

RCM



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OCTOBER 1978

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radio control MODELER

THE WORLD'S LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST



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ANNUAL
NORTHWEST RC
SEAPLANE
CHAMPIONSHIPS**



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RCM MODELER

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This Month's Cover

features the R/C versions of Irwin Ohlsson's 1936 Pacemaker which are enhanced by lovely Miss Colleen Crowley while Irwin's Grumman Widgeon floats gracefully in the background. Photo by Dick Tichenor.

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From The SHOP



DON DEWEY



Newsletters . . .

Many thanks to the editors of R/C club newsletters who send a copy to RCM each month. We read all of them and they are our best source of information as to what is really happening in R/C.

The *K Factor* from the National Society of Radio Controlled Aerobatics, editors Betty and Suzi Stream, is actually a mini-magazine that gives us the straight scoop on the world of competition pattern flying. Professionally presented articles and reports by the top names in pattern competition make interesting and informative reading. For instance, a recent article by Don Lowe explained how too much lubrication in fuel could contribute to the very high rear bearing failure rate in the high performance Schnuerle engines. Discussions on proposed rule changes; the details of how to properly perform maneuvers; contest calendars and reports; and all sorts of items concerning the activity are handled quite well. These folks tell it like it is, both the good and the not so good.

Here is a suggestion --- each R/C club should purchase a membership in the NSRCA for its newsletter editor who, in turn, can receive the newsletter and borrow pertinent material to pass on to the club. Of course, those modelers involved in pattern flying should have their personal NSRCA membership. Send the \$6.00 dues to Mrs. Sally Brown, Secretary/Treasurer, 8534 Huddleston Drive, Cincinnati, Ohio 45236. Being able to read Sally's footnotes that she types into husband Dave Brown's material is alone worth the dues fee.

Quarter Midget Racing

Quarter Midget Racing celebrates its tenth birthday! The June '68 issue of RCM presented Chuck Cunningham's proposal for a sport racing event that he named Quarter Midget. Chuck outlined a set of rules and specifications that have proven practical and popular.

George Zink, Q.M. Editor, NMPRA, requested copies of the original Q.M. rules and the following is a nice note that

we received from him:

Hi Don,

Many thanks for the copies of Chuck Cunningham's Q.M. rules and the article about the Q.M. Rivets.

I have typed Chuck's entire article as it appeared in the June '68 RCM and am sending it along to Jeff Berken to be printed in the next issue of the NMPRA News Release.

I was truly amazed to see how little the Q.M. rules had changed in 10 years. I think that stands as a tribute to Chuck and the staff at RCM.

Again, many thanks for the articles.

Very best regards,

George Zink

Q.M. Editor, NMPRA

Thanks for the kind words, George, and a Happy Birthday to the Quarter Midgets!

We received the following announcement from Chuck Moses and Don McCarthy, co-owners of Authorized Radio Control Service, 915 North Main St., Orange, Calif. 92667 (714) 639-8886, that should be of assistance to modelers needing radio service.

Dear Don:

Authorized Radio Control Service has recently been appointed as a Kraft Warranty and Authorized Service Station.

We are factory trained technicians with over fifteen years service in radio control electronics. Our ability to provide you with fast (usually five days or less) service is enhanced by our close relationship with sixteen companies that manufacture radio control equipment and who have designated our company as a Factory Authorized Service Center for their products.

ARCS services all the following brands:

Factory & Warranty Service: Ace, Kraft Systems, Inc., Mathes Electronic Systems, Pro Line Electronics, Inc., RS Systems, Simprop.

Factory Authorized Service: Aero Sport, Cannon Electronics, Inc., D & D Electronic Specialists, EK-logicrol, Micro Avionics, Orbit Electronics, Royal Electronics, World Engines Radios,

Jomac/Jerobee, Cirrus.

Other Brands Serviced: Bonner, Citizenship, Cox/Sanwa, Futaba, Hobby Lobby, KSE-KGL, Mac's, MRC, Novak Electronics, Tower.

Hours: 10-8 Monday, Wednesday and Friday; 10-6 Tuesday and Thursday; Closed Saturday and Sunday.

You are invited to visit our well equipped service facility in Orange, California. We look forward to providing the fast and reliable service you can expect from Authorized Radio Control Service.

Yours for Quality Service,

Chuck Moses and Don McCarthy

We received the following memo from Leon Shulman, 173 Essex Ave., Metuchen, New Jersey 08840.

Dear Don:

Ever since the "How we did it" article on the "Shulman System" appeared in the April 1971 issue of R/C Modeler Magazine, I have had, and complied with, hundreds of requests for it. Because the inquiries have been continuing, I have just reprinted another 250 copies. I would appreciate it if you would make mention of the availability of this to any Contest Director who may want a free copy. They can be obtained simply by requesting one from me and enclosing a self-addressed stamped return envelope.

Sincerely,

Leon Shulman

According to Leon's article the system was conceived because "our Flight Line Director 'broke-down' and walked off the field mumbling to himself. It was then we decided that something had to be done to simplify procedures, method of frequency management, circle assignments, balance between circle, complete control of frequencies to prevent interference, etc., etc. We just can't lose good modelers and contest workers this way. As the Contest Director, we were in a position to see these problems associated with overall management and went to work to overcome them."

NEW! The engine for giant RC aircraft!

DESIGNED SPECIFICALLY
FOR RC AIRCRAFT --
You no longer have to convert an industrial or
chain saw engine to power a giant RC plane.

Hobby Lobby-EVRA 190

\$97.50 List price \$139.95

Engine made in U.S.A.

REAR EXHAUST PIPE --
Specially designed for easy
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**PUMP PRESSURE
CARBURETOR** -- You can
put the fuel tank five feet
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and idle stop screw.

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on con rod, 2 ball bearings
on crankshaft

INSIDE: Loop charging for
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BEAM MOUNTING FLANGES -- For easy mounting
in aircraft that have wood engine mount rails. **AND,**
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No points to foul or cause radio
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Electronic spark advance.

**CANTILEVERED
CRANKSHAFT** --
No useless shaft sticking
through the rear of engine.

GIANT PROP DRIVE UNIT
for giant props. No more
crushed prop hubs.

The Hobby Lobby-Evra 190 is a 2 stroke cycle ignition engine designed specifically for very large RC aircraft. It is 1.9 cu. in. displacement (31 cc.)—roughly 3 times bigger than a .60 engine. We have run 18 to 22 inch props on it at top RPMs of 7000 to 5000. It idles at 1500 to 2000 RPM depending upon the prop used. It runs very economically on regular leaded gasoline mixed 20 to 1 with 2 cycle oil.

The Hobby Lobby-Evra 190 is a model airplane engine and not a lawn trimmer or chain saw engine: The cantilevered crankshaft does not have a protruding rear shaft; the carburetor is accessibly mounted on

the rear of the engine; the engine has conventional beam mounting flanges. We also have a cast aluminum firewall mount available for it. The Hobby Lobby-Evra 190 was designed to withstand sustained full-power running. It has large cooling fins, 4 ball or needle bearings, and a very strong conrod and crankshaft. Even the extra large prop drive unit and large prop washer were designed with giant RC aircraft in mind.

There is no sensation in RC quite like flying a giant RC plane. Here at last is the engine that was made for these giant aircraft.

Send me ____ Hobby Lobby-EVRA 190 engine(s) at \$97.50 ea. Send me ____ Firewall Mount(s) for EVRA 190 at \$15.00 ea.

() I enclose check for \$____, plus \$1.80 handling. () Charge to my BankAmericard No. _____ Expires _____

() Charge to my Master Charge No. _____ Expires _____. () Ship C.O.D. \$2.75 handling for C.O.D. and bank card orders.

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\$88.00

List price \$115.00



53 inch wing span near scale model of the famous WWII fighter and ground attack aircraft. For .40 size engines and 4 or 5 RC channels. The kit is a truly deluxe Trueline product: pre-shaped balsa parts, veneered foam wing panels, 3 large veneered foam fuselage sections, formed wing fairings, cowling and detail parts, authentic spun aluminum spinner, decals, accessory packs, detailed drawings and step-by-step building sketches. Typhoon is an excellent stand-off scale subject because model engines can be effectively hidden in the unusual deep scale cowling.

SURE-FLITE A-R-F
FOAM KITS



SPITFIRE MK I.....\$28.85

List price \$37.95
Brand new injection molded all foam kit. Clear canopy and mold-on radiators. Decal sheet. 50" span, 450 sq. in. wing area. For 2 to 4 channels, .29-.40 engine.



PIPER J-3 CUB FOAM

ARF.....\$28.85

List price \$37.95
For .15-.19 engine. 52" span, 442 sq. inch area. 2 to 4 channels. Includes semi-scale engine cylinders, vinyl numbers, stripes, Cub decals, steerable tail wheel.



CESSNA SKYLANE 182

FOAM ARF.....\$28.85

List price \$37.95
For .15-.19 engine. 53" span, 420 sq. inch area, 2 to 4 channels. Steerable nose gear, 2 hour assembly.



HOWARD "PETE" \$18.95

List price \$24.95

36" span, 250 sq. inch wing area, all foam RTF for .051-.10 engines. Classic racer of 1930's, includes decals, hardware, nylon pushrod material. For 2 RC Channels.

This outfit starts you flying
R/C with a full 4 channel plane!
JUNIOR TELEMETER
BEGINNERS OUTFIT \$277

A Combo price in effect until
Oct. 31, 1978
B Hobby Lobby
JUNIOR TELEMETER
C Fox 15 R/C
ENGINE



D 2 rolls/SUPERKOTE

Any beginner can build it...
Every beginner can fly it!



Hobby Lobby
RECRUIT
\$21.95

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

EXACT SCALE!
Hobby Lobby/Klaus Krick
KLEMM L 25 d



\$54.95 list price \$72.95

73" wing span, 632 sq. in. wing area, for 4 channels, .30 size engines. Klemm 25 was pre WWII German sport aircraft of all wood construction. Kit is all balsa and easy to build because of flat fuselage side design of original. Incredibly well-designed kit with specialized hardware, scale wheels, and English language instructions. Ultra-gentle flyer. Imported from Germany.

EXACT SCALE!
Hobby Lobby
Klaus Krick



\$72.95 list price \$96.95

Winner of the 1976 German Scale Nationals! 69" span, 581 sq. in. wing area all balsa kit with a strip-planked fuselage and split flaps! For 5 channels and .30-.45 engine. Flap actuation is fully hidden as in the original. Original was 1938 German basic trainer for future Luftwaffe pilots. Spot landings are made predictable because of very effective split flaps. Special hardware and scale wheels. Imported from Germany.

EXACT SCALE!
Hobby Lobby
Klaus Krick



\$99.95 list price \$133.95

75" wing span, 646 sq. in. wing area, 4 channels, for .23-.40 size engines. "Student" came out in 1937 and became famous for its 450 foot takeoff run! This kit includes a well-detailed fiberglass fuselage with cowl and cockpit. The remainder of the kit is balsa construction. The wings plug into the fuselage like glider wings, and have special hardware to make the aileron linkage hookup. The hardware includes scale wheels, tailwheel. Detailed English building instructions included.

NEW! Here is the fanciest **CHIPMUNK**
Kit you'll ever see!

HOBBY LOBBY/TRUeline
KRIER CHIPMUNK \$79.00



50" span near scale model of the Krier Conversion DeHavilland Chipmunk. For .35 to .40 engines and 4 RC channels. A very deluxe Trueline kit: Pre-shaped balsa and plywood parts, pre-veneered foam wing and pre-veneered rear fuselage section. Formed wheel pants, wing root fairings and cowling. Superb molded clear canopy, good hardware and detailed drawings with instruction manual. If you've always wanted to build a Chipmunk but were waiting for a kit that was good enough to be worth building—here it is!

Hobby Lobby/Multiplex
BIG LIFT \$99.00
list price \$124.95



Designed for LIFTING or carrying gliders up to launch altitudes. Extremely strong balsa construction with a 2 piece wing so you can carry the plane in a compact car. Excellent hardware includes functional wing struts. 87" wing span, 64" length, 1070 wing area for 3 channels and powerful .60 engines. Glider Carrier for Big Lift \$15.88

NEW! Clean engine parts quickly!
SONAC CLEANER.....\$24.95



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

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

NEW! NO ADAPTERS NEEDED!
These will fit any engine!
KAVAN ALUMINUM SPINNERS



1 1/2" (40mm) diameter \$4.80
1 3/4" (45mm) diameter \$5.10
2" (50mm) diameter \$5.40
2 1/4" (55mm) diameter \$5.70
2 1/2" (60mm) diameter \$6.00

Kavan Four-way wrench \$2.50

The deeply in-set flange is held directly against the prop by the prop nut eliminating adapter bolts. You can use a socket wrench or the Kavan 4-way wrench to tighten the prop nut. A soft rubber plug caps the spinner. Spinners are cast and polished aluminum that'll last when used with an electric starter.

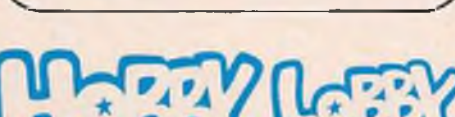
Brand New Design! Lower Price!
STARTS, CHARGES, LIGHTS,
FILLS, DE-FUELS, TESTS!



Hobby Lobby
POWER CENTER
\$17.88

List price \$29.95
This is the ideal field box accessory. With your 12 volt battery you can run your starter, your electric fuel pump and fill or defuel right from the Panel! It will also fast charge your airborne Nicad pack and your transmitter battery right at the flying field. It will power your 1 1/2 volt glow plug on the "HI" plug position and a 2 volt plug on the "LO" position... or you can use it to burn off too much fuel prime on your 1 1/2 volt glow plug on the "LO" position. The meter gives indication of glow plug condition and current flow during fast charging. It won't fly the plane or clean it up when you go home, but it sure will just about do everything else you need in starting and getting your plane fueled, started and staying in the air. Size: 6" x 3 5/8"

SPECIAL!
G.E. Nickel-Cadmium
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1.2 volt 500 mah. Pancake size
4 for \$9.99
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This is the high quality G.E. cell that's original equipment in the best radio outfits. Cells have solder tabs.

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MULTI-PROP



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

If you haven't tried MULTI-PROPS yet . . . you can save \$ by trying them NOW!

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 - Spare 10" Blade for Multi-Prop 99¢
 - Spare 12" Blade for Multi-Prop \$1.49

NEW! Adjustable Pitch for Ducted Fans!



Hobby Lobby—S.L.E.C.
Multi-Prop FAN UNIT
\$14.99
List price \$21.95

This is not a complete ducted fan unit with venturi housing, but is only the fan itself (as pictured). The idea is to make available this 6" diameter, 6 blade unit with its adjustable pitch feature for experimenters. The included instructions have many suggestions for building ducted fans. This 6" diameter unit is intended for .60 engines. Blades can be trimmed to 5" for .40's.

ATTENTION OWNERS OF . . .
Hobby Lobby and EK-Products, Inc.
Radio Systems:

We have an excellent Radio Service Department. We specialize only in these two brands of radios. We will return your radio to you, properly repaired, 5 working days after we receive it from you.

TRY US OUT — B.D. did:
 "... been a pleasure to do business with you. Everything sent . . . I never received such fast service . . ."
 B.D.—Philadelphia

BULK Balsa Wood

20-1/16x3x36	\$7.77
20-1/16x4x36	\$11.11
20-3/32x3x36	\$9.99
15-3/32x4x36	\$11.11
10-1/8x4x36	\$8.88
10-3/16x4x36	\$9.99
10-1/4x3x36	\$7.77

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

NEW! Balance ANYTHING!



Would you ever believe it's possible to balance not only a prop, but also the prop NDT? Don't laugh—this thing'll do just that. It'll also balance spinners, flywheels, boat props—anything that's got a 1/8" to 3/8" hole in it. Beautifully made.

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2-10 Adhesive	\$3.75	M.E.N. Trainer	\$34.95
H.I. Power Center	\$26.95	M.E.N. Buzzard Bombshell	\$53.95
SurefLite Cessna Skylane		K&B 61 R/C w/pumper	\$122.00
182 ARF	\$42.95	K&B 40 RC	\$74.95
SurefLite Spitfire ARF	\$42.95	OS 25 R/C	\$45.95
SurefLite Piper J-3 Cub	\$42.95	OS 40 R/C	\$74.95
Sig Kadet	\$38.95	OS 60 Schnuerle R/C	\$149.95

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Prices in effect until October 31, 1978

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

American design and engineering.

The range is so extreme that many HLB radios can be flown reliably with partially extended antennas.

Beginning RCers need a strong stick centering tension; experts want lighter tension. Our control sticks have ADJUSTABLE centering tension.

Hobby Lobby radios have very low current drain . . . they fly longer on a charge and you'll never need a field charger. A battery condition meter shows remaining capacity.

You are NEVER the test pilot for a new Hobby Lobby radio design. Our circuit design is so well-proven we've never needed to change it.

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

The servo electronics are located inside the receiver case instead of inside the servos. This contributes greatly to reliability because servos, which are tightly mounted to the vibrating airframe, are the worst place to put delicate electronics.

Airborne weight with 4 servos is only 11½ oz. Yet, this lightweight system has enough servo power to fly the biggest 1/4 scale RC planes.

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

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The popular Thorp Raceway was the sight of the 1978 McCoy Championship Road Race. 110 entries made this the largest race of the year.

The Annual Southern California McCoy Road Race continues to be one of the biggest, if not the biggest, Road Race in the U.S.A. This year's race had 110 entries from all over California, Arizona, Nevada and Washington. The race is sponsored by Dick McCoy of model engine fame, run by the Pro-Car club and held at the popular Thorp Raceway track in Pomona, Calif.

This was a 2 day event with one round of qualifying on Saturday, a second round of qualifying and the Main Events on Sunday. We figured that Friday the track would be crowded with guys practicing, so we went to the track Thursday and found another 30 guys there, but it was just the right amount for practicing. The MRP team of Tony Bellizzi, Don McKay, and Bob Welch came down from Washington along with Gary Kyes from San Francisco. They had a new prototype car and were anxious to try it out in competition. The car had a fiberglass chassis plate, radio shaker plate, disc brake and an adjustable rear pod plate. As soon as I saw them run, it was apparent this car was a great improvement over their older car. Don McKay came over to say hello, and he was smiling and crying at



Jeff Rold (in the center) won the Expert Main event with Curtis Husting, on the left, second and Bob Welch third.

McCOY CHAMPIONSHIP RACE June 10 & 11, 1978

EXPERT CLASS

A MAIN

1. Jeff Rold, 60 Associated
2. Curtis Husting, 58 Associated
3. Bob Welch, 58 MRP
4. Bill Jianas, 58 Associated
5. Chuck Hallum, 57 HRE
6. Earl Campbell, 52 Associated
7. Bill Steele, 50 Associated
8. Jack Barton, 48 Scratch
9. Jim Aguirre, 36 Associated
10. Gary Kyes, 21 MRP

B MAIN

1. Bob Titterington, 50
2. Gene Husting, 49
3. Ken Kimbrow, 49

AMATEUR MAIN

A MAIN

1. Mike Kimery, 50
2. Dana Smeltzer, 50
3. Jay Spere, 46
4. Jerry Thompson, 45
5. Larry Ferriss, 43
6. Paul Kawaguchi, 42
7. Bill Watson, 15
8. Paul Vega, 9

B MAIN

1. Rick Perry, 40
2. George Hague, 40
3. John Keltz, 40

NOVICE MAIN

A MAIN

1. Randy Smeltzer, 40
2. Dick Rold, 40
3. Glenn Williams, 37
4. Don Baiss, 37
5. Dave Shuck, 37
6. Jeff Warner, 35
7. Barry Grossenbacher, 34
8. Mike Reedy, 29

B MAIN

1. Thomas Hickenthier, 30
2. Joe Tentschert, 30
3. Lance Love, 29

BEGINNER MAIN

A MAIN

1. Chuck August, 30
2. Joe Sorillion, Jr, 30
3. Willie Green, 29
4. Ira Kimble, 25
5. Donald Gaither, 25
6. George Anderson, 22
7. Robert Roben, 20
8. Reba Steele, 16

B MAIN

1. Joe Sortillion, Sr., 30
2. Ray Shum, 29
3. Tim Bell, 25



Jeff Rold's race winning Associated RC200 car featuring Futaba radio, K & B 3.5 engine modified with McCoy parts.

the same time. Actually, he was very happy over the way his car was running, but his eyes were watering from the heavy smog. It was pretty bad. He said something to the effect that we could keep our smog and he'd keep his rain, as he went away coughing.

The track was really in good shape and everybody appeared to be going very fast. Gary Kyes, probably the best 1/12 scale racer in the country, had his MRP running extremely well as always and Bob Welch also had his MRP going very, very fast. Bob is one of those guys who everyone likes — a super person. Bob is a one man MRP factory, somehow managing to make all the MRP parts, assemble kits, make body tooling and everything else that boss man Tony Bellizzi can dream up. Bob is also an extremely talented driver and almost unbeatable in the Northwest, but driving in other areas he always seems to run in bad luck. Maybe this race will be different.

We got our cars out and proceeded to get them dialed in to the track. I just about had mine handling the way I

to page 180



The new trend in exhaust systems as used by Butch Kroells and Rich Lee. Outlet is on the side of the pipe.

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Radio: 2 - 3 ch

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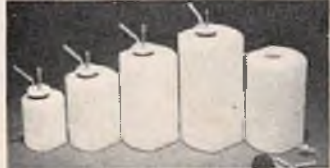


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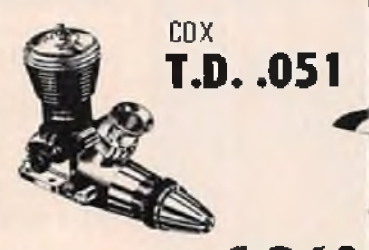
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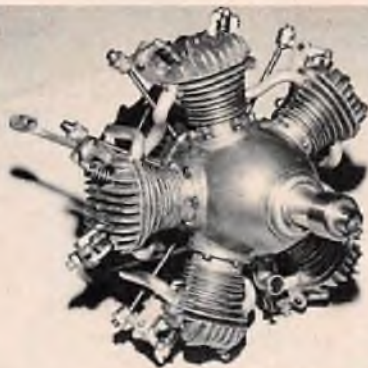
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It has been seven months now since the last old-time engine article. Because of the large number of letters coming in during the height of the flying season we decided that answering these was more important and, as a result, have held off on any old-time engine articles. With the influx of letters and related problems slowing down now, I figured it is about time to work in another old-time engine which will be the ninth in the series.

The engine I have chosen for this month's article is the Morton M-5 --- probably one of the most unusual model airplane engines the field has ever had to offer.

The Morton M-5 was designed and developed by G.R. Morton who headed the Morton Aircraft Co., in Omaha, Nebraska. The M-5 was actually a scaled down version of the famous Le Blond 5D radial, air-cooled aircraft engine. Some changes were made, however, to simplify the engine for model aircraft use. One of the principal differences between the two engines

crankcase. The M-5 induction was more like that of a two stroke engine in this respect, in that the incoming fuel mixture was drawn into the crankcase and then routed through intake tubes to the intake valves in the heads. This, in turn, assuring ample lubrication to the internal parts. This did, however, cause quite a few problems. Any leakage in the system lowered fuel draw ability and the M-5 had a considerable number of places for leakage to occur --- around the base of each cylinder, the intake tubes, out the crankshaft bearings, etc. In fact, the only means of sealing leakage out the front crankshaft bearing was by packing the space between the front and rear bearings with cup grease. Needless to say, after quite a bit of running, the grease dissolved and was flushed away. Few M-5's really ran well straight from the factory and, if they did run, were quite difficult to get running. Those that did run well had usually been reworked by fellows with the necessary experience. It was usually necessary to seal all of the points of fuel leakage with Permatex or similar material, make a crankshaft seal, lap the valves, etc. With these modifications, the engine could be made to run like a sewing machine which is pretty much the way it sounded in the air.

The M-5 was first announced in 1944 as a do it yourself type project. The kit consisted of a set of machinist drawings, castings, and materials. The original intent of the project was to train young men in precision mechanics from a practical standpoint. The dies for the M-5 were actually financed by the U.S. Government for an aircraft mechanics training program with the Army Air Force. Whether any of these M-5 kits

ever found their way into any Air Force training schools, I do not know. Having spent quite a few years in the Air Force during WW II, as a pilot, I was naturally in contact with many aircraft mechanics, crew chiefs, etc. None I ever knew had ever seen a Morton M-5 as part of a training aid. If anyone out there can verify this fact, I would appreciate you letting me know.

Quite a few M-5 machining kits were sold during 1944, but as can be expected with a complex project such as this, many problems cropped up such as complaints of engines not running, etc. So, in 1945, Morton decided to offer the engine in a completely assembled ready to run version. A close friend of mine, also in the Air Force at the time, ordered one of these first engines and it was subsequently received. A few years later I acquired the engine and it is the one pictured. Both two and three bladed adjustable pitch propellers were available as was a propeller hub assembly for using wood propellers.

In 1946, Morton decided to give up the project and all inventory, tooling, and dies were sold to the Burgess Battery Company, Handicraft Division. The engine was now called the Burgess M-5. Burgess continued the project until about 1949 or 1950 and then they, too, decided to call an end to the production. A gentleman by the name of W.L. Manning had worked for Burgess and bought out the remaining inventory, tooling and dies. W.L. Manning, along with his son-in-law Edward Sawusch, continued to service and repair engines under the name of M-S Engineering Co., in Libertyville, Illinois. Approximately another 200 engines were assembled

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ENGINE CLINIC

from page 10

from the remaining Burgess parts. In 1955, M-S discontinued the project due to health problems on the part of Mr. Manning, and his son-in-law taking a job in another state, thus ending the saga of the Morton M-5.

Today the M-5 is one of the most sought after of the old-time engines by engine collectors and even fellows not interested in engine collecting but wanting it for a mantel piece to remind them of the "old days." Just about every engine collector wants an M-5 in his collection. This is the first engine many fellows look for when first starting an engine collection. As a result, the M-5 is one of the top price old-time engines.

Only the Elf 4 cylinder and possibly Feeney four stroke are in the same price range. I am not going to quote any prices in this article although I am well aware of what is being paid, and has been paid, for M-5's. Unfortunately, if I give a value it would become a guide for those selling engines to go by and I do not want to be part of the inflation that is taking over in the hobby of old-time engine collecting. Unfortunately, there are those who now have no appreciation or interest in the hobby — they are only in it to make a buck. These are people the model engine collectors group could well do without.

For those interested in the specifications — the engine was a five cylinder, four stroke, radial air cooled model aircraft engine with a bore of .625 and stroke of .600 for a displacement of .92 cu. in. The overall diameter of the engine was 5 3/8" and bare weight without coil, condenser, batteries or propeller,

22 oz. The actual flying weight was closer to 2 lbs. The engine was claimed to develop 1/2 horsepower at 3,500 rpm.

As a comparison, the full size Le Blond was 33 1/4" in diameter, weighed 219 lbs., and developed 85 hp at 1,250 rpm --- the M-5 actually having a higher power to weight ratio.

★

Dear Mr. Lee,

I enjoy your column in RCM very much. I am an old time RC'er from way back. I have been away from modeling for about 10 years and now I have started back into it again.

I think that I, and a lot of your ardent readers, are getting confused about the metric listings on the engine sizes.

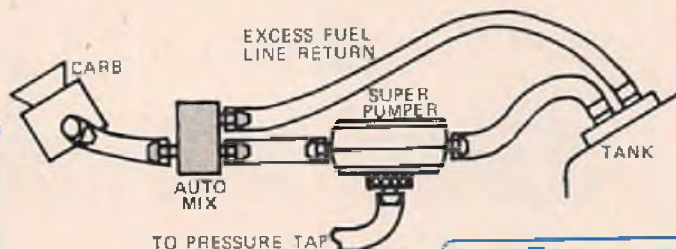
I think that it would make a good answer in your column on engines if you showed the metric sizes compared to the American standard sizes.

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Scale Spotlight



Mammoth Aerobatic Scale was flown for the first time at this year's Sig IMAC Championships. The winner of the event, Larry Scott of Harlan, Iowa had a sharp Webra .91 powered Great Lakes biplane that attracted a lot of attention. Larry started from a smaller Great Lakes, built from the Winner (formerly Long Island Hobbycrafts) kit, that he liked and also flew at the contest in the Sportsman Biplane Class. He enlarged the plans of this small design from 53" wing span to 80", a 50% increase, to create the biggie. As can be seen from the accompanying photos, the model has a high quality finish and markings in the color scheme of Harold Krier's air show Great Lakes Special.

The small job weighs 7½ pounds, the large one 15 pounds. Since the 50%

increase in dimensions results in a more than 50% increase in wing area, the larger model has a lighter wing loading. Another advantage of size is decreased scale effect and greater efficiency. The big biplane had a nimbleness that belied its bulk. It was flown head to head against Gary West's Nosen Gere Sport, which placed second. Gary's Quadra powered monster made a hit with the spectators from sheer "300 pound canary effect" as well as Gary's fine flying. It really looked like a lot of fun. But I came away remembering the throaty growl of that .91 in Larry's Great Lakes. It sure doesn't sound like a lawnmower!

By the way, one of the hazards of Mammoth Scale was dramatically demonstrated during the contest, when Gary stripped the gears on his aileron servo in the midst of a roll, nearly clipped a tree and pulled up from low altitude to barely make it back to the runway in one piece. Looks like those new heavy duty servos that are now appearing are a good idea. We've seen a full circle in RC development — from the bulky early servos down to tiny sub-miniature sizes and now back to the big ones again.



The IMAC Story

Jerry Nelson's innovations in the early years of pylon racing set the style and tone for the event. Coupled with the founding of the NMPRA, one of the first specialist organizations, he could have rested on his laurels for these unique contributions to the hobby. Instead, he began to form the ideas that resulted in the present International Model Aerobatic Club. The original plan was for an organization to encourage biplane aerobatic competition, to be called the National Sport Pattern Association. Up

to that point, biplanes had mainly been flown in scale competition and were popular for sport flying. Jerry's call for a model version of the full size IAC (with contests featuring a continuous flow of aerobatic maneuvers in a defined zone or "box" area) found receptive ears, and a hard core of biplane enthusiasts joined quickly after word was spread by mail and at the Toledo show. Jerry published suggested rules which became the standard for the first experimental contests held in 1974 and were submitted to the RC Contest Board as a rules proposal. The Board adopted them as a provisional event for the AMA rule book.

Since the word "Pattern" in the name duplicated another event, a more distinctive designation for the group was soon chosen — Miniature Aerobatic Biplane Association. But this title was also fated to be a temporary one because the scale-like aerobatic biplane theme was so close to scale aerobatic monoplane outlooks that future growth seemed likely in that area as well, just as the full-size IAC incorporates both. So the final name became the International Miniature Aerobatic Club.

There were IMAC members who objected to this expansion of purpose but, in hindsight, most admit that it was a good move. Specialist organizations that are too specialized do not prosper. Experimental IMAC monoplane events have begun to catch on and show signs of becoming just as popular as the biplane classes. Jerry has carried the broader concept to his work with Bill Bennett's Tournament of Champions and the 1978 affair in Las Vegas will be a combined scale-like extravaganza of aerobatic biplanes and monoplanes. Pattern events are beginning to lose attention from too much repetition and the time seems right for this latest evolution of the IMAC idea, combining good features from both pattern and scale. So stay tuned for further developments.

In the meantime, every scale or pattern flier who is interested in this movement should help it stay viable by joining the IMAC. After a strong start, the group has faltered from time to time. The life line of a specialist group is the



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Gary West's Gere Sport heading for landing - and photographer McCullough...



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newsletter. When it is being published regularly, communication between members keeps the organization functioning properly. But it is not an easy job to get one out and the position of

editor went unfilled much of 1977. This year, though, I suspect he does not really have the time. Glen Carter look over the post of newsletter editor as well as Secretary-Treasurer because of his enthusiasm for the organization. Norm Casella is the current President of the group. In addition to the newsletter, members receive a wallet card, IMAC license number, decals and an explanatory brochure. To become a part of this interesting activity, send \$5.00 to: Glen Carter, IMAC, 2020 Gill Port Lane, Walnut Creek, Calif. 94598.

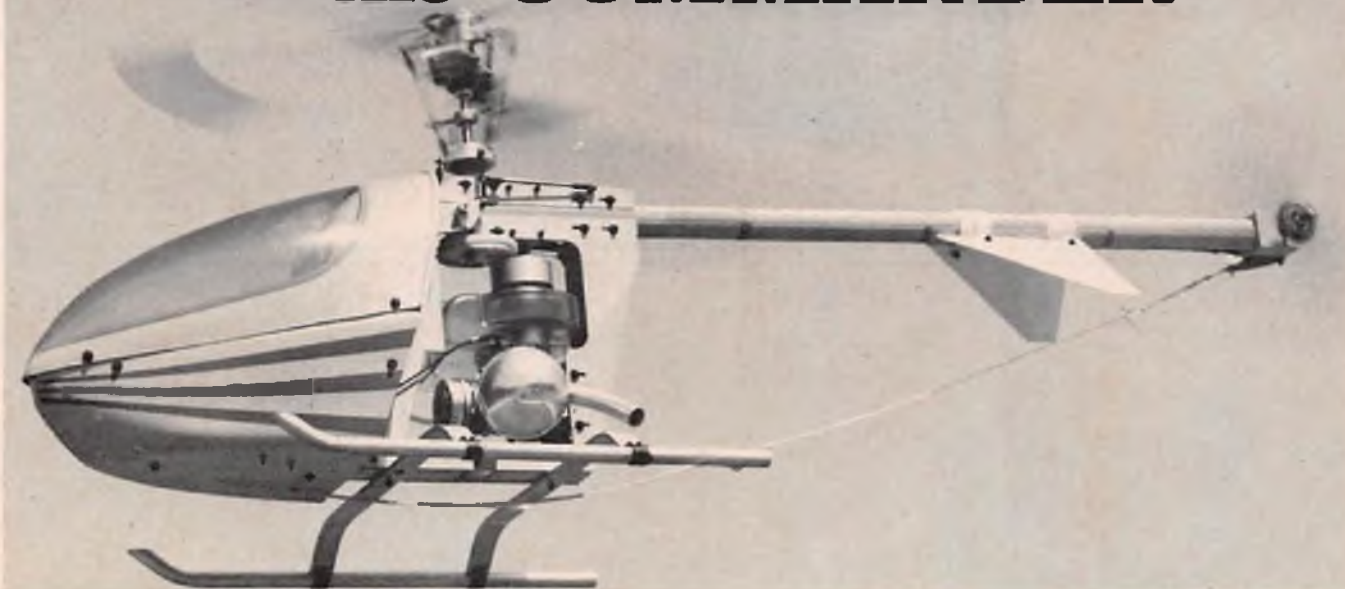
Fine Tuning The Rules

The basic IMAC rules appearing in the AMA rule book have worked out well with one major exception, that of the width of the aerobatic zone. The book states: "All maneuvers shall be flown in an area in front of the judges, 45 degrees on either side and no higher than 400 feet. Minimum altitude unless landing or taking-off shall be 20 feet." It was found, in operating the competition, that the zone was too narrow for best results. Scores are docked every time the contestant flies out of this zone, so to avoid this possibility they would move out farther away from the judges into the wider area allowing more turn-around room. This made a less attractive performance for judges and spectators alike. So a wider zone of 60 degrees on each side was tried at several IMAC meets and met with good acceptance. My guess is that at least 90% of the participants favor the wide zone. The rule book proposal was already beyond change in the cycle, and no one thought to introduce a change proposal for the 1978-79, book so it continues to say 45 degrees. We are including a drawing of the wider zone here and suggest that you try it as well as the 45 degree zone listed in the AMA book.

In planning for the 1978 Sig IMAC Championships, the Des Moines Modelaires and Sig Factory Fliers found that a new rule in the 1978-79 AMA book posed some problems. The meet had become the largest of its type anywhere and seemed certain to attract even more contestants. It was held at a small airport with limited runway space. The new pattern included in the book gave points for landing judging in the Sportsman Class. Since the key to getting a large number of contestants through a reasonable number of rounds is an uninterrupted flow of flights before the judges, having to tie up the take-off area and the judges with landings being scored, promised to cut down the number of possible flights and introduce traffic problems as well. The pattern from the '76-'77 book had caused no problems the year before, so it was decided to retain it for the '78 meet. My personal opinion is that the landing judging, with its gopher-hole luck on a grass field, is out of step with the basic

to page 18

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SCALE VIEWS

from page 16/15



Norm Cassella checks idle on his prototype Cass Skybolt - 1st in Advanced Biplane.

premises.

Efficient operation of the ready lines is also important to high flight totals. The flight line directors have to keep a continuous stream of airplanes prepared for take-off; taking off and holding upwind from the aerobic zone ready to fly into the zone on a moment's notice just as soon as either of the two contestants, flying before the judges, completes a pattern. At some contests, this results in the fliers being made to feel like Roman galley slaves with Adolph Hitler as the coxswain. Roger Schelenker, Gordon Boudewyn and the Des Moines club, helped by Hank



Don Fuller holds Sig Liberty Sport with Hawk P-6E color scheme for Bob Camarata.



Beno Echerd and Bill Heger flew M.A.N. Super Fli's. Bill took 1st in Adv. Monoplane.

Pohmann of Sig, on the field, figured out a variation that worked out fine, yet took a lot of pressure off the contestants.

Eight lines were set up, each marked with frequency flags. Seven were for the 72 frequencies, the eighth for 27 and 53

frequencies combined. A common clothespin pole was used for frequency control. At the start of a round the fliers get in their appropriate frequency lane. The Flight Director can see at a glance how many models on what frequencies

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were to be flown. The longer lines had to move faster so he had to pay particular attention to them. And, inevitably, toward the end of the round there were not full complements of fliers available. Even so, anyone having trouble was allowed to retire to the end of the line to try again before the round was finished. Nose-overs on take-off were allowed to re-start. No set order of rotation was followed from round to round. Roger said afterward, "Our goal was to have a contest with no more pressure on the flyer than he would have at a fun-fly event — to have a contest where everyone would have the maximum possible turns to fly. We also tried to break farther away from regular pattern procedures, where at a big contest you may get to fly only once or twice a day." And it did work out. About 300 flights were flown in 12½ contest hours, not all of them full steam, a flight for every 2½ minutes.



Bud Hall and his Master Kit Hiperbiplane.



K.K. McClure took 2nd in Adv. Biplane with his Sig Skybolt.

Monoplane & Mammoth Experiments

The June 17-18 contest was the 4th Annual Sig IMAC Championships held at Montezuma, Iowa. The series started as a strictly biplane affair but added Monoplane Aerobatics last year when this became a suggested part of the IMAC concept so as to have actual competition experience upon which to base rule conclusions. For 1978, given

the growth of interest in Mammoth models and 1/4 Scale, a new approach was tried. A sort of Las Vegas Middle West affair was hatched, for engines larger than the top regular IMAC event displacement of .61 cubic inches and combining biplanes and monoplanes in the same event.



Bud Atkinson holds Soarcraft Skybolt for Ken Van Toyl.



Howie Wayne helps Maurice Rossi start his O.S. .60 powered, 6 lb. Sig Skybolt.



Leonard McCoy's K & B .61 powered Sig Skybolt won 1st in Sportsman Biplane.



Gene Pond and Ralph Yount came all the way from California to Sig meet.

In the IMAC biplane event, any biplane design — scale or non-scale — is eligible, but a 10% bonus on the earned flight score can be given to all entries that are Sport Scale versions of



Part of the frequency ready lines that speeded contest operation.



Larry Scoufe with his K & B .40 powered Spinks Acromaster.



The IMAC action in one picture. In the background, two entrants fly their patterns simultaneously before the two sets of judges. In the foreground, two more fliers hold their models upwind until a judging spot opens. The caller then guides his pilot to the judges and another model is cleared for take-off to replace him. Ideally, four models should be airborne most of the time during the round.

full size biplanes. This bonus score was introduced at the beginning to serve as a start-up device encouraging development and entry of scale-like models. The future outlook at the time was a probable requirement that all biplanes be scale. Perhaps even farther down the road is a specification that they be **aerobatic** biplanes as well. In these latter cases, of course, a scale bonus will no longer be needed since non-scale models could not enter. The proposed monoplane rules that came from the Toledo Conference of IMAC members are used at the Sig contest. The flight and procedure regulations are the same as for the biplanes but entry is restricted to Sport Scale versions of aerobatic airplanes that have actually flown in full size competition using the aerobatic zone "box." The allowable list is fairly long, including such well-known designs as the Super Chipmunk, Super-Fli, Zlin, Yak, CAP 20, Clipped Wing Cub, Taylorcraft, many home-built aircraft,

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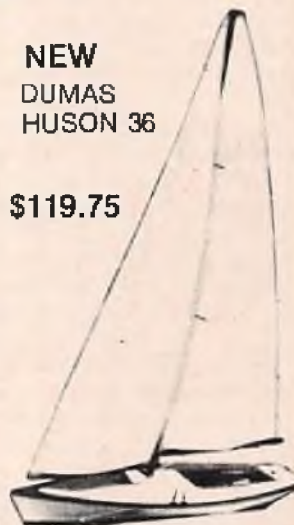
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The instructor collected them, nodded approvingly as he saw that they did pay attention, according to what they wrote. Except one.

"What's this, Willard?" (Yes, I took the course.)

"All you'd need to be rescued, sir."

"A fifth of gin, small bottle of vermouth, and some olives?"

Yessir, I figure there'd probably be lemons on the island if you wanted a twist."

"Blast it! Howinell do you think that means you'd be rescued?"

"Very simple, sir. All I'd do is pour out about three ounces of gin in a glass, add a little vermouth, drop in the olive, and start to stir. Right then, some joker is bound to jump out from behind a bush and yell 'Hey, wait a minute. That's not the way to make a martini!' And I'd be rescued."

Well, that could be a bit far fetched, but in the same vein, when it comes to Sunday flying, you guys are always willing to rescue me when I try to air some of the problems we Sunday fliers are confronted with from time to time.

Take my column in the July issue, for instance. I quoted a fuel expert who said, "Heat is power. Anyone who claims his fuel delivers more power, while at the same time runs cooler, is misleading the public!" I asked for comments. Here's a letter I received from George Aldrich:

Dear Ken,

About the temperature vs. power thing — in your recent column.

When I first started testing over 3 years ago, I could hardly believe the things that were happening. The incident that really set me off was this — I filled a 1000 ml Graduate with: 100 ml's lube, 50 ml prop. oxide, and 850 ml of 100% nitromethane to top off the graduate — I then took a new S.T.



The 'Bluebirds' fly fine on a Max .10 in the nose. An .051 Tee Dee can't pull them.

G21/35 (lapped piston) out of the box, mounted it, and ran a 4 oz. tank through the engine. The last 2 minutes were peaked out and screaming on a cut down 9/16 prop. At no time did the engine show signs of sagging or overheating.

Because of the above and other tests, I called a friend who is a physicist at Southwest Research Foundation in San Antonio, Texas. After telling him a little of what I was getting for results on test fuels, i.e., 400-600 more rpm's at less or lower temps — he came back with this, "The only way you can get more power at the same or lower temperature, is to reduce friction."

My personal feeling is that I would never knowingly tell anyone something that was not the truth and I spent over \$200.00 for an accurate pyrometer and thermocouple and several days testing to be sure I had accurate numbers before the first ad was ever placed.

George Aldrich
Mission, Texas

Now George is known as a fuel expert, just like the other guy. Just goes to show that even the experts don't agree. I will say this: heat is power, unless it is caused by friction. And if there is a lubricant which reduces friction, then the same amount of heat should produce

more power — or less heat would produce the same power. I keep hearing about the virtues of various lubricants, but admit that I don't know anything about them. Maybe Clarence Lee will address himself to the matter (if he hasn't already).

I will say this, from personal experience. I have a K & B .40 in my Sporty Forty, with an Airflow muffler. As an unscientific test — but one which any Sunday flier can perform and reach his own conclusions — I filled the tank with one of the standard hobby fuels which are available. It's good fuel, and the .40 ran very well on it. I flew the plane several times, then, after the last flight, emptied the tank, and put in some of George's 5% Magnum fuel.

When I restarted the engine, it ran rich at the same needle valve setting, and I had to turn the needle valve in about two turns to get the engine back to two cycle.

Now I admit I didn't put a tachometer on the engine, nor did I have a cylinder head temperature gauge, but it was my impression that even at the leaner setting, the .40 was running consistently, without sagging due to overheating.

That was good enough for me. My laboratory is the sky. If it works up there,

to page 161

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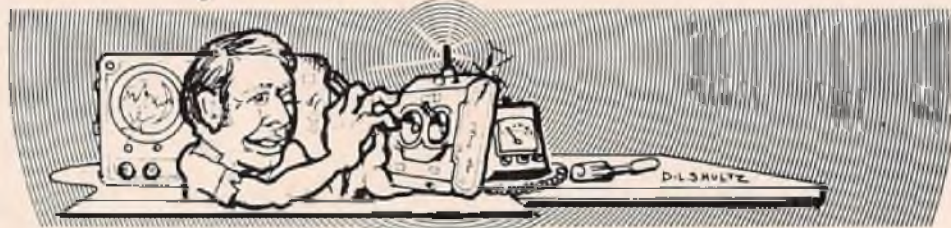
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never should have written that last column; the one about how to keep your airplane flying. Would you believe the very next weekend, while practicing the new FAI pattern, with my old Curare that has been flying for over a year, disaster struck. I was about half-way through the first loop of the new reverse inside loop maneuver, when I heard the dreaded sound that goes with control surface flutter, followed by a pop, and then severely degraded control. At the time I wasn't sure what I had lost and I just concentrated on keeping the plane level. I managed to steer a big circle and get somewhat lined up with the runway which I proceeded to hit before rolling off into the weeds. When we went over to the plane there was absolutely no aileron control. Luckily with a load applied to the aileron there was some limited amount of control that helped me get it down. The only damage that was done was two stripped gears in the servo.

The funny thing is I had read the articles on flutter. As I recommended last month, and at the time thanked God that I didn't have to worry about that. What then caused the problem now after a year of flying? It wasn't the new maneuver because I was throttled back and it isn't any more strenuous than a "Split S" which I've done many times. There were two other things different which could have contributed. I had decided I needed more aileron throw to do the new pattern. This I accomplished by shortening the aileron cranks. For a given amount of servo throw you then get a greater aileron deflection. However, this puts a greater load on the servo and makes the whole linkage more spongy. There is less moment arm to oppose the aerodynamic forces on the ailerons themselves. The other thing different was a hot new Rossi engine with a fiberglass propeller. I had flown the propeller before but it didn't really rev on previous engines. I tend to discount the impact of the engine/prop combination because I was throttle back part way at the time the flutter started, but I could possibly have hit a resonance that set everything off.

After fixing the servo, I put the pushrods back at the end of the cranks and increased the throw electronically. I also put that fiberglass prop away. I was

very nervous the next time out but the problem has not re-occurred.

By the way, I used 1/8" wire aileron torque rods/cranks instead of the 3/32" supplied in the kit. If I build another one I think I would consider 3/16 tubing like we used to use in the Super Cudas.

Another thing I've done since that occurrence is install 1/16" I.D. eyelets in the nylon control horns and put in Kraft clevises with the steel pins. This takes all the slop out. I still think a stainless steel control horn would be a winner. I guess you sell more nylon stuff because the holes are sure to wear.

You may be saying to yourself, "Boy, is he lucky. If it happened to me I would have crashed." Before you call me lucky, wait until you hear about my weekend in San Diego. We went down the Friday before the contest to get in some practice. Remember how I said to make sure the runway conditions are safe? Well I think that I always look down the runway before I take-off to make sure it is clear, and I probably did this time too, but that didn't prevent the explosion that took place when I got to about 10 o'clock taking-off right to left. Remember how I said I had hit everything that flies? Well now I can add something that runs, namely a miniature dachshund. Luckily the prop didn't get him. I borrowed Bill Salkowski's plane for the contest and never did get three complete flights in, with an engine blowing on my first attempt and would you believe a mid-air on landing approach. Some crazy Mustang was doing his straight return flight about 10' off the deck, I must say he was right down the center of the runway. On the bright side, we got home early Sunday afternoon and both Curares are repairable. The third member of our Conejo Valley Club pattern team, Don Toomey, also brought home a damaged, but repairable, Curare. His problem was traced to a broken wire on the aileron servo connector. If you are going to have a broken wire, this is the most likely spot. This connector gets flexed every time you put the plane together and take it apart. There is also a tendency to keep that "good, reliable" servo on ailerons forever. Remember this is all man-made stuff and will eventually wear out.

Anyway, there is some more things to worry about. Slight changes in control

linkages can cause a potential flutter problem. Keep an eye on those connectors and cables and watch out for dogs and Mustangs.

Image Problem

Haven't seen up and coming expert flier Curt Oberg on the West Coast pattern contest circuit this year; the following letter may explain why in part:

Dear Jim,

I just returned from a combination vacation/contest in Denver, Colorado, where I was involved in an incident that I believe is worthy of mention in your Radio Spectrum column due to the wide dissemination of information in your column. Unfortunately, we have to keep re-discovering "gravity" because you pointed out the potential hazard involved in the simultaneous operation of two aircraft on the 72.080 and 72.960 frequencies in your column in the June 76 and Oct. 76 issues of RIC Modeler. I have been attending pattern contests for several years in the Southwest and have been operating a Pro-Line radio on 72.080 without so much as a glitch either because of dumb luck and superstition or because the contest directors heeded the information in your column, admitted that a hazard could exist and arranged the frequency assignments accordingly. Knowing the high quality of the contest management of the contests I normally attend, I believe the latter choice to be the case. At the Sky Ranch model airport in Denver, all of the ingredients were perfect to generate a frequency conflict that very easily could have resulted in a personal injury and did result in major damage to my new Rossi powered Curare. The runway was very narrow (approximately 30'), two flight lines were set up approximately 250' feet apart, fliers and judges were located right on the edge of the runway, the lead off flier on line 1 was operating on 72.960 while I was the lead off flier on line 2, operating on 72.080. Line 2 was located downwind, take-offs would be from line 2 towards line 1. On the first flight, my aircraft suddenly snapped into a hard left bank shortly after lift off, almost flying behind the line of judges at the edge of the runway on line 1. The wind was gusting quite hard at the time so I reasoned that the wind had picked



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up the wing because the roll rate was much faster than normal. I made a comment to the judges that the wind sure was blowing hard (they weren't sympathetic at all) and pressed on with the flight, during which everything worked fine. On the second flight, I really didn't notice anything strange on take-off, everything seemed normal. On my third flight, the take-off roll was very close to the runway centerline, the lift off was very shallow. I retracted the landing gear and the aircraft continued to accelerate in a very shallow climb down the runway centerline. Just as I was going to announce completion of the take-off, my elevator went full down and my Curare which had considerable speed at this point smashed back to the runway right in front of the judges and flier on line 1. I was completely at a loss for a cause and was beginning to have serious doubts about the reliability of my radio. Another contestant who viewed the incident informed me that the loss of control occurred when my aircraft passed the antenna of the other flier who was transmitting on 72.960, then the light bulb lit up. I must confess that the modeler who informed me of the situation was much more observant than I because I have been using 72.080 successfully for so long that I had forgotten the possibility of interference between the frequencies. When the contest director was approached with the suggestion that the frequency assignments plus the field arrangement caused the accident, the C.D., along with another local flier from Denver who claimed to be very knowledgeable about radio operation, informed me that there is no way the frequencies could interfere if my radio on 72.080 was working properly or if I had it "fixed." In retrospect, I realize that under the conditions that existed that I was playing "Russian Roulette" with five rounds in the cylinder and was very fortunate that the loss was only mine financially. I shutter to think of what would have happened if my aircraft had decided to turn hard left into the crowd of judges, fliers, helpers, and spectators gathered at the edge of that narrow runway. I suppose that the point that I am trying to make with all this is that when a potentially hazardous condition exists under the right conditions due to the simultaneous operation of 72.080 and 72.960, shouldn't the two frequencies be treated as one and shouldn't the AMA be informing all contest directors of the potential hazard? As for me, I'm either going to convert all my equipment to another frequency and let the "other guy" worry or I will definitely be scrutinizing the frequency assignments on any contest I might enter in the future.

Sincerely,
Curt Oberg
Litchfield Park, Arizona

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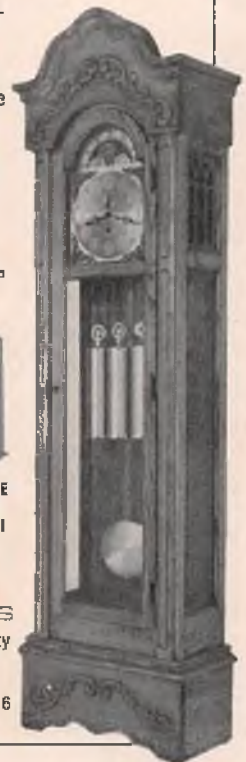
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Your solution is a good one Curt, but I'm sure everyone can't afford to change frequencies. Betty Stream who runs almost all our contests these days, God bless her and Suzy, always puts 72.08 and 72.96 on the same line. This also solves the problem. See, if you'd vacation in California instead of Colorado, you'd still have the Curare. Seriously it can be a problem, but it doesn't mean the R/C community should give up on it. The problem is caused by the 72.08 receiver image being very close to 72.96. A dual conversion receiver has the capability to reject the image frequency and should work quite well in the same set of

conditions. My recommendation is to be aware of the danger and avoid it.

Power Panels

There has been quite a bit written about power panels and there are many on the market. We get requests for an ultimate panel but I'm not sure very many modelers would pay the price. After reading the following letter, you ought to be thankful that you can buy one at any price.

Dear Sir,
I would like to buy a "Power Panel" but it is not sold over here. I even took the trouble phoning up two model

shops in Singapore for it, but they don't have it either.

Now I would like to build one myself but I can't do it without a diagram. I wonder if you can send me one diagram with outlet for glow plug, starter and a pump. I will be very grateful if you can help me out. Thank you.

Sincerely yours,
Tony Yee
Selangor, Malaysia

Most of the power panels on the market are nothing more than a panel, a meter, some plugs and jacks and some dropping resistors. The idea is to drop the twelve volt motorcycle battery voltage to 4.5V or 6V for the fuel pump

and to 1.5V for the glow plug. The size of the dropping resistors will depend on the pump motor and glow plug. If you know the voltage and current rating, you can calculate the value of the dropping resistor. For example, let's say you have a 4.5 volt pump that draws .5 amps. The circuit is shown schematically in Figure 1.

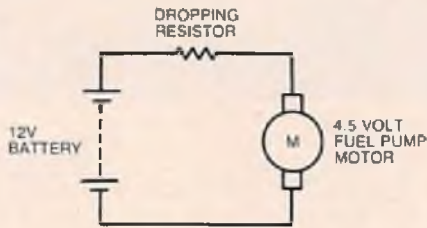


FIGURE 1

We want the voltage to drop 7.5 volts across the resistor (12V-4.5V). If we divide 7.5 by the motor current (.5A) we find we need a 15 ohm resistor. We can write an equation that looks like the following:

$$R = \frac{V_{hi} - V_{lo}}{I} = \frac{12 - 4.5}{.5} = 15\Omega$$

For a 1.5 volt glow plug that draws 3 amps:

$$R = \frac{12 - 1.5}{3} = 3.5\Omega$$

You can calculate the dropping resistor for any "load" in the same manner.

The resistors must have adequate power rating which is also easy to calculate.

$$P = I^2R = \frac{E^2}{R} = EI$$

For the fuel pump example above:

$$P = (.5)^2 15 = .25 \times 15 = 3.75 \text{ watt}$$

Theoretically a 5 watt resistor should be enough, but I would recommend going to 10 or even 25 watts. For the glow plug:

$$P = (3)^2 3.5 = 9 \times 3.5 = 31.5 \text{ watts}$$

You probably would want to use a 30 watt to keep the temperature down.

Note that this is a very inefficient use of power for more power is wasted in the dropping resistor (unless you use it to warm your hands back in Ohio) than is used in the load. There are converters available that are more efficient, but they also cost a lot more. Besides electricity is cheap if you take care of your 12 volt battery properly and don't have to replace it once a year. A simple power panel diagram might look like Figure 2.

Or you can buy a hand pump and use a D size nicad like I do. If you have a fast charger for your airborne battery that has current limiting you can charge the

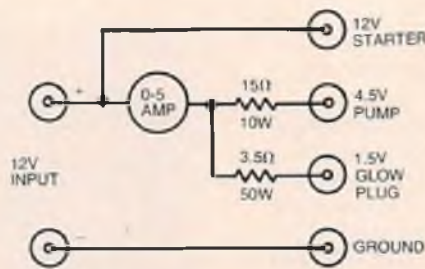


FIGURE 2

single cell nicad at the field too, from the 12 volt battery and have the advantage of being able to put it in your pocket when you go out to the starting line.

◆ Gel Cell Charger

I received a number of letters on the Gel Cell article we did a few months ago. I wasn't aware of the M.E.N. charger at the time I wrote the article, but have since received one for evaluation. They use a different approach but one that should produce acceptable results. The charger is a constant current type, but it has voltage sensing which turns the charger off when the battery is charged or at least before it is over charged. A light (L.E.D.) comes on at that time. I haven't had a lot of time to evaluate it at this time, but at first glance it appears to be a solution to the Gel Cell charging problem. I get a little nervous when I connect a charger and it doesn't have any indication that it is charging, although one can probably tell that this one is working by the fact it gets quite warm and the light is not lit. The only other disadvantage I can see is that it will not reset and come back on if the battery self discharges as it will during storage. But so what; it just means you have to go out and charge a couple of times during the winter to make sure your battery doesn't get too low. I'll report more later, but I think this one will prove to be a winner.

◆ Auto Pilots

Some time ago we printed some info on a Fluidic Rate Sensor that could be used in place of a conventional gyro. I talked to a number of guys who worked with it and had some pretty good results. This month I received a report from an MIT student who did a lab project which consisted of building a single axis auto pilot for use in R/C aircraft using the Fluidic Rate Sensor. I was very impressed with his professional approach and thoroughness. His objective was something small and light and under \$50.00 in cost. The most significant new twist, was an interface unit that allows the device to be used with standard servos and allows in-flight gain adjustments. The output of the sensor is analog in the form of a varying voltage. In previous auto pilot systems this voltage was summed in to the feedback loop requiring special modified

servos and was usually difficult to adjust. The interface unit modifies the pulse width between the receiver and servo similar to the Christy Mixer.

The study included effects of linear as well as rotary inputs, temperature stability, optimum flow rates in the sensor, thermistor time constants, sensitivity and linearity as well as flight tests in a sailplane.

All in all, it was a very ambitious and well done project. It is a little specialized and long to print, but if Mr. Dewey gets good requests, he'd probably consider it. If he only gets 5000 and you are dying to read the paper, write to: R.W. Parks, MIT Br. P.O. Box 110, Cambridge, Mass. 02139.

If any other engineering students are looking for R/C related project ideas, drop me a line. I have more ideas than time.

◆ Microcomputer-Controlled Planes

I hope you all read the article in the July issue on microcomputers in R/C. The author kind of lapsed out some ideas and then backed off and said he didn't think it was the way to go. When I was asked to comment, I recommended printing it to get some wheels turning in some more heads out there. Sounds like there are some other people who have been doing more than dreaming.

Dear Sir:

After reading the article "Microcomputer-Controlled Pattern Planes" in your July issue, I thought you might be interested in knowing that I built and flew such a system in 1976. The programs were developed during the summer of 1976 and a test unit was flown in October 1976, using a World Engines radio system with a "Buddy Box" connection. The results were good.

A second unit was built into a Kraft transmitter by enlarging the back portion of the transmitter case. This unit has been flown and demonstrated at our club field.

Programs are fed into the system by monitoring the signals of the encoder while the plane is being flown through a maneuver. The recorded data can then be used to reproduce the original encoder signals. Other modes of operation are also possible with microcomputer program changes.

I am currently working on a system which will take data directly from the control sticks, eliminating the encoder section and allowing the microcomputer to modify the stick data if desired, before generating the pulse train to the RF section.

Alexander Mozdzer
Long Island, N.Y.

Sounds great! I know there will be a lot of resistance to this but let's face it, the world is going digital and I mean true
to page 160

KADET KORNER

The Sig Kadet continues to be the most recommended trainer for RC novices across the country. Both thru club newsletters and by word of mouth, modelers have learned of the Kadet's sterling building and flying qualities. In addition to a box full of SIG quality building materials, the Kadet kit includes a detailed full size plan and a comprehensive building manual loaded with hundreds of construction photos and drawings - all geared to the newcomer with no previous modeling experience. There isn't an easier to build RC trainer on the market! Yet truthfully, in the air is where the Kadet really stands out as the best in its class. Read part of a recent letter about one novice and his very first RC flight. The list of many thousands who have successfully soloed with a Kadet grows longer.

THE IDEAL RC TRAINER



KADET

Designed by: Claude McCullough

KIT FEATURES

- Flying Check List And Piloting Tips For First Flight
- Handy Printed Fuselage Sides; Build Internal Structure Directly On The Wood
- Instructions For Installing Radio Equipment
- Complete Illustrated Building and Flying Instructions
- Nylon Nose Gear Bearing
- Nylon Control Horns
- Molded Surface Hinges
- Heavy Duty Steering Arm
- Die-Cut Balsa And Plywood Parts
- Top Quality Balsa And Hardwood
- Full-Size Plans
- Molded Plastic Engine Cowling
- Formed Nose Gear With Shock-Absorbing Coil
- Torsion Bar Main Gear

SIG
\$34.95

Kit No: RC-31
Length: 42"
Wing Span: 57"
Weight: 4 Lbs.
Engines: .19-.35

UP TO 3 CHANNEL RADIO EQUIPMENT



"... My son and I went out to our club's (PCRC) field where we have two 400' (60' wide) runways . . . We did a lot of taxiing around until finally I said, "I'm not going to learn how to fly just taxiing around." . . . So I took a position behind the KADET and gave her the gun (which isn't all that much power on this old worn 1988 Enya .35 with about 9,000 RPM's on a 10 x 8 prop). After about a 300 foot take-off run I applied some back pressure on the elevators to unstick her and up she went. Now, I haven't told you about the weather conditions that day . . . it was a very foggy/hazy morning, typical here in the greater Washington D. C. area. The ground was clear but as the KADET climbed to about 500 feet it became invisible in the fog. I immediately applied some down control. After what seemed like an eternity we again saw the KADET. Now my legs were like rubber, my mouth had gone dry and my confidence was little to non-existent. I flew around hesitantly knowing full well that sooner or later I MUST land my KADET. I applied some down trim and made a wide high approach . . . I had the engine back-off to idle and had setup the glide path, somewhat inaccurately. The KADET dropped its left wing and I applied right rudder . . . now I was off the glide path with the runway and dropping fast in the corn field at the edge of the runway. I applied left rudder then right rudder to regain the glide path, but now the KADET was dropping close in to the corn field . . . so I gave her full power, pulled back on the elevator (almost stalling) and went around for another attempt. Now I'm back on the glide path and a little high but the rate of descent is too fast. I hold it, though, and now we're at about 8 feet altitude. I round-out, and again almost stall . . . apply power and go around again. Now I'm lined up with the runway, height not bad but still dropping fast. I hold it in its decent pattern and at 8 feet slowly round out . . . it floats!!!! The KADET covers about 250 feet of runway and we're still at 3 feet altitude . . . apply power and go around so as not to hit the corn field at the other end of the runway. Boy was I now shaking, and I knew I was low on fuel. I re-established my glide path, still the decent was too fast. I was a little to the side of the runway but am now committed. At about 4 feet I slowly round-out and it floats past me. It's gliding for a grass landing at the side of the runway. I let her sink slowly at about 350 feet down the runway the KADET touches down. . . (and IN ONE PIECE) . . . WHEW, I'd soloed.

"... You've a good design and I'm glad I built this aircraft."

Sincerely,
William R. Rauch



KADET ON FLOATS

This Kadet, built by Bill Mitchell of Columbus, Georgia, is equipped with floats for off-water flying. No modifications to the 3-channel kit plane were made. The floats were built out of balsa and plywood, and Bill included a steerable water rudder next to one of the floats to facilitate taxiing. Powered by a K&B 40, the float equipped Kadet reportedly loops and does barrel rolls with ease. Looks like fun!



KADET SKYWRITER

Bud Combs of Hazard, Kentucky equipped his Kadet with ailerons and a smoke system. The Smoke cartridge straps into a homemade metal bracket which in turn is strapped onto the bottom of the Kadet's fuselage at the balance point. Bud stated in his letter that his Kadet "flies like a dream" even while carrying the 6 ounce smoke bomb. He then added: "I can recommend this plane for a beginner or advanced flyer as it is easy to build, a dream to fly and is a pure work horse." If interested, write to Bud Combs: 100 Lincoln; Hazard, KY for more information on the type of smoke cartridges.

See your dealer first! To order direct, add \$1 postage under \$10, postage free over \$10. No C.O.D.

SIG MANUFACTURING CO., INC.

PLAN TO ATTEND September 24, 1978

5th ANNUAL

ALL KIT FALL RC CARNIVAL OF FUN

AT COBRA FIELD COUNCIL BLUFFS, IOWA

- * Events Designed For Novice & Expert Alike
- * No Entry Fee Of Any Kind
- * Plenty Of Prizes For All Contestants

It's sponsored by Sig Mfg. Co. and directed by Bud's Hobbies & Crafts of Council Bluffs. The only thing you need to enter is an RC model built from a Sig kit. A variety of low-pressure fun events will be run and novice fliers can do as well in most of these as experts. Write for more information to Sig, or Bud's Hobby, 183 W. Broadway, Council Bluffs, Iowa 51501.



Designed by: Claude McCullough

KOUGAR


Kit No.: RC-35

Wing Span: 50-1/2"
Wing Area: 540 Sq. In.
Length: 45-1/2"
Engines: .35-.50
Suggested Radio: 4 Channel

\$44.95

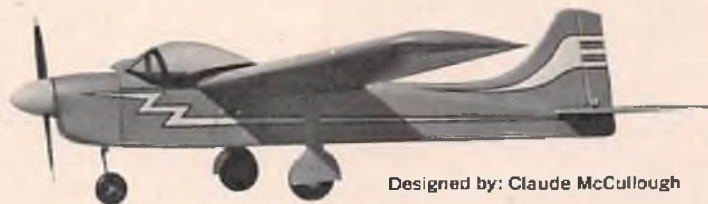
Advanced Trainer

KOMANDER

Wing Span: 62"
Length: 44"
Weight: 5-1/2 Lbs.
Engines: .40 to .50 Cu. In.
Suggested Radio: 4 Channel


Kit No.: RC-32

\$39.95



Designed by: Claude McCullough

The Aileron Trainer That Doesn't Look Like A Trainer



Designed by: Hank Pohlmann

KIWI


Kit No.: RC-42

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

\$37.50

RC Sport Pattern Model

KAVALIER

Wing Span: 55-1/2"
Engines: .29-.40
Suggested Radio: 4 Channel


Kit No.: RC-39

\$39.95



Designed by: Claude McCullough

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RCM PRODUCT TEST

House of Balsa P-47 THUNDERBOLT



The P-47 Thunderbolt is another in the line of 1/2A Stand-Off Scale models produced by House of Balsa, 2814 East 56th Way, Long Beach, Calif. 90805. Like its predecessors, the model is a product of the agile mind of Don Dombrowski, the impressario of 1/2A Stand-Off Scale.

This is House of Balsa's first attempt at a radial engine design and the oval shape of the Jug's cowling makes it an ideal subject for their usual basic box and blocks construction. The fuselage is fabricated of sheet balsa with plywood doublers, with the die-cut sides formed around the fuselage top and attached plywood bulkheads. Pre-fabrication of the cockpit and its interior is a separate step which, when completed, is glued to the top of the box fuselage. This not only provides the finished canopy and cockpit, but also the major portion of the fuselage top. Since the canopy and its associated turtle deck are of molded plastic, much of the trickier, more time consuming cutting and carving, is completed with a minimum of effort and with beautiful results. The top nose block is added and shaped using the cowl former and the front of the canopy structure, together with the printed templates as guides. The bottom nose block is removable to give full access to the engine, tank and batteries. The wing is built up of balsa and is constructed flat on the building board, using the lower leading edge planking and spar as a jig, despite its unique House of Balsa high lift semi-symmetrical airfoil. The distinctive P-47 elliptical trailing edge shape is attained by simply cutting and sanding the tapered trailing edge stock provided in the kit to the shape of the printed pattern. The tail surfaces are sheet balsa, cleanly die-cut to shape.

All wood used is of excellent quality and the die-cutting is sharp and clean. Parts match the plans and fit together without sanding.

The piece de resistance, however, is the instruction booklet in the kit. It consists of 23 pages of step-by-step directions, illustrated by 96 (count 'em) photographs. Considering the accuracy of the parts and the clarity of the instructions, the only way to foul up is to completely ignore the booklet. One interesting note is that, unlike some other kits which use one set of instructions "doctored" to fit a series of similar kits, House of Balsa does each booklet specifically for the kit it covers. In fact, the booklet even gives finishing instructions and color schemes for the illustrated model. They even include a scale 3-view for those who might want to add panel lines or other scale details. Despite their scale-like appearance, these little birds really fly. They don't just stagger around, barely under control, they go where you point them, when, how, and right then. Even in a three point attitude for landing there is full aileron control with no tendency to snap over. Our test model was powered by the recommended TD .049 with a Cox 6/3 grey prop, fueled by 25% Go-Pop and steered by an Ace

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

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

SPECIFICATIONS

Name P-47 Thunderbolt
 Aircraft Type 1/2A Sport
 Manufactured By House of Balsa
 2814 East 56th Way
 Long Beach, California 90805

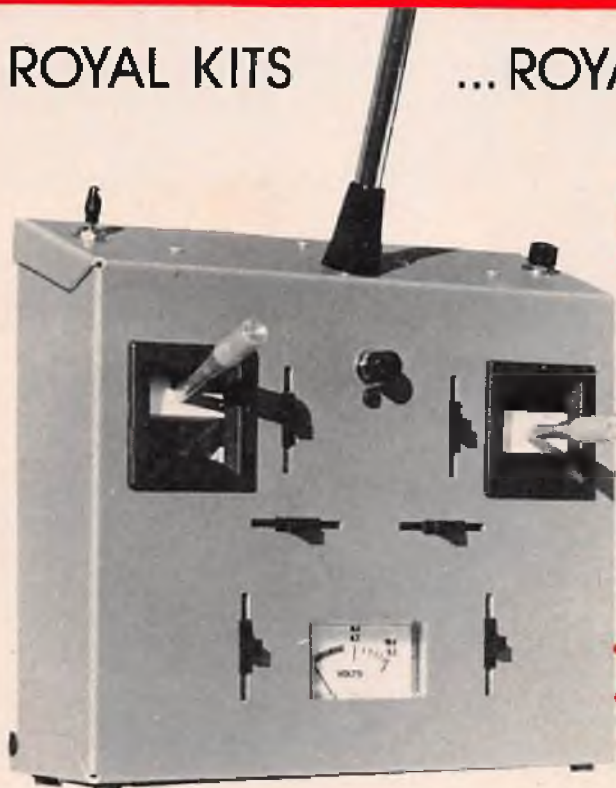
Mfg. Suggested Retail Price \$29.95
 Available From Mfg. & Retail Outlets
 Mfg. Recommended Usage Stand-Off Scale
 Wing Span 36 Inches
 Wing Chord 5" (Avg.)
 Total Wing Area 216 Square Inches
 Fuselage Length 28½ Inches
 Radio Compartment Dimensions (L) 7¼" x (W) 2½" x (H) 2¼"
 Wing Location Low Wing
 Airfoil Semi-Symmetrical
 Wing Planform Double Taper
 Dihedral 1½ Inches
 Stabilizer Span 13 Inches
 Stabilizer Chord (incl. elev.) 3" (Avg.)
 Total Stab Area 39 Square Inches
 Stab Airfoil Section Flat
 Stabilizer Location Top of Fuselage
 Vertical Fin Height 4¼ Inches
 Vertical Fin Width (incl. rud.) 3½" (Avg.)
 Mfg. Rec. Engine Range049-.051
 Mfg. Rec. Fuel Tank Size 2 Ounce
 Landing Gear Conventional
 Recommended No. Of Channels 2
 Recommended Control Functions Elevator & Ailerons
 Basic Materials Used In Construction:
 Fuselage Balsa, Ply & Plastic
 Wing Plywood & Balsa
 Tail Surfaces Balsa
 Hardware Included In Kit See Text
 Plan Size 24¾" x 37¼" (1 sheet)
 Building Instructions on Plan Sheets No
 Instruction Manual Yes (23 pages)
 Construction Photos Yes
 Kit Includes Shaped & Die Cut Parts
 Mfg. Rec. Flying Weight 22-28 Oz.
 Wing loading based on rec. flying wt. 14.6-18.6 oz./sq. ft.

RCM PROTOTYPE

Weight, Ready To Fly 28 ounces
 Wing Loading 18.6 oz./sq. ft.
 Covering & finishing materials used See Text
 Engine Make & Disp. TD .049
 Muffler Used No
 Radio Used Ace
 Tank Size Used 2 Ounces

ROYAL KITS

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7-channel TRANSMITTER KIT

The Royal Omega 7-channel transmitter kit is precision engineered and performance proven — at a price that makes sense . . .

- Separate RF board — field changeable
- Encoder — linear ramp
- Non-linear controls
- Two programming buttons
- Metal gimbals
- Optional mixer for elevons/flaperons
- Servo reversing direction switch
- Expanded scale voltmeter
- Optional timer

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Tach-Tron constantly monitors main rotor RPM and automatically adjusts throttle servo to maintain constant RPM for the most precise hovering you've ever experienced. Each Tach-Tron is engineered specifically for YOUR equipment.

KIT AS LOW AS **28⁰⁰**

Write for detailed description and ordering information.



PRO TACH



Includes: all parts, case, standard meter, switches, built-in battery check and easy-to-follow instructions

An easy-to-build, easy-to-use tachometer kit that gives superior accuracy and readability over full range of engine RPM and light conditions.

59⁹⁵

Fully assembled and calibrated: \$89.95

MODEL 250

VARIABLE CHARGER



Charge rate can be adjusted from 15MA to 250MA by knob on front panel. Chart supplied lets you set the proper charge rate to the MA/hr. capacity of your NiCad battery.

15⁰⁰

1/2A 2-channel RECEIVER



Lightweight (1.1oz.), low drain (7.5 to 9.5MA) and small size make this the flyingest 2-channel receiver to come along in years. Put the fun back in R/C with the Royal 2-channel 1/2A Receiver.

INTRODUCTORY PRICE **22⁹⁵**
Complete kit less connectors

*U.S. Patent pending. Designed by Al Irwin.

royal

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use your **MASTERCHARGE**

or **BANKAMERICARD**



When work began on a flying wing glider design in 1974, which ultimately resulted in the Saracen (RCM April 1976), the idea of a 50" span .40 powered four channel flying wing had not yet entered my thoughts. The Simitar 540 is a result of an evolutionary process which included following the Saracen with a 48" 1/2A Simitar (RCM Dec. 1976) followed by the Simitar XV (MA Dec. 1976) which in turn was followed by the Simitar 503, a four channel, predecessor to the Simitar 540.

After completing the first 503 powered by a Super Tigre .23, it flew in the 1976 Tournament of Champions in Las Vegas as a part of the in-between rounds,

demonstration flying. The second 503 was powered by a K & B front rotor .40. Taking the 503 lines we began to design a fiberglass fuselage that would incorporate the 503 design plus a larger canopy, simulated air intakes, a jet-like exhaust and removable cowl.

Patience we waited for the wooden plug to be carved, the molds to be crafted and, finally, the first 540 fuselage came out of the mold. It was only a matter of days before the completed ship took form around the new fuselage. I'll be the first to admit that my knees were weak as it lifted into the air. With a K & B .40 at full power, it flies at 90 mph plus; throttled back at 40 mph its a piece of cake. Response to control

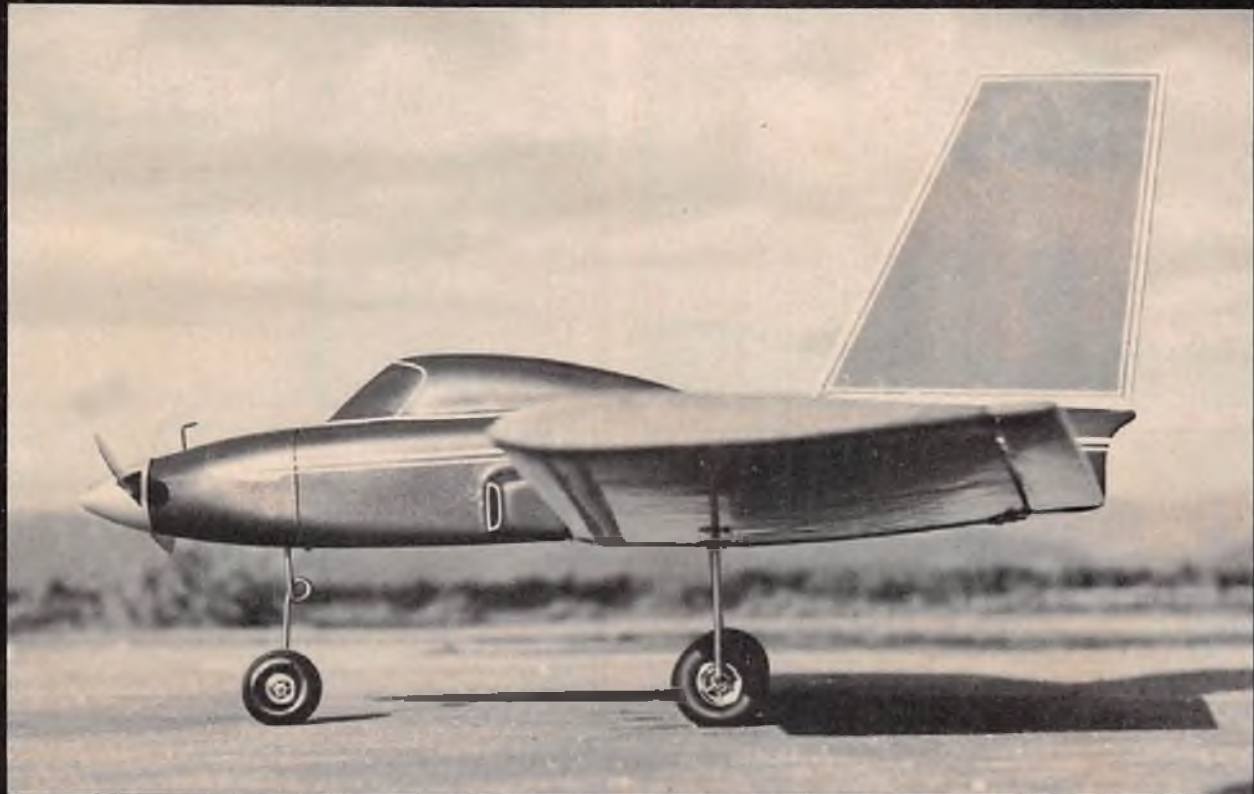
commands is instant. It performs tight loops, turns very tight, rolls instantly, inverts very well, will four point roll as well as vertical roll out of sight. Landing can easily be stretched; I particularly like to pull an inside loop just before touch-down on a dead stick landing.

One morning, late in March, I test flew five new Simitar 540's each one performed without a hitch, and handed the transmitter over to the owners to land.

Though shown with a four channel set-up, the 540 can be flown two channel (to operate the elevons which are a mixture of elevators and ailerons).

For a real hot set-up, we have flown a few 540's with the K & B rear rotor .40





SIMITAR 540

Designed By : Bill Evans

TYPE AIRCRAFT

Sport Pattern Flying Wing

WINGSPAN

50 Inches

WING CHORD

14" Root - 8" Tip

TOTAL WING AREA

540 Square Inches

WING LOCATION

Bottom of Fuselage Pod

AIRFOIL

Symmetrical Reflexed

WING PLANFORM

Swept T.E.

DIHEDRAL, EACH TIP

1 Inch

OVERALL FUSELAGE LENGTH

27 Inches

RADIO COMPARTMENT AREA

(L) 12" x (W) 3" x (H) 2"

VERTICAL FIN HEIGHT

9 Inches

VERTICAL FIN WIDTH (incl. rudder)

6 Inches (Avg.)

REC. ENGINE SIZE

.40 Cubic Inch

FUEL TANK SIZE

6-12 Ounces

LANDING GEAR

Tricycle

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Elevons (2), Throt. (1), Nose wheel (1)

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Foam & Ply
Empennage	Balsa
Wt. Ready-To-Fly	76 Ounces
Wing Loading	20 Oz/Sq. Ft.

SIMITAR 540

A 50" .40 POWERED FLYING WING THAT CAN TEAR UP THE SKY AT FULL POWER, YET WHEN THROTTLED BACK BECOMES A VERY GENTLE FLYING AIRCRAFT.

By Bill Evans

and without landing gear. These are pushing speeds close to 200 mph.

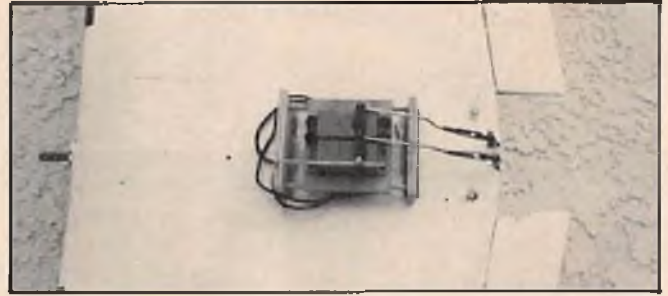
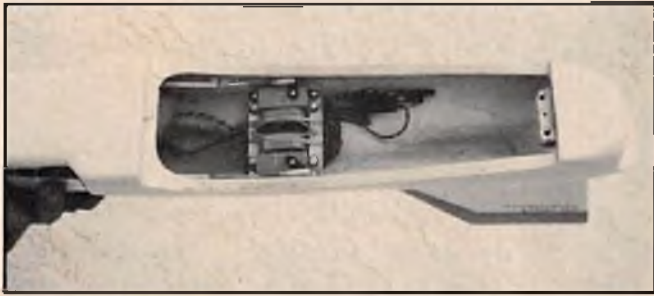
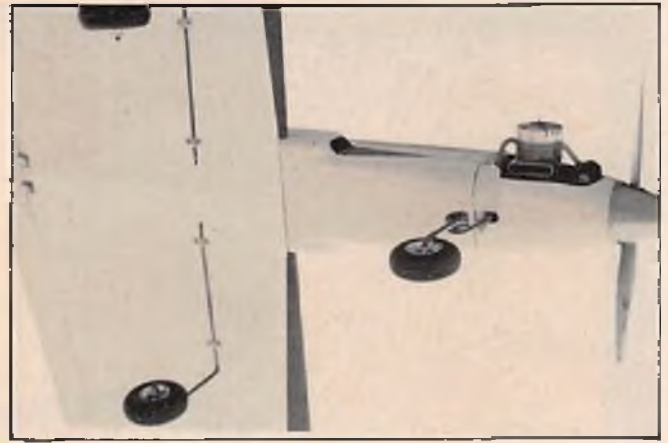
As you may wonder, the designation 540 comes from the combination of its 50" span and engine size .40 --- therefore 540. Which, incidentally, is also the wing area. Using four channels, two to operate the elevons, one for engine throttle and a fourth for the steerable nose wheel, the weight will come out between 4¼ to 4¾ pounds. So

the wing loading is about 20 ounces per square foot.

The one special note about building has to do with the landing gear placement. Set the gear in place per the plans and make sure that the wing sets with about 3/16" of positive with relation to the ground. This is to make for easy take-offs.

My best advice is to build the 540 per plans. If you have a modification in mind,





1ST ROW, LEFT: Cowling removed showing K & B .40 mounted on Kraft mount. Mount drilled for nose gear installation. **RIGHT:** Bottom view of fuselage and wing. With side mounted engine and cowl in place, makes a sleek looking aircraft. Very responsive in maneuvers. **2ND ROW, LEFT:** After success of prototype, author turned out this glass fuselage. Very simple radio installation. Servos are throttle and nose gear steering. **RIGHT:** Simple sliding tray for elevons. This type has been used on almost all of Bill's flying wings, both power and sailplanes (see RCM Aug. '75, p. 58). **3RD ROW, LEFT:** This wing was set up with Du-Bro's V-Tail Mixer which also works great. Note the MonoKote hinges used which keeps the elevon gap to a minimum. This is a necessity.

do it after you fly it as designed.

Soaring Research, 19216 Calvert St., Reseda, California 91335, can supply Simitar 540 wing cores for \$10.00; 1/64" ply wing sheeting for \$8.00; and the epoxy fiberglass fuselage for \$35.00. California residents add 6% sales tax.

540 CONSTRUCTION METHODOLOGY

Simitar 540 construction is very quick and has been kept simple. The use of a sheeted foam core gives tremendous strength. In a way, a sheeted foam wing is much like a piece of case hardened steel --- that is, the outside skin provides a fairly hard protective shield for the more soft inner core which serves as a shock absorber.

The fuselage, built on a flat surface, utilizes the technique of box construction with triangular stock in the corners which produces rounded and streamline results.

Glue and pin the 1/4" balsa leading and trailing edges to wing cores; make sure to keep the leading and trailing edges free of curves or bends; set these

aside to dry. (A white glue is very satisfactory for this purpose.)

Pin fuselage top down on flat surface. Glue and pin left and right sides to fuselage top.

Glue and pin 1/2" balsa triangle stock in place. (Push pins in through from the outside of the fuselage through the triangle stock this will help remove pins later.)

Glue and pin in rear fuselage tail blocks.

Glue and pin bottom fuselage corner squares in place.

Glue and pin fuselage front bottom. Glue cowl block material together. Let fuselage assembly dry.

Trim and sand wing leading and trailing edges so that the sheeting will fit nicely over them.

Cut wing sheeting to shape of wing panel with about 3/8" over size to allow for trim.

Coat wing cores and wing sheeting with a good water base contact cement. (Sig Core Bond or Carl Goldberg's Blue Goo is recommended).

Let contact cement dry per manufacturer's instructions.

Apply wing sheeting to cores; trim and sand where necessary.

Pin and glue on wing tip plates. After they dry, trim and sand to shape.

Join wing panel using a good 5-minute epoxy. Do not attempt to make a perfect joint. Leave some gap so that when the epoxy is applied you virtually have a I-beam of epoxy all the way around the joint.

Apply a 2" strip of fiberglass over the joint; again use epoxy for this purpose.

Locate and mark hardwood gear blocks on underside of wing.

Make cut-out in wing so that gear blocks will fit flush.

5-Minute epoxy gear blocks into wing cut-out.

Cut the elevons from 3/16" sheet stock; trim and sand to shape.

Tack glue the cowl to the firewall and trim and sand to shape.

After the fuselage has dried, trim and sand to shape.

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THE 6TH ANNUAL

The Kentucky State Parks and the local R/C Clubs of Kentucky, Indiana, and Ohio have just completed organizing another successful Mint Julep R/C Meet.

This year's Pattern and Sport Scale meets were held at separate times to allow for more flying of each group. The Sport Scale was held on April 29 & 30, and the Pattern events were held on May 20 and 21. The Sport Scale events drew 23 contestants from all over the country. Two classes were flown to allow a better separation of skills. These were classed as Expert and Sport. To give an example for this reasoning, there were five past Nats champions, one past World champion, and two current FAI scale team members. This seems to be a good way to go to encourage first timers to enter a Sport Scale contest.

According to the C.D., Dale Arvin (who furnished this information), there were some spectacular airplanes in both

By Grady Howard

classes, with Bob Underwood's DeHavilland DH88 sporting a 7' 4" wing span topping the list in Expert. Corky Heitman had a 10' wing span, Douglas A26 that brought him first in Sport Class. Corky had the misfortune of losing an engine on take-off and made an inverted landing. This resulted in a damaged tail section and loss of most of the rudder. After a two hour repair job, Corky was back in the air and went on to win the Sport Class.

The winners through 3rd Place are as follows:

Expert

1st: Bob Underwood	DH88
2nd: Hal Parenti	Zero
3rd: Bud Atkinson	Hawker Hunter

Sport

1st: Corky Heitman	A20
--------------------	-----

2nd: John Foreman	Super-Fly
3rd: Skip Gizowski	(Not given)

Plans are already on the board for next year's Stand-Off Scale meet at Rough River, Kentucky, so plan on attending and flying or just watching some realistic aircraft going through their paces.

On May 20-21, at the same beautiful Rough River State Park, the Pattern guys got together to the tune of 85 contestants for their part of the 6th Annual Mint Julep Meet. This year's meet was held under perfect weather conditions and the first totally dry weekend in 8 weeks at the park. Flying was great with many novice entries and even a special pre-novice class.

This pre-novice class was for fixed gear type of airplanes and the contestant could not have placed in any previous contests. If the aircraft used had retract, then they were left in the down position. The contestant could



1ST ROW (L) Pre-Novice Winners - lt. to rt. 2nd Place Mark Schagol, 1st Place George Briarcheck, 3rd Place Charlie Halmaker. (C) Novice Winners - lt. to rt. 4th Place David Wathen, 2nd Place Bob Pannell, 1st Place Steve Rojecki, 3rd Place Mike Patrick, 5th Place Robert Drolan. (R) Advance Winners - lt. to rt. 4th Place Tony Satorius, 2nd Place Allen Szabo, 1st Place Paul Clements, 3rd Place Richard Stultz, 5th Place Mark Been.
 2ND ROW (L) Expert Winners - lt. to rt. 4th Place Thad Pawlikowski, 2nd Place Randell Lyman, 1st Place Rod Barnes, 3rd Place Ken Patterson, 5th Place Bob Bremer. (C) Master's Class winners - lt. to rt. 4th Place Tom Moore, 2nd Place Dean Kager, 1st Place Fred Kugel, 3rd Place Ivan Kristensen, 5th Place Don Seals; (R) Stu Mason with his modified Phoenix flew in Advanced class.
 3RD ROW (L) Joe Nabor flew advanced with his Cumare. (C) Jeff Nabor gave father Joe some stiff competition in Adv. Class with his Trion. (R) The Skyflight is Paul Clements' design and it brought him to 1st place in Advanced.

MINT JULEP MEET

leave out any two maneuvers from the Novice pattern. This class had 5 entrants.

The flying was somewhat below par for the first couple of rounds as this was the first outing for many of the contestants. After the nerves had settled and the radios and airplanes were trimmed out, the flying began to settle into a groove that was very keen.

The Masters class flew the new FAI pattern and, for many, this was the first time they had flown it in competition. After talking with many of these Master flyers, I was able to form an opinion as to their feelings about it. Most felt that the new pattern was challenging and would advance the skill of all who flew it. Also, there were some who felt that the maneuvers were simply variations of loops and rolls and would need only to be practiced to become as easy as any past patterns. Most Master flyers felt it very unfortunate that the AMA did not

get the rule book out any sooner than they did. It was also discussed that these maneuvers are not as new as some think. They have been on a provisional list for two years, but somehow no one in the Masters class seemed to know about them until they were made official.

There seemed to be quite a few radio problems at this meet with several crashes as a result. After talking with many contestants, the feeling was that it was not interference but simply the first use of radios that had been stored all winter. This was blamed on not keeping batteries cycled and charged during storage.

With 6 flight lines operating, there were 6 rounds flown and not one mid-air collision. Novice, Advance, and Expert classes flew 5 rounds while Masters class flew 6 rounds. The new Masters class has four rounds of qualifying and the top 5 then fly off two rounds of finals.

The top single flight in qualifying was

put in by Fred Kugel with a blistering 500 score. The Masters pattern is really something exciting to watch - - - it is so different from what we are used to seeing. The finals were flown from the center flight line with all eyes glued to this area. Ivan Kristensen, from Canada, put in the highest flight in the finals with a spectacular 734.5. This was followed close with Fred Kugel's 724.5 and Dean Koger's 724. On the last flight of the finals, all eyes were on the sky. This included spectators as well as the Novice flyers. After the smoke had cleared and the scores totaled, Fred Kugel came out victorious as the 1978 Masters Champion of the 6th Annual Mint Julep Meet.

The Du-Bro Helicopter demonstration Team was present again this year and kept the action going during the lunch breaks and in the evenings after the Pattern flights were over. James Poe

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1ST ROW (L) Eddie Mattingly flew Novice class with his Super Lucky Fly. (C) Robert Beemer from Dayton, Ohio flew this MonoKoted Trion in Expert class. (R) Chuck Slade flew his own design that he calls "Miss American Pie".
 2ND ROW (L) This Compensator was Mark Beens's 5th Place winner in Advanced Class. (C) This beautiful T2A was finished in Auto lacquer and belongs to Larry D'Arillio. (R) Beautiful paint job on James Lyon's Phoenix 7.
 3RD ROW (L) "Mister Cool" himself, Don Lowe, does his Masters pattern practice before official flying starts. (C) 13 year old Mike McConville flies Novice with his Currare while father calls. (R) "Oh the advantages of a big airplane!" Here James Poe of the Dubro Demonstration Team catches 40 winks in the shade of the wing.

ADDING LIGHTNESS

By
Col.
John A.
de Vries

Anthing you can do to make your R/C model lighter will contribute to its ability to fly well. This is particularly true when your model is a Half-A scale bird. Many modelers are adding retractable landing gears to their .049 powered models, and the additional weight may result in marginal flight characteristics. Very carefully built House of Balsa models weigh in from 18 to 24 ounces, ready to fly. Anything over 30 ounces on the old kitchen scale and more pilot expertise is called for. We've heard of 32 ounce models that will only glide from shoulder height to the turf --- with the T.D. screaming its heart out!

It is true that Robart Half-A retraction mechanisms are **lighter** than the HOB kit gear installation (stock Robarts = .38 oz. per "leg"; kit components = .42 oz. per leg). **But**, when we add a retract servo (.79 oz. for an Ace Mini with Deans plug) plus connecting linkage (about .22 oz.) we're "up" a full ounce from the kit's fixed gear.

There are two modifications to the Robart retracts that will result in a lighter installation without affecting either their strength or function. First, we can trim some of the plastic from the retracts themselves and, second, we can replace the 3/32" music wire legs with some lighter gauge wire. The weight savings will be small --- but, every little bit helps!

How the retraction mechanisms may be trimmed may be seen from our photographs. Essentially, we remove plastic from the "box" that contains the movable parts of the retract. You'll find that when you "attack" the plastic that it is **very** tough! Remove as much as you can with a razor saw after marking your cutting lines. # 100 sandpaper on a block levels the plastic slowly. Careful trimming with a # 11 X-Acto blade will smooth the area between the pivot points. Jewelers needle files will finish the job. Resist the temptation to scallop the mounting flanges on either side of the retract between the mounting holes. We need the mounting surface **and** the flange's strength. One caution when you finish your plastic trimming chores --- remove any nicks that could be the point from which a crack might start.

What do we "save" by trimming plastic from the retract mechanism "box"? We used a sensitive balance to find out --- the kind ammunition reloaders use to weigh gunpowder. Each retract weighs 18.2 **grains** (.04 oz.) **less** in modified form. For a two-gear installation, we save about a tenth of an ounce.

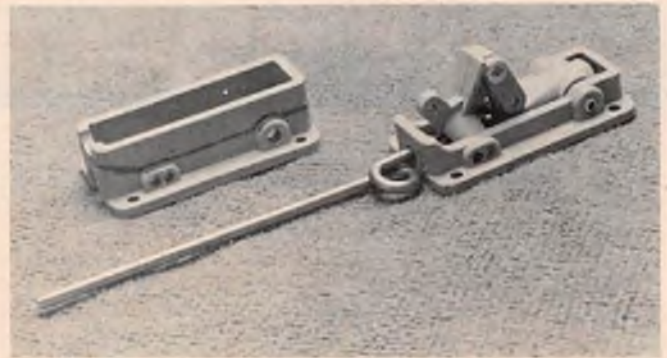
The second modification requires less work on your part, but "saves" .09 oz. per retract. Since you will probably remove the moving parts of the retract while you're trimming the plastic, installing new wire legs can be

accomplished while you've got things apart. You'll find that the Robart wire leg is held into the trunnion by the same two set-screws that act as the landing gear leg pivot. Unscrewing the larger pair of set-screws not only frees the trunnion, it also frees the wire. As we've noted, Robart legs are 3/32" wire and include a shock absorbing coil. Simply cut a couple of lengths of 3/32" O.D. brass tubing (as long as the stock leg support) and slip them over some 4 3/8" lengths of .062 music wire. A drop of cyanoacrylate glue to hold tubing and wire together, and the lighter legs are made. The set-screws will "bite" into the brass tubing when you reassemble the gear and fix the new legs in place. No need to bend-in a coil --- the lighter legs will give plenty of shock-absorbing action without being sloppy.

Using the trusty powder scale after completing both modifications, we found that we'd saved 1/4 of an ounce (.26 oz., exactly) for a two-gear installation. That amounts to 1/3 of the servo weight we're able to off-set --- and the all-up retract installation is only .67 oz. heavier than the kit's fixed gear.

By making a couple of simple modifications, we've "added lightness" to the Half-A retract installation. While we were sanding away on our set of retracts, we came up with an interesting "wild hair". Wouldn't it be neat if Robart

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Unmodified and modified Robart retract mechanisms. Trim the plastic "box" as shown by the line on the stock retract . . . to save weight.



Robart retract mechanisms come apart by removing four set-screws for modification. Larger screws act as landing gear trunnion/pivot and hold gear leg in position. Brass tubing on 1/16" music wire is as long as stock leg support.



Comparison between stock Robart retract gear leg (3/32" m.w.) and modified leg made from 3/32" O.D. brass tubing and .062 (1/16") music wire. Modified leg is almost 1/10 of an ounce lighter --- works just as well.

RCM PRODUCT TEST

Concept Models AIR SCOUT



The Air Scout is a basic trainer and general sport aircraft designed by Owen Kampen and kitted by Concept Models.

Looking more like a Stand-Off Scale model of a light plane of the Thirties, this pretty little taildragger is a welcome change from the boxy looking, tricycle geared models now generally accepted as the normal for the beginner.

The fuselage starts with two piece sides, the forward part back to the rear of the wing made of plywood and from there back, balsa. Plywood and balsa formers provide the basic shape, with the lapered upper rear section constructed of formers and stringers. Hardwood motor mounts and a plywood motor plate are used instead of the usual commercial motor mount. Also, rather than the normal rubber bands and dowels to hold the wings on, the Air Scout uses full width, pre-drilled hardwood blocks with epoxied-in nylon nuts, pre-assembled as part of bulkheads #2 and #3. Three 1/4-20 nylon bolts, one in the front and two in the rear, hold the wing in place. Another innovation is the method of attaching the landing gear. Rather than the usual straps or torsion bar arrangement, they are sandwiched between the grooved blocks in the bottom of the fuselage and a plywood plate which is screwed to the fuselage bottom. Although we haven't had to test this arrangement under actual conditions, it appears that, in the event of a **hard** landing, the screws would pull through the bottom plate rather than tearing out the bottom of the fuselage.

The wing is built in three pieces, the center section and two outer panels which are joined with plywood braces to make a single unit.

The plywood braces, in addition to the strength they provide, are cut to give the center section ribs the right angle for dihedral. Both the top and bottom of the leading edge is sheeted, with cap strips over the ribs. Two spruce spars and a pre-shaped spruce leading edge give the wing a high degree of strength without excessive weight.

The tail surfaces are of sheet balsa with filler blocks to provide extra support to the critical and often weak rudder to stabilizer joint.

Our model was assembled using Pica Gluit aliphatic resin, Zap and Devcon 5-Minute Epoxy. The wing and stabilizer were covered with yellow Solarfilm and the fuselage and vertical tail with metallic green Solarfilm.

Construction is straightforward and is simplified by the clarity of the plans and instructions. A complete hardware package is provided, including pre-bent landing gear legs, nylon tailwheel bracket, horns, hinges, nylon nuts and bolts for wing mounting, in addition to the required assortment of screws, nuts and bolts.

All parts are band sawed to shape and match the plans and each other nicely. Wood quality is good and, as an example of

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

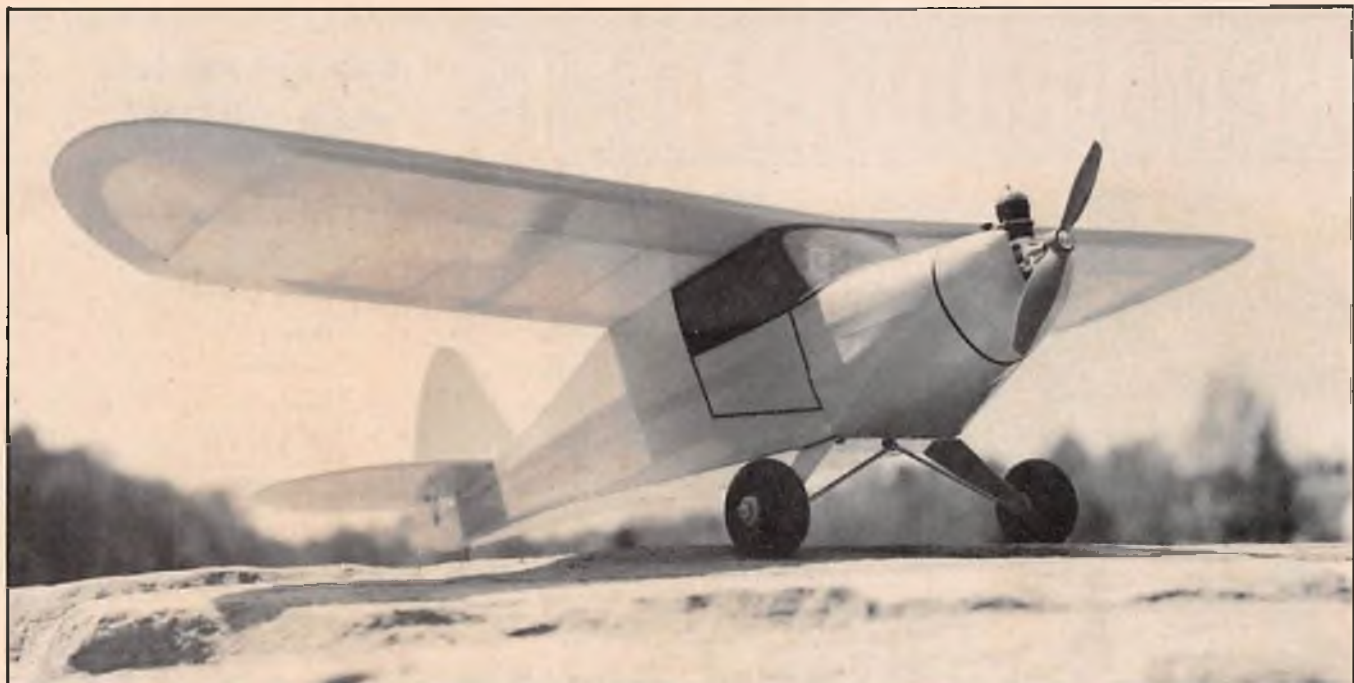
E=Excellent / G=Good / A=Average / F=Fair / P=Poor

SPECIFICATIONS

Name	AIR SCOUT
Aircraft Type	Trainer
Manufactured By	Concept Models 2906 Grandview Blvd. Madison, Wisconsin 53713
Mfg. Suggested Retail Price	\$39.95
Available From	Both Mfg. & Retail
Mfg. Recommended Usage	Basic Powered Trainer
Wing Span	54 Inches
Wing Chord	9 Inches
Total Wing Area	486 Square Inches
Fuselage Length	39 Inches
Radio Compartment Dimensions	(L) 9" x (W) 3" x (H) 5 1/2"
Wing Location	High Wing
Airfoil	Flat Bottom
Wing Planform	Constant Chord
Dihedral	2 Inches
Stabilizer Span	28 Inches
Stabilizer Chord (incl. elev.)	5" (Avg.)
Total Stab Area	100 Square Inches
Stab Airfoil Section	Flat
Stabilizer Location	Top Of Fuselage
Vertical Fin Height	6 Inches
Vertical Fin Width (incl. rud.)	7" (Avg.)
Mfg. Rec. Engine Range	.15-.19
Recommended Fuel Tank Size	4 Oz.
Landing Gear	Conventional
Recommended No. Of Channels	3-4
Recommended Control Functions	Rud., Elev., Throt., All. (opt.)
Basic Materials Used In Construction:	
Fuselage	Balsa & Ply
Wing	Balsa, Ply & Spruce
Tail Surfaces	Balsa
Hardware Included In Kit	See Text
Plan Size	24" x 36" — 36" x 48" (2 sheets)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (4 pages)
Construction Photos	No
Kit Includes	Shaped Parts
Mfg. Rec. Flying Weight	50-58 Oz.
Wing loading based on rec. flying wt.	14.7-17 oz./sq. ft.

RCM PROTOTYPE

Weight, Ready To Fly	58 Ounces
Wing Loading	17 oz./sq. ft.
Covering & finishing materials used	See Text
Engine Make & Disp.	O.S. .25
Muffler Used	Yes
Radio Used	Ace Commander
Tank Size Used	4 Oz.



MICRO VAGABOND

Designed for the new miniature radio systems, this 18" span replica of Bryce Petersen's popular Vagabond is a must for the small field flyer.

By
Bryce
Petersen

It has been said, "the bigger the model, the better." It all has to do with Reynolds Numbers and air molecules. Models are getting bigger and bigger because modelers are striving for realism which is a product of efficiency.

The idea of a small 18" R/C model flying around in a scale-like manner might seem like the impossible dream. Those of us who used to build the little rubber powered models surely have day dreamed about the day we could radio control a model that size. It has been tried with the standard radios, with the usual result of a heavy wing loading causing the super-fast, barely

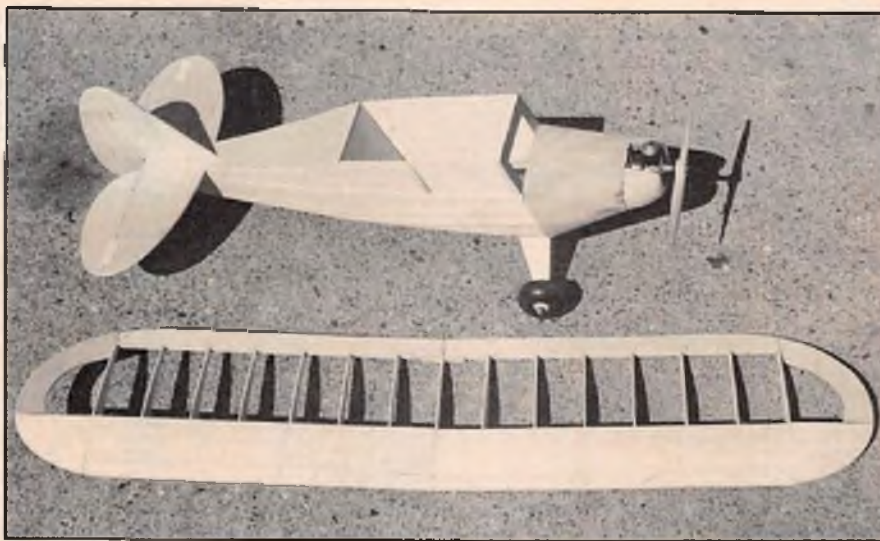
controllable bomb.

When you look around today at the "state of the art" in electronics and engines, it is almost inconceivable that you can purchase a servo that weighs only 1/2 oz. and a .020 engine with a dependable throttle.

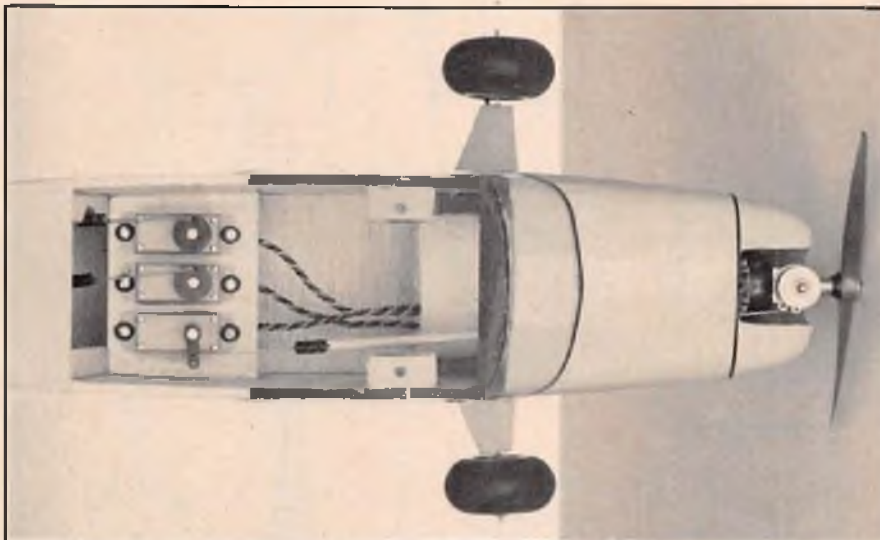
All this was too much for me, so I had to give it a try.

I feel that everyone would like to build a "cute little airplane", but hesitates because of the size and weight of the radio gear. Well, fellows, the time has come. Team up a set of Kraft KPS18 servos with a Cox .020 with throttle; add a small receiver with a 125 mah battery and you come out around 5 1/2 oz. With





The Micro Vagabond all framed up and ready for covering. Note the simplicity of the construction.



Looking into the radio compartment shows the new Kraft KPS-18 servos mounted 3 abreast. Throttle servo goes to a Cox .020 Pee Wee with Cox throttle.



The Micro Vagabond shown trying to get some shade under mother's wing.

one servo in motion, the current drain is around 100 milliamps so you can have a comfortable 45 minutes flying on one charge.

To make the project more interesting, I promised my friends I would build an R/C model with full control and shoot "touch and go's" in a gymnasium.

Because of the low Reynolds Numbers involved, you should choose a stable design. This is why I scaled down my full size Vagabond model. It is so

stable in the air, it is almost unfair to enter it in a fun-fly contest.

The Micro Vagabond will fly in a scale-like manner and gives the pilot plenty of time to react. Nice lazy Figure Eights around the antenna is pure joy. Because the model is never far away, I installed the antenna in the wing. This keeps that horrible looking wire from dangling from the rudder. The receiver switch is a small shorting plug instead of the usual switch. With the new two-wire power packs, you simply break one of the leads.

The model is simple to build. The woodwork can be completed in three evenings.

When it comes to installing the pushrods, things get a little tight. The pushrods are 1/8" dowel and .035 music wire. The control horns are handmade from soft aluminum.

If you are a beginner in this sport, I would suggest that you build several trainers before trying the Micro Vagabond.

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MICRO VAGABOND

Designed By : Bryce Petersen

TYPE AIRCRAFT

Micro Sport Scale

WINGSPAN

25 5/8 Inches

WING CHORD

5-7/16 Inches

TOTAL WING AREA

130 Square Inches

WING LOCATION

High Wing

AIRFOIL

Clark "Y"

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

1 1/8 Inch

OVERALL FUSELAGE LENGTH

17 5/8 Inches

RADIO COMPARTMENT AREA

(L) 5" x (W) 2 1/4" x (H) 2"

STABILIZER SPAN

10 Inches

STABILIZER CHORD (incl. elev.)

3 Inches (Avg.)

STABILIZER AREA

30 Sq. In. (Approx.)

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

2-5/16 Inches

VERTICAL FIN WIDTH (incl. rudder)

3 1/8 Inches (Avg.)

REC. ENGINE SIZE

Cox .020 W/Throttle

FUEL TANK SIZE

On Engine

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

3

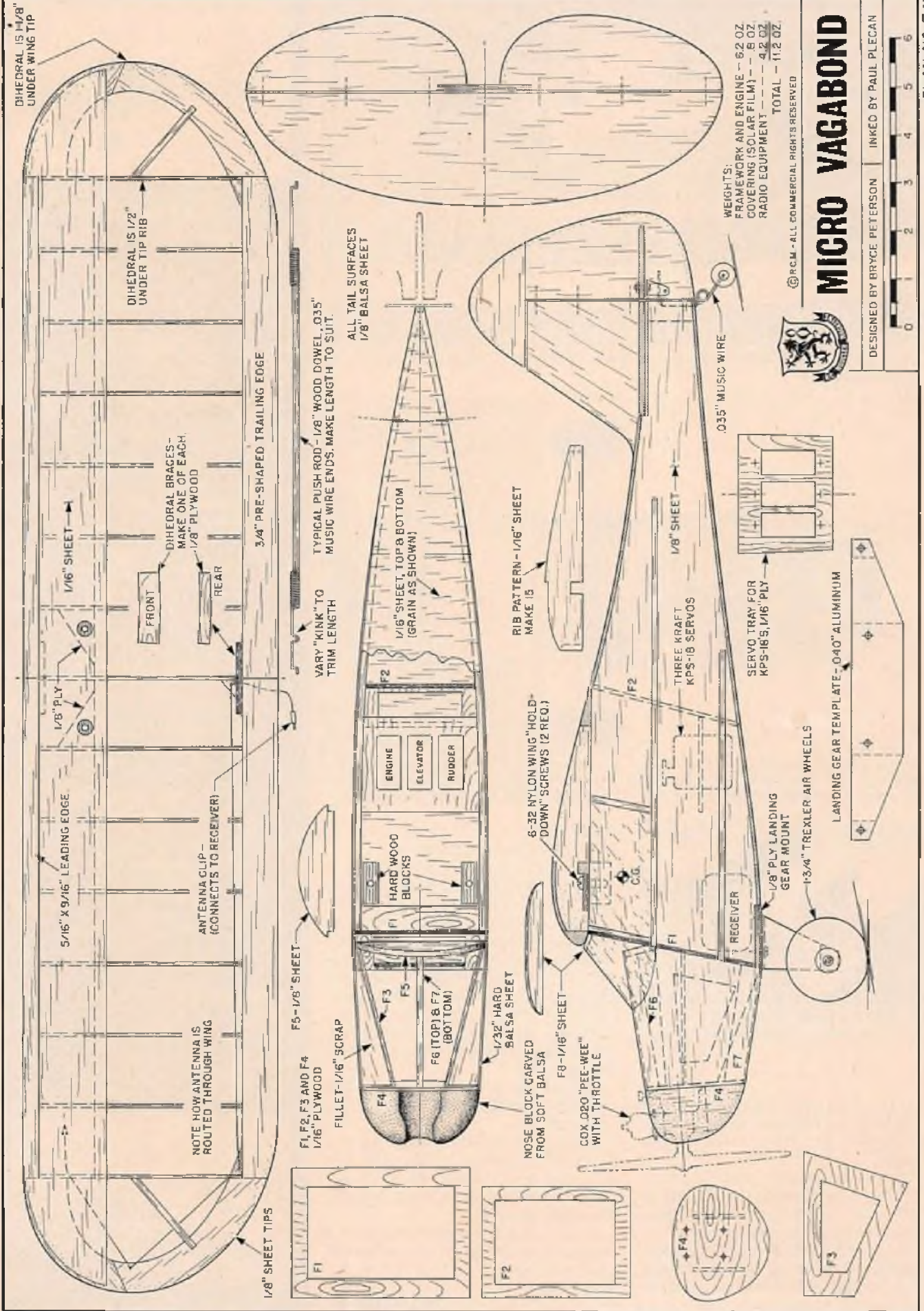
CONTROL FUNCTIONS

Rud., Elev., & Throt.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa & Ply
Empennage	Balsa
Wt. Ready-To-Fly	11.2 Ounces
Wing Loading	12.4 Oz/Sq. Ft.



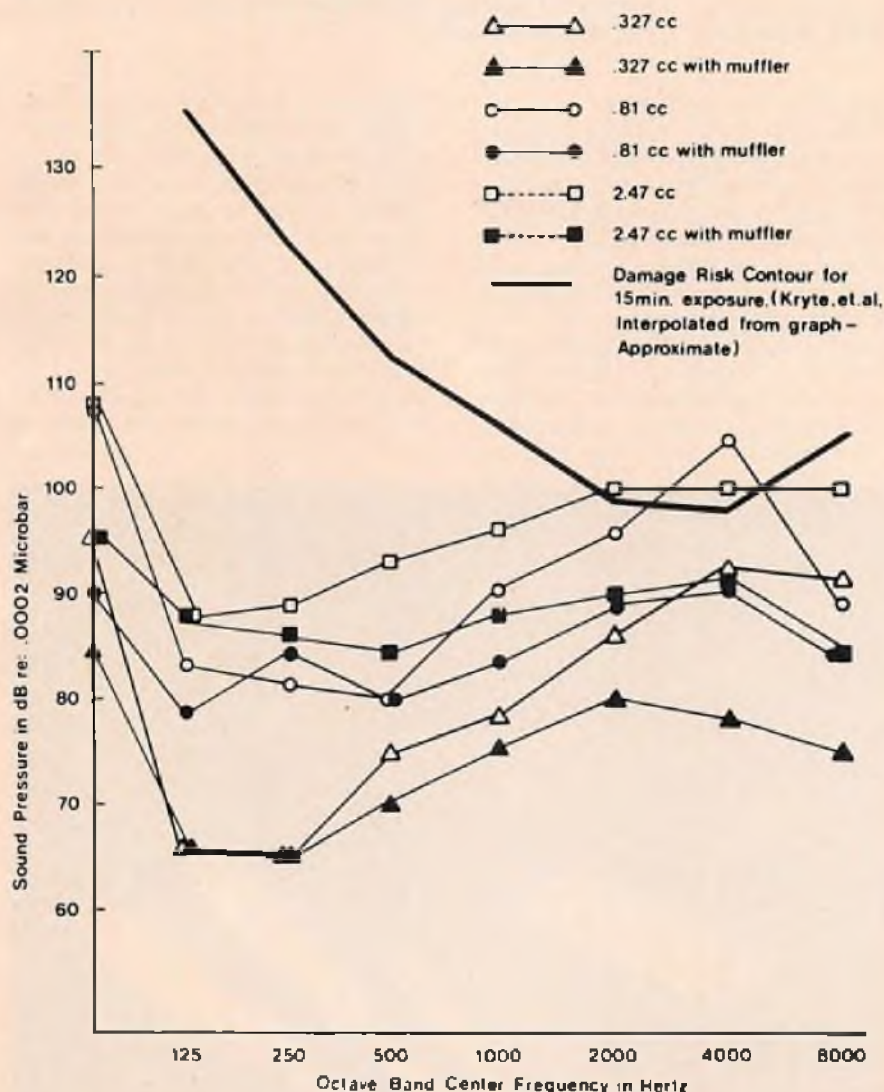


MICRO VAGABOND





The three experimental engines used in the Fredonia study.



Noise levels of engines with and without mufflers.

In April, 1971, The Williams Steiger Occupational Safety and Health Act (OSHA) established the need for conservation of human hearing. The law established regulation of industries which produced

noise that could potentially damage structures in the ear. A 90 dB sound pressure level for eight hours was the maximum permissible exposure level. This level was based on the research information available at the time. One of

NOISE EXPOSURE LEVELS FROM MODEL AIRPLANE ENGINES

By Ronald C. Pearlman

ABOUT THE AUTHOR

Ronald Pearlman resides in New York with his wife, Nancy, and their two children. He is a graduate of Rhodes Preparatory School, C.W. Post College of Long Island University with a Ph.D from the University of Missouri. Ron is a member of the New York State Speech and Hearing Association, the American Speech and Hearing Association, and the American Audiology Society. At present he has a private practice in Audiology as well as being an Assistant Professor of Audiology/Speech Pathology at the State University of New York College in Fredonia, New York. Ron enjoys RC as a member of the Jamestown Flying Aces.

the assumptions made when the 90 dB level was arrived at was that the off-job hours would consist of low-volume acoustic stimulation so that the auditory system could rest and recover from the noise of the day.

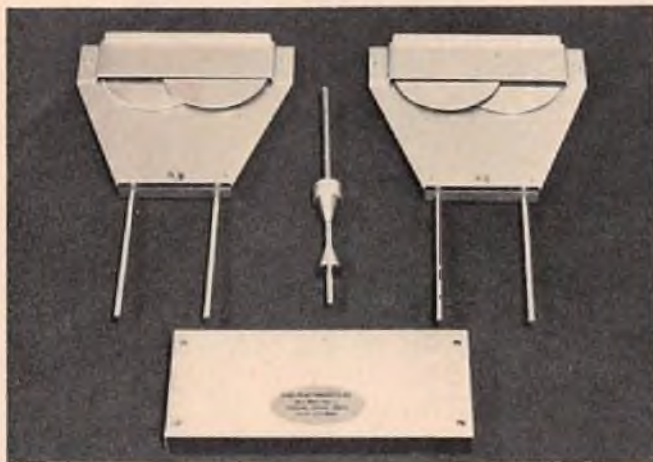
If a worker added more high level noise during his recreational activities he would be adding to the risk of losing his hearing. The list of loud recreational activities include: snowmobile riding, motorcycle riding, target shooting and hunting, playing loud music, playing with toys such as cap pistols and firecrackers and, unfortunately, gasoline powered model airplanes and cars.

Unlike other kinds of bodily damage, noise induced hearing loss is not accompanied by pain. The only warning may be a ringing sound in your ear and a slight hearing loss called a temporary threshold shift. Some time after the noise stops the ringing often subsides and hearing returns to the pre-noise exposure level. However, if the noise is repeated on a frequent basis, the temporary threshold shift becomes permanent. Permanent hearing loss of this kind cannot be reversed with medication or surgery. Sometimes a hearing aid will help correct the hearing problem, but hearing is usually not restored to normal. Damage to the fine nerve cells in the ear is irreversible.

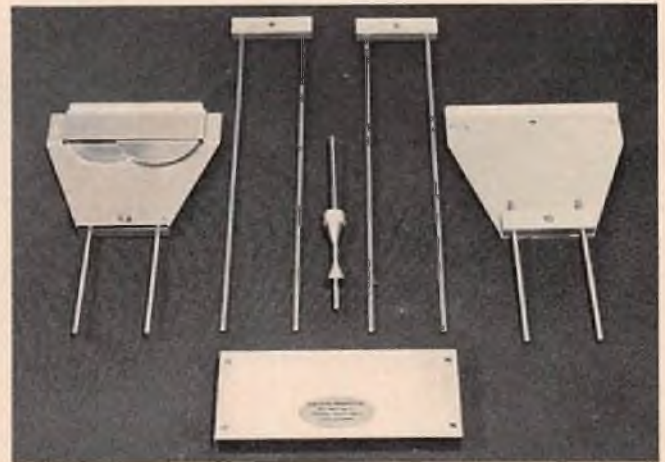
Often the hearing loss from excessive noise happens so gradually and over a long period of time (perhaps several

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HERE'S HOW



The High Point Products Company balancer. A unique and sensible balancing device with extreme sensitivity for the most critical modeler.



Extra long legs are available for balancing large props if you fly the big ones.

While walking down the crowded aisles at the Twenty-Fourth Annual Toledo Conference, I discovered this very unique balancer. Looking it over closely made me wonder how such a balancer could achieve the extreme sensitivity required to balance small diameter items such as spinners or boat props. It was certainly unlike any balancer that I have ever seen before. After satisfying myself that it did indeed have that extreme sensitivity for balancing large props as well as small ones, I thought it interesting enough to

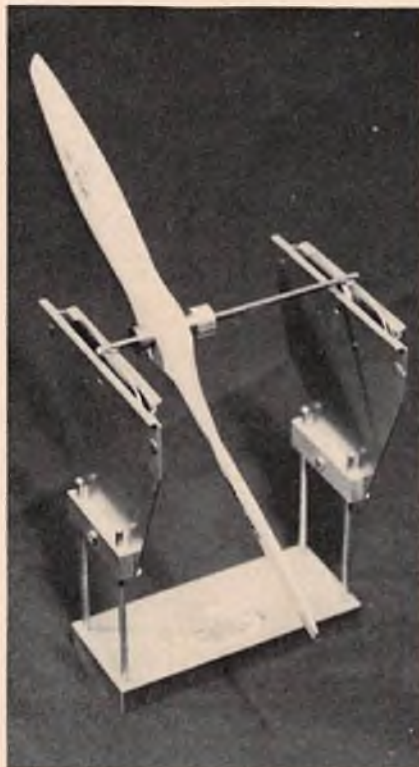
pass on to you, the reader.

The High Point Products Company balancer is an efficient balancer design used by industry for a long period of time; only the design features have been miniaturized for modelers use. Unlike other balancers it does not have to be level or is there any friction involved in holding the balancing shaft. The extreme sensitivity of the balancer will enable all modelers to minimize vibration in their models and utilize more available power from their power plants.

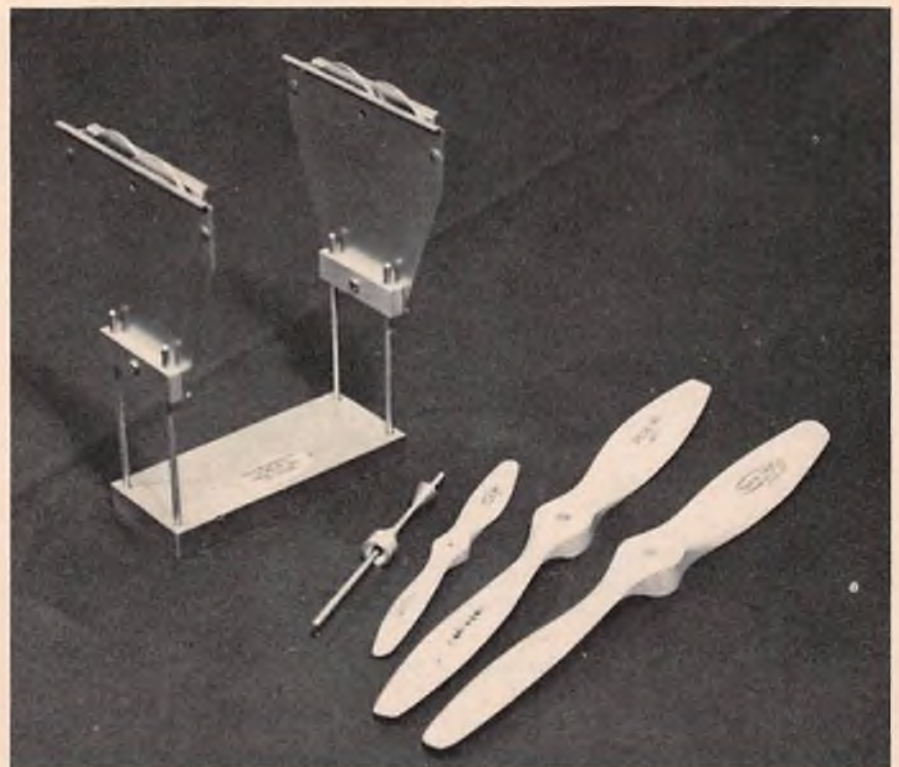
A closer look will show how the

balancer achieves its extreme sensitivity. The balancing shaft, which holds the object to be balanced, is of a small diameter. This shaft rotates against a large diameter wheel. The action becomes a mechanical force, like a small gear driving a large gear. Therefore, any unbalanced weight on the small shaft is magnified on the wheel (see Figure A). This force is further magnified through a leverage type of force to the small axle (see Figure B). Any unbalanced weight on the balancing

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Prop shown in balancing position. Items such as spinners, boat props, fly wheels, car wheels and ducted fan rotors can also be balanced.



Super balancing shaft design, with centering cones, allow for easy and positive mounting. Will accept 1/8" to 3/8" diameter hole in item to be balanced.

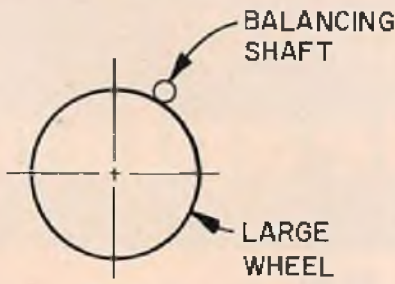


FIG. A

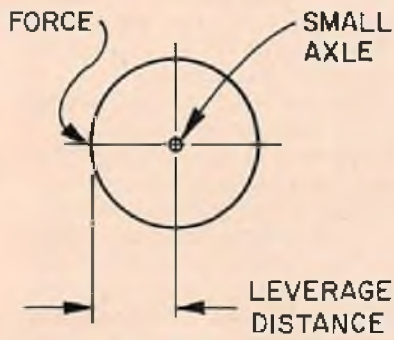


FIG. B

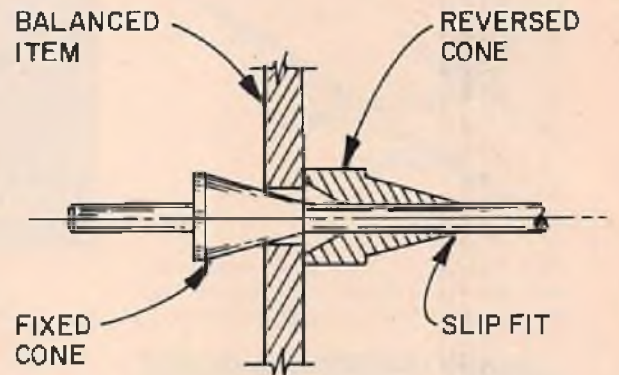


FIG. C

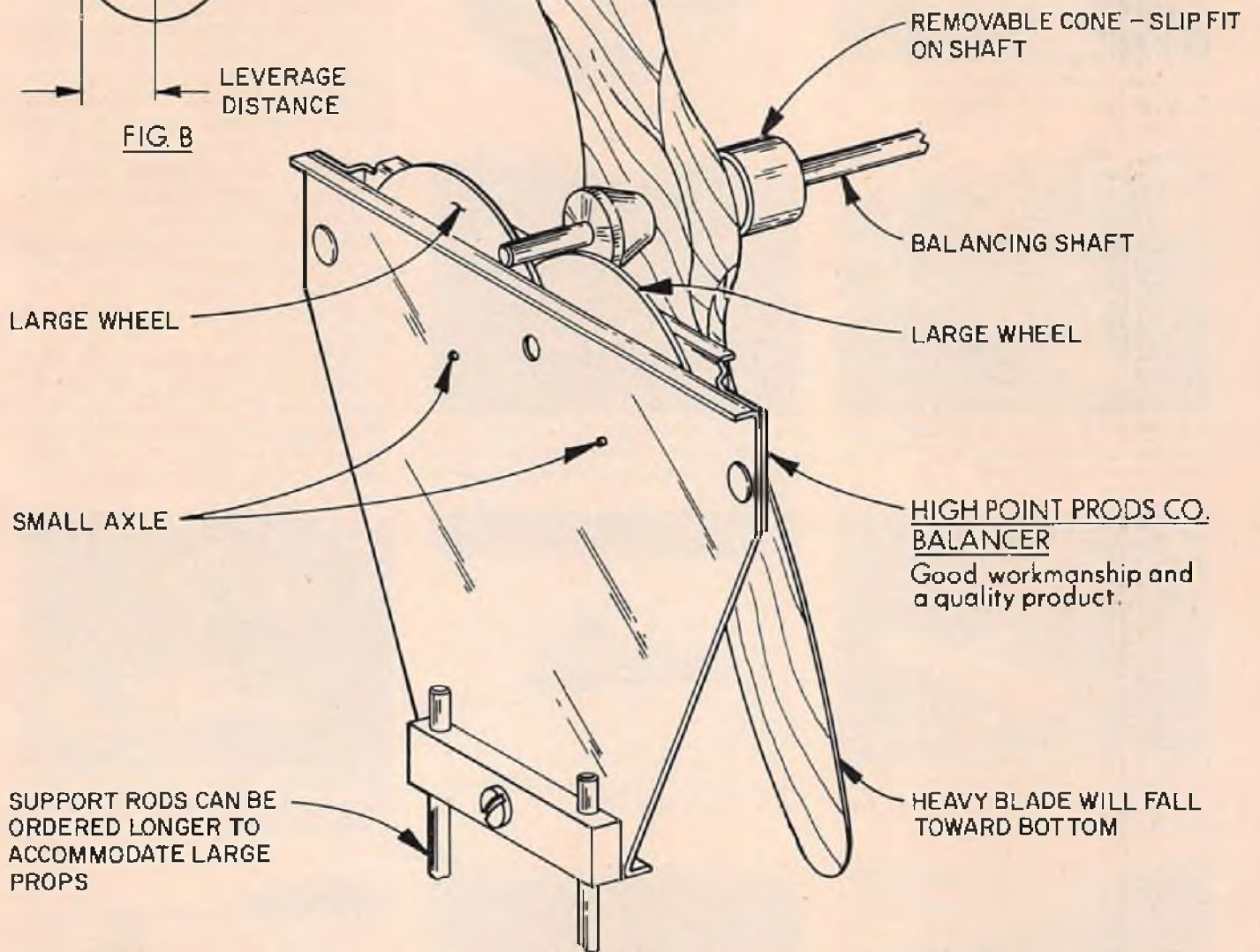


FIG. D



Dick Hanson's Taurus has spectacular performance. Efficient float design was developed by the Skyknights R/C Club.



Jim Trump, Editor of Benton County R/C Club newsletter, flew a VK Cherokee.



R.B. Pfeiffer, Mt. Ranier R/C Society, used a paper cup bomb release on his Taurus. Invert plane to drop bomb.



Two Spickler 500's with O.S. .40's and Sure Flite floats were flown by (L) Don and (R) Brian Done.



Irwin Ohlsson's Pacemaker on landing (water?) approach.



Portion of the pit area. Forest in background contained dozens of campsites where most of the contestants camped.



Joe Tschergi's Brandenburg Flying Boat on a graceful take-off.



Bill Foster, Salem R/C Pilots Assn., with his original design entry.

Haystack Reservoir, Madras, Oregon, was the place, 1978 was the tenth consecutive year, and the Skyknights R/C Club of Portland, Oregon, was the host club for the Northwest R/C Seaplane Championships. Dick Riever is president of the Skyknights, and Bill and Bob Raser were co-contest directors.

The contest is really a flying vacation for seaplane enthusiasts with emphasis on enjoyment. The events were bomb drops, taxi race/spot landing, limbo, mail pick-up, and wade-off scale. Those events sound simple enough, but a few fiendish minds in the Skyknights have included little refinements that, when done in the water, can be quite challenging and sometimes hilarious. Somehow water isn't as solid or predictable as terra firma.

Winners were determined by the total scoring of points earned in each event. This year the champion was Vern Ahlberg followed by Don Martin and Mike Pavelak.

The types of models flown in the meet included a wide variety of designs, in fact, they hang floats on most anything. The most popular bird is the Top Flite Taurus which is strong, light weight, and has lots of wing area. Next, is the Bridi



Mike Farmer, Benton County R/C Club, flew a Ken Willard designed Wavemaster powered by two Fox .40's.



Chance Vaughn OS2U-3 KingFisher by Bob Kreuzinger, Salem R/C Pilots Assn.

Northwest R/C Championships

Trainer .60. Somewhat of a mind-blower is the Quickie 500 .40 powered racer on floats, works great.

Several float designs were used but the majority used balsa covered foam floats developed by the Skyknights and cut for club members by Dick Hanson. The ability of these floats to quickly break water and to lift off is unreal. RCM is attempting to obtain this float design for publication.

Futaba radios were the most prominent brand seen with the seaplanes. Being almost impervious to water has made Futaba a favorite for seaplanes as well as for model boats.

Haystack Reservoir is an Oregon State Park with dozens of individual camp sites scattered throughout a lush pine forest. These sites were filled with the motor homes, trailers, campers, and tents of the contestants. The contest was held over the long Fourth of July weekend and, as mentioned earlier, is a family type model flying vacation. For the first time in ten years a few thunderstorms dampened the bodies but not the spirit.

We have covered our share of modeling activities and know that there are a lot of nice people in R/C but this group at Haystack out did themselves

with hospitality and consideration. No way could we go hungry or thirsty at that meet. We were picked up at the Madras airport by a convoy of modelers and delivered to our motel (they made the reservations). How can we thank a guy like Vern Ahlberg who handed us the keys to his van and insisted that we use it during our stay at Haystack?

Our transportation to Haystack was Lew Mahieu's Bonanza. We made the 800 mile flight from Long Beach, California, non-stop in four hours flat. Besides Lew and myself, there was Joe Bridi and Irwin Ohlsson. Along with the luggage and tool boxes were Irv's 7'

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Joe Bridi piloted Irwin Ohlsson's Grumman Widgeon through several spectacular flights.



(L to R) Roger Misterek, Bill Ely, and Vernon Ahlberg all flew Bridi .60 Trainers.



C.D. Bill Raser, Portland Skyknights R/C Club, did his thing with a Phoenix on floats.



Bill McNally, Mt. Ranier R/C Society, flew a Graupner Piper PA-18.



Joe Bridi ponders over the water rudder control while Lew Mahieu (center) and Irwin Ohlsson (white hat) look on.



Mike Pavalek, Thundervolts R/C Club, used a Kaos tail on his Taurus.



Powerful .60 featuring front rotary disc intake built by Ralph Cooney, Fourmost Racing Products and flown by Dick Hanson.



Ohlsson's Widgeon presented an interesting retrieval procedure.



Erv Levand's Ugly Stik sported an appropriately marked repaired wing.



Bill Raser with sighting protractor used to triangulate bomb drop distance.

Boeing P-26A
Real or Model?
Built by Eddie Chavez.



9½" span Sikorsky S-42 flying boat built by Eddie Chavez & Bob Fogg.



Photos by Robert H. Haack

Cunningham On RC CHUCK CUNNINGHAM



EDDIE CHAVEZ, MASTER MODELBUILDER

Down in San Antonio, Texas, exists an aircraft factory employing about one hundred skilled craftsmen, and headed up by the presiding genius, Eddie Chavez. The thing that sets this aircraft company

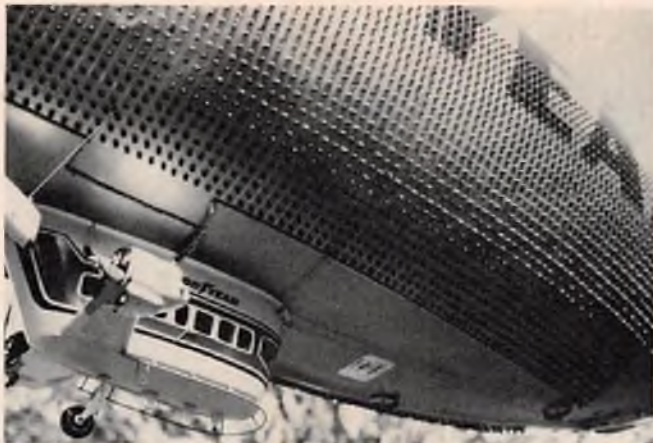
apart from any other is that it is engaged in turning out fantastically built, fully detailed, exact scale replicas of full size aircraft. The other feature that sets this company apart is that except for its President, Vice President and Janitor, all of the workers are only 5" tall. I kept looking around the factory for these workers, and after much searching, realized that these scale modelers exist

only in my imagination, and that all of this fantastic craftsmanship emanates from the fingers and mind of a great guy, Eddie Chavez. Eddie is the President and Janitor of his operation while his charming wife Kathryn serves as Eddie's Vice President in charge of slowing Eddie down.

As you can tell from the pictures, Eddie's models are so well detailed that

*American Airline 1932
Curtiss Condor – about to
load passengers.
Model by Eddie Chavez.*





they boggle the mind. It is almost impossible to tell them from the real item. His latest finished product is a 7' span Curtiss Condor II, biplane transport of the very early thirties. The detailing is complete down to upholstered seats, with seat belts, drapes over the windows, and two berths for overnight flights. It is a beautiful model that brought many people to Eddie's door while it was under construction. Don't

call him up asking to come by and look at it, because it is on permanent display at the Nut Tree Restaurant in California. Let's go back a bit and find out about Eddie and his beautiful models. Ten of Eddie's works of art are hanging in the Smithsonian Institute in Washington D.C. Twenty-one are on display at the famous Nut Tree Restaurant and Airport just outside Vacaville, California. The Nut Tree

would love to have more of his models, but each completed model represents just about a year of Eddie's life. Eddie grew up in San Antonio, one of his boyhood friends being Joseph Nieto, whose scale plan work has been familiar to most modelers for many, many years. Eddie enjoys working from Nieto plans, as they are so very well detailed and accurate. He also works from drawings supplied from aircraft factories the world

over. He has the plans photographically enlarged to the size aircraft he wishes to build. He got his early love for aviation by hanging around Kelly Field as a kid, bumming rides or doing odd jobs, anything, just to be near aircraft. When WW II came along, Eddie became an aircraft gunner in a B24 and served throughout the war. After, he joined the Post Office as a route carrier. In 1947 Eddie received a direct commission in the military reserve as a 1st Lt. in military intelligence, with the primary responsibility of building recognition models. The Korean War came along and Eddie was activated to service, and emerged from the Korean mess as a Captain in CIC. After this conflict, Eddie returned to the Post Office, and it was at this time that he began working both for retirement and as a model builder. Eddie told me that he realized that he could retire when he was fifty-five with thirty years of federal service, so with unswerving devotion he began working towards that date, which by the way was April 28, 1972. He showed me a picture of his last month's calendar with the days marked off to that day.

During this time, though, Eddie began turning out his world famous models. He began by building a scale model of a Cessna 172 for the then great sum of \$172.00. This led to a number of models for owners of private aircraft who wished a replica model to place in their offices. He then built a model for the Piper distributor in San Antonio, and that model became his first to be displayed in the Smithsonian Museum. Later, other major aircraft manufacturers wanted Eddie to build models of their aircraft to be displayed in the Smithsonian, and Eddie's model building business was off and flying. These models were all constructed to 1/16" scale.

About this time, the Nut Tree Restaurant asked Eddie to build a model of an Aero Commander for them. This was the beginning of a long association with the Nut Tree through one of its owners, Edwin I. Powers, and its Design Director, Don Birrell. The Nut Tree is on my list of "gotta-see" places the next time that I visit California. It began as a restaurant situated on Hwy. 80, just outside of Vacaville, California, between Sacramento and San Francisco. Several years ago Ed Powers, an active private pilot, realized that there was enough suitable ground around the Nut Tree to construct a private airport, and it has since become a Mecca for private pilots flying any place in that area. A place to gather, partake of excellent food, and for the past sixteen years wonder at the craftsmanship of Eddie's models on display. Now, Eddie builds models only for the Nut Tree. He is again talking of "retiring", but the Nut Tree is on a project of having a Chavez model of each full size aircraft that's on display at the Smithsonian. A big undertaking that

should keep Eddie un-retired well into his nineties. Eddie is a warm hearted, gregarious, human being who has become a very good friend just on the basis of the day that I was lucky enough to spend with him. With Eddie's energy and ability, he will never retire, slow down a bit, but if he can retire, then I can flap my ears and fly.

Eddie's models, as you have gathered by now, are not R/C models, and are not flying models, but the techniques that he uses to create them are exactly the same as you and I use. Except in my case, I could try for a life time and never even build one part as superb as Eddie builds an entire model.

He uses balsa, foam, spruce and plywood for the basic structure, and has been using for many years, the products of Petit Paint Company, which we as modelers know as Hobbyoxo. He has found the Hobbyoxo paints and glues to be perfect for his application. The fuselages of his models are generally constructed of plywood formers, spruce or balsa longerons and a planked shell of balsa strips. These strips are held in place with Hot Stuff, another of Eddie's favorite working materials, in fact, like so many modelers, he wonders how he ever built a model before epoxy glues and Hot Stuff. Over the planked and sanded fuselage, Eddie applies a layer of 3/4 ounce fibergalss cloth. He works Hobbyoxo resin into the glass cloth exactly like the directions indicate. When dry, he sands it off for a beautiful, tough and durable working surface. Painting with Hobbyoxo enamels is done in the aircraft painting booth at the Beechcraft Aircraft Dealers repair facility at the San Antonio Airport. The entire wall of this shop is an air exhauster, and the paint room is spotless clean so that Eddie can put on a perfect, dust free paint job.

Most of the wings of Eddie's models are constructed with foam cores, covered with a balsa skin, then covered with glass cloth and Hobbyoxo resin. Detail such as wing ribs, outlines, etc., are generally applied over this glass surface. On his model of the Northrup Gamma, the entire surface of the aircraft is covered with small pieces of very thin sheet aluminum. Each sheet has all of the rivet markings of the original aircraft. The rivets were made by indenting the back of the metal sheet with a small punch, turning the sheet over and lightly tapping the very center of each rivet head with an even smaller punch. The finished product looks exactly like a full size rivetted surface. Eddie told me that there are about 80,000 such rivet markings on the Gamma. The metal plates are held to the surface of the model with Hot Stuff.

Several years ago when Eddie was first beginning his super detailed model career, a good friend, Lt. Col (Ret.) Bob Fogg, worked with him. Each worked on

his speciality. Bob began developing another business that took him away from working with Eddie, but they remain close friends. Bob's other business is building mock-ups for case work production runs of computer terminals, and the pictures that he showed to me were again of fantastic craftsmanship. But the biggest interest to me in Bob's shop is the 8' span Fokker D VII R/C aircraft that he is building. Bob has long been an R/C flier, and is now enjoying building and flying the big models, when his other work gives him a bit of time. Another very active Retiree.

All of Eddie's models for the Nut Tree are done in the scale of 1/10" for single engine aircraft and 1/12" for multi-engined aircraft. This helps to keep the finished display aircraft of manageable size, and yet allows sufficient size for detail work. Eddie's next project is the biplane Curtis Racer R3C-2 float equipped that Jimmy Doolittle flew? The project after this is to be a DC 3, which will have an 8' span. It will have operating doors, full interior, complete with seats, belts, etc. My wife Jan went with me to visit with Eddie and Kathryn, and when the talk got around to the DC 3 her eyes lit up because she spent her early time as an Air Hostess for TWA flying on the DC 3. She can probably serve as Eddie's Technical Consultant on the location of the "air sick bags" since the low flying DC 3 flew through much more turbulence than do the modern day airliners.

Eddie has been fortunate to be able to draw upon the experience of many people while building his aircraft, and I'm sure that the reason that he has been able to enlist so much aid is his very warm-hearted nature. I doubt that Eddie ever met someone that he didn't like. Bob Engle, another active modeler who is now moving into R/C, has done the art and lettering work on all of Eddie's models for a long time. Bob even makes replica decals in exact scale for any decal that was used on the original aircraft. His lettering and art work enhance already perfect models.

One of the most interesting models that Eddie has constructed are two models of the Goodyear Blimp; one in the Smithsonian, and one at the Nut Tree. The lights on both sides of the blimps were duplicated by optic fiber lights and colored glass headed pins for the bulbs. There are **only** 7,580 lights on each blimp. The blimp was molded out of fiberglass, and this molding was carried through even down to the lettering of "Goodyear" on the blimp's tires. When Eddie built his model of the Ford Tri-Motor for the Nut Tree, American Airlines flew the original to San Antonio so that Eddie could examine it before flying it on to the Smithsonian for permanent display.

Another Chavez model is a 12' long
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An Easier and More Exact Way To Make TAPERED RIBS

By Eddie Kolassa

This is an update to an article (July 1974 American Aircraft Modeler) on a way to make tapered ribs using the Sandwich Method, where balsa blanks are placed between two templates, carved and sanded to the shape of the templates.

When the original article was written, the thought was that an invaluable tool, for making very accurate tapered ribs, could now be used by the designer-builder. But, because of apparent misinterpretation of the original article, such may not be the case with everyone. This assumption is made after talking to several model builders, and observing construction articles since 1974. If there really is some confusion, then with high hopes, an effort will be made to make everything perfectly clear.

The objective is to make a set of ribs to fit the wing in Figure 3. You only need to draw, accurately, rib Numbers 1 and 5 to obtain a perfect set of ribs good enough to be used, if you will, in engineering drawings.

With carbon paper between the plans and aluminum or plywood sheet, trace the outline of rib Numbers 1 and 5 using a sharp 6H pencil. Use a ship curve to accurately guide the pencil. After removing the carbon, go over the outline with a sharp scribe (needle in a pin vise), otherwise the outline tends to be obliterated when handling the template. It is not a bad idea to use the ship curve to guide the scribe. Make the initial cut wide of the line and file or sand to the line, constantly checking with the plans as the sanding nears the line. When finished, you will then have, in aluminum or plywood, perfect replicas of rib Numbers 1 and 5, and these templates will, in turn, be used to make a perfect set of ribs to fit the wing in Figure 3.

To illustrate the theory, the just-made templates are compressed to zero thickness, and 4 balsa blanks are placed between the templates as shown in Figures 1 and 2. The thickness of the blanks are exaggerated for clarity, but the results are the same no matter what the thickness. The large template is designated L-L and the small templates S-S. Also, one extra balsa blank is placed outside of template L-L. In practice, before bolting everything together, I place a small dab of glue, between each blank, not far from the

trailing edge. This helps prevent the blanks from shifting during carving and sanding, especially if the airfoil is rather thin.

After planing or whittling the balsa blanks close to the outline of the templates, use a sanding block to approach the templates. To be very precise, the sanding block should be tangent to both templates at the same airfoil station. In other words, as you sand parallel to the templates, the sanding block should be tangent to the quarter points of both templates simultaneously, the half-way stations, and the three quarter stations. These are quarter and half-way points of the airfoils and not the rib. The L.E. and T.E. must be included to determine the station. I always draw 1/4, 1/2, and 3/4 lines on the outside of my templates to use as a guide when sanding. While the error is small, it is not accurate to sand in any other way. In a straight tapered wing, a straight-edge laid across the 30% station (or any station) of every rib will touch every rib. The straight-edge may not touch every rib if you go from the 40% station at one end of the wing to the 30% station at the other. You can make the sanding block touch unequal stations of the template simultaneously, but the balsa blanks may no longer be a true representation of the template airfoil.

After dismantling the stack you will note that the ribs are beveled at the top (and bottom) and at the trailing edge (and L.E.). One side of each rib is larger than the other. Because of the bevel, the ribs would present a poor gluing surface. So the T.E. bevel is cut off and the top bevel is sanded flat using the small side of the rib as a guide. To make certain the rib is not distorted by sanding too much, using a felt pen, color the bevel edge near the small side of the rib. Sand off all the color except for a thin line adjacent to the small side of the rib.

Noting that the plan of the wing is at half scale, measure each of the ribs on the plan and compare them to the ribs in the stack. Ribs of the same number are of equal size. Rib Numbers 2, 3, 4, and 5, were made from balsa blanks placed between the templates and rib Number 1 from a blank outside the template. Therefore, if the correct number of rib blanks needed, in the Sandwich Method of making ribs, includes one blank just

outside the rib templates, the number of blanks between the templates is one less than needed. This is known as the Bumble Bee Theory because that's who told it to me - - - a bumble bee.

What happens when you enter the real world and the templates have thickness? Use the inside face of each template (Figure 4) and the thickness of the template has no bearing on the results. The large template needs no alteration, but the small template must be beveled to allow the sanding block to touch the inside face.

Even though the inside face of the template is used, it is the smaller side of each rib that represents the true rib. Any marks or cuts made to the rib to designate spars, ailerons, or whatever, should be taken at the smaller face of the rib. I run 1/16" deep razor slits across the ribs to mark where the spars and aileron cuts will be made. Some of these razor slits traverse the ribs at other than right angles. If you use the slit mark where it meets the smaller face of the rib, you will not get the same aileron location compared to that same slit mark at the larger face. Always be guided by the smaller face. If you do use this method, be reminded that the slit marks, if not made deep enough, can disappear after sanding off the bevel. All would not be lost though. The ribs can be made accurate enough to take measurements right off the plans, using this method.

The correct amount of rib blanks to use seems simple enough, but that number may not always be apparent.

Take a look at the double taper in Figure 5. While this planform is not found in everyone's workshop, the straight inner panel, tapered outer panel (Figure 7) is fairly common with glider buffs. Then, everything said about the double taper is applicable to the other.

The best way to look at the double taper is to split it into two separate panels (Figure 6) with rib Number 4 common to both panels. Make templates of rib Numbers 1, 4, and 8, and sandwich 3 balsa blanks (4 ribs - one less blank) between 4 and 8. Duplicate template Number 1 in balsa, and you have all the ribs. If there is any question as to the number of blanks needed, count all the ribs in the panel, including the ribs the templates are made of, and subtract one.

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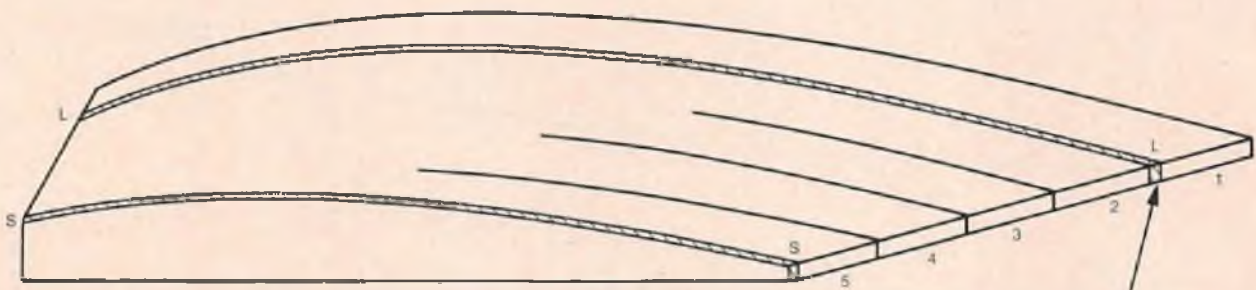


FIGURE 1

NO THICKNESS
LARGE TEMPLATE

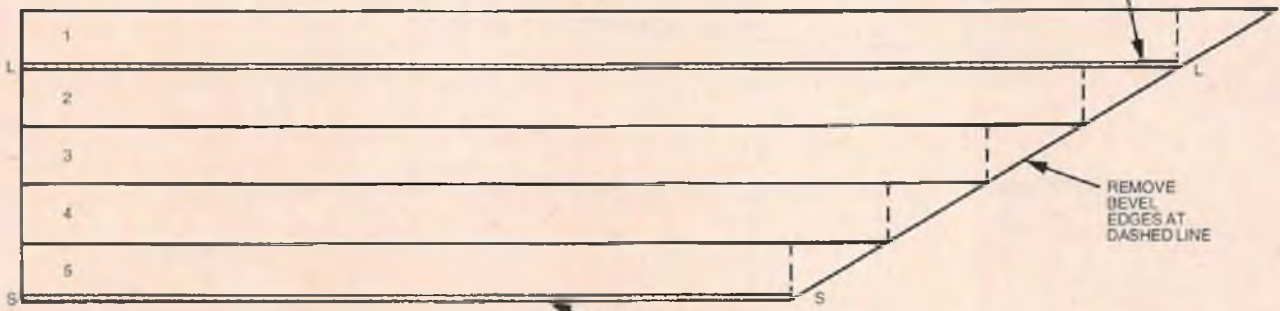


FIGURE 2

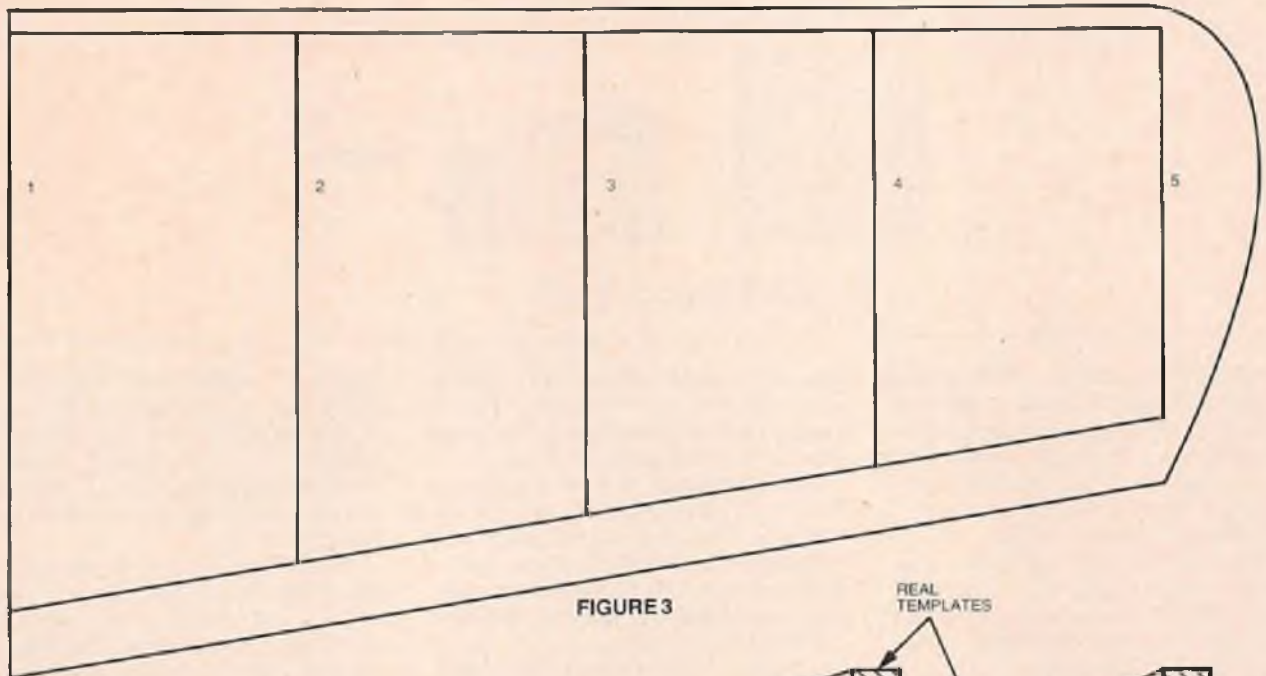
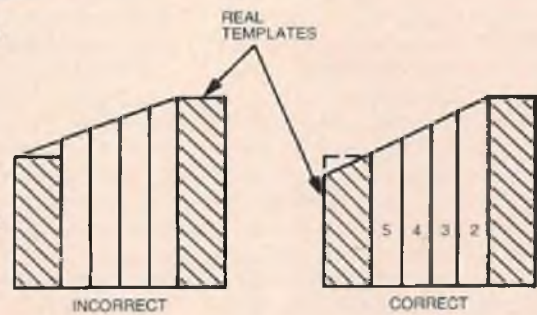


FIGURE 3

SCALE — 1/2

FIGURE 4



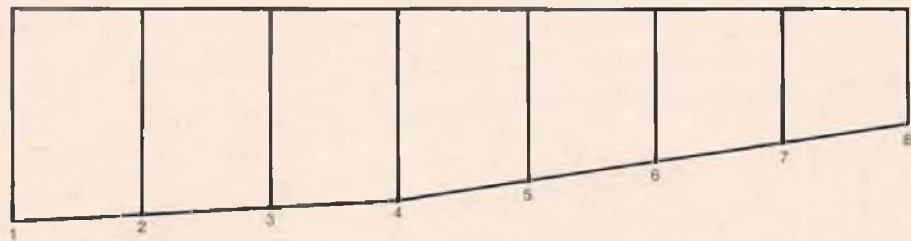


FIGURE 5

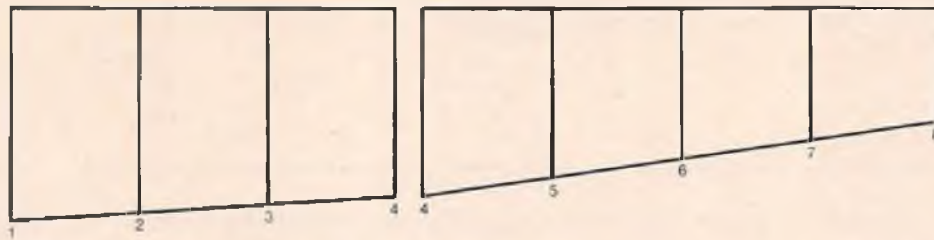


FIGURE 6

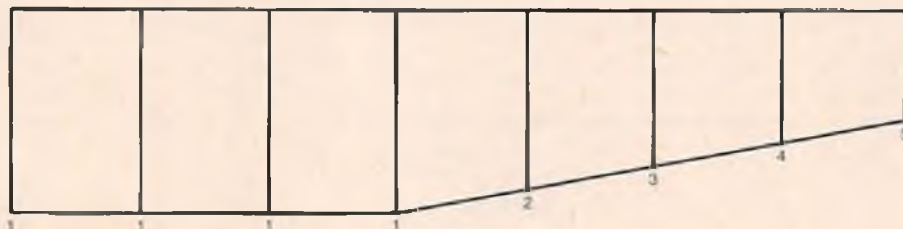


FIGURE 7

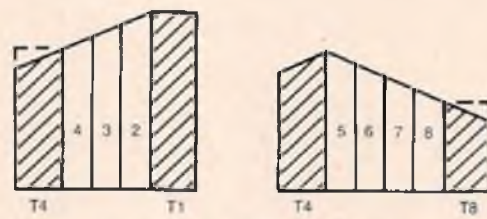


FIGURE 8

NOTE HOW ONE STACK GOES TO THE LEFT AND THE OTHER TO THE RIGHT

The ribs for the other half of the wing are best made by duplicating each rib separately. This way any inaccuracy in one wing half will be the same in the other wing half, aerodynamically balancing each other, and making it easier to flight trim the model.

A neat trick makes use of a spacer between each blank. In a 5 rib wing panel, where 4 balsa blanks are used, add 4 spacer blanks. Beginning with the largest rib, label the blanks 1A, 2, 2A, 3, 3A, etc. After unstacking, do not remove the bevel from the A ribs, and rub some glue over the edges to strengthen them. The non-A ribs will, of course, have the bevel removed and be used in construction. The A ribs can be put aside for future use; their function being to make duplicate ribs for repairs or to draw ribs for your plans. Keep in mind that the larger face of the A ribs is the correct

side and exactly matches its numerical equal with the bevel removed. That is the high side of 2A equals 2, the larger side of 3A is the same as 3, etc.

Also remember that all the blanks must be of equal thickness and the ribs equally spaced, otherwise the perspective is distorted and the ribs no longer will be proportional to each other. You can not have some rib blanks out of 1/16" sheet and others out of 1/8" sheet. If some ribs must be thicker than others, duplicate the thicker ones from the thinner ones after dismantling the stack.

The claim is made that this is one of the most accurate methods for making tapered ribs at the designer-builder's disposal. And the cost in time is quite low, when compared to some of the other methods.

Consider the other methods. Plotting and drawing all the ribs is out of the

question. Using photo magnification equipment is not that simple. You are working in the shadow of the projection, and the tracing procedure is open to error. At least one rib must be plotted anyway, and the airfoil must be the same from root to tip.

Another method sometimes used is to draw the tip section above the root section, and connect equal station lines. Accuracy is the equivalent of plotting all the ribs, and it is almost as tedious and time consuming. Accuracy suffers unless enough connecting points are used, the recommended minimum being the number of stations used when plotting ribs. This method is reasonably practical only when the number of tapered ribs is not excessive, or when the number of connecting points taken is relatively few, but then accuracy is lost.

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RCM PRODUCT TEST

Bridi Hobby P-51D MUSTANG



The P-51D Mustang is a Sport Scale Model manufactured by Bridi Hobby Enterprises and is available direct from manufacturer, as well as your local hobby shop. This kit comes complete with an epoxy glass fuselage, foam wing and stab cores, plus all necessary balsa, plywood, and hardwood parts to build the wing and tail section. Hardware is complete and includes such items as a pre-bent and soldered elevator horn, aileron torque rods, pre-bent tail wheel wire, pre-formed canopy, cowling and air scoop. Decal sheets are provided for the Bob Hoover version. The kit contains adequate plans and written instructions and is packaged to provide safe passage to your workshop. Most components are grouped and bagged in clear plastic bags to enable easy identification.

The kit builder needs to have worked with foam cores previously in order to follow the instructions and to properly assemble the 4 piece wing. After the wing and stab have been sheeted and joined they were covered with K & B 3/4 oz. fiberglass cloth and K & B resin. Be sure to follow the kit instructions when using finishing resin and the various epoxy products. You will need to decide, as you sheet the wing, on retracts or standard fixed landing gear and build in the required structure. The fuselage does require sanding and filling with a considerable amount of patching along the wing fillets. You will find that a K & B .61 pumper is too long for the cowling so approximately a 1/4" ring is needed to fill the space. On the test model a C.B. Enterprises spinner was cut off and attached to the fuselage with a new spinner back plate being fabricated to accommodate the remaining spinner. The end result looks very nice.

Be very careful when you get ready to mount the stab. The scribe marks on our fuselage were not correct to put the incidence at 0°. A line was drawn on the plans and then on the fuselage and a new mark was made to correctly cut the

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

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

SPECIFICATIONS

Name	P-51D MUSTANG
Aircraft Type	Sport Scale
Manufactured By	Bridi Hobby Enterprises, Inc. 1611 E. Sandison St. Wilmington, California 90744
Mfg. Suggested Retail Price	\$129.95
Available From	Both Mfg. & Retail
Mfg. Recommended Usage	Competition
Wing Span	65 3/4 Inches
Wing Chord	10 1/2" (Avg.)
Total Wing Area	690 Square Inches
Fuselage Length	51 inches
Radio Compartment Dimensions	(L) 12" x (W) 5" x (H) 4"
Wing Location	Low Wing
Airfoil	Semi-Symmetrical
Wing Planform	Double Taper
Dihedral	2 1/2 Inches
Polyhedral	NA
Stabilizer Span	23 Inches
Stabilizer Chord (incl. elev.)	5 1/2" (Avg.)
Total Stab Area	126 Sq. In. (approx.)
Stab Airfoil Section	Symmetrical
Stabilizer Location	Mid-Fuselage
Vertical Fin Height	10 1/4 Inches
Vertical Fin Width (incl. rud.)	5" (Avg.)
Mfg. Rec. Engine Range	.60-.80
Recommended Fuel Tank Size	14
Landing Gear	Conventional
Recommended No. Of Channels	5-6
Recommended Control Functions	Rudder, Elevator, Throttle, Ailerons, Retract Gear, Flaps

Basic Materials Used In Construction:

Fuselage	Epoxy Glass
Wing	Foam & Balsa
Tail Surfaces	Foam & Balsa
Hardware Included In Kit	See text
Plan Size	42" x 58" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (11 pages)
Construction Photos	No
Kit Includes	Shaped Parts
Mfg. Rec. Flying Weight	128 Ounces
Wing loading based on rec. flying wt.	26.7-31.7 oz./sq. ft.

RCM PROTOTYPE

Weight, Ready To Fly	128 Ounces
Wing Loading	26.7 oz./sq. ft.
Covering & finishing materials used	See Text
Engine Make & Disp.	K & B .61
Muffler Used	Du-Bro
Radio Used	Krall 7 channel
Tank Size Used	14 ounces

AEROMISTRESS

ALMOST ENTIRELY CONSTRUCTED OF FOAM AND PLY, THE AEROMISTRESS HAS MANY UNIQUE FEATURES DESIGNED INTO IT. IT HAS HAD SOME ROUGH TREATMENT AND STILL CAME THROUGH WITH MINIMUM SCRATCHES.
BY LAWRENCE MARGOLIN

This article probably would have never come to be if Bruce hadn't lost a wing on the maiden flight of his brand new Aeromaster. Bruce is a member of the Q.C.R.C. It seems that Bruce was trying to do some sort of aerobatic maneuvers when the top wing blew off and, in turn, took the rudder with it. The rest was the classic swan dive. How or why the wing decided to solo, no one really knows. Old rubber bands, etc., etc. The only complete part of the wreckage was the top wing which, being relieved of its burden, came down last.

As we looked over the wreckage, Bruce decided it was beyond repair. The cabane ripped out on one side (maybe it ripped out in the air?), the stabilizer was gone and the lower wing was shattered. I was on my way for matches and marshmallows when someone remarked to Bruce, "Bet Larry could make it out of plywood --- Hey, Larr, want an Aeromaster body?" I reluctantly threw the debris into the trunk. Some nights later I decided to see how this airplane was built.

I extricated the body and did a little pushing and gluing and suddenly realized the body wasn't too bad. The Aeromaster is a well designed plane.

I rebuilt the fuselage, made a new empennage and decided to try foam wings. Having never tried to build a foam wing, I was reluctant. I weighed the built-up wing that was still intact and then weighed the components for the same wing as supplied by Wing Manufacturing. I was surprised to find I could build a foam wing that was actually lighter than a built-up wing. I built one set using the Wing manufactured components and another using balsa sheet for covering instead of the material supplied by Wing Manufacturing. By being careful to use the contact cement sparingly and using light balsa of 1/16" thickness, I came out with a considerably lighter wing. This being the case, I might be able to build a fuselage mainly out of plywood and the total weight would be the same. I finished rebuilding Bruce's biplane and flew it. I had never cared much for biplanes and, after flying it, I still didn't.

I let all the hot shot Aeromaster pilots try it out and they said it flew great. I was used to something more aerobatic, so I decided to make some modifications to this popular design.

After having designed a plywood structure for the fuselage that reduced the number of components and simplified construction, I went ahead and cut parts for four Aeromistresses simultaneously. If one flew, I wanted to be sure of repeatability. When I completed the first, I was sure I had a highly aerobatic biplane. The first design had the top wing the same span as the bottom. I then completed Number 2. This time I used the standard upper

Aeromaster wing. This made the airplane more docile and still very maneuverable. In construction, one of my main concerns was to build the cabane so that I could plug the cabane in as a unit. I wanted to be able to finish a fuselage completely, then attach the cabane so that it was a permanent unit. The way I did this was to build the cabane as a unit by leaving one cross

AEROMISTRESS

Designed By : Larry Margolin

TYPE AIRCRAFT

Aerobatic Biplane

WINGSPAN

Top 53 1/2" - Bottom 48 1/2"

WING CHORD

9 Inches

TOTAL WING AREA

876 Square Inches

WING LOCATION

Biplane

AIRFOIL

Symmetrical

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

Top none - Bottom 1 1/4"

O.A. FUSELAGE LENGTH

40 1/2 Inches

RADIO COMPARTMENT AREA

(L) 8" X (W) 3 1/2" X (H) 3 3/4"

STABILIZER SPAN

20 Inches

STABILIZER CHORD (incl. elev.)

8 1/2 Inches (Avg.)

STABILIZER AREA

100 Square Inches

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Mid Fuselage

VERTICAL FIN HEIGHT

7 1/4 Inches

VERTICAL FIN WIDTH (incl. rudder)

8 Inches (Avg.)

REC. ENGINE SIZE

.61 cu. in.

FUEL TANK SIZE

12 Oz.

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Ail. & Throt.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Foam & Ply
Empennage	Balsa & Ply
Weight Ready-To-Fly	120 Ounces
Wing Loading	19.7 oz./sq. ft.

piece on the front of the cabane unsoldered and doing the same with the rear cross piece. By doing this, I was able to 'spring' the cabane apart far enough for insertion into four holes into the fuselage. After the cabane is in place, the front and rear cross pieces are wrapped and soldered on the fuselage.

Another innovation was to have the top wing removable by using one nylon



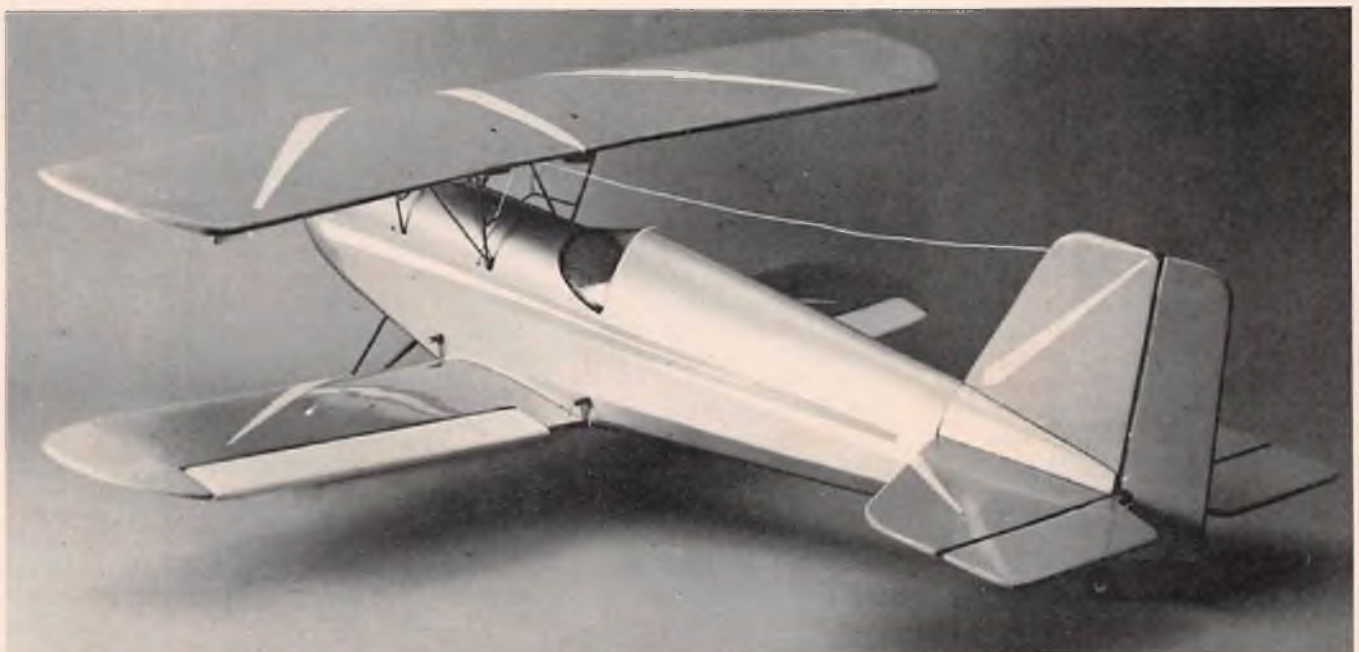
screw. I did this by using a swiveling block that is threaded. The block is attached to a rear cross piece and, as the screw is tightened, the piano wire cross piece is pulled up exerting a continual spring force on the wing. The block comes into intimate contact with the wing and the shearing force is very high. The single screw is effective for any aerobatics but, at the same time, will shear under impact before much damage is done. I avoid the use of nylon bolts in the bottom wing because the lower wing is usually hitting on tips, etc., and rubber bands are more practical. I know the fuselage is somewhat heavier than the standard configuration, but the strength to weight ratio is extremely

ABOUT THE AUTHOR

Lawrence Margolin, age 45, has been modeling since the age of ten. He stopped for a period of twenty years because of work and schooling and became re-involved when R/C equipment became more reliable and available. Most of his designs have all been based on plywood construction. The Aeromistress design is his tenth and he is presently creating new designs. Larry is a member of the Jericho Flyers and the Queens County Radio Control Society and is a teacher of General Science in Rockaway Beach, New York.

high. On some of my early flights I was having trouble with the elevator hinges. They were sliding in and out of the stabilizer and I didn't spot this immediately. This caused three "landings" that, in one case, knocked the landing gear and top wing off; in another case, bent the prop shaft and shattered a lower wing. The fuselage structurally was undamaged. The same semi-crashes would have definitely required major repairs had straight balsa construction been used.

A jig saw is a necessity for the construction of the body parts. The only part of this airplane that really requires some detailed information for building is the fuselage. Most builders have



experience with foam wings and the empennage is just regular balsa construction. The cabanes require a little study, but are not really difficult. We will start the construction part of the article with the fuselage.

Fuselage: Using some drafting vellum, trace out the crutch, being sure to include the holes for wing dowels and cabane. Spray contact cement onto a 3/32" ply sheet and lay the tracing paper on it. Tack the plywood to another plywood sheet so you will be cutting two crutches simultaneously.

Drill holes for the cabanes and dowels. Where the triangular sections are removed from the rear of the fuselage, drill a hole using a 1/4" drill in each 'triangles' corner. This avoids a lot of maneuvering with the jig saw. Next, trace out all the formers and follow the same procedure. The engine mounts are cut from 3/4" maple or other hardwood. If you can't get this, you could laminate 3/8" ply to get the thickness. Cut the fuselage top and turtle deck out. At this point in the fuselage construction, let's stop and do something that will ease later assembly.

The plywood skins are very easy to work with if they are shaped before assembly. Trying to clamp ply skins onto a structure can be a pain, in wherever you are sensitive, if they have not been formed first. There are a number of ways to shape the skins to a round configuration. By soaking the outside of the skin for an hour, they become very pliable. I used an old towel saturated in a solution of hot water and Top Job detergent. (The detergent kills the surface tension and lets the water become more penetrating.) I lay the towel on the skins and after an hour I form the skins in a number of ways. You can clamp the skins around a pipe or Laly column so that the skins are in a horseshoe shape. A good diameter for the front fuselage skin is anywhere from 2" to 3" diameter. After the skin is dried, it will spring out some so that the fuselage curvature will be pretty close and all you have to do is slide the skin down over the formers and clamp the sides. Another method is to bend the sheets into a 'U' shape (the radius will occur naturally). Then slide the shape between two surfaces that will hold the width. Can't think of anything? How about nailing a couple of boards to a 3" wide base to form a channel? Too hard? How about moving a dressing table away from a wall and shoving the skin between the furniture and the wall. Another way to bend the 'U' shape is by using rubber bands or masking tape wrapped around.

For the turtledeck, the same procedure is involved except the tail end is a much smaller radius than the cockpit end. You can do the furniture routine by having the furniture touching the wall on one end so an angle is formed, then

push the 'U' shaped skin into the angle and let it dry. Let the skins remain in this position until you are ready to use them — the longer the better. If you are pressured into restoring furniture to "normal", wrap some rubber bands around the skins and they will lose their memory for flatness . . . where was I? Oh yes, formers . . . cutting out . . . uh . . . yes, now start the assembly by epoxying F2 and F3 to engine mounts. This sub-assembly will facilitate the rest of construction. Cement F4 and F4A, F5 and F6 to one side of the crutch. Then epoxy the motor mount assembly to the same crutch. After the cement has set, epoxy the remaining crutch onto the assembly.

Once this entire unit is set, pull the fuselage together at the rear former and epoxy. You will now find that there is a space at the tail for the insertion of the tailwheel and block assembly. Let's see . . . what next? The nose has to be pulled together to make the body sides (crutch) come in contact with the motor mounts which taper in. Again wet down the outside of the crutch where the bend takes place, apply white glue and squeeze sides together with a furniture clamp. Install "cabane sockets" over the drilled holes, make the tailwheel block and glue in place. Install wing seat doublers. By now it is probably simple to see what comes next. Drill the cabane holes through the "sockets" with a 9/64" drill. Slide the front top fuselage skin down over the formers after applying cement at all contact points. Do the same for the turtle deck. Clamp or rubber band into position. Now you have probably noticed that the holes you drilled for the cabanes are covered by the plywood skins. How to find the holes? Take off your right boxing glove, pick up a 3/32" drill bit, shove hand and drill into fuselage. Insert drill into each cabane hole and twist the bit. A hole will appear in the plywood as the drill comes through from inside. If your hands are too big to fit into this fuselage, see a doctor, you have Acromegaly.

Now would be a good time to decide what kind of linkage you need for rudder and elevator and throttle, if it's NyRod, do it.

The fuselage can be closed up by installing F1-A and F2-A. These parts are installed after adding a 1/4" doubler into the inner fuselage sides and under the motor mounts. The rear lower fuselage is cross grained 1/8" balsa (soft). Finally, epoxy F1 into position. This adds a great deal of strength to the nose assembly. Add 1/8" x 3/16" hardwood stringers to the fuselage. The stringers start under the cockpit and end at the tail. The stringers should be sanded to a feather edge at the front and rear. The landing gear blocks are installed and the remaining spaces are filled with scrap 1/8" plywood. The entire fuselage is now cleaned up. The nose

can be beveled round on the corners. All the other corners should have at least a 1/4" radius. Methods for tank installations vary a lot. I usually shove the tank in as high as it will go. Then I put a removable wire retainer under the tank. There is a lot of room in this fuselage so many options are available. The engine can be positioned and the mounting holes drilled #6-32 x 1 1/4 long screws and self-locking nuts are used. I usually fuel proof the entire engine compartment at this point. I find fiberglass resin great for this application. The photos show a 1/4" thick doubler (balsa) at the top of each engine mount. This helps the MonoKote to adhere, but doesn't do much structurally. You can add a piece of balsa sheet here and sand it to the shape. It's no big deal. It is optional. Do this before installing the plywood top cover.

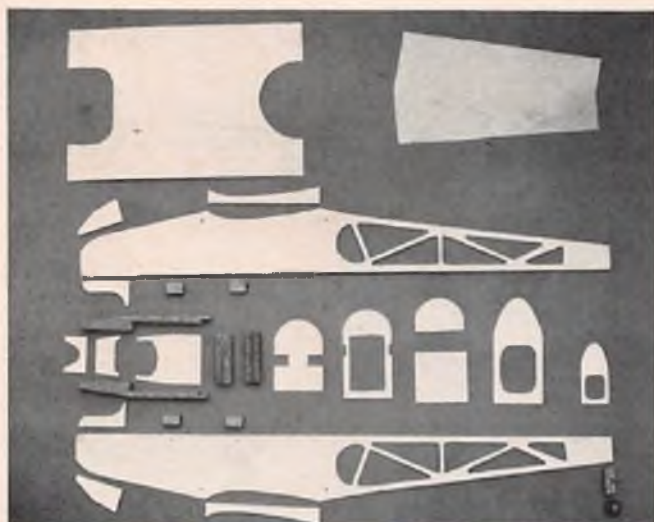
Cabane: The next most interesting part to develop is the cabane assembly. Bending wires that are highly tempered is difficult. What I have done is to heat the wire to a dull red color and let cool. This takes the high temper out of the wire and makes the wire easier to bend accurately. I use a heavy vise and a hammer. This is the best way I can get accuracy.

First mark the wire for each bend with a dab of dope or nail polish. Do this on both wires simultaneously. Put the wires into the vise both at the same time with marks located at the vise jaw line. Now by tapping the wires with the hammer, the vise acts as a bending brake and both wires will bend identically. The most critical wires are the two side pieces that plug into the fuselage. This determines the wing incidence and lateral positioning. The other wires are not critical and should not be softened.

The wing retainer block should be completed and then slid onto the wire along with the washers for soldering. There is one joint on the front and one on the rear of the cabane that is left incomplete. After the cabane is installed, two joints are completed.

The fuselage, at this point, makes a handy jig for assembly of the cabanes. The wing saddles can be made from banding iron (the stuff that is wrapped around crates for shipping). The width and thickness are ideal. Sand off any finish on the iron and solder to upper cabane wires as shown.

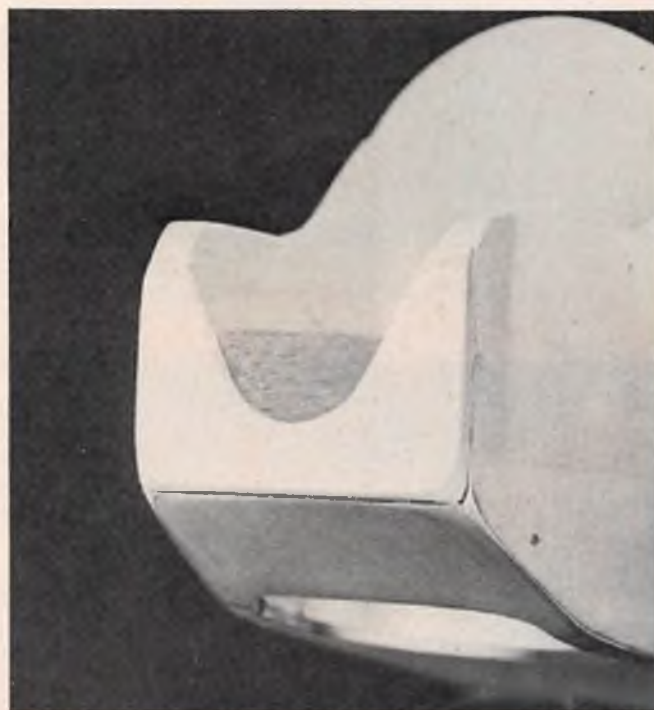
One additional piece of information that could save the day. I just read the November issue of RCM and in Chuck Cunningham's article "Lazy Ace." He describes a great way to get alignment for cabane wires. He cuts the wire that supports the wings and installs a piece of brass tubing. After he gets the exact length, he solders the tube in place. In other words, if you make the cabane sides and you don't get exactly the same size, cut the cabane sides and slip four lengths of tubing over the ends, lay the



Complete fuselage parts kit cut and ready to start assembly.



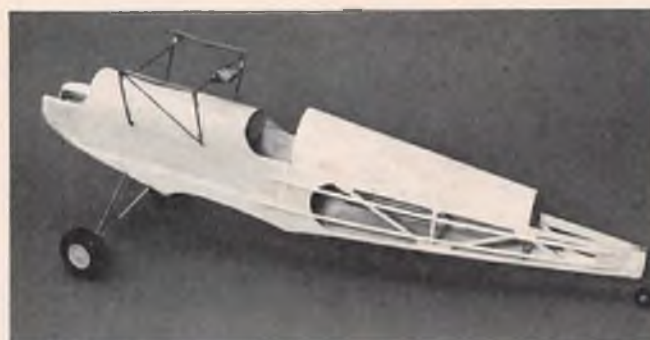
Fuselage assembly almost to the completion stage and ready for sanding.



Close up of nose section of fuselage.



Bottom view of nose section.



Completed fuselage ready to cover.

cabanes down over the plans and adjust to exact size, then solder the tubes in place. Great idea, but four **Aeromistresses** too late!! But that inspires an idea for a new parasol wing design.

Between Lou Andrews, Chuck Cunningham and Wing Manufacturing, I don't have much left to do but draw pictures.

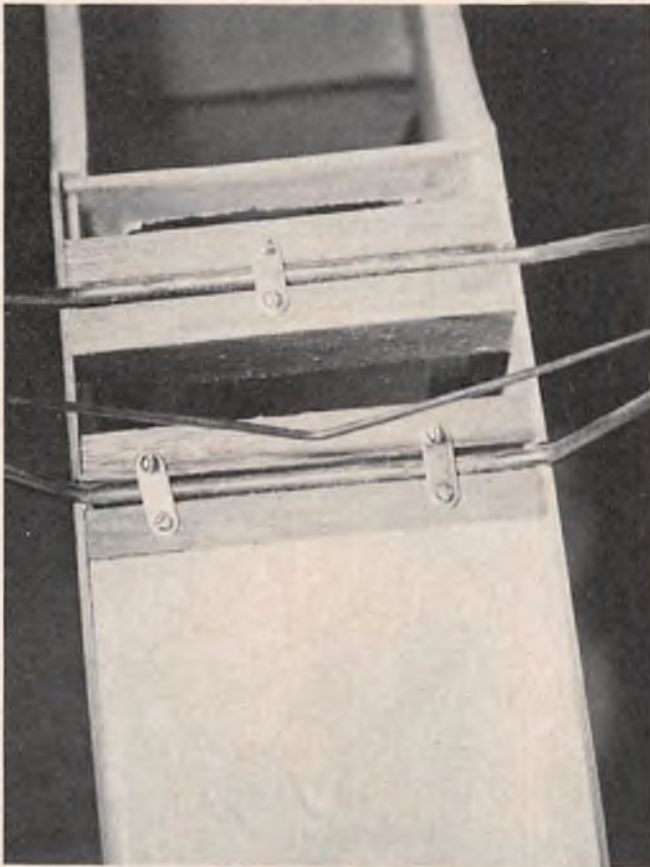
Wings: Most of us are pretty familiar with building foam wings by now. I know I was the last one in the Jericho Flyers and the Q.C.R.C. to do this. I asked questions for a year before I tried doing a foam wing. After doing one set, I decided which techniques I liked best. It seems for me, the most expensive way is best.

Which means covering the cores with sheet balsa. My friends use the covering supplied with the wing kit and the results are great.

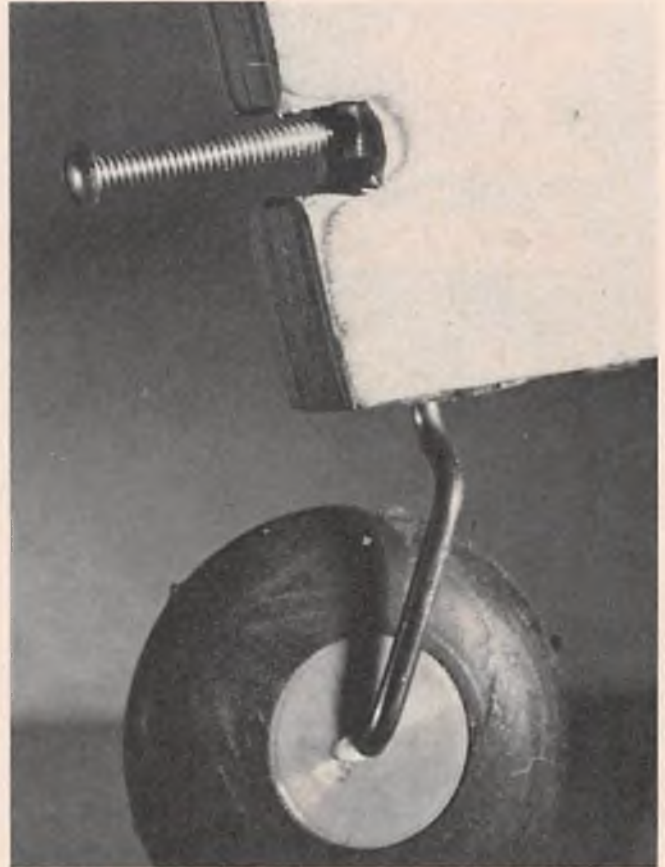
I don't think it is necessary to go into a big description about covering materials and procedure, but there is information that is probably unique to this plane, that is needed for the wings.

The top wing is built so it can be removed and attached with one nylon screw. The leading edge of the wing is held down by a retaining plate and the rear by a nylon screw. After the core is covered with whatever you decide to use, you can start making slots for dihedral braces and, in this case, the wing retainer plate. Measure 3/4" from

the leading edge. Draw a centerline parallel with the leading edge and the length of the retaining plate. Now cut a 1/8" slot on the centerline and remove the wood. Use copper wire in a soldering gun to clean out the slot. The retainer plate has to sink into the wing so that the cabane will be seated correctly. If you have been following the sequence for building, you will have the cabane finished and we can use the cabane for locating the depth to which the retaining plate sits in the slot you made. Coat the retainer with epoxy and put enough epoxy in the slot so there will be good adhesion. Slide the retainer onto the two projecting wires on the front of the cabane. Push the retainer into the slot



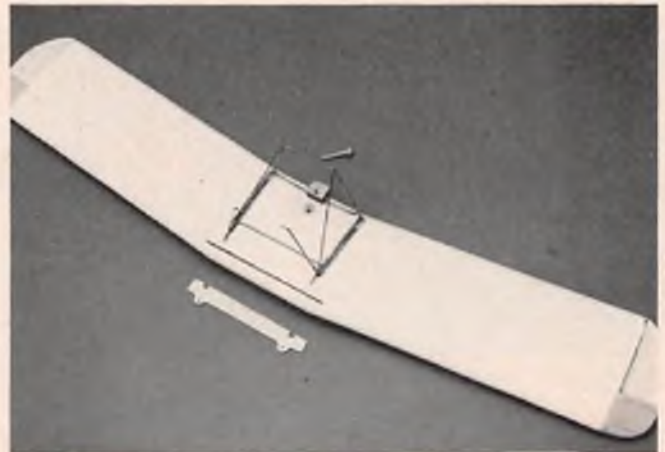
Landing gear mounting detail.



1/8" tall wheel wire with collar and 4-40 bolt. Bolt slides into rudder. Makes nice steering arrangement.



Cabane struts completed and ready to attach to fuselage.



Bottom view of upper wing. Note cabane wires slip into ply plate and is bolted at rear.

until the cabane is seated firmly against the wing. This establishes the correct depth for the retainer. Let the epoxy set up. While the wing is in this position, with the cabane in place, you can now locate the centerline for the wing hold-down screw. The wing hold-down block is used for locating the screw hole. By inserting a piece of wire or a drill bit through the mounting block hole, you can mark the location for the hold-down screw. A 3/4" hole is made in the wing for insertion of a length of dowel the thickness of the wing. This is epoxied in

place. After the dowel is secure, the cabane is replaced and you do the same thing again. This time the hole for the screw will be marked on the dowel. Drill the dowel through with a 9/32" drill. This should now match with the hold-down block and the screw should line up. There will be a space between the wing and the hold-down block, but as you tighten the screw the cross wire that the block pivots on, will flex and provide a spring action for the wing mounting. Tighten the screw until the block seats against the wing. The wing will now be

secured at the front by the wing retainer plate and held in the rear by the screw. One advantage of this arrangement is that you can position the wing so that it will be perpendicular to the body by simply shifting the retainer block on the cross piece and resoldering the positioning washers and, of course, you don't have big holes in the wing for rubber bands.

As far as the bottom wing goes, I used the material supplied in the wing kit for everything but the covering. Again, I used wood instead of the material

supplied. I used dihedral braces as shown. The simple aileron linkage makes the job easier than using bell cranks especially with foam wings. The wing tips are not supplied in the kit so they are as illustrated. Ailerons are done by first marking the foam and removing the aileron section with a fine hack saw blade. Then remove another 1/8" of foam from the aileron and the section of the wing the aileron came from. I then replaced the amount of foam removed with a 1/8" balsa facing, both on the wing and aileron. The trailing edges are done by cementing 3/16" square balsa stock on. The leading edge is cemented on and the wing ends have a balsa rib cemented on. Then sand the edges flush with the foam and apply the wood sheeting. In effect, the foam is surrounded by a wood edging for the sheeting to adhere to. After the sheeting is set up, it is easy to contour the sheeting and all the edging. The aileron linkage is set up with 15° of differential. (The aileron horn is bent toward the servo 15°.)

Empennage: The photographs do not go into great detail showing rudder and stabilizer construction because of the simplicity. The elevator is a structure and is covered with MonoKote. I have done this to keep the tail end as light as possible. A small difference in the tail weight of a plane requires a much greater addition of weight in the nose to compensate for the big difference in moment arms. The stabilizer itself is built-up and sheeted in order to maintain strength, but still retain some lightness. The rudder should be constructed of a fairly light balsa.

Landing Gear: The landing gear is conventional. I am, however, using large 4" Du-Bro wheels which are heavier than usual, but offer the advantage of good shock absorption and they tend to ride on rough surfaces and grass without digging in and causing nose-overs. The gear is retained by standard landing gear retaining straps.

Tailwheel: The tailwheel is operated by the rudder through a tiller bar that is held captive in the rudder cavity by 1/32" plywood sandwich. A flat should be filed on the tailwheel wire so that once the screw has been lightened, the gear will retain its position. A steel bushing should be used in the fuselage block so that stripping is minimized.

Covering and Finishing: Some of the boys at the field miss the appearance of stringers showing on the turtledeck. I must admit I do to, so on my last **Aeromistress** I Zapped a 1/8" square balsa stringer to the ply sheet and sanded the ends to a feather edge. It looks great! I asked some opinions and the opinion was . . . "But, it doesn't look racy," . . . from the sophisticates . . . "adds weight," . . . "increases parasitic drag" . . . "leave it alone." So if it's what you like, don't look for opinions or you

will be redesigning every flying session.

I used MonoKote exclusively. It is a pleasure to finish the fuselage and just plug the cabane in. The finished assembly (fuselage and cabane) really looks slick. The cabane is somewhat complex, but this adds to the appearance as well as to the strength. Every wire in the cabane is functional. Spring the cabane apart far enough so the four angled wires enter the holes in the fuselage. Get someone to hold the fuselage while you pull the sides apart and slip them into the holes. Please be sure to trial fit the cabane before you MonoKote the fuselage. By tapering the ends of the wire where they plug in, insertion is a lot easier. Make sure you get the sides of the cabane far enough

Make sure that all surfaces are rigged to correspond to the transmitter controls. You do not need to be impaired by a left turn when giving right stick, or down when you had something else in mind.

Flying: Make sure you connect the aileron servo when installing the wing. This plane is no big deal on rudder only. Run about a half tank of fuel out on the ground, taxi the plane around, see how it handles. Throttle up and down, let everything shake itself into position (or out of position). If you have a big field, taxi away to check ground range under vibration. The observers on the field will no doubt get nervous with this taxiing and engine running. You will probably hear remarks like, "When is he gonna fly that thing? I know where to see R/C cars." Or, "When you gonna take it back for the 3,000 mile check?" Don't let them bug you. It's your money, time and nerves. After you have burned out the fuel, check all flying surfaces for loose hinges, motor mount bolts, anything that can be affected by vibration. I had loose elevator hinges and didn't know it till I plowed into the ground three times (that plywood is tough). Check C.G., aileron throw should be at least 30° up. Okay, if everything checks out and the engine holds revs while sticking, straighten up - - - you are ready for some hot action.

I like to get up to flying speed before getting off the ground. Most guys think the plane is under control just because it left the ground. Half the time a plane is in a partial stall on take-off. Here we go. Hold full back stick (you pointed into the wind?), open throttle slowly (steer with rudder), let ground speed pick-up, open throttle all the way, move stick to neutral (tail comes up), stick a little forward (still on rudder?). She is going like wild now (see photos). Ease back on stick, you're on ailerons now (drop rudder), long flat climb-out (dyn-o-mite). Bank into your first turn (gently), get used to a very responsive, active and fast ride. Fly in a big circle, first one way then the other. Trim with controls if required. Notice how the responses are. If anything seems too far out, land and make adjustments. (You may need more or less throw on ailerons, elevator, etc. This can only be determined by the individual.) If there are no adjustments needed, then try the ship in aerobatics.

Rolls are fast and need little correction, spins are easy to induce and recovery is fast. Split S's are beautiful. Try the ship at part throttle, make some slow passes. You will be surprised at how well it flies at low speed. As I said before, my flying experience with bipes is really not extensive and my flying has been with aerobatic, low wingers. So my perceptions are somewhat new regarding bipes. Viewing this I let a few of the heavy bipe men fly the **Aeromistress**. They are all caught up with the performance and are building.

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BILL OF MATERIALS

Fuselage

- (1) 3/16 x 6 x 12 ply sheet (firewall).
- (1) 1/32 x 12 x 48 ply sheet (top front, turtle deck).
- (1) 1/8 x 12 x 24 ply sheet (formers).
- (1) 3/32 x 12 x 48 ply sheet (crutch).
- (2) 1/8 sheets 4 x 36 balsa (fuselage rear bottom).
- 3/4" thick maple stock (motor mounts, tail block & cabane sockets).

Wings

Kits supplied by Wing Mfg. Co.

Empennage

- (3) 1/16 x 4 x 36 balsa sheets (stabilizer covering).
- (6) 1/8 x 1/4 balsa strips (stabilizer structure).
- (3) 1/4 sq. balsa strips (elevator structure).
- (1) 1/4 x 3 x 36 balsa sheet (rudder and fin).

Cabane

- (2) 1/8 dia. x 36 lg. piano wire.
- (1) 3/32 dia. x 36 lg. piano wire.
- (1) 1 x 1 x 3/4 maple block.

Landing Gear

- (2) 5/32 dia. x 36 lg. piano wire.
- (1) 1/8 dia. x 36 lg. piano wire.
- One pair of Du-Bro 4" "Big Wheels".
- One pair of steel wheel retainer bushings.

apart so you don't tear up your brand new covering job while attaching the cabane. After the cabane is on, simply clean, wrap and solder the forward and rear joint. This cabane is now a permanent installation. Someone asked me if I put silicone cement in the cabane holes to help seal against fuel. I said, "Of course" but, I didn't . . . you had better.

Radio Installation: I did three with three servos on a tray, one with three servos abreast on beams. I used dowel pushrods, I used NyRod, everything works if you do it right. It is the individual's ability and desire that counts. I do make sure the battery is up front as far as possible, the receiver has lots of foam around it, and that the antenna goes out the fuselage without hanging out near the servos or linkage.



WINDFREAK

PART I

By Roger Sanders

Flying wings have long intrigued me, but I have been very puzzled by their absence from the usual flying field. Furthermore, I have never seen a truly competitive design used in competition. The reason for this state of affairs becomes rather obvious when one watches the flight performance of typical flying wings. They tend to have very poor glide slopes which result in poor duration, they seem to have to fly fast, have strange control behavior, and tend to be suicidal on tow.

At the same time, it is apparent from theory that flying wings should offer magnificent maneuverability and have an outstanding glide slope. Now, greater maneuverability and glide slope sounds ideal for a sailplane . . . why aren't people flying them? The answer is that nobody has developed a flying wing that would match or exceed the performance of conventional sailplanes. I do not know why better flying wings haven't been developed, but felt that there was no good reason that one couldn't be

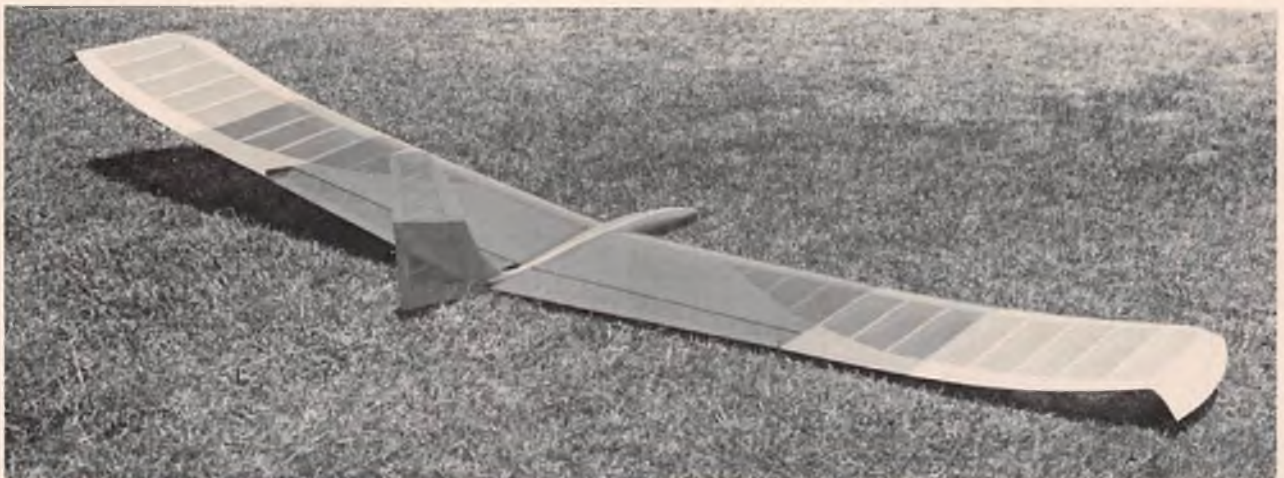
"Finally . . . an advanced flying wing sailplane design that will match the duration of the best conventional designs, while maintaining the legendary maneuverability of flying wings."

developed. I have designed a long string of conventional sailplanes. Some of these were not good performers, but some of them were outstanding. I felt that I had determined what would produce outstanding flight performance. Since flying wings are subject to the same laws of flight as conventional gliders, I believed that I could apply my experience and knowledge to a flying wing with excellent results.

The "Windfreak" was inspired by Ken Bates' "Windlord", which it superficially resembles. (Model Aviation, March 1978). However, the Windfreak is a totally different aircraft except for the same general wing planform. The important aerodynamic parameters are

quite different; the air frame is grossly stronger and, probably most important, a much different airfoil is utilized. While I obviously feel that the Windlord can be improved upon, I nevertheless feel that Mr. Bates' design was a giant step forward in the design of flying wings. The name "Windfreak" was partly derived from "Windlord" out of appreciation for Mr. Bates' design. The "freak" part of the name seemed appropriate because the ship is certainly the most unique ship one is likely to see at your local flying site.

In this article I will attempt to give some insight into how I go about designing a sailplane, some of the parameters involved, what the various parameters do, and the various compromises involved. Before we can design a sailplane, however, we must know what we want it to do. I, therefore, developed several performance goals I hoped to accomplish. These goals used Lee Renaud's "Olympic II" as a yardstick. I doff my hat to Mr. Renaud as



I feel his designs are the finest performing ones on today's soaring scene. The Olympic II has, in my opinion, the flattest glide slope, the best manners, and greatest maneuverability of the commercially available standard class gliders. I fully agree with Mr. Renaud's design theory as outlined in his article on the Olympic II in RCM, June 1976. However, I felt that a flying wing should be able to outperform it. My goals were as follows:

- 1) The glide slope must be as good as, or better than, an Olympic II.
- 2) The maneuverability must surpass an Olympic II.
- 3) Behavior on tow must be stable, predictable, and result in launch altitude at least equal to an Olympic II.

Obtaining the first goal, a good glide slope is deceptively easy. All that is required is to have a good lift to drag ratio (L/D). Since lift is a compromise of various factors and is fixed by the airfoil used, what we are really talking about is **reduction of drag**. Drag reduction is a very futile hunting ground. Much can be done to reduce it. The effect that drag reduction has on flight is startling. Virtually all gliders have more drag than they might have, including the Olympic II. It was by reducing drag and improving the lift characteristics of the airfoil that I hoped to exceed the glide slope of the Olympic II.

There are three types of drag: induced, parasitic, and profile. Induced drag has been called the "price of flight". It is produced in exchange for lift, and it is determined by the aspect ratio of the wing. In short, long skinny wings have less induced drag than short wide wings. As usual, there are compromises here. It involves Reynolds Numbers, wing loading, towing characteristics, wing strength, and turning performance. Without getting into these things in detail, let me simply state that, as a general observation, it can be seen that low aspect ratio wings exhibit better Reynolds Numbers, have lower wing loadings, tow higher, have greater wing strength, and turn better than high aspect ratio wings. Therefore, one must trade off drag for some of the other desirable characteristics. Experience has shown that an aspect ratio of 11:1 is about ideal for a standard class ship, while higher ratios are better for larger ships. The Windfreak has an effective aspect ratio of 11:1 although it appears to have an aspect ratio of 7:1. This is because the lifting part of the wing is only 10" wide. The last 4" of the wing is reflexed and does not produce lift and, therefore, does not produce induced drag.

This is a good time to explain how a flying wing flies. There seems to be some mystic about "wings". It appears that they should not fly. This is because they do not appear to have a "tail". Nothing could be further from the truth.

They most certainly have a "tail" (stab). A flying wing is nothing more or less than a conventional glider with the fuselage cut so short that the stab/elevator is attached to the back of the wing. Since all airfoils must have some positive angle of attack to be stable, the stab must be at a slight angle in comparison to the wing . . . therefore, flying wing airfoils are "reflexed". It is very simple, and the only question is how much reflex should be used.

An astute observer may note that although the reflexed section of the wing does not produce induced drag in the conventional sense, it does produce induced drag from negative lift. This is true. But remember that it produces overall less drag than the stab/elevator which it replaces from an induced drag standpoint, so we are still ahead.

Parasitic drag is the one that can be most controlled by the careful "modeler designer builder." Parasitic drag is that drag caused by all factors not related to induced drag or profile drag. Such things as fuselages, fins, hinge gaps, sharp fuselage corners, large cross sectional areas, poor streamlining, control horns, tow hooks, switches, blunt trailing edges, rubber bands, dowels, gaps between the wing and fuselage, skids, wheels, and surface interfaces cause parasitic drag and should be minimized as much as possible. Taken individually, each of these things is very small, but when added together, the effect is startling. It is much like the lightweight back packer who says, "Don't worry about the pounds, just take care of the ounces and the pounds will take care of themselves!" There are many ways to reduce these items of parasitic drag. To start, you should use a fuselage that is as skinny as possible, and it should be rounded. Fins, rudders, elevators, etc., should be as thin as structurally possible. Tapering these items is ideal. Streamline everything as much as possible. Hide control linkages and horns inside the various structures and, if you can't, then put them in the turbulence following another required structure. Put switches inside the fuselage and use a small wire to turn it on. Make the wire push in to turn "on" so that less wire is sticking out in flight (seriously!). Make sharp trailing edges. Don't use rubber bands or dowels. Fit the fuselage to wing joint so it is close, consider taping it (smoothly please). Don't use skids. Minimize interfaces between the stab, fin, rudder by using fully flying surfaces and fillets at the joints. Use high aspect ratios on the empennage. Use **MonoKote type hinges** and seal the hinge gap on the other side with some type of film. Always remember that it takes energy to push anything through the air. The less you have to push, the longer the energy you put into the glider by towing it to altitude will last. The longer the energy lasts, the

longer you stay up. From a physics point of view, you put 1500 foot pounds of energy into a glider that weighs three pounds and is released from tow at 500 feet of altitude. If there is dead air, that glider will land at the moment it uses up 1500 foot pounds of energy overcoming **drag**. If you want to stay up, you must reduce drag. Every little bit counts. Don't poo poo a 1% drag reduction. 1% of 7 minutes is only 4.2 seconds, but that may be all you need to beat the next guy in a contest - - - why give anything away?

Profile drag has to do primarily with the airfoil. A blunt thick airfoil will have greater drag than a long thin one. However, again compromise is in order because thin airfoils have generally less lift than thick ones (of the flat bottom variety), and stall characteristics are influenced by these factors as well. Remember that it is the **ratio** of lift to drag that counts, not either one in an absolute sense. In other words, if we could make an extremely thin flat plate wing, it would have extremely low drag, but it would have even less lift. Therefore, its L/D would be terrible and it would have a poor glide slope. This leads to a discussion of airfoils but I want to mention that a short, sharp reflex greatly increases profile drag. It is much better to use a long gentle reflex.

Airfoils are at the heart of the flying wing performance problem. There is absolutely no doubt in my mind that the reason that flying wings perform so poorly is that they are using the wrong airfoils. Additionally, we are thinking about the airfoils the wrong way. A flying wing airfoil should be thought of as a conventional wing and airfoil with a stab hung on the back. Then we won't make the wrong calculations with regard to aspect ratio, wing thickness, CG location, wing high point, and L.E. radius. The typical flying wing airfoil is obtained from full scale ships and tends to be excessively thick (drag), have an excessively forward high point (profile drag), and tends to be semi-symmetrical (poor lift). In short, they have a poor L/D. No wonder they won't stay up.

Why not use a top quality conventional model glider airfoil? One of the best is the one used on (guess what) the Olympic II. I feel that it works even better if it is thinned from 10% to 8% or 9%, has a more rearward high point, and has a little bit of raised entry. These changes give better penetration and higher L/D although stall is a bit sharper and turns are not quite as tight. I chose 9% for the Windfreak. Note carefully that a 9% thickness with a 10" chord gives a wing that is only 0.9" thick. I am not counting the reflex which would give a root chord of 16". If I did, I would end up with a wing that was almost 1 1/2" thick! If you take the 0.9" wing thickness and figure the thickness of the entire wing chord you find that we now have a percentage

thickness at the root of only 5.6%, and at mid-span, only 6.4%. As indicated, this is erroneous thinking for calculating flight performance, but it is a very serious concern when talking about structural strength! All that is required to do to the airfoil at this point is to add a long, gentle reflex such that the mean chord line intersects the mean camber line at about 75% of the total chord. This results in surprisingly little reflex. The completed airfoil should now fly exactly like a conventional one, the CG should be at the same point, about 33% of the chord (not counting reflex, remember), the lift should be excellent, and the profile drag should be vastly improved over a typical flying wing airfoil.

Maneuverability refers to the basic ability of the ship to respond quickly to controls and to make light, flat thermal turns. There are many factors that are interrelated to accomplish these desirable traits. One of the most important is dihedral. In general there are three types of dihedral: straight dihedral, polyhedral, and elliptical dihedral. Of the three, there is no doubt that elliptical dihedral is superior. However, it cannot be used in a wing that has a hinge line in it because a hinge line must be straight if built in a conventional manner. Elliptical dihedral has less drag and is overall more efficient than any other type. It is not really difficult to build, in fact, I find it easier to build than a polyhedral wing. Straight dihedral does not produce as flat a thermal turn as a polyhedral wing, and is the least efficient of the three because the lift vector of the entire wing is so far from vertical. Polyhedral is good, but it has drag around the polyhedral break, and it is very difficult to produce a truly excellent fit at the polyhedral junction. Additionally, the polyhedral joint tends to be heavy and adds mass to the wing at an undesirable area as will be explained further in this article.

The amount of dihedral/polyhedral is extremely important and is a major area of compromise in any design. To begin, the use of any dihedral is bad from a straight L/D standpoint because the lift developed is not vertical. Therefore, dihedral reduces straight line glide slope. If no dihedral is used, the rudder will only yaw the ship, no roll will result, and the ship will not turn. A small amount of dihedral will result in a ship that is slow to turn and will tend to slip off in a turn. Too much dihedral will result in quick turns, but the ship will be excessively stable and will not want to stay in a turn. It requires that you constantly lean on the rudder in a turn which gets to be a problem in prolonged thermal turns. Remember also that any control offset results in drag, so this should be avoided as much as possible. In my opinion, the ideal amount of dihedral will result in a ship that turns quickly, doesn't slip off in a turn, and will stay neutral in a turn. True

neutrality is very hard to come by, and the best ships seem to tend to gradually level out from gentle turns, remain neutral in medium tight turns, and require some opposite rudder to get out of really tight turns. So what are the magic angles? There are no absolute values, but in general, I have found that on a polyhedral wing, 8 degrees at each joint is about right (that would be 4 degrees at each fuse/wing joint for a total of 8 degrees for the central wing joint). Dihedral requires 14 to 16 degrees. Polyhedral can be done in any combination, of course. In the case of the Windfreak, I chose to use elliptical polyhedral. That is to say that I used straight dihedral from the root to the end of the elevators and elliptical curve for the polyhedral section from there to the tip. I used 10 degrees of dihedral and 6 degrees of elliptical polyhedral. This results in ease of building, less drag than a polyhedral joint, and still retains the straight section required for the elevator hinge line.

The other extremely important parameter regarding maneuverability and responsiveness is inertia. Specifically I am referring to mass at the extremes of the aircraft. This means that you must keep the **wingtips light**. It is also necessary to keep the extremes of the fuselage light. However, please note carefully that it is much better from a low inertial standpoint to have a short heavy nose than a long light one. This is a very important consideration and one that can be worked with extensively when you are deciding what wing loading you are going to be using. In short, it is better to add the ballast required to reach your design wing loading to the nose of the ship which is then shortened as much as possible, than it is to add weight to the CG and leave a long light nose.

Weight at the wingtips naturally leads to a discussion of spar design since it is the spars that add the most weight to a wing. In the design of spars, I must say that most designs are very poor. There is absolutely no reason to ever break a wing on tow! None. It is so easy to design strong spars that are also light that the winch line should always break before a wing does. Furthermore, extremely stiff wing rods should be used as wing flex results in loss of altitude. Let's look at the forces on a wing spar for a moment and it will then become obvious what must be done to make strong light spars.

Imagine that the wing spar is a solid bar of material extending from the top to the bottom of the wing and that the wing is on tow. At the bottom of the spar, the forces are trying to pull it apart (tensile loads), while at the top of the spar the forces are trying to crush it together (compression loads). If you think about it a little, somewhere in the middle of the spar, the forces are changing direction and there are neither compression or tensile loads. In short, the spar material

in the middle is doing nothing and is wasted weight we are hauling about. It is at the **surface** of the wing where the forces are the highest and where we should concentrate our spars. There are, however, considerable forces trying to crush the spars together. These forces must be resisted by something, therefore, we use shear webs. It should be obvious at this point that spars should be thin and flat and built right on the surface of the wing. The spars should not be placed below wing sheeting, and they should not be placed on edge so that they extend deep into the interior of the wing. Shear webs should be placed with their grain running vertical between the spars and they should be placed directly between the spars. If they are glued onto the sides of the spars then it is only the glue joint that is preventing the spars from crushing together. If the shear web is directly between the spars then the glue only keeps the shear web from slipping out of position. Furthermore, the forces on the spar tend to balance themselves on the shear web so that the spar doesn't twist to one side. It is my opinion that most wing fractures are due to shear web glue fractures. The spars can then come together and they then have virtually no strength and the spars break.

Now, isn't that interesting . . . if you draw a picture of the spar structure I have just described, you find you have the classical "I" beam! Well, now that the secret is out, I'll tell you another one: The bending loads on the wing increase dramatically as you get near the root. In other words, you do not need large, heavy spars near the wing tip. The spars must take both compression and tensile loads, so suitable materials must be used. There recently has been a great deal of interest in filamented graphite spars for example. However, although this material is excellent for handling tensile loads, it will not handle compression loads. If the graphite is potted in epoxy, then the epoxy will handle the compression loads . . . but epoxy is much heavier than other materials such as spruce. Aluminum works well, but it is difficult to work with, shape, and glue. I have found that spruce is still the best material you can use from a practical standpoint. By using thin spars and tapering them, you can have a wing that is extremely light, and virtually unbreakable from a bending load standpoint.

The other, and more difficult, area of wing strength involves torsional rigidity. In other words, how can we keep the wing from fluttering? There are a few rules, but it should be noted that at some fearful velocity any wing will flutter and destroy itself. The name of the game is to get the wing still enough so that it will not flutter in a terminal velocity vertical dive. Ships are available that will do this,

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How many times have all of us gone through a copy of RCM and then tried to remember in which issue we saw a sailplane that we were interested in. And then go back and try to find it - - - good luck. Major John Mott, stationed in Germany, got tired of thumbing through back issues, so he compiled a list of all sailplanes and construction articles and sent them to me. John did a fine job and I would like to pass it on to my readers.

I will quote directly from Major Mott. "The following is a list of sailplane reviews and construction articles I culled from your magazine. I made the list because I build a lot, and don't like to leaf through four years of RCM when I want to know what's been said about a particular aircraft, and I had an evening when my sole activity was to listen to the epoxy cure on my latest Aquila.

"Anything that had metal in the pointed end, except for ballast, was not listed. I did not indicate the type of sailplane because most manufacturers go nuts with comments like - - - is equally at home in the clouds or on the slope, does well in FAI speed runs and thermals like a balloon . . . The span is a general indication of what the gliders forte is and will neatly fit into the AMA classes. The list of sailplanes are listed in alphabetical order, the month and year that they appeared in RCM, and the wing span."

Name	Month	Year	Wing Span
Albalross	Feb.	78	99"
Anser	Feb.	78	72"
Apollo	Mar.	75	99"
ASW-15	June	77	99"
ASW-15	Feb.	75	100"
Aquila	May	75	99"
Aquila	Dec.	75	99"
Borne Free	Nov.	77	130"
Boss T	Jan.	75	120"
Bunny	Apr.	76	73"
Cadet UT-1	Oct.	77	62"
Cara Cara	July	77	126"
Canturion II	Sept.	77	100"
Cirrus 3000	Aug.	75	118"
Cloud Bound 4	May	77	144"
Cobra 17	Jan.	76	121"
Curio	Mar.	75	100"
Drifter	Jan.	75	72"
Easy Riser	Nov.	75	86"
Eye Soar	Mar.	76	72"
E-Z II	Aug.	77	72"
Grand Esprit	Aug.	75	134"
Happy Face	Sept.	76	85"
Hi Jacker	Nov.	75	72"
Hobie Hawk	Apr.	75	98"
Javelin	Dec.	74	98"
Javelin II	Jan.	77	134"

J-Bird	Nov.	77	97"
Kestral 19	Dec.	76	134"
Legion Air	Apr.	75	137"
Legion Air 100	Feb.	77	100"
Libelle 2700	Apr.	77	106"
LS 1	Mar.	76	98"
Monarch	Nov.	74	126"
NI-M	Aug.	76	72 3/4"
Nomad Two	Oct.	75	61"
Olympic II	June	76	100"
Orlice	May	77	134"
Paragon	May	77	118"
Paragon	Jan.	76	118"
Pierce 970	Sept.	76	120"
Plank	July	75	100"
Ridge Racer	Jan.	77	72"
Ridge Runner	Sept.	75	72"
Rubber Ducky	Nov.	75	75"
Saracen	Apr.	76	72"
Scout G-72	Mar.	77	72"
Silent Squire	May	76	60"
Silent Squire	Feb.	75	60"
Sinbad Supreme	Jan.	77	94"
Spirit of 76	Nov.	76	76"
Spitelul	May	76	58"
Square Soar	Oct.	77	72"
Sundancer	July	76	98"
Super Questor	Feb.	75	80"
Wanderer	Apr.	77	72"
Wanderer	July	77	72"
Wasp W-21	Dec.	77	100"
Western Wind	Aug.	75	64"
Windhover	Oct.	75	100"
Windrifter	Dec.	76	99"
Zoegling	Dec.	76	73"

Thank you, Major Mott, for a job well done.



"Windfreak" an original by Roger Sanders. See page 64 this issue.

A new sailplane on the flying wing concept has appeared and this one is a winner. Roger Sanders of Atwater, California, has designed and tested the "Wind-Freak." This name doesn't sound too exciting but the model is. We at RCM were so impressed with this 98" wing

span with 1400 square inches, that we are going to feature it as a construction article. Look for it. You will be pleased with Roger's building and construction comments.

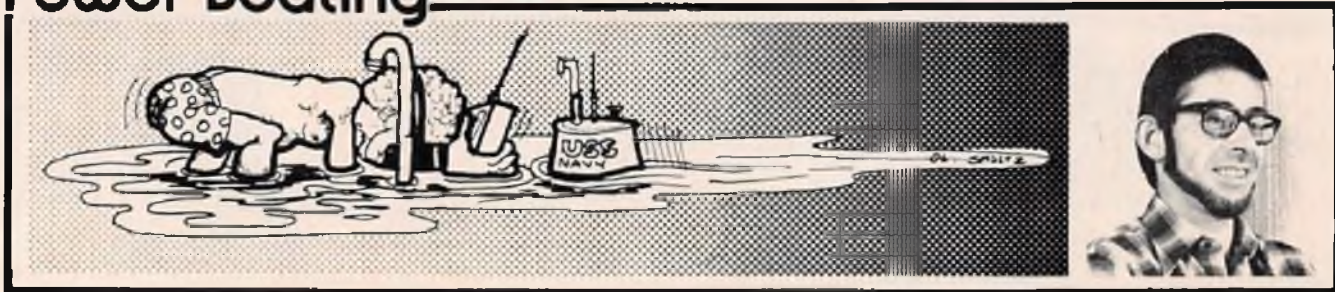


Power winch 1001 shown, PW 1002 is without battery base. See text.

In the July 1978 issue of RCM, I mentioned a new turn-around and winch drum from Bill Armour. He has now come out with a new winch that incorporates his new features. Model PW-1001 power winch includes all aluminum welded base, re-manufactured 12 volt starter motor, 6 volt solenoid, red anodized aluminum reel, sealed ball bearing 2-way swivel turn-around, battery cables, switch panel with three completely wired switches, and 6' lead foot control and hold-down spikes. The base is designed to accommodate a 6 volt heavy duty battery. All painted assembly, less battery and nylon line, complete as above is \$169.00. A companion unit is the PW-1002. It is the same as above but the battery is detached. This unit sells for \$159.00. If you are interested, contact Bill Armour, 20326 Madison St., Torrance, Calif. 90503.

Many new clubs are springing up around the country (and world) and I really enjoy the newsletters. There are too many to mention by name but one has caught my eye in the wording of their Charter - - - no beating around the bush, straight facts. The club is called the "Millstone Valley Silent Flyers." Paul Wedeking, Secretary, sends the following:

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I have been trying out the Hobbypoxy Formula 3 thixotropic epoxy glue that I mentioned last time, to see if it does what it is supposed to. It was a bit of a job deciding just what to try it out on but, in the end, I used it on the frame of a very big torpedo boat that I am in the process of building. This is a traditional model, in that it uses frames and stringers, and in the past I always had trails of glue running down the frames from the joints. This time I deliberately put far too much glue in each joint, and left the whole thing to see what would happen.



Hull structure showing joints made with new Hobbypoxy No. 3. Thixotropic epoxy glue. As can be seen, it doesn't run.

As can be seen from the photo, 24 hours later everything had set solid, and there was no trace of running. It must be pointed out that I used far more glue than I would normally, so my opinion is that this new Hobbypoxy Formula 3 is good; it does what it is supposed to, which is to not run. Apart from these joints, it can



Prototype Cobra after a hard ride! The new Hobbypoxy filler soon sorted this out, and the hull is now as good as new.

also be used to glue the skins in place, and would be very good for building up fillets of glue in difficult corners. The one trouble with it, is that you can't rely on it to run into joints, like other glues; it has to be put there. I would say it is a useful addition to the Hobbypoxy range, and will make for neater and tidier boat building.

Trying out Hobbypoxy's new sandable filler was a lot easier. As you can see from the photo, the prototype of the Cobra got itself into a terrible state when it came loose in the car trailer on the way to a demonstration — holes all over the place! Well, I filled them all in with this new filler, sanded them down, re-sprayed, and the boat is now as good as new. Two words of warning, however, about this product. The first is to be very, very careful with the catalyst, since it is dangerous, especially if it gets into the eyes. This is not too bad where the modeler himself is concerned, since he should have enough sense to look after himself. But for goodness sake do keep that little tube high up, away from the inquisitive hands of small children. They are so apt to play with whatever Daddy uses, and the consequences could be serious. The same thing applies to instant glues like Zap, Hot Stuff and so-on; keep them out of the reach of the kids.

The second point again concerns the catalyst. Use it as per the instructions. Old Big Head here tried using it like the ordinary catalyst for polyester resin — the result was a big blob of filler that went solid before he even got round to trying to use it! But if the instructions are respected, there is no problem.

★ ★ ★

The other thing I have been trying out is something that I find very useful. It is Tuf-Grind cutting disc from the House of Balsa. One of the great difficulties with flexible drive shafts is cutting them; about the only way to do it is with a high speed grinding tool, like the Dremel. I have broken so many discs doing this that I had to give up buying them, it's not that they don't cut, it's that they are very fragile if you put any sideways stress on them. Someone at House of Balsa must have found the same thing, because this new disc is reinforced, and thus much less likely to break. I have used the Tuf-Grind on a piece of 12mm diameter copper piping; 5mm music wire, and

7mm flexible cable. On all of them it cut just fine, although the cut itself is somewhat thicker than an ordinary disc, but that's not too important. I deliberately tried flexing the disc sideways at grinding speed and it showed no sign of breaking. The only reservation I have is on the longevity of the tool — after half a dozen cuts, the diameter was down considerably on the original. This is quite usual with any grinding tool, but at nearly a dollar a time, it remains to be seen if the cost effectiveness is okay. However, from a purely technical point of view, there is no doubt about it — the Tuf-Grind is strong, and it cuts. A useful item to have in the workshop.

★ ★ ★

Changing the subject somewhat, I'd like to throw up an idea and see what happens. I have been taking a very close look at model R/C racing cars lately, and have been wondering just what ideas they use that could be applicable to our powered boats. An analysis shows that the most obvious thing is the gearing. All these cars use 21 engines and they all have gears which allow them to get their engines to run at very high revs --- which, of course, means high power. I believe that the good K & B 21 McCoy engines are running on 15%-20% nitro at around 24,000-25,000 rpm. A recent article by Peter Chinn in the English magazine *Radio Modeller* puts the standard K & B 21, without muffler, and on 5% nitro, at 0.73 bhp at 21,500 rpm. This would mean that the fully kitted engine at 25,000 rpm must be putting out well over 1 bhp. Unfortunately, it is practically impossible to get a marine propeller turning at this sort of speed, unless of course, you use a surface piercing prop on a hydro — and that's not everyone's thing. You could get these revs on a prop (if you use very tiny ones) but then potential bhp at lower revs than it peaks at, and so losing out in the power stakes.

Okay, so where do we go from here? Well, I have a feeling that a good idea would be to fit the engine with gears of some sort. There are two possibilities; one is to use quite ordinary spur gears, like the car people; the other is to use toothed belts. Which do we choose? Here I may have to stick my neck out a little. Looking through the design and loading parameters for toothed belts, it seems that they are unlikely to be very

useful to us. The trouble is, the higher the power and the revs (which they translate into the linear speed of the belt) the bigger the diameter of the pulleys that are necessary in order to get the belt to last for any length of time. And we are limited by the space available inside the boat. This feeling is backed up by a simple question - - - why do the car people use gears and not belts? Well, obviously, dirt and sand will be more of a nuisance in cars than in boats, but apart from that, it seems reasonable to suppose that they have found gears to be better.

The next point is to decide how to go about it. Now, gears are nothing new — people have been using them in Europe for some time on 15 size speed boats. Kosmic, the Italian firm, make (or at least, made) a geared engine mounting. All these systems used two case hardened steel gears, and there were two weak points: one was the noise, which is quite fantastic, and the other was the fact that the gears wear very quickly. Back to the cars — they use a steel gear on the engine and a plastic or fibre gear on the axle, and they don't make too much noise. So, it would seem to be logical to go for a mixture of metal and plastic.

What about ratios? Well, here again, we can get a 21 to turn a prop at 18,000 quite happily, and now we want the engine to go up to around 24,000-25,000 rpm. So, we should maybe try something in the region of 1:1.4. At any rate, this would be quite a good starting point.

Finally, there will be a problem with the propeller. My suggestion, born out by knowledge of what some experimenters have found, would be to start with a metal prop normally used for a 40 engine, and re-work it until the pitch is about right for the combination you are using. Obviously, by having a different gear ratio, the engine could even turn a 60 size prop, but the argument against this would be the torque problem generated by a prop of this size. So it would, perhaps, be better to keep the ratio down to a reasonable level.

All this is, of course, theory, backed up by some practical knowledge. I just wondered what sort of reaction it would provoke among all you demon boat modelers. I am, at this time, fitting out a racing hull with a 1:1.5 reduction gearing, mounted on silent rubbers, using a flexible drive shaft and a plastic gear. It will take some time to find out whether or not it is a viable proposition but, as soon as I do come to any conclusions, I'll let you know about them.

★ ★ ★

Let's go back now to model skiers. Last time I showed you how to make them, and said that I would talk about boats for towing them. It's quite obvious that practically any powered boat, from



This shows the hull I intend to use, as it was three years ago, before being relegated to the depths of the cellar!



A very pretty model by a German firm, using an ABS hull. Unfortunately, this one has a low aspect ratio, and isn't very good for towing — not that it was designed with that in mind.

about 19 cu. in. on up, will do to tow a model skier. However, the whole point of the exercise is to try to produce an outfit that looks like the real thing. This means that the ideal boat would be one that is about scale in comparison to the skier. In rough terms, we need a boat that is somewhere around 95 cms long, (or 3' if you prefer it that way). But that is not the end of the story. Not only does the model need to be scale, but it also needs to look like a ski boat and, if you think about it, there are very few models available commercially that fit this specification. If you do find one — good for you. But, if you can't find one then you are going to either have to design one, or modify an existing hull.

I have been looking around for some time, and I still haven't found exactly what I want myself. The trouble is, to tow accurately, what is really needed is a moderate deep V model, with what in 'plane' terms would be referred to as a high aspect ratio. In other words, the hull needs to be at least three times greater in length than its widest part. There is a reason for this - - - when you have a single skier out to one side, ready to jump, that hull length, combined with the V, is necessary to keep the boat on a straight course. Believe me, when you are trying to line a skier up on a scale ski jump at any speed, the very last thing you want is a boat that wanders around all over the place. It must be remembered that in full size skiing, it's the skier himself who lines up with the jump — the driver just has to be in



A new hull, the Tiger Shark from AMPS, together with their outboard (Rossi .60). Very good looking, but I haven't had time yet to give it a good workout, so I'll reserve comment on this one. But if it is okay, it will make a fine ski-tower.

approximately the right place. In model skiing, it's the boat which lines the skier up onto the jump; any driving error, and you miss the jump completely or, even worse, hit it with one ski, and that looks plain ridiculous! So, the boat has to be one that will hold a steady course.

Life now gets even more complicated because a boat with a high aspect ratio of this order will not look like a typical ski boat! However, this is no great problem because there is a very simple way round it (providing you are prepared to accept a bit of compromise). All you need to do is to make the deck of the model overlap the hull on each side by a couple of inches. Thus, you have a longitudinally stable hull with a high aspect ratio and a model that **looks** as though it were a real ski boat. This is what I did with Pazutil, way back. (And if anybody wants to know why I don't use another, it's because I don't fancy using another wooden boat with a limited life, and I didn't think to take a moulding of the original.)

I believe I have found a hull that might well do the job; an old cabin cruiser that has been sitting in the cellar for years. What I now aim to do is to fit it with a plywood deck and build it up to look like a full size boat. The difficulty is in hiding the engine. With a deep V hull, the motor must not be too far forward, or the rear end of the boat will tend to come up out of the water, especially in tight turns. This means that it is practically impossible to hide it under the deck, which is the obvious place. The alternative is to install it in a central position and build a box of plywood to hide it. The difficulty with this solution is that, in the first place, the box will have to be quite big to accommodate the silencer, which is very necessary. Second, the shaft angle will be quite steep. This latter is not too bad because at the speeds used there is not much chance of the boat porpoising and, if it does, this can be cured by flaps.

Yet another possibility that I have thought of is to use an outdrive just like the full size boats. Of course, this is not a common object and costs quite a lot of money, but it does allow the engine to be installed right at the end of the boat, under the decking, thus preserving

reality. The radio can then be put under the fore-decking, and the control runs hidden.

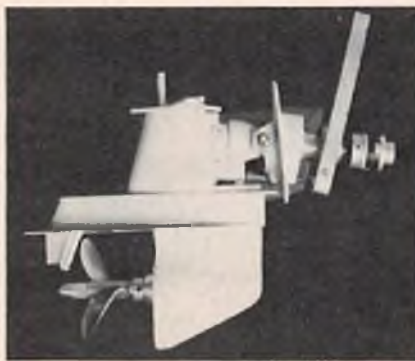
Finally, a little bird tells me that K & B is soon to bring out a new outboard, a 45 cu. in., and this would be the real answer to all problems, since the whole of the inside of the boat would then be available for scale use. The outboard could be fitted with a scale-looking cover, made up to resemble a Mercury or similar type. In this case, it might well prove necessary to ballast the front end of the boat in order to make it run right.

Since we are on the subject, let's take a look at suitable engines. We can say straight away that the last thing we need is a racing engine, for the simple reason that on this type of engine it is quite difficult to get a decent idling speed, and a good idle adds considerably to the realism of the outfit. Let me explain why.

You will remember that I told you the first skiers I ever saw were made so that the skis were large enough to make them float. If you build a skier according to my specifications, you will find that it will sink until just the head and a bit of the shoulders rest above the surface of the water. Now, when you are towing, a good idea is to slow the boat right down. As you get down to real low speed, the skier will settle down into the water, and float in this way. If you have about 3-4 metres of tow-line, the trick is now to slap on hard rudder, in either direction, so that the boat turns and heads back towards the skier, very slowly. Just as you get up to the skier, turn the other way, and go away from her, still very slowly. To the spectators, it looks as though the boat came back to throw the tow rope to her. Now, just before the line tightens, start to accelerate; and, as the line actually comes tight, slam on full throttle. The effect is just like full size; the skier will be towed back up onto the surface of the water, and will start skiing again. Done properly — and it does take a bit of practice — this is a very realistic and impressive maneuver and one that really gets the on-lookers.

It is obvious that in order to be able to do this, you need two things. The first is an engine with sufficient power, and I would suggest a good 40. My Pazutil had a 29, but it was an ED Viking, which is a diesel, with an enormous amount of torque. This boat would tow three skiers comfortably, but wouldn't take a fourth. There is no reason why a 60 shouldn't be used, providing you are prepared to use the throttle intelligently.

The second thing is to get a good, slow tick-over. Here, there are two things that can help. The first is to use a small propeller. This will cut down the top speed, but that isn't too important since, when towing, you don't need a great deal of speed. The second is to fit a bigger flywheel than usual. To give an example - - - on one of my boats I have an old plain bearing OS 40 which is fitted



The AMPS Z drive, which should be fine for use on a really scale looking model. This will take any engine from .29 on up through 1.2 c.i.

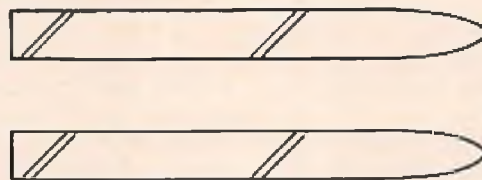
with an OS No. 4 flywheel (these should be available from World Engines). This flywheel is made for the old OS 80 so is much bigger than the one designed for the 40. The explanation is that the bigger and heavier flywheel smooths out the reciprocating movement of the engine to a greater extent, thus allowing a slower tick-over. This combined with a smaller prop, which loads the engine less at low speed, will give you really good slow-running — I always boast that I can count the revs by ear on my OS 40!

Okay, so now we have a skier, or two, and a suitable boat. Some people are

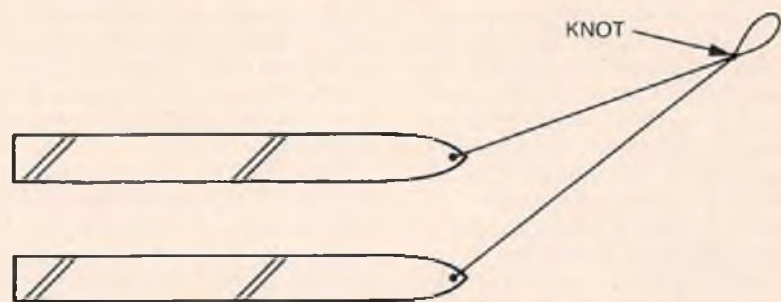
now, no doubt, beginning to wonder how to get the skier to go over a jump without busting up the boat (because the skier will follow directly behind the boat). Yes, this is quite true with an unmodified skier; the trick is to do something so that the skier will follow the boat off to one side, and it's really very simple. The answer is match sticks! Yes, I said match sticks. All you need to do is to cut the heads off of four matches, glue them as shown on the bottoms of the skis, and modify the towing bridle as per the diagram. Give the matches a coat of paint, to prevent them from getting water logged, and you now have a model skier that will run parallel to the boat, but off to one side. The distance to one side can be adjusted by playing around with the length of the tow line, and the attach point on the bridle. There are, unfortunately, no "hard and fast" rules for this: it's a matter of experimenting until you get it right. A nicely built boat with three skiers in echelon behind it at speed really looks great, and is well worth the trouble of building them.

There is a point concerned with the skier set to run parallel, and this is to do with the place the tow-line is attached to the boat. The best thing is to have a very short stub-mast set solidly into the deck on the transom, about 4cms high. At the top, use an epoxy glue and fix the

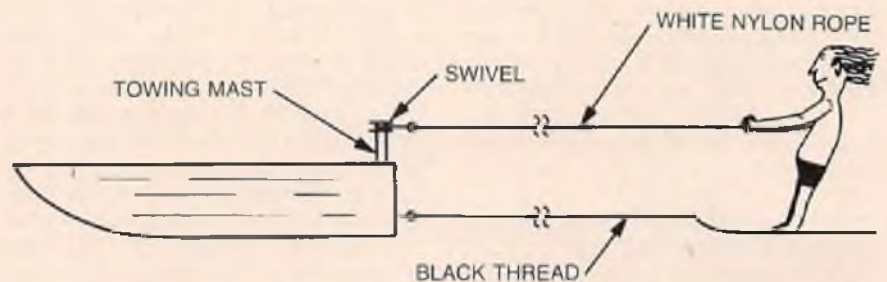
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MATCH STICKS GLUED TO BOTTOM OF SKIS TO MAKE THEM TRACK OFF TO ONE SIDE OF BOAT



TOWING BRIDLE MODIFICATION FOR TRACKED SKIER



WHITE ROPE SHOULD BE 1-2" LONGER THAN BLACK THREAD



SUPER Scale BY DICK PHILLIPS



It is a pleasure for me to be able to tell you that Super Scale will be appearing in RCM every month from now on. The letters that have come in and the interest world-wide in Super Scale has resulted in a need for more frequent submissions to RCM.

Fearless Leader forwarded a letter to me recently which I think deserves a fairly comprehensive answer. The letter comes from Robert W. Kirick of Trail, Minnesota, and his questions refer to engines, and he mentions the Quadra. (This is a bit of a coincidence, as the Quadra is manufactured in Trail, British Columbia.)

I won't reprint all of the letter as some of it is not germane to the subject; the pertinent points are contained in the following excerpt:

The problem with the large planes is the need for a more powerful engine to turn the larger prop. Now there is the Quadra model aircraft engine, 2 HP 8,000-10,000 rpm; prop drivers turn your .60 into a 1.20. There was the OS .80 R/C 1.5 HP 13,000 rpm, 18.3 ounces. I have read your .60's have 1.3 HP and 16,000 rpm. Now the problem (Cap'n Dick's Cockpit column, June '78) - that hot Schneurle .60 pulling over 4 HP. Where is the problem about needing engines with more horsepower? This is 2 times the power of the Quadra and weighs far under three pounds. The cost is about the same, too, for 2 times the power and a lighter engine. The only thing I can think of is that maybe the larger props can't take the higher rpm's and since HP comes from rpm's, or displacement, one has to go to an engine with lower rpm and larger displacement, larger and heavier engine. Would you be able to help me with this problem - - why the powerful .60 isn't used in the larger model alone, without a prop driver?

In answer to Robert's query, I must admit first that I am not an engineer and draw on my own experience and knowledge of what happens and what I have seen, to try and provide a reasonably accurate answer.

Let's consider the glow engine. It's power comes from high rpm in order to produce those high horsepower ratings.

Now some of the engines may indeed produce **under ideal conditions**, the kind of HP claimed, but I doubt they can do it consistently at all altitudes and under all conditions - - it just ain't so. They just aren't capable of turning 16-17 and 18" props at those rpm (i.e., 12,000-16,000 rpm) and, therefore, cannot produce the kind of power required for a large model.

Prop drivers solved some of the problems by permitting lower prop rpm (and thus larger props) and still permit the engine to turn up the kind of rpm that produce the necessary power. The shortcomings are the high mortality rate of drive belts and the high fuel cost for the larger engines being used, such as Schneurle ported .60's, which tend to burn more fuel than ordinary .60's.

The reason for the larger, slower turning and, frequently, coarser pitch props is to move more air than might be the case with the smaller prop. The Quadra, and other large gasoline fueled engines, do this very well. The Quadra will turn 20 and 22" props at 6,000-8,000 rpm. The net result is that more air is moved, more thrust is produced, and it is done with fuel costing about a dollar a gallon. And that, Robert, is about the biggest bargain you are going to find in R/C modeling these days!

Another consideration is that, in the past, most large models have had to be built very, very light, in order to fly at all, and many of them floundered around the sky performing in a pretty sick fashion. With the Quadra, the model can be built much more substantially than before, and it will perform much better than the lighter (and therefore weaker) model.

A common error many have fallen into with the Quadra is they try to do as we have always done with model engines, get the most rpm possible. The Quadra performs well down at around 6,000 rpm, with the correct prop, and it will turn 7,000 to 8,000 rpm on a 20/8 prop.

A close friend of mine flies a Quarter Scale DH Beaver on floats. When it was first test hopped on the water, it could not become airborne with an 18/6 prop, nor with a 10/6. But it was flown quite successfully with a 20/8 and the rpm drop between the 18/6 and the 20/8 was over a thousand rpm! The Quadra was originally a chain saw engine and it

works best loaded down - - in other words, you have to make it work hard, to get it to work well. I have a 24/10 prop I am going to try on my Mr. Mulligan (if I ever get it finished!) and I'll be surprised if it doesn't work well.

So the old model glow engine adage - that rpm equates to power - is not quite so true with the gasoline engines. Another plus is that with a mix of 20 to 1 (gas to oil) there is more energy available in the fuel than there would be in the much higher methanol to oil ratio in glow fuels.

Now I just hope I haven't opened another Pandora's Box like the 'Downwind Turn' controversy which crops up from time to time! The above ideas are based on experience and observation and, despite what we have come to believe about flying models and their engines, it works.

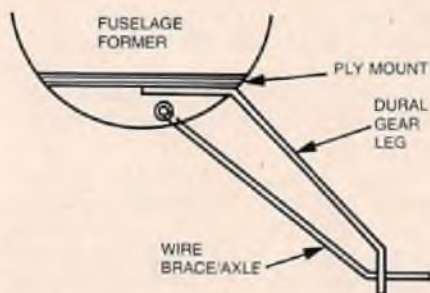
★

A couple of things have come to hand recently which bear talking about this month. The first of these is a sample spoked wheel for vintage models in a 7½" size. Millman Engineering Co., Inc., 3448 Bishop Road, Chehalis, Washington 98532 produce these in a variety of sizes. The principal shortcomings of this type of wheel in the past has been high cost and the lack of strength to resist collapse when subjected to high side thrust forces. Millman appears to have solved the latter problem and, as production runs increase, hope to lower the cost as well.



The accompanying photo shows the wheel sent to me as a sample of the product and the spokes are apparently cast into the hub, which would seem to be a pretty substantial anchor for the hub end of the spokes. The wheel end of the spoke is then riveted into the rim. The

tire is quite soft and would take some effort getting it off the rim as it is sealed to the rim with a mastic type material. The ends of the rim are apparently silver soldered or soldered together with a backing plate. The wheel can be stressed out of shape (as would be the case in a side slip landing) but springs back to a true shape as soon as the stress is removed. I suspect that the landing gear constructed to use this wheel should have some spring or bungee built into them as should all large models. The landing loads placed on gear by our heavier models require more design strength and give than is the case with the smaller models. I am quite pleased with the Nosen designed gear on the Mulligan and plan to incorporate it into other models that I build in Super Scale. A sketch of the basic idea is shown.



★

Recently I received a set of plans for a Tiger Moth in Super Scale which were done by Toni by Toni Clarke's Practical Scale in West Germany. Toni is well-known in Europe for his beautiful scale model plans and kits. Actually, the word 'beautiful' doesn't do them justice at all --- they are really something special. The 1/4 scale Tiger Moth is on eight sheets, not counting the three-views and it is so close to scale, I'd defy anyone to detect any deviation at all. Toni will have the kit available in August and plans a semi-kit as well. He has indicated he will supply parts to those who wish to scratch-build as well. The Moth plans (and others to come) show the Quadra engine installed on the firewall, indicating the model has been designed specifically for this engine. It is one of the nicest plans I have seen in a long time and is such that you can hardly wait to get your building board clear in order to start it! In North America, contact Polaris Products, 2514 Highway 97 North, Kelowna B.C., Canada V1X 4J4, for further information since they will be handling the Practical Scale product line here.

Toni also sent me some pictures of the prototype model of a Nieuport 17 in 1/3 scale that he has recently designed. The model flew straight off the building board (as do many Super Scale models) with no trim adjustment required. The 17 has ball bearing aileron torque rods built as close as possible to scale, and the



Prototype Nieuport 17 from Toni Clarke's Practical Scale in West Germany. The plan and a kit will be forthcoming in time. Model by Reinhold Gerner, powered by a Quadra which is apparently enjoying great popularity in Germany.

compass actually works! One local scale buff, and friend of Toni's, built the Nieuport from the plan and became an overnight expert pilot. When Toni asked him about his newfound skill, he replied, "With this type of model, one has time to think and you can make much wider turns without the model shrinking to fly on ceiling proportions suddenly as with smaller scaled models."

The photo of the Nieuport represents Reinhold Gerner's prototype of the 17. Aside from the prop, and with the misty background, it would pass for full scale in 1917, although the concrete runway is a bit out of character! Toni mentioned in his letter to me that Super Scale was really taking off (pun intended, I'm sure) in Germany with more and more products appearing for the large models. The same thing is beginning to happen here.

I hear that Dave Platt is coming out with a Super Scale Bucker Jungmeister and an article on it appeared in the Sept. 78 issue of RCM (plan #738, also templates available). Dave's work is well-known and I am sure the construction of the large Bucker will live up to Dave's reputation.

Joe Bridi's new 1/4 size Rearwin Speedster (RCM September '78) will be out in kit form before the year is out. RCM will be supplying the molded fiberglass cowl and wheel pants along with the landing gear for those of us who would rather scratch-build from RCM plans (#737).

These are just a few of the good things in the works for those of us into Super Scale and I'm sure we will see more and more as time goes by. Eddie Morgan's Quarter Scale Association of America (QSAA) Meet in late September expects to have 100 or better Super Scale models present. Those of you who are interested and who have not yet joined the QSAA may do so by sending your \$10.00 dues (hopefully to be reduced as support grows) to Lee Taylor, 129 C St., Roseville, Calif. 95678. I have received the first two issues of the Association's newsletter 'Monster News' and it contains plenty of information and pictures pertaining to the "big birds." The QSAA is intended, more than anything else, as an information

exchange and will not encourage competition with the Super Scale models. Those who attended The Super Scale Rally in Las Vegas last year decided that the Association was made up of individuals who were out to enjoy themselves ('nuts' some claimed) and the idea of creating yet another competitive arena with the attendant mental anguish and strain of competition was unnecessary and would not be a part of QSAA. If that turns you on the way it did me, send your fee in to Lee and join us all in Las Vegas later this year. I hear tell there are 100 rooms booked for those attending, and the Circus Circus, of Tournament of Champions fame, will be the headquarters for the event. Judging from comments I have heard about last year's event, they really know how to make you welcome there. Information can be obtained from Ed Morgan, 1244 Barnard Dr., Las Vegas, Nevada 89102, and I'm sure there will be announcements in the model press well in advance of the dates. Dick Kidd and Dick Tichenor of RCM's staff will be there and I doubt that I am going to be able to resist the temptation to attend. Incidentally, the motto of the QSAA is 'Big Is Beautiful' and I'm sure any regular reader of RCM knows where that first appeared!

★

You know, with all of the new things appearing on the RC market for the Super Scale buff, it is a pity that so few models designed around the larger engines have yet appeared either in plan or kit form. There are a couple, of course, and more coming all the time. EWH Product's Puma is one which appears to have started out on the right track. I mean they have used materials more suited to the larger model than the conventional balsa construction we have used for a good many years. It was fine for its intended purpose, but is just not good enough for the really large (1/4 and 1/3 scale) models now being built, where weight is not as serious a consideration as it has been in the past. When models are being flown at upwards of 30 pounds, strength is a prime consideration, and with gas engines capable of flying these large, and relatively heavy, models now becoming readily available, we need new approaches to construction, radically different from what we have been doing for years.

I live in hope that more kit manufacturers will switch to woods and other materials better suited to the larger models as EWH apparently has done and will get away from just blowing up a conventional model with conventional construction and hoping it will be able to handle the loads placed on the structure by the higher weights and greater stresses being placed on structures than has been the case in the past. Some

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RCM PRODUCT TEST

Jemco
FAIRCHILD PT 19



In selecting a Stand-Off Scale subject, I reviewed the Jemco kits available and chose the PT-19 for two basic reasons:

First of all, I felt that this model would be very good for Stand-Off Scale contests because of the variety of color photos and three views available. In addition, I felt the colors of the airplane would be very eye catching for static judging.

The construction of this kit is very simple: Just follow the instructions! The instruction booklet and plans are well thought out and include added detail for scaling out the model. Accessories included were; pre-shaped landing gear, ABS plastic cowl, molded windshields, control horns, pre-formed aileron wires, wing tape, and decal sheet. The only variations that I made from the plans was the addition of two 1/8" x 1/8" stringers to each side of the fuselage. This gave the plane a more fabric look when covered with Super Coverite.

Construction of the plane took about 25 to 30 hours to complete, including painting and adding of detail. The plane was just a bit tail heavy when completed, but approximately three ounces of weight in the nose balanced it beautifully.

Building the fuselage of the PT-19 is done in three very easy steps. The basic construction consists of plank sides and blocks on top and bottom. The blocks are of good quality wood and are easy to shape. Be sure to keep in mind that the tail needs to be kept as light as possible. The entire fuselage can be built in one evening. We found the wood that covered the cockpit area was extremely hard and cracked when trying to install it. This was replaced with 1/64" ply over 1/16" sheet balsa.

Wing construction of the model is very simple and fast. The only decision one must make is the type of ailerons preferred - - - scale or strip. Scale ailerons are a little more sensitive than strip ailerons but the plane still handles very well with them. Wing fillets were added as shown on the plans.

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

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

SPECIFICATIONS

Name FAIRCHILD PT 19
Aircraft Type Army Primary Trainer
Manufactured By Jemco
1305 Foothill Dr.
Vista, California 92083

Mfg. Suggested Retail Price \$54.50
Available From Both Mfg. & Retail
Mfg. Recommended Usage Sport or Stand-Off Scale
Wing Span 50 Inches
Wing Chord 10½ Inches
Total Wing Area 450 Square Inches
Fuselage Length 39 Inches
Radio Compartment Dimensions (L) 10" x (W) 3" x (H) 3½"
Wing Location Low Wing
Airfoil Semi-Symmetrical
Wing Platform Double Taper
Dihedral 2½ Inches
Stabilizer Span 20 Inches
Stabilizer Chord (incl. elev.) 7½"
Total Stab Area 137 Square Inches
Stab Airfoil Section Flat
Stabilizer Location Top Of Fuselage
Vertical Fin Height 6½ Inches
Vertical Fin Width (incl. rod.) 8"
Mfg. Rec. Engine Range29-.40
Recommended Fuel Tank Size 8 Oz.
Landing Gear Conventional
Recommended No. Of Channels 4
Recommended Control Functions Rud., Elev., Throl., Ail.
Basic Materials Used In Construction:

Fuselage Balsa & Ply
Wing Balsa & Foam
Tail Surfaces Balsa
Hardware Included In Kit See text
Plan Size 24" x 42" (1 sheet)
Building Instructions on Plan Sheets Yes
Instruction Manual Yes (2 pages)
Construction Photos No
Kit Includes Shaped Parts
Mfg. Rec. Flying Weight 64 Oz.
Wing loading based on rec. flying wt. 20 oz./sq. ft.

RCM PROTOTYPE

Weight, Ready To Fly 88 Ounces
Wing Loading 27 oz./sq. ft.
Covering & finishing materials used See Text
Engine Make & Disp. K & B .40
Muffler Used Du-Bro
Radio Used Kraft
Tank Size Used 8 Oz.



Cap'n Dicks Cockpit BY DICK BRADFORD



'Hats off' to General Nugteren and staff at Hill AFB for a fine open house.



Col. Chris Christison (AMA 100!) was head honcho for the R/C demo.



The XBQM 106A - used to teach USAF RC'ers how to fly - uses Kraft equipment.



McCullough mill for the XBQM 106A pushes it along at about 80 knots.



The crowd looks over a twin tailed F-15 Eagle - what a performer (see text).



Approx. 20,000 enthusiastic spectators watched the Hill gangs performance.

Open House At Hill AFB

I met General Cornelius Nugteren, the Vice Cmdr. of Ogden Air Logistic Center, in front of flight ops. General Nugteren and staff were hosts this day to approximately 20,000 enthusiastic spectators attending the annual Armed Forces Day open house at Hill Air Force Base.

The last one of these shindigs that I had attended was in 1953, when the order of the day were B-50's, B-47's, F-86's, F-94's, and P-80's. Heck, in those days a 'mach busters pin' was awarded to all the 'jocks' who managed to slip through 1.0M in a screaming dive at 100% RPM. It would bankrupt the U.S. Treasury to award those pins these days, as just about every USAF student pilot exceeds the speed of sound on his 'dollar' ride! It would appear that technology has really crept up on us (old-timers?)! Believe it or not, there are a few airline captains flying today (graduates of military jet schools) who have never flown a prop driven airplane!

The General and I compared notes on F-15's and DC-10's - - - still all stick and rudder (and being over-paid key punch operators). I snapped his picture, thanked him for his kindness, and

headed out to the flight line.

A large crowd was forming along the north/south taxiway, and I could hear the unmistakable buzz of a hot piped .60. Quick like a bunny, I headed for the noise, only to be stopped in my tracks by a very large Airman 3/C as I attempted to hop the rope barrier holding back the crowd. After a confrontation that would have tested Dirty Dan Rutherford's usually serene countenance, I was

allowed to pass. Help had come in the form of an Air Force Major who recognized my mug from the pages of RCM (thank goodness - - - I've got at least one reader).

It seems that each year a different local club is given the enjoyable task of providing R/C entertainment for the armed Forces Day spectators. This year the Northern Utah Radio Control Aircraft Club from Ogden had drawn the short



A lull in the R/C flying as a Thunderchief taxis by.



Club endurance record holder - great performer (see text).



Armed Forces Day crowd checking out an RF-4C.



The crowd really got a kick out of Steve Kellers Dog House.



Cal Adams manned the R/C booth in Hangar #1.



T-37 --- the ship that many USAF 'Jocks' learn to fly in Primary Training.



Larry Bennington kicked off the 'bash' with his OPS piped .60 powered Vertigo.



Seth and Grandpa Bradford look over the 'business' end of an A-10 - Seth still "likes guns."



Travis Smith flew a Bridi Sun Fli 2 with K & B .40 on Kraft signals.



DC-130 with two AGM-34M Photo Recon Drones under wings.



Close up of AGM-34M Recon Drone --- that's Grandpa Bradford to left of pylon.

straw. Able assistance was provided by the Hill Aeromodelers (several Air Force types belong to both clubs), and by a couple of fellows from IMPRA.

The head 'honcho' for the R/C festivities was Col. Chris Christison (AMA 100!). Chris is Chief of Production Resources Division, Directorate of Maintenance at Hill AFB, President of the Hill Aeromodelers, an active member of the host 'Northern' club, and a super R/C enthusiast. Chris told me a bit about R/C activities on Base.

"The club members benefit greatly from the USAF Mini Remote Control Vehicle Program which is conducted on station at Hill. We have the use of the RCV runway --- a 300' x 50' black topped strip at the east end of the field."

I asked Chris about the Air Force Radio Controlled bird that I had photographed earlier in Hangar #1 (XBQM 106A --- see photo).

"It's a real sophisticated piece of machinery --- controlled via modified Kraft gear. Has a Kraft encoder in 'L' band transmitter, and an 'L' band receiver with Kraft decoder. Uses KPS-16 servos --- two for elevator, one for each aileron, and one each for throttle, rudder, and brakes. It's powered by a McCullough racing engine and tools around at about 80 knots. It sports a telemetry system capable of ground readout in such areas as cylinder head temperature and air speed."

A placard attached to the '06A' stated it is a "trainer to teach controllers ground handling, take-off, flight, and landing techniques of small Remote Control Aircraft." I wonder how many AMA'ers do that sort of thing for the USAF? What a ball that must be!

The Northern boys put on a well balanced show and, judging by the crowd reaction, it was a huge success.

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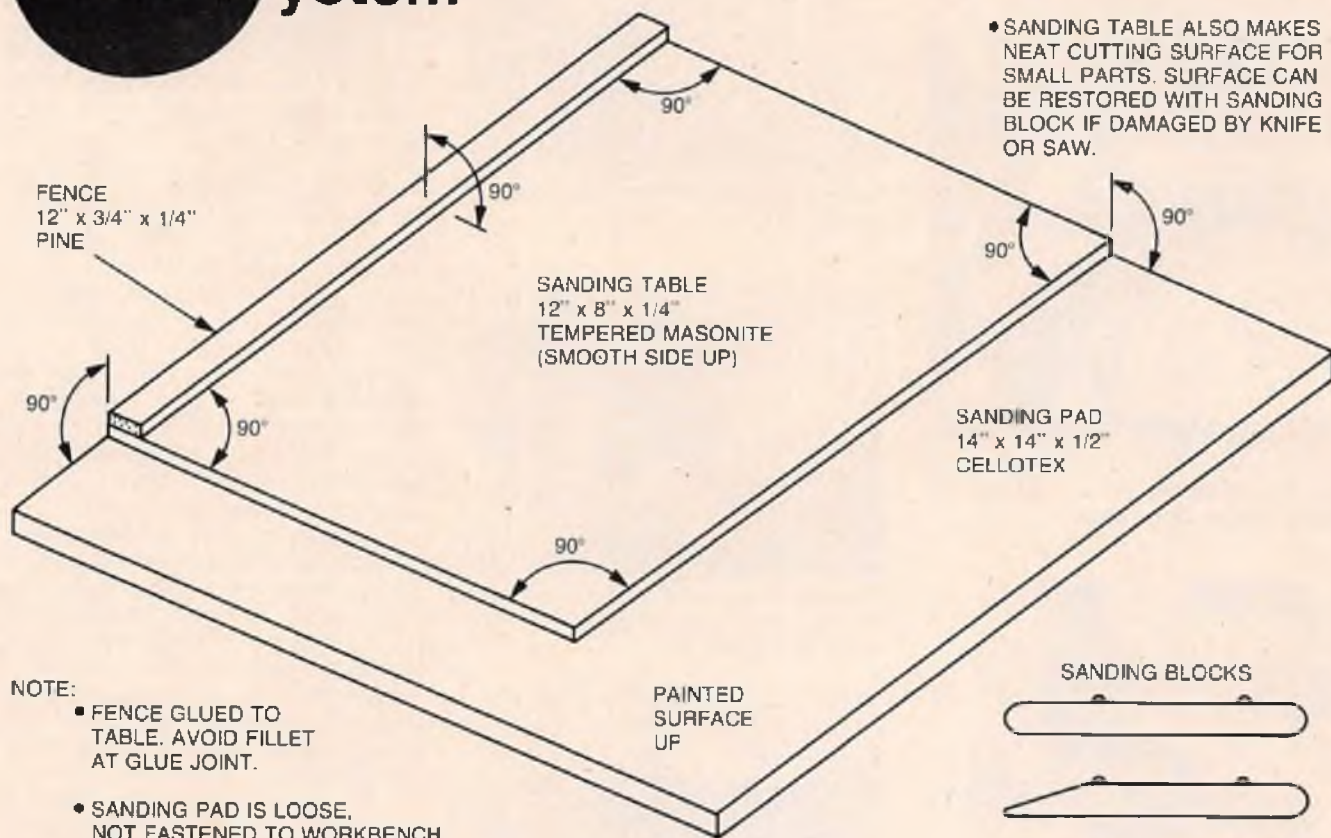
Shirley's Sanding & Shaping System

By William R. Shirley

I was appalled! After several years absence from modeling, I returned to RC, attracted by the inexpensive radios and reliable engines, to find that the younger modelers in my area weren't aware of the second most valuable modeling tool available to them — namely the sandpaper block. They all had discovered the X-Acto knife and #11 blade, but sandpaper wasn't considered an essential workbench aid. As a consequence, their models exhibited gaping joints and rough surfaces, that even the marvel of heat-shrink covering couldn't hide.

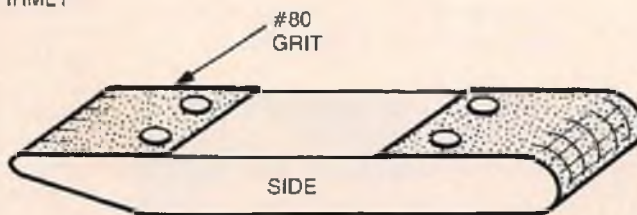
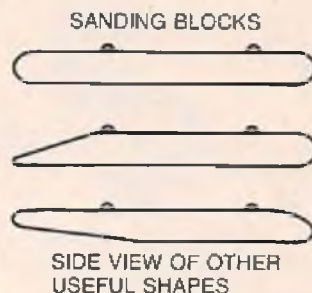
I grew up in the golden age of aviation,

- SANDING TABLE ALSO MAKES NEAT CUTTING SURFACE FOR SMALL PARTS. SURFACE CAN BE RESTORED WITH SANDING BLOCK IF DAMAGED BY KNIFE OR SAW.



NOTE:

- FENCE GLUED TO TABLE. AVOID FILLET AT GLUE JOINT.
- SANDING PAD IS LOOSE, NOT FASTENED TO WORKBENCH OR SANDING TABLE.
- MAKE FENCE NO THICKER THAN 1/4" OTHERWISE IT IS DIFFICULT TO HOLD THIN WORK FIRMLY IN PLACE.



SANDING BLOCK
6" x 2" x 3/4"
HARDWOOD

- SANDPAPER FASTENED TO BLOCK WITH 4 THUMB TACKS.
- PAPER MUST NOT BE WIDER THAN BLOCK OR BLOCK WILL NOT SLIDE ON EDGE.

SIDES MUST BE SQUARE TO TOP AND BOTTOM AND MUST BE PARALLEL.

NOTE:

- MAKE SEVERAL WITH VARIOUS RADII AT ENDS. 2" IS MAX. PRACTICAL WIDTH. 6" IS MAX. LENGTH TO ACCEPT SANDPAPER STRIPS CUT FROM 11" SHEET.

when model kits featured "printed" wing ribs and formers which had to be laboriously cut out with discarded razor blades. A sandpapering system was absolutely essential if there was to be any hope for a successful flying model. Borrowing an idea here and another there, we developed a combination of techniques adapted to the special wood-working problems associated with modeling in balsa and spruce.

Probably the greatest single obstacle facing new modelers is trying to cut or saw square ends on modeling materials. Sig's fine catalog points out that 3/16 of an inch is the maximum thickness of balsa that should be cut with a modeler's knife, however, I feel that any thickness greater than 1/8" is difficult to cut successfully with a knife. It is difficult to use even the versatile razor saw to

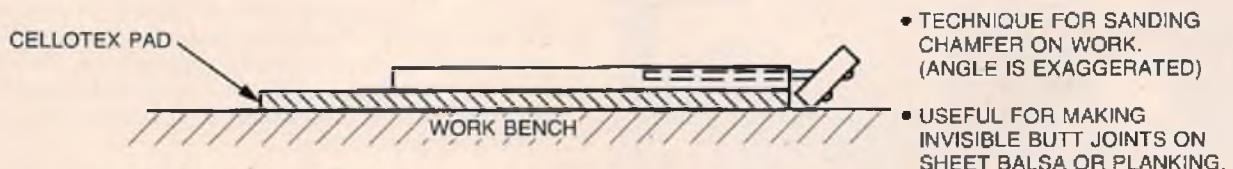
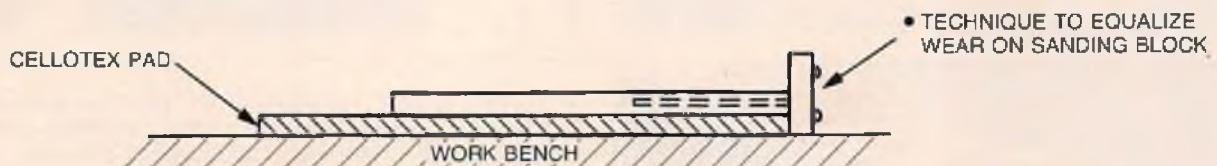
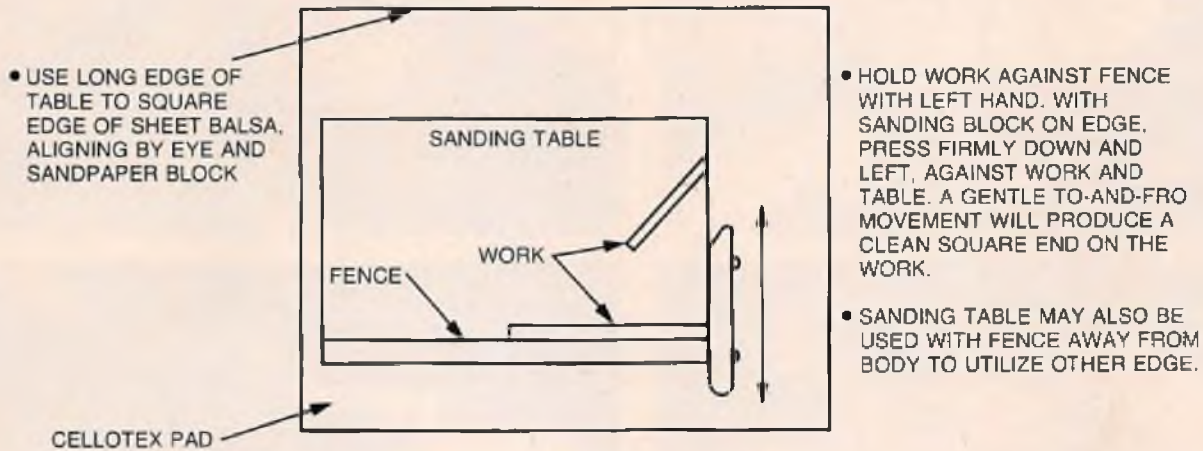
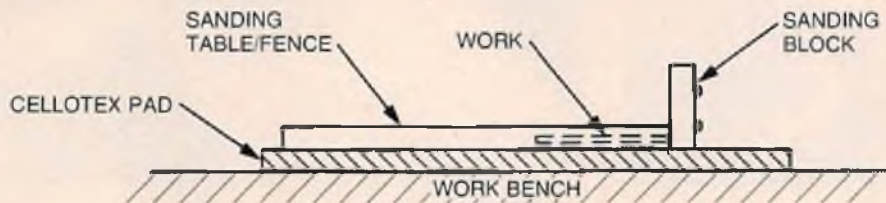
produce square ends on thicker materials. With the trend towards larger models, balsa of 1/4" thickness as well as spruce and plywood compound the problem.

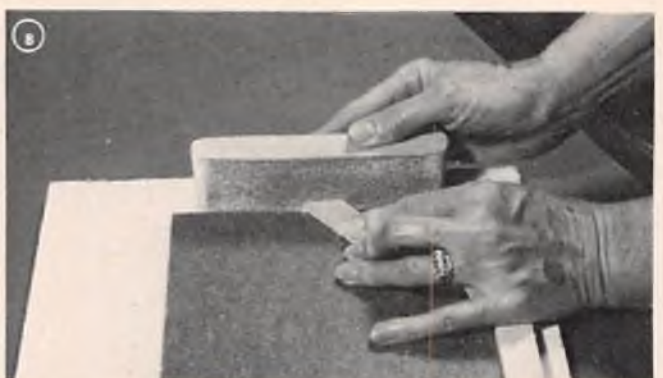
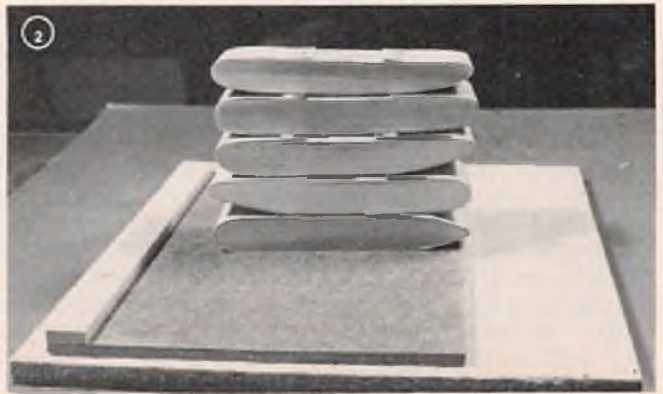
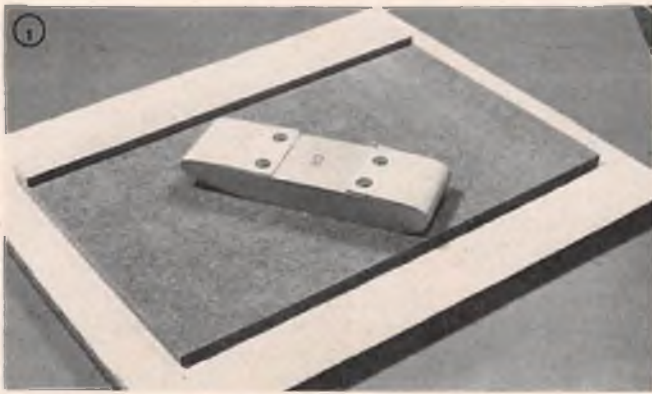
The Shirley System depends on cutting materials slightly oversize using a knife or razor saw, then sanding the joints to fit in a manner utilized by cabinet makers. Using this technique, minimal glue (and weight) are required and stronger joints are produced. The technique is easy to learn, requiring only simple, inexpensive and homemade tools including an improved sandpaper block.

Before I describe the sanding system, a few comments on sandpaper are in order. Many modelers start with much too fine a grit, then wear themselves and the paper out before the job is finished. I

firmly believe that most, if not all, modeling work can be accomplished in the shortest possible time, with a single grit (except polishing surfaces with 600 wet-or-dry). I use 80 grit, silicone carbide and before the howls of protest reach epidemic proportions, bear with me. Of course I use finer paper but I make it by wearing out my 80 grit! The paper can be identified by its light gray or off-white color. In my part of the country its Armour brand and can be purchased in Sears and Montgomery Ward stores. It is also called "no-load".

One thing that silicone carbide paper isn't, is sandpaper. It contains no sand whatsoever. No tiny little balls of crystal to scratch and gouge the tender balsa surface. Silicone carbide paper caresses the surface — as soon as its
text to page 95





(1) The System - sanding block, sanding table and pad. (2) Useful shapes for sanding blocks - all 80 grit. (3) Using fence and table as cut-off tools. Cut made outside workpiece line then sanded to line. (4) The System in use - squaring the end of balsa sheet. (5) Squaring edge of balsa sheet for butt gluing. (6) Round piece being trued up. Cut made outside workpiece line then sanded to line. (7) Rounding and squaring edges of plywood - any job requiring square edges. (8) Squaring diagonal end of sheet balsa. (9) Shaping a diagonal on 1/4" sq. balsa using workbench as a base to equalize wear on sanding block.

RCM PRODUCT TEST

**Hobby Shack
AMAZON SUPER 200**



The Amazon Super-200 is an ARG (almost ready to go) .15 to .20 powered air boat, sold by Hobby Shack stores, and manufactured for them by the OK Model Co., Ltd. We found the packaging excellent, and the list of accessories impressive. Aside from all the small parts you might expect, there were nuts, bolts, screws, control horns, hinges, a fuel tank, prop spinner, and a clear plastic radio box cover.

Building (we should say, assembly) instructions were on the plans sheet, and we recommend reading them as well as giving the drawings a thorough study prior to starting the project. Nothing complicated here, but just good practice, we think.

The Amazon's hull is of ABS plastic, and had a very nice finish. The engine pylon is aluminum and plywood, and the rudders (2) are aluminum. We rated Amazon's "assembly" category as excellent --- and that it is. Outstanding pre-shaped parts made things almost fall together, which in turn, made for an enjoyable few short hours from start to finish, to the water. A very, very completed kit indeed.

The Amazon is amazing. She proved to be a fantastic fun boat and, can be enjoyed by the whole family... provided the rudder throw is held to minimum travel. With increased rudder travel, the worst that can happen is a sharp spin-out, followed by a quick recovery... and away she goes!

Yes, this little 2' long, flat bottom air boat is nothing but fun, and if you've been looking for a change of pace, this could be it. And, just to add the frosting, she even comes with her own display stand... for those rare moments you won't have her zipping around the water!

Note: The review or discussion of any product by RCM does not constitute an endorsement of that product nor any assurance as to its safety or performance by RCM. □

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

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

SPECIFICATIONS

Name AMAZON SUPER-200
 Boat Type Air Boat
 Manufactured By OK Model Co.
 Distributed in U.S. Hobby Shack
 18480 Bandilier Circle
 Fountain Valley, CA 92708

Mfg. Suggested Retail Price \$49.99
 Available From Hobby Shack
 Length 24½ inches
 Beam (Width) 11.6 inches
 Radio Compartment Dimensions (L) 4¾" x (W) 3¼" x (H) 2¼"
 Hull Type Flat Bottom
 Mfg. Rec. Engine Range15-.20
 Mfg. Rec. Fuel Tank Size 4 Oz.
 Recommended No. Of Channels 2
 Recommended Control Functions Rudder & Throttle

Basic Materials Used in Construction:

Hull ABS Plastic
 Engine Pylon Ply & Aluminum
 Rudders (2) Aluminum
 Hardware Included in Kit See Text
 Plan Size 36" x 24" (1 sheet)
 Building Instructions on Plan Sheets Yes
 Instruction Manual No
 Construction Photos No
 Kit Includes Die-Cut & Shaped Parts

RCM PROTOTYPE

Weight, Ready To Float 60 ounces
 Covering & finishing materials used None
 Engine Make & Disp. Veco .19
 Muffler Used Closed Front
 Radio Used Cox-Sanwa
 Tank Size Used 4 Ounces

BUD NOSEN MODELS

INCORPORATED

BOX 105, TWO HARBORS, MINNESOTA 55616

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

9' PIPER J-3 CUB



Standoff Scale
Formed ABS
cowl Kit -

\$119.95

3 or 4 Channels
Flies like a
trainer Kit -

\$99.95

9' CHAMPION CITABRIA



9' AERONCA "CHAMP"



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

\$99.95

3 or 4 Channels
No foam or
plastic Kit -

\$79.95

102" BUD NOSEN TRAINER



8' CURTISS JN-4D JENNY



Standoff scale
4 Channels
required Kit -

\$129.95

1/3 size Standoff
scale 4 Channels
required Kit -

\$129.95

8' 1933 GERE SPORT



9' "MR. MULLIGAN"



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

\$139.95

1/4 size Standoff
scale Molded
cowls Kit -

\$169.95

10' CESSNA 310 TWIN



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

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

**OVERSEAS
DISTRIBUTORS**

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

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

Bud Nosen's spectacular

102" P-51 D

KIT \$169⁹⁵

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

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

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

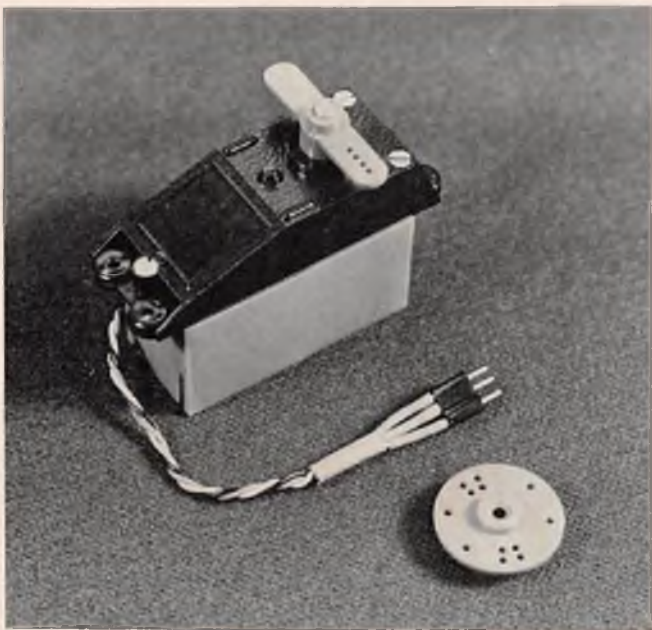


BUD NOSEN MODELS, INC.

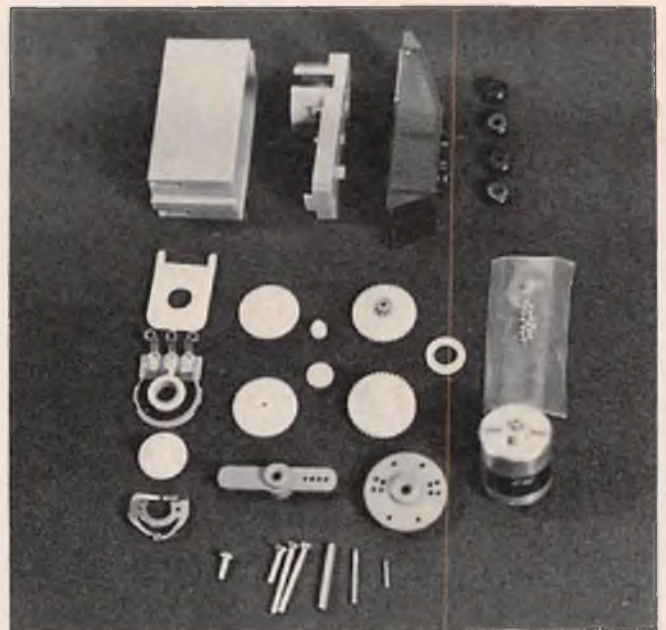
Box 105

Two Harbors, MN 55616

catalog 50c



Completed Royal "Chevron" Servo with Deans connector. A rugged servo! Connectors are available from Royal to match your set. Servo can be used with most positive pulse systems.



Parts of "Chevron" mechanics as received in kit. Note large diameter pot and wiper.

BUILDING THE

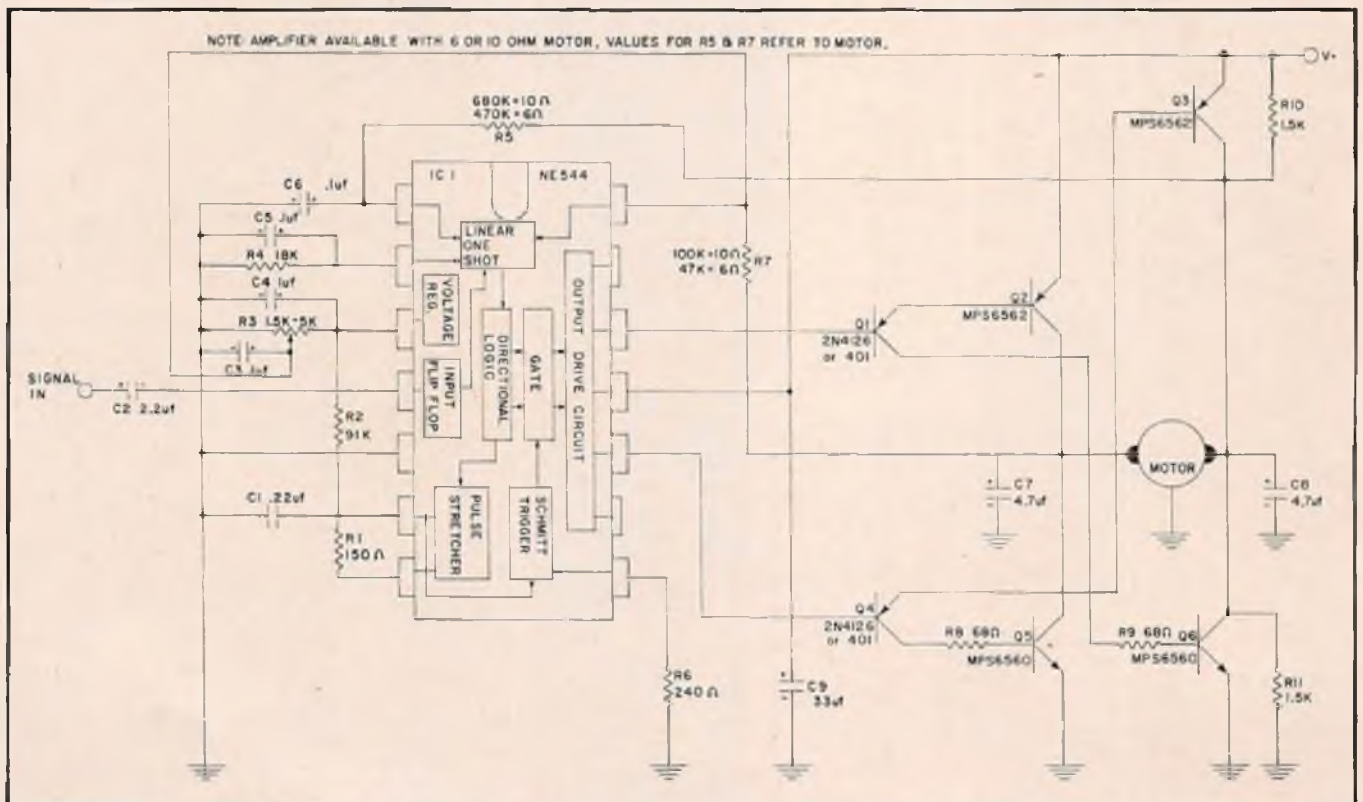
By Jerry Smith

ROYAL CHEVRON SERVO

Are you interested in a super servo with muscle enough for the larger RC models now becoming popular? Royal Electronics Corporation of Englewood, Colorado is now marketing such a servo. The servo is available in kit form or completely assembled and will operate with most

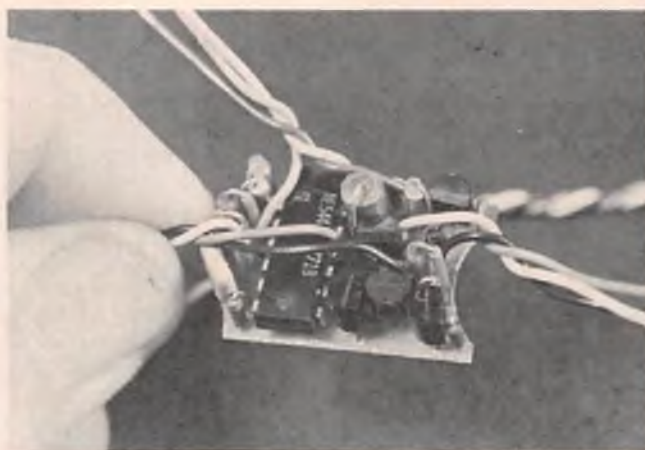
any positive pulse system. The amplifier is a Royal design while the mechanics are imported from France under the name of Radio Pilote. The mechanics were designed by Pierre Marrot, the well-known world class RC stunt flier and producer of the prestige Radio Pilote RC equipment.

This servo, called the "Chevron" was mentioned briefly in Jim Oddino's column, (RCM June 1978). However, after taking a closer look at this unique and versatile servo, I felt it would benefit the RC'er interested in larger aircraft as well as cars, boats and helicopters of the design criteria and performance built





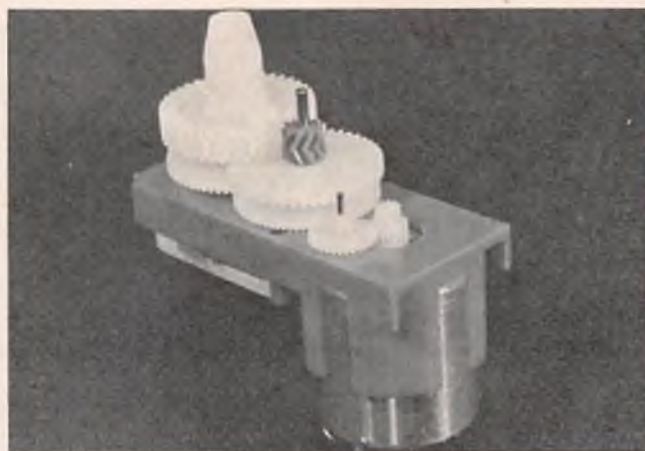
Chevron servo amplifier kit. Board is easy to assemble with good dependable parts and excellent instructions.



Completed amplifier. Good packaging allows for ease of assembly.



Ball bearings mounted in top cover. Balls are placed in groove and retained with plastic ring. Apply a drop of Hot Stuff to retainer ring.



Gear, next to motor pinion, in normal position for good response and transit time.



Gear, next to motor pinion, in lower gear ratio position. Less responsive, slower transit time but more power.



Chevron size comparison with Kraft KPS 18 and Ace Bantam servos.

into the Royal "Chevron."

Let's look briefly at the design aspects Pierre chose to impart in the "Chevron" mechanics. First, it had to be a smooth-action servo, strong and completely undeformable, capable of maintaining its original characteristics over an indefinite period of time with the possibility of using the basic design in different modes at absolutely the same cost. And, finally, a servo which would be accepted as the finest available by all

types of modelers. Thanks to the unique gear design, the "Chevron" is ideally suited for most any application and eliminates once and for all any danger of stripped gears.

Looking over the mechanics of the "Chevron," the lower case is molded in high density Delrin. This is subsequently treated in an electric oven, to eliminate all internal stresses, which could eventually cause warping. The slots in the lower part are designed for use with

a special quick-release plastic mounting plate, which will allow very rapid transfer of the servos from one model to another, while insuring absolute accuracy when they are returned to the original. The slot around the top edge of the case allows you to make it watertight, for boat use, by simply running a fillet of silicone rubber into it before finally closing the servo. The corners of the case are webbed, for extra strength, and the square channel at one end allows the amplifier cable to

be taken out at the level of the mounting lugs, thus making for a much simpler installation.

Concerning the center platform, you will notice immediately that this is much deeper than is normally the case. This has been done to give the servo extremely high torsional rigidity. Extra material has been allowed around the holes which serve as bearings for the gear axles — this is to avoid deformation of these holes over long periods of use. The upper casing is also made of Delrin and is heat-treated. The well-tried "fast-back" design was chosen because it is very efficient. It allows reinforcement of the mounting lugs without breaking the harmony of the line. Extra material has been molded around the gear axle seatings — not only does this obviate any chance of wear, but also guarantees a much better vertical line-up, and this over a long period. Torsional rigidity is very high, in order to preserve this perfect line-up. The hole for the output shaft has been designed to take a ball bearing, in which the shaft runs, to stop any possibility of binding or breakage under imposed loads of a very high order. The two small lugs on each side of the top are there to provide positive fixing of the clips on the servo mount.

The gears are the heart of this servo, and have been developed at great cost. They are made by an entirely new method, are to all intents and purposes unbreakable, and are completely stable. They are molded in Delrin, but instead of injecting the material through one single hole at the periphery of the gear, it is injected through three holes in the center of the gear. The great advantage of this process is that it allows a much more even distribution of the material throughout the mold, resulting in a gear which is completely true (plus or minus 5 microns), and which is completely stable, so it **stays** true over a long period of time.

The two output gears, as you can see, have a tooth in the form of a shallow V, hence the name "Chevron." This form imparts quite incredible sheer strength to the teeth, and also imparts to the servo a very high resolution (which will, of course, depend on the amplifier used). There is very little backlash, and yet the gear train is perfectly free-running.

The output drive shaft is a splined cone, which allows an infinity of positions for the arm, or disc, without having to open the case — a great advantage when setting up the neutral position. As already mentioned, the shaft runs in a ball bearing.

The potentiometer is a carbon-film, long-life, 20 mm diameter model. 20 mm was chosen to give much greater radial angularity, thus allowing better resolution, coupled with smoothness, which is a decided asset for elevator control for instance.

If you decide to go the kit route, assembling the amplifier calls for a different kind of skill, and that is soldering. Perhaps, it would be best to say, if you are in doubt with regard to your soldering skill, read up on the subject and practice. The amplifier board is not particularly difficult and the instructions furnished by Royal are excellent. It is just a matter of reading and understanding before you proceed. The experienced kit builder should encounter no difficulty with assembly.

There are several items that could cause trouble when assembling the amplifier. First there are three 1/8 watt resistors under the integrated circuit. Make sure these are of correct value and located properly. Changing them later on will be difficult. Second, it is necessary to remove pins 9 and 13 on the NE544 IC. Make sure before you cut, this could be a \$5.00 mistake. Third, pay attention to capacitor polarity. The Royal instructions call for R.D., meaning red end down or R.U., meaning red end up. It is a common mistake to install these capacitors with opposite polarity.

There are several transistors on the board packaged close together. Here again, it is important to follow the instructions. Form the transistor leads as shown for proper installation.

The amplifier kit, as well as the assembled servo, can be purchased in two configurations for either 6 ohm or 10 ohm motors. Royal has this worked out in a very simple manner by merely changing two resistor values on the board. R5 and R7 are the resistors specified. When building your amplifier make sure you install the correct resistor values required to satisfy the motor resistance. The 6 ohm motor has more power and is a bit snappier than the 10 ohm motor. However, there is always a trade-off. The 6 ohm motor draws more current causing a little more drain on the batteries. For general use, however, the 10 ohm motor will give great performance.

Statistically speaking, the Royal "Chevron" is a super servo. I obtained average output powers, lifting vertical loads, of 4.75 pounds in the outer hole of the output arm. Moving the load to the inner hole, the servo lifted 6.60 pounds. With the gear train switched to the retract mode (the small gear next to the motor in its alternate position) I was able to lift 8.45 pounds in the outer hole and 10.10 pounds on the inner. This was accomplished using a standard Royal Chevron servo with a 6 ohm motor. A 550 ma battery pack was used for power sources. Idle current on the amplifier was 15 ma. The 10 ohm motor version stalled at 450 Mil while the 6 ohm motor version stalled at 750 Mil.

The "Chevron" is just a little larger than the average large servo measuring 29/32" wide by 2-7/16" long by 2" high

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R/C SAILING REGATTA IN SCOTTSDALE

By Doug Denny



The well managed Copperstate Model Boat Club ran the event.

On Saturday and Sunday, March 18 and 19, 1978, the Copperstate Model Boat Club held their annual Spring Sailing Regatta at Chaparral Lake in Scottsdale, Arizona.

Early Saturday morning, there was no wind, and there was talk of not holding the races that day. But soon the wind picked up and the races were on.

The models are placed in two categories: Models which are 50" long are called 50/800's, and ships which are 72" long are called Newport 12 meters. The 12 meters are designed after the yachts which sail in the "American Cup" every four years on the east Coast.

There were 20 skippers entered into the events. Most were from Arizona, but there were some from California, Nevada, and Colorado. Saturday afternoon the wind really started picking up and some excellent racing took place. Some 30 races were held and here are the results of the first 6 heats in the 50/800's and 12 meters.

50/800'S

Heat 1

1st	B. Heywood
2nd	S. Holmes
3rd	B. DeBow

Heat 2

1st	L. Goodman
2nd	B. Heywood
3rd	B. DeBow

Heat 3

1st	B. Heywood
2nd	L. Goodman
3rd	S. Holmes

- Heat 4**
 1st B. Heywood
 2nd S. Holmes
 3rd B. DeBow
- Heat 5**
 1st S. Holmes
 2nd L. Goodman
 3rd S. DeBow
- Heat 6**
 1st B. DeBow
 2nd L. Goodman
 3rd B. Heywood

12 METERS

- Heat 1**
 1st B. DeBow
 2nd L. Johnson
 3rd L. Goodman
- Heat 2**
 1st E. Kimball
 2nd L. Goodman
 3rd B. Webb
- Heat 3**
 31st S. McClellan
 2nd B. DeBow
 3rd B. Webb
- Heat 4**
 1st S. McClellan
 2nd B. Webb
 3rd L. Goodman
- Heat 5**
 1st T. Kimball
 2nd L. Johnson
 3rd E. Kimball
- Heat 6**
 1st L. Goodman
 2nd A. Daigle
 3rd G. Baldacchino

The final results are:

50/800'S

- 1st B. Heywood — Colorado
 2nd L. Goodman — California
 3rd B. DeBow — California

12 METERS

- 1st S. McClellan — California
 2nd S. Johnson — California
 3rd L. Goodman — California

Chuck Beery, Commodore of the club said, "All the competitors enjoyed the event 100%, and thought the organization was superb." It is too bad none of the locals got any of the trophies, but I heard someone say, "Wait 'til this fall, during the October Regatta!" □



Two officials of the club retrieve an injured craft.



Ships in the 50/800 class round a pylon.



ABOVE: Led by Scott Holmes, a group of skippers intently watch their ships. LEFT: Gary Baldacchino places his ship in the water before the next race.

RCM Tests The

POWER PACER

By Ben Strasser



Introducing the Power Pacer? Not really. This unit has been available at local hobby shops for some time. We're just slow in getting our product review in print. But then, there are lots of advantages in being slow. One advantage is that we have been using the unit for over a year and can cite several cases in which we were able to discover failing battery packs before we flew, not after we picked up the pieces. Second, since many of your friends probably have been using one of these units for awhile, we're sure they'll verify our findings. Just ask them.

Originally produced by Fosgate Electronics, the L.R. Taylor Company bought the rights to it a couple of years ago. Essentially, the Power Pacer is a unit that charges and discharges both the receiver and transmitter battery packs. One or both units can be charged or discharged at the same time. Or, by plugging the receiver or transmitter packs in one at a time and pushing the test button when the first battery pack is plugged in, it's possible to discharge one while the other is in the charge mode. While the Power Pacer operates essentially the same as the no longer available Super Cycle (with the exception that the Power Pacer reads out capacity rather than time), the electronic circuitry is entirely different which yields greater reliability and accuracy.

To operate the unit, it is plugged in to a

110 volt AC outlet. When the receiver and transmitter battery packs are plugged in, the green LED's will light up indicating they're in the charge mode. The slow charge rate is 50 mil's, which means that a 550 mah battery pack will take 16 hours for a full charge. Specific charging times are given in the instructions for 220 through 1000 mah battery packs. It is important to emphasize that overcharging can damage your battery packs and is one of the worst things you can do to them. Follow the recommended charging times included with the unit and you'll be in good shape.

That's the Power Pacer as a charger, nothing special so far. But that's only part of the story. In our view, the most important use of the unit is the regulated discharging capability. When discharging, it is electronically designed to switch to the charge mode when the pack reaches a low of 1.1 volt per cell so the cells cannot be damaged. Furthermore, when the knobs on the unit are set to zero at the beginning of the discharge cycle, the unit reads out the capacity of the batteries. While we had purchased our unit to occasionally cycle the battery packs in our R/C systems to prevent memory as well as to serve as a slow rate charger, the capacity read-out has proven to be an invaluable way of monitoring the condition of our battery packs. For example, by charging the packs for the recommended time and

then putting them into the discharge cycle, we have been able to spot potential trouble. If, for example, a charged 500 mah pack only reads out 250 mah on the capacity indicator after a discharge, it could mean you have a bad cell in the battery pack. However, instead of immediately buying a new battery pack, we also repeat the charging-discharging cycle a couple of times first. On occasion, some packs have come back to their full or nearly full capacity. It's as though they need the occasional exercise. It is important, however, that battery packs that have been "saved" by recycling be monitored more frequently just to make sure the problem doesn't re-occur. While we know of some R/C'ers who drain the packs by running their equipment at home after a flying session, this could cause more harm than good if the drain is not cut off when the packs reach 1.1 volts per cell. Draining the batteries below this point is the other worst thing that can be done to Nicads.

The Power Pacer can also enable you to find out just how much safe flying time you have. Simply run the system in the discharge cycle to find out the remaining capacity when you get home after a day of flying. If, for example, you have a 500 mah pack and find you have 250 mah left after a flying session, you know you've used up about half of your flying time. By knowing exactly how long

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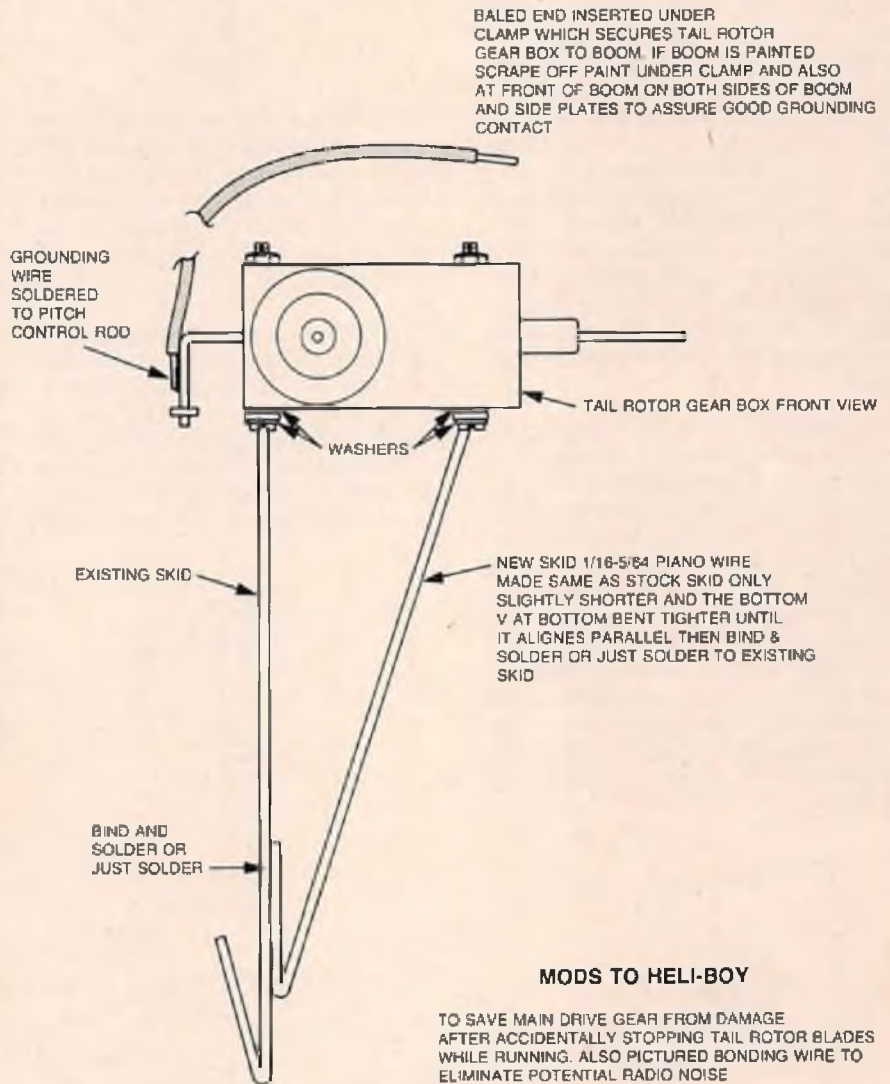
What a year this is turning out to be for helicopters. Just a year ago, only the bravest of souls would attempt to do a loop or a roll with a helicopter. Now, just a year later, it seems that everybody is doing aerobatics with helicopters. A year ago just a plain old common inside loop was really something. So far this year I have seen inside loops, outside loops, rolls to the right and rolls to the left, vertical rolls, Immelman, Split S's, Cuban Eights, 5-6 second inverted flights, consecutive rolls up and six consecutive loops past a number you wouldn't believe. Some of this stuff could go into the Guinness Book of Records.

Where is it all heading? Nobody knows but, like I have said before, there is no time like the present to get started in helicopters. All the past excuses that have been used are falling by the wayside - - - the biggest one being that you can't do anything but hover around with a helicopter. Along with all this Hot Dog flying has also come the technology making the machines easier to fly for the novice who is just getting started. To you guys who have been watching with your nose pressed to the window - - - in the words of the deodorant commercial on T.V. "It's time to get off the can and on the stick." The only thing that is holding you back now is yourself. So if you're going to try helicopters, now is the time.

☆

One of the hottest things going right now is the Heli-Boy by Schluter. This helicopter out of the box is just fantastic but as it is with all of us who tinker, always looking for a better way, here is one little mod to the Heli-Boy which won't make it fly any better (as if that were possible anyway) but it sure can save you some down time and money for parts.

The main drive gear on the main shaft also drives the tail rotor and works flawlessly until you try to stop the tail rotor without letting the rest of the machine know about it. In other words, backing the tail into the bushes or dropping in too hard for a landing or any number of ways that you can have an accident with the tail. Any of you who have Hell-Boys know what happens when you do this with this machine, the top part of the main gear gets all the teeth taken off which costs \$14.50 to replace. Well there is an inexpensive,



MODS TO HELI-BOY

TO SAVE MAIN DRIVE GEAR FROM DAMAGE AFTER ACCIDENTALLY STOPPING TAIL ROTOR BLADES WHILE RUNNING. ALSO PICTURED BONDING WIRE TO ELIMINATE POTENTIAL RADIO NOISE

FIGURE 1

simple, easy fix (that's the best kind isn't it?). In Figure 1 you will see how to build a simple additional tail skid which is almost a twin for the stock one only it's bolted on the left front of the gear box, then angled to the stocker and soldered to the existing skid. Now what you have is a "V" shaped skid that will not flex sideways into the tail rotor blades. Also, when pushing straight down on the boom, it won't flex and allow the tail rotors to catch the ground. Since making this mod it has saved me from wiping out the gear five times already.

Also, while on the subject of the

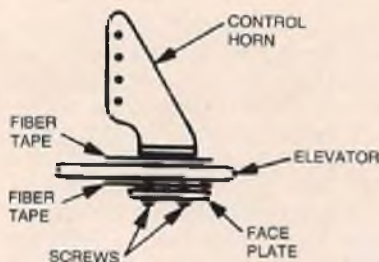
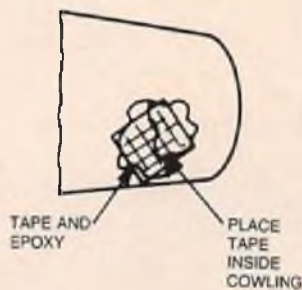
Heli-Boy, in talking with several pilots around the country who are flying this bird I find we have all had one common problem and that seems to be at one time or another, or possibly all the time for that matter, in some cases we have had a radio problem. Well, in tracking it down, it is coming from the tail rotor. If you take an ohmage reading from the shaft that the tail rotor blades are mounted on, to the tail boom, you'll find it is totally open or, in other words, infinite ohms. Well the tail rotor blades being plastic - - - when spinning - - - are

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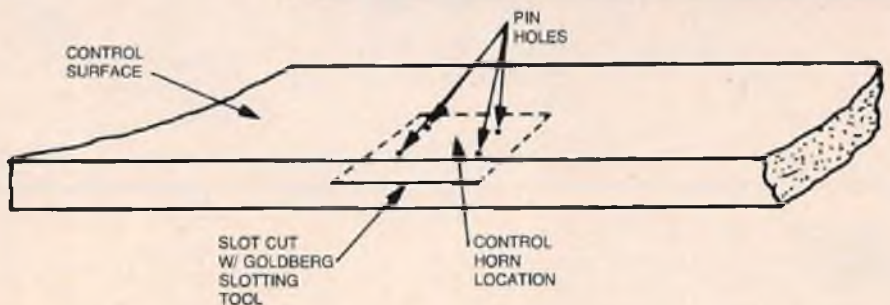
FOR WHAT IT'S WORTH

Oily rubber bands are no longer a messy bundle of sticky goo for Harry N. Donaldson of Albany, New York. Possibly others would like a clean, neat way to take care of theirs. Take a regular aspirin (100) plastic bottle which you fill half way with detergent and water and carry in your field box. After your flying session is over, remove rubber bands and place them in the bottle. Cap the bottle and shake vigorously. Leave them in the bottle until you get home, then give them a repeat cleaning with a fresh mixture of detergent and water. Place the bands on a small piece of 1/4" ply that has been wrapped with paper towels. This helps to dry them and they are left on the board for the next flying session. They can be stored in a bottle with talcum powder added, which will keep them fresh also. This procedure will greatly extend the life of the rubber bands.

Francis Lang of Saskatoon, Saskatchewan, Canada, discovered a good way to repair cracked plastic or fiberglass parts. This material also can be used to reinforce various places as shown in the sketch. The material is a fiberglass tape used for sealing up packages. It's extremely strong and cannot be torn. For reinforcing control horn areas, just lay a small square of tape on both sides of your control surface and coat with epoxy glue. Your control horn can now be attached in the normal manner to this very hard and sturdy base.

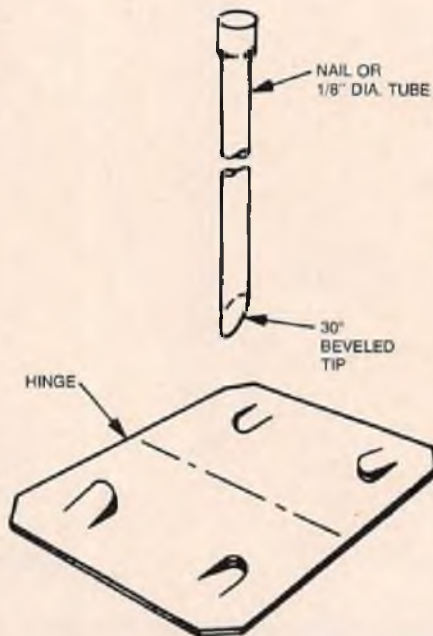


William Bennett of Valley View, Ohio, sent in this suggestion on how to mount control horns. After determining control horn location, cut a slot as per sketch.



Insert a piece of 1/32" plywood and put a drop of cyanoacrylate glue in each pin hole. Proceed to install your control horn in the normal manner. The glue hardens the balsa to prevent crushing and the plywood center insures the control horn will never pull out.

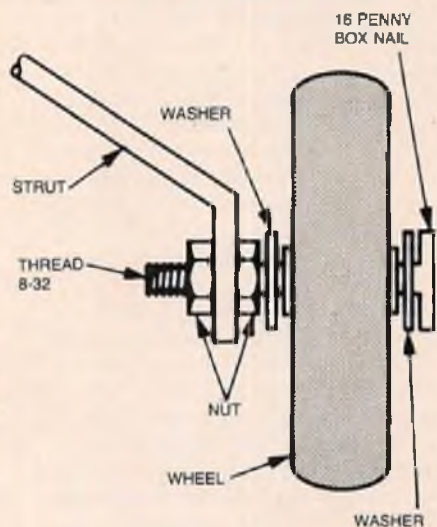
For those who use mylar hinges, here is an additional feature to aid retention submitted by Paul Czar of Orlando, Florida. Take a nail or a piece of 1/8" diameter tube and grind a 30° beveled tip. Then pierce punch the hinge from both sides 1/2 the length of the bevel. This will leave a clean cut, anti-pull out tab.



Here is another tip sent to us by Robert B. Clark, Jr., of Burlington, North Carolina, to ease the difficult job of reinforcing wing center sections, etc., with fiberglass cloth. Cut your cloth to size, place one edge on the trailing edge and (here's the trick) use a cyanoacrylate glue to tack the edge in place. Then pull your glass cloth tight and do the same at the leading edge. The cloth is now firmly fixed in place so you can use your favorite epoxy or polyester resin and smooth out. Bob

uses a 2" strip cut from a rubber squeegee. When dry, turn the wing over and do the other side. If the edges should start to fray, just nail them down with another drop of glue. With this method, you're able to use 5-minute epoxies and get very satisfactory results.

Wheel axles for sheet metal landing gear can easily be made from nails. This method has been used by Dawes H. Reyburn of Merced, California, and no problems have been experienced in the use of them. Use 16 penny box nails (approximately 5/32") for .19 to .35 size planes. These give a smooth (no thread) wheel bearing surface and a "hubcap" which can be painted if desired. See the accompanying sketch for complete details in making a set for yourself.



Deane Woodiwiss of Swartz Creek, Michigan, experienced a radio failure due to a wire breaking off of the plug from the battery pack. This was apparently due to flexing fatigue. He then potted all of his connectors with a generous dab of silicone rubber. By using the clear rubber, it permitted a visual inspection of the wires. There has been no more broken wires since.

The suggestions appearing in For What It's Worth have been submitted by individual hobbyists or reprinted from club newsletters. RCM has not tested, or otherwise tried, each idea printed herein. Send your suggestions to RCM and win a free 1 year subscription or other prize.

NEW!

FOUR WAYS TO IMPROVE A CHAMPION.

Cox/Sanwa's 8040 radio system helped Skip Miller become the 1977 World R/C Soaring Champion. And now, one of *four* advanced versions of the 8040 can help make you number one. Whether you're flying for sport or competition.

Want reliability and performance at a reasonable cost?

Then you want our new 8044 or 8054 system, available on all 72 MHz frequencies. The 8044 is four-channel. The 8054 has a fifth channel with toggle switch to retract landing gear.

Both inherit all the 8040's outstanding features while adding innovations of their own. Such as *totally new miniature servos* for easy installation in smaller models. These have everything you want in a servo—plus 60% more power than micro-servos offer!



Two more successors to the 8040 bring a new dimension to competitive flying. And if these new 8048 and 8068 systems *look* distinctive, wait till you see their features.

Including the low-force open gimbal sticks with a unique dirt-resistant design. Variable rate adjustment on aileron and elevator channels. Adjustable stick lengths to suit your own style.

And you get *new miniature ball bearing servos*—with a ball bearing output shaft plus an isolated, long-life potentiometer and waterproof case. There's even a modular gear train for easy servicing.

The 8048 provides four channels. The 8068 adds a proportional fifth channel, and sixth channel with toggle switch. Both are available on all 72 MHz frequencies.

All four systems feature the quality, engineering, craftsmanship, and affordable pricing that's made Cox/Sanwa famous. Behind each one stands a world champion. Pick the one that'll win for you.

All systems include transmitter, four miniature servos, receiver, dual charger, servo trays and accessories.



Cox/Sanwa Radios, Airtronic Kits, Cox Engines.

Cox Hobbies, Inc. A Subsidiary of Leisure Dynamics, Inc.
1505 East Warner Avenue, Santa Ana, CA 92702

showcase '78

All items appearing in Showcase '78 are press releases supplied by the manufacturer of the product and/or their advertising agency unless otherwise specified. Note: The review or discussion of any product by Radio Control Modeler Magazine does not constitute an endorsement of that product nor any assurance as to its safety or performance by RCM.



30 SECOND CONTACT CEMENT

Devcon's 30 Second contact cement is a super adhesive for making a permanent bond without pressure or clamps. Very thin films dry in 30 seconds, and up to 10 minutes for heavier coatings. Bonds to wood, rubber, metal, plastics, and paper. The colorful 1 1/2 fl. oz. tube is blister packed, one per eye-catching card at a price of 90¢. For more information, write Du-Bro Products, Inc., 480 Bonner Road, Wauconda, Illinois 60084.



SUPER KYDEX CHASSIS AND BUMPER

A new product from a new hobby supply house, The Pipeline, P.O. Box 1868, Fremont, California 94538. The Super Kydex Chassis and Bumper are strong, durable components that have

been enlarged for optimum competition performance for 1/12 scale R/C electric cars, as they are neither too flexible nor too stiff, which allows for better handling and maximum traction. The Super Kydex Chassis has a very high impact resistance. The chassis are precision cut and drilled for a custom machined aluminum front end, motor mount and rear axle from The Other Pottols Throttles Shop, which the The Pipeline has fully stocked. The Pipeline also has other R/C car accessories and R/C boat supplies available. For a complete catalog, send \$1.00.



HOT-HED

Idea Development, Inc., has announced their newest unusual product Hot-Hed, a visual heat warning indicator for engines that takes the guess work out of mixture settings and possible inadequate air flow. Applied in dots to the upper fins and top of an engine, Hot-Hed is an olive green while the engine is cool. As the engine reaches proper operating temperature this specially formulated paint turns to a light brown. As the engine cools down, the dots of Hot-Hed turn color back to the olive green. However, should the engine head temperature reach 490°, Hot-Hed turns to a deep red brown, giving a definite signal that the engine is running far too lean, or not receiving an adequate air flow for proper cooling. While Hot-Hed gives this final warning at 490°, a temperature too high for continued engine operation, the visual warning comes in time to avoid serious damage to an engine. Hot-Hed sells for \$3.00 per half ounce bottle, postpaid, direct only from Idea Development, Inc., P.O. Box 7399, Newark, Delaware 19711. Complete instructions for use are included with each bottle.

DUMAS FIBERGLASS STAR 45

Sure to enhance the popularity of the Star 45 class (an AMYA one design class), this new Dumas fiberglass Star 45 offers the ease of fiberglass construction with the proven sailing performance of its wooden predecessor (which is still available). An excellent RC model sailboat for the beginner, the new Dumas Star 45 can also be a very



competitive racing boat for the serious racing sailor. The complete kit includes a fiberglass deck and hull for the modeler to join; wood to shape mast, boom and jib club; rudder; keel; keel weight; hatch; dacron sails; complete fittings standing and running rigging. The Dumas-Probar sail control unit #3701, any two channel proportional radio and a 6 volt battery (not included) is all that's needed to be sailing. From Dumas Products, Inc., 901 East 17th St., Tucson, Arizona 85719.



RK-049

Following the success of the Axiflo™ RK-40 Ducted Fan, Midwest Products have announced the availability of the RK-049. This kit is designed for use with a Cox Tee Dee .049-.051 size engine. All of the pieces for the kit are either molded or machine cut, insuring a precision fit. Special features of the kit include a jig for properly aligning the stators, a glass filled nylon motor mount and a tailcone that serves as a 1 1/2 ounce fuel tank. Full size drawings and a comprehensive instruction booklet are included. Performance tests show a thrust of 16.00 oz., using a Cox Tee Dee .049, 25% nitro and 20,000 rpm. Retail price is \$38.95. An injection molded foam A4D Skyhawk will be released to be flown with this unit. See your dealer today and go with Axiflo! Midwest Products Co., Inc., 400 South Indiana St., Hobart, Indiana 46342.



DIESEL CONVERSION KIT FOR .09 ENGINES

Due to increasing demand for more power, light weight, and economy, for overweight 1/2A ships as well as new 40" wing span planes, Davis Diesel Development, Box 141, Milford, Connecticut 06460, announces the availability of their new C-10 diesel conversion kit. Utilizing the same advanced fluoro-carbon diesel disc concept, a typical engine will swing a 9/4 prop at 11,000 rpm. In attractive two-tone gold and silver finish, the kit sells for \$12.95 or with RC Throttle arm for \$15.45 plus \$1.00 postage and handling or see your dealer.



POWER PANEL

Astro Flight, Inc., 13377 Beach Ave., Venice, California 90291, presents their nifty power panel that is specially designed to provide proper power forms to your starter, glow plug & fuel pump. It features high & low glow plug outputs and a center off reversing switch for your fuel pump. Available either from your dealer or order direct. Price \$22.95.



SAFETY-SPINNER HUB

Harry B. Higley & Sons, Inc., 433 Arquilla Drive, Glenwood, Illinois 60425, introduces the Safety-Spinner Hub which is a scale like, hand polished aluminum prop nut that meets AMA rules for events and areas of the country

that require such a device. It is also convenient for use with electric starters as its large size provides maximum contact with the starter cup. The Safety-Spinner Hub is exactly the same shape as the Harry's Heavy Hub only much lighter. Available in 1/4-28, 7mm (Enya), and 5/16-24 threads. Price \$2.39 each.

SIG CESSNA 150

Sig Manufacturing, Montezuma, Iowa 50171, introduces their new "Kwik Bilt" Cessna 150 kit for RC sport scale and sport flying. It features ABS parts that are easy to glue and paint. It has exact scale outline, is smooth and stable, responsive to control, builds fast and ideal for 4 or 5 channel radio equipment. It is priced at \$69.95. Also available for the Sig Kwik Bilt Cessna 150 is an accessory window kit. Included with this window kit are step-by-step instructions, one molded windshield, two sided windows, and two molded rear windows. The accessory window kit is priced at \$3.95.



PRO LINE SERVO POT WIPER

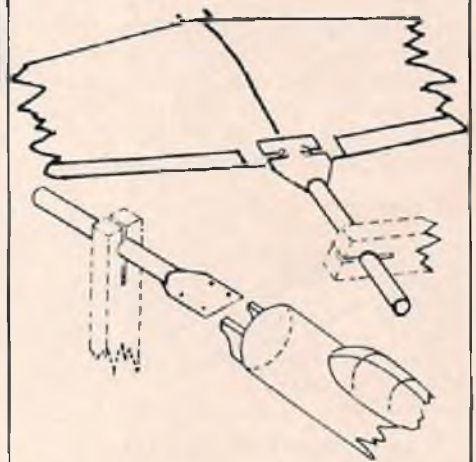
Introduced as the most significant improvement in R/C servo mechanisms, the new single point wiper is available exclusively from Pro Line Electronics, 10632 N. 21st Ave., Suite 11, Phoenix, Arizona 85029. Available in two sizes, it works in all other manufacturers' servo pots of the same diameter. Provides positive and extremely smooth tracking. The centering reliability is the closest available today. Plus it's virtually maintenance free. The new SM-155 Servo pot wiper (for PLS-1 servos) and the SM-156 Servo Pot wiper (for PLS-11, 12, 14, and 15 servos) are currently available at most hobby shops for \$2.80 each. As the initial supplies were very limited, some hobby shops may already be out of stock. We suggest you call your favorite shop as soon as possible to make arrangements for your order.

DJ'S MULTISTRIPES

Big things are happening at DJ's Multistripe. They are now handling their own distribution: Distributors and dealers are invited to order directly from DJ's Multistripe. For a limited time, extra



discounts are available on volume purchases. They have added 3 new colors in 4 widths — orange, green and silver. Other manufacturers may be going to cheaper products to reduce costs but at DJ's Multistripe they will continue to supply the finest tape at the same reasonable price. What makes DJ's Multistripe the best? The main reason is the patented Multistripe adhesive which cures in sunlight. If you want the best, order from DJ's Multistripe, P.O. Box 9382, Glendale, California 91206.



EZE-HOLD PAINT JIG

If you had trouble holding your last airplane while painting it or if you are tired of getting your hand covered with overspray, then try this unique, versatile jig for holding .19 to .80 size planes. It rotates 360 degrees for complete coverage of both wing and fuselage in one application of either spray or brush painting. Four pieces, made of durable, high strength aluminum. Uses and mounting instructions are included. Price \$6.95 from Better Built Airplane Products, 269 Orange Ave., Goleta, Calif. 93017.



CHARGE ALL

The "Charge All" unit from Kraft Orange County, 2817 E. Linclon Ave., Anaheim, California 92806, will satisfy most all of the charging requirements in the RC modeling field. Features include: operates from a 12 VDC source or 120 VAC (A.C. power pack included); individual or simultaneous charging of a transmitter and receiver pack at a fast rate (500 ma) or a slow rate (50 ma); automatic shut-off when transmitter and receiver is fully charged; charge condition of transmitter and receiver batteries is determined by an expanded scale system displayed on light emitting diodes; 12 VDC field battery, transmitter or receiver batteries may be charged on the bench (120 VAC); may be permanently connected to 12 VDC battery; and compact, easy to carry size.



ALUMINUM ENGINE MOUNTS

Available from Kraft Systems Inc., P.O. Box 1268, Vista, California 92083, are precision lightweight engine mounts which provide a rigidity desirable for high powered or larger displacement engines. For further information contact Kraft Systems.

1978-1979 R/C CATALOG

Tower Hobbies, P.O. Box 778, Champaign, Ill. 61820, offers their new catalog of 294 fully illustrated pages that contain over 3000 radio control products and related accessories. Over 140 manufacturers lines are all pictured,



described, and discount priced in this super complete catalog. It also features four indexes to help you find exactly what you want quickly; special postcards you can send for brochures; information and answers to your questions; an accessory completion guide to help you pick everything you'll need to complete your kit; and product section introductions written by R/C expert Bill Baxter. This catalog will put the wonderful world of R/C at your fingertips, as well as serve as a complete reference manual. Price: \$1.50 U.S., \$5.00 foreign. Direct only from Tower Hobbies.



DECALS

A new, innovative manufacturing process allows Pica Products, 2657 N.E. 188 St., Miami, Florida, 33180 to reproduce authentic markings on an incredibly strong and thin Mylar sheeting. Pressure sensitive for ease of application, the colors are fuel proof and fade proof. The decals will lay as flat as a painted marking. A rich assortment of styles are available ranging from World War I to current insignias. Look for these new decals as well as other fine Pica Products at your favorite hobby store.

SUPER SANDER

Stanfield Mfg. Co., P.O. Box 6333, Ft. Worth, Texas 76115, introduces their Super Sander available in 1, 2, or 3 foot



models. Refills are also available. The features of this revolutionary all aluminum multi-purpose hand sander include 150 grit E-Z flex Metalite cloth, E-Z grip handle and 1" x 2" extruded base. Prices are: 1'-\$4.95; 2'-\$12.95; 3'-\$13.95. Refills are \$2.50. Available at your hobby dealer or direct from Stanfield Mfg.



MINI POWER TOOL

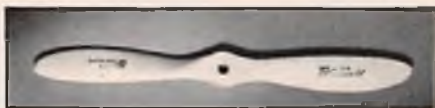
A precision mini power tool has been introduced by WEN Products, Inc. This convenient little grinder will make a welcome addition to your field box as it operates on 12 volts DC. It features a high performance vented motor with a no-load spindle speed of 14,500 rpm. The 3/32" and 1/8" collets supplied with the grinder accepts all standard grinding and cutting tools. WEN has a 12 VDC power supply that operates on 110 VAC house current and a 21 piece accessory kit of cutters, grinders, buffers, and mandrels. The grinder is priced at \$12.95 and is available at your local hobby shop. The entire line of WEN hobby tools is distributed by California Hobby Distributors, 415 South Palm Ave., Alhambra, Calif. 91803.



DASSAULT MIRAGE III

Do you want to enjoy the thrills of flying a high performance jet fighter? The Dassault Mirage III is now available as a production semi-kit from Jet Hangar Hobbies. It is a ducted fan powered

model that performs in a 105-130 mph range dependent upon barometric and atmospheric conditions. Maneuvers are solid with the capability of performing the Stand-Off Scale pattern. The kit includes a lightweight epoxy fiberglass fuselage, air inlet ducting, engine cover cap, vacuum formed drop tanks, control horn fairings, intake diffusers, clear plastic canopy, and detailed drawings. The built-up wing plan has patterns for all parts. The semi-kit is priced at \$129.95 (Calif. res. add 6% tax) FOB Lakewood, California. Jet Hangar Hobbies has ducted fan units, engines, tuned pipes, and a complete line of accessories and parts required to complete the model. For additional information and price lists send a self addressed stamped envelope to Jet Hangar Hobbies, 12554 Centralia Rd., Lakewood, Calif. 90715. Phone (213) 860-7612.

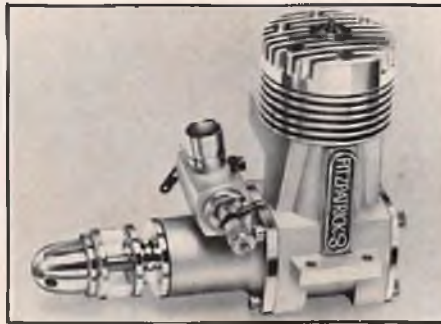


TOP FLITE EXPANDS MAPLE PROP LINE

One of the most complete lines of maple props is available from Top Flite Models, 1901 N. Narragansett Ave., Chicago, Ill. 60639. Precision crafted of rock-hard, straight grained maple, Top Flite provides the right prop for all types of flying. Included are free flight, control line, slow and fast combat, speed flying, R/C pylon racing, sport scale, scale and pattern flying. Featuring a high luster, fuel proof finish, each Top Flite maple prop gives more flights per dollar by reducing splintering and nicking in virtually all flying conditions. Each also features accurate balancing, true aerodynamic pitch and a highly efficient airfoil to deliver maximum thrust. In addition, quality crafted Top Flite maple props lessen vibration and allow you to tighten the prop nut securely. Contact your local hobby shop for your choice of rock-hard maple Speed, Pylon, and Super-M maple Top Flite and power prop designs, plus a free copy of the latest up-to-date prop chart.

THE NEW AMERICAN FITZPATRICK .60 ABC SUPER SCHNURLE

Six years of engineering development, field testing and actual performance figures document that the new American Fitzpatrick .60 has top-end muscle much beyond that currently available. Robust and ruggedly built, yet finished like a beautiful, expensive jewel, each Fitzpatrick .60 is selectively custom hand fit and assembled into a fine masterpiece. New



internal design innovations coupled with ultra-precision machining and workmanship achieves an extraordinary level of reliability and brute torque power on ordinary sport fuels and standard pattern and scale props. Incredible quality provides 1000 to 2000 R.P.M. over its nearest competitors. Also an advanced ABC piston cylinder assembly insures ultra-reliable starting and superb out of the box performance with absolutely no breaking-in required. Unexcelled idle, quick response and smooth transition are features of its special carb. Being completely manufactured in California, USA, the Fitzpatrick .60 (the super engine) assures immediate parts availability and service. Now available direct only for \$150.00 from Swiss Craft, 7342 Fulton Avenue, North Hollywood, California 91605.



EXPAND'R

EXPAND'R is an excellent quality expanding rubber mandrel for use with 1/2" diameter spiral bands. A convenient feature is the knurled shaft that permits the band to be replaced with no tools needed other than your fingers. One of these little sanding drums in your Dremel tool can be the handiest tool in your shop. They are available at your hobby shop for \$1.79 or order direct from Hobby Products, 18719 Covello St., Reseda, Calif. 91335.

THUNDERBIRDS T-38 TALON

R/C Kits Mfg., 353 Briar Ave., North Canton, Ohio 44720, introduces the Thunderbirds T-38 Talon. It is a Stand-Off Scale T-38 Talon as flown by the famous Air Force Thunderbirds. A beautiful jet, a beautiful model. This



model will do all the Thunderbird aerobatic routines. Rolls and point maneuvers are crisp and precise just like the real aircraft. The Thunderbirds manual included in the kit shows complete paint scheme and three views. Everything needed for scale presentation. Construction is foam wing and stab, balsa fuselage. The kit features complete rolled plans and instructions; formed canopies; complete cockpit detail shown; select balsa, all sheeting included; foam wing and stab; Thunderbird manual, full color photos and 3 views. The price is \$89.95 from R/C Kits.



BIRCH AIRCRAFT PLYWOOD WING SKINS

The finest grade birch aircraft plywood available. Light weight and much stronger than balsa. For covering wing and stab surfaces. Very smooth and easy to finish. Giant 48" x 48" sheet. .020 thick in protective shipping package. Available from your hobby shop or direct from Wing Mfg., P.O. Box 33, Crystal Lake, Illinois 60014. Price is \$19.00.

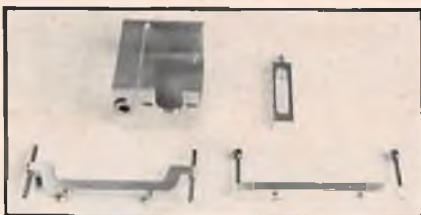
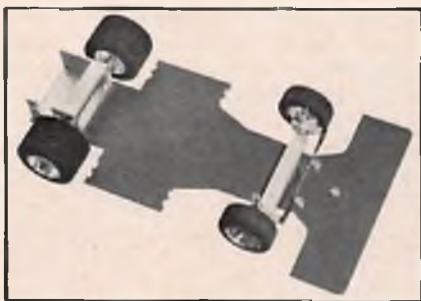


R/C TANK

New from Monogram Models is the radio controlled 1/32 scale Leopard Tank. With a range of over 12', the tank steers right and left with the solid state

to page 94

transmitter. The tank has the power to climb obstructions and steep inclines, crash through barriers, and be guided through tight obstacle courses. Four plastic "cone" barricades are included with the set. The ready to run tank requires three "C" and two 9-volt batteries (not included). Battery compartments open easily, yet latch securely. The flexible rubber treads provide excellent traction on most firm, dry surfaces, indoors and out. For further information write to Monogram Models, Inc., 8601 Waukegan Road, Morton Grove, Ill. 60053.



NEW STUFF FROM THE OTHER POTTOLS THROTTLE SHOP

1/12 scale electric car components, shown here mounted on the Super Kydex Chassis. Front axles at \$8.95 and \$9.95 are designed to utilize either MRP or Jerobee spindles. The modular rear end motor mount combination at \$17.50 is available in mid or rear motor configuration. It's also fully adjustable to allow for gear ratio changes. Both rear module and axles are complete with tapped holes and hardware. Other items include Hex Adapters, to mount all hex type wheels onto round axles, at \$7.95 a pair. And last, but not least, a perfectly

engineered Gear Puller for \$4.95. To order write to The Other Pottols Throttle Shop, P.O. Box 992, Saratoga, Calif. 95070.

CHERRY MOUNTAIN DESIGN

The T-shirt as an advertising medium is well known and is as much a part of the American way of life as nitro and helium! Flying in the New England climate, however, has persuaded us that there may be a market for an alternative --- for those chilly sessions on the slope or by the lakeside --- hence the Turtleneck! Cherry Mountain Design has selected the best quality 100% cotton "Skyr" garment to introduce the turtleneck to the modeling world. Already worn by many professional race drivers, pilots, skiers, these garments are comfortable and durable. More important, your logo is still visible even if you are muffled-up against the weather. There are fifteen colors of turtlenecks and any color ink can be used for the print including multi-color. Sizes: Men & Ladies Small, Medium, Large & Extra Large (T-shirts in childrens sizes). Price: Turtleneck, \$8.50 each; T-shirt, \$2.60 each. Prices vary according to number of colors in design and quantity ordered and are subject to change. A 10% deposit is required with the order on all new accounts. All orders are shipped UPS and are C.O.D. Available from Cherry Mountain Design, P.O. Box 1303, Conway, New Hampshire 03818.

GUARANTEED TWIST DRILLS

Arvid L. Anderson, Frederic, Wisconsin 54837, introduces his registered Guaranteed Twist Drills. They are all guaranteed against breakage. Of course they can be broken by misuse, abuse or misfortune, but you will never pay the full price for the replacement when the purchase has been registered. When used with their special Drill Saver Lubricant at the correct speed and pressure, they will drill, lead, aluminum, copper and other dense metals along with other materials used by all model builders. When you purchase their complete set of 31 drills, (not the usual 20) and return the registration slip, every drill you bought is covered by the manufacturer's guarantee. Available at your hobby shops or contact Arvid L. Anderson.

REPLA-TECH INTERNATIONAL

Available from Morrison Repla-Tech International, 48500 McKenzie Highway, Vida, Oregon 97488, is their catalog No. 5, 1978 edition.

Listed are dozens of aircraft, missiles, and warships scale drawings that have been accurately produced. Among the drawings of propeller driven aircraft that are profuse with details and cross-sections suitable for scaling for R/C usage are: Starduster Too, Zlin



Z-50L, Modified Akrosport, Saab Safari, Polen Special II, Cessna Agwagon, Stolp Starlet, Polish Wilga, and Russian YAK-50.

Scale enthusiasts will find the catalog well worth the price of \$1.00.



DUMAS DRAG'N FLY

From Dumas Products, 901 E. 17th St., Tucson, Arizona 95719, comes the venerable Drag'n Fly hydro which has been one of RC racings "old standbys" for many years and is being reborn! Many model boaters possibly don't know it, but the original Drag'n Fly kit was developed from a full size, very successful outboard hydroplane. Based on this fact, Dumas "The Model Boat People" modified the Drag'n Fly 20 hydro for the 3.5 outboard. Prototype testing proved excellent results. Just goes to show that good outboard hydros make good outboard hydros! The Dumas Drag'n Fly 20 Mark II outboard hydro kit is plywood construction and comes with complete instructions for pickle forking the bow, as shown, if desired. Available from your hobby shop now. □

ROYAL CHEVRON SERVO

from page 84/82

(over output arm). It weighs just over 2 ounces (2.1) and comes in an attractive gray and black case. The output disc and arm furnished with the servo are bright red. Here is a list of good design features I found in the Royal "Chevron" servo: Good ease of assembly; strong and solid case; three screws retain top of case — easier access to gears; strong and smooth operating gears (minimum backlash). Connector cable comes out of top side of servo; output shaft is splined — easy top side adjustment and

centering; output shaft is ball bearing supported; gear ratio may be changed to use as retract servo; availability in 10 and 6 ohm motor size.

I found the Royal "Chevron" to be an excellent piece of equipment. Outstanding in performance and dependable. If you're interested in a servo with real "guts", why not buy a "Chevron." I am most satisfied with mine. You can order yours from Royal Electronic Corporation, 3535 S. Irving St., Englewood, Colorado 80110. Phone (303) 761-5960, priced at \$38.95 in kit form or \$69.95 assembled. Royal has a good selection of connectors to match your set. However, in case they don't, it is recommended that you get in touch with your nearest service center and not the factory. □

SANDING & SHAPING SYSTEM

from page 77/76

initial stiffness has been tamed. Need an in-between grit now and haven't any well-used paper? Break the new papers crispness over the edge of any stiff metal edge, a shovel, your car bumper, any heavy sharp metal edge.

Particularly troublesome for beginners seems to be shaping the slight angle required on the ends of cross members to match the curving longerons as they converge at the tail and firewall of the fuselage. Another problem seems to be producing the diagonal ends required on the braces used in the common Warren truss fuselage construction, as well as parallel sides on sheeting used for wing spar webbing. The Shirley system can't assure accurate cutting of such pieces to length, but if the proper angles are approximated and the pieces cut slightly long, the sand-to-fit technique will produce accurate joints — with a bit of industry and patience.

The mechanical system consists of three tools: a sanding block, a sanding table (adapted from the familiar office paper cutter), and a sanding pad — a square section of cellotex or other firm, cushiony material.

In use, the sanding table is placed on the pad to protect the workbench and to provide a frictionless surface for the sanding block. The work is cut slightly oversize then held firmly against the fence with the edge to be shaped projecting slightly over the side of the table. The sanding block is used on edge, with the sandpaper vertical. Slight down and side pressure on the sanding block, with a smooth to-and-fro stroke, will rapidly produce a clean, square edge on the work. Try the work for fit on the model and repeat as necessary.

The success of the system, in producing square ends on the work, is

due to the accuracy of the sides of the sanding block and sanding table, as well as the squareness of the fence to the table. Care spent in gluing the fence accurately to the sanding table will be reflected in the accuracy of the work produced. Eventually, with use, sides of the sanding table will be worn out of square, however, one or two dressing passes against a sanding disc will restore the original accuracy. The parts are almost indestructible in use; I have been using my present table for more than five years, building professionally, and the table is still as good as new although it is somewhat smaller than it was when it was originally made.

The sketches depict the parts for the system and illustrate typical chores. You will probably discover additional techniques as you work with the tools and will soon wonder how you ever got along without the system.

A final suggestion — make several sanding blocks, you can never have too many. Nothing is more frustrating than to be faced with a lot of coarse sanding and having only well broken-in paper available. Periodically, I reload several blocks with 80 grit so that I always have four or five fresh and waiting. □

CAP'N DICKS COCKPIT

from page 75/74

Larry Bennington kicked off the bash with his OPS piped .60 powered Vertigo. Larry is a prolific builder — had a fine assortment of machines out to the flying yard. His original high wing spot landing/cross country ship (powered by an Enya .15) holds the club endurance record of approximately 2 hours, 45 minutes.

"Would have been longer," says Larry, "if my official witnesses had not made me land so they could attend a football game. There was still 14 oz. of fuel left in the tank. Sure was mad!" (Can't win 'em all, Larry.)

Larry's bird features a 6' span with 2' plug-in panels at the tips. It weighs 2¾ pounds dry, and uses RS radio gear. It was flown for the demonstration by Gary Smith - - - good performance.

Another prolific builder out in force was Steve Keller who displayed a beautiful Pitts, and cranked up a 'dog house' that really tickled the crowd.

Travis Smith, who is an instructor with the 533 Field Training Detachment at Hill flew a Bridi Sun Fli 2 powered by a hot K & B .40. He uses a Kraft Expert radio.

Forest Burnett did his thing with a Hobby Market Half Fast with OS Max FSR .40.

John Perri and Bud Pannier of IMPRA (Inter-Mountain Pattern & Racing Assoc.) were guests of the Ogden club. John 'wowed' the folks with a super

chopper demonstration using his reliable Revolution. Bud flew a Jemco Corsair powered by an OS .40 with Robart Pump.

The time allocated on the program for R/C flying was one hour, but static displays were available for viewing in Hangar #1 throughout the day. Cal Adams was manning the booth and doing a good job answering questions.

The remainder of the afternoon was spent mingling with the spectators, observing F-4 and F-105 fly-by's, para-rescue demos, and climbing all over those hot USAF and Navy blow torches that I'd give most anything to fly...

Not long ago, after coaxing that 'aluminum overcast' that I drive up to 41,000 feet to top some thunder bumpers, I was passed like my brakes were locked by a twin-tailed Eagle that was really moving out — and just a speck in the sky above. Had to be close to Mach 2! Now I had the chance to crawl all over an F-15 and view its 'innards.' What a magnificent chunk of iron!

The 'Northern' boys and the gang from Hill AFB really deserve an 'atta boy' for propagating our hobby in such a professional manner. Thanks! And a public thanks to the United States Air Force from this writer for making it all possible.

See you on my next layover.
From Cap'n Dick's Cockpit.



Taken from Cap'n Dick's Cockpit with his new 205mm lens, is this "unusually named" DC-3 parked at the Winnipeg Airport. He was taxiing his DC-10 out for take-off when this was spotted. □

FAIRCHILD PT 19

from page 73

Next, the wing was covered with clear MonoKote to give it a smooth finish due to the fact that the real PT-19 wing was covered with plywood. The fuselage, rudder, elevator, and ailerons were covered with Coverite to give a scale appearance.

To add a bit more realism to the model I used some Zinger panel tape on the ailerons, elevator, and rudder, to simulate ribbing under the fabric covering. At

to page 98

OS

from
**WORLD
ENGINES**

OS Grows

As the years go by it becomes more and more of a challenge to discuss the many ramifications of the OS enterprise, particularly when one is confined to a single written page. OS seems to be always coming out with something new.

90 Pictured on the right are prototypes of their coming 90 and their four cycle 120 twin.

H We have taken a picture of the OS Max 40 R/C, Series H. This is the non-Schnuerle variety. This type of engine is good for beginners because it is more tolerant to a wider range of propeller selection than is a Schnuerle engine. This engine will generally run better in the hands of a total novice.

New The radio shown is a new entry into the two and three channel market by OS. The locomotive shown at the bottom of the page is the 1880 vintage Porter Mogul, 1" scale, which runs on a 3½" track. OS offers a beautiful kit which does not require a machine shop to finish the pieces. It will run on propane or coal.

FSR This 60 was marketed as the OS Blackhead 60. Both the 40 and the 60 were top of the line OS engines before they introduced their Schnuerle engines. These engines have been retained in the line because they are outstanding sport series engines. They produce almost as much power as the Schnuerle engines as well as having a much wider latitude and propeller selection, and are easier to adjust. They are also substantially lower in price as to their Schnuerle relatives, the OS 40 FSR and the OS 60 FSR.

We received a large shipment of the OS 40 engine in June, 1978 and will be receiving a good shipment of the Blackhead 60's in September, 1978.

When Prices have not been set on the OS 90 and the twin. First issue of the OS 90 production should arrive in the U.S.A. in early 1979, and that should be followed by the four cycle twin. This series of OS two and three channel should be available by January, 1979.



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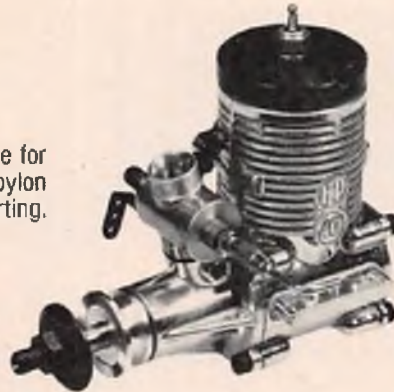
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FAIRCHILD PT 19

from page 95/73

this point the entire plane was primed with K & B primer; when dry it was sanded off lightly. I then masked off the rudder and elevator and painted rudder, elevator, stab, and wing all at the same time with Aero-Gloss Cub Yellow. By using the Aero-Gloss the fabric look on these parts of the plane stood out more. The remainder of the fuselage was painted with K & B Corsair Blue.

Having completed this much of the model, I began mounting the radio gear. After the radio installation, I detailed out the plane for a scale appearance. The decals were applied and scale handles for moving the plane were made and put on the tail and wing tip as shown on the plans. Also added were crash bars, exhaust stacks, windshields and Robart Scale wheels. Black fuel line was added around the cockpit area to simulate cockpit combing. Two Williams Brothers pilots were painted and glued in place to finish out the model. The photo was taken before the model was completely detailed.

Once more the balance was checked and the plane was ready for its maiden flight. I range checked the radio and did some ground handling. Taxiing at slow and fast speeds showed the plane to have very good ground handling characteristics. Following the take-off procedure as described in the instructions gave a very smooth take-off. If flying from a grass field, we found take-offs are easier if the landing gear is bent forward slightly. It will prevent a nose-over. Only a little trim was required to achieve a very smooth first flight.

Jim Meister has included his flying manual in the kit which will be a great help to both the beginner and more experienced pilot.

I always try a stall at slow speeds to check the stall characteristics of a new model. I found the plane handled well at slow speed stall and that rolls and loops were also smooth and gentle. Landing the plane proved to be a piece of cake. Of all the radio control planes I have flown, the Jemco PT-19 is one of the easiest to land.

In conclusion, I found the Jemco PT-19 to be a high quality kit, which builds easily and quickly. Documentation is readily available for those who choose to compete with it. It can be docile for the beginner or detailed out for the competitor. In short, I found it to be a fun airplane, and a good value for the price.

Note: The review or discussion of any product by RCM does not constitute an endorsement of that product nor any assurance as to its safety or performance by RCM. □

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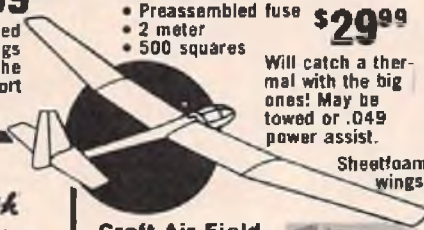


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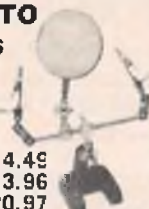
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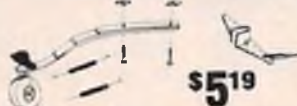
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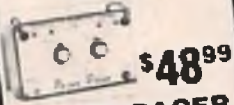
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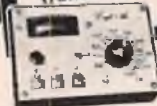
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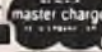


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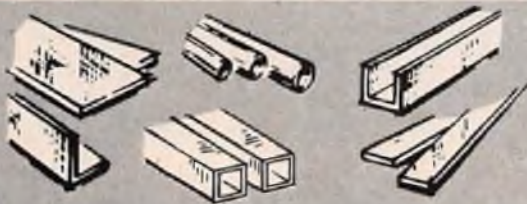


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133	5/16	50
134	11/32	55
135	3/8	60
136	13/32	65
137	7/16	70
138	15/32	75
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140	17/32	85
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232	9/16x1	35
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235	9/16x1/2	20
236	9/16x1/2	30
237	9/16x1	55
238	9/16x3/4	50
239	9/16x2	100
240	9/16x1/4	20
241	9/16x1/2	35
242	9/16x1	65
243	9/16x3/4	50
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BRASS ANGLE (12")		
STOCK NO.	SIZE	PRICE EACH
171	1/8x1/8	30
172	5/32x5/32	35
173	3/16x3/16	45
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175	1/4x1/4	65

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184	7/32	65
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SOLID BRASS ROD (12")		
STOCK NO.	SIZE	PRICE EACH
159	020	08
160	1/32	08
161	3/64	12
162	1/16	20
163	5/32	25
164	1/8	40
165	5/32	50

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192	033	06
195	047	06
197	055	06
199	061	05

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KS 176

Association and have ordered some of their construction manuals in order to learn enough about home-built construction in order to apply it to the construction of what might better be termed miniature aircraft than models.

I don't mean to scare you off building a large model, but do be aware that there are some pretty significant differences between the biggies and ordinary models. The most satisfying of these differences is the way these birds fly. They are nothing short of majestic in the air, they never cease to attract attention wherever they are flown (and win converts to Super Scale!) and they are fun to fly. Touch and go's are a breeze with most large models, landings are more fun than they ever were before (especially in a cross wind) because the big models just fly better and more realistically than anything else. Quadra powered models even smell more realistic than models.

Hopefully more of the manufacturers will climb onto this band wagon and either make kits that will handle the stresses being applied to model airframes, and will also use woods better suited than balsa is to the type of construction required. Hopefully this will also lower the cost of building. Also, it is to be hoped that more of those supplying us with plans will indicate that other woods than balsa can be used in these large models. I mentioned in an article in these pages last year that I had built Sid Morgan's J-3 Cub for under \$25.00 which, admittedly, included some material from my scrap box. This low cost was attained by the use of spruce which I cut to the required sizes myself, using a radial arm saw. I have since used yellow cedar, red cedar, poplar and pine, and have heard from many others who have experimented with the soft woods available in their areas. The principal criteria for wood is that it be fairly light (but not so light as balsa, obviously), be straight grained and clear and, above all, be readily available and relatively inexpensive. Beyond that, do your own thing, wherever you are.

Mahogany door skins make a good source of material for ribs and formers as will other light plywoods. While I have not used it as yet, some tell me they are using an Arborite backing material for wing ribs. Apparently it cuts well, glues quite well and satisfies the other requirements of low cost and ready availability. If you do as others are doing and look around you, with an open mind, you, too, will find sources of materials for the construction of these miniature aircraft that won't break your pocketbook obtaining them.

I mentioned earlier that I had joined the EAA for the purpose of obtaining their construction manuals and any other information which might apply to the type of construction we are doing

to page 112

SUPER SCALE

from page 72/71

present kits are not suited to the power of engines such as the Quadra and require considerable modification in construction and materials to be a safe and satisfying model to fly.

One correspondent has suggested, as mentioned in my last column, that we should be scaling down from home-built construction, rather than scaling up from model construction. For this reason, I have joined the Experimental Aircraft

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This is the Sigma-Ace .19 size dune buggy distributed by Leisure Electronics.

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BOLINK 20%
ELECTRIC OFF
CAR



This 2 channel 1/12 scale electric car comes already assembled with 05 motor, nicads, & charger & goes over 25 mph.

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CRAFT-AIR 33%
FIELD BOX OFF



It's ready to use, not a kit, made of lightweight indestructible polyethylene. 22" long & holds everything. A SUPER BUY!

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CRAFT-AIR 35%
HI-START OFF
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Features reel, tubing, towline, parachute, stake, tow ring, and strong construction. For sailplanes of 100" wingspan and larger.



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AIRTRONICS 30%
OLYMPIC II OFF



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ZINGER 35%
WOOD OFF
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Two popular sizes--Stock up now on these high quality props!

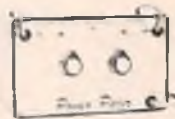
10X6 WOOD PROPS(6)

RETAIL NOW ONLY \$5.48
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POWER PACER 20%
BATTERY OFF
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A new ni-cad battery tester, cycler, and charger. Works great!

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\$59.95
9.6 volt Stock #PWR80096
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S&O BATTERY 35%
TESTER OFF



Test all aspects of your batteries with this high quality tester.

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\$24.95 Stock #BRI86100

GOLDBERG 40%
SKYLARK 56 OFF



Fun to fly sport airplane with pattern capabilities. 56" span. .30 to .40 size engine, all balsa construction. Finally available!

RETAIL NOW ONLY \$26.98
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SPECIALS GOOD UNTIL OCTOBER 15th, 1978 ONLY

ZAP ZAP ZAP ZAP
50% OFF



Zap is a Super Cyanoacrylate adhesive that is super fast setting. Large size comes with extra applicators. Limit of 6 per order.

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DUMAS 35%
HOT SHOT 21 OFF



This fiberglass tunnel hull with pickle fork bow is 27" long and is very competitive. Add the K&B .21 outboard engine and a 2 ch. radio and go!

RETAIL NOW ONLY \$44.18
\$67.95 Stock #DUM70413

GOLDBERG 38%
HANDI TOTE OFF



This flight box is compact yet has room for everything you need.

Most popular flight box ever made!

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HOT STUFF 44% OFF
HOT STUFF



Hot Stuff is an instant bonding cyanoacrylate super adhesive that is a must for modelers. Stock up now at this super price. .5 oz.

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K & B .40 40%
RC ENGINE OFF



The most popular .40 ever made! Features a Perry carb.

Quantities are limited. Limit of 1 engine per order until sold out.

RETAIL NOW ONLY \$39.98
\$67.50 Stock #K&B01040

DU-BRO 40%
KWIK FILL FUEL PUMP OFF



RETAIL \$10.95
NOW ONLY \$6.98
Stock #DUB20191

HOUSE OF BALSA 30%
P-51D (.29-.40) OFF



This all balsa sport, stand-off scale ship is beautiful. It has a 49" wing span and takes a .29-.40 engine size.

RETAIL NOW ONLY \$38.48
\$54.95 Stock #HOU73000

K & B .61 40%
R/C ENGINE OFF



The most popular .60 engine in the R/C hobby!

This outstanding engine features a Perry carb and muffler.

RETAIL NOW ONLY \$53.98
\$90.00 Stock #K&B01161

TOWER HOBBIES 50%
R/C LONG GLOW PLUGS OFF

These excellent glow plugs feature an idle bar. Made by the world's finest plug manufacturer especially for Tower. 6 plugs per package. The best buy anywhere!



RETAIL NOW ONLY \$3.58
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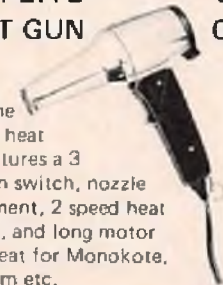
STERLING 40%
1/2 A CORSAIR OFF



This all balsa 36" span kit features special hardware and decal sheet. Requires a .049-.10 engine and a 2 channel radio.

RETAIL NOW ONLY \$17.98
\$29.95 Stock #STE72036

TOP FLITE 36%
HEAT GUN OFF



This fine quality heat gun features a 3 position switch, nozzle attachment, 2 speed heat control, and long motor life. Great for Monokote, Solarfilm etc.

RETAIL NOW ONLY \$17.98
\$27.95 Stock #TOP45301

DUMAS 24" 40%
HOT SHOT TUNNEL HULL OFF



This die-cut mahogany and birch plywood kit is designed for a 3.5 cc outboard like K&B's.

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COX READY TO FLY SPORTAVIA
THE PERFECT TRAINER

30%
OFF



This completely ready to fly molded foam trainer with 70" wing span is unbelievably easy to fly. Has two piece wing for easy transportation. Comes with .049 engine installed. Install the Sanwa 2 channel radio or other 2 channel radio and you're ready to go!
RETAIL \$69.95 NOW ONLY \$48.98 Stock #COX72402

COX READY TO FLY
CESSNA CENTURION

This all molded foam scale model comes complete with a Cox .049 engine, prop, push rods, horns, and all other fittings already installed. 36" span, Cox 2 Ch, recommended.
RETAIL \$54.95 NOW ONLY \$38.48 Stock #COX72401
The Cox/Sanwa 2 Channel radio fits perfectly into this model. Must be purchased separately.
RETAIL \$109.95 NOW ONLY \$69.98 Stock #SAN88522



DREMEL
MODEL 381
MOTO-TOOL
WITH FULL
ACCESSORIES

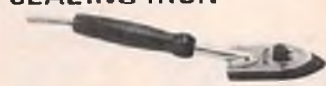
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The Model 381 is the ultimate in hand grinders. It features variable speed control, ball bearings, and full accessories.
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SEALECTOR
CUSTOM MODEL
SEALING IRON

33%
OFF



This custom model is great for covering with Monokote, Solarfilm, etc. It features adjustable temperature, teflon shoe, and a handy stand. Excellent quality.
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MILLER
No. 2017
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40%
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Complete set includes a 12 foot air hose, compressor, spray gun, air brush, and nozzles.
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STARTER

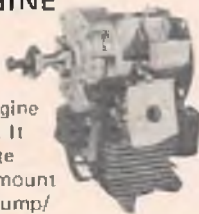
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The Sullivan electric starter is a high torque, high R.P.M., 12 volt starter. Limit of 1 per order.
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QUADRA 2 CUBIC
INCH ENGINE

The perfect engine for the biggies. It comes complete with muffler, mount and Tillison pump/carb. Longlasting.



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EPOXY IN
ECONOMY
9 OZ. SIZE



Now in squeeze bottles for your convenience. Limit of 3 per order.
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DREMEL 572
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33%
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FALCON 56

40%
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This all time best seller is now redesigned with ailerons. 56" span, 15 - 35 engine, all balsa construction. An excellent trainer.
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\$214.98



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KP-6A KRA88262 \$214.98

We believe these sets offer by far the best value in the radio control field. They are identical except for the difference in the number of channels. The 4-channel can be converted to the 5 or 6 channels when the customer desires. Contest type open gimbal sticks are featured for accuracy and smoothness in control. The miniature receiver incorporates a double tuned RF section with exclusive noise and interference rejection circuitry. For convenience, the receiver antenna plugs in. The rugged KPS-1411A or KPS-1511A servos are standard. Systems include a transmitter, 4 servos, receiver, rechargeable receiver and transmitter battery packs, charger, switch harness and servo tray.

*Note, 1977 and 1978 Sport Series systems feature a longer than normal digital time base for greater simplicity. Therefore, they are not compatible with other Kraft systems or components but a complete line of accessories is available to Sport Series specifications.

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SERIES SEVENTY-EIGHT

\$369.98



KP-5C KRA88252 \$269.98 each KP-5CS KRA88251

The KP-5C and KP-5CS five channel systems establish an entirely new level in quality and performance in the medium price field.

The transmitters feature an internal plug-in frequency module accessible by removing the back. The transmitter meter monitors relative R.F. output. A trainer system is optional and can be easily added at any time. The low cost KPR-5C five channel receiver does not have plug-in modules but is completely interchangeable without the need for matching to the transmitter. Pictured in the system are the optional KPS-1511 servos which combine great power with high speed of operation. Also shown is the optional lightweight 450 MAH KB-4M battery pack. Systems include a transmitter, receiver, rechargeable receiver and transmitter battery packs, charger, switch harness, four servos, and servo trays.

KP-7C KRA88272 \$369.98 each KP-7CS KRA88271

For competition or sport flying, the KP-7C and KP-7CS seven channel systems are loaded with features and extra controls to suit the requirements of the most complex model. The systems feature external plug-in frequency modules in both transmitter and the standard receiver.

Three function dual meters in the transmitter indicate R.F. output, transmitter battery voltage, and via a jumper cable, receiver battery voltage. For greater accuracy and long life, transmitter control pots are expensive precision instrument type. A trainer system is standard. The antenna disconnects and retracts into the transmitter case.

Optional KPS-1411 servos and KB-4E battery pack are pictured with this system. Because of its small size and rugged gear train, the KPS-1411 is an ideal all around servo. Systems include a transmitter, receiver, rechargeable receiver and transmitter battery packs, charger, switch harness, four servos and servo trays.

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31%
OFF



This popular and powerful engine comes with a muffler. Super value.

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A-JUSTO-JIG

33%
OFF



This complete wing & fuse jig holds alignment within .1%. Allows you to make up to a 6 foot wing. Fuse jig fits on without tearing down your wing jig.

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PUMPER MKII

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This "in-line" fuel pump is a simple, easy, and reliable way to pressurize any engine. Fits into fuel line. Limit of 2.

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WEBRA .61
R/C SPEED

46%
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SCHNEURLE



This outstanding engine is one of the most powerful and most popular engines on the market.

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MRC
MARTINI PORSCHE

20%
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\$67.98 Stock #MRC91202

MIDWEST
ATTACKER

35%
OFF



This all molded styrofoam kit builds fast and flies great. 48" span and .19-.35 engine. Very popular.

RETAIL NOW ONLY \$25.98
\$39.95 Stock #MID73134

ANDREWS
BIG H-RAY

40%
OFF



This 3 channel trainer has a 56" wing span and takes a .19-.45 engine. Super performance and strength.

RETAIL NOW ONLY \$29.98
\$49.95 Stock #AND73008

PICA-PLATT
DUELIST 2/40

35%
OFF



This all balsa twin is easy to fly and safe handling. It has a 67" wing span and requires two .23-.40 engines.

RETAIL NOW ONLY \$58.48
\$89.95 Stock #PLA74005

JEMCO
CORSAIR

20%
OFF



This beautiful stand-off scale favorite has a 54" span and takes a .40-.60 engine and a 4-6 ch. radio. This high quality kit has foam wings.

RETAIL NOW ONLY \$54.78
\$68.50 Stock #JEM74105

STERLING PUDDLE
JUMPER MK II

35%
OFF



This airboat has a plastic hull and cabin with balsa and plywood parts. It uses a 2 channel and a .15 to .35.

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\$39.95 Stock #STE70027

MIDWEST
CARDINAL
A.R.F.

35%
OFF



This all foam trainer has a 46" span and takes a .049 - .15 size engine. Rugged and flies great.

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O.S. MAX
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This popular and powerful engine comes with a muffler. Super value.

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DUMAS BIG
SWAMP BUGGY

36%
OFF



This rugged and stable airboat runs on water, dry grass, or snow. Really moves out with a .40 and flies with a .60. Lots of fun!

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STAFFORD
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COMMANCHE

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This museum scale twin engine favorite is always in high demand. It's all-balsa, has a 72" span, and needs two .40 engines.

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K&B 3.5cc (.21)
OUTBOARD

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MARK'S MODELS
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This easy to build and easy to fly glider has a 72" wingspan. So stable it will fly free flight without a radio. Great for the beginner!

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The super
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SIMPLICITY Best possible first engine for uncomplicated - no tinkering operation, yet more horsepower than any .80 size engine.

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SUPER SCALE

from page 102/71

and have asked them to let me know if the material is available to those who are not members. If their reply is affirmative, I'll mention the booklets available, the prices, and the address for them. I have gone through their catalogue and have found at least three which I have ordered and which I feel will contain information of value to us in our search for a better way to build. I presume their material will be copyrighted and this would preclude reprinting it here for the benefit of all. However, I'll mention in the column what results come from my inquiry.

★

I have, in the past, asked readers to send me pictures of their Super Scale projects, and would like to say a few more words about such pictures. The words 'Super Scale' denote principally large models, not necessarily either 1/4 or 1/3 full scale. They do not necessarily have to be true scale models. Super Scale applies more to the size than anything, even though most of the large birds are representative of a full sized aircraft, and almost all the plans available are for a specific full scale aircraft. I suspect this is because those of us who are tempted to get into building large models also like them to look like the real thing; we, therefore, stick to modeling full scale aircraft. Anyway, in respect to pictures, due to the process required to make a black and white print from a color print, I prefer to have black and white prints for reproduction. 5" x 7" is good, 8" x 10" better, but most sizes from Jumbo up are acceptable and usable. They should be crisp and sharp since such prints reproduce better. In each step of the process involved in printing photos in a magazine, something is lost from the original. It, therefore, makes sense that if you start with a good original, you'll end up with a decent reproduction of it in the pages of RCM. Those soft, fuzzy instant prints just won't cut it! In regard to color shots, if you would like to send me, personally, copies of color prints of your special bird, I'd be delighted to add them to my collection. Many already have and I must say I am really pleased to have them.

A brief word about correspondence. Now that we are a monthly feature here, my replies to you may be a bit less long winded than has been the case in the past. I am hurrying to get this to RCM prior to the deadline and I must have about 20 letters awaiting replies. Don't despair, I'll eventually get to them all. To all who have written offering help and new methods, who have shared their ideas with me, and who have sent

to page 114



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TRI-MOTOR**

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...in a parking lot!

The BMW leads but comes out of the curve too wide! The Maserati corners perfectly, hits the hammer and the cars fly down the straight neck and neck!

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You bet! And it could be in your driveway or even on your kitchen floor! Because the cars are from Pro-Cision's 1/16 scale racing stable. Four fabulous cars in all! Driven by Pro-Cision's famous high-speed battery powered engines!

Two Maserati Boras and two BMW 3.5 CSLs. Each Pro-Cision car has its own configuration. Each a fantastically scaled replica of the full-sized

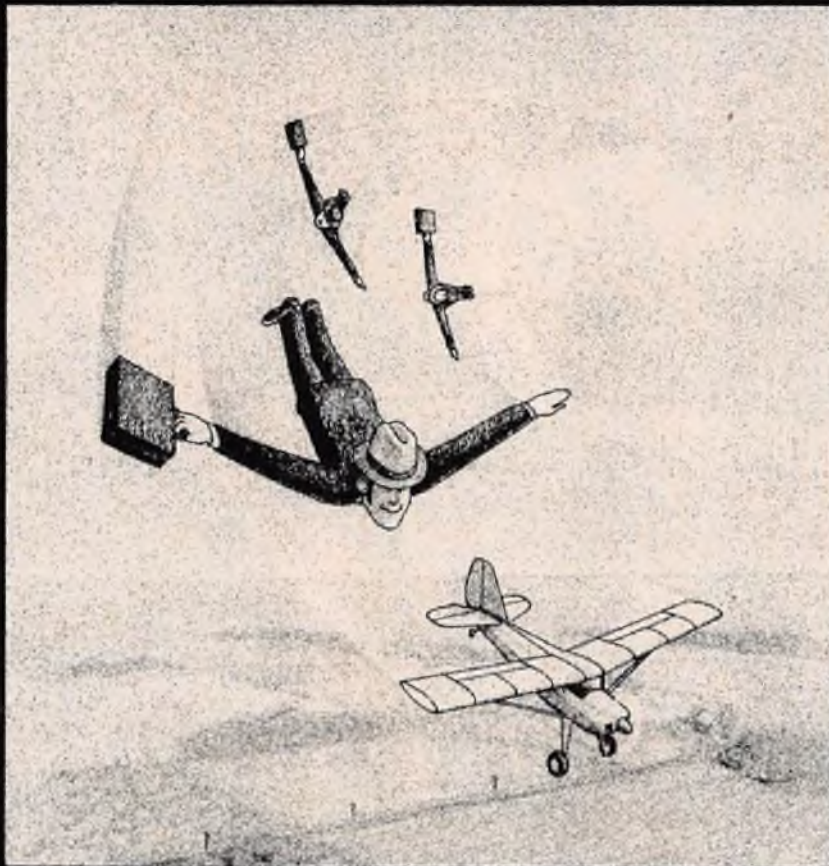
original. And each has its own frequency so all four cars can be raced at once.

Pro-Cision's handling is phenomenal. A steering wheel control on the transmitter assures you of precise steering. There's even a trim adjustment for exacting wheel alignment. And the throttle control enables you to crawl or run flat out—and everything in between! You can stop or reverse at will.

If you think racing these Pro-Cision cars is kid stuff you just haven't tried it!

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SUPER SCALE

from page 112/71

pictures of their biggies, my thanks - - it makes the chore of writing much more pleasant than it otherwise might have been.

In order to meet a deadline sprung on me rather recently, I am going to have to get this in the mail quickly, so will close off with this request. If you have an idea that has worked for you, let me know and I'll pass it along to the rest of the Super Scalers. If there is any way we, at RCM, can help you, let us know and we'll do our best.

See you next month.

POWER BOATING

from page 70/68



Bob Gregory's Drag Boat uses a Hallet Drag Hull. Length 42", Beam 10", mahogany veneer ply decking, ash wood structure, and leather tuck and roll upholstery.



Bob Gregory built the 2 cylinder, 2 cycle water cooled engine and drive train. Engine uses numerous McCoy .60 parts. Beautiful workmanship.

two big washers, about 5mm apart. Then bend up a piece of music wire to make a swivel hook and use this to attach the tow-line. I have tried fixing the black line low down on the transom (to get it as close to the water and, thus, as invisible as possible). This is okay with a skier towed directly behind the boat, but if you do it with an off-set skier, you will find, as I did, that the drag of the line on the surface of the water will not only

to page 116



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After more than a year in development, Casburn Kits has introduced the new Funette trainer this month. The flying ease of this new bird is unbelievable, and is matched by the ease of assembly. An excellent "first bird", the Funette will allow most new RC'ers to solo in half the time it took before. The Funette is destined to become the all-time classic trainer.

- 600 sq. in., 90% pre-built Balsa covered wing
- Flat bottom air foil
- Only join wing halves, add cap-strips, tips & leading edge
- Jig pre-built fuselage, you only add tail-feathers and other minor finishing
- A truly "forgiving" trailer — requiring 3 or 4 channel operation to have .40 size flying ease. Engines .35 to .40

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 per gallon in cases. Shipped
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- P51 Special \$59.95
- P-51 Deluxe \$89.95
- P40 \$59.95

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- 7 ft. tall; 60 sq. ft. room for modelers & airplane stuff!
- J.C. Power Panel (39.95) \$28.95
- 12 volt Motor cycle Battery \$13.95
- Kraft Air ESV \$15.95
- Sonic Power Panel (27.95) \$19.95
- Sonic Electric Fuel Pump \$9.95
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Four Flight Areas

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Piscataway, New Jersey 08854
(201) 885-5379

POWER BOATING

from page 114/68

cause the skier to run much closer in towards the line taken by the boat, but it will also make the boat difficult to steer accurately. So keep the towing point fairly high up on the boat. If you are going to tow more than one skier at a time, fit several points, to avoid getting the lines tangled.

Well, I guess that's it for this month, folks. See you all next time, when we'll take a look at building a jump, and actually doing some jumping. □

SOARING

from page 67

"Persons aspiring membership in the Millstone Valley Silent Flyers must exhibit proficiency in piloting gliders as evidenced by the attainment of Level I in the League of Silent Flight.

"Competitive flying is strongly encouraged since competition with other glider pilots sharpens flying skills and promotes an *Esprit de Corps* within the RC soaring community. The M.V.S.F. meet on the flying field and any pertinent business will be discussed and handled while flying or by the officers of the club.

"Members of the M.V.S.F. are expected to assist in club sponsored activities and contests. The M.V.S.F. are interested in interacting and competing with other soaring clubs."

Straightforward and to the point. I read, too many times, where just a few always seem to run the club activities.

Tom Walker of St. Charles, Missouri, sends in a "How-To" on cleaning a spray gun after using. Sounds great, but be careful.

"At one time or another, all of us have run into the problem of how to get paint build-up out of a spray gun. No matter how well a spray gun is cleaned, it seems that there will always be some paint left which will go unnoticed — Murphy's Law insures it. It is quite difficult to remove dried paint, particularly if it is epoxy, right?

"I won't guarantee this procedure to be fool-proof, but it worked for me. After spraying a coat of clear epoxy on my latest model, I neglected to clean the gun until the next day. To keep things inside the gun movable, I put a small amount of Super Poxly thinner in the paint cup after cleaning the gun and screwed it loosely in place. To my amazement, when I removed the paint cup about two weeks later, the

accumulated paint was peeling off of the inside parts of the gun. It was a very simple task to remove the old paint with a scraper. A screwdriver point worked fine for corners and cracks.

"Apparently, the vapors from the Super Poxly thinner (which contains lots of Toluol) attacked the paint quite vigorously when confined inside the spray gun. I must say that I wouldn't try this with a gun containing plastic or synthetic material as parts. My gun is all metal (with the exception of one rubber "O" ring seal)."

Two years ago I wrote about the volatility of vapors and their explosive qualities. Tom has a good idea, but don't build yourself a bomb. Handled properly, vapor cleaning is great - - - I have done it myself with very good results.

House of Balsa has got a winner. It is called UP-Right, a clever plastic device with 1/16", 3/32", and 1/8" slots for holding any of the above widths of balsa or ply vertically while pinning or "Zapping." It works well for wing ribs, especially for the uniformity in airfoil contour that is so necessary for the competitive flyer/builder.



Ted Dore and his "Ascender" two meter canard.

The Soaring Union of Los Angeles holds regular 2 meter contests and at their latest affair, Ted Dore of Hawthorne, Calif., arrived with his blue and white Canard. The 77.5" span has 663 square inches and a flying weight of 46 ounces. Ted found that the landing was a whole new ballgame. The forward stabilizer stalled so much faster than the main wing. He had to maintain a much faster, flatter landing pattern.

In closing, the L.S.F. yearly contest papers have been sent - - - I hope you were one who supported the various contests held around the country. "I lift my lid" to the winners and expect to see them compete in the finals in 1979 at the Lewis College in Lockport, Illinois. I am also pleased to see that the LSF and NSS are accepting the Two-Meter Class in National Soaring Competition.

Good lift. □

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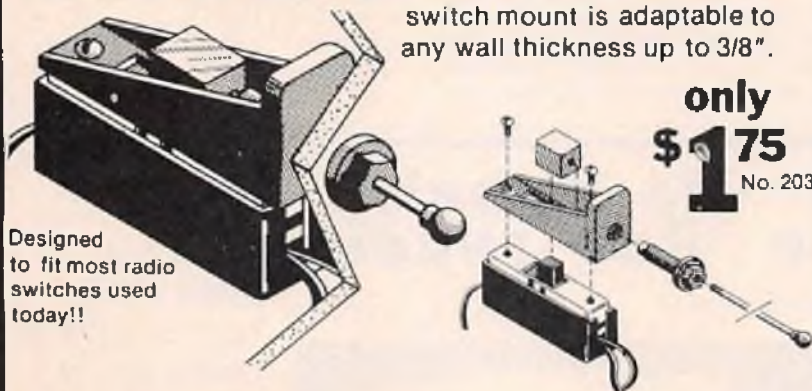
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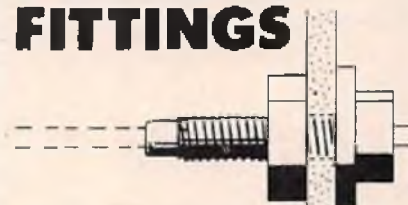
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 Engine .40 cu. in. One piece main rotor blade Clear molded canopy
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WINDFREAK

from page 66/64

fiberglass, or balsa sheeting, and have enough drag that they won't go too fast. For our purposes, all these special purpose wings are too heavy. We can do pretty well if we remember that again the forces are at the surface of the wings. In short, use "I" beam ribs (capstrips), lots of sheeting, and short wide wings. The higher the aspect ratio of the wings, the harder it is to keep them stiff. The thinner they are the harder it is to keep them stiff.

As before, the most stresses are near the root, so concentrate your efforts there. Fortunately, this is the area where we can afford to add some weight.

One final consideration with regard to maneuverability is the wingtips. I have experimented with various types of wingtips. These fall into three categories: straight, swept up, and swept down. The worst are the plain tips.

to page 120

but they usually use foam and plywood,

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VANTEC

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WINDFREAK

from page 118/64

Swept up tips were initially used on the Windfreak, but behavior in tight turns was not as good as expected. Sweeping the tips down improved turn performance obviously and, as an added bonus, winch altitude was increased. It was also possible to remove some of the washout in the wings and still maintain tight thermal turns without tip stalling.

Wing loading is a very important consideration. I have built ships that were so light that they literally would not fly, and I have also gone to the other extreme. Let me say that, although a light ship will allow for slightly better turns, the heavier one will be more stable and, in general more versatile. It

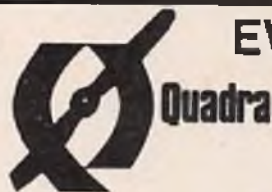
is amazing how much weight you have to add to a ship to make it truly so heavy that it will not fly well. As a general rule now, I design my ships so that I have a short nose moment and fill the first few inches with molton lead. Lead shot would also work okay, but it is not as dense. It, therefore, takes up more fuselage space and I don't have any to spare. On larger ships, the wing loading should be increased due to scale effect. I consider a wing loading of 7 oz./ft.² to be a minimum in the Windfreak. That is really too light. Better to go to 8 or 9 oz./ft.². The problem is in getting the weight around the CG. You do not want it at the extremities. Recall, also, that you are not really dealing with a 1400 in.² wing since only about 940 in.² is actually lifting. Mine came out to 48 oz. It flies well at that weight, but I think it would do better at about 55 oz. The structure is grossly strong and it should have no problem handling 80 oz. □

from page 87

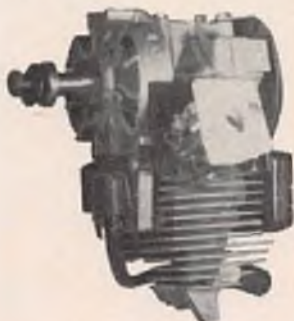
generating some serious voltage which is directly applied to the tail rotor drive shaft. The drive shaft is almost exactly the same length as the receiver antenna and there you have an instant radio problem. Simple easy cure #2; refer to Figure 1 and see where to solder a single bonding wire to the pitch control rod which runs through the gear box. The other end is grounded to the tail boom by inserting it under the hose clamp which holds the gear box to the tail boom. What this does is grounds out the static electricity being generated by the tail rotor blades and dissipates it into the whole framework of the helicopter. If you check now with an ohm meter you should read at most 1 to 1½ ohms from the tail to anywhere on the chopper.

I had the very same problem with my first Jet Ranger until I did the very same

to page 123



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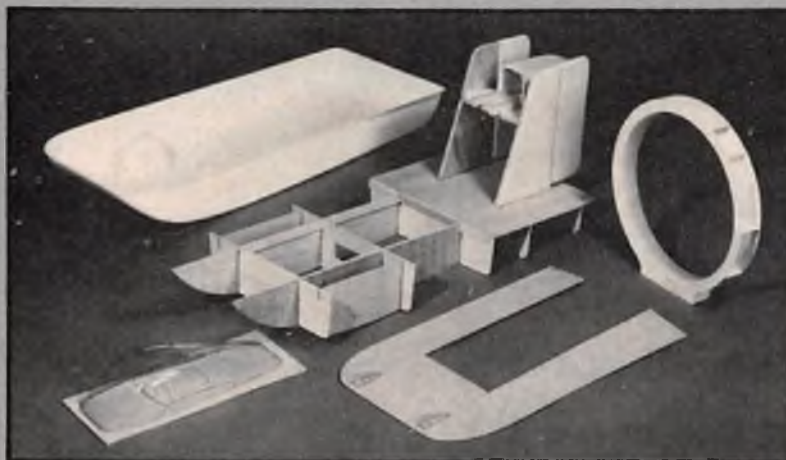
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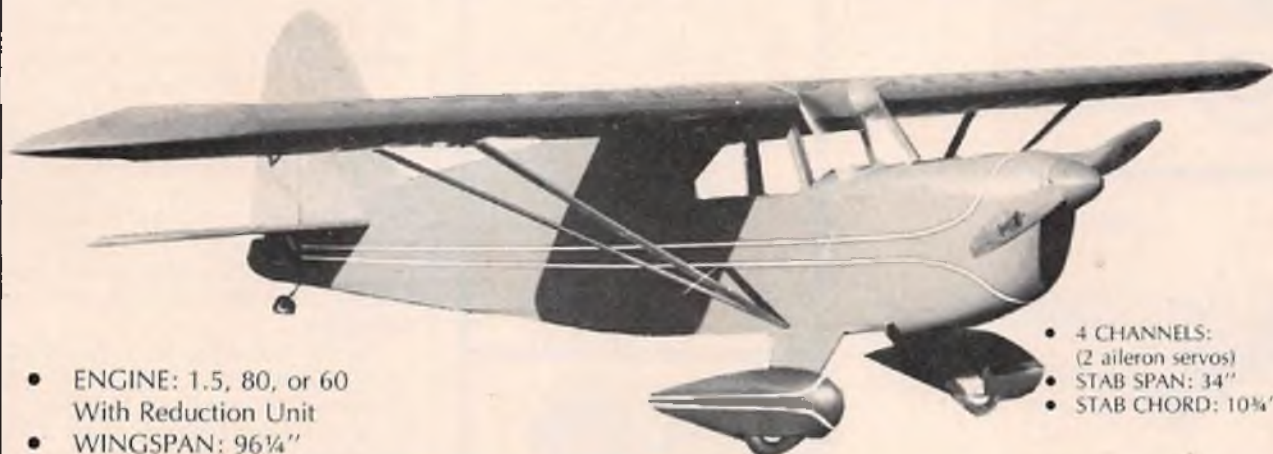
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HOVER

from page 120/87

type of bonding to tie everything to everything else to break up the static charged condition. I fought this problem for 2 1/2 months in the Ranger before I discovered the cure. We always seem to associate radio noise with metal to metal in helicopters, but it really comes from

the static that is built up by the rotors, main and tail, then if it is not dissipated it gets to the radio. Some radios are more prone to this problem than others and also the weather plays a big part. Also, in talking with a Jet pilot, they have the same problem with a static build up on the wings, etc., sometimes so bad it will blank out their radios completely. The worst conditions are very high humidity conditions or while flying through rain. It has been my experience also with the

Ranger and now the Heli-Boy, that when flying in very humid air, like after a rain or on a hot humid day, the conditions are ideal for static build up. Unlike very dry conditions being best for producing static electricity with the comb and silk cloth trick, with helicopters the static is best generated using the moisture in the air going over the rotor surfaces. Bob Hellman at Westport International informs me that this type of generator is capable of generating literally



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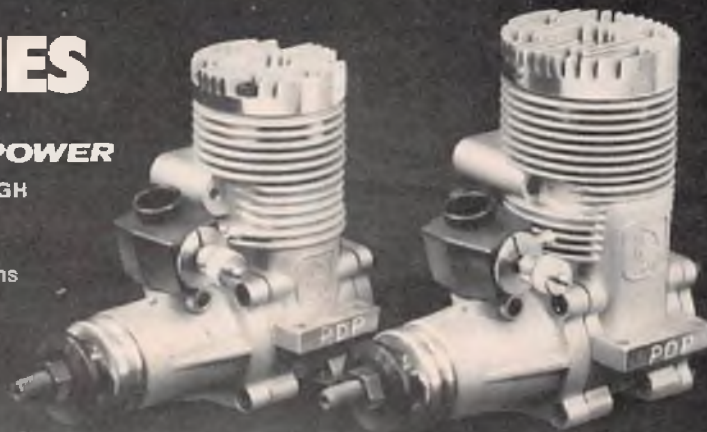
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40 PDP* Model 4200

.61 PDP* Model 6300

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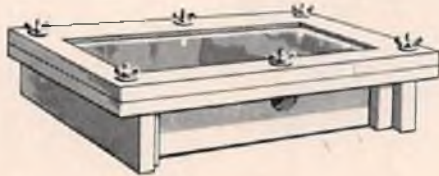


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THICKNESS	PCS. PER PACK	PACK PRICE
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Assortment Pack (see below)		13.00

Assortment Pack contains: 6-.020/ 4-.030/ 3-.045 2-.060/ and 1-.090 sheets. Any pack \$12.00 when ordered with the Formicator. ALL ABS is white only.

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thousands of volts. Well, anyway, to keep it simple just solder the wire on the shaft and ground it to the boom no matter what kind of radio you are using in your Heli-Boy and avoid any problems. Any simple wire will do but the best is the braided type wire which is made specifically for grounding applications.

With the NRCHA Nationals and the AMA Nationals just 2 or 3 weeks away, and having attended two contests in the last three weeks, I guess you could say the contest season is here. This is what we wait all winter for --- being able to get together to talk and fly with one another and so far this summer it has been great.

The first gathering or contest that I could make was the First Annual Chopper Challenge put together by Dave Darr and Bob Haden from Uniontown and Jeanette, Penn.

The contest was at the Connellsville Airport outside of Uniontown, Penn. I must admit when I looked at the required tasks for Novice, Intermediate, and Expert, the contest seemed to be too tough for everybody. For example, graduated smaller gates down to 3" rotor clearance for the Novices; a spinning take-off doing three tail spins to a 20 ft. hover; and a stall turn with a 45° descent to a non-hover spot landing in Expert. But, once we got under way, it was sheer fun. The excellent way that Dave and Bob ran the show made it the most fun contest that I've ever attended and I want to thank them for their efforts in putting together such a contest. We are all looking forward to the Second Chopper Challenge in 1979.

Novice Winners were: First, Dan Chapman flying a Heli-Boy, Webra Speed, Variant single stick; Second, Dwayne Stephens flying a Jet Ranger, Webra Speed, Custom Variant single stick; Third, Dan Sweazen flying a Jet Ranger, Rossi, Custom Variant dual stick.

Intermediate Winners were: First, Al DeCanio, Revolution, K & B 40, Futaba dual stick; Second, Bob Hayden, Super Heli-Baby, OS 40 FSR, Futaba dual stick.

Expert Winners were: First, Don Chapman, Heli-Boy, Rossi, Custom Variant single stick; Second, Ron Wiench, Heli-Boy, Rossi, two stick home custom radio.

The second contest in Elkhart, Indiana, at Cliff Bennett's (remember last year's AMA Nats) in his beautiful back yard. Unfortunately, the weather wouldn't cooperate what with high winds and lots of rain. We did manage to get in three rounds on Saturday but Sunday was a total washout. This is how they finished:

Expert: First, Bill Youmans, Heli-Boy, HP, Kraft dual stick; Second, Bob Pinto, Heli-Boy, HB, Futaba dual stick; Third,

to page 126



ID

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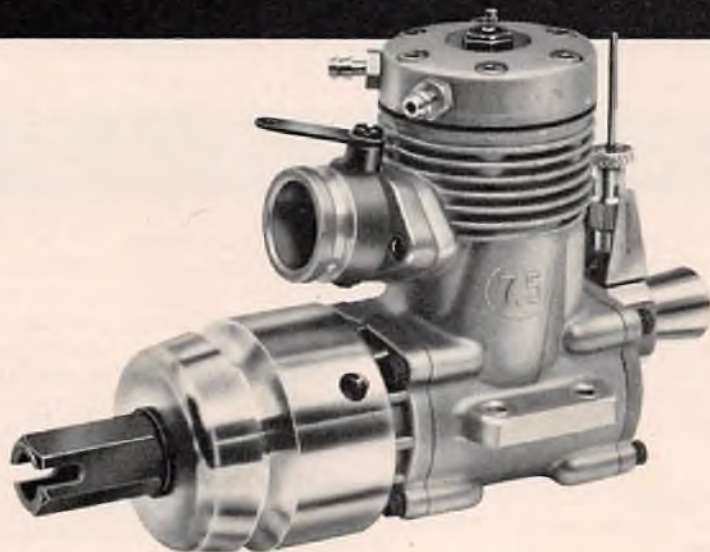
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We feel certain this new K & B 7.5cc Marine Engine will break many or all of the existing records held by the highly successful K & B 6.5cc Marine Engine. It has power to spare! It is equipped with a rear exhaust butterfly throttle and water-cooled head.

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- CHROMED BRASS SLEEVE and LOW EXPANSION ALUMINUM PISTON constitute the ABC combo.
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- BALL BEARINGS

- ROTATABLE CASE (center block) — permits changing of exhaust from forward to aft position.
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- K & B's QUINTUPLE PORTING

The K & B 7.5cc is easy to mount. If your present hull is equipped with a K & B 6.5cc and you want to add more power, it just takes minutes to install the new 7.5cc as it fits the same mounting set-up.

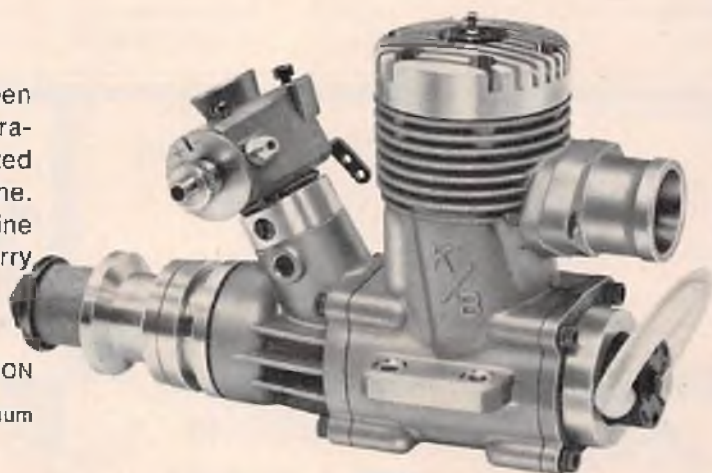
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Another sure winner! This engine has been developed specifically for Ducted Fan operation. We feel as confident about this Ducted Fan engine as we do the above Marine engine.

Now you can have a Ducted Fan engine "right out of the box," complete with Perry Pump/Pump Carburetor.

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- CON ROD — machined from 7075-T6 solid aluminum bar stock. Bushed both ends.
- BALL BEARINGS
- PERRY CARBURETOR
- HIGH PERFORMANCE HEAD — machined from solid aluminum bar stock.
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- LED indicates approximate state of charge while charging!
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HOVER

from page 124/87

Faye Peoples, scratch-built, ST 51, Kraft single stick.

Intermediate: First, John Clark, Heli-Boy; Second, Wendell Hostetler, Jet Ranger, Webra Speed, Proline single stick; Third, Tom Knerr, Revolution.

Novice: First, Dan Chapman, Heli-Boy, Webra Speed, Variant single stick; Second, Stuart Kay, Heli-Boy; Third, Dwayne Stephens, Jet Ranger, Webra Speed, Variant Custom single stick.

Maybe next year we can bribe the weatherman for better weather. During the rain we all had the opportunity to sit and talk helicopters which is usually the best part of these get-togethers.

Thanks, Cliff, for a good time and for your super back yard flying site.



Next month the AMA and NRCHA Nats will be history and I will try to have coverage of them and the latest helicopter hot talk. Until then, keep the stick forward. □

POWER PACER

from page 86

you flew at the field, you can determine what you have left. Since it would be very risky to fly a battery pack to the maximum time, you can build in a known margin of safety, rather than guessing. If you could fly for 2 hours, save from 15-30 minutes for insurance, just in case you used the servos more than usual or

forgot to count a flight.

While on the subject of calculating the flight time available on your battery pack, this unit makes it possible for you to determine your actual rate of discharge. We say actual rate because how you fly (how frequently you use the controls), the type of plane you're flying (faster flying planes have a greater load on the control surfaces and demand more current to operate), the kind of servos you're flying, how free the linkage and hinges are, and chattering or poorly centering servos all affect your rate of current drain for each flight. Find out for sure with the Power Pacer and calculate your safety margin accordingly.

You can also use the Power Pacer to check for intermittent cells. Just put the receiver pack in the discharge mode. Then, thump the battery pack. If it kicks

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Stick-On Weight

- ★ Fits into close areas
- ★ No epoxy needed
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- ★ Increments of 1/4 oz. & 1/2 oz.
- ★ Forms to contour

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Nose Weight

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Wing Span 150 in.
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OVERALL WINNER OF THE
1976 SOAR NATS

SP-5 \$139.95

SAILAIRE IS A SERIALIZED AND REGISTERED SAILPLANE.

Registered Sailable owners have been, and will be, individually contacted by the designer, Tom Williams, to advise them of any new technical developments which result from Craft-Air's on-going development program. This exclusive Craft-Air service is, of course, without charge. Just one more reason why the Sailable is the finest kit ever produced—made for those who care enough to fly the very best.

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Optional Spoiler Kit
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Pre-formed, rugged plastic fuselage—made of a plastic new to model aviation: ASA (not ABS). With the NEW INSTA-BUILD assembly method, the results are a stronger, lighter and quicker built fuselage.

Wing Span 99.8 in.
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In 1977 Windrifter SD 100's won three regional grand championships: SC² (So. Calif. Soaring Clubs), TS³ (Tri-State Soaring Society), Great Lakes Soaring League, as well as the AMA NATS (Std. Cl.).

More pilots have won more trophies with Windrifters than with any other R/C sailplane—ever.

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from page 126/86

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- brass gears
- choice of 3 gear reductions
 - 1:1 (11900 rpm)
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out of the discharge to charge mode (the red LED goes off and the green LED goes on), you have a loose internal connection. Get it fixed.

Finally, another way to safety check you nicads is to monitor them for loss of charge internally. Most battery packs will lose a charge over a long period of time on the shelf. That's why radio manufacturers urge R/C pilots to charge their R/C system the night before they fly. If the battery pack loses too much of its capacity in two days though, Mr. Taylor warns that you could be about to face a problem. To check the loss with the Power Pacer give the packs a full charge, then discharge them to measure their present capacity. Next, give them another full charge and put them aside for two days. After that time, put them on discharge, to measure their remaining capacity. If, in running this test for leakage, you find your batteries down 20% (a 500 mah drops to a 400 mah charge), you may want to cycle them a couple more times then run the check again. If the pack drops 20% again in a second test, you will probably want to consider putting a replacement battery pack on your shopping list.

These comments about keeping in touch with your battery packs are not intended to suggest that the batteries we're using are not as good as those we've had. Indeed, fewer and fewer failures due to battery problems attest to better quality. Obviously, though, no battery pack will last forever. And then we hasten their demise when we occasionally forget to turn them off after the last flight or over-charge them. A Power Pacer will make it possible for you to find potential problems on the bench. We have discovered and replaced two failing battery packs that could have cost us two great flying planes. Saving one of them more than covered the cost of the unit.

If you are one of the fortunate folks who have more than one R/C system but the plugs are different, adaptors are recommended. Then, when you get yourself a quick charger or an expanded scale voltmeter, you can also use the adaptors with them. The Model 100 Power Pacer is required for 1971 and later Pro Line Competition and Challenger II systems which have the batteries in the transmitter wired as two separate 4.8 volt packs for charging; the Model 300 is designed for systems that use standard 9.6 volt battery pack for the transmitter; Model 500 is designed for use with transmitters that have a 12 volt battery; Model 200 is available for the new Kraft 6 volt Sport Series or Royal 6 volt transmitter models; and the

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SALE

Cirrus 700 Series RADIO CONTROL SYSTEMS



Hobby Shack **CIRRUS SPORT THREE**

FREE

**AIRBORNE NI-CAD
AND CHARGER**
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The Cirrus Sport Three radio system is complete with two MS-ICR servos, CR-732 triple tuned front end receiver, 180 day warranty, 3 channel transmitter with two sticks, meter and trim on each function including throttle. Giving you the FREE Ni-Cad airborne & charger makes this a super value.

REG. \$129.99

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**X-TRA
SAVINGS**

We offer you this full four channel, all Ni-Cad system with two servos, for those who need only two channels now, for a glider, boat or smaller powered model, and think they may want to step up to something bigger later. With the addition of two more servos you will have a full four, and not have to purchase another radio later. This is an excellent price, and perhaps the best way for you to save money!



4 CHANNEL
2 SERVOS
ALL NI-CADS

CIRRUS 4CH WITH 4 SERVOS - \$179.99

149⁹⁹

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- 6 CH - 4 SERVO - ALL NI-CADS
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The conversion contains an additional stick assembly, a new case, and complete instructions for performing the conversion. All existing electronics and hardware are utilized.

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THREE CHANNEL SYSTEM KIT WITH MICRO FLITE PACK
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A brother to the Bantam servo (which has been a respected name in servos for years), the Bantam Midget is considerably smaller and lighter, but boasts the same torque and gear strength as its big brother with even a bit more speed. Notice the extremely low profile—important when interfacing the elevator and rudder servos with the aileron servo and linkages.

Reread the above paragraph then consider the fact that the Midget offers a servo that is in the micro-miniature category but also has the power and strength for .60 powered pattern ships! Truly a universal servo.

A Signetics 544 IC, external driver transistors, quality plastic conductive element pot and other components make a combination that has become synonymous with Ace R/C and Digital Commander servos. Servos that have "Competition Grade" performance with an economical price tag.

The Bantam Midget will work with any modern positive pulse system. For negative pulse systems (ProLine, etc.) a pulse inverter (14G1B-S2) is required for each servo.

A rotary wheel, extended arm, and an adjustable arm are furnished. No connectors are furnished with servo kits.

All of our flite packs and complete systems are available with the Midget option; please write for details.



Bantam Midget

Size: Height--1.125" Length--1.43" Width--0.6"

Weight: .85 oz. (24 grams)

Thrust: 20 in. oz.

Transit Time: Under .5 sec. for 90°

14G20R--Bantam Midget, Kit \$23.95

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PLEASE WRITE FOR DETAILS ON FLITE PACKS AND COMPLETE SYSTEMS INCORPORATING THE BANTAM MIDGET.

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POWER PACER

from page 128/86

Model 400 for Cox-Sanwa equipment. For our European readers, the Power Pacer is available on 220VAC, 50HZ.

Available from your local hobby shops or directly from L.R. Taylor, 20831 1/2 Roscoe Blvd., Canoga Park, California 91306 (213) 360-1178. The Power Pacer sells for \$59.95. It's the best battery insurance plan around.

Power Pacer Specifications

- Average charge current = 55 ma nominal.
- Average discharge current = 500 ma nominal.
- Receiver voltage = 4.8 volts (4 cells).
- Transmitter voltage = Model 100, two 4.8 volt circuits (8 cells).
- Transmitter voltage = Model 200, 6.0 volt (5 cells).
- Transmitter voltage = Model 300, 9.6 volt (8 cells).
- Transmitter voltage = Model 400, 10.8 volt (9 cells).
- Transmitter voltage = Model 500, 12 volt (10 cells).
- Receiver cutoff voltage = 4.4 volts **
- Transmitter cutoff voltage = Model 100, 4.4 volts **
- Transmitter cutoff voltage = Model 200, 5.5 volts **
- Transmitter cutoff voltage = Model 300, 8.8 volts **
- Transmitter cutoff voltage = Model 400, 9.9 volts **
- Transmitter cutoff voltage = Model 500, 11 volts **
- ** Cutoff voltages decrease slightly as the unit reaches operating temperature. It is normal for the Power Pacer to become hot when discharging due to all of the power being dissipated.
- Clock speed: 1/2 revolution per hour — Power required: 117 VAC 60 Hz. — 220 VAC 50 Hz Models are also available.

AEROMISTRESS

from page 61/56

Landings I tend to do at a fairly good speed with part throttle. I want to land with control, although I am told that I am overdoing it. Other pilots have floated this ship in, but I feel 7.5 pounds need a little power available for a safe landing. One other thing - - - you will find this plane is good in the wind. It does not bounce around too much and penetration is good.

Well, I guess that's about it for now. This project was very interesting for me and I hope you have as much fun flying the Aeromistress as I have.

P-51D MUSTANG

from page 55

opening. If we had not checked this beforehand, we would have built in several negative degrees of incidence. (Up she goes). Also, be sure that your internal elevator pushrod connection is one you trust because it's now going inside the fuselage, hopefully, never to be seen again.

to page 134

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TRANSMITTER Model 810

- Number of Channels: 5.
- Case Material: Hi-Impact ABS plastic.
- Type Gimbals: Dunham open-gimbals.
- Type Pots: CTS 5K ceramic.
- Power Supply: 9.6v nicad.
- Type Meter: RF and battery condition indicator.
- Modes Available: Two stick, Mode 1, Mode 2, and single stick — also special order stick arrangements.
- Frequencies Available: 27, 53, 72 MHz
- Weight: 19 oz. with antenna & nicads.
- Size: 1-23/32" x 4-27/32" x 5-11/32" (43.5 x 123 x 136mm).
- Unique Features: RF section provides nominal 750 mw output. One of the smallest transmitters on the market.

RECEIVER Model 520R (5) (4)

- Case Material: Nylon.
- Size: 23/32" x 1-19/32" x 1-27/32" (18 x 40.5 x 47 mm).
- Weight: 1.24 oz. (35.1 gr.) for 5-channel.
- Type Decoder: C-MOS 8-bit shift register.
- Type Front End: Double tuned, dual FETS. FET RF AMP. Feeding a FET Mixer.

- Type Amplifier I.C. amplifier, utilizing T.I. 28604 I.C. chip.
- Motor Size: 8 ohm, 16 mm.
- Servos: CE-4 (Dunham Mechanics)

SYSTEM

- Airborne Power: 500 mah (Nicads).
- Type Connector: Deans 3-pin.
- Type Charger: Dual nicad charger, 2 charge indicators.
- Servo Trays: Full set.
- Shipping Container: Plastic outer, foam plastic inner.
- Service Available: Warranty service thru Mac's P.O.B. 909, BELLFLOWER CA. 90706. Other service available from Service Centers throughout U.S.A. and Canada.

SERVOS Model CE-4

- Case Material: Nylon.
- Size: 3/4" x 1 1/2" x 1 1/2" (19 x 38 x 38 mm).
- Weight: 1.25 oz. (35.4 grams).
- Output: Rotary type.
- Output Controls: Arms.

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P-51D MUSTANG

from page 132/55

As you progress through the building cycle you will reach a point where you have to decide what to do about the "pilot's office". On the test model, a D & B Models cockpit kit was assembled and installed. From the compliments received it sure is worth the extra effort. An appropriate "pilot" by the name of "Big Jim" was located at a local department store. Jim looks great in the cockpit all decked out with his flight suit and complete with a headset made from left over hub caps from previous plastic

kit projects.

Now that we have all the detailing completed it is time to install the canopy. It will take considerable time in trimming to get the correct fit. I first tried R/C 56 glue and found it to be rubbery and impossible to work into a feather edge for finishing on this type, so, off it came and the canopy was re-installed. This time I used the "old fashioned" method of Goldberg "Jet" Super Glue and Devcon 5-Minute Epoxy. ("Old fashioned" means I have successfully done it at least once before.)

Finishing is always an interesting time for a model. There seems to be so many different ways to use the same products

and, then, there are also a whole group of products to try in an effort to get that "super" finish quickly and easily. This model was to receive a new finish that has worked very well for some other folks and it starts by using Ditzler as a primer. After final sanding and preparation, the Ditzler acrylic lacquer color was applied with the final step being a coat of Delthane clear. One drawback to the finish we noted right away was that it is extremely brittle. We must have missed a step for plastisizer, or something, because the slightest bump chips the finish. This one point will encourage a different finish on future models.

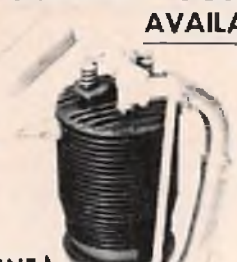
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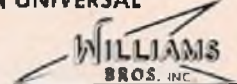
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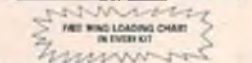
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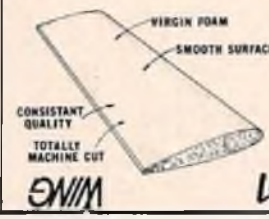
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This model was not difficult to get to properly balance and with a slight amount of radio component movement it came out correctly, per the plans.

The test model has flaps and fixed landing gear and is being flown on 5 channels. Even though the building process seemed to be tedious at times, the finished product is a joy to see in the air.

It is safe to say that a full size P-51 is not for a beginning pilot, likewise with this model. It seems very smooth in the air, much like a pattern model, in fact, I guess it would be easiest to express its flight as that of a pattern ship, fast and smooth. It does surprise you on landing

because it is very docile on approach and settles right in with application of some flap.

All things considered, I would say this model is for the above average builder who can handle a competitive pattern model.

It sure is pretty in the air. Our club will be flying several P-51's in a simulated Reno Unlimited air race. Now that should warm the blood of anyone, to see several of these beauties tearing around the race course.

The K & B .61 pumper has proven to be very reliable in idle and various other power settings with an impressive "top end". The inverted engine position has

not caused any problems.
Our test model recently won the "Best of Show" award at the CAM's 6th Annual Symposium in Coeur d'Alene, Idaho. So pardon us if some pride shows! I hope your P-51 turns out as nicely as ours. □

TAPERED RIBS
from page 54/52

The least desirable method is where the small rib is drawn inside the large rib, and the desired ribs are drawn "parallel" to the contours of the smallest and largest rib through only a few points such

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as maximum height, etc. The results are only an approximation of the true airfoil.

Along with extreme accuracy, the Sandwich Method for making tapered ribs also offers another advantage. The airfoil need not be the same from root to tip.

Varying the airfoil along the span is one more tool the designer-builder has at his (or her) disposal to improve flight performance. Aerodynamic twist can be achieved, and might be more desirable than the usual geometric wash-out, by choosing a tip airfoil with the right characteristics such as less mean camber, and more forward maximum mean camber. Another benefit is as an aid to more nearly approaching the desired elliptical lift distribution. Generally, the root airfoil with more thickness ratio, and greater maximum mean camber, usually has the higher lift coefficient than the chosen tip airfoil. Optimum lift distribution might be more readily gotten by having the root airfoil begin to change, not at the root, but further along the span. How far away from the root? Depends on the wing outline. Open for experimentation. The philosophy around here is, try a little and if it doesn't hurt, try some more.

Something else to consider is that by having a tip airfoil strong in pitch stability, a root airfoil of only adequate pitching moment can be harnessed. Sometimes airfoils that are weak in pitch control, offer some nice L/D performance.

There has been, relatively, hardly any model work along these lines, so practically anything learned and reported through the model magazines, has got to contribute to the state of the art. □

CUNNINGHAM ON RC

from page 51/49

Graf Zeplin built from German factory plans and on display at the Nut Tree. A 9 1/2' span Sakorksy Flying Boat was a joint project by Eddie and Bob, and this too is at the Nut Tree. The Northrup Gamma, 4' span Jenny, Gee Bee Racer, and many others all "fly" the skies of the Nut Tree along with the beautiful blue and orange Curtis Condor. Paul Matt's plans were used to construct the Condor.

Eddie and Kathryn have just returned from delivering the Condor to the Nut Tree this spring. In true Chavez fashion they made the 6,400 mile round trip in Eddie's immaculate 1959 green and white Thunderbird. A classic car, in mint condition, with an engine so finely tuned that it could not be heard. His workshop is another measure of the craftsmanship of the man. His workshop is a spotless

to page 140

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1/8 x 2 (10 PK) 3.60	1/8 x 1/4 (30 PK) 2.34	1/8 DIA. (10 PK) 1.90
1/4 x 2 (10 PK) 4.50	1/8 SQ. (30 PK) 1.80	5/32 DIA. (10 PK) 2.90
1/16 x 3 (10 PK) 3.00	3/16 SQ. (30 PK) 2.34	
3/32 x 3 (10 PK) 3.60	1/4 SQ. (30 PK) 3.60	BLOCKS 36"
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1/4 x 3 (5 PK) 3.59		1 x 4 2.20
1/2 x 3 (5 PK) 4.49	DOWELS 36"	2 x 3 1.42
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3/32 x 4 (10 PK) 5.69	3/16 DIA. (10 PK) .70	
1/8 x 4 (5 PK) 3.33	1/4 DIA. (10 PK) 1.00	SHEETING 30"
3/16 x 4 (5 PK) 3.83		1/16 x 2 x 30 (10 PK) 2.50
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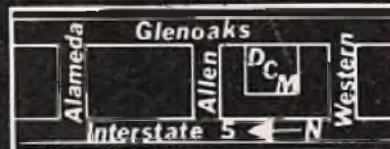


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from page 136/49

garage, with his only tools a small Delta bandsaw, an ancient jig saw, a 1/4" drill, a small workbench, many tiny hand tools, and hands that do everything with precision delicacy. When Jan saw Eddie's workshop, she gave me a number of dirty looks, my workshop is

anything but neat. But, I could relate to Bob Fogg, his workshop was more like mine, you have to shove something aside to find a place to work.

I accused Eddie of giving me pictures of real aircraft rather than of models because they are so life like. The photography in many cases done at

what would be eye level if the photographer was in scale with the aircraft. Everything about Chavez's models is done with perfection. The photography work is done by Bob Haack. Bob is an acrobatic pilot in full scale aircraft flying a Bucker Jungmeister and has a natural feeling for photographing scale models. His work imparts a realism not often found in model photography. Any modeler living on the West Coast, or planning on visiting the area owes it to himself to visit the Nut Tree Restaurant to see these fantastic models and to dine in their fantastic restaurant.

Eddie, who quite often serves as a Scale Judge for San Antonio R/C contests, has invited Jan and me to return to spend the weekend with Kathryn and him, and this time I'm going to drag along one of my models and take Eddie out flying. It sure isn't too late to turn that great talent to R/C flying, and if Eddie does "retire" again from building display models, he's going to need this hobby to keep himself busy. He can't sit still.

One more thing, don't call Eddie to build you a replica of your private jet aircraft, he doesn't do this anymore. While we were there, several phone calls came in, demanding that Eddie build replica models; each call Eddie politely turned down, as he now spends his time building only for the Nut Tree.

Eddie Chavez, sparkling brown eyes, white mustache bristling, guiding light of an army of 5" tall master craftsmen, extraordinary modeler and super good, new friend.

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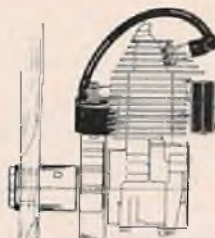
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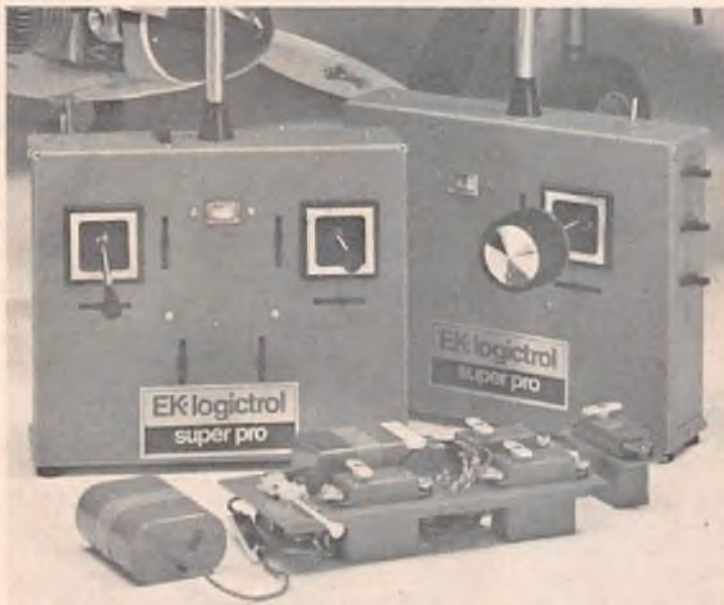
from page 47/46

span Grumman Widgeon and his Pacemaker on floats. You better believe the Bonanza was completely filled and maybe a tad over gross on take-off. It all made for a great weekend. Come to think of it, attending events like this isn't too bad a way to make a living.

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For a limited time, buy the Super pro or Champion and get one extra servo free. These systems are equipped with our remarkable super miniature servos. This light weight servo which has an output thrust of over 4 lbs. allows you to handle any model from 1/2 A to 1/4 scale with the SM servo.

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Super Miniature Standard

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HERE'S HOW

from page 44

shaft is magnified twice, enabling the balancer to achieve extreme sensitivity. The second wheel duplicates the first wheel in magnifying forces, while retaining the balancing shaft in position, and is free to rotate in location without any requirements.

The balancer is constructed of

anodized tempered aluminum. The side frames are designed for quick assembly and disassembly by inserting the uprights in mounting holes in the base. This will allow a 7" diameter prop to rotate freely. By loosening a screw on the side mounting block and rotating 180°, then re-tighten the screw and inserting in the base will allow a 12" diameter prop to swing fully. Special mounting blocks are available with long posts that will allow a 24" diameter prop to swing freely. Longer posts can be readily made or special ordered.

The centering cones on the balancing shaft will accept any item with a 1/8" diameter hole to a 3/8" diameter hole.

One centering cone is fixed on the shaft, while the other cone slides on the shaft with a friction fit that holds it in position. This cone can also be reversed to allow centering and squaring of thin objects such as thin props or spinner back plates (see Figure C). Items that can be mounted on the balancer include propellers, spinners, boat propellers, fly wheels, car wheels, and ducted fan rotors.

When balancing any item on the balancer, always remove material from the side that falls to the bottom of the balancer. An item that is balanced will stop rotating on the balancer without

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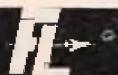
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engine - .19 to .40



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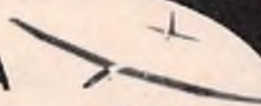
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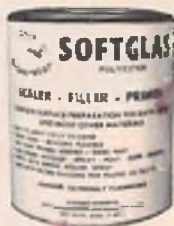
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If not completely satisfied, return unused portion within 31 days of receipt and receive full refund.

HERE'S HOW

from page 142/44

rocking back and forth. It should stop in any position and stay there. On props, material can be removed from the front of the blade towards the trailing edge of the blade, or from side of the hub if prop is out of balance 90° to the blades (see Figure D). Spinners should be balanced by balancing the back plate first, then mount the cone part with the back plate and balance by removing material on the inside of cone from the heavy side.

The balancer comes packaged in a storage case with an area for storage of small tools, such as knives, small files (not included).

The balancer may be purchased direct from the High Point Products Company, 3013 Mary Kay Lane, Glenview, Illinois 60025, Phone (312) 272-8684, and is priced at \$19.95. □

NOISE EXPOSURE LEVELS

from page 43



Various forms of ear protection against noise. Note that cotton is not an example since it has poor sound-stopping qualities.

years) that the individual may not realize he is becoming hard of hearing until one day he realizes that "people don't speak as clearly as they use to." He will have difficulty hearing certain sounds, such as the "s" sound, and may even find it easier to hear the low voices of males compared to the high voice of his wife (assuming he wants to listen).

Many factors play a part in determining if a temporary threshold shift takes place. How loud the noise is, how close you are to the noise, what pitch the noise is, how long you listen to the noise and even your own noise susceptibility plays a part. Some people have "soft ears" while others have "hard ears."

At least three different research studies have indicated that gasoline

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Satellite City

142 Tabard Drive
San Antonio, Texas
June 30, 1978

Dear Bill & Bob:

Do hope all is well for you both and "HOT STUFF". Here's some thoughts of mine that perhaps you'd like to know. As a professional scale model builder, I use many techniques and products to help me duplicate full size aircraft in model form. I've used your product "HOT STUFF" since it was introduced by R/C Modeler, and I must say it's strength and instant setting time have become increasingly valuable in my work.

I've enclosed several photos you might like, such as the Douglas World Cruiser, Sikorsky S-42 Clipper, P-26 Pea Shooter, Winnie Mae, Ford Tri-Motor and my latest project, the Curtiss Condor, which was the last of the luxury airliners to feature sleeping accommodations. All models, of course, have full interior detail.

The Curtiss Condor is now on display permanently at the Nut Tree Restaurant near Vacaville, Calif., so if you ever happen to be on U.S. 80, between San Francisco and Sacramento, stop in at the Nut Tree airport. Don Birrell, the design director, commissioned me years ago to build scale aircraft for their extensive display, and I'm sure you would enjoy browsing thru aircraft of years gone by. The dining is great, so the visit would appeal to your wives also.

We had eighty-nine visitors to view the Condor at my shop in San Antonio prior to delivery. Most were model builders all interested in model building of some sort. Many were already "HOT STUFF" users and the rest were amazed to learn that the entire Condor was built with your wonderful product.

The Curtiss R3c-2—will be next and the Nut Tree is interested in an 8 ft. DC-3, lots of "HOT STUFF" will go into that.

Sincerely yours,

Edward Chavez
Edward Chavez

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NOISE EXPOSURE LEVELS

from page 144/43

powered model airplane and car engines may be in the damage risk category. The first study which was reported in 1972 in a professional journal called *Clinical Pediatrics* was conducted by Drs. Fred Bess and Richard Powell. These researchers measured .19, .23, .35 and .46 size engines without mufflers. Sound levels ranged from 106 to 114 dBA three feet from the engine. Sound of such magnitude closely approximated or exceeded the damage risk criterion for 15 minutes of noise exposure per day. When three people were tested after "breaking-in" a .19 size engine for 11 minutes, temporary threshold shifts of hearing ranged from 5 to 30 dB. Three months later hearing thresholds were again tested and there was complete recovery from the temporary threshold shifts, but the shifts tend to indicate that prolonged and repeated exposure could result in permanent hearing loss that would not be correctable by medication or surgical means.

A second article on model engine noise by Bill Neuman appeared in the January 1978 issue of *R/C Sportsman*. Several engines ranging from .049 to .60 size were tested with and without mufflers at several distances. The sound levels ranged from 94 to 117 dBA. Engine mufflers were not found to be efficient in bringing the noise to "safe levels." Mr. Neuman recommended that one possible solution was to set a standard noise level and have the R/C club buy a sound level meter to monitor the noise --- a good idea if everyone cooperates.

At the State University of New York College at Fredonia, we tested a .049 and .15 engine, in a controlled environment, both with and without the manufacturers recommended mufflers (Cox and O.S. Max). While, as in the two previous studies, both engines exceeded the damage risk criterion for 15 minutes at a distance of one meter, they were substantially below the damage risk criterion when muffled.

There are several precautions that could guard your hearing for the future. First, never bench test or break-in an engine on the ground unless you are using ear plugs or ear muffs designed for hearing conservation. The best place to "break-in" your engine, as far as hearing is concerned, is in the air. Noise decreases with distance. The further from the noise source the less intense the noise is.

Always try to use a muffler designed to decrease noise. Some flow-through type of mufflers designed for racing may provide minimum protection. An engine could still be dangerously loud even with

some types of mufflers. Ask the manufacturer how much the muffler will reduce noise. Size of engine, propeller, engine displacement and speed duration, distance from engine, etc., all play a part in engine noise, but if the public shows interest, perhaps the gas engine mufflers can be compared. Hopefully, the result would be more efficient muffler designs.

If your ears ring after running your engine consider the ringing a warning sound and use ear plugs. Keep in mind, however, that hearing loss may be taking place without pain or ringing in the ear. The more time you spend running your engine, and the louder your engine, the more you need ear protection. Also, the hazards of hearing loss apply to anyone close to the engine, not just the person starting the engine, so keep spectators as far back as possible.

Another good idea would be to have your hearing checked once a year by an otologist (a physician trained in surgical and medical treatment of the ear) or an audiologist (a college trained professional specializing in evaluating hearing loss).

Gentlemen, muffle your engines! □

MICRO VAGABOND

from page 41/40



CONSTRUCTION

Start the fuselage by cutting the two fuselage sides from soft 1/8" balsa. Prepare F-1 from 1/16" plywood and lay it on a flat table. With the two fuselage halves pointing up, epoxy F-1 in place. F-2 comes next and can be held in place by pulling the tips of the tail together which is also secured at this time. Be sure to check the fuselage alignment with a straight line on your work table.

Prepare two F-3's and one F-4 that make up the nose area. Check the location marks on F-4. Using masking tape, place the parts together until everything lines up straight. This can be simple by placing the fuselage on a flat table and weighting it down with a book. With another weight bulging up against the firewall (F-4), double check your alignment and tack glue the parts with Hot Stuff. When things feel solid enough, apply the epoxy to it. F-5 and F-6 can be hand fitted. Dress the nose

to page 154

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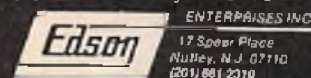


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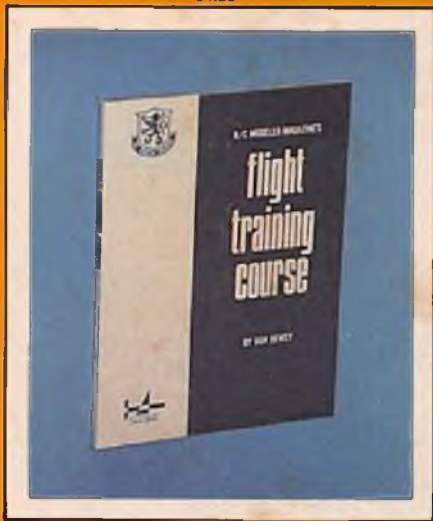
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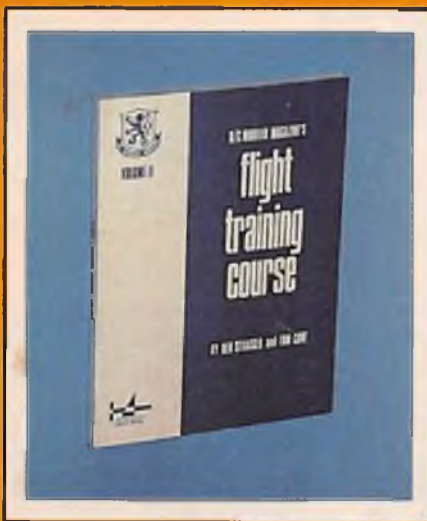
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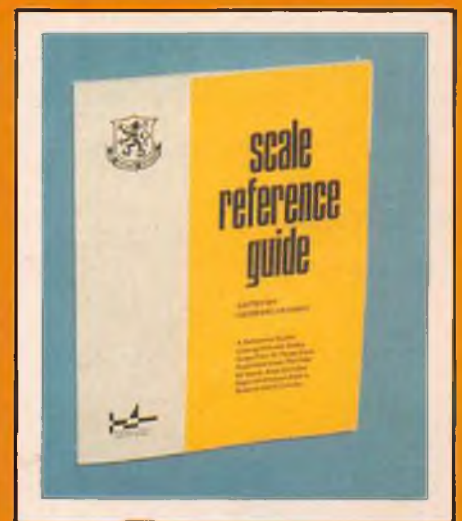
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MICRO VAGABOND

from page 151/40

area with the top side and bottom fillets. Wrap the wax paper around the nose area and mark off a pattern for the nose sheeting. I used a light veneer for this, but any light material — like 1/32" balsa will do. The nose block should be prepared slightly oversized with the U-shapes cut-out for the engine. Epoxy in place and sand to shape. Add the landing gear mounting plate and stringers and sand everything lightly.

Tail:

All tail surfaces are cut from soft 1/8" balsa. The ends are rounded with light sanding.

Wing:

Build your wing from tip to tip on a flat table. Before sheeting the leading edge, cut the middle and add your dihedral and

plywood doublers for strength. Cover your model with your favorite covering material.

The model is one of those "almost scale" designs. The nose has been thinned down for better prop efficiency.

For those of you who like the model and hope to use an 8 oz. to 12 oz. radio, I honestly believe it is too small for fun and games in the air. If you want to use an .049 engine instead of the .020, you will have a bumble bee.

Indoor and backyard flying is here. Build the Micro Vagabond and have a ball next winter. □

AIR SCOUT

from page 39

... the care that goes into the selection of the parts for each kit, separate left and right plywood side pieces are furnished to equalize the

natural tendency of pop-ply to belly.

Since we are flying off a grass field, we were in doubt about the ability of the recommended .15 to .19 engine to get airborne. Figuring that we could always throttle back, we installed an OS .25 with a stock OS muffler. For guidance we used our faithful Ace Digital Commander 1-8 with a 450ma battery pack and 3 Ace Bantam servos. We use this radio in most of our test models because of its proven reliability, range and ease of repair (which it hasn't needed yet).

When we opened the throttle for take-off we needed only slight right rudder correction to keep it straight. In all probability, the take-off run would have been perfectly straight if we had used the recommended less powerful engine. Only minimum back pressure was needed for a beautiful lift-off and climb-out. With the .25 engine, the airplane was faster than we expected

to page 156



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AIR SCOUT

from page 154/39

and was capable of consecutive loops, alternate snap rolls and Immelmann turns, at about two-thirds throttle. It will cruise forever on one-third throttle and, with the throttle completely closed and full back stick, she sat in a three point attitude and munched along with full lateral control and no nasty tricks.

Landings are smooth and easy, either wheel or three point, but a slow idle is a must or she won't come down. Ground control is positive and, like all tail draggers, full up elevator should be used when taxiing, both to prevent nose-overs and to give more positive steering.

Unlike many other trainer kits which underestimate the required engine size, we believe that this airplane would perform superbly with the .15 or .19 called for.

In our opinion, the price of \$39.95 is well justified considering the quality of the kit and the flight capabilities of the finished model.

For anyone who wants to fly strictly for fun and relaxation, with an airplane that doesn't look like the offspring of a cookie cutter, the Air Scout will fill the bill.

NOTE: The review or discussion of any product by RCM does not constitute an endorsement of that product nor any assurance as to its safety or performance by RCM. □

ADDING LIGHTNESS

from page 38

sold their Half-A nose gear retract separately - - - to be used as a lightweight tailwheel retraction mechanism for larger scale models? It's rugged enough and steerable to boot! □

MINT JULEP MEET

from page 37/36

and Dave Hale along with yours truly flew the Du-Bro Shark 60 helicopters.

The 1978 Mint Julep is history now and lots of pleasant memories are stored up in the minds of those who attended. Th Kentucky State Parks Systems and the area R/C clubs are to be commended on a fine job of presenting the 6th Annual Mint Julep Meet.

Awards were given through 5th Place and those who placed are as follows:

to page 158

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MINT JULEP MEET

from page 156/36

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3rd	Ivan Kristensen

4th
5th
Novice
1st
2nd
3rd
4th
5th

Expert
1st
2nd
3rd
4th
5th

Make your plans now to attend next year's 7th Annual Mint Julep Meet at Rough River, Kentucky and plan to enjoy a fabulous weekend.

Tom Moore
Don Seals

Steve Rojcek
Bob Pannell
Mike Patrick
David Wathen
Robert Drolan

Rod Barnes
Randall Lyman
Ken Patterson
Thad Pawlikowski
Bob Bremer

from page 34/32

Cut the air scoops from 3/8" stock, trim and sand to shape. (If the fuselage is to be covered with Solarfilm or MonoKote, it is much easier to cover the fuselage and air scoops before the air scoops are glued to the fuselage.) Before gluing air scoops to fuselage, it is important to remove that portion of the fuselage covering where the air scoops fit against the fuselage.

Construct the sliding servo tray to fit your servos.

Final sand all parts and cover with your choice of heat shrink covering; the original was covered with Solarfilm.

to page 160

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VERTICAL MILLING MACHINE. A new concept in compact precision metal working tools. Can be used for milling, drilling, fly-cutting, and boring of complex projects such as steam engines, clocks, instruments, etc....

SPEEDS: Variable speed control with a 1/5 HP motor. Speed from 200 to 2000 RPM.

CAPACITY, CONTROLS: 13" X 2 3/4" tee slotted work table with 9" of movement on the "X" axis and 3" on the "Y" axis. In its uppermost position the spindle nose is 8" from the table and has 6 1/2" movement on the "Z" axis. (vertical) Movements on all axes are controlled by handwheels calibrated in 1/1000" division. This machine has all the features normally found on only the most expensive machine tools; such as a precision spindle with adjustable pre-load ball bearings, anti-backlash feed screws, adjustable tapered gibs, and table locks. The head may be rotated for machining angles.

CONSTRUCTION: Fully dovetailed machined slides with adjustable gibs, solid base with mounting holes. Permanently lubricated ball bearing used with spindle, which has a Morse No. 1 inside taper and 3/4" 16 TPI male thread. Design also permits inexpensive conversion to metric. Overall dimensions: 12 X 14 1/2 X 17 inches high.

ELECTRICAL INFORMATION: 110-115 volt, 60HZ, A.C. 300 watts, 8 foot, 3 wire cord.

No matter what type lathe you may presently own, the need for a vertical mill becomes apparent the moment a complex project is started. Holes have to be accurately drilled and bored, shapes other than round have to be machined, work becomes too large for faceplate turning, these only to name a few of the problems to be encountered. Standard milling attachments are helpful when machine rigidity permits their use, but cannot be compared with a machine that is 100% designed for the job. Sherline is pleased to offer their precision vertical mill to complete your miniature machining center.

5000 Vertical Mill..... 212.49

Additional Accessories for Vertical Mill

3060 Set of 3 Collets & Draw Bar..... 19.95
3072 Drill Chuck & Draw Bar..... 14.95



Patty's Corner Inc.

P.O. BOX 565

WEST PATERSON,

NEW JERSEY 07424

201-342-5097

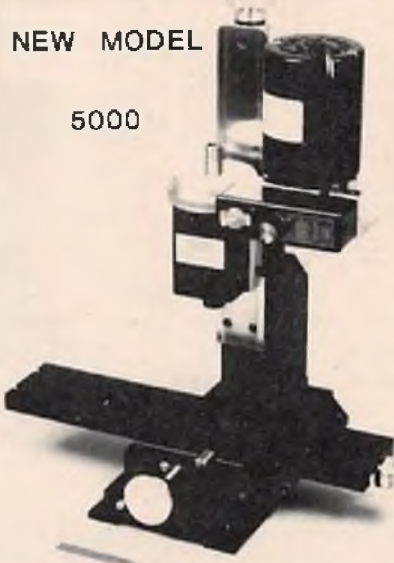


Hi, I'M PATTY. Since this is my first ad in the R/C Modeler I thought I would like to introduce myself. My specialty is tools. Most of my tools lend themselves to the hobbyist. Because the hobby is so diversified the right tool will always come in handy whether at your Club or on your home workbench. I have put together what I think is quite a well rounded assortment of hand tools at very attractive prices. My aim is for volume sales to make a profit. Now I need you as a customer. You will find my service is fast and efficient, so why not send for my complete catalog @ \$1.50 while you are thinking about it. Enclosed will be a card for your credit of this amount on your first purchase.

Happy modeling *Patty*

NEW MODEL

5000



NEW DREMEL 4" TABLE SAW

The Dremel Model 580 Table Saw features slots for optional table extensions. Miter gauge is adjustable to 45° on either side of perpendicular and "stops" at 0°, 45°, and 90°. The sawdust chute at back can be attached to bag or vacuum cleaner. Table and base of glass reinforced engineering plastic. The cutting depth can be set. A guard covers all blade angles and heights. Blade splitter with "spurs" prevents kick-back of workpiece. The rip fence is adjustable, self-aligning. Miter angle can be set and locked. There is a grounded power plug and a handy "push-pull" power switch, colored orange for safety, which can be locked. This saw can be permanently fastened to a table or workbench. Comes with combination blade 30 teeth .046 thickness 1/4" arbor.



MODEL 580

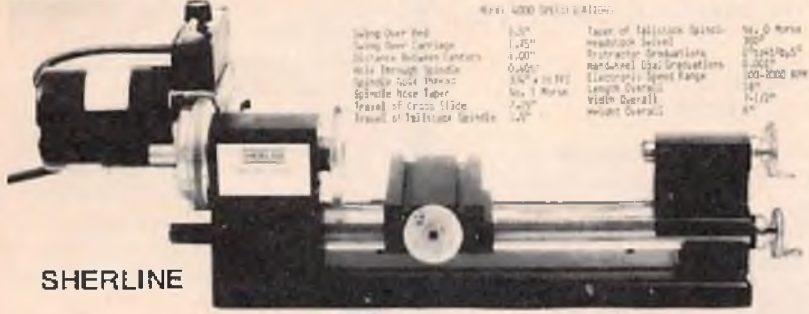
580 4" Circular Table Saw..... 59.95

6003	Combination Blade 30 Teeth.....	4.00
6004	Fine Tooth Blade 100 Teeth.....	4.00
6034	Sawdust Bag Attachment.....	4.00
210	Drill Press.....	15.95
217	Foot Speed Control.....	16.95
219	Motor Speed Control.....	15.95
229	Router Attachment.....	7.95
232	Moto-Flex Tool.....	41.95
245	Moto-Tool Kit.....	23.95
260	Moto-Tool.....	26.95
261	Moto-Tool Kit.....	29.95
270	Moto-Tool.....	26.95
271	Moto-Tool Kit.....	29.95
280	Moto-Tool.....	33.95
281	Moto-Tool Kit.....	35.95
290	Engraver.....	8.95
370	Moto-Tool.....	33.95
371	Moto-Tool Kit.....	40.95
380	Moto-Tool.....	40.95
381	Moto-Tool Kit.....	42.95
571	Moto-Shop.....	44.95
572	Deluxe Moto-Shop.....	59.95
701	Deluxe Moto-Lathe.....	39.95
600	6 Pc. Router Bit Set.....	17.95

The sturdy robust Sherline enables you to perform work normally considered beyond the capacity of machines of this size. Built with many design features normally found only on much larger and more expensive machines - a solid brass alloy bed, fully dovetailed slides, adjustable gibs on cross-slide and saddle, totally protected lead screw and feed screws, handwheels graduated in micrometer measurements, adjustable headstock bearings that are prelubricated for life, hollow headstock spindle, and a powerful variable speed 115 V. Motor.

The Sherline does not require permanent installation. Set it up in a working area less than 2' x 1' in minutes and store away after use on a workshop shelf or in a small cupboard.

Built with the precision required by skilled technicians and design engineers, the Sherline is priced within the reach of every individual. In homes and laboratories, classrooms and factories, the Sherline is the ideal small solution to big problems.



SHERLINE

4000

Key 4000 SPECIFICATIONS:

Swing Over Bed	13"	Taper of Tailstock Spindle	Morse No. 1
Swing Over Carriage	10 1/2"	Headstock Serial	2000000
Distance Between Centers	10 1/2"	Hydraulic Breakdown	10000
Wash Through Spindle	Outer	Hand-Carved Gear Insulators	10000
Spindle Nose Thread	3/4" x 16 TPI	Electronic Speed Range	100-2000 RPM
Spindle Nose Taper	Morse No. 1	Vision Overall	18"
Travel of Cross Slide	7 1/2"	Right Overall	14"
Travel of Tailstock Saddle	12"	Lead Screw Overall	6 1/2"

Sherline Lathe with American threads. Standard equipment included with the Lathe consists of motor and speed control, pulleys, belt, faceplate and carrier, two dead centers, two Hexagon keys, toolpost and tool bit, three-core cord, instruction booklet and guarantee card.

4000-A cones complete with the following: Sherline Lathe (4000) - Tail Stock Chuck & Key (1072) No. 1 Morse Arbor (1183) - 3-Jaw Chuck (1041) - Everything needed to get started.

4000	Sherline Lathe.....	197.55	3005	1/4" sq. High Speed Tool Blank.....	1.60
1007	Faceplate.....	3.55	3006	Carbide Tool Set.....	8.95
1041	3-Jaw Chuck.....	44.95	3007	High Speed Steel Set.....	8.95
1044	4-Jaw Chuck.....	44.95	3012	Hold Down Set.....	12.55
1072	Tailstock Chuck & Key.....	11.65	3020	Allen 1/4" Driver (for cap screws on lathe)	1.75
1074	Steady Rest.....	11.65	3021	Center Drill Set.....	8.95
1180	Collet Set.....	44.95	3050	Vertical Milling Column.....	53.95
1161	MW Collet Adaptor & Draw Bar.....	22.45	3051	Milling Vice.....	22.45
1185	Vertical Milling Table.....	44.95	3052	Fly Cutter.....	13.45
1187	Chuck to Tee Slot Adaptor.....	1.75	3054	Boring Head.....	26.95
1188	No. 1 Morse Arbor (for No. 1072 chuck).....	2.65	3055	Morse No. 1 Blank.....	8.95
1191	Live Center.....	11.65	3100	Screw Cutting Attachment.....	80.95
1291	Spacer Block Kit.....	17.95	1 Nut 10/32 (2).....	.85	
3001	Power Feed.....	35.95	3058	4-Jaw Hold Down Set.....	11.65
3032	Cut-Off Tool & Holder.....	17.95	4004	Drive Belt (lathes Ser. #4983 & higher).....	1.80
3083	Two Position Tool Post.....	6.25	4045	Drive Belt.....	1.80

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Dremel - H.S. Twist Drills - X-Acto -
Microflame - Sherline - Merit Abrasives -
Panavise - Brown Spray Equipment
Conditions of Sale

I do not have a store. A warehouse only. I ship "prepaid" via UPS in the 48 states. So please give a complete address with zip code and phone number with area code. If you must use a P.O. box please add \$2.00 for handling. Minimum orders must be \$25.00 or more, orders under this amount please add \$2.00 for handling. Orders outside the 48 states add \$10.00. Master Charge and Visa customers must give Id. numbers and expiration date. Or M.C. you must give 4 digit bank number. I cannot accept collect calls, but if you want fast service you may call your orders in with Master Charge and Visa and we can ship at once. Make checks or money orders payable to Patty's Corner, Inc. Orders with bank checks or money orders will be shipped at once. Personal checks will have to clear first. New Jersey residents add 5% sales tax.

My bound catalog of all our tools will be available by the end of August. I must ask \$1.50 which would be refunded with your first order of \$25.00 or more.
Thank you for your interest. This sale ends Sept. 30th, 1978.

B. D. HOBBY WAREHOUSE

1128 ORCHARD AVE. · Louisville, KY. 40213 · (502) 966-2313

	List Price	Our Price	Nicads	Servos,
2 Channel Single stick				
Cox 5022	139.95	93.	2	no
Logictrol Nimbus	135.00	98.	2	no
2 Channel Dual stick				
Cox 8020	99.95	70.	2	no
Futaba FP-2GA	109.95	75.	2	no
Futaba FP-2E	139.95	93.	2	no
MRC 772	119.95	84.	2	no
2 Channel Wheel				
Cox 8021	139.95	93.	2	no
Futaba FP-2F	139.95	93.	2	no
3 Channel Single stick				
Cox 8031	159.95	104	2	no
Logictrol LRB-3	159.00	100.	2	no
Logictrol Ranger	179.00	113.	2	no
3 Channel Dual stick				
Cox 8033	229.95	148.	3	yes
Futaba FP-3F	179.95	118.	2	no
Futaba FP-3FN	199.95	131.	2	yes
4 Channel				
Cox 8040	299.95	189.	4	yes
Cox 8044	279.95	178.	4	yes
Cox 8048	449.95	285.	4	yes
Futaba FP-4N	299.95	190.	4	yes
Futaba FP-4FN S17	269.95	175.	4	yes
Logictrol Nimbus	309.00	187.	4	yes
MRC 774	279.95	189.	4	yes
5 Channel Dual stick				
Cox 8054	299.95	180.	4	yes
Futaba FP-5FN	349.95	217.	4	yes
Logictrol LRB 2-5	285.00	170.	4	Rxonly
Logictrol Champion	369.95	225.	4	yes
MRC 775	379.95	251.	4	yes
5 Channel Single stick				
Logictrol LRB 1-5	310.00	197.	4	Rxonly
6 Channel				
Cox 8060	369.95	230.	4	yes
Cox 8068	479.95	305.	4	yes
Futaba FP-6FN	359.95	227.	4	yes
Futaba FP-6FN S17	319.95	202.	4	yes
7 Channel Dual stick				
Futaba FP-7G	579.95	392.	4	yes
Logictrol Super Pro	419.95	255.	4	yes
7 Channel Single Stick				
Logictrol Super Pro	440.95	270.	4	yes

MRC Cars & Tanks

	List Price	Special Price
Porsche 934 RSR	64.98	50.95
Porsche 935	67.98	53.95
Tyrell P-34	67.98	53.95
FMC XR 311	74.98	58.95
Sherman Tank	134.98	106.95
Leopard Tank	174.98	138.95
Battery Pack & Charger	29.95	26.95

Enya Engines

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.15 IV TV	40.98	24.59
.19 VI TV	45.50	27.30
.29-B IV TV	50.50	30.30
.35-B III	45.50	27.30
.40 TV	89.98	53.99
.40 XTV	115.98	69.59
.45 II TV	89.98	53.99
.60 B III 6B TV G8	124.98	74.99
.60 XF TV Schneurle	199.98	119.99

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60 Maximizer

Fits Smaller Engines, Too

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Sales have been fantastic, and with good reason! Superior design and construction lead to outstanding performance in any product and the 60 MAXIMIZER™ has it all in abundance, WITH IMPROVEMENTS!! A NEW ONE PIECE ECCENTRIC SHAFT FOR MORE ACCURATE ALIGNMENT AND A HEAVIER DAMPNER FOR EASIER STARTING.

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The 60 MAXIMIZER™ fits engines with 1/4" shafts and adapts to 5/16" shafts on smaller engines. Construction is a sturdy cast aluminum alloy frame, balanced parts, Aircraft quality bearings and long life ball bearings for engine safety. Weighs only 21 ounces.

Check with your dealer or order direct. Free literature for a stamped envelope. Price still \$85.00.



Stewart Aircraft Corporation

11420 State Route 165 SALEM, OHIO 44460

TELEPHONE: 216/332-0865

SIMITAR 540

from page 158/32

Install control linkage, making sure left aileron control on transmitter results in the left elevon going up and the right elevon going down.

Neutral position of the elevons should be such that the elevons are raised 1/8" to 3/16" above which you would normally expect to be neutral. This will produce a slight reflex.

Install motor control servo and steerable nose wheel servo as shown on plans.

When using the Kraft motor mount, the nose wheel can be mounted by drilling a 5/32" hole vertically through the mount which will serve as the bearing for the nose gear.

Built according to plans, and following the suggested construction sequence, your Simitar 540 building project will result in a rewarding flight experience.

MATERIALS LIST:

Balsa:

- 1 — 3/8" x 3" x 36" (elevons).
- 4 — 1/4" x 3/8" x 36" (wing leading and trailing edges).
- 3 — 3/16" x 4" x 36" (fin and fuselage sides).
- 1 — 1/4" x 4" x 36" (fuselage top).
- 10 — 1/16" x 4" x 36" (wing sheeting) or 1/64" ply sheet. □

P-47 THUNDERBOLT

from page 30

... Digital Commander 1-8 radio with Bantam servos and a 450ma battery pack. The wing and tail were covered with silver Solarfilm. The fuselage was finished with silver Hobby epoxy over resin filler, which matched nicely and also as recommended in the instruction booklet. Even though it weighed in at the top end of the recommended weight of 28 ounces, it performed beautifully, doing every two channel maneuver, just like the real T-bolt.

For a fun airplane which will shock the local lead-sled jockeys with its performance, we strongly recommend this model. Our hats are off to House of Balsa for giving the 1/2A enthusiast something to crow about.

NOTE: The review or discussion of any product by RCM does not constitute an endorsement of that product nor any assurance as to its safety or performance by RCM. □

RADIO SPECTRUM

from page 27/24

digital. I know there are guys looking at shaft encoders, stepping motors and all

the things that go with numerical control systems. I don't know what Mr. Mozdzer's system looks like, but I didn't think the one presented in RCM had adequate resolution. If we want more resolution and want to transmit the information in true digital form, we will probably need more bandwidth, but I think this is what we'll eventually have. Don't be too surprised if someone comes along with a complete strap down inertial guidance system to go along with it. I heard one of the big gyro companies is working on a gyro just for model helicopters.

The amount of energy put into the R/C hobby will always amaze me. I sometimes wonder if it is all worth it, but then I see a newcomer get his first plane flying or an old timer with a new super plane, and see that satisfaction, and I have to believe it is worth it. □

SUNDAY FLIER

from page 22

that's all I care about. And, unless I'm wrong, that's all you care about.

What's the answer? Simple. Forget the advertising claims — and counterclaims. If it works for you, use it. If it doesn't, then find something that does. But make up your own mind. Just think, what a wonderful world it would be if all the products lived up to their advertising!

Now, before all you advertisers get upset, hold it! The great majority do not make claims which cannot be backed up by proof — but it is also true that, in the time honored fashion of "put your best foot forward," advertising certainly does not tell the whole story. In fact, that's one reason why RCM's Product Reports is one of the most popular items in the magazine. It does.

Which brings me to the next example of how you guys rescue me from the dilemmas I seem to create. In the same column, I make another quote — "Nicad batteries do not have a memory." Then I mention another booth which says you should cycle your batteries to get rid of the memory.

Richard Loggins, of L & L Electronics, in Albuquerque, New Mexico, throws me this lifesaver:

Dear Mr. Willard:

In response to the question of "Memory" in nicad batteries that appeared on page 157 of the July issue of RCM, I would like to take this opportunity to clear up this subject once and (hopefully) for all. Obviously the person who responded "Nicad batteries do not have a memory" is misinformed. The following information to page 163

A QUALITY ENGINEERED KIT

- Beautifully finished, glossy white fiberglass fuselage.
- Crystal clear plexiglass canopy, trimmed to fit.
- Wing foamcores preformed to accept ailerons and spoilers. (Balsa for wing skins not supplied.)
- Dihedral tube already installed.
- Extensive hardware package.
- Extremely comprehensive 100 page instruction manual.
- Designed and produced by Ralph Learmont.

SPECIFICATIONS

Span 14 feet. Aspect ratio 25. Loading 1 lb./sq. ft. Weight 8 lb. Controls: rudder, elevator, ailerons and spoilers. Provision for flaps, retractable u/c and tow release.

KESTREL 17

Hi Performance Sailplane
1/4 Scale Replica
Wingspan 169"

\$295.00

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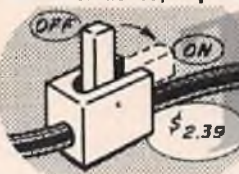
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FUEL LINE SHUT OFF VALVE

- Positive on
- Not affected by heat or fuel
- Red aluminum weighs less than 1/4 oz.
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- Indorsed by Rom-Air
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AMA-Sanctioned

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Sponsored by:

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Hosted by:

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Hitachi his and hers Color Television Sets for all 1st Place winners
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Silver Trophies 1st through 5th Place courtesy of A & L Distributors,
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- Gifts for all contestants ■ AMA & FCC licenses required
- Entries limited to 25 per class ■ Fantastic banquet Saturday night
 - Camping OK—no facilities ■ USPJA judges
- Pre-registration required ■ Party Friday night at Lakeshore Inn
- Free RC Cola for contestants and families (courtesy of Royal Crown)

Located in beautiful California City,
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Hitachi R/C Classic

Enclose \$20.00 per event

C/O Dick Russ, C.D., P.O. Box 32852, Oklahoma City, Oklahoma 73132

NAME	AMA NO.	FCC NO.			
ADDRESS	CITY	STATE	ZIP		
CIRCLE EVENT:	Novice	Advanced	Expert	Masters	S/O Scale
Frequency: Pattern:		MHz	Scale		MHz

IMPORTANT:

Pre-entry—No entries will be accepted after September 15, 1978. When classes are full,
earliest postmark determines acceptance.

Due to limited accommodations, be sure to make motel reservations early for
Hitachi R/C Classic at Lakeshore Inn,* 21330 Lakeshore Drive, California City, California, (714) 373-4861

*Tell them it's for the Hitachi R/C Classic, or you won't get in. Insist on Reservation Guarantee.

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The quarter size planes that do it all on .61 power



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• 84" span • For .61 engine • 1000 squares



Fun flyin' **LUCKY LADY**

\$8000 Add \$4 postage, handling

• 72" span • .45-.61 power • Easy build



Magnificent
LAZY ACE

\$13500 Add \$5 postage, handling

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Complete kits: balsa, spruce and plywood construction, all parts machine cut and packaged, rolled plans.

Dealer inquiries invited

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Master Charge / Visa Texas residents add 5% sales tax. Send check or Money Order, no C.O.D. shipments.

SUNDAY FLIER

from page 160/22

concerns what is known as the "Memory Effect", and should not be confused with the "Depressed Voltage Effect" which is an entirely different subject.

MEMORY EFFECT

Temporary effects on discharge voltage levels at any point during the discharge period, or an apparent reduction in capacity to a predetermined discharge voltage cut-off point, are developed in the battery system from repetitive use patterns. If the battery is discharged to random depths of discharge, and overcharged for random amounts of overcharge time, and subjected to various duty cycles, these temporary

effects will not manifest themselves. The following paragraphs will discuss the factors and causes of these temporary memory effects.

Sealed cells subjected to a repetitive depth of discharge under certain cycling conditions may exhibit an apparent temporary loss of capacity. This phenomenon, sometimes referred to as "memory", was first noticed in a satellite where the cell received a very precise charge/discharge regime using only a small portion of the available capacity over and over again. If the cell experiences such a series of repeated partial charge and discharge cycles of exact magnitudes, the cell may become so conditioned that it will deliver to the normal end of discharge voltage only slightly more capacity than has been required of it during these preceding repetitive cycles. Thus, if the discharge cycles are

short, the cell capacity may be temporarily shortened to coincide with the discharge capacity previously experienced during the repetitive discharge cycle.

This effect is also more significant when the cut-off voltage is above 1.0 volt at the C rate. If the cell is subjected to a deep discharge and then recharged, this "memory" is erased and nearly all of the original cell discharge energy is regained.

It must be emphasized that the "memory" effect does not manifest itself when the battery is discharged to random depths of discharge or overcharged for random amounts of overcharge time as is typically the case in most applications.

I hope this will explain the reason and conditions under which this normally occurs. After all, isn't everyone getting a

to page 166

ATTENTION RC GLIDER ENTHUSIASTS

Tired of getting your wings dirty, scratched or even damaged while transporting them? Is your investment being held together by a rubber band? GBS Enterprises has the answer; **Wing Sox!** The custom fit washable polyester transport bags are tailored for your wings. They come with stabilizer pockets for removable stabs and a convenient shoulder strap so you can free your hands to do other things.

Wing Sox will accommodate any of these kits: Aquila • Olympic II • Californian • Super Mallbu • Super Monterey • ASW 15 • ASW 17 • Monterey • Cirrus • Libelle • Midwest Hawk 8" • Hobie Hawk 10" • Paragon • 970 • Sallaire • Windrifter • SD-100 • Butterfly II • Viking Mark I • Viking Mark II • Wanderer 99 • Windfree • Wanderer 72 • SB-10 • Albatross • The Anser • Javalin II • Centurion II •

Wing Sox come in five (5) bright colors: Red, Royal Blue, Yellow, Orange & Black.

Order your Wing Sox today, mail in your check and order blank right now!!

\$19.95

California Residents Add 6% Sales Tax
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Kit #RC - 20

Wing span: 48"
Area: 504 sq. inches
Engine Size: .29 to .40

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*requires hdwe kit No. 2317-see Rt. pg.



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3.5 CSL

1200 mah nicad pack included
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SUNDAY FLIER

from page 163/22

little tired of hashing this over?

Sincerely yours,
Richard Loggins

I have to admit I get a kick out of Dick's statement "Obviously, the person who responded --- is misinformed." For obvious reasons of my own, I didn't identify the "person" who made the statement, but he is one of the most highly respected authorities in the field. And, once again, we are faced with the difference of opinion that exists among the "experts."

But is it really a difference of opinion? Or just a different approach? If I read Dick's letter correctly, I conclude that I needn't worry about memory of nicads, because I discharge to random depths, and overcharge to random amounts — and unless I miss my guess, so do you. And maybe that's what the other expert took into consideration. After all — how many of you fly for exactly thirty two minutes, at eight minutes per flight, and then recharge for four hours and ten minutes? No way. I just follow a standard procedure — recharge the batteries the night before I plan to go flying and every time I don't do that, I worry. Why? Because, on several occasions over the past few years, I've been caught short with low batteries, and had a repair job as a result. So, my advice — strictly unprofessional — is, charge your batteries before you go flying. Then, maybe once every six months, discharge them to full discharge, then recharge them to full charge, and go flying some more. Then, one of these days, a 100% reliable measuring device will be invented which says "You can fly for 'x' more minutes before recharging." Yes, I know. There are such items advertised — but the experts disagree on the reliability. So be conservative. If in doubt, recharge!

Up until this point, I've been talking about fuels and batteries — mainly quoting experts. Now I'd like to print a letter from a reader regarding some of the aspects of designs, and the plans associated therewith. It poses an interesting question. S.L. Evans of Oakmont, Pennsylvania, wrote a letter early this year about plans which appear in the magazine. He says:

Sir:

The plans in the February issue for the "Air Skimmer" has brought an old question to mind and I would like to confront your experts with it.

Typical instruction with most construction articles start out (construction of the fuselage) by stating "build the fuselage side directly over the plans and when dry join using the fuselage formers or cross pieces and so on, and so on."

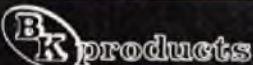
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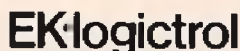


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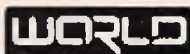


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My point now is if this is done, i.e., build both sides from the side view on the prints, and then proceed to construct the fuselage with formers and cross pieces shown in the top view, then the constructed fuselage will come out **shorter** than shown on the side view. This is particularly true of wide fuselages. The draftsman has drawn the top view directly from projecting the side view. If you will notice the top view of the "Air Skimmer" the total length of the side of the fuselage is longer than the side view on the plans.

This, as you can see, will cause the tail moment arm to be shorter than the designer planned. In some designs it could change or affect the flight characteristics.

Some time ago I purchased a 1/4" scale "Fling Flee" kit (no longer in production) and after building up the side I then tried to join these to form the fuselage. The fuselage was so wide that I had to add 1 1/2" to bring the fuselage up to the designed length. Recently I built a Sig's "Komander" (plans printed on the wood) and found when I went to join the sides to the top or bottom "view" the sides came out to be approximately 5/8" short and a block had to be added to the length.

This is a real problem with built-up models and I have yet to see a draftsman deal with it properly. The models that do not have such a problem, though, are those that are built around a center crutch or keel, such as most of "Cleveland's" old kits.

Please could you have someone address himself to this problem in a future issue.

Thank you,
S.L. Evans

Well, Don Dewey is busy these days measuring the length of fish, so he sent the letter to me to discuss the length of fuselages.

All I can say, Mr. Evans, is that you have a valid point — but not one which has any real significance. Why?

Basically, the reason is this. When designers draw plans, the side, or "profile" view, of the fuselage, depicts the dimensions which the designer used in constructing the fuselage. Then, when the sides are pulled together, both at the nose, if it is tapered inward, and at the tail, there is a small "foreshortening" effect — as you so correctly refer to. However, except in the most extreme cases of unusually wide fuselages, this effect is inconsequential, and can be ignored. Let me give an example: The "Pondhopper" which I designed some time ago has a fairly wide hull — 4" — which tapers to 1/2" back at the tail. In the plans, I showed the top view at the same length as the side view; true, it isn't. But the difference is so small as to negate the drafting effort required to accurately depict it. And that's why the drawings don't make that small

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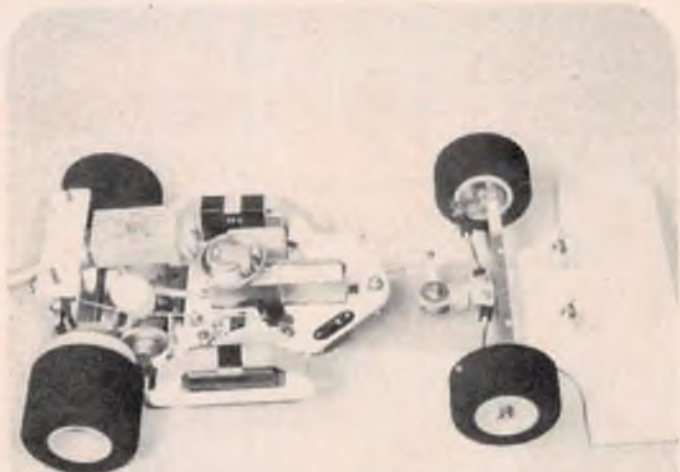
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correction. So, for all of you who build from drawings, use the side view projection, that's what the designer used. And the foreshortening which results from "pinching the sides together" is actually what the designer had as well. In any event, Mr. Evans, thanks for bringing up the point.

To wind up this month's column, I've got a couple of letters about 1/2A engines that you'll be interested in reading.

The first is from Walter A. Legan of Lakeland, Florida.

Dear Ken,

Your statements on page 167 of the May '78 issue of RCM calling 1/2A and Max .10 "two different classes of power plants" has me confused.

Using 10% nitro, any throttled Max .10 I have ever run will only get about 13,000 rpm with a 7/4 wooden prop.

Even the new Max .10 FSR will only get slightly better than that, if you can get one to run correctly.

On the same fuel, a throttled TeeDee .049 will turn a 6/3 wooden prop at least 18,000.

It is my contention that the .10 size engines put out only about 5-10% more power than the Tee Dee .049's. I remember Clarence Lee or one of the other engine experts publishing a displacement versus horsepower graph some years ago which reflected this same relationship. It is not until you get to the .15 displacement size that you get any appreciable increase in horsepower over the Tee Dee .049's.

Please scribble me a reply if you have a chance.

Thanks,
Walt Legan

I answered Walter essentially like this. Okay, if the Max .10 only puts out about

5%-10% more power, then why bother to go to a Max .10, and thus destroy the true classification of "1/2A"? The reason is two-fold. One is that the Max .10, up until recently, would throttle down to idle much more reliably. The other is that we must not confuse "power" with thrust. Put a 7/3 1/2 Cox prop on a Max .10, and the thrust output is far greater than the Cox .051, because the Cox is not happy unless it is revving around 18,000-19,000. A good example of the difference shows up in my "Bluebirds" design. They weigh 2 1/4 pounds, and the Max .10 hauls them around very handily. I also have a slightly smaller version, that weighs 1 1/2 pounds, and is powered by a Cox .051. They also fly reasonably well, but the .051 just would not be enough for the larger group.

To accentuate this difference in thrust, here's a letter from Edward F. Ellison,

to page 170



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1212 Sandcastle Drive, Corona Del Mar, Calif. 92625. I give his full address in case some of you want to write him.

Dear Ken:

Your column in the May R/C magazine on 1/2A flying prompted me to pass on some information on .049 engines which might be of interest.

I have been interested in modeling for many years (my first engine was a Baby Cyclone) but only recently have I had time to build radio controlled models. In the past I have built engines, carbs., rotary intakes and, in general, fooled around with 2 cycle engines considerably. I recently got the idea that a reduction unit might be interesting for an .049 engine as the little 6/3 or 6/4 props running at 15,000 rpm are horribly inefficient in many situations. Since I had a Cox .049 Black Widow engine which doesn't care which direction it turns, I decided to build a gear reducer. I had some gears on hand (I used to be in the instrument gear business) which would give a 2.66:1 reduction. The reducer turned out great with ball bearings on the output shaft. A good pair of gears can be as much as 98% efficient so I didn't lose much in the reduction. The results were truly amazing.

I have been flying my old modified Pierce Arrow sailplane with a pod with mediocre results. I moved the engine to the nose with some improvement, then I installed the engine with the reduction unit in the nose. I started out with a 9/5 prop, then 10/3 1/2, and some others in-between. The best seemed to be 9/6. Then I got real bold and hung an 11/6 on (on an .049?). This gives me about 40% better thrust (static) than the old 6/3's or 6/4's. Now I got scientific and bought a tach. The .049 turns the 11/6 at 12,250 rpm. The 9/6 runs about 13,000 but the 11/6 seems to match my airplane better. Note - these are engine speeds.

This all sounds kinda' wild but it's for real. Some interesting possibilities open up now as you could build some fairly large models with scale props but with smaller engines. Performance with a .09 would be great although you would have to run left-hand or make a new crank shaft. By the way, I have a new rear rotary carb coming along for the .049 which should make it a bear.

Regards,
Ed Ellison

His experiments pretty well demonstrate what a difference in thrust results from the use of a larger propeller.

So I still say, let's keep 1/2A as a class at .051 or lower, and not muddy it up by introducing the next size larger engines like the .09 or .10.

Mr. Ellison's tests show that good thrust can be obtained from 1/2A engines. And it seems to me that we need more development in the .051, and under, engines, rather than just going to bigger engines.

Now that you've all come to my rescue again, I think I'll have another go at mixing that martini.

Send a self-addressed, stamped envelope if you want to know how (and are over 21). □

SCALE VIEWS

from page 19/15

etc. This keeps the Monoplane Class from being swamped by AMA pattern airplanes without scale or full-size aerobatic connection.

Unlike the IMAC biplane event, where non-scale activity was a considerable factor in the beginning of the movement, there is little non-scale activity in Mammoth flying. So it seemed appropriate to require from the beginning that Mammoth biplanes entered by Sport Scale models, though a biplane need not necessarily be an aerobatic type as is required for the monoplanes. The thought was that this requirement could be put on at any time it was required for the original biplane event, if and when this is indicated. Without a scale bonus involved it was possible to fly the monos and biplanes in the same event.

The Mammoth experiment was a late addition to the schedule and as it turned out, no big monoplanes showed up. But the interest sure to be stirred up by the Circus Circus meet, will help to change this situation quickly. The potential for growth is there. In the Monoplane events for .61 and under engines, entries in 1978 were about double what they had been at the 1977 contest.

Footnotes

★ In the July RCM Scale Views column on differential, I expressed an interest in hearing the views of an expert pattern flier on the matter. No sooner said than done. In his column in the August issue of Model Builder, Dave Brown goes into the use of differential in depth. He discusses how to achieve perfected maneuvers by just the right touch of differential movement. Anyone interested in the subject should get the magazine and read his remarks — particularly, several fliers who have argued with me that it did no good in pattern applications!

★★ In last month's September column on "Small Stuff", we forgot one item. Perfect Products has another hardware item called "Railroad Spikes No. 430." These are round headed nails, 1/4" long with a head diameter of about 1/16".

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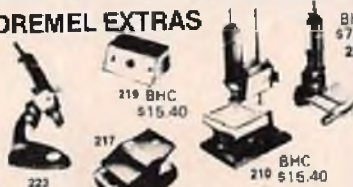
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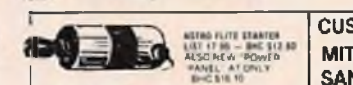
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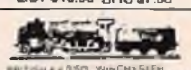
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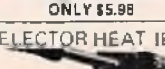
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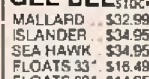
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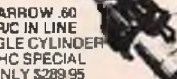
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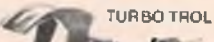
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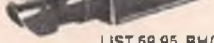
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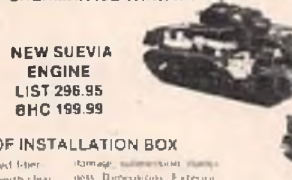


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R/C MODELER MAGAZINE'S MODEL OF THE MONTH CONTEST

The Model of the Month Award Program is designed to encourage the sport and novice competition flier to submit details of his most recent kit or scratch-built model to RCM in order to encourage general model craftsmanship and the overall promotion of R/C flying.

Each month R/C Modeler Magazine will award a 371 Variable Speed Moto-Tool as illustrated in the photograph. The second and third place winners each month will receive a one year subscription to R/C Modeler Magazine or, if they are a subscriber, an extension of their current subscription.

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1ST PLACE
Ernest F. Mausolf
Esmond, Rhode Island

Scratch-built AD-6 Skyraider from Flying Models plans by Franz Meier. Has 75" span at a 1 1/2" = 1" scale outline. This model is a replica of the Squadron 35 that was aboard the carrier Leyte during the Korean conflict. Powered by an Enya .61 with a Kraft radio. Total weight is 9 1/2 pounds.



2ND PLACE
Mel Carver
Oceanside, New York

Outstanding Smith Mini-Plane built from a Sig kit. Covered with Permagloss Coverite, with trim brushed on with Pactra paint and striped with D.J.'s trim tape. Radio system is by Kraft and a Webra .40 Blackhead with a Semco muffler up front. Model weighs 6 pounds.



3RD PLACE
Walter Bellmer
Franklin Square, New York

The model is a Bridi Hobby Dirty Birdy 40 with an O.S. Max .40 Schneurle for power using a 10/6 Zinger prop. Has a Kraft single stick radio with a total weight of 5 1/2 pounds. Fuselage covered with glass cloth and Hobbyoxy 2 then K & B primer. Paint is Pactra's Formula U. Mods made were: increase in thickness of 1/2" to wing & stab, anhedral added to the stab.

RULES

- A. Model Aircraft Origin**
- Any kit — wood, fiberglass, foam, or ARF kit is eligible. Any scratch-built aircraft built from magazine or original plans is also eligible.
- B. Category**
- All types of radio controlled airplane models.
 - Scale
 - Pattern
 - Racing
 - Fun-To-Fly
 - Original Design
- C. Entrants to submit:**
- Color photo or slide, size 35 millimeter or larger.
 - Black and white glossy photos (any size) of both sides, top, rear, front, and bottom views.
 - Close-up photos may be submitted on detail work if desired.
 - A short write-up giving dimensions, weight, power, radio, etc.
 - A statement that:
 - The submitter was the sole builder of the model.
 - Parts and/or accessories used were part of the kit or available to all modelers at retail outlets.
 - All non-available or special parts were built by the hands of the submitter.
- D. Judging will be on:**
- Workmanship
 - Quality of finish
 - Attention to detail
 - Subject of model or difficulty of the project will count in judging.
- E. Judging will be done by RCM Editors Dan DeWey and Pat Crews.**
- F. Persons not eligible**
- Members and employees of RCM or any other model airplane publication
 - Members and direct or indirect employees of Dremel Manufacturing Co.
 - Members and employees of any manufacturer of hobby kits, hardware or supplies.
 - Anyone engaged in the wholesale or retail distribution of hobby kits, hardware or supplies as a major source of income.
- G. Models not eligible for submittal are:**
- Models that have been submitted for judging of workmanship at any major AMA sanctioned contest and have placed 1st, 2nd, or 3rd in that judging. Flying points as a final standing do not apply.
 - Models that have been built for display purposes only.
 - Models that have been built for manufacturers demonstration purposes.
 - Models that have won a similar award in another publication.
- H. Entrants who have models that qualify under these conditions are eligible to enter. Included with the entry should be the entrant's AMA and FCC numbers, and also, the name of his club, if any.**
- I. Prize Information:**
- A Dremel 371 Variable Speed Moto-Tool will be awarded to the monthly winner. An illustration and description of the kit will be included each month along with the winner's name, address, club, etc. The second and third place runners-up will be awarded a one year subscription to R/C Modeler Magazine.
 - Dremel Manufacturing Co., of Racine, Wisconsin will be notified of the monthly winner immediately after a decision is reached by the judges so that the kit award can be received by the winner prior to the issue of that month's RCM.
- J. General:**
- All contest entries must be addressed to RCM Model of the Month Award Program, R/C Modeler Magazine P.O. Box 487, Sierra Madre, California 91024.
 - All photographs and materials submitted by the contestant will become the property of R/C Modeler Magazine and none will be acknowledged or returned.

This contest will be null and void in any state or locality where specifically prohibited by law.

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SCALE VIEWS

from page 171/15

Handy in conjunction with 1/32" head aluminum rivets when a slightly larger rivet is called for or for king-size models in which all of them are large.

★★★ If you like the Krier color scheme on Larry Scott's model in the Scale Spotlight, this issue, note that the Aeromodeller plan pack for the Krier Great Lakes can be had from Bob Holman Plans, Box 741, San Bernardino, Calif. 92402. Ask for No. 2748. In addition to a 3-view, it has pictures and marking information. For a complete listing of this great collection of 3-view and scale documentation information, send a self-addressed, stamped envelope to Bob. Or a buck will bring you a complete catalog of his plans and kits. □

ENGINE CLINIC

from page 12/10

Thank you very kindly and keep up the excellent columns that you put out.

*Sincerely yours,
Robert C. Schlag
Jewett City, Conn.*

Quite a few fellows have written in lately confused over the Metric listing of engine displacement. Conversion is actually very simple if you just remember the number 6. If the engine is metric such as 3.5, 6.5 etc., you just multiply by 6. The 3.5 c.c. becomes .21 cu. in. — the 6.5 c.c. becomes .39 cu. in., etc. If you want to convert an engine listed in cubic inches to cubic centimeters you simply divide by 6. A .60 cu. in. engine becomes 10 c.c., etc.

Dear Clarence,

I have an O.S. Max .60 Blackhead. Unfortunately the carburetor was torn off in a crash.

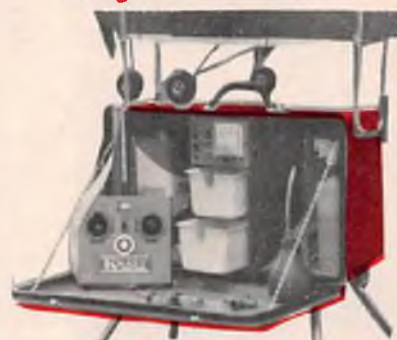
I have a new crank case housing but I cannot get the crank and bearings out of the old one. I put the flanges, or rather rested the flanges on, an open vise and tapped the prop shaft with the nut on expecting the shaft and inner bearing to pop out. This did not happen. Am I going about this the right way?

I think RCM is a fantastic magazine for the RC enthusiast.

*Sincerely,
Jim Malek
Grand Ledge, Mich.*

Sometimes the shafts and bearings are pretty tight and it takes more than a little tapping on the end of the crankshaft to get them out. You did not say if you heated the case or not, but this is necessary. It is always better, if the engine has a removable front plate, to leave the front plate attached to the

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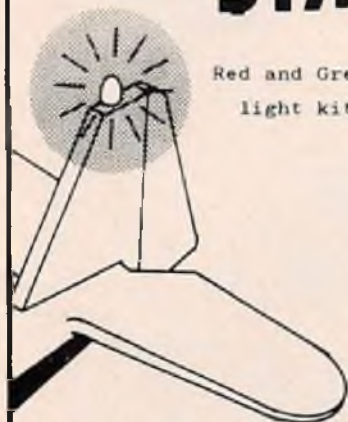
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engine and rest the back of the case on a block of wood. Supporting the flanges on the jaws of a vise can often mark up the sealing surfaces or even bend them. The case can be heated with a propane torch, over the gas stove, or in an oven. Just be careful not to overheat it. If tapping with a small hammer will not drive the crankshaft out, do not try a bigger hammer. You will only damage the bearings. You will have to locate somebody with a drill press and use the drill press to press the crank out. If the crank finally does come out but the rear bearing remains in the case, reheat the case and, holding by the fins, smack the back on a block of wood. A few sharp

rap will pop the rear bearing out. The front bearing can easily be pushed out with a wooden dowel or similar tool.

Dear Mr. Lee,

I have been reading your articles in RCM for two years now. I must say, they are quite unique, especially for us readers in Europe.

Last year I got myself the NSU Wankel (O.S.), first of all because I'm collecting all kinds of engines. But also being a modeler for years, I recently put this engine on my Middle Stick (Graupner). The performance was hopeful. Only, after each flight I made, we had the greatest trouble starting it again. On top

of that, it was always steaming hot. Do not get me wrong! We tried all kinds of fuel mixtures, with resin as well as synthetic oil (MA731) from 80/20% up to 70/30% which is already very greasy. We tried all the possible glow plugs existing. No use, only waiting until the damned thing had cooled, off did help, which means 3 flights on one afternoon. On the Middle Stick, the engine is completely free mounted so gets maximum air cooling. No need to tell you we tried all possible props. Compression should be all right as once it's working well we do get the max. rpm out of it. Also, the specimen I got is of the newest type!

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Maybe with your knowledge you could possibly tell me what's wrong?

*Luyx Reggy
Belgium*

It is pretty hard to say if there is really anything wrong with your O.S. Wankel or not without being able to examine the engine. The Wankels do run on the hot side due to lack of much in the way of cooling fins. They are also not the easiest of engines to hand start even when cold. Some seem to start fairly easy by hand and others are real bears to get running. It depends on how tight the engine is, compression seal, etc. Generally I have found it easiest just to use an electric starter on the Wankels.

As far as your heating problem — this could be caused by using too much prop on the engine. The Wankel is not a "lugger" and likes to turn up. Using too large of a propeller will cause overheating. You want to prop the engine to turn 12,000 or better. This usually can be done with a 9/6 or 9/5 prop. Do not lug the engine below this rpm. Also, do not use a spinner any larger than 1 1/4" diameter. I have seen fellows using spinners 2 1/2" in diameter which completely deflects the air away from the cooling fins on the engine.

Fuels with synthetic oils also run hotter than castor oil. If your heating problems continue, try a castor oil based

fuel.

Dear Sir;

I have a few questions to ask concerning fuel mixtures for both control line and radio control use. Recently, I mixed some fuel containing 16-18 percent Klotz 2-stroke racing oil, and 4-6 percent castor oil, and have used between 5 and 10 percent nitromethane, the rest being methanol. I enjoy mixing my own fuel, and even though I probably do not save any money in the process, it still is a lot of fun. Can you suggest how to examine the engine case and bearings (bushings) to make sure that excessive

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wear is not taking place? The engines being used are Fox .15, .35, and K & B .35's for the most part. For radio control use, would you suggest that more castor oil be used? I have also used the 18 percent Klotz/4 percent castor oil in the K & B 6.5 engine when using 10%-15% nitromethane, with no apparent ill effects, in fact, running the engine pretty fast. The only recent change in the fuel mixture I have used is to include 0.5 or 1 percent propylene oxide to the mixture to give slightly better starts. Will probably leave it out in the final analysis, since most ethers form peroxides, and it is not a good idea to leave the propylene oxide around for too long.

Any suggestions you may have about the ratios to use as a function of the engine size and use (U/C-R/C) would be appreciated. Most of the engines were broken in on either Fox Superfuel or K & B 100 some time ago. Most of my concern is that in radio control use, a higher ratio of castor oil to 2-stroke oil might be indicated to make sure that the shaft and connecting rod and bearings or bushing receive adequate lubrication

during prolonged flight. With the 2-stroke oil, there is much less residue on the plane after a flight, but at least some castor oil is needed to protect the engine at higher rpm or longer run times.

Sincerely,
Terry Joe Sprinkle

Detecting wear in a model engine is pretty hard to do visually unless excessive wear is present, i.e., a badly worn upper con-rod end or wrist pin hole in the piston will be quite obvious by the sloppy fit. However, the beginning of wear can only be detected by the use of a micrometer and appropriate ball gauges. You have to know the diameter of the crankpin, I.D. of the rod bushing, etc., when the engine is new and take it from there. The difference between a properly fit rod with .0015"-.002" clearance and one that is getting sloppy with over .002" can only be detected by measuring. If the crankpin or wrist pin have a blue discoloration, this is an indication of lack of lubrication. If the exhaust side of the sleeve is blue, it would indicate lean running and heat. These are about the only visual signs

you can go by.

As far as oil — you should not be using Klotz 2 cycle racing oil. We have run some pretty extensive tests and had nothing but problems with this oil in model engines. This is due to the fact that the viscosity is that of a 20 weight oil. In theory it has the same lubrication qualities as a 60 weight oil at higher temperatures (rated 20-60) but in actual application this does not bear out in our model engines. You want to use the old Klotz Special Formula. This originally had a 30-50 rating on the can but that has now been changed to 20-60 the same as the 2 cycle racing oil. However, the local distributor assures us that the only change over the original oil is on the can label. The oil is still a heavier bodied oil.

17% Klotz Special Formula and 5% Bakers AA castor is a good all around oil mixture for either U-control or R/C. You do not need to vary oil content with different size engines or type of flying. For racing purposes a little less oil can be used (18%-20%). The 1/2A can also use less oil but, other than these cases, you need 22% in your fuel. □



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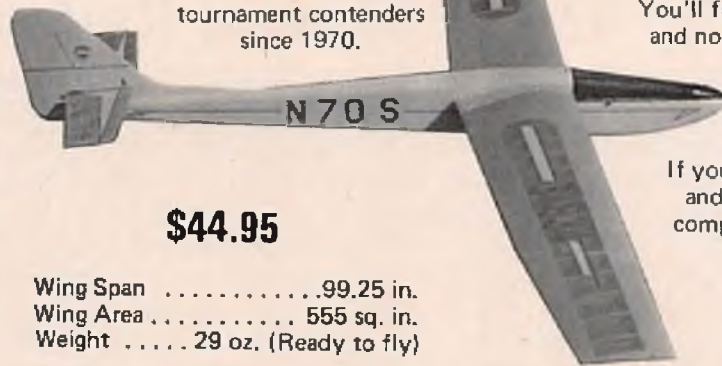
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PIT STOP

from page 7

wanted and then I lost the steering
servo. Naturally, I forgot to bring a spare,
so we concentrated on my son Curtis's

car and got it working the way he
wanted.

Butch Kroells and Rich Lee had tuned
pipes on their cars. As with anything
new, there are always some problems to
be worked out, but the combination
looks real promising. I don't think there's
any question but that we'll all be running
tuned pipes before long. One of the
hardest parts is trying to tune the engine
because the pipe is so much quieter

than the mufflers we're now using. But
it's definitely the way to go.

We didn't run Friday, but the reports I
got Friday night said that Chuck Phelps
from Phoenix, Arizona, had his
Associated RC200 running about 1/2 a
second a lap faster than anyone else.
That's quite a bit.

Saturday morning we got there early
and the place was already packed. 110
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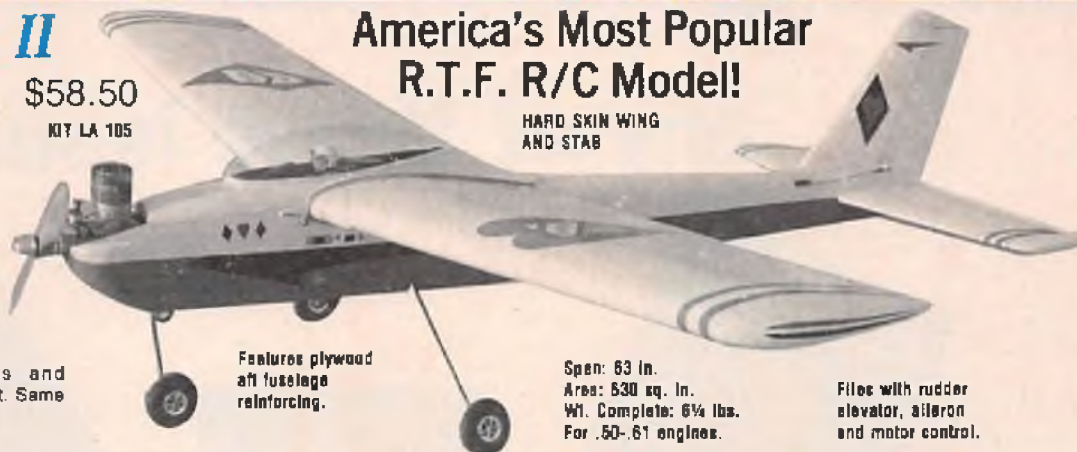
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area pretty fast. We got 2 rounds of practice before our qualifying heat and Dick McCoy was sitting trackside timing the faster cars. Sure enough, Chuck Phelps was running a 1/2 second a lap quicker than anyone else, which had to make him a favorite for the Top Qualifier spot. And in his first qualifying heat, he looked like he was going to do it, but he burned out a glo plug. The next day, a pit error caused him to run out of fuel in the

middle of his qualifying heat, so the fastest car never got to race in a Main.

But there was still plenty of qualifying thrills. Bill Jianas holds the track record at Thorp's which was set at the World's Championship race. And anyone who saw that qualifying race will never forget it. Bill only knows how to drive one way, and that's as fast as the car will go. And with another fantastic drive he again broke the track record lowering it to

3:02.6. But just two tenths of a second away was Jeff Rold, with a 3:02.8 time, with what looked like a picture perfect run. That's about half a car apart after 10 laps!

With the qualifying over, we were ready to start the Mains. The drivers were classified into Beginner, Novice, Amateur and Expert classes. The fastest 10 drivers in each class ran in an

to page 183



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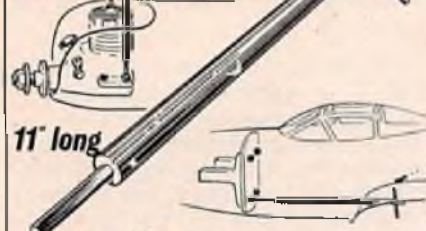
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PIT STOP

from page 181/7

"A" Main and the next 10 fastest ran in a "B" Main. Top Qualifier in the Beginner Class was George Anderson with a 3:33.4 time, but the 30 lap Main Event belonged to Chuck August, but not without a hard battle from Joe Sortillion, Jr., who finished 2nd with Willie Green taking 3rd.

Mike Reedy used all his skill to perfection to become Top Qualifier in the Novice Class with a 3:19.4 time, but he ran out of luck with his motor in the Main. Randy Smeltzer and Dick Rold had one of the closest races of the day with Randy winning the Novice Main, Dick right behind in 2nd and Glenn Williams 3rd.

Amateur Class driver Dana Smeltzer has to have one of the best Thorp cars running here. He's been qualifying better than a lot of the experts and today was no exception. Dana's 3:10.0 qualifying run was beautiful, but Bill Watson took the lead in the Main and looked like he was going to run away with it, until his steering servo went out. Mike Kimrey and Dana Smeltzer then had a good race with Mike winning the 50 lap Amateur Main, Dana taking 2nd and Jay Spere 3rd.



With the tuned pipe coming over the top of the radio tray, the batteries and receiver are moved underneath.



Chuck August won Concours with this very beautiful Lola Sports Car.

The 60 lap Expert Main was next and it promised to be a good one. Gary Kyes got off to a good start and took the lead with Jeff Rold right behind. At about the 10th lap Jeff passed Gary and started to open up a lead. Gary held down 2nd until the 21st lap when his engine let go. Bob Welch then took over second. There

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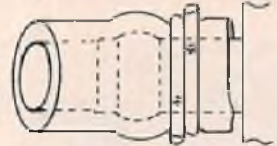
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was quite a difference in driving styles between the two drivers. Welch was going fast, and he looked like he was going fast, with a little extra sideways motion here and there. In the meantime, Rold was opening up his lead, not looking so terribly fast, just driving perfect and making it look so easy.

In the meantime, there was a lot of other good racing going on. Janas tried some different front tires for the Main that didn't work out quite right, but he and Chuck Hallum had some good racing. Curtis Husting had gotten off to a bad start, but had now worked his way up to 3rd place, right behind Welch. Welch and Curtis then had a very close race going. Curtis was used to this tight racing, having won the last three Southern California Series races. (He's since won two more to make it five in a row). The pressure, or whatever, found Welch in a crash and he lost his wing. Curtis slipped by to take 2nd place just 2 laps from the end of the race.

Jeff Rold continued on to a well deserved win with Curtis Husting 2nd, Bob Welch 3rd, Bill Janas 4th and Chuck Hallum 5th. Dick McCoy then presented the beautiful trophies to the happy winners.

We would like to thank Dick McCoy for his generous sponsorship of the largest R/C car Road Race in the U.S.A. and John Thorp and Jerry Thompson as Race Directors. □

FROM THE SHOP

from page 2

From the East Bay Radio Controllers newsletter "Carrier" comes this Psychoanalytical approach to flying . . .

Man has always wanted to fly. Driven by a desire, a wish to escape, and a thirst for excitement and adventure, man's dream of flight has progressed from fantasy to reality, from desire to accomplishment.

From classic to modern times, artists and poets have been fascinated by Ovid's tale of Daedalus and his son Icarus who fashioned wings of feathers imbedded in wax to make their escape from the labyrinth of Cretan King Minos. However, the tragedy occurred when Icarus flew too high and the sun melted the wax, thus plunging him into the sea.

A fear as well as fascination still surrounds the mystery of flight. Only with the advent of flight has man been able to move from his two-dimensional world into a third dimension. Flight gives man the feeling of being liberated from all earthly laws, and as individuals, it is well documented that aviators feel at one among themselves and distinct from the rest of the human race.

Several years ago, the renowned American psychiatrist Dr. Douglas D. Bond, made an interesting and comprehensive study of the emotional problems confronting aviators during combat. For his study, Dr. Bond

concentrated on specific cases of fliers in the training command of the USAF, and in the Eighth Air Force stationed in England during World War II. One fascinating aspect of this study was that most airmen regard their aircraft as an object of erotic love. Many even consider their airplane as a woman for whom they feel not only a sensual passion, but also experience a similar jealousy and devotion that a man in love feels for his beloved. Some pilots also identify their aircraft with their mothers, while the sky represents the father-enemy.

Psychoanalytically, flying is a symbol of physical love, and the airplane, like the bird, is a symbol of sexual potency. Flying, therefore, becomes a supreme erotic force that satisfies an airman's hidden infantile fantasies. Thus, it is evident that the airman's love for the act of flying is narcissistic and he comes to regard his plane as the most important extension of his own body. In spite of the love he has for his airplane, the aviator also indulges in a kind of exhibitionism that imperils his love object (plane). The more dangerous the flight, the greater the psychological satisfaction for the pilot, who accepts death as one further attraction of the game. Victory over earth and death becomes a personal triumph.

Essentially, we all have a basic fear of flying. Most of us, however, manage to adjust to, and overcome, that fear, but in many, an adjustment is not possible and serious emotional disturbances then arise. In his enlightening article, Dr. C. Tempereau discusses some of the results of his study of the emotional problems in flight. He maintains that a basic fear of flying, that is of being sustained in the air without visible support from the ground, is normal. The three stages through which both passengers and pilots pass are as follows: (1) The "Initial Thrill", the exhilaration and sensation of thrill that occurs regularly during the first few flights is an exhilaration born of denying fear, like the excitement experienced when riding a roller coaster. (2) "The Hot Pilot", which occurs when the fundamental fear is completely repressed but effects one in a much more subtle manner. It is at this point that flying seems to satisfy some intense emotional need and becomes both a release and an expression of the ego. (3) "The Airplane Driver," represents the normal and desired end for both pilot and passenger (include automobile driver here also). This is a stage of routine with neither unusual thrill, excitement, nor exhibitionism.

The above might apply to most R/C pilots in one degree or another. Don't we all experience the fear during our Initial flights (including newly built models) and surge with excitement and ego boost after a successful touchdown (in one piece). Likewise, isn't the time spent at the field quite successful in taking us away from earthly worries and renewing our outlook towards routine work?

So pilot your mighty R/C's with care and affection, for are they not an extension of yourself?

The subsonic psychiatrist
Dr. Don Galen

See you next month. Good flying! ☐

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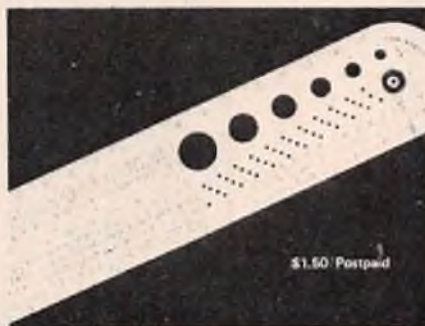
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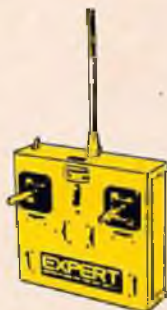
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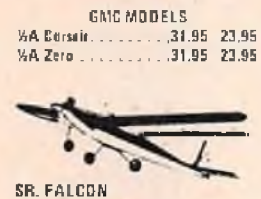
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For those of you who read this magazine monthly, you will surely note how our Indy franchise dealer list is growing. It is about to push the column right off of this page.

Also, growing is the number of exclusive Indy products. We are expanding the number of Corgi engines to include both a 48 and 35. We are adding the Corgi 05 Marine engine.

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Atlas

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Cipolla

These engines are lapped piston type and are complete with glow plug. Satisfied customers are calling in and telling us that these really are little power houses.

We are now offering the following three versions. Cipolla .09 Std. U/C - L: \$14.55 I: \$11.75. Cipolla R/C - L: \$18.95 I: \$14.95. Cipolla R/C Marine - The price is to be announced.



Indy Film

New colors similar to the K & B epoxy paint colors. Solids - White, Yellow, Orange, Blue, and Royal Blue.

L: \$7.50 per roll. I: \$3.99 or 3 rolls for \$9.99. This is an introductory offer.

Metallic red and green are coming soon. Prices slightly higher.



SG Race Car

Complete with Supertigre X-21 Schnuerle engine and clutch. Includes engine, muffler, and heat sink head. This is the competition series race car with ball bearing wheels. Ferrari body included. L: \$199.95 I: \$159.95

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Como

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Complete with muffler and ST carburetor. L: \$69.95 I: \$43.00. U/C version less muffler L: \$59.95 I: \$33.95. Taking orders for 48 R/C and 35 Combat.



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MRC'S new ready-to-fly breaks the price barrier...

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Until now if you wanted to buy a ready-to-fly airplane that wasn't an .049 powered toy you had to spend big bucks, or settle for kid stuff control, low end power and minimum performance features.

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