a coming issue I'll write about my conversion model, born at last after nine months labor.

AAM GLIDER WINCH

(Continued from page 66)

the line out of the bicycle hub. If the line gets hung up in the axle, you are not going to get altitude on the next flight—that's for sure. If the line pulls hard back to the winch after a launch, check the turnaround for some kind of line entanglement—it could be hung up on the anchor pins.

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The winch line guide is made of spring steel wire from your local hobby store. To get it formed, I used a one-in. socket gripped into a vise. Start somewhere in the middle and start twisting. A suggestion is to practice with a piece of soft wire like a coat hanger. This should give you some practice in the technique to be used for the hard-to-bend spring steel wire. Cut off the excess to give the seven-in. length to fit into board "E" brass tubing. Do not epoxy the guide in place because it will be unhandy in transporting. Keep it so it can be removed after a day's flying. Remember the notation "Caution" on the drawing.

The secret to using a light wood pulley is the use of this winch line



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guide. If the guide is forgotten, the pulley will shatter on your first tow. The advantage of using a light wood pulley virtually eliminates any fly-wheeling action. A heavy pulley will cause nothing but trouble. The backlash will be so bad you will spend hours untangling the winch line after each tow. Keeping the pulley light is the key to eliminating backlash problems.

The starter motor is a Ford 12 V 1954 to '64 long shaft vintage. The wrecking yard is a good place to start looking for one. Be sure the bearings are good and the armature isn't dragging the fields.

A modification to the starter should be made in order to increase its efficiency by removal of the third small speed-limiting field. This is done by cutting one of the lead wires to it. It is easy

to recognize which one. Observe the third field winding in the starter removing the electrical connection on the smaller field of the three. I found that this modification increased the rpm by 33% and lowered the current drain by 15%. The no load rpm should be checked on six volts. If you cannot get over 3400 rpm, something is binding or out of balance and should be corrected. This is important because when hoisting the three- to four-lb. or more gliders you need all the power you can get. A handy instrument in checking the rpm is the Heathkit Thumb Tach. This can be done by placing a piece of black tape across one end of the wood pulley as a light source interrupter.

The starter solenoid can be picked up at a local auto parts store. Be sure it is a six volt unit, otherwise intermittent operation will result.

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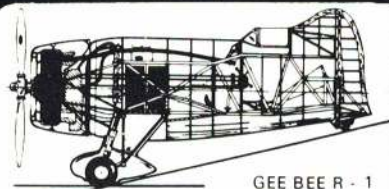
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Final assembly and wiring following the electrical diagram is straightforward. The only problem that you might encounter is getting the right length battery cables from an auto parts store. Most of them are too long and if you decide to cut them off you have no way to make up the cable ends. Three heavy cables are required. One cable 24" long will be enough material but if you can purchase two smaller ones that would equal the 24" length you are better off.

The bolt-on clamp type terminals worked very well and let one dress up the cable length to make a nice-looking job. Required cables are one six in. with lugs on each end and one ten in. and one eight in. with lugs at one end and battery terminal clamps at the other.

Make sure all connections are secure and your common ground on the starter case has a good metallic connection. The 3/8 x 2" bolt is long enough for this and will be double nutted with the cable and foot switch lead between. The reason for the electrical socket setup on the foot switch was for safety. When the winch is not in use it can be disconnected, thus keeping it from being turned on by mistake.

A push button could replace the foot switch if necessary. Having the foot switch lets the glider pilot do the operating and a much more efficient launch can be made. Keeping the wings intact is most important and if mishandled the electric winch will sure pull them off.

Various types of winch line can be used. The nylon seine twine is the most

economical and practical. Monofilament is hard to see and has too much stretch. The woven fish line is too expensive and has no give. The seine twine does very well and gives just the right amount of flex. For heavy gliders size No. 15 can be used. I have tried the No. 9 cord and found the weight that the glider has to pull up is 1/2 of the No. 15 size. More altitude can be obtained but will part the line on gliders over five lb. The No. 12 is then the average and works the best. The local hardware store or hardware section of a department store should stock it. Nylon seine twine is used a lot for wrapping packages. The winch line can be half hitched to the 1/4" dowel shear pin when reeling in on the pulley.

The free end of the winch line (the part you are going to attach to your glider) will have some sort of metal eye. The common dime store one-in. key ring is perfect. It fits just about all tow hook attachments on gliders.

The parachute is the conventional drag type used on Hi-starts. They are advertised in most model magazines for soft-landing model rockets. If you decide to make your own, don't make it too big because it will balloon on you when in tow. The fish line swivel between the parachute and winch line lets you disconnect the two. This will save a lot of wear and tear on the parachute when reeling in the line. It also lets the free end untwist, keeping it from having any more tangles than are necessary. On crosswind days, it might be wise to remove the parachute. In its place use a small cloth rag. This will let

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the winch line free fall back to earth near the turnaround a lot closer than letting the parachute go off to the extreme left or right out in the boonies and weeds. The parachute's main intent is to cut down the line retrieval time letting the wind bring back the slack to the launch point.

The foam rubber glued to the bottom of the winch will help keep it from sliding on irregular surfaces. The anchor pins are necessary to keep your winch in place on a hard pull. Never let the winch line pile up against the end plates of the pulley. To test this alignment after the line has been stretched out through the turnaround, press the foot switch to take up the slack in the line. Be sure you are holding onto the key ring parachute end. Watch how the line takes up on the pulley through the winch line guide. If the line stays to one side, reposition the winch and reanchor with the pins. See that the line oscillates back and forth on the pulley. If it does, you are ready for your first launch.

This winch operates best in lifting two- to four-lb. gliders. If lifting gliders five to eight lb., I switch the battery to a 12 volt system. The winch operates very well on this voltage and no other changes are necessary.

A speed control device is what every winch operator dreams of. I have worked on several ideas. The reostat type would be too big and bulky; the transistor type would be fine, but at this time the cost would be ridiculous for something to handle the power. They would cost well over \$100.



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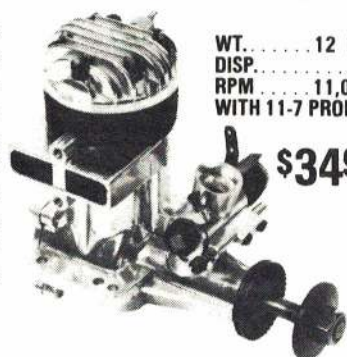
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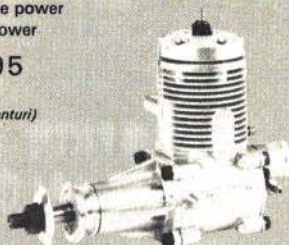
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A simple device with which I have had success is an offshoot of the old Phelps pulser used in Galloping Ghost system transmitters. The pulser becomes the keyer in series with the foot switch, pulsing the solenoid at an on-off rate. The adjustment of the pulse width gives the amount of on time with voltage applied to the winch. The mean average giving the reduced voltage, or whatever, needed for the right kind of tow for the glider. The solenoid seems to stand up well under the hammering. Adaption of the pulser with control to some sort of foot control to increase or decrease the winch speed has not yet been tried. The use of one's foot on the foot switch (for the 10 to 15 sec. in use) and pulsing manually seems to control the speed well enough for the present.

The pulser becomes most useful when the 12 volt winch is available and you want to tone it down to hoist a two-lb. glider. Turn it on and operate the foot switch as normal—only with the pulse operating at a 50-50 rate which is equal to six volts on the starter motor time-wise, from a 12 volt battery.

A final word on using the winch. It can be a killer and wing buster if you get too heavy on the foot switch. Treat it with respect, taking pride in seeing how you can control the speed and pulse your way to a new height on each tow. You have the control, use it.

Electric Winch Parts List: Foot switch, Model T51-S, Lafayette Radio (\$2.90*); Plywood, 2' x 2' x 1/2" (\$1.25); Motor, starter 5/8" O.D. long shaft, Ford 1954-1964. Used: Local Auto Wrecker, in good condition (\$7.50); Solenoid, starter, six volt, for early Ford. Bendix SW-55 (\$3.50); Cables, battery, three each, short. (\$3.50); Battery, six volt, 85 amp hour, sport car type. Wards Riverside No. 1C-19L (\$18.00); Material cost for a pulley made from a common household rolling pin and 1/4" birch plywood. Center hole to fit the 5/8" starter shaft. (\$3.00); Bicycle front hub (For remote turnaround pulley). Schwinn No. 4901 (\$2.50); 2000 ft. of No. 12 or No. 15 nylon seine twine. Newton Line Co., Homer, New York (\$4.50); Miscellaneous: Nails, screws, wire, paint, glue and three in. of 1/4" dowel (\$2.50). Total cost: \$49.15

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SKYHAWK

(Continued from page 30)

flaps can be an asset on Scale Carrier ships but that they are not really necessary on a Profile by increased weight and drag, not to mention the linkage problem. The only days on which flaps can be used to their full advantage are those with near calm wind conditions. With calm winds, a good pilot can fly much of the slow speed run with the model stalled and hanging on the prop. Two members of my club, the Chandler Balsa Bugs, have flown slow speed runs consistently over two minutes (less the 15 mph)! With the airfoil stalled, flaps are worthless.

Construction is by no means complicated, but since the wing is a bit unusual, a word or two on its construction is in order. Construction should begin with the center section. The center section ribs, R3 and R4, should be assembled separately with F2 and F3, the main landing gear block, tailhook mount and bellcrank platform. Use a piece of scrap balsa tack glued to the ribs at the trailing edge to ensure alignment while the glue is curing. Use epoxy on all hardwood joints for adequate strength.

The entire wing is built as a unit. Tack the lower trailing edge to a straight

(Continued on page 102)

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INTERESTED IN JOINING A.M.A.? Over 46,000 did in 1972. Details may be had by requesting FREE BROCHURE from above address.

FAI CIAM 1972 Plenary Meeting

BACKGROUND. The Federation Aeronautique Internationale (FAI) is the world-wide governing body for all sporting aviation, with approximately 50 member nations. The FAI is concerned with competitions and related activities for all aspects of aviation: airplanes, helicopters, balloons, gliders, parachutes, model aircraft, etc. For each major sport, the FAI has created specialist committees; for modeling the applicable group is known as the Committee for International Aero Modeling (CIAM).

The National Aeronautic Association (NAA) is the U.S.A. representative of the

FAI. The NAA, in turn, delegates authority for specialized activity in this country; the AMA has been authorized to represent American modelers before the CIAM.

The FAI is also concerned with airspace use for all sporting aviation on a world-wide basis just as NAA and its affiliates, including AMA, are concerned in America. In its attempt to safeguard against loss of airspace, the FAI is organizing a new Committee for Airspace—to include representatives from soaring, ballooning, general aviation, models, etc. As indicated in this report further on, AMA Executive Director John Worth was

elected to represent the CIAM on this important committee.

THE MEETING. Voting delegates from 24 nations (one vote per nation) attended the November 30-December 1 Plenary (full) Meeting of the CIAM, along with approximately 25 advisory personnel and subcommittee members. For the U.S.A. the following were present: Maynard Hill, voting delegate and RC Subcommittee chairman; John Worth, alternate delegate, AMA executive director; John Clemens, AMA president; John Spalding, AMA-FAI Activities Committee secretary; Cliff Telford, AMA-FAI Activities Committee Pylon Racing representative; and Harry Stine, Space Models Subcommittee chairman.

A huge agenda was successfully handled, and overall results of the meeting were considerably more favorable to the U.S. position than usual. Especially in the area of Pylon Racing, the AMA's experience and leadership was influential in improving and clarifying the rules.

Except as noted for Free Flight, all of the changes to the rules were voted to be effective on January 1, 1973.

Free Flight

Of all the actions taken during the meetings, the one which may have the greatest impact on designs and techniques concerns Free Flight models. The new rule in the World Championship competition classes of Wakefield Rubber, A-2 Towline Glider and FAI Power allow changes in span, sweep and chord of the wing and tail—in addition to changes in camber and incidence allowed previously; however, models must comply with the rules when in both minimum and maximum extended modes.

The new provisions allowing variable geometry surfaces won't be applicable at the 1973 FF World Championships. The CIAM decision was that the new rule would be effective for International and World Championships purposes beginning in 1974. For AMA purposes, however, it has been decided to apply the new rule immediately—for both ordinary contests and team program purposes; this will allow U.S. flyers the maximum amount of time to experiment with variable surfaces.

Speculation is that the variable geometry allowed for A-2 Gliders will have little if any practical usage. Some interest has already



Probably the most successful experiment with variable geometry Free Flight power models has been by Canadian Jack McGillivray. Wings fold at quarter-span dihedral joints and are coupled with multi-function timer to reduce span (but not frontal area) by half during engine run. Goes straight up from V.T.O., then wing opens to full span for glide as in photo below. Jack's plane, though .15-powered, weighs far less than an FAI rule design. Unanswered question: whether variable area designs will provide enough consistency for World Champs.





been shown in taking advantage of the 31 sq. ins. variation allowed for Wakefield, and in Power, Canada's Jack McGillivray has been successfully experimenting and competing with his "Folder" which climbs under power with a 50% reduction in wing area—and this degree of variation (and more) will be permitted by the new rules.



U.S. experience and know-how in RC Pylon Racing, represented in the CIAM meeting by Cliff Telford (R), resulted in most AMA proposals being accepted. Telford shown chatting with Ron Moulton, CIAM Tech. Secretary.

Control Line

The required wire diameter of the control lines for the World Championship class of Speed models (.15 cu. in. engines) was increased to .40 mm, plus or minus .01 mm (fixing the standard size at .016" in English measurements), and the pull test load was made a uniform value of 15 kg (33.07 lbs) instead of a variable test load according to model weight as previously. The increased wire size for FAI Speed causes the opening of new national records for models using the new size line.

Some recent thinking to beat the Team Race max tank size by putting the lubricant in a separate tank was squelched by a new rule specifying a single tank for holding both the fuel and oil.

Radio Control

In Aerobatics, the possibility exists that the 1973 World Championships in Italy may culminate in the Individual World Champ being chosen from points earned in final rounds flown only by the top competitors. The flying of the best pilots in close succession would make for an exciting World Championships conclusion. The CIAM RC Subcommittee is to make a recommendation to the Italian Aero Club which, in turn, may apply

for approval by the CIAM officers at the Bureau Meeting in April.

In the definition of a Spin, the references to an imaginary vertical line were deleted.

A number of revisions were made to the FAI Pylon Race rules. The throttle requirement was replaced with a shut-off requirement; the prohibition of tuned pipes was lifted (an effective silencer is still required); the minimum wheel diameter was reduced to 2.24"; the standard fuel formula was changed to 80% methanol and 20% castor oil; hand pushing for takeoffs is now allowed; pylon heights were specified to be between 13.12 and 16.4 feet, and another new rule provides for considering as dangerous (with the possibility of disqualification) the persistent flying below the top of the pylons.

Pylon Race rules also were revised to prevent engine restart after the two-minute period; simultaneous takeoff is now specified when there is a separation of 19.7 feet or more between contestants; aircraft involved in collisions will receive a zero score for the race involved, and the race will not be rescheduled; sequence of crossing the finish line will determine placing rather than the clocked time as previously; team entries of two persons are permitted; the flagging procedures were changed to bring them in close agreement with U.S. common practice.

Busy Year for World Champ Programs

During 1973, AMA programs will be initiated and/or concluded to select nine U.S. teams for the various modeling world championships to be held during 1974 and 1975 under auspices of the Federation Aeronautique Internationale. The FAI is the world-wide governing body for all sporting aviation. The National Aeronautic Association is FAI's U.S. affiliate, and the NAA has authorized AMA to represent the U.S. in all of FAI's aeromodeling affairs.

Available space doesn't permit the printing here of the complete details of how AMA members may enter the various programs and possibly go on to earn a highly prized place on one of the three-man U.S. teams. However, full information may be obtained by request to AMA HQ, 806 Fifteenth St., N.W., Washington, D.C. 20005; send a pre-addressed, stamped (8 cents) return envelope, and specify which program (by model type) is of interest. Following is some of the most basic information about each of the programs. Common to all is that entrants must be AMA members and have the FAI stamp. The programs are for models built to FAI specifications.

CONTROL LINE. 1974 teams for Aerobatics, Speed and Team Race will be chosen in a Team Finals competition in St. Louis, Mo., over the 1973 Labor Day weekend. Some modelers qualified to compete in the Team Finals during 1972 regional Semi-Finals, and the 1972 U.S. team members are automatically qualified. Additional qualifiers will come from the 1973 National Contest and from those who accumulate points in AMA sanctioned meets from March 15

through July 4, 1973. Request full program details for entry requirements and fees.

SCALE. 1974 U.S. Control Line and Radio Control Teams will be chosen in competition during the 1973 National Contest. Models meeting either AMA or FAI Scale Rules may vie for a place on the team, but if not using a model meeting FAI rules, the competitor will be required to build a model which complies with FAI rules before finally being accepted as a team member. Entry in the program in advance by mail (before June 30) may be done at a lower rate than program entry at the Nats. Write for details.

INDOOR. There are three levels of competition in 1973 for competitively selecting the U.S. 1974 Indoor World Championship Team. The Local Trials, open to all AMA members, are to be held between February 1 and May 27. Regional Semi-Finals Trials, open to those who have qualified at the Local Trials and certain others, will be completed by July 22. The Team Finals, which will be competed in by qualifiers from the Semi-Final Trials and by members of the 1972 U.S. team, is expected to be at a single "central" U.S. location if a suitable site is located or at East and West Coast sites as in the previous Indoor Team Program. Write for details.

FREE FLIGHT. The program will be to select 1975 U.S. teams for the Nordic Glider, Wakefield Rubber and FAI Power World Championships. Details of the program were not known when this was written, but the poll of previous program entrants as required by current AMA-FAI policies was just being completed. Likely, full details will have been developed by the time this issue reaches readers. Write.

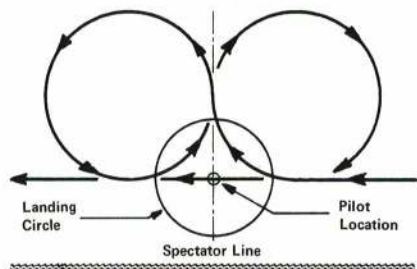
Scale

Changes to the flight K factors for Control Line and Radio Control were made to equalize maximum static and flight scores. The only change to the K factor for static judging, affecting all categories, was an increase from 2 to 3 for Complexity of Landing Gear. Documentation rules were changed slightly to permit more than three photos for each of the seven judging points, but only in certain cases where additional photos are needed to show detail. With further regard to documentation, the CIAM noted that both drawings and lists of dimensions are permitted; the contestant is to indicate which references are accurate in cases of discrepancy in dimensions between both sources.

The new Control Line Flight K factors: Takeoff, 8; Realism in Flight, 10; Landing, 7; Taxi Demonstration, 5; All Options, 7. This results in maximum possible flight points of 650.

The new Radio Control Flight K factors: Taxi, 3; Takeoff, 10; Straight Flight, 3; Procedure Turn, 3; Figure Eight, 4; All Options, 4; Realism in Flight, 9; Rectangular Approach, 4; Landing Quality inside 25 m circle, 9 (inside 50 m circle, 6; outside 50 m circle, 3). This results in maximum possible flight points of 650.

Several changes were made to the Scale Judges Guide concerning RC maneuvers. A new Taxi definition was approved, providing different conditions for two-wheel and three-wheel gears, similar to the current AMA rule. Straight Flight for 10 seconds is now called for instead of a distance of 100 meters. The Procedure Turn no longer needs to be started immediately at the conclusion of the Straight Flight judging; purpose is to permit repositioning when necessary to avoid being too far away from the judges. The Figure Eight definition was revised to avoid flight over spectators, as per the following sketch.



World Records

The required accuracy for timing straight-line speed record models was upgraded by the new specification for timing devices measuring to at least 1/100th second; the difference in times recorded by the two timers must not exceed 1/50th second. In another action, the CIAM technical secretary was authorized to check the paperwork submitted for record claims so as to include a modeling representative in the review process.

World Championships Calendar

1973. Free Flight (Wakefield, A-2 Towline Glider, FAI Power) will be at Wiener Neustadt, Austria, August 14-19. Radio Control Aerobatics will be at Gorizia, Italy, September 11-16.

1974. Czechoslovakia made a firm offer to hold the Control Line World Championships (Stunt, Team Race, Speed). The U.S. made a tentative offer to hold a World Championships for Scale or RC Pylon, or a combination of both. Poland and Romania made tentative offers to hold the Indoor World Championships. Decisions on these offers will be made in late 1973.

1975. Switzerland and Belgium made firm offers to hold the RC Aerobatics World

Championships. There are no present offers for hosting the 1975 Free Flight World Championships.

1976. Canada offered to be host for Scale.

CIAM Officers Elected

President, S. Pimenoff, Finland; Vice-President, L. Bovo, Italy; Vice-President, W.

Kmoch, Yugoslavia; Secretary, G. Revel-Mouroz, France; Technical Secretary, R. Moulton, England; Airspace Committee Representative, J. Worth, U.S.A.

SUBCOMMITTEE CHAIRMEN: Free Flight, L. Bovo, Italy; Control Line, P. Freebry, England; Radio Control, M. Hill, U.S.A.; Education, M. Chiati, Egypt; Space Models, H. Stine, U.S.A.

Insurance—Safety Code In, Rule Book Out

The Official AMA Safety Code provides the conditions under which model aircraft flyers must operate for liability insurance protection to be afforded AMA members and clubs by the blanket policy issued for 1973 by the Hartford Accident & Indemnity Company. Compliance with the rule book was required previously.

Basing insurability on the Safety Code instead of the rule book has the effect of broadening protection inasmuch as the code concerns itself primarily with "how" you fly instead of "what" you fly. An area that was particularly troublesome previously was when a Scale or sport RC plane was flown with a .74 cu. in. engine; since rule book compliance was required, insurance for such planes was in effect only at AMA sanctioned contests, and then only for planes entered in the RC Scale event. Such airplanes now come under AMA insurance at all times, whether flown in competition or for sport, so long as the Official AMA Safety Code is followed. (For competition purposes, max engine sizes stated in the rule book still apply.)

Limits of protection under the new insurance policy remain at \$300,000 per accident for bodily injury and/or property damage during all model flying activities whether competition or sport, except that the first \$100 is deductible (concerning property damage only) when an accident involves one AMA member with another. The deductible condition does not apply when an accident involves an AMA member with a non-member (such as a spectator). But in any case, AMA's liability insurance is "excess" to any other coverage which may be applicable.

Close followers of these things will note that AMA's 1973 liability insurance policy is issued by a different company than in recent previous years; this is simply because the Hartford Accident & Indemnity Company offered a more attractive rate than the previous company. Anyone involved in an earlier accident which may not have reached final settlement should not worry, however, because the company issuing the policy in force at the time of the accident is obliged to follow the claim through to its conclusion.

OFFICIAL AMA SAFETY CODE

GENERAL

1. I will not fly my model aircraft in competition or in the presence of spectators until it has been proven to be airworthy by having been previously successfully flight tested.
2. I will not fly my model higher than approximately 400 feet within 5 miles of an airport, without permission of the airport operator. I will give right of way to, and avoid flying in the proximity of, full scale aircraft. Where necessary an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full scale aircraft.
3. Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless, and/or dangerous manner.

RADIO CONTROL

1. I will have completed a successful radio equipment ground range check before the first flight of a new or repaired model.
2. I will not fly my model aircraft in the presence of spectators until I become a qualified flyer, unless assisted

by an experienced helper.

3. I will perform my initial turn after takeoff away from the pit, spectator, and parking areas, and I will not thereafter perform maneuvers, flights of any sort, or landing approaches over a pit, spectator, or parking area.

FREE FLIGHT

1. I will not launch my model aircraft unless at least 100 feet downwind of spectators and automobile parking.
2. I will not fly my model unless the launch area is clear of all persons except my mechanic and officials.
3. I will employ the use of an adequate device in flight to extinguish any fuses on the model after it has completed its function.

CONTROL LINE

1. I will subject my complete control line system (including safety thong, where applicable) to an inspection and pull test prior to flying.
2. I will assure that my flying area is safely clear of all utility wires on poles.
3. I will assure that my flying area is safely clear of all non-essential participants and spectators before permitting my engine to be started.

A Useful New Talent Pool—AMA's Non-Flying Members

PRESIDENT'S MEMO

Rapidly making itself seen, heard, and appreciated is a tremendous pool of organizing and administrative help for model airplane clubs. One of the really important and always-present problems of keeping air modeling organized, progressive, and enthused is the search for leadership. In checking about 500 club newsletters, attending model meets and club meetings, those of us who are most sensitive to good leadership are proud to see a whole new trend.

We are seeing NON-FLYERS taking over the various clubs' officerships, newsletter editing, contest management, and public relations chores. They are doing this with an inspired enthusiasm! And the ACTIVE FLYERS are tickled to death.

Model FLYING enthusiasts NEVER have really enough time for their building and flying. They usually only reluctantly give up these "goodies" to run clubs and write newsletters and time or judge at a model meet while some other joker is having a ball flying and competing for the handsome hardware. Another group, in the past, has been pretty well ignored. It is made up of a bunch of fine people that, for want of a better name, we are calling "NON-FLYERS." They are really "modelers" at heart but for one reason or another never, or seldom ever, actually fly a model.

Some of this vast group of "non-flyers" just simply are not interested in the actual building of models, or perhaps for one reason or another they don't care to or don't enjoy the actual flying of model planes. Some simply don't have the time for building and flying (AMA presidents often find themselves forced into this category!), while others build but have no desire to fly. Some lack the manual dexterity for intricate building, or lack the self confidence and daring to risk their handiwork by letting it go into the air and into the laps of the gods. But any of these missing elements doesn't for one minute diminish their love for modeling and the opportunity to mingle and fraternize with the

superior type of persons that we always find modelers to be.

In the two years of my serving as AMA president and moving all around the country, meeting with as many groups in as many different situations as possible, a solid picture has formed in my mind. MANY of the most progressive clubs and associations are administered by these non-flyers. Or perhaps the club newsletter is produced by the non-flyer. Or maybe they serve by doing the liaison or "legwork", in negotiating with the community fathers and the publicity outlets.

In these services on the part of the non-flyer he is protecting and preserving the valuable building and flying time for the technically minded and flying-oriented modeler. Thus the technically minded flyer is released to serve the club and himself in purely technical matters without being burdened down with the "business" of the club, unless he so desires. These non-flyers (or perhaps he is just an occasional flyer) are usually qualified business people who are well able to handle the club's business chores. This, of course, is considering that you have chosen your elected officers carefully, and not just on a popularity basis. They should always be chosen as carefully as if you were HIRING them for the job, and not just because they are your good buddies or the best flyers. This type of club leader can usually be more effective in setting up interesting club programs and organizing contests.

Another most pleasant discovery suddenly dawned on me in attending the Nationals, regional meets, team selection meets, and all the other large and small meets, and the club meetings. Female "camp-followers," the WOMEN AND GIRLS, are showing up on a rapidly increasing frequency. SO OFTEN we find these women-folk working their heads off as club secretaries or newsletter editors and at meets as registrars, tabulators, and hostesses and being beautifully effective.

In talking with these fine gals who are pitching in to help at meets and club activities, I have found that each one is fiercely proud of her contribution, but even more beautiful, they all are proud and happy to be

a part of what their husband or boyfriend is doing. This goes a long way to re-establish the family togetherness which, regrettably, has been a seriously diminishing factor in our community well-being. This benefit from our hobby should always be stressed in any contact with our community fathers or the publicity outlets. A further benefit beyond the family going afiel together is the fact that MODEL PLANES ARE BUILT AT HOME. And that is a place where all of us should spend more time.

Looking for a reason for the great increase in modeling as a family activity, I find several obvious things. The "image" and acceptance of modeling by the public as a mature and dignified activity has improved tremendously in the past couple of years. Wives and girlfriends no longer try to hide the fact that their men fool with "toy airplanes" and feel ashamed of it. This new attitude also has a profound effect on the man, who is now far more likely to say, "Honey, come on and go with me!"

One of the most effective ways that the non-flyer can "join in" and really serve the activity and his individual club is through the club's newsletter. EVERY CLUB SHOULD HAVE A NEWSLETTER! If the newsletter is edited by an active flyer he SIMPLY MUST CHEAT one or the other. He either cheats his building and flying time, or he skimps on the newsletter. Then why not see if there isn't a non-flyer who can be the "mouthpiece" for the club? This can easily be the most important person in the entire club. It will be through this editor that the membership knows what is going on, and where and when the next meeting is. Your newsletter will keep the present members active and attending, and will, if used properly, bring in new blood. It will be a means of "pounding your chests" to the rest of the world and letting them know what YOUR group is doing. It will invite an exchange of newsletters with other progressive groups. You should make SURE that a copy of your newsletter goes to AMA HEADQUARTERS, and also if you want accelerated attention, send a copy to the AMA president and your own district vice-president. This way AMA's leaders don't have to guess at what you are doing and thinking.

Summarizing all this, the non-flyer (I wish I could think of a better name for this important type of AMA'er) can be a proud and very productive member of our AMA family. By "pitching-in" he can make a tremendous contribution to the release of the active flyer for technical progress and fun, and to his own ego and pride from feeling useful. If you ACTIVE FLYERS aren't tapping this wealth of help, look around and do a little recruiting. And if you NON-FLYERS aren't yet doing anything, for crying out loud, VOLUNTEER! All of this will simply mean more fun for everyone. And in air-modeling, fun is the whole purpose. HAVE MORE FUN THROUGH MORE MODELING!

John E. Clemens
AMA President



AMA President John Clemens (L) at the November 30-December 1 CIAM Plenary Meeting with Sandy Pimenoff, Finland, CIAM President. Pimenoff holds the special presentation made him by Clemens. Now, how's he going to finish driving in that nail?!



CHARTERED CLUBS

Many of the AMA Chartered Clubs were listed in this section last month (March AAM, PP. 109-113). The remaining clubs are listed here. Contact the person named for the clubs of interest—for meeting time, place and date. The one-letter code at the end of each listing indicates the principal kind of model interest as follows: R—Radio Control, C—Control Line, F—Free Flight, S—Scale, I—Indoor, M—multi-interest.

NEBRASKA

Cobra RC Club, Howard Hough, 924 Avenue I, Council Bluffs, Ia. 51501 R
FREMACE'S, Gary Hetrick, 1615 N. Monroe, Fremont 68025 C
Frontier Flyers Inc., Robert Carlson, 2326 Phelps Ave., Fremont 68025 R
Hastings Skylarks RC Club, Carl Leipold, RFD No. 1 Box 217 Qtrs 500, Hastings 68901 R
Lincoln Sky Knights, Allen Graves, 1815 Devore Dr., Lincoln 68520 R
McCook Area RC Soc., Jack Merritt, 215 Park Ave., McCook 69001 R
Mid Nebraska RC Model Club, Richard Hansen, Box 373, Cozad 69130 R
Ogallala Gophers RC Club, Gary Lacy, 215 E. 10th, Ogallala 69153 R
Orbiting Eagles of Greater Omaha, E. Prohaska, 13448 Cryer, Omaha 68144 C

NEVADA

LVRC, Richard Berg, 2100 Frontier Ave., Las Vegas 89106 R
Reno RC Club, Thomas White, 343 Sawyer Way, Sparks 89431 R

NEW HAMPSHIRE

Ashuelot Valley Flyers, William Sterling, RR 2, Box 75, Keene 03431 R
Concord Aeroguidance Soc., Harrison Morgan, 110 Rowe Ave., Concord 03301 R
Southern NH RC Club, Inc., William Fitzgerald, 205 Wilkins St., Manchester R

NEW JERSEY

Atlantic County Skyblazers, T. Woodo, 607 N. Indiana Ave., Atlantic City 08401 R
Atoms RC'ers, Richard Hann, East Mountain Rd., Neshaic 08853 R
Bergen County RC Club, Inc., Henry Stiles, 185 Franklin Turnpike, Mahwah R
Berkeley Blade Busters, Fred Wolff, 68 Berkshire Dr., Berkeley Hgts. 07922 C
Bridgewater Raritan High School E MAC, G. Eiland, 1362 Crim Rd., Somerville C
Burlington County RC Club, Owen Gearhart, 80 Middleton Ln., Willingboro 08046 R
Central Jersey RC Club, Steven West, 13 North Terrace, Maplewood 07040 R
Clayton RC Club, William Sanger, Pitman Richmond Rd., Pitman 08071 R
Crossing FF Group, John Balaam, 2 Peusner Road, Morrisville 19067 F
E. Coast Indoor Modelers, Emanuel Radoff, 61 Springbrook Rd., Livingston I
Edison Recreation MAC, W. Campbell, 21 Mayling Court, Edison 08817 C
Esso Engineering, R.L. Thomas, 19 Cedar Ave., Madison 07940 R
Garden State Circle Burners, K. Purzycki, 273 Marcella Rd., Lk. Parsippany C
Hackensack Valley Flyers, Inc., R. Shy, 466 Third St., Palisades Park 07650 R
Jersey Coast RC Club, Inc., E. Williams, 417 Lafayette Dr., Bricktown R
Jersey Tailwinds, G. Drechen, 120 S. Jackson St., Woodbury 08096 C
Lakeland RC Club, Inc., Duke Hoeckle, 9 Manchester Way, Pine Brook 07058 R
McGuire Starlifters MAC, C. Carter, 4232 C. Falcon Cts. N., McGuire AFB R
Mercer County RC Soc., Inc., R. Moloney, 210 Holly St., Delanco 08075 R
Middlesex Modelers, Inc., A.W. Koenig, 1613 Frase St., S. Plainfield 07080 C
Monmouth MAC, Inc., Harold Owendoff, 83 Leedsville Dr., Lincroft 07738 R
Morris County Aeromodelers, Thomas Glancy, 13 Mohawk Ave., Rockaway 07866 R
North Jersey RC Club, Joseph Beshar, 198 Merritt Dr., Oradell 07649 R
Oakland RC Club, William Stumpf, 166 Beech Terrace, Wayne 07470 R
Ocean County Modelers, E. Raye Aikins, 519 Riverwood Ave., Pt. Pleasant 08742 R
Rockaway Valley RC Club, William Money, 13 Wetmore Dr., Denville 07834 R
Rockland County RC Club, Leon Audino, 254 Glen Rd., Woodcliff Lake 07675 R
Roxbury Area MAC, Lee Markowski, 7 Woodsedge Ave., Budd Lake 07828 C
Salem County RC MAC, Thomas Kurtz, Michigan & Elm Streets, Pennsville 08070 R
Somerset Signal Senders, K. Carpenter, 80 Brookside Ave., Apt 11-A, Somerville R
Somerset Soaring Society, J. MacMaster, 24 Meadow Brook Dr., Somerville 08876 R
South Jersey Aeromodelers, C. Apprendi, 3213 E. Chestnut Ave., Vineland 08360 C
South Jersey CL MAC, Carl Kern, 920 Acadia Dr., Blackwood 08012 C
South Jersey Flyaways, John Gamble, 603 State Rd., Mantua 08051 R
South Jersey RC Society, Thomas Zurn, 1031 Niagara Rd., Camden 08104 R
Top O'NJ RC Club, Louis Lucatelli, 19 College Rd., Netcong 07857 R
Township of Ocean Prop Swingers, S. Flickinger, 5 Brooklawn Dr., Neptune C
Tri County RC Club, Ray Combs, 7 Locust Dr., Helmetta 08828 R
West Jersey RC Club, R. McCloy, 413 E. Summit Ave., Haddonfield 08033 R
West Jersey Radio Flyers, L. Jezorek, 1701 Oakwood Terr., Scotch Plains R

NEW MEXICO

Alamogordo Model Aviators, R. Teichert, Yucca Trailer Pk. No. 30, Alamogordo R
Albuquerque RC Club, James Baremore, 9424 Gutierrez NE, Albuquerque 87111 R
Clovis MADS, Edward Harvey, Star Rt. Box 48, Clovis 88101 R
Hobbs Aero RK Society, Inc., J.R. Cox, 901 E. Michigan No. 42, Hobbs 88240 R
South West Aero Team, Howard Ryerson, 4004 Donald SW, Albuquerque 87105 F

NEW YORK

Aeroguidance Society Inc., Robert Noll, 96 Pine Knoll Rd., Endicott 13760 R
Aeromasters RC Club, William Kenic, 137 Barber St., Brentwood 11717 R

Aero Radio Club of Syracuse, F. Hogg, 232 Seneca Dr., Syracuse 13205 R
Balsa Busters, John DeVinney, 32 Union St., Hornell 14843 R
Bayside Wiretappers MAC, C. Scalisi, 35-02 203 St., Bayside 11361 C
Bethlehem RC Club, Robert Pike, 17 Morningside Dr., Delmar 12054 R
Blue Angels RC Club, John Pimentel, 436 Carol Place, Pelham Manor 10801 R
Brooklyn Eagles, Steve Storman, 1237 Ave. Z, Brooklyn 11235 R
Dawn Patrol RC Club, Douglas Rajski, 650 Warburton Ave., Apt. 5-M, Yonkers R
Flying Knights MAC, Inc., Jean Hultberg, RD No. 1, Box 140, E. Nassau 12062 R
Flying Knights of Hamburg, G. Piscitello, 5581 Meadow Dr., Hamburg 14075 R
Flying Live Ones, Richard Ross, Turkey Hill Rd., Conesus 14435 R
Flying Rebels, Joe Saeli, 33 English St., Jamestown 14701 R
Flying Sparks Inc., Donald Peak, 3518 Vermont Ave., Elmira 14903 R
Gee Bees RC Club, Inc., Martin Berman, 2249 E. 28th St., Brooklyn 11229 R
Golden Knights, John Zugec, 69 Maple St., Geneva 14456 C
Green Bush Pilots, John Blaylock, Box 804, North Chatham 12132 R
Hudson Valley RC Club, Fred Bange, 64 Farm Rd., Briarcliff 10510 R
Island Model Plane Society, E. Uthgenannt, 39 Florence Dr., Syosset 11791 R
Kingston Aeromodelers RC Club, A. Goodwin, 22 Birchwood Dr., S. Saugerties R
Long Island Aero Radio Soc., R. Ellisen, 933 Gardner Dr., Bay Shore 11706 R
Long Island Drone Soc., G. Barry, 107 Searingtown Rd., Albertson 11507 R
Long Island Fly Together Soc., F. Heil, 213 N. 9th St., Lindenhurst 11757 R
Long Island RC Society, F. G. Nesbitt, 125 President St., Hempstead 11550 R
Meroke RC Club, Inc., C. Robinson, 2513 Wilson Ave., Bellmore 11710 R
Mid Hudson RC Soc., Inc., D. Amodeo, Hill Hollow Rd., Hyde Park 12538 R
Midstate Modelers, Ed Maloid, 148 Warden Ave., Syracuse 13206 R
Modelers of Binghamton, Howard Jarnagin, PO Box 206, Hop Bottom, Pa. 18824 R
Mohawk Valley RC Modelers, Mario Ruhnke, 134 Kensington Dr., Utica 13502 R
Niagara County RC MAC Inc., R. Antoszewski, 1346 Harvard Ave., N. Tonawanda R
Niagara Sunday Flyers, Don Cameron, 420 12th St., Niagara Falls 14303 R
Onondaga MAC, Carl Crownhart, 5419 Loretta Lane, Clay 13041 R
Oswego Valley Modelaires, Lawrence Abraham, 26 Utica St., Port Byron 13140 R
Pan American MAC, Joseph Modica, 2235 E. 15th St., Brooklyn 11229 R
Penn. Ave. RC Soc., Bernard Sanders, 14 Arrowwood Ln., Huntington Sta R
Queens County RC, Michael Farella, 140-35 58th Rd., Flushing 11355 R
Southgate Lanes, Inc., Thomas Warda, 9 Hazel Court, W. Seneca 14224 R
RC Club of Rochester Inc., R. Greene, 178 Pleasant Way, Penfield 14526 R
RC Pulsers of Western NY, L. Roll, 1707 Baxter Ave., Alden 14004 R
RC Society of Marine Park, Harold Silverman, 8619 Ave. B, Brooklyn 11236 R
Richmond Model Flying Club, Inc., L. Hollwitz, 1736 Madison Pl., Brooklyn 11229 R
Rochester Aero Modeling Soc., Charles Smith, 334 Dickinson Rd., Webster 14580 R
Saratoga County Aeromodelers, G. Cannon, 322 Ard 2 Traver Rd., Gansevoort R
Seaway Valley Modelaires, Paul Dewey, 6 Brighton St., Massena 13662 R
Sky Rovers Flying Club, Ronald Lukowski, RD No. 2 RT 89, Romulus 14541 R
Sky Scrapers, Ed Fronczek, 34-14 Broadway, Long Island City 11106 F
Squadron Escarole, Inc., John Sbare, 3240 Barker Ave., Bronx 10467 R
Staten Island Sky Devils, W. Truppper, 67 Raymond Ave., Staten Island 10314 R
Suffolk Falcons, Eugene Rogers, 11 Soundview Dr., Shoreham 11786 R
Suffolk Wings RC MAC, Ray Swanson, PO Box 133, Port Jefferson 11777 R
Sullivan County RC, Bernard Klein, Box 443, S. Fallsburg 12779 R
Sullivan, Orange, Ulster Radio Soc., W. Scott, Box 569, Pine Bush 12566 R
Syracuse Thunderbirds, P. Williams, 2516 S. State St., Syracuse 13205 R
Thundervolt RC Club Inc., Daryl Hull, 15 Service Rd., Schenectady 12303 R
Tri County Model RC Club, G. Ball, 9 Oneida St., Glens Falls 12810 R
Tri States Model Flying Club, D. Gore, 22 McAllister St., Port Jervis 12771 C
Westchester Radio Aero Modelers, R. Ehrlich, 40 Sammis Ln., White Plains 10605 R
Wingmasters, John Sullivan, 1A Saturn Blvd., Hauppauge 11787 C

NORTH CAROLINA

Burlington Aircraft RK Club, H. Randles, RT 1, Box 484 S, Burlington 27215 R
Coastal Carolina RC Club, James Sutton, 308 Ives St., Havelock 28532 R
E. Carolina Radio Controllers, S.A. Rhodes, 100 Brock, Goldsboro 27530 R
Ft. Bragg MAC, Robert Chilton, 5 Hunt, Ft. Bragg 28304 R
Gastonia RC Club, Inc., George Mantooth, Rt. 1, Lewis Rd., Gastonia 28053 R
Greensboro Radio Modelers, James Bartlett, 4202 Hampshire Dr., Greensboro R
Greenville Flight Club, William Waggoner, Rt. 1, Box 221 T, Bethel 27812 C
Ground Pounders, William Mackenzie, Rt. 1, Box 122, Grimesland 27837 C
Hickory RC Prop Twisters, Shirley Teague, 625 5th Ave., SW, Hickory 28601 R
Kinston Greenville Aero Modelers, C. Buchanan, 404 Edgehill Ave., Kinston R
Monroe RC Club, Carl Whilden, 4735 Emory Lane, Charlotte 28211 R
Montgomery Randolph RC Club, J.C. Pugh, Box 455 RFD 1, Franklinville 27248 R
Nash County RC Club, Roland Harper, Rt. 5, Box 130, Rocky Mountain 27801 R
New Bern RC Club, Ted Baxter, 315 Middle St., New Bern 28560 R
Prop Twisters MAC, John Comerford, 3611 Hobbs Rd., Greensboro 27410 C
Raleigh Durham RC Club, Johnny Clark, 1412 Spring Dr., Garner 27529 R
Rutherford Cleveland RC Club, Keith Tomblin, 308 Poplar St., Spindale 28160 R
Rutherford County Area RC Club, G. Pateat, P.O. 404, Cliffside 28024 R
Tar Heel RC Flyers, Ken Gurganus, Box 370 RT 5, Rocky Mountain 27801 R
Wenoca RC Club, Albert Weigle, 3306 Starmount Dr., Greensboro 27403 R
Western NC RC Society Inc., F. Lewis, 422 Midway Cove, Hendersonville 28739 R
Wilmington Model Flying Club, J. Wood, PO Box 3122, Wilmington 28401 R
Wilson RC Modelers Assn., John Scott, 615 Glendale Dr., Wilson 27893 R

NORTH DAKOTA

FM Skylarks, Lonnie Kroeber, 1754 S. 9th, Fargo 58102 C
Red River RC Club, Charles Orange, 1701 University Ave., Grand Forks 58201 R
Valley RC Flyers, Inc., James Joyce, 2706 N. 9 St., Fargo 58102 R
Williston BalsaBusters, Martin Tkachyk, 910 University Ave., Williston 58801 R

OHIO

Alliance Balsa Bees, C. Topel, 1705 Western Ave., Alliance 44601 M
Capital City Controlliners, R. Kanoski, 839 Meadowview Dr., Columbus 43224 C
Centaur RC Club, Wilson Esken, 712 W. 9th St., E. Liverpool 43920 R
Central Ohio FF Club, Floyd Miller, 1313 Brookridge Dr., Columbus 43220 F
Central Ohio RK Soc., Fred Johnson, 867 W. Eighth Ave., Columbus 43212 R
Cincinnati Aeromodelers, G. Vogeler, 2873 Carroll Dr., Cincinnati 45311 R
Cleveland Radio Controlaires, D. Klein, 2641 Edgewood Dr., Beachwood 44122 R
Cleveland FF Society, Bob Davidson, 8170 Allendale Dr., Mentor 44060 F
Columbia RC Assn., Robert Wargo, 5611 Snow Rd., Parma 44129 R
Dayton Buzzin' Buzzards, Jack Haupt, 3908 Neco Ave., Dayton 45406 C
Dayton Wingmasters, Martin Richardson, 7130 Claybeck Dr., Dayton 45424 R
Drake County Aero Modelers Assn., L. Harman, 410 W. Third St., Greenville R
Electronic Flyers, Jay Spaulding, 455 Park Ave. W., Mansfield 44906 R
Flying Aero Sport Team, Dennis Cassel, 350 S. Church St., New Lebanon 45345 R



FORKS, Leslie Anthony, Rt. 7, Lancaster 43130 R
Fredericktown Aeromodelers, R. Morrison, 16 E. College St., Fredericktown M
Goodyear MAC, Bill Peel, 116 Donovan Ave., Mogadore 44260 R
Greater Cincinnati RC Club, R. Schleifer, 121 Bayham Dr., Cincinnati 45218 R
Hi Fliers MAC, Charles Macuga, 15728 Sandhaven Dr., Middleburg Hts. 44130 C
Hubbard Valley Flyers, Peggy Boleratz, 1192 W. Comet Rd., Clinton 44216 R
Lake Erie Gas Model Club, R. Woodward, 4818 Maplecrest Ave., Parma 44134 C
Lakewood Flite Masters, Robert Evey, 5010 Longwood Ave., Parma 44134 C
Licking County RC Club, Inc., W. Headington, 1221 New Gambier Rd., Mt. Vernon R
Lima Area RK Society, Joseph Nichols, 626 Cornell Dr., Lima 45805 R
Lima Beans Prop Busters, Robert Monge, PO Box 3096, Elida 45807 R
Lorain County RC Club, James Carek, 4403 Tacoma Ave., Lorain 44055 R
Loveland Propbusters, Vernon Michael, RR 1 Box 142E, Loveland 45140 R
Mahoning County Model Club, D. McMurray, 1294 W. Western Reserve Rd., Youngstown R
Mansfield Controliners, Jim Winningham, 17 Maple Dr., Shelby 44875 C
Marion Airfoils, James Harris, 3044 Smeltzer Rd., Marion 43302 R
Mentor Area RC Soc., A.E. Nobora, 6265 Chase Dr., Mentor 44060 R
North American Rockwell Aero., Samuel Wright, 4144 Wright Park, Columbus 43213 C
North East Ohio Radio Flyers, R. Gibbons, 5319 Reed Ave., Ashtabula 44001 R
Northern Ohio FF Assn., Rudy Klueber, 2021 Lakeland, Lakewood 44107 F
Ohio Flying Aces, Richard Smith, 4122 Kirk Rd., Youngstown 44511 C
Portage Aero Modelers, L.J. Adams, 1735 Sedro St., Cuyahoga Falls, 44221 R
Prop Busters MAC of Lake County, C. Ziehlke, 5215 Harmony Ln., Willoughby C
Queen City U-Control, Louis Servizzi, 3154 Niles St., Cincinnati 45208 R
RC Short Circuits Club, Inc., Don Stamp, MC 1 Pidgeon Rd., Salem 44460 R
RC Thermalists, J.G. Mader, 2708 Sciote Trail, Portsmouth 45662 R
Ridge Road RC, R.A. Sommer, 563 Adelaide NE, Warren 44483 R
SHOO Flyers MAC, Inc., Dick Kraner, RR 1, Ohio City 45874 R
Sky Hawks MAC, Robert Arnold, 129 Karen Place, Winterville 43952 R
Skyhawks RC Club, Sam Barbone, Box 504 Silica Rd., N. Jackson 44451 C
Skylarks, J.W. Stidham, 6067 Sherwood Dr., N. Oldstead 44070 R
Southwestern Ohio FF, Donald Wright, 559 Evanswood Pl., Cincinnati 45220 F
Toledo Weak Signals, Roy Hinger, 502 Louisiana Ave., Perrysburg 43551 R
Tri State RC Club, H.S. Edwards, 610 Washington St., Coal Grove 45638 R
Trumbull County RC Modelers, Bob Plant, 550 Freeman St., Warren 44483 R
Wayne County RC Club, Barbara Jackson, 930 Spink St., Wooster 44691 R
Western Ohio RK Society, Donald Kabel, 827 Antioch School Rd., Vandalia 45239 R
Winton Woods Flying Club, Robert Oehler, 2003 Sundale Ave., Cincinnati 45239 R
Zanesville Area RK Society, John Proccaci, Box 101, New Lexington 43764 R

OKLAHOMA

Falcons Model Club, J.C. White, 1516 Madison, Bartlesville 74003 R
Lawton Area Fun Flyers, Gene Elkins, 2907 N. 26th St., Lawton 73501 R
Oklahoma City Controliners, Marlin McGee, 904 N. Harris Apt. D, Oklahoma City C
Ponca City RC Modelers, Norman Barnes, 1712 Potomac Dr., Ponca City 74601 R
Ponca Pivot Pilots, Mark Whitney, 711 Edgewood, Ponca City 74601 R
Salt Plains Aeromodeling, Ronald Van Delden, 1619 South Jackson, Enid 73701 R
Tulsa Glue Dobbers, William Salnikov, Rt. 1, Box 130C, Coweta 74429 R

OREGON

Barnstormers, James Alderson, 8705 SW Washington Dr., Portland 97223 R
Eugene Prop Spinners, Melvin Macum, 2065 Providence St., Eugene 97401 C
Eugene RC Aeromodelers, Roger Breedlove, 2710 Chuckanut, Eugene 97401 R
Flightmasters of Klamath Falls, R. Harris, Rt. 3, Box 242, Klamath Falls 97601 R
Fly A Ways RC Modelers, Bernie Marek, 13115 SW Park Way, Portland 97225 R
Flying Tigers Flying Club, G. Petty, Rt 3 Box 233 No. 57, Milton Freewater 97862 R
Nor'Westers, John Anderson, 1495 NW 136th Ave., Portland 97229 F
Portland Stardusters RC Club, L. Mei, 12704 SE Center St., Portland 97236 R
Rogue Eagles RC Club, Victor Drew, 1628 Corona, Medford 97501 R
Salem RC Pilots Assn., Inc., Robert Ellison, 1595 19th St., NE, Salem 97303 R
Sky Knights RC Club, William Owen, 1030 NE 178th, Portland 97230 R
Tri County RC Club, Marvin Peterson, 1421 N. 9th, Redmond 97756 R
Willamette Modelers Club, Earle Moorhead, 275 S. View Pl. S., Salem 97302 F

PENNSYLVANIA

Aircraft Modeler Associates, W. Seal, 268 Makefield Rd., Morrisville 19067 R
Bath Area Modelaires, Clayton Ott, 770 Washington Ave., Bethlehem 18017 F
Beaver County MAC, Roger Pattison, 66A VanBuren, Beaver 15009 R
Bucks County RC Club, Harry Zobel, 3102 Steele Ave., Bristol 19007 R
Buc Le Aero Sportsmen, Stanley Bucior, 519 Richhill Rd., Sellersville 18960 R
Brentwood Flying Aces, Robert Volk, 138 East Francis Ave., Pittsburgh 15227 M
Butler Area Radio Flying Soc., W. Henderson, 202 Williams Rd., Butler 16001 R
Carlisle RC Club, Richard Lane, 438 West Penn St., Carlisle 17013 R
Central Dauphin MAC, Donald Phillips, 722 S. 60th, Harrisburg 17111 M
College Area MAC, Al Niessner, RD No. 1 Box 398, Boalsburg 16827 R
Ephrata RC Club, Clyde Wealand, 207 Main St., Akron 17501 R
Erie MAA, Linley Reichel, 3301 Cindy Lane, Erie 16506 M
Erie Model Controliners, Anthony Frackowiak, 2720 Pebble Dr., Erie 16508 C
Flying Dutchman MAC, John Fullerton, RD 3 Box 305C, Elizabethtown 17022 M
Flying Tigers, Joseph Hudak, 537 Cooper Dr., Warminster 18974 R
Gateway RC Society Inc., William Isherwood, 4425 Burma Rd., Monroeville 15146 R
Golden Eagles, Donald Reed, 371 Southcroft Rd., Springfield 19064 F
Greater Pgh. Aero RC Soc., Alex de Poutloff, 1089 Greenlawn Dr., Pittsburgh R
Indiana County Model Aviation Club, G. Krempels, 2242 Wilson Ave., Indiana R
Johnstown RC Club, Gerald Black, 603 Demuth St., Johnstown 15904 R
Keystone Clippers RC Club, Edward Wisser, 1521 Summit, McKeesport 15131 R
Keystone RC Club, James Bachelor, 732 Longshore Ave., Philadelphia 19111 R
Keystone RC Soc. Inc., John Landis, 704 Haldean Ave., New Cumberland 17070 R
Lackawana Aero Modelers, Ted Mynyk, 402 Newton Road, Scranton 18504 R
Lancaster County RC Club, R. Bowers, 734 Stevens Ave., Lancaster 17602 R
Laurel Highlands MAC, David Poole, 713 Ash St., Jeanette 15644 R
Laurel RC Club, John Anderson, 554 E. Main St., Uniontown 15401 R
Lebanon Valley RC Club, Howard Rittle, 207 North Railroad St., Myerstown 17067 R
Lehigh Valley RC Society, James Cooper, 325 Hanover Ave., Allentown 18103 R
Levittown Flying Bucks MAC, R. Leishman, 167 Goldenridge Dr., Levittown 19057 C
MERCIO MAC's, Alex Lekon, 104 8th Ave., Greenville 16125 R
North Hills Cloud Dusters, William Hodgson, 139 Elmwood Dr., Glenshaw 15116 R
Olean MAC, George Ward, 155 Harrisburg Run, Bradford 16701 R
Penn Ohio RK Society, Harry Montgomery, 1639 Katherine St., New Castle 16105 R
Philadelphia Sky Pirates, Thomas Kerr, 7824 Lexington Ave., Philadelphia 19152 F
Pittsburgh Stunt Masters, George Hodder, 623 6th St., Trafford 15085 C
Pocono Modelers, Donald Hewlings, RD Box 12, Cresco 18326 R
Quaker City RC Club, Owen Reeves, 2893 Stanford St., Philadelphia 19152 R
Queen City RC Aircraft Club, Earl Schneck, 328 S. 18th St., Allentown 18104 R

Rangers RC Club, Wayne Cummings, 24 Edgemont Ave., Clifton Heights 19018 R
RC Aeromodels of Altoona, Robert Baker, 1409 Aberdeen St., Altoona 16602 R
RC Club of Erie, Richard Thaler, PO Box 8132, Erie 16505 R
Skylarks of Sharon Pa., Henry Smith, 477 S. Oakland Ave., Sharon 16146 R
Sky Pirates RC Club, William Holt, 88 Harvest Rd., Levittown 19056 R
SPARCS, Melvyn Katz, 110 N. Byberry Rd., Apt. G10, Philadelphia 19116 R
State College RC Club, G. Gurney, 1705 S. Allen St., State College 16801 R
Sunday Flyers, James Renner, 406 Seville St., Philadelphia 19128 C
Susquehanna Valley Modelers, Charles Mull, RD 1, Selinsgrove 17870 R
Susquehanna Valley RC Club, J. Rechel, 967 High St., Williamsport 17701 R
Tri County Sky Barons, Douglas Leshor, PO Box 181, Newport 17074 R
Tri County Wingsnappers, Inc., W. Gladney, 1807 Elizabeth Ave., Laureldale R
Tuscarora RC Club, Robert Greenall, 419 E. Mauch Chunk St., Tamaqua 18252 R

RHODE ISLAND

Aquidneck RC Fliers, R.J. Maynard, 3924 Main Rd., Tiverton 02878 R
Rhode Island Aero Modelers, Bernard Collins, 11 Taft St., Cranston 02905 R

SOUTH CAROLINA

Camden MAC, Robert Moon, 1721 Woodside Dr., Camden 29020 R
Carolina U-Liners, Larry Stewart, 68 Lane Wood Ave., Rt. 6, Greenville 29607 C
Charleston RC Society, Ed Roberts, 794 Piccadilly Dr., Charleston 29407 R
Dixie RC Flyers, Carl Cox, 11 Clemson Dr., Aiken 29801 R
Gooney Birds, Edward Schwab, Quinby Circle S., Florence 29501 R
Greenwood Radio Aircraft M. Soc., A. Stockman, Rt. 1 Box 280, Greenwood 29646 R
Jackson Flyers Assn., Bill Rivers, 1451 Bonner Ave., Columbia 29204 R
Lexington Aircraft RC Soc., J.W. Scharpf, 820 Fontana Dr., W. Columbia 29169 R
Marlboro MAC, Johnny Powers, 715 West Main St., Bennettsville 29512 R
Sky Knights MAC, Ralph Dobson, Box 66, Spartanburg 29301 C
Sumter RC MAC, Raymond Thompson, RT 1 Box 57 H6, Sumter 29150 R
Tri County RC Flyers, Bob Haymond, 123 Mt. View Lane, Clemson 29631 R
Western Carolina RC Club, S.E. Meek, 232 Pineville Rd., Spartanburg 29302 R
Wing Busters, James Smoak, Rt. 1 Box 158A, Branchville 29115 C

SOUTH DAKOTA

Flying Eagles Model Club, Inc., W. Van Wyngarden, 949 S. Thompson, Sioux Falls C
Huron Prop Busters, Larry Sroufe, 260 Sunrise Dr., Huron 57350 R
Rapid City Propbusters RC Club, C. Besancon, 4926 Pierre St., Rapid City R
Sioux Falls Gas Model Club, J. Donovan, 1409 Thompson Dr., Sioux Falls 57105 R

TENNESSEE

Coffee Airfoilers, Lee Webster, 1000 Sycamore, Manchester 37355 F
Cumberland Flyers, William Clement, Rt. 11, Clarksville 37040 R
East Tenn. RC Society, John Tudor, 109 Chatham Land, Oak Ridge 37830 R
Memphis Propbusters, Kenneth Nash, 204 Parkdale, Memphis 38109 C
Memphis RC Club, Harry Adams, 2017 Lauretta Ave., Memphis 38127 R
Middle Tenn RC Society, J.W. Sweeney, 3924 Plantation Dr., Hermitage 37076 R
Sodbusters, Harry Plemons, 412 A St., Lenoir City 37771 R
Tenn. Tech. Univ. RC Club, Walter Dooley, 235 N. Dixie Ave., Cookeville 38501 R
Tenn. Valley RC Club, Nap Smith, 1421 Shawhan Terr. Chattanooga 37411 R
Tri Cities Aeromodelers Inc., Robert Jesse, 4602 Hileah Dr., Springfield 37663 R
Twin Cities MAC, James Sullivan, 73 King St., Maryville 37801 R
Volunteer Aero Modelers Inc., James Gore, 2908 Alice Bell Rd., Knoxville 37917 R
Whitehaven RC Specialists, Lloyd Evans, 5121 Appleville St., Memphis 38109 R

TEXAS

Abilene RC Soc., Clark Kreiter, Box 13 Rt. 1, Clyde 79510 R
Alamo RC Society, Inc., Lewis Mason, 8026 Hubble Dr., San Antonio 78227 R
Amarillo RK Society, John Miller, 2900 Duniven Circle, Amarillo 79109 R
Austin RC Assn., Steven Froehner, 1301 W. Olcott No. 29, Austin 78704 R
Beaumont RC Club, James Osborne, 1270 Elaine Dr., Beaumont 77706 R
Bee RC Club, Eugene Steffen, 503 Tripoli, Beeville 78102 R
Big "D" Skyliners, Roy Taylor, 3914 Poinsetta, Dallas 75211 C
Capitol Aeroneers, Jerry Malin, 1206 Karen, Austin 78757 R
Centex Model Masters, Bruce Humphrey, 305 N. 11th, Coppertown 76522 R
Cliff Cloud Climbers, Frank Perkins, PO Box 873, Richardson 75080 F
Coastal Bend Aero Modelers, John Hoffman, 4618 McGregor, Corpus Christi 78411 C
Corpus Christi Bees, Inc., L. D. Boudreau, 910 Stirmar, Corpus Christi 78411 R
Corpus Christi RC Club, Paul Jordan, 4322 Tim Lane, Corpus Christi 78412 R
Dallas RC Club, David Webb, 3515 Colgate, Dallas 75225 R
Flying Chaparrals, Allen Young, 3119 W. Kansas, Midland 79701 C
Ft. Worth Cowtown Circleburners, P. Storrie, 1415 Austin, Denton 76201 R
Ft. Worth Planesmen, Henry Spence, 3508 Lynnwood, Arlington 76013 F
Ft. Worth Thunderbirds, R.B. Moncrief, 6713 Brants Ln., Ft. Worth 76116 R
Golden Triangle RC Club, J. Peterson, 3201 Woodford Dr., Arlington 76013 R
Gulf Coast RC Club, Louis Poirier, 2731 Hearne, Pasadena 77502 R
Gulf Coast Remote Control Assn. L.A. Waitschies, 2203 E. Mimosa, Victoria R
Heart O'Texas RC MAC, George Goolsby, 2621 Edna Ave., Waco 76708 R
Houston Aeromodelers, John Mohr, 4532 Pine St., Bellaire 77401 R
Houston FF Club, James McPherson, 219 Coronation, Houston 77034 F
Houston RC Club, Bob Grundy, 10903 Rampart, Houston 77035 R
Hi Sky RC Club, E.J. Gardner, 3905 West Illinois St., Midland 79701 R
Key City Prop Twisters, Eddie Thomas, 5349 Harwood, Abilene 79605 C
Kingsville Aero Modelers Soc., R. Olen, 1248 Saratoga, Kingsville 78363 M
Lackland Model Flying Club, L. Mango, 543 Scates Dr., San Antonio 78227 R
Manned Spacecraft Center RC Club, D. Hitch, 1610 San Sebastian, Houston R
McAllen 360° Modelaires, A. Alonzo, 2716 South 27th St., McAllen 78501 C
Model Aircraft Club of Dallas, W.H. Kuhn, 2247 Homeway Cir., Dallas 75228 R
Northeast Texas MAC, Charles Novy, 1904 Wimberly, Longview 75601 M
Odessa RC Prop Busters Club, Tom Oakley, 3815 Kenwood, Odessa 79660 R
Planesmen MAC, Hugh Smith, 2608 N. Hill St., Amarillo 79107 C
Plano Prop Poppers Flying Club, C. Merritt, 1700 15th Pl., Plano 75074 R
Port Arthur RC Club, Robert Talley, 3112 Lawrence Ave., Nederland 77627 R
Richardson RC Club, John Kelly, 323 Dogwood, Richardson 75080 R
San Angelo RK Soc., B. G. Sanders, Rt. 4, Box 1008, San Angelo 76901 R
Snoopy's Squadron, Ed Reynolds, 1508 Oakcliff Rd., Ft. Worth 76103 C
Sod Busters Flying Club, J. Sheffield, 4520 Hazard, Houston 77006 C
South Austin Modelers, Samuel Hand, 115 Blessing Pl., Bergstrom AFB 78743 R
Southmost RC Flyers, Bob Austin, 107 W. Park Dr., Brownsville 78520 R
SPARCS, Ladislaus Skrabala, 338 Mitchell Blvd., Lubbock 79415 R
Tri City RC Model Club, George Davidson, 12613 Lone Shadow Trail, San Antonio R
Tyler Modelers Club, Robert Fair, 4245 Old Bullard Rd., Tyler 75701 R
Wichita Falls RC Club, William Enloe, 5223 Catskills, Wichita Falls, 76310 R



UTAH

Hill Aeromodelers, John Mariani, 3309B Liberty Rd., Hill AFB 84401 R
Utah State Aeromodelers, George Swanson, 1420 Logan Ave., Salt Lake City 84105 F

VIRGINIA

American Eagle Flying Modelers, M. Bonner, 8711 Winthrop Dr., Alexandria R
Backriver RC Flyers, Eugene Bures, 118 Schooner Dr., Hampton 23369 M
Blue Ridge RC Modelers, Brock Henry, 15 Bondurant St., Martinsville 24112 R
Central Virginia RC Assn., Sam Thompson, 7206 Richland Dr., Lynchburg 24502 R
Commonwealth Miniature Aeroplane Soc., J. Paul, 309 Greenway Ln., Richmond M
Curles Neck FF and Soaring Soc., J. Novak, PO Box 539, Chester 23831 R
Danville Aeromodelers, F.N. Howard, 425 Southland Drive, Danville 24541 R
Dahlgren MAC, Jerry Barnett, 4 Jefferson St., Fredericksburg 22401 R
Fairfax Model Associates, Jerome Persh, 4908 Sauquoit Ln., Annandale 22003 M
Fly Away RC Club, Eugene Kluth, 18 Arlie Dr., Annapolis, Md. 21401 R
Fort Belvoir Flyers, Ira Vial, 9015 Nomini Lane, Alexandria 22309 R
Hampton Brainbusters, Reid Hull, 65 Cavalier Ct., Hampton 23360 F
Mid Virginia RC Club, Fred Gregg, 12709 Richmond St., Chester 23831 R
Norfolk Aeromodelers, Robert Alfriend, 7457 Hampton Blvd., Norfolk 23505 C
Northern Potomac MAC, Jon Jacobus, 607 West Maple Ave., Sterling 22170 C
N. Va. RC Club, Inc., Claude Tanner, 13215 Pt. Pleasant Dr., Fairfax 22030 R
Prince William RC Club, Ben Ivie, 9300 Taney Rd., Manassas 22110 R
Richmond Area RC Club, Inc., Wyatt Richardson, 4225 Bonnie Bank Rd., Richmond R
Roanoke Aero Guidance Soc., Norman Poff, 1526 Monterey Rd., NE, Roanoke 24019 R
Southeastern Va. RC Group, David Bills, 797 Chatsworth Dr., Newport News 23601 R
Suffolk Bellcranks, Joe Alexander, 277 Sleepy Hole Rd., Suffolk 23434 C
Tidewater Model Soaring Soc., W.H. Phillips, 310 Montee Ave., Hampton 23361 R
Tidewater RC Inc., James Raynor, 5529 Nashua Rd., Virginia Beach 23462 R
Washington RC Racing Assn., James Blanchfield, 3356 Woodburn Rd., Annandale R

WASHINGTON

Barons Model Club, David Wirth, E. 12417 4th Ave., Spokane 99216 R
Boeing Charterhawks, Joseph Deady, 466 155th Ave., SE, Bellevue 98007 F
Clipped Wings MAC, Ben Quaring, PO Box 520, Walla Walla 99362 C
Cowlitz Valley RC Flyers, Reid Cope, 2802 Florida, Longview 98632 R
Everett Line Kinkers, Don Stewart, 13643 Mukulteo Speedway, Lynnwood 98036 C
Everett Modelers Assn., Robert Bashforth, 13710 58th Ave. NE, Marysville R
Kent Strat O Bats MAC, S. Helmick, 1914 1st Ave., W., Seattle 98119 F
Kitsap Aero RC Soc., Al Villcock, 1321 Warren Ave., Bremerton 98310 R
Mt. Rainier RC Society, Larry Sperberg, 1601 S. Mason St., Tacoma 98405 R
Port Angeles RC Soc., Phil Bone, Rt. 3, Box 674, Sequim 98382 R
Pylon Racers of Puget Sound, John Schuy, 12327 SE 158th, Renton 98055 R
Radio Aero Modelers, John Haskin, 11127 Woodward St., Seattle 98178 R
Redmax MAC, Fred Bostrom, 100 Kirkland Ave., Kirkland 98033 C
Seattle Radio Aero Club, Phil Taylor, 2501 NE 94, Seattle 98115 R
Seattle Skyriders MAC, Chuck Thomas, 7711 Easy St., Everett 98203 C
Tacoma Modelaires, William Brazze, 6107 136th St., Puyallup 98371 C
Tri City RC Modelers, Maurice Durkin, 1111 Perkins, Richland 99352 R
Valley Aero Modelers, William Tucker, PO Box 167, Zillah 98953 R

Walla Walla Organization of RK'ers, D. McLeod, Rt. 2, Box 314, Walla Walla R
Wenatchee Red Apple Flyers, Lyle Matson, 501 Pioneer Dr., Wenatchee 98801 R
Whatcom Aero Modelers Soc., Boyd French, 1311 Lk. Whatcom Blvd., Bellingham R

WEST VIRGINIA

Berkley MAC, Tony George, Box 113, Piney View 25906 R
Central WV Model Club, James Bush, 349 Court Ave., Weston 26452 R
Flying Hillbillies, J.S. Hudnall, Rt. 1 Box 136, Winfield 25213 R
Hill Hoppers Model Club, J. Fulton, 17 Maplewood Ave., Wheeling 26003 R
Mountaineer RC Club, Turner Ratrie, 1501 Thomas Cir., Charleston 25314 R
Princeton Area RK Society, Jim Harper, 1609 Honaker Ave., Princeton 24740 R
Valley IFO's MAC, Robert Kable, 528 Briarcliff Ct., New Martinsville 26155 R
Vienna Sky Sharks MAC, Henry Nilsen, 1003 27th St., Vienna 26101 R

WISCONSIN

Bong Eagles, Bob Whaley, 528 Greenbay Rd., Thiensville 53092 M
Circlemasters, James Wright, 5075 N. Kent Ave., Whitefish Bay 53217 C
Clintonville RC Club, James Vanderwalker, Rt. 3, Clintonville 54929 R
Franklin Model Flyers, Leonard Mlynarski, 4434 S. Taylor, Milwaukee 53207 R
Green Bay RUF Club, Inc., Orvell Peterson, 552 Mech St., Green Bay 54302 R
Kettle Moraine Flyers, Charles Salkowski, 325 E. Lincoln Ave., Hartford 53027 R
Lakeland RC, Robert Schultheis, 38552 Genesee Lk. Rd., Oconomowoc 53066 R
Madison Aero RC Society, Robert Tice, 1713 Browning Rd., Madison 53704 R
Milwaukee Area RC Soc. Inc., James Hansen, 8260 S. Verdev Dr., Oak Creek 53154 R
Milwaukee Flying Electronics Inc., K. Ehlers, 2738 N. Cramer St., Milwaukee R
Pebble Creek Flyers Inc., Ken Seeling, 4406 S. 36, Milwaukee 53221 R
Platteville Balsa Builders & Busters, G. Louthain, 1285 West Hill, Platteville R
Point Aero Techs, Myron Bigalke, 417 5th Ave., Stevens Point 54481 C
Racine RC MAC, Rick Kuiper, 301 Ohio St., Racine 53405 R
Tri City Radio Controllers, D. Condon, 1117 Woodman Rd., Janesville 53545 R
Valley Aero Modelers, John Schmiding, 2118 N. Division St., Appleton 54911 R
Wausau RC Sportsmen, Dennis Lewandowski, 1212 Stark St., Wausau 54401 R

WYOMING

Casper Airmodelers Assn., D. Williams, 1400 Brookview Dr., Casper 82601 R
Wyoming Sagebrush Hoppers, Karl Richmond, 432 E. 8th, Powell 82435 R

APO, FOREIGN

Balsa Busters, Walter Constantini, 48FMS Box 97, APO NY 09179 C
Borinquen RC Club, Charles Paz, 2222 Soldado Cruz St., Santurce, P.R. 00913 R
CCK Flyers, E. LeClair, Box 5057 21 TAS, APO San Francisco, CA 96319 R
Eifel Aero Modelers, George Morton, CMR 2545, APO NY 09132 R
Hessen Eagle Modeler Club, Robert Swan, USAMC STITEUR, APO NY 09710 R
Mid Atlantic Aeromodelers, Rex Whitehurst, Box 121 1605 ABWG, APO NY 09406 R
Misawa Aeromodelers, D. Patzwald, NSGA CMR Box 4563, APO San Fran., CA 96519 R
P.R. RC Modelers, J. Pineiro, Calle Manila No. 992, Sta. Rita, Rio Piedras, P.R. R
Tien Mou Flyers, L.W. Hoffman, 81044 Lan Ya Li, ShiLin, Taiwan R
Wiesbaden Flying Circus, Dale Dacus, Box 605 USAF Hospital, APO NY 09220 M
Wurzberg A Meisters, D. Meeker, 102 Sig Svc. Co., STRATCOM, Kitz Det, APO NY 09031 R

CONTEST									
	1	2	3	4					
7	8	9							13
14	15			18	19	20			
			24	25	26	27			
29	30	31							

Official Sanctioned Contests of the Academy of Model Aeronautics

MARCH 17-18-SNOHOMISH, WASH. (AA) Polar Bear RC Meet. Site: Snohomish. P. Williams CD, 5803 East Dr., Everett, Wash. 98203.

MARCH 18-MIAMI, FLA. (A) Dade Park & Recreation Indoor (Cat. I) Contest. Site: Youth Fair. B. Myers CD, 3935 SW 125th Ave., Miami, Fla. 33165. Sponsor: M.I.A. M.A. Club.

MARCH 18-LIVINGSTON, N.J. (A) Livingston Flying Tigers CL Air Races. Site: G-V Controls. C. Schaefer CD, 514 N. Chestnut St., Westfield, N.J. 07090.

MARCH 31-LOCUST VALLEY, L.I., N.Y. LIAMAC Indoor (Cat. I) Record Trials. Site: Friends Academy, J. Pallet, CD, 30 Emerson Rd., Brookville, L.I., N.Y. 11545.

APRIL 15-DAYTON, OHIO (A) Spring CL Fly-In. Site: Dayton. J. Haupt CD, 3908 Necco Ave., Dayton, Ohio 45406.

APRIL 15-MIAMI, FLA. (A) Dade Park & Recreation Indoor (Cat. I) Contest. Site: Youth Fair. B. Myers CD, 3935 SW 125th Ave., Miami, Fla. 33165. Sponsor: M.I.A. M.A. Club.

APRIL 21-22-DAYTONA BEACH, FLA.

(AA) Eagle-Beagle CL Model Airplane Contest. Site: Daytona Beach. H. Lambert CD, 109 Old Carriage Rd., Daytona Beach, Fla. 32019.

APRIL 29-FT. WORTH, TEX. (AA) 3rd Annual RC "Lone Star Airobatic Convention." Site: Benbrook Lake. L. Stanfield CD, 1813 Montclair, Ft. Worth, Tex. 76103.

APRIL 29-CINCINNATI, OHIO (A) CL Combat Bash. Site: Lunken Airport. W. Messerly CD, 1122 Eight Mile Rd., Cincinnati, Ohio 45230. Sponsor: Queen City U-Control Club.

APRIL 29-HILLSBORO, ORE. (A) Nor'-Westers Spring FF (Cat. II) Contest. Site: Hillsboro. D. Sobala CD, 1720 NW 138th Ave., Portland, Ore. 97229.

APRIL 29-TWIN FALLS, ID. (AA) Magic Valley Aeromodelers Fun Fly. Site: Twin Falls. R. Adamson CD, 320 Locust St., Twin Falls, Id. 83301.

MAY 5-6-WACO, TEX. (AA) The 2nd Texas Open RC Contest. Site: Waco. M. Blose CD, Box 544, Hamilton, Tex. 76531. Sponsor: H.O.T. M.A.C.

MAY 5-6-HUNTSVILLE, ALA. (AA) 13th Annual Rocket City RC Meet. Site: Old Huntsville Airport. G. Martin CD, 3412 Hutchens Ave., Huntsville, Ala. 35801.

MAY 6-MESQUITE, TEX. (AA) 15th Annual Mothers' Day FF Contest (Cat. II). Site: Samuels East Park. J. McDonald CD, 2523 Greenport, Dallas, Tex. 75228.

MAY 6-FRANKTON, IND. (A) 5th Annual Madison County Fun Fly. Site: Frankton. J. Payton CD, 601 W. Washington, Alexandria, Ind. 46001. Sponsor: Madison County RC Flyers.

MAY 12-13-BURLINGTON, N.C. (AA) Central Carolina RC Meet-4th Annual. Site: Burlington. H. Randles CD, 3016 Marlborough Rd., Burlington, N.C. 27215. Sponsor: Greensboro Radio Modelers.

MAY 19-HILLSBORO, ORE. FAI Quarter Final Qualifying FF Meet. Site: Hillsboro Field. R. Waterman CD, 1520 N.W. 131st St., Portland, Ore. 97229.

MAY 19-20-JACKSONVILLE, FLA.

(AAA) 1973 FF, CL & RC Rebel Rally (Cat. II). Site: Whitehouse N.A.S. F. Carney CD, 1839 Loyola Dr., Jacksonville, Fla. 32218.

MAY 19-20-ROUGH RIVER, KY. (AA) Kentucky's 1st Annual "Mint Julep" RC Meet. Site: Rough River Landing Strip. D. Early CD, 4505 Crator Dr., Louisville, Ky. 40229.

MAY 19-20-LAFAYETTE, LA. (AA) 5th Annual Model Aviation RC Day. Site: Stutes Field. G. Myers CD, 204 Montgomery Dr., Lafayette, La. 70501. Sponsor: Acadian RC Club.

MAY 20-MIAMI, FLA. (AA) Dade Park & Recreation Dept. Indoor Contest (Cat. I). Site: Youth Fair. B. Myers CD, 3935 SW 125th Ave., Miami, Fla. 33165. Sponsor: M.I.A.M.A. Club.

MAY 20-GLASTONBURY, CONN. SAM-7 Spring FF Rally. Site: Meadow Road. J. Whittles CD, 43 Farview Ave., Saybrook, Conn. 06475. Sponsor: Society of Antique Modelers Chapter 7.

MAY 20-MESQUITE, TEX. (A) The RC Glider Gagger 1. Site: Samuels Park East. L. Dierolf CD, 207 Leda Dr., Mesquite, Tex. 75218. Sponsor: Dallas RC Club.

MAY 26-27-GRAND JUNCTION, COLO. (AAA) Memorial Day Annual FF & CL Meet. Site: Modeleers Field. P. Neilsen CD, 2104 Gunnison Ave., Grand Junction, Colo. 81501.

MAY 26-27-EUGENE, ORE. (AAA) Northwest Regional CL Championships. Site: Eugene. M. Gilbert CD, 170 Formac, Eugene, Ore. 97402. Sponsor: Eugene Prop Spinners.

MAY 26-28-COUNCIL BLUFFS, IOWA National Falcon Tournament. Site: Cobras Field. J. Simpson CD, 2736 Ellsworth, Omaha, Neb. 68123.

MAY 27-OKLAHOMA CITY, OKLA. (AA) Central Oklahoma CL Championships. Site: 5300 Broadway Ext. M. McGee CD, 904 N. Harris, Apt. A, Oklahoma City, Okla. 73107. Sponsor: Oklahoma City Controllers.

MAY 27-CHARDON, OHIO (AA) C.R.C. 11th Annual RC Pattern Event. Site: Chardon. F. Sheplav CD, 36981 S. Lakeshore Blvd., Eastlake, Ohio 44094.

AMA News Extra



THREE NATS POSSIBILITIES!

By the time this issue reaches you, a final decision as to the dates and place of the 1973 National Model Airplane Championships should have been made, and at this point a note or phone call to AMA HQ (area code 202, 347-2751) will obtain the latest information--if you don't have it already. But at press time there were three separate possibilities concerning where and when for the Nats.

Each was awaiting some final detail to enable a firm decision to be made, and it appeared that the AMA Executive Council, at its February 17 meeting in Washington, D.C., would have to settle the question then. Presumably, therefore, the decision will have been made by now, probably in favor of one of the following:

1. July 23-29, Chanute Air Force Base, Rantoul, Ill., about 150 miles south of Chicago and just north of Champaign. At press time the Air Force seemed inclined to say yes to hosting the event, but needed clearance from the Air Training Command at Randolph Air Force Base in Texas.

2. July 23-29 or July 30-August 5, Glenview Naval Air Station, Ill., just north of Chicago, scene of the last three Nationals. The situation at press time was that Navy Recruiting in Washington was exploring the possibility of reversing a previous Navy decision (by a different department) to not host the '73 event.

3. August 6-12, Wittman Field, Oshkosh, Wisc., about 165 miles north of Chicago --home of the annual fly-in of the Experimental Aircraft Association, to be held in 1973 from July 29-August 5. Because of difficulties in securing firm and early Nats agreements from either the Air Force or Navy, AMA officers were considering accepting an offer from the EAA to use their facilities.

Background. When Navy sources said no in January to hosting the 1973 Nats, despite earlier indications of a yes answer, AMA's efforts revived an earlier proposal to the Air Force. From late January through mid-February, Air Force hosting appeared likely, although with the probability of less support than the Navy had provided: probably no large hangar, limited officials' berthing, no barracks or mess hall feeding.

While awaiting a definite Air Force answer, a Navy inquiry to AMA HQ indicated renewed interest in continuance of a Navy-hosted Nats program--based on new recruiting interest resulting from ending of the military draft system. Because Navy hosting offered more, AMA was receptive, provided a quick answer could be obtained.

Meanwhile, negotiations with the Experimental Aircraft Assn., which had begun in early 1972, reached agreement on a means by which AMA could use EAA facilities. This possibility had previously been tabled because it involved higher cost for AMA and a change from traditional Nats dates (which could affect vacations). But the possibility was renewed and was getting stronger daily as firm word from both the Navy and Air Force was slow in coming.

In any case a full week-long Nats schedule is planned for 1973. The AMA Nats Committee, which met on February 3 in Chicago, approved the same basic schedule as for the 1972 Nats, with a few minor detail changes.

By special arrangement with the publisher this page is produced at the very last minute, just before the magazine is printed, to bring you the latest news concerning current Academy of Model Aeronautics events of national significance.

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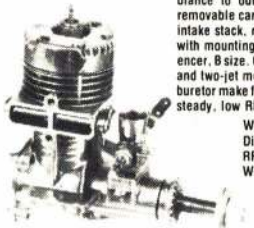
The new Fox 19 is similar in appearance and construction to the Fox 25. It will interchange with the larger engine using the same motor mounts. The Fox 19 has a meehanite piston lapped to a steel liner and the power output is surprising for a bushing motor—out-running many ball bearing motors.



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SKYHAWK

(Continued from page 93)

building board, mark the rib locations and pin the tip rib, R9, and the center section to the trailing edge. The leading edge is the secret to the wing alignment, and both pieces must be straight. Glue the leading edge to the center section and tip ribs blocking the leading edge up 1-3/16 in. at the lower front corner of rib R4 and 5/32 in. at the lower front corner of R9. This will provide two degrees washout in each tip. Next, insert the remaining ribs aligning them with the bottom of the leading edge and add the top trailing edge and spars. Assemble the engine mount consisting of the engine bearers with blind nuts, spacer blocks and doublers, and glue this assembly to the center section and ribs R1

and R2 adding F1 at this time. The top of the leading edge can now be carved to shape and the top sheeting and capstrips installed. Note that the leading edge sheeting extends over the carved leading edge.

At this point the wing is fairly rigid and can be removed from the building board for installation of the control system. I used a J-Roberts system because of its reliability and simplicity. Install the engine temporarily to ensure accuracy in the throttle linkage. Don't forget the aluminum engine pads. The top center section sheeting can now be installed. The wing is inverted, the trailing edge pinned to the board, the leading edge blocked to prevent warps, and the bottom leading edge carved to shape. The bottom spars and sheeting and bottom capstrips are added to complete the wing.

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The fuselage is cut to fit between the plywood doublers and flush with the top surface of the wing. Use plenty of glue since, although the fuselage carries little load in flight, it will be your grip for the pull test. I recommend using Sig Epoxolite or something similar at the wing-fuselage and tail joints to produce a smooth fillet and strengthen these areas.

I prefer to use Silkspan or Super MonoKote for wing covering since silk requires too much dope (weight and time) to achieve a really smooth surface. The original A-4P was finished in the white and red of Navy training squadrons. Color scheme possibilities are almost endless with the great variety of paint that Navy birds have worn throughout the years.

The fuel tank is a modified Veco T-32 two oz. rat race tank. It gives steady fuel flow regardless of aircraft speed. It is not intended for inverted flight as that is not allowed in Carrier flying and because the Skyhawk is marginal in inverted flight. Many commercial tanks can be fit into the tank area.

If you have not flown models with sharply swept wings, there are a few characteristics which should be pointed out. The first is tip stall. The tips have

two degrees washout to counteract the effects of the air flowing out toward the tips instead of straight back over the wing as it should. Without washout, this spanwise flow would cause the tips to stall first and result in a sharp pitch-up which is, at best, difficult to control.

The second characteristic is Dutch roll. This effect is similar to dihedral but works on a different axis. If the model is yawed toward the outside of the circle, the inside wing will produce more lift and the model will bank away from the center. It is, therefore, very easy to tell when the model is flying straight around the circle and producing minimum fuselage drag. If it banks out, it is not tacking straight and needs tail weight.

Practice flying your Skyhawk to become thoroughly familiar with it and to determine the best propeller to use for your particular engine. My Supertigre 35 will give over 80 mph off the deck with a 9-7 prop and 25% nitro fuel. The Skyhawk must be kept low during the high speed run to avoid the problem of high induced drag. Slow speed flight will require higher power settings than straight-wing airplanes, and power can be used quite effectively to produce a nose-high sink rate for landing.

**SEE SUDDEN SERVICE PLANS
PAGE 85**

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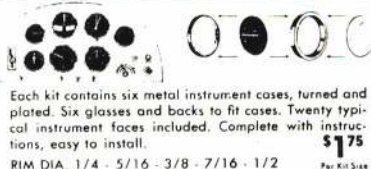
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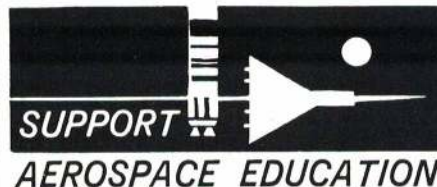
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MOONEY ON FF

(Continued from page 18)

models of the Waterman Aerobile, First Northrop wing, and B-49 to flying planks, Deltas of variable sweeps, Rogallos, and Stringless wonders. Stringless wonders were there powered by rubber bands, CO-2 engines, and gas engines. This design by Bill Hannan really flies well.

A more or less unducted (I think) scale of the Lockheed Supersonic transport was doing spectacular long takeoffs with zooming climbs. One CO-2 entry was a yellow Delta with a yield sign on the bottom surface—just like the standard California highway signs.

Bill Watson, running south after a rapidly climbing flying wheelbarrow, was the high-light of the day.

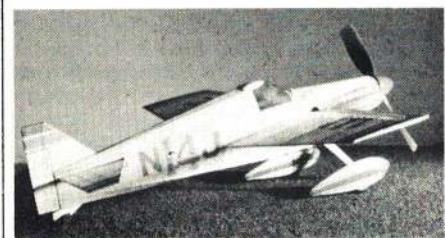
The following week the N.A.R. Flightmasters held their annual Jumbo Scale contest and got identical perfect conditions. They also had a Peanut scale event. Jumbo was won by Ray Berens flying a Skyfarer. Hal Cover, the winner of the first two contests flying a Puss Moth, was forced by rule changes to build a new model and entered a superb foam FW 152. It uses retract gears and flew nicely, but not long enough to win.

One of the Jumbo rules is a requirement for a pilot. This really enhances an open cockpit model.

New Products: Marlow Engineering (North Hollywood, California) is making machined balsa prop blanks that are just the thing if you need a propeller lighter than the plastic ones, or want higher pitch for longer duration than most plastics will provide. They have the prop shaft hole already drilled and can be carved and sanded into very efficient propellers. They will work even without any carving if you are a rank beginner.

One of the nicer toys for scale modelers was one put out by Mattel some years back, called the Vacu-Form. Unfortunately they discontinued production (maybe too many little kids got burned or maybe not enough scale modelers found out about them), and

Mooney's free-flight "Ole Tiger" has many vacu-formed parts—see text.



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the supply of material is running out also. A source of material is the vinyl file separators carried by some stationery stores. These come in 9 x 12 sheets in several colors and are .015 thick.

This vinyl material was used to form the cowl cheeks, spinners, and wheel pants for my latest Peanut scale "Ole Tiger."

FRED MARKS ON RC

(Continued from 36)

The shorted cell should be discarded. A reversed cell can sometimes be brought back to normal by a fast high current charge, but how long it will remain normal is questionable.

A monitor is useful to have for simple checks of transmitter operation, to check for broken receiver crystals, as well as for monitoring. The following came from the Valley Flyer. "This is a monitor built around the Heathkit receiver for which parts are available on all 17 RC frequencies. Jerry Pullen drew a circuit which permits a speaker to be driven by Q102, (please refer to the Heathkit assembly manual for the GD-19 receiver) the second pulse amplifier on the decoder circuit board as shown in Figure 2."

The task begins with procuring the Heathkit receiver and the decoder parts thus identified. The remaining parts may be bought at most local electronic shops: 500 ohm potentiometer, 10 microfarad capacitor, 500 ohm primary/8 ohm secondary audio transformer, 8 ohm speaker two-in. dia., 3 pencil batteries, battery holder, switch, antenna connector, suitable box. Be sure that the box is large enough to hold everything. When all of the parts are collected, locate them in the box with good accessibility.

Once satisfied with the layout, drill grid holes for the speaker and mounting holes for the on-off switch, antenna plug and volume control. The antenna plug should be installed close to the receiver board. Use an assortment of epoxy and double-backed servo mounting tape for the speaker, battery box and printed circuit boards. The decoder board has some rather large lands with many holes which can be used for the multiple red and black wires needed. Do the necessary wiring among the components before mounting them permanently into the box.

The antenna can be a piece of piano wire. We used 3/32" dia. wire about 18" long. Don't forget to guard the tip some way for safety. Sweat solder this wire into the antenna plug. Run a short wire from the input antenna coil tab to the female part of the antenna plug screwed into the case. Tune up the receiver with the antenna attached per the Heathkit manual.

After you get everything together, turned on and tuned, you should hear something like a 60-cycle hum with a transmitter on. If not, or if the hum does not change its sound as the sticks are moved, there is a malfunction.

In addition to its use as a transmitter monitor, this monitor will help determine if the receiver crystal is broken or the local oscillator is not functioning. Without the transmitter on, turn the monitor on. A hiss will be heard. Turn on the suspected receiver. If the monitor "quiets" the local oscillator and crystal are all right.

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