

R/C Pattern plan • C/L Stunt plan

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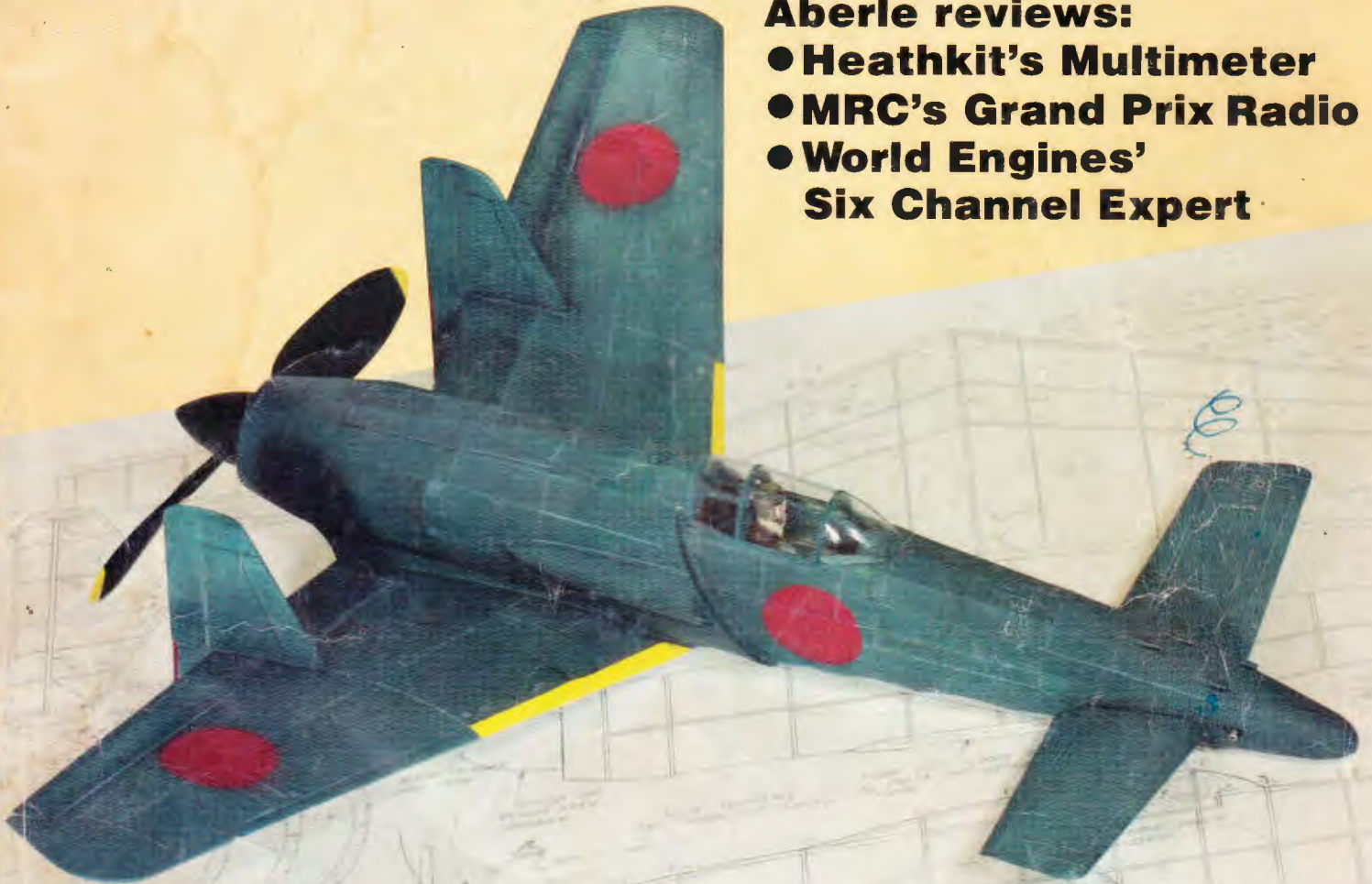
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● MRC's Grand Prix Radio
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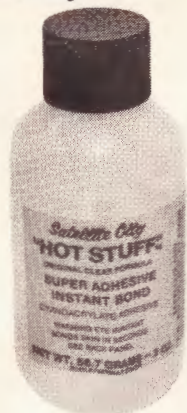


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associate editor

Robert Aberle
contributing editor R/C

Al Berry
contributing editor R/C boats

Vic Macaluso
contributing editor R/C boats

Ed Whalley
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On the cover

Don Srull is well known for his unusual Rubber Scale entries. This WW II Japanese Shinden won the Flying Aces Club Nationals. It's different. Photo by John Preston.



September 1981

Vol. 84, No. 9/530

Aircraft features

- 21 **Gulfstream/Bruce R. Lund**
A stylish Pattern bird for 60 size engines
- 25 **World Engines Six Channel Expert/Bob Aberle**
An FM Product Review: New circuitry and smooth sticks make it a winner
- 29 **Shinden/Don Srull**
A Rubber Scale model of the WW II Japanese canard fighter
- 33 **Heathkit Multimeter/Bob Aberle**
An FM Product Review: Extreme accuracy at a reasonable price
- 36 **Ceres/Bob McDonald**
This top Stunt design features sheeted "I" Beam construction
- 41 **Archaeopteryx Avion Associates' Petrel/Bob Crane**
An FM Product Review: A record holding 2-meter sailplane
- 46 **Flyin' Things For Fledglings/Earl VanGorder**
More news from the gang
- 50 **R/C Sport Scale/Rich Uravitch**
A look at competition and the rules
- 51 **R/C Sport/Ron Farkas**
Choosing a plane to fit your needs and experience
- 52 **R/C Soaring/Bob Crane**
Launching systems are discussed
- 53 **F/F Sport/Larry Kruse**
Getting the word out
- 54 **C/L Combat/Phil Cartier**
Beginners deserve a Combat event of their own
- 55 **C/L Stunt/Bob Hunt**
Checking out and trimming a C/L Stunt trainer
- 56 **With Model Builders/Ed Whalley**
News and views from all over

R/C model car racing

- 57 **MRC's Grand Prix radio system/Bob Aberle**
Something special for the racer
- 62 **Starting Line/Jack Russell**
News from the world of R/C Car Racing
- 63 **Delta's Pocket Rocket/Dean Hughey**
A good thing in a small package
- 64 **R/C Auto Clinic/Jack Russell**
A diet program for your car

R/C model boating

- 67 **Precision Boats' El Diablo/Al Berry**
An FM Product Review: Speed of assembly and speed on the water
- 69 **Scale Model Ships Unlimited's Patrol Craft/Eric Goldschrafe**
An FM Product Review: Super Scale detail in a moderate size package
- 72 **Ducted Fan Swamp Buggy/Dick Sarpolus**
Midwest's ducted fan takes to the water in a Dumas boat
- 73 **R/C Sport Boating/Vic Macaluso**
The model boating tool box is examined, plus a look at various drives

Departments

- | | |
|-----------------|---------------------|
| 5 Editorial | 65 Pit Report |
| 7 Flying Report | 75 Letter Rip |
| 17 Air mail | 80 Classified |
| 17 Timetable | 81 Dealer Directory |
| 19 FM Clinic | 82 Ad Index |

editorial



Stunt circle shown here is just part of the permanent site in Czesochowa, Poland, used for the 1980 World Championships. Site also includes caged-in Speed and Team Race circles. Part of sports complex.

The problem

I've just lost the use of a flying field. It was a good one with smooth grass and undisturbed air on three sides. I'm going to miss it.

This has made me aware of the plight of the many modelers who have the same problem and I've done some research on the reasons we are losing fields at such an alarming rate.

The most obvious is the constant development of accessible, flat, dry land. As the population centers swell, so too does the construction of new housing developments, shopping centers, hotels, and recreation areas.

One would think that we would be included in the recreation category. After all modeling is a sport isn't it?

Another reason for the loss of a field is noise. As the developers close-in on our flying

sites, the residents of the new homes start to complain.

A third reason is liability. No land owner wants to be responsible for a group of people flying high speed "toys" around. In case of an accident he feels he will be caught up in the litigation no matter how much insurance the flyer claims to have.

There are other reasons why we are having trouble getting and keeping our flying sites. The big question is what can we do about it?

I called A.M.A. headquarters about the problem and talked with Geoff Styles. Geoff is the Flying Sites Program Director for A.M.A. He told me of the various programs A.M.A. is involved in to help clubs in their quest for fields. Geoff has developed a 29 point outline for club discussion on this prob-

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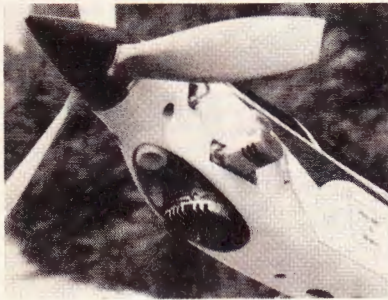
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lem. The A.M.A. also has put together a book entitled *Getting and Keeping Flying Sites*. It is a well prepared piece that deals with every facet of the problem with chapters on How to Find a Flying Site, Selling the Idea, Financing, The Nightmare of Noise, and sections on Keeping What You Have, Documents Available From A.M.A., and Endorsements of Aeromodeling. This last section contains copies of letters and telegrams from such notables as President Jimmy Carter, Neil Armstrong, Max Chernoff, Frank Borman and others who have built and flown models during their lives and feel that many skills were acquired in this manner.

All this is well and good, but as Geoff and I spoke one fact kept surfacing. The public image of model airplanes is still one of grown men playing with toys. Our macho society refuses to look on the hobby/sport as one of a scientific and mature nature. Until the public's perception changes, we will continue to have flying site problems.

Other sports don't have this problem. Tennis courts are springing up at an astounding rate. Baseball fields are almost always busy. Handball courts are being built in every community. Americans are finding more recreational outlets than ever before. But, to the masses, model planes are still just toys.

The situation is different in Europe. Modeling is held in high esteem there and the public seems to understand the nature of the pastime as more of a sport than a hobby. Many permanent flying facilities are to be found on the continent and most of these are government sponsored.

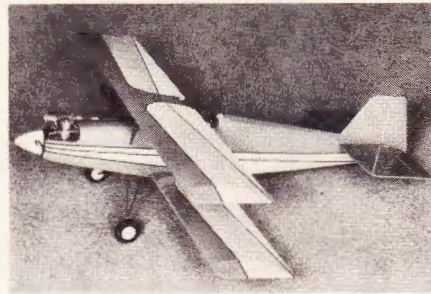
While attending the Controline World Championships in Poland last year, our team was impressed by the beautiful, well laid out, permanent flying facility. There were three asphalt circles with cages constructed around the Team Race and Speed areas, pit cubicles, rest rooms, and spectator seating. All of this was built on the perimeter of a large sports stadium. The Combat event was flown on the grass infield of the stadium. And, all of this was government sponsored.

Similar sites can be found in Belgium, Finland, Russia, Italy, and other countries. Modelers are perceived as serious adults with a legitimate interest in a worthwhile sport.

We must make the public aware of our sport as one that isn't just for kids.—BOB HUNT.

Bob

flying report



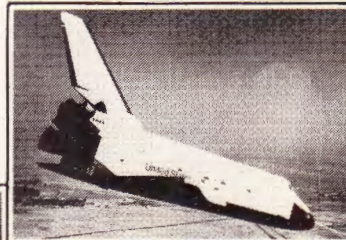
NORTHEAST AERODYNAMICS, 568 Main Street, Haverhill, MA 01830, is manufacturing the Bel-Air .40, a true .40 size sport biplane. The Bel-Air has a 45 1/2" wingspan and is

designed for a 4 channel radio. The kit features bolt-on wings, plug-in cabane wires, all balsa wing and fuselage construction, and easy to read plans and instructions. Wing and fuselage kits are also available separately. For more information write to the above address.

DYNATHRUST PROPS, INC., 2541 N.E. 11th Court, Pompano Beach, FL 33062, has come up with a new way for the users of Dynathrust Props to start the engines on their jumbo scale aircraft. The Dynahub converts prop shafts to pull rope starting. Dynathrust claims the Dynahub makes starting easier because it increases the starting voltage and cranking speed. In addition, the pull rope feature increases safety by get-

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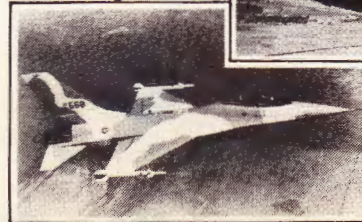
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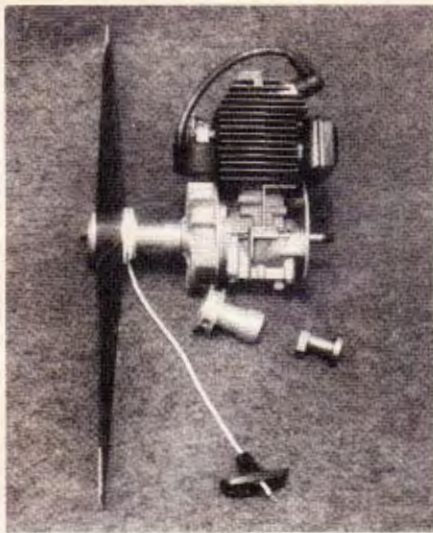


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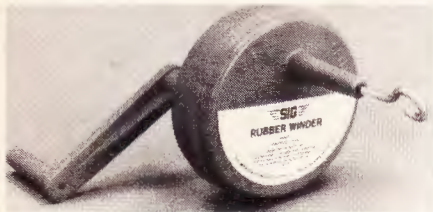
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ting hands away from the prop when starting. The Dynahub fits all engines with $\frac{5}{16}$ NF threads, including Quadra, Husky, Roper, Evra 190 and others. Custom made hubs are also available. For more information write to above address.



SIG MANUFACTURING CO., INC., 401 S Front Street, Montezuma IA 50171, has come up with an improved version of a 6:1 ratio rubber winder for the free flight modeler. The winder features a durable plastic case and will wind either forward or reverse. The new Sig rubber winder is priced at \$3.95. For more information write to the above address.



HOBBY HIDEAWAY, RR 2, Box 19, Delavan, IL 61734 is paying tribute to one of model aviation's classics, the Zipper, by presenting the old timer on a T-shirt. The yellow shirt features red artwork and costs \$6.50, postpaid. The shirt is available in adult sizes S, M, L, and XL. Childrens sizes S, M, and L are available for \$6.00. For more information write to the above address.

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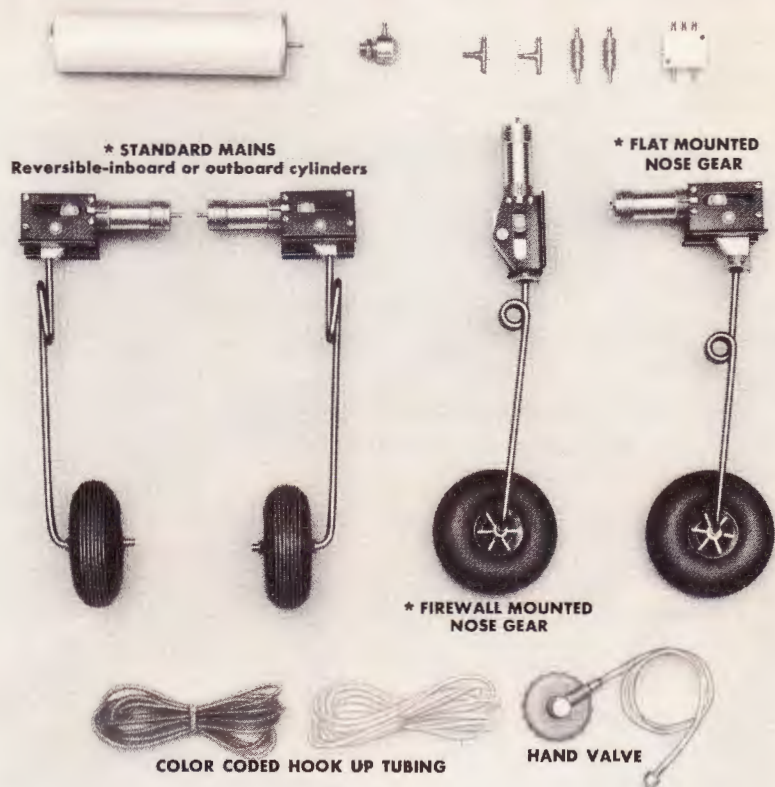
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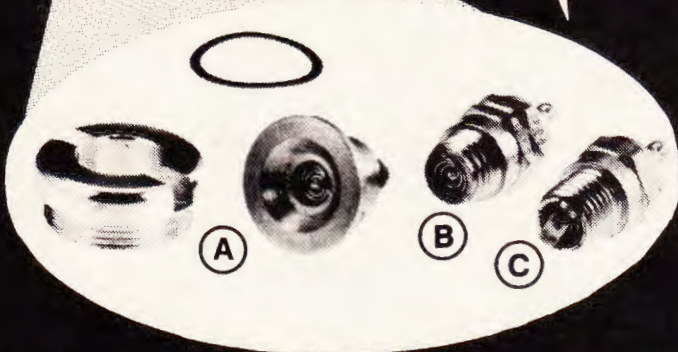
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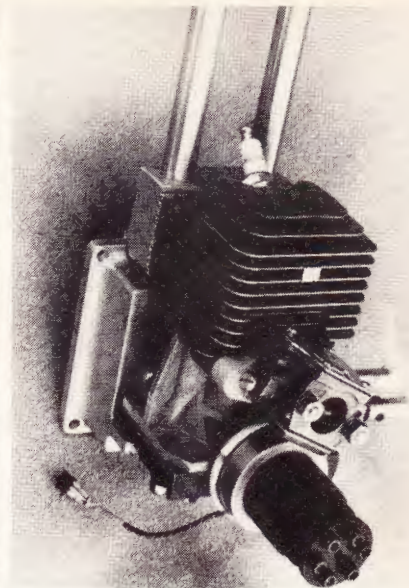
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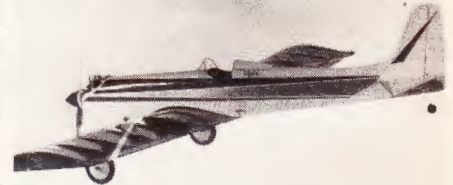
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E.W.H. SPECIALTIES, INC., 3012 Avenue "E" East, Arlington, TX 76011, gives jumbo scale enthusiasts yet another engine to contemplate with the release of the Super Hustler MkII. This upgraded version of the older engine features tighter bearing tolerances and finite balancing which contribute to the Mk II's smooth operation. The Super Hustler Mk II develops 25-26 pounds of thrust while swinging a 20x8 prop at 72 RPM. The older model Hustler can be upgraded to a Mk II by the factory. For more information write to the above address.



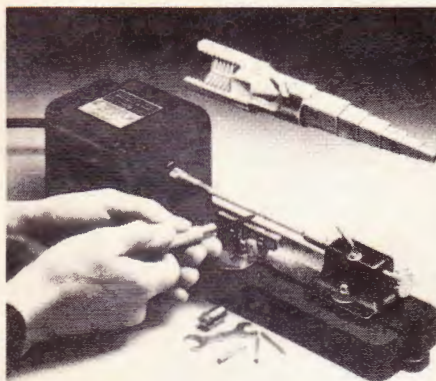
TK ASSOCIATES, Box 248-Y, Millis, MA 02054, announces the release of the Ramco Next Step R/C plane. The Next Step is designed to serve a dual function. With the 60 inch span flat bottom wing and a .35 engine the Next Step serves as a docile four channel trainer. A semi-symmetrical wing and .45 size engine will allow the Next Step to turn into a hotter ship capable of 10 foot takeoff runs and any pattern maneuver, but it still retains its docile landing qualities. The kit features contest quality balsa and plywood with all parts machine cut. Also featured is an assembled main gear. Construction time is approximately 8 hours. For more information write to the above address.

R&R MODELS, 1611 Red Bud Drive, Northwood, OH 43619, is a new company producing two giant kits. The first model, the 15-2000, weighs about 20 pounds and has 2000 square inches of wing area. The 15-2000 has a 102" wingspan and is designed for Qua-

dra-type power plants. The second model from R&R is the Snapper. This plan has an 86" wingspan and is meant for the Sunday flier. It, too, is designed for Quadra-type engines. For more information write to the above address.



BALSA USA, INC., P.O. Box 164, Marinette, WI 54143, announced the release of their new 1/3 scale Fly Baby Biplane. The kit is a stand-off scale model of Pete Bowers homebuilt. All outlines, rib spacings, etc., are to scale. A scale 3-view is included in the kit. The wingspan is 88", and the flying weight is 19 pounds which makes it ideal for the large engines now available. The complete kit is fast building and features full-size rolled plans, complete instructions including photos, three views, formed ABS cowl, formed wire parts, complete hardware package (except hinges), fallout die-cutting, cable, cable ends, turnbuckles, rubber cockpit padding, and decals. The kit is all AAA grade balsa and plywood. Field assembly time is ten minutes. The complete kit is priced at \$99.95 or \$183.95 with the Quadra engine, plus \$1.00 handling. For more information write to the address above.



DREMEL, 4915 21st St., Box 518, Racine, WI 53406, introduces a new lathe chucker designed for use with the Dremel Lathe securely holds 1/4" to 1/16" round and square wood stock and keeps it centered. The Model 1005 chucker holds the smallest diameter turning stock and allows the user to turn intricate designs quickly and accurately. Miniature furniture legs, doll house furnishings, miniature cannons, parts for model ships, cars and railroading, model airplane wing tanks and many other miniature parts can be made using the new chucker. The metal chucker adapter is threaded to fit the

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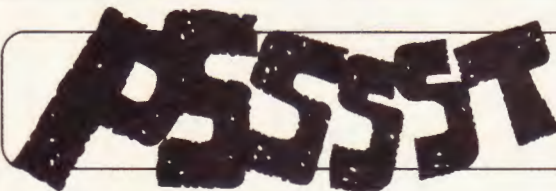
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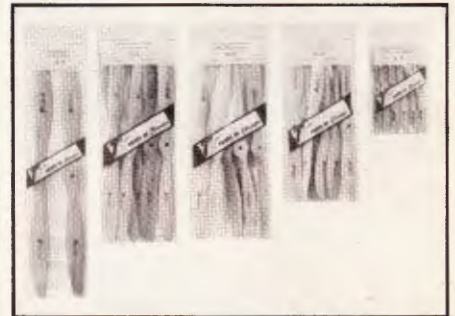
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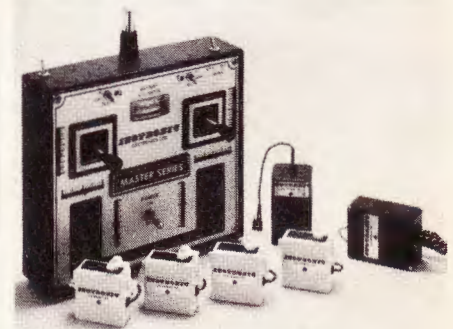
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Dremel Moto-Lathe's spindle threads. An internal centering marker accurately centers both ends of the turning stock. A nest of six removable square metal tubes ranging in sizes of 1/16", 3/32", 1/8", 5/32", 3/16" and 1/4" are part of the chucker. The tubes hold the different sizes of turning stock. According to Dremel, hardwoods such as walnut, mahogany and cherry work best for turnings; basswood, which is softer, also works well. Needle files are recommended for very small diameter turnings. The new Model 1005 chucker has a suggested retail price of \$9.95. For additional information write to the address above.



TOP/FLITE MODELS, INC., 1901 N. Naragansett Ave., Chicago, IL 60639, is now distributing an improved line of rock-hard maple Super M and Top Flite props which will further increase flying performance. These props boast refined accuracy in pitch and balance, excellent workmanship in sanding, improved high luster and fuel proof finish. For the convenience of both the retailer and the modeler, this new, improved line of props and Top Flite's quality nylon props are now packaged in clear plastic hang up bags for easy display of types and sizes. The prop packages will be color coded for easy identification and will hold six props each except for the larger props which will be packaged two per bag. In their new hang up bags, these props will offer dealers more efficient use of display area and permit better inventory control. Every Top Flite wood prop is crafted from selected, rock-hard, straight-grained maple. For more information write to the address above.



TOWER HOBBIES, P.O. Box 778, Champaign, IL 61820, is importing the Isotronic Master Series 7 radio from Canada. Isotronic is a Canadian manufacturer who has earned the reputation for reliable, high quality products. The Master Series 7 features low end adjustable dual rates and 4 servo reversing switches located behind the name

plate on the front panel. The radio has cross trim configurations for the main sticks. The Isotronic Master Series 7 radio has a one year warranty, with U.S. service centers handling repairs. For more information, write to the above address.



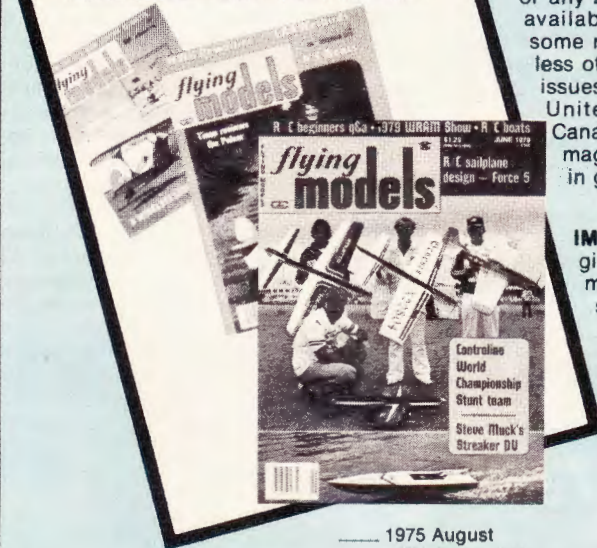
TOP FLITE MODELS, INC., 1901 Naragansett Ave., Chicago, IL 60639 announces a new radio control J3 Cub that offers modelers a scale rendition of one of aviations best loved airplanes that has trained thousands of pilots. The J3 Cub is ideally suited for the modeler ready to advance to scale aircraft. It is a large airplane especially designed for engines in the .40 range. It features scale outlines with balsa and plywood construction for strength and lightness. The Cub gives you two different variations of wing configuration from which to choose. Build the original "gentle" flying Cub with a 77 1/2" wingspan and 795 sq. in. of wing area. If you want a Cub with more aerobatic response, build the clipped wing version. Wingspan is 59 1/2" with a wing area of 595 sq. in. Overall length of the Cub is 49" and the flying weight is 4 1/2 to 6 1/2 lbs. Top Flite's Cub has an exclusive one piece injection molded cowl to accommodate .35 to .50 engines. Sparing no detail, the cowl has been carefully color coordinated to match Top Flite's "Cub Yellow" FabriKote™. The kit also features: A one piece glass, fibre-filled motor mount; scale, 3 sheet decal package; two, die cut acetate window and windshield sheets and scale, hinged doors for easy interior access. The kit is complete with a scale "Clark Y" airfoil; scale-like shear bolt wing attachment; shaped, hardwood struts; preformed landing gear wire parts and a total wiring package. The Cub has machine finished, precision die cut parts clearly printed for accurate identification and easy assembly. The large radio compartment easily accommodates any 4-channel equipment. A complete hardware package provides all necessary nuts, screws, clevises, hinges, Nyrods and nylon fittings. With a consistent eye toward helping the builder, Top Flite's Cub will feature a detailed, completely illustrated instruction manual. The manual features step-by-step directions, scale documentation and an original Hank Clark cutaway scale illustration. Plus, the kit includes three full-size, illustrated plan sheets. For the final touch, Top Flite recommends covering with new FabriKote™. It's a superior fabric finish that adds 25% more torsional and bending strength, is 15% lighter than other iron-on fabric coverings, is extremely durable and stays drum tight. When covered with FabriKote, the Cub is a faithful rendition of the original version which was actually covered with fabric. For more information, write to the address above.

KALMBACH BOOKS, 1027 North Seventh Street, Milwaukee, WI 53233, recently released a how-to book entitled Getting the Most from Radio Control Systems. Fred

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Marks, an engineer and R/C hobbyist, is the author of this latest offering. Getting the Most From Radio Control Systems is an 88 page book with chapters which deal with topics such as the R/C hobby, how systems work, super systems and much more. The price of the book is \$8.95. For more information write to the above address.

DUBRO PRODUCTS, INC., 480 Bonner Road, Wauconda, IL 60084, has introduced a new, heavy duty Ball Link designed for use in giant scale aircraft and R/C cars. The latest addition to the DuBro line features a 4-40 threaded ball and locknut, with a heavy duty nylon socket molded with a hex shaped end that can easily be adjusted with a 1/4" open end wrench. For more information write to the above address.

DUBRO PRODUCTS, INC., 480 Bonner Road, Wauconda, IL 60084, has more goodies for the giant scale enthusiast. The latest offering from DuBro is a set of heavy duty hinges. These hinges are 3/4" wide by 1 3/8" long and .040" thick. The heavy duty hinges are held together with a removeable, .047" cotter pin, which can be replaced with .047" music wire if the builder would rather use wire. The wire is not supplied with the hinges. For more information write to the above address.

REPLA-TECH INTERNATIONAL, 48500 McKenzie Highway, Vida, OR 97488. The Repla-Tech line of scale drawings is expanding once again, with the introduction of packets for the golden age of the U.S. Army and Navy, and the jet age military categories. Packet number 4 of the U.S. Navy series

and packet number 5 for the U.S. Army series are both drawn by Bjorn Karlstrom. Karlstrom also inked the drawings for the jet age series. A seventh packet, for the U.S. Air Force WWII, will be available soon. For more information write to the above address.

MIDWEST PRODUCTS COMPANY, 400 South Indiana Street, Hobart, IN 46342, has good news for giant scale fans. Midwest now has spruce available in 72" lengths. This is aircraft grade lumber and it comes in 10 popular sizes. For more information write to the above address.

TOP FLITE MODELS, INC., 1901 N. Narragansett Avenue, Chicago, IL 60639, has improved and updated its line of nylon props. The props now feature new nylon composition with all virgin nylon material, along with high contrast, safety striped tips, a Top Flite exclusive. Advanced manufacturing techniques in the molding process give the props increased centrifugal stress load and better balance. In addition, the props have been ultra-violet stabilized to better resist weathering and provide greater tolerance against the effect of sunlight. The new Top Flite props also have greater stiffness which culminates in better performance. Props are available for most R/C and Control Line events. For more information write to the above address.

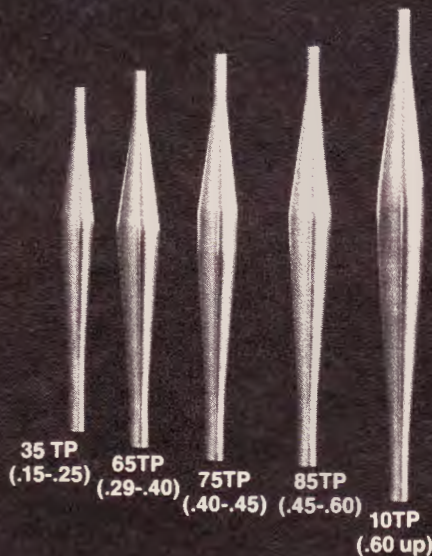
TIME-LIFE BOOKS, INC., 777 Duke Street, Alexandria, VA 22314, is producing a series of books on the history of aviation. Titles include The Airline Builders, Barnstormers and Speedkings, and The Giant Airships. The Time-Life series includes a

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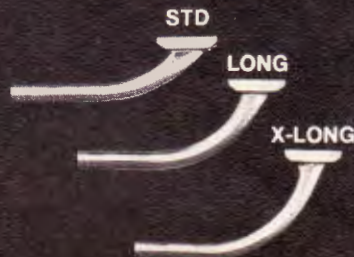
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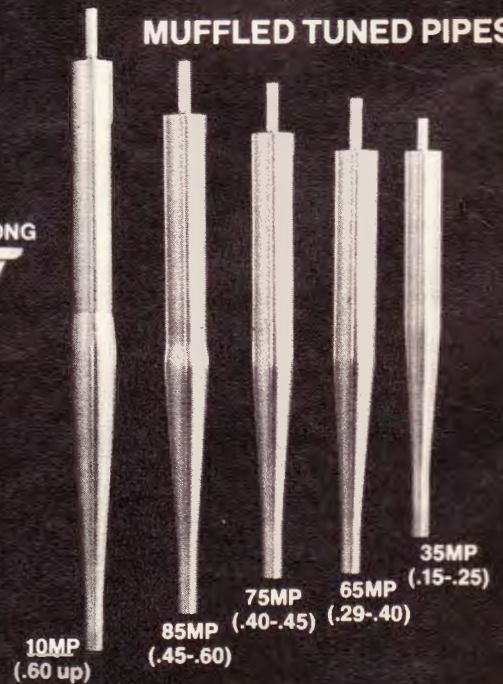
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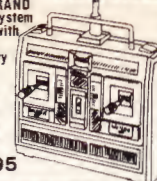
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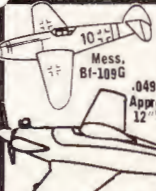
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number of photographs which document the various branches of aviation development. The series is called The Epic of Flight. For more information write to the above address.

HEATH COMPANY, Benton Harbor, MI 49022, has a new 104 page catalog available free. The catalog includes electronic kits for amateur radio, stereo and high fidelity, automotive test equipment, electronic test equipment, microcomputers, marine instruments and televisions. The new Heathkit catalog also includes a number of self-study courses. For more information write to the above address.

FRANK COSTELLO MODELS, 27 Kearney Street, Dover, NJ 07801, is supplying certain, select, hard-to-make parts for Bob Morse's quarter scale model of the Cessna 180. Included in this parts line are landing gear struts, wing tongues, foam cores for tail surfaces, offset flap hinge units and parts templates. All items are custom made of high quality materials and are exactly as shown on the plans. Other parts are available on special order. For more information write to the above address.

An FM Product Review:



RAM MODELS INC., 4736 N. Milwaukee Ave., Chicago, IL 60630, has a new monitoring device which they call their Audio Battery Alarm (Red. No. 11). This alarm lists for \$19.95 (assembled). As shipped it is intended for receiver battery monitoring applications with a pre-set trigger level of 4.55 volts. By cutting one resistor lead wire you can change this trigger level to 9.0 volts making it suit-

able for transmitter voltage monitoring (for transmitters with nominal eight cell nickel-cadmium battery packs).

The alarm consists of two components connected by a small cable. One part is the electronics circuitry which is contained in a small case measuring 7/8x7/8x1/4 inches. The other item is the buzzer (audio alarm portion) which measures 7/8x7/8x9/16 inches. Total weight of both components is only 0.5 ounces. Battery drain at idle (alarm not sounding) (4.8 volt input) is 10 MA. When the buzzer sounds the current increases to approximately 25-30 MA. This is low current and will have little affect on the total current drain in either receiver or transmitter applications.

How do you install the alarm? To monitor receiver voltage the audio alarm is installed in the model. The buzzer (alarm portion) must be hard mounted to a solid surface (fusealge side or bulkhead) to resonate properly. A two wire cable must be connected to your receiver battery pack. The easiest way to do this is to attach it to an unused servo channel cable (you must supply your own connector for this). For transmitter applications you will most likely have to solder the alarm input wires to the power switch leads. Do this *after* the switch, otherwise the alarm will never be turned off.

In actual operation I found that my particular alarm was set to trigger off at 4.88 volts which is a little higher than the spec. of 4.55 volts. With the aid of a digital voltmeter you could easily reset this level (a pot control is available on the circuit board). Since this alarm stays in the circuit all the time (it isn't just a ground check), it is only loaded by the receiver and servo current drain. You can't use a built-in load resistor as you do with an externally mounted expanded scale voltmeter (E.S.V.). To make a proper check on your battery voltage before a flight you must exercise the servos quite vigorously to simulate a load of several hundred milliamperes. Failure to do so will only give a false indication of remaining battery capacity. Another item to consider is that the alarm is in the model. If it goes off in flight, with the engine running, it is doubtful if it could be heard on the ground. One bonus of the alarm, in this application, is the fact that it might help locate a model lost in a wooded or tall grass area. You would, of course, have to wait for the voltage to drop to the trigger level before the alarm would sound off.

In transmitter service I feel this alarm does the most meaningful job. If the voltage

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drops off and triggers the alarm you will easily be able to hear it and still land your model safely. Better still, if you forget to turn off your transmitter, this alarm would eventually sound off and tell you so.

This is one of a half dozen such devices now offered on the hobby market. The price for this particular unit is reasonable and it does work according to the manufacturers claims—BOB ABERLE.

air mail

Returns with FM

I've been away from Control Line flying (or any form of model flying) for eleven years. Recently, the bug bit again. I found several modeling magazines at a local book store and bought each one for several months. That's why I'm writing.

FLYING MODELS certainly is the most informative publication I have found.

Thank you for all the Control Line information. That's where it's at for me. Even so, I find I read the F/F Rubber, R/C Soaring, and even the sections for R/C boats and planes.

STEPHEN LIGON

Collector

This is just a note to tell you that I'm trying to collect the early issues of FLYING ACES, from 1928 to 1933. I am wondering if you ever get any offers for issues I could use?

I have many FLYING ACES from the 1930s and 40s, if you know of anyone interested in them.

I would appreciate it if you could help me collect the early issues.

BRUCE THOMPSON

Toronto, Ontario, Canada

There is a growing demand for the early issues of FLYING ACES/FLYING MODELS. Once out of print, they cannot be reprinted and they contain a wealth of information to both the modeler and air historian. We suggest you use our classified ads, at nominal cost, as your prime source. There was no. Vol. 1, No. 1 of FLYING ACES. The first issue was Vol. 1, No. 2, occurring through a distribution fluke. Earlier, scarcer issues command a premium price. Many back issues of FLYING MODELS are still available direct from the publisher in new or unsold condition at very low prices while they last. Quantities are limited—Ed.

timetable

of coming events

Airplane contests

BAYPORT, NEW YORK — August 15-16. Long Island Sport Scale Festival for AMA Sport Scale and Giant Scale events, hosted by the Long Island Aero Radio Club at Bayport Aerodrome. Contact: Pete Polapink, 42 Eastwood Blvd., Centerreach, NY 11720. 516/585-7013.

HATFIELD, PENNSYLVANIA — September 20. Second Annual Electric Fly for Best Looking Plane, Longest Flight Time, Most Aerobatic, and Surprise events, hosted by The Keystone R/C Club at KRC Flying Field. Contact: Bob Kopski, 25 West End Drive, Lansdale, PA 19446.

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38K44—550 mah, 1/2 Sub C	3.50
38K58—1200 mah, Sub C	4.75

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38K43—100 ma, Oblong Pack	\$18.95
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38K51—175 ma, Cube Pack	13.95
38K56F—450 ma, Oblong Pack	16.95
38K56S—450 ma, Cube Pack	16.95
38K46—550 ma, Flat Pack	14.95
38K47F—500 ma, Flat Pack	16.95
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38K59—1.2 AH Pack	23.95

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Boat meets

AMARILLO, TEXAS - August 1-8. NAMBA Nationals, hosted by Muddy Rudders MBC at Thompson Park. Contact: Charles Mobley, 4430 Clearwell, Amarillo, TX 79109. 806/373-3040 or 816/252-7166.

ROCHESTER, MICHIGAN - August 8-9. IMPBA Scale Internats, hosted by Michigan Miniature Mariners at Rochester Municipal Pond. Contact: Skip Temple, 16872 Golfview Dr., Livonia, MI 48154. 313/464-8449.

INDIANAPOLIS, INDIANA - August 8-12. IMPBA Internats, hosted by Indy MBC at Pond #1. Contact: Gregg Huey, 621 Turtle Creek N. Dr. #3, Indianapolis, IN 46227. 317/784-0151.

PORTLAND, OREGON - August. NAMBA Heat Racing, Sport 40, hosted by Rose City Model Yacht Club at Force Lake. Contact: Gary L. Ginader, 7224 N. Wilbur, Portland, OR 97217. 503/285-4325.

CALGARY, ALBERTA - August 23. NAMBA Record Trials, hosted by Bouy Busters Calgary at Carburn Lake. Contact: J. Pomeroy, 131 Winbledon Cr., Calgary, Alberta T3C 3J2. 403/242-0531.

KENOSHA, WISCONSIN - August 23. IMPBA Heat Racing for A-B, C-D, E-F and Outboard, hosted by Badger Model Boaters, Inc., at Badger Lake. Contact: Gary Randall, 3209 Fenceline Rd., Racine, WI 53406. 414/886-5295.

FLINT, MICHIGAN - August 29. IMPBA Record Trials all classes, hosted by Wolverine Miniature Race Boat Association at Thread Lake. Contact: Ken Bergman, P.O. Box 102, South Lyon, MI 48178. 313/437-9452.

FLINT, MICHIGAN - August 30. IMPBA Annual Can-Am Race, hosted by Wolverine Miniature Race Boat Association at Thread Lake. Contact: Dick Grenier, 29331 Wagner, Warren, MI 48093. 313/751-1207.

OAK FOREST, ILLINOIS - August 30. IMPBA Heat Racing for A-B, C-D, E-F Mono and Hydro and Outboards, hosted by Marquette R/C Boat Club at Twin Lakes. Contact: Randy Vitek, 3044 Forest Ave., Brookfield, IL 60513. 312/485-6706.

INDIANAPOLIS, INDIANA - September 5. IMPBA Record Trials, hosted by Indy MBC at Dandy T Lake. Contact: Bob Finley, 740 Mt. Ranier Dr., Indianapolis, IN 46217. 317/786-9048.

CAMPBELL, CALIFORNIA - September 5-6-7. NAMBA District 9 Points Heat Racing, Sport 40, hosted by Marine Modelers of Santa Clara at Perks Pond. Contact: Gary Frank, 234 Escuela Ave. #24, Mt. View, CA 94040. 415/968-7910.

SPOKANE, WASHINGTON - September 5-6. NAMBA District 8 Points Heat Race, Sport 40, Deep Vee, Outboard and Unlimited Hydro, hosted by Lilac City MBC at Spokane River. Contact: Alex Lesine, E. 2928 - 62nd, Spokane, WA 99203. 509/448-2454.

EDMONTON, ALBERTA - September 5-6. NAMBA District 16 Championships, Heat Racing, Outboards, Scale, Unlimited Hydros and Offshore, hosted by Edmonton Model Boat Racing Association at Hermitage Lake. Contact: Louie Omerzu, 15710 - 89th Ave., Edmonton, Alberta T5R 4R5. 403/489-3494.

INDIANAPOLIS, INDIANA - September 6. IMPBA Racing for A-B, C-D, E, F Hydro, Scale Class and Outboard, hosted by Indy MBC at Dandy T Lake. Contact: David Lee, 1121 N. Payton Rd., Indianapolis, IN 46219. 317/359-7522.

PETERBOROUGH, ONTARIO - September 5-6. IMBPA High Point Heat Racing - All Classes, hosted by KMMC Peterborough at Lock 23 Trent Canal. Contact: Top Kemp, 616 Harold Dr., Peterborough, Ontario. 705/742-7606.

HOUSTON, TEXAS - September 5-6. IMPBA Heat Racing for Deep Vee, Twin, Outboard and Scale Hydro, hosted by Lone Star Model Boat Club of Houston at Conroe Lake. Contact: Scott McGuffin, 813 S. Pruett, Baytown, TX. 713/427-5359.

SAN DIEGO, CALIFORNIA - September 5-6-7. NAMBA District 19 Points Heat Racing for Offshore, hosted by San Diego Argonauts at Model Yacht Pond. Contact: James Woodhouse, 652 Rancho Santa Fe Rd., Olivenhain, CA 92024. 714/753-2299.

HUNTINGTON, NEW YORK - September 13. Huntington Nautical Festival III, for R/C Scale ships and boats of all types. Contact: Eric Goldschrafe, 61 Hunters Lane, Huntington Station, NY 11746. 516/549-1814.

WELLINGTON, OHIO - September 12-13. IMPBA Deep Vee Enduro for A-B, C-D, E-F Mono, hosted by Cleveland MBC at Clare-Mar Lakes. Contact: Pat Myers, 273 Hillard, Elyria, Ohio 44035. 216/365-7508.

SAGINAW, MICHIGAN - September 13. IMPBA Hydro Class Multi Racing for classes A-B, C-D, E-F, 1/8 Scale, hosted by Saginaw-Bay Boat Club at Lake Linton Reservoir. Contact: Terry Lindauer, 516 N. Grant St., Bay City, MI 48706. 517/893-3105.

SAN FRANCISCO, CALIFORNIA - September 13. NAMBA

District 9 Championships Scale, hosted by San Francisco Model Yacht Club at Golden Gate Park. Contact: Robert Vienot, 2366 9th. Ave., San Francisco, CA 94116. 415/664-6272.

BATAVIA, ILLINOIS — September 13-14. IMPBA Heat Racing for A-B, C-D, E-F Hydro, Mono and Scale Hydro, hosted by Batavia Boat Club at the Batavia Boat Club House. Contact: Rodney Gabehart, 5 Scarsdale Rd., Aurora, IL 60538. 312/897-9662.

TACOMA, WASHINGTON—September 19-20. NAMBA District 8 Points Heat Racing for Offshore, Outboard and Sport 40, hosted by Puget Sound MBC at Lake Waughop. Contact: Jerry Dunlap, 119 Crestwood Dr., S.W., Tacoma, WA 98498. 206/584-7131.

CHESAPEAKE, VIRGINIA—September 19-20. IMPBA Record Trials for 1/16 mile straight and 1/3 mile oval, all classes, hosted by Old Dominion Model Boat Association. Contact: Rick Johnson, 805 Clearfield Ave., Chesapeake, VA 23320. 804/547-4868.

SEASIDE, CALIFORNIA—September 19-20. NAMBA Offshore Championships, hosted by Gold Coast Model Boaters at Lake Roberts. Contact: Howard Power, Jr., 2031 Marsala Cr., Monterey, CA 93940. 408/394-1200.

INDIANAPOLIS, INDIANA—September 19-20. IMPBA Record Trials, hosted by Indy MBC at Dandy T lake. Contact: John Ackerman, 7049 Weston Ct., Indianapolis, IN 46224. 317/241-4724.

FLINT, MICHIGAN—September 19-20. IMPBA Record Trials for 1/16 straight and 1/3 oval, hosted by Wolverine Miniature Race Boat Association at Thread Lake. Contact: Ken Bergman, 9452 Silverside Dr., South Lyon, MI 48178. 1-313/437-9452.

NAPEVILLE, ILLINOIS—September 20. IMPBA Scale Boat Silver Cup Race for 1/8 Scale and 1/12 Scale, hosted by Minute Breakers Inc., at Tollway Lake. Contact: Gary Preusse, 17 W. 323 16th St., Oakbrook Terrace, Villa Park, IL 60181. 312/279-2451.

BELOIT, WISCONSIN — September 27. IMPBA A-B, C-D, E-F, Mono and Hydro and Outboard class per M.W.C. guidelines, hosted by Stateline MBC at Riverside Lagoon. Contact: Karl Steidl, 630 Cranston Rd., Beloit, WI 53511. 608/365-2795.

HAMMOND, LOUISIANA — October 3. IMPBA Time Trials, 1/16 Straightaway and 1/3 Oval, hosted by Southern Gentlemen Racing Association at Miller's Lake. Contact: Don Wagner, 2300 Fable Dr., Meraux, LA 70075. 504/277-1923.

WHEELING, ILLINOIS — October 4. IMPBA Heat Racing, Hydro & Mono; A-B, C-D, E-F, and 1/4 mile oval, hosted by Racing Dolphins at Potawatomi Lake. Contact: Merv Mischnick, 914 Robert Dr., Mt. Prospect, IL 60056. 312/437-2094.

HAMMOND, LOUISIANA — October 4. IMPBA Heat Racing, hosted by Southern Gentlemen Racing Association at Miller's Lake. Contact: Don Wagner, 2300 Fable Dr., Meraux, LA 70075. 504/277-1923.

MARYSVILLE, WASHINGTON — October 3-4. NAMBA Record Trials, hosted by Seattle Model Yacht Club at Twin Lakes. Contact: Bill Hornell, 2533 N.E. 24, Renton, WA 98055. 206/226-7454.

MISSION, BRITISH COLUMBIA — October 10-11. NAMBA District 16 Points Enduro, Heat Race, Deep Vee and Scale, hosted by Canadian Marine Modelers at Sandy Beach. Contact: Dave Haydon, 607-2445 Ware St., Abbotsford, B.C. V2S 3E3. 604/853-7829.

SPOKANE, WASHINGTON — October 10-11. NAMBA Heat Racing, Sport 40, Outboard and Deep Vee, hosted by Lilac City Model Boat Club at Spokane River. Contact: Ronald A. Miller, 819 E. 35th, Spokane, WA 99203. 509/624-6702.

INDIANAPOLIS, INDIANA — October 10-11. IMPBA Record Trials, hosted by Indy Model Boat Club at Dandy T Lake. Contact: Jim Fetters, 3219 W. 58th St., Indianapolis, IN 46208. 317/291-9986.

SAN ANTONIO, TEXAS — October 10-11. IMPBA Offshore Classic for 20-40-60 Mono and Enduro, hosted by San Antonio Model Boaters at Poop 410 Lake. Contact: Tom Folts, 315 Tomrob Dr., San Antonio, TX 78220.

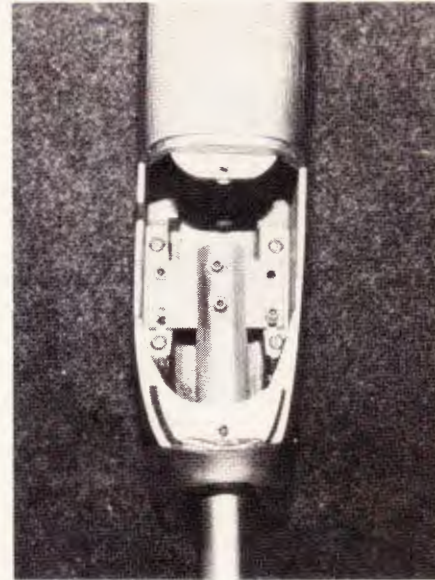
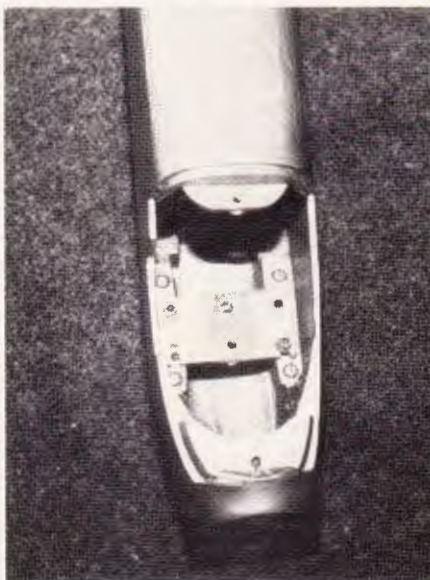
KENT, WASHINGTON — October 18. NAMBA Heat Racing, hosted by Seattle Model Yacht Club at Kent Lagoon. Contact: Bill Hornell, 2533 N.E. 24, Renton, WA 98055. 206/226-7454.

DALLAS, TEXAS — October 17-18. IMPBA Straightaway Record Trial, hosted by Dallas R/C Boat Club at Nitro Lake. Contact: Jack Hickman, 1309 Navaho Trail, Richardson, TX 75080. 214/231-4222.

PHOENIX, ARIZONA — October 31, NAMBA District 19 Pointa Heat Racing, hosted by All American Girls Model Racing Team at Lake Pleasant. Contact: Marti Mueller, 722 E. Belmont, Phoenix, AZ 85022. 602/944-0961.

FORT LAUDERDALE, FLORIDA — October 17-18. IMPBA format Heat Racing for Hydro, Non-Hydro, F (X), Scale, Sport 40 and 60, hosted by Broward Model Boat Club. IMPBA or NAMBA card required. Contact: Ed Schlee, c/o Modelville Hobbies, 6339 Stirling Rd., Fort Lauderdale, FL 33314. 305/791-7068.

FIM Clinic



Painting Jig

Often, the toughest job associated with building a new plane is the painting of the ship. It's difficult to find a good way to hold the plane while applying paint. In an effort to overcome this problem, I've come up with a simple jig that is mounted on an inverted garbage can. This jig allows the plane to be held horizontally during the painting operation and the entire ship can be rotated around its roll axis for positioning the plane without having to touch it.

The mounting block for the jig is a 6"×2"×2" maple block with a one inch hole drilled three quarters of the way through the length of the block. The shaft which mounts

to the plane is simply a one inch dowel with one end turned down so it will rotate freely in the maple block. The other end of the dowel has a 1/8" slot which fits over a mounting plate designed to be bolted to the plane's engine mounts. One side of the dowel has two 4-40 blind nuts installed to allow the mounting plate to be bolted to the jig. The mounting plate itself is made of 1/8" aluminum.

The jig is held in the jaws of a vice which is mounted to a piece of 1/4" to 1/2" plywood. The plywood can be placed on top of an upside-down garbage can.

This particular jig works well for Control Line Stunt ships and other planes of that general size. Give it a try—BOB BARON.



Carstens Flying Plans Favorites

CF-16 Thermal Queen

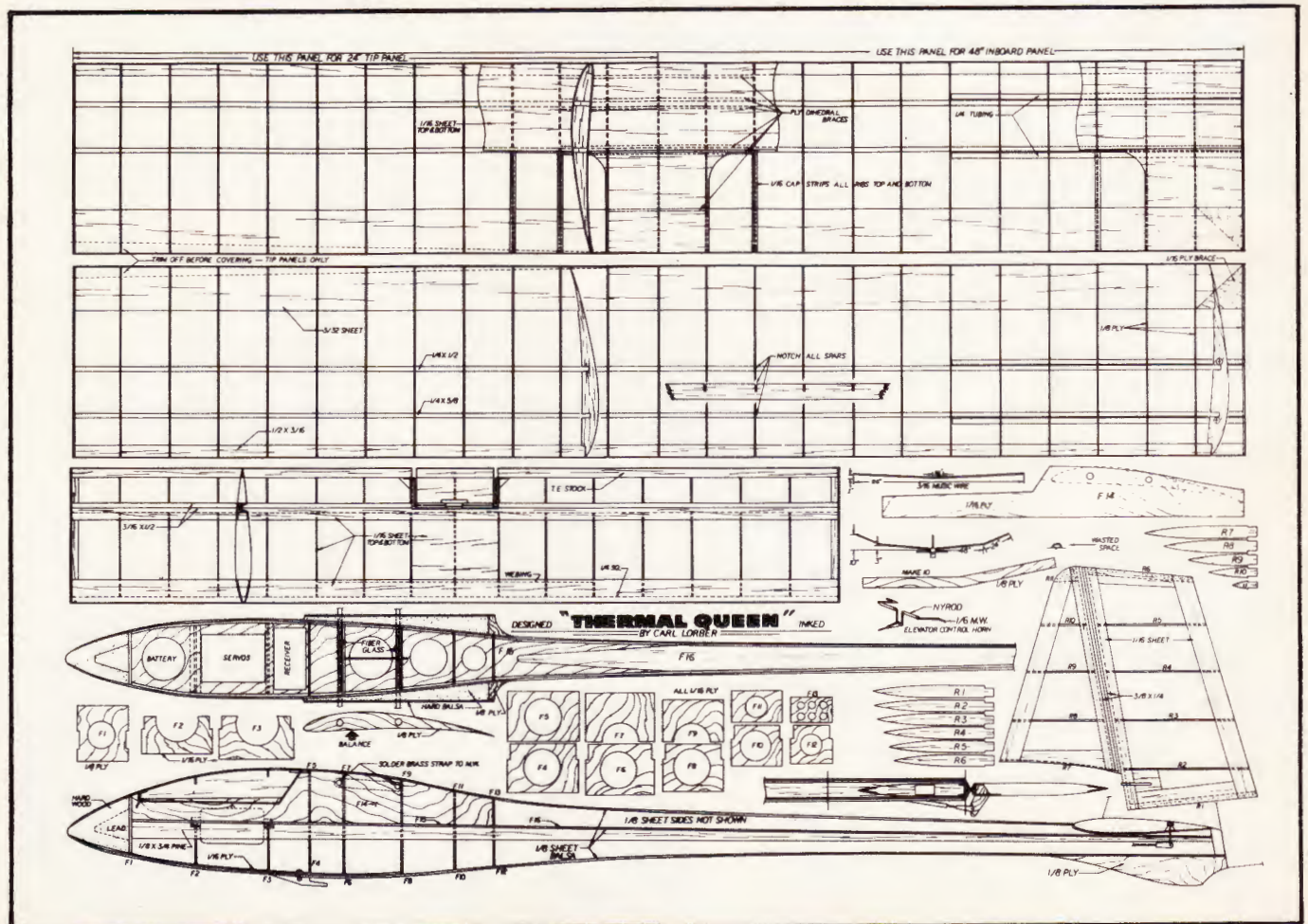
Almost nothing can match the enjoyment of guiding an R/C soaring machine around the sky on a lazy summer day. If duration is what you're after, then the Thermal Queen is your kind of ship.

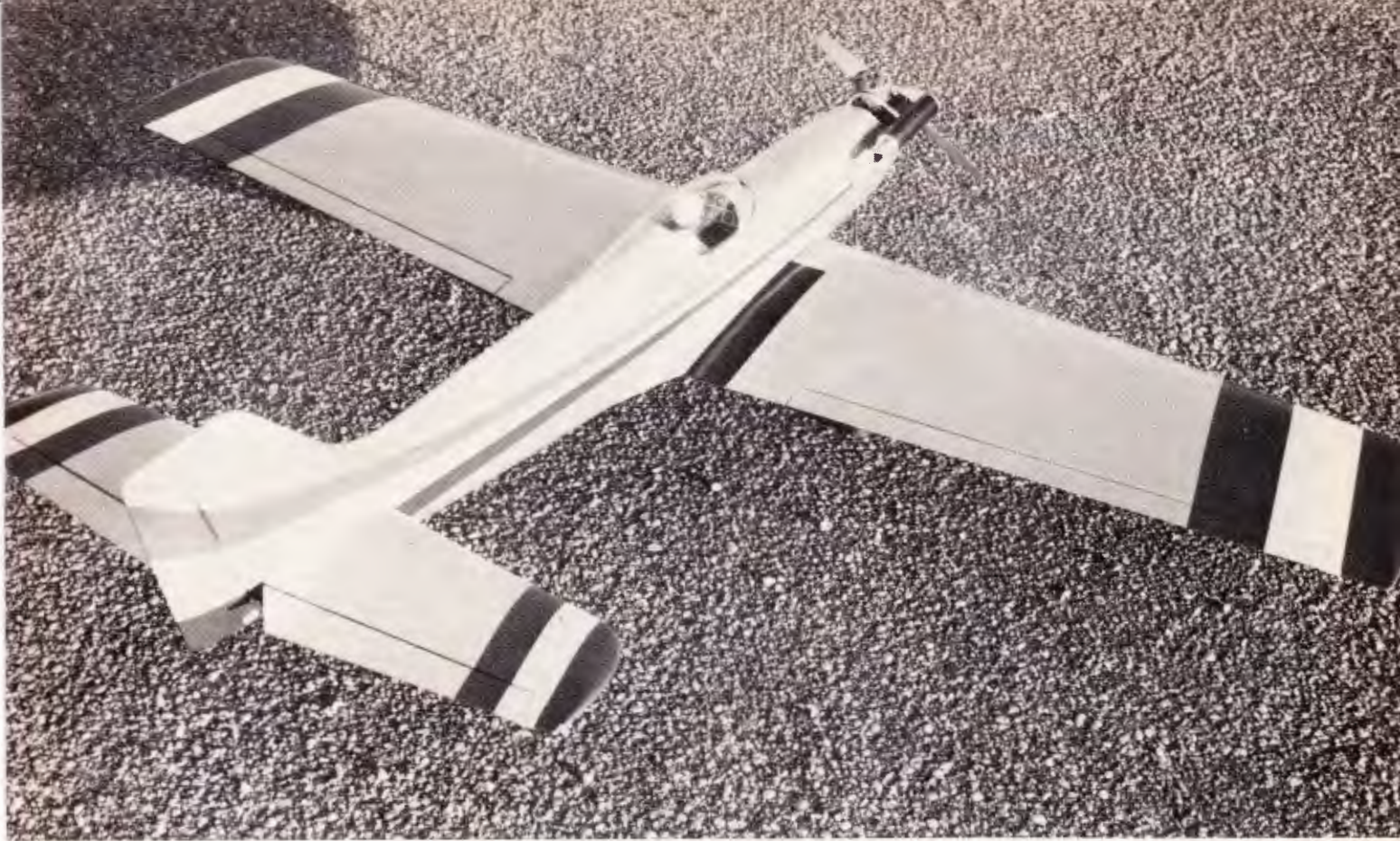
Designed by Carl Lorber, and presented in the November 1970 issue of *FLYING MODELS*, the Thermal Queen features an undercambered Eppler 385 airfoil . . . perfect for duration flights. With an 18:1 aspect ratio and 8 to 12 ounce wing loading, the Thermal Queen is light and elegant.

This soaring ship was engineered to take advantage of the light lift encountered early and late in the day, when wind is usually not a problem. The 12 foot span allows for winch launches up to the 500 foot level and that should be plenty of height for working the weak thermals which pass through in the morning and late afternoon.

Plans for the Thermal Queen are available from Carstens Flying Plans service. Order plan CF-16, \$4.00.

A large selection of plans, for R/C, Free Flight and Control Line, is available from Carstens Flying Plans service. A complete listing of available plans was printed in the March, 1981 issue of *FLYING MODELS*. Back issues are available for \$1.50 from Carstens Publications.





PHOTOGRAPHY BRUCE R. LUND

Gulfstream

By Bruce R. Lund

This stylish 60 powered R/C Pattern ship
has evolved from a proven design.

In sitting down to design a model to fly pattern most of the variables have already been established by trial and error over the years. Areas, moments, airfoils and general configuration of all pattern planes are pretty much standardized. Just look around at the popular pattern ships at a contest. If it wasn't for their individual paint jobs, it would be hard to tell one from another. This I don't like. I want my plane to stand out and be as individual, as I am. I want a design that meets all the established parameters but is easily recognizable as being different. Different, but not freakish. I will not try to build a canard, flying wing or some other weird contraption for pattern flying. What I will do is start with good sound designs and try to make them look better. I will not sacrifice any of the better flying characteristics just to make it look better. As an example, several years

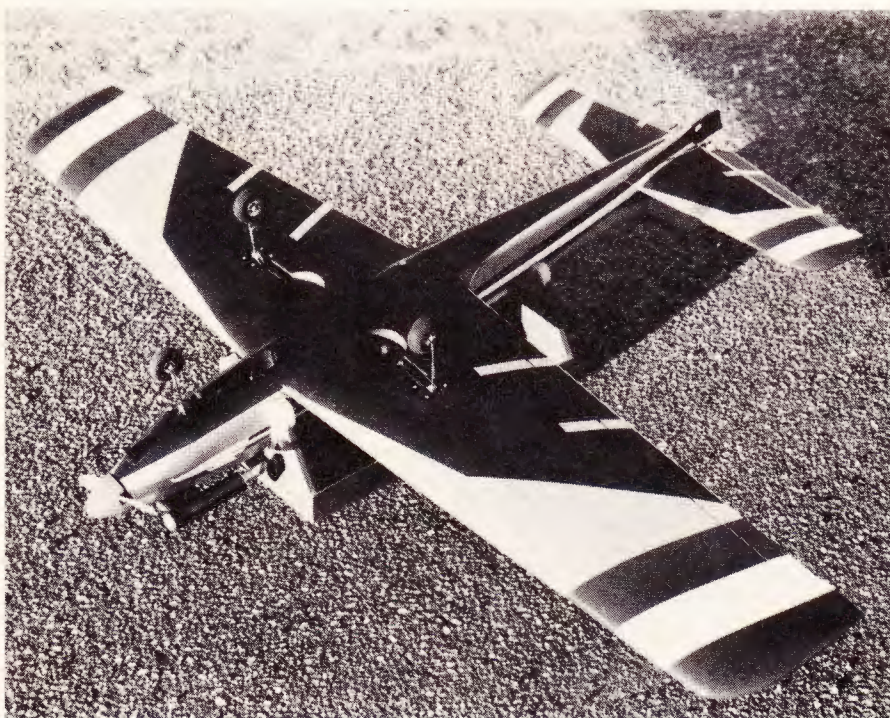
back, Don Coleman designed his Cutlass. I worked with Don and drew his plans for a magazine article. I was impressed with his plane's flying qualities, but not with the way it looked. I built one, but before I finished, I had changed the profile of the rudder, squared off the wing tips and used a different canopy. The overall appearance was dramatically changed. Many people came up to me to ask what design I was flying. This made me proud. I had a bird that was different, but, yet, one that flew with the best of them.

The Gulfstream II actually evolved over a period of four years. The first Gulfstream was a modified Cutlass. This time I moved the canopy back, added the turtle deck and changed the profile of the rudder. The wing and stabilizer were Cutlass except, at the last minute, I added some dihedral to the stabilizer. This was done only for looks, but you would be surprised how many people

asked me about it. You would think that I had revolutionized aeronautical engineering by the type questions that were asked. I found that I had to come up with a better answer than "I did it just for looks". Now that I have had time to investigate it further, I find there is a very sound reason for the dihedral. If you will look around at some of the newer aircraft (and some old ones), you will find that many have dihedral in the stabilizer. The Cessna Citation Jet, Beechcraft King Air, and the old Globe Swift are just a few examples. I feel now that when flying near stall, with the nose high and the tail low, the airflow over the wing will blank out the effectiveness of the stabilizer. It will no longer be in clean air and the action of the elevator will be unpredictable. A flat stabilizer (no dihedral) will be blanked out all at once. With dihedral, the center section will blank out before the tips, leaving enough elevator control for good control. I have noticed this especially when entering spins and on landing approaches. You can bring the nose up and slow this plane down enough to where landings on the main gear alone are not uncommon. A higher placed flat stabilizer (T-Tail) would do the same thing but it would not be as structurally sound as when mounted on the wide fuselage. If you did make a T-Tail structurally sound I am sure that a lot of weight would be added to the tail and that means a whole lot of weight would have to be placed in the nose to bring the plane back into balance. Several other designs were built and each time I changed something. Occasionally I would build a kit exactly as the instructions called for. This gave me a benchmark with which to compare my designs. After I had built and flown a stock Tiger Tail, I built my own design Tiger Tail. I changed it so much that it would never be mistaken for what it was. Cheek cowls, no



Business end of Gulfstream II (above). Plane shows clean lines, with neat wing fillets and smooth nose. Retract installation (below). Note simple, clean underside. No frills. Practical pattern ship.



dorsal fin, new bubble canopy and swept back conventional gear with wheel pants made it look like an overgrown Formula I Racer. It actually flew better than my stock Tiger Tail. But that's another story.

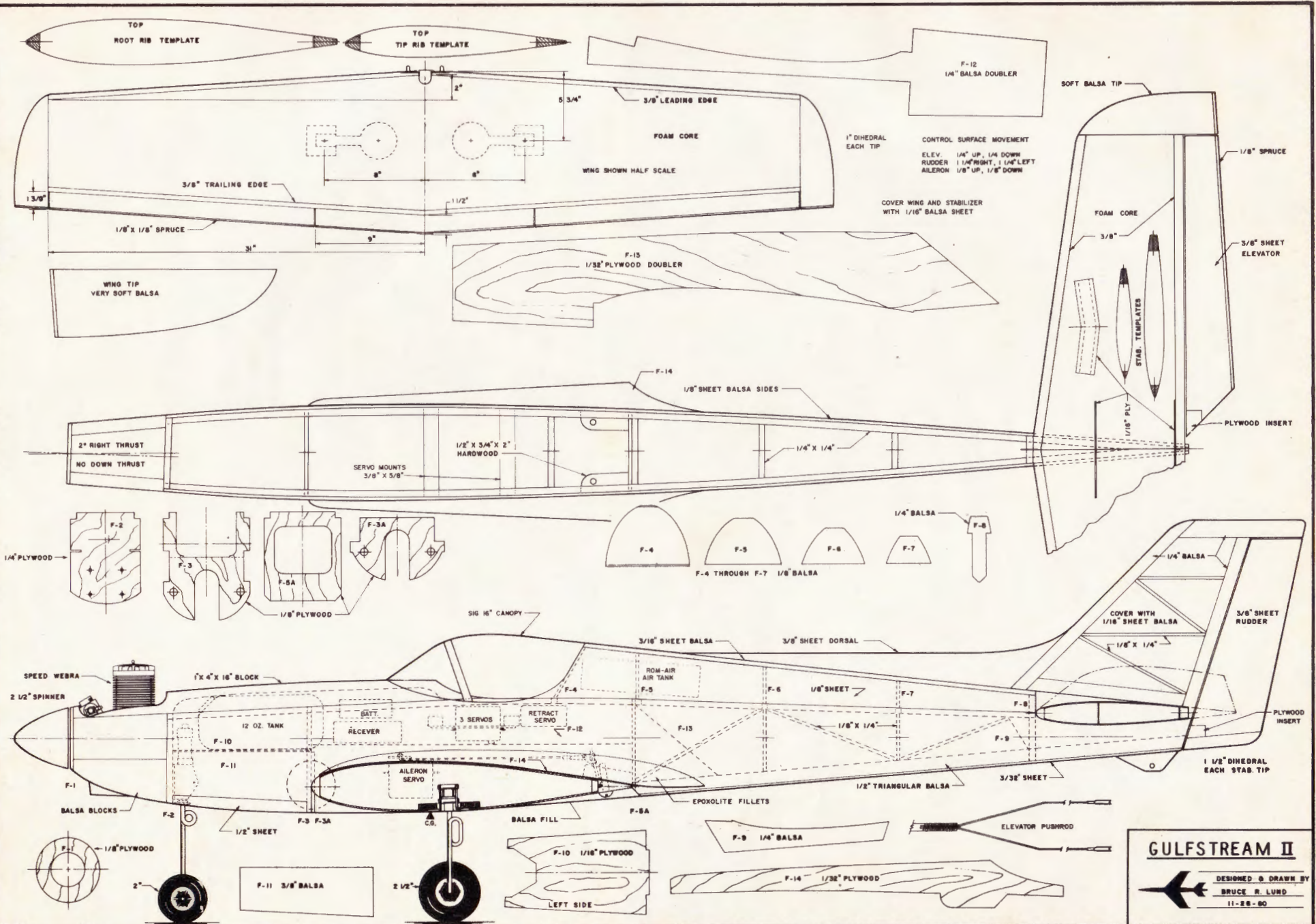
Gulfstream II is a combination of known parameters and a sprinkling of my ideas. It expresses my feeling of what a pattern plane

should look like. I think it flies better than any of the stock kit pattern planes around today, but I am prejudiced. I have confidence in my airplane, I am proud of it and it just has to fly better. The design has utilized airfoils from the Tiger Tail (wing tip) and Cutlass Supreme (wing root template-modified). The stabilizer uses Cutlass templates, but has 2"

more span and dihedral. This fuselage is very similar to the original Gulfstream, but this time retracts have been added. The construction is conventional with built up balsa fuselage, foam wing and stabilizer cores. You will note that I have utilized a solid $\frac{1}{4}$ " wing leading edge. This acts like a spar and makes up for the strength lost when wheel wells are cut into the bottom of the wing. If any of you have built a Cutlass, Tiger Tail, Mach I, Compensator or any of the other large pattern machines do not hesitate to build the Gulfstream II. There are no problem areas and no special tools or jigs are required.

The rudder frame is constructed right on the plans and then covered with 1/16 sheet balsa. The stabilizer cores are cut from foam, rear spars glued in place and then covered with 1/16 sheet balsa. Sand the leading edge of the foam and glue the leading edge into place. Sand the root of each stabilizer half for the correct dihedral angle. Slot the foam at the trailing edge and midpoint to accept the 1/16 plywood dihedral braces. Cover the plywood braces with glue along with the root of each stabilizer half and join together. Block each tip up $1\frac{1}{2}$ " and allow to dry. Add a $\frac{3}{4}$ " strip of fiberglass on top and bottom of this joint for strength. Note that a $\frac{1}{8}$ " square spruce strip is glued to the trailing edge of the rudder and elevators. If you have never done this before, I would recommend that you try it. It sure strengthens the trailing edge, makes sanding the sheet balsa control surfaces easier, gives a good straight trailing edge, and helps prevent hanger rash later.

The fuselage construction is straight forward. The two sides are cut from $\frac{1}{8}$ " balsa. Lay them on your work table with the outside of each side facing down. This will insure that you end up with a right and a left side. Glue a $\frac{1}{4}$ "x $\frac{1}{4}$ " balsa stringer along the top of each side. Add the plywood and balsa, doublers F-9, F-12, and F-13. The $\frac{1}{2}$ " triangular stock can be added along the bottom edge of each fuselage half. The $\frac{1}{8}$ "x $\frac{1}{4}$ " diagonal bracing can be added between the top stringer and the bottom triangular piece. While all of this is drying, cut out your fuselage formers F-2, F-3, F-5A, and F-8. When the sides are dry, mark the location of each former. This will be a great aid when gluing the two sides together over the formers. Sand the required taper in the tail end of each side. Now place the sides over the top view of the plans and install F-5A and F-8 while holding the tail together with clothes-pins or clamps. You will note that the top of the fuselage is not a straight line. You will have to form the fuselage in two steps. First, from F-5A to the tail and then from F-2, to F-5A. At all times keep the fuselage lined up with the center line on the plans. Make sure that you have the firewall F-2 offset for the two degrees of right thrust. While waiting for this to dry, hollow out the 1 inch block that forms the top of the nose. As soon as the fuselage is removed from the plans glue this top block into place. Add the $\frac{1}{8}$ " turtle deck formers and sheet cover with $\frac{1}{8}$ " soft balsa. When dry, block sand the top of the turtle deck to accept the top $\frac{3}{16}$ " sheet. Note! Do not cover the bottom of the fuselage till you have installed the split elevator pushrod. The $\frac{1}{2}$ " inch side



GULFSTREAM II

DESIGNED & DRAWN BY
 BRUCE R. LUND
 11-26-80



nose blocks and the chin block can now be installed. Sand the nose true and glue plywood former F-1 into place. The plywood tank bottom F-10 and balsa F-11 are now glued into place. This completes the main fuselage framing. The wing fillets must wait till you have the wing made and aligned with the fuselage.

The wing is made using light weight foam cores. The trailing edge is glued to the cores first. When dry, sand them to contour and cover the wings with $\frac{1}{16}$ " sheet balsa. Sand the leading edge till the balsa skins meet the foam and then glue the $\frac{3}{8}$ " leading edges into place. When dry, carve the leading edge to shape. Now join the two wing halves and install the aileron torque rods. I use $\frac{1}{8}$ " piano wire with brass tubing bushings. The trailing edge and wing tips can be glued on now. Be sure to add a $\frac{1}{8}$ " square spruce strip along the trailing edge. This will be a great aid in trimming the trailing edge to shape and prevent hanger rash in the future. Carve the tips and sand the entire wing. Cover the center section with a 4 inch wide strip of fiberglass for strength. Add the landing gear mounting and F-3A. You are now ready to fit the wing to the fuselage. Be sure of your alignment as this is a most important step. When you are sure that the wing fits the fuselage correctly, cut out $\frac{1}{32}$ " more balsa so the wing fillet base F-14 will slide between the wing and fuselage. When you are satisfied with the fit, slip some wax paper or saran wrap under the plywood base and glue it to the fuselage. Leave the wing in place. Now mix your Epoxolite or Micro balloons and



Gulfstream II and author's Christen Eagle (top). The Gulfstream shows off its turtle deck and dihedral stab. Buce R. Lund starts engine and prepares the Gulfstream for another flight (above).

form the fillet. While the wing is still on the fuselage this is a good time to glue the tail into position. Be sure of your alignment. Check everything several times.

The model may be finished in your normal manner. Take your time, as this is what shows from here on. I have taken a step backwards and do not use any of these so called super finishing methods. I use old

fashioned silk span and dope. It works very well, is cheap, and I get a finish that is much better than average.

The model must balance at the CG shown on the plans, even if you have to add lead to the nose. Also check your wing tips for balance. If one wing is heavier than the other, add lead till it balances.

Good luck building the Gulfstream II. ☺

During a recent review of World Engines servos I mentioned that I had hopes of obtaining a sample of their new *Expert Three* R/C system. Well for some reason the "Three" model hasn't materialized as yet, but a new World Engines Expert Mark IV system has. It is this system that I will now review in detail.

The Expert Series has always been regarded as the top of the World Engines line. It is, in fact, the system Dave Brown has used for at least the past five years on the national/international pattern competition circuit. The present Mark IV system, although outwardly looking much the same as the MK II system that I reviewed back in the October 1977 FLYING MODELS, has a new twist. It has been completely redesigned in the interest of reducing overall costs and hence making it more attractive, sale wise, for the average modeler. As you will see in this article, both the transmitter and receiver are clearly new items.

Expert Mark IV system

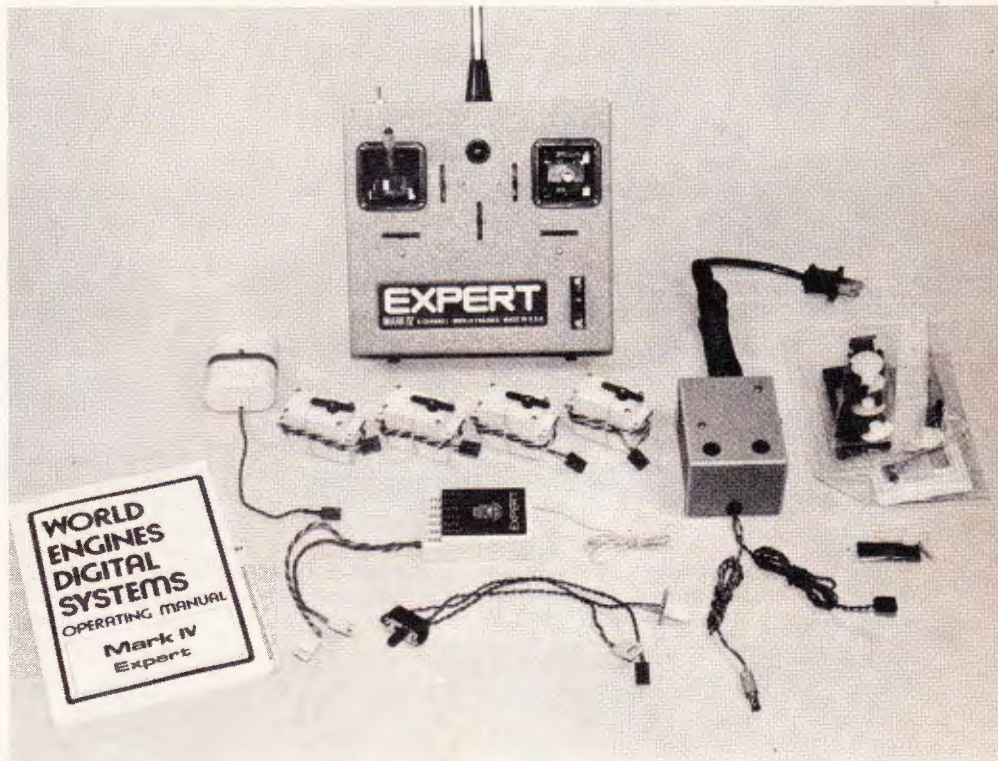
As received, my evaluation unit of the Expert Mark IV system consisted of the following items: six channel transmitter with nickel cadmium rechargeable batteries; seven channel receiver (six are used in this application); four S-11 standard servos; 550 MAH capacity rechargeable airborne battery pack; dual output battery charger; battery/switch harness; servo trays; an assortment of servo mounting hardware; additional servo output arms and an instruction manual. The exact system just described presently lists for \$303.19 (WE System Model No. 17632). World Engines will also be offering a variety of Expert Mark IV system options including five different types of airborne battery packs and eight types of servos. For example, one particular system intended for the large aircraft (like quarter scale) is offered with three heavy duty S-16 servos (for the rudder, aileron and elevator control functions) along with an S-11BB servo for the throttle and the heavy duty 1.6 AMP/HR airborne battery pack for a system list price of \$377.93. There are many "mix and match" combinations offered. I suggest you write to Harry Roe at World Engines (8960 Rossash Ave., Cincinnati, Ohio 45236) and request a catalog along with a basic price schedule.

The World Engines Expert Mark IV system will only be made available in the dual stick transmitter mode (either Mode I or II). Again we single stick flyers are out of luck. Systems will be available only on the 72-75 MHZ R/C frequencies (no six meters—again I'm out of luck!). An important point to keep in mind as I review this system is the actual selling price (what you will have to pay for this system at your local hobby shop). The price is going to be surprisingly low and very competitive, even when compared to the so called "economy" systems now offered on the market.

Transmitter

The case size and construction is probably the only similarity with the previous Expert Series transmitters. World Engines is still

FLYING MODELS



PHOTOGRAPHY BOB ABERLE

Complete World Engines Expert Mark IV radio control system reviewed in this article. System includes four S-11 standard servos and a 550 MAH battery pack for airborne components. List price is \$303.19.

An FM Product Review:

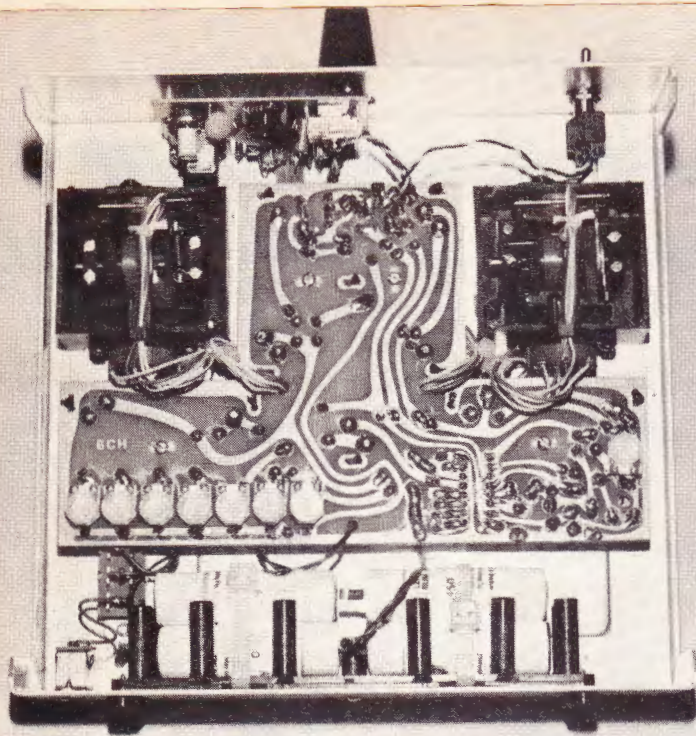
World Engines' Expert MkIV

By Bob Aberle

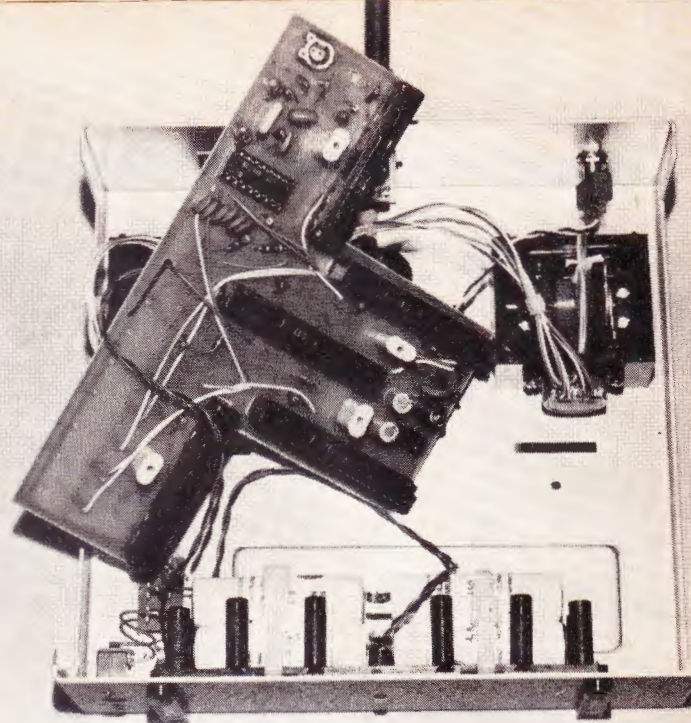
Improved circuitry highlights this latest offering
from World Engines.

employing a heavy gage aluminum case which is covered with a gold colored vinyl material (it is not a painted, baked on finish). Case measures 7 inches wide X 6 $\frac{3}{4}$ inches high X 2 inches thick (less stick projections). Total weight of the transmitter is 1 $\frac{3}{4}$ pounds. The transmitter is a dual stick, six channel variety. As received my unit was set up for the popular Mode II method of flying which has the aileron and elevator control functions on the right stick and the throttle/rudder controls on the left. It is a very simple

task for the modeler to convert this arrangement over to the Mode I stick configuration if he so desires. In the Mode I control concept the aileron and throttle are located on the right stick assembly, while the rudder and elevator are on the left. Antenna is the typical ten section whip that extends to 48 inches and collapses down to just 6 inches (it can also be completely removed for storage purposes). In the interest of keeping the overall price down the previously supplied folding stand/carrying handle and the buddy



Inside the new Expert Mark IV transmitter. Note that the R-F section is now a separate printed circuit board (top of case) which can easily be removed for frequency changing. G.E. 450 MAH ni-cads at bottom of case.



The encoder P/C shown removed from the front panel and rotated so the component side of board is visible. Five slide pots take up considerable room. Signetics NE-5044 chip reduces number of parts needed.

box connector have been deleted from this new system.

I consider the control stick assemblies supplied with this system as one of my favorites. These World Engine proprietary stick assemblies were designed principally by Dave Brown, based on his requirements for serious pattern competition flying. Dave, in fact, won a mechanical engineering society design/production award for his efforts on this control stick assembly. They are about the finest one can obtain, in the R/C market, at the present time. Although the spring tension isn't directly adjustable (you could substitute springs if you like) the feel is about perfect. World Engines spends a little more in the correct area and supplies enclosed Bourns 5K ohm conductive plastic pots with their stick assemblies. The transmitter control stick and control pot are both a very important part of the overall servo resolution. Stick length can be adjusted from a minimum of 1¼ inches from the case front, to a maximum of 1¾ inches, by using a small Allen type hex wrench (not supplied). This wrench is inserted down the center of the control stick.

Each of the four basic control functions (aileron, elevator, rudder and throttle) has a separate electrical trim pot. In this new transmitter design World Engines is employing linear motion, slide type pots. Average trim travel was measured at approximately 20 degrees total which is an acceptable amount. A fifth slide type pot, located in the center of the transmitter's case, provides a proportional auxiliary channel (which does not have a separate trim control). A sixth channel (non-proportional) is operated by a switch located at the top, left corner of the case. This channel can be used to operate a retractable landing gear system on a model aircraft.

As another cost reduction item World Engines eliminated the expanded scale voltmeter in favor of a new flashing L.E.D.

scheme. The L.E.D. (red) selected for this application is one of the new high intensity variety. I found that it could be seen reasonably well, even in direct, bright sunlight. In this circuit the L.E.D. flashes at a very high rate when the batteries are at full charge. As the charge is depleted the flashing rate slows down. In my personal observations I felt that the flashing rate change wasn't really that noticeable. This probably results from the fact that the World Engines Expert transmitter draws only 90 MA. current from the battery supply. With such a light load the transmitter battery capacity will far exceed that of the receiver pack. Stated another way, the L.E.D. will most likely flash at a high rate all the time, unless you experience a complete failure, such as a shorted or bad battery cell.

Inside the transmitter you will really notice the extensive changes to the Expert series. First of all, World Engines has placed the R-F section on a separate and removable printed circuit (P/C) board. Interconnections to the remainder of the electronics is through a small connector. Although technically not a plug-in module, it can easily be removed by the modeler and another board substituted for frequency changing purposes. This removable R-F board will also permit easier changing to the new FM frequencies should they become available in the near future. The measured R-F output of this circuit is approximately 550 MW (milliwatts) which is surprisingly high when you consider the total current drain from the transmitter battery was in the order of only 90 MA. Even at full pack discharge (in this case 8.8 volts) I still measured 475 MW R-F output at the antenna. It would seem that World Engines has developed a very efficient circuit in this sense.

A much larger P/C board contains an all new encoder circuit which centers around the use of the popular Signetics NE-5044 I.C. chip. Since the introduction of this chip last

year many R/C manufacturers have adopted it's use because of improved performance and reduced production costs. The overall encoder parts count is greatly reduced by the use of this integrated circuit. For those interested, the World Engines transmitter circuit has a fixed frame rate of 23 M.S. (milliseconds). Neutral pulse spacing is 1.3 M.S. (with a range of +/- 0.5 M.S.).

Also quite noticeable are the linear slide type pots for the four trim controls and the proportional auxiliary channel function. These pots are soldered directly to the encoder P/C board. Their levers actually protrude out through slots out in the front panel of the transmitter. Again these pots eliminate a lot of extra wiring and cable routing and yet still provide electrical trim at reduced costs. Because electrical trim is employed it is possible to add dual rate switching without the annoying problem of neutral shift (which does occur on some current R/C systems). Although the Expert Mark IV does not come with dual rates it is my understanding that World Engines will be marketing a companion system shortly, which they will designate as their Expert Mark V. The Mark V will come with standard dual rate switching on the aileron and elevator control functions. You may want to contact Tony Frackowiak at World Engines for more details and a price schedule of this new system. Tony, by the way, is a top pattern competition flyer, who will really understand your questions and be able to direct you to the system that best suits your needs.

Transmitter power supply consists of two separate four cell packs connected in series for a nominal 9.6 volt input. The cells are A-A size, in this case, manufactured by General Electric and rated (according to the markings) at 450 MAH. Both packs are soldered directly into the circuit (connectors are not supplied). The charging jack located at the bottom of the transmitter's case does not have any diodes in the line. Full voltage is

available at the jack should you want to use one of the popular battery tester/cyclers.

Receiver

Again we have a completely new design (at least the packaging certainly is). The new receiver measures $2\frac{3}{4}$ inches long X $1\frac{1}{4}$ inches wide X $\frac{13}{16}$ inch thick and weighs 2.0 ounces. This receiver actually has seven channel capability (only six channels being used in this case). Two cables exit from the receiver's case, one for the power connection and the other for the aileron control function. The remaining connectors are located on the P/C board. The receiver has been repackaged on to a single deck P/C board (the previous receiver had a two deck arrangement which required inter-board wiring). For those interested the crystal is soldered directly to the board. On one end of the P/C board you will find a "line up" of Molex type connectors. These connectors are similar to the type supplied with the Cox/Sanwa sets for the past couple of years or more. The use of the Molex connectors is a departure for World Engines. Although the new servos are electrically similar to the older models, the Molex connectors are not compatible with the previous Mitsumi variety.

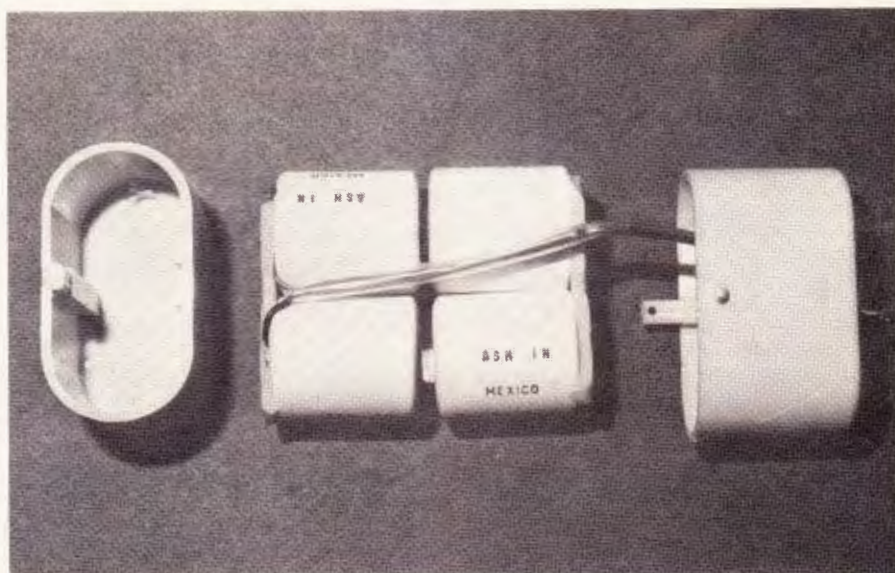
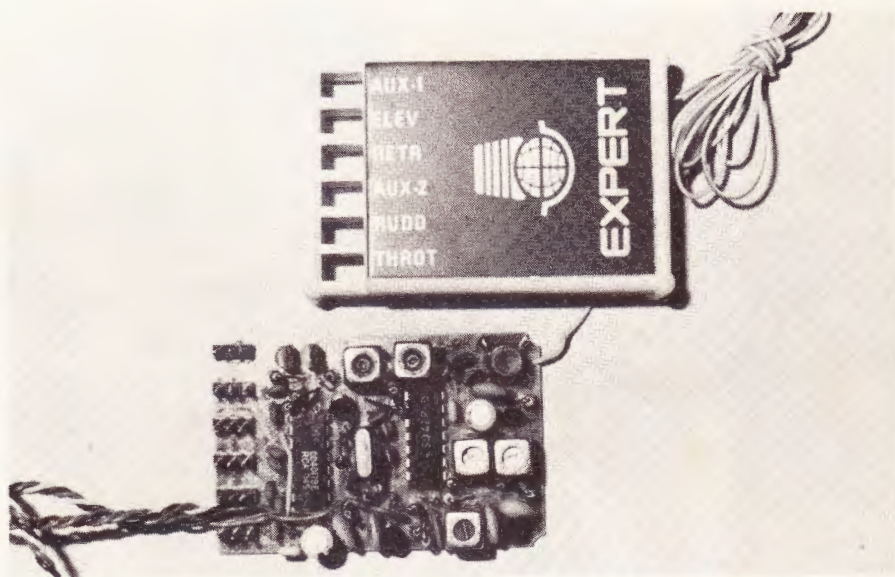
Circuit wise the Expert Mark IV receiver is still very close to the popular Butch Lanterman design that has been used by World Engines for the past several years. A Siemens SO-42P I.C. chip provides a balanced mixer front end. If you read the model press you must be aware that this chip is also featured in the popular Novak Electronics and Kraft FM receivers. World Engines uses a CD 4017 Johnson counter for the decoder (not the Signetics NE-5045 as you might have expected). I measured the receiver idle current at 14 MA. Had the NE-5045 chip been used the idle current would have been more like 30 MA.

Remaining equipment

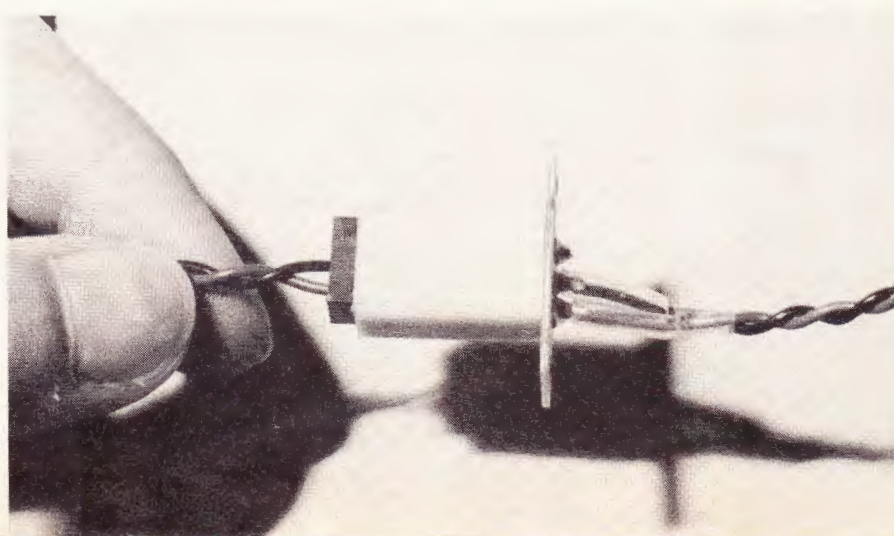
This evaluation unit came with standard World Engines S-11 servos. They measure $1\frac{11}{16}$ inches long X $1\frac{1}{2}$ inches high X $\frac{7}{8}$ inch thick (less output arm and mounting flanges) and weigh 2.0 ounces each. Output torque is in the order of 40 in. oz. Idle current is 6 MA. For a more detailed look at the entire World Engines servo line I would refer you to my recent product review which appeared in the April 1981 issue of FLYING MODELS (p. 34-37). A copy of this magazine is available from Carstens Publications, P.O. Box 700, Newton, New Jersey 07860, for \$1.50 (post paid).

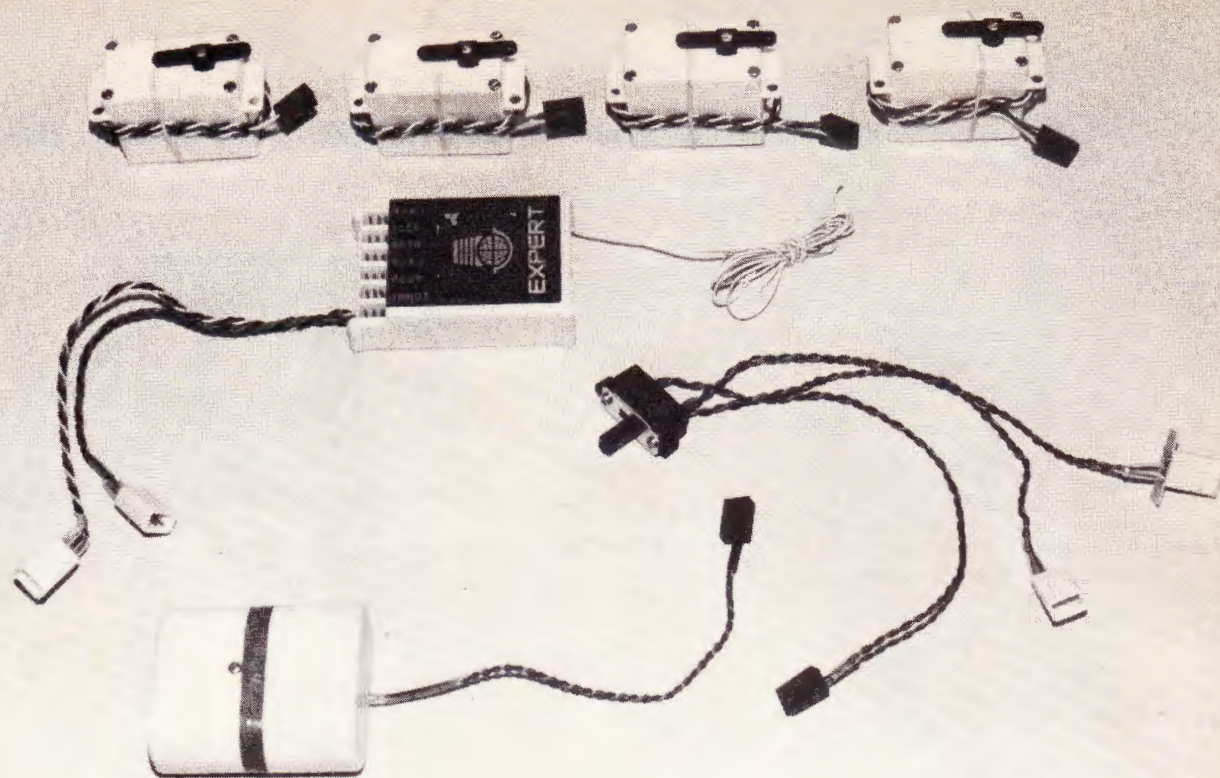
The airborne battery pack supplied with this system was the more conventional 550 MAH variety. From all appearances these cells look like the G.E. Sub-C type with final assembly done in Mexico. The pack measures $2\frac{1}{4}$ inches long X 1 inch thick X $1\frac{1}{8}$ inches wide and weighs 4.7 ounces with connector. Although somewhat unusual I did notice that two small sheet metal screws are used to hold the battery case halves together in addition to more usual tape. Just to be on the safe side I would eliminate the screws. The tape is sufficient to hold the case together. My concern is that one of the screws got very close to the battery cable inside the case. You

FLYING MODELS



Inside the new single deck World Engines Expert receiver (top). Same circuitry as prior units, but repackaged. Uses I.C. front end. Airborne battery pack (above). This pack contains G.E. 550 MAH Sub-C cells assembled in Mexico. Charging jack (below) is quite long and should project quite easily through any fuselage. Plug has tight fit. Takes two hands to pull it apart.





Typical airborne components (above). Total airborne weight is 15.2 ounces. Will guide .60 powered planes. Charger (below). Matches transmitter case.

can use your imagination on the rest.

The switch harness supplied contains a charging jack that can be easily mounted on a fuselage side or bulkhead. The jack itself is almost $\frac{3}{8}$ inch long which means that it will easily protrude out of a very thick fuselage. Even the power switch has an extra long handle for the same reason. What I didn't like was the fact that the Molex connectors tend to penetrate too far into the mating halves. As a result you have little to grip on to when removing the connector. Most modelers will therefore resort to pulling on the wires which is not a good idea. The inclusion of a small "pull cord" might be a good idea.

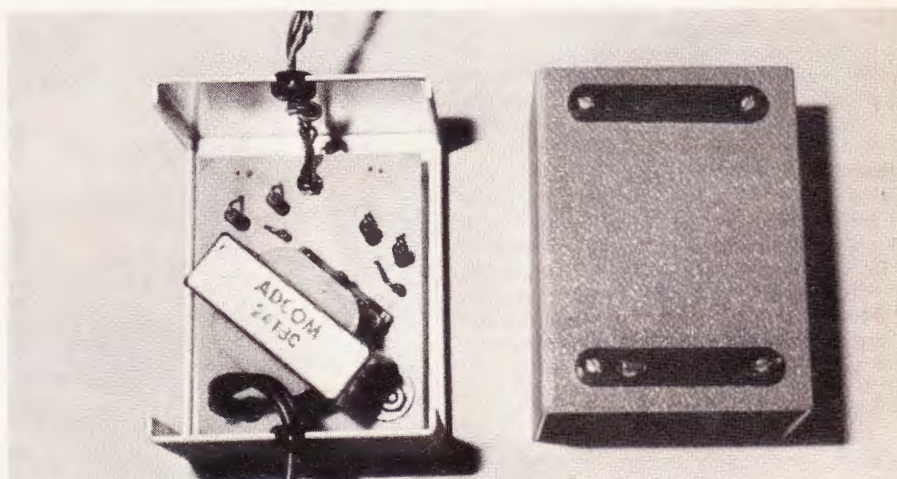
Weight and battery consumption

This particular system with the four S-11 standard servos and the 550 MAH battery pack has a total airborne weight of 15.2 ounces. It would be perfectly suitable for flying .60 powered model aircraft without any limitations.

I measured the current drain of the airborne components at 36 MA (at idle—no servos in motion). Pulsing one servo in continuous motion yielded an average drain of 350 MA. With two servos in continuous motion the average current drain was close to 500 MA. Based on this data I think you would be able to get about 1½ hours of safe flying time from a fully charged battery that was in good condition. It is a good idea, of course, to check the battery voltage under load using one of the popular expanded scale voltmeters (E.S.V.) now on the market. You should do this check after each flight as a normal safety routine.

Battery charger

The charger supplied was the standard World Engine unit that has dual outputs and separate L.E.D. indicators. Charger comes in a heavy duty, all metal case, finished similar to the transmitter. The A/C power cord does



not have the third wire for grounding purposes. Output is roughly 55 MA. for both the receiver and transmitter battery charging. This will provide the nominal C/10 (capacity of the battery divided by 10) charge rate required by these cells. Charging time is the usual 14-16 hour period. If you should option for the 1.6 AMP/HR heavy duty battery pack you will have to use the charger just described, but for a longer period of time (something like 40-48 hours). World Engines does expect to have a special charger, with an output of 150-160 MA., available at a later date for use with the "jumbo" battery pack.

Warranty and Instructions

World Engines offers a limited warranty for a period of one year from the date of purchase. Should the R/C system prove defective by reasons of improper workmanship or material during that period it will be repaired without charge for either parts or labor. You will still have to pay a \$6.00 fee to cover "incidental" expenses when you return the

system under the warranty.

The operations manual for the Expert Mark IV system still only gets an average rating from me. It's certainly better than the one I reviewed several years ago but it still leaves out some details that would be important to a beginner. They still have omitted any reference to the very important frequency control (color flag) system that is used at local flying fields throughout the country. In the same regard a frequency flag is not provided with the system.

Summary

The World Engines Mark IV radio control system works just fine. I especially like, and always will, those great control stick assemblies. The servo resolution and specifically the centering accuracy is quite good, and possibly in the order of $\frac{1}{2}$ to 1 degree. The circuit updates including the use of the NE-5044 I.C. chip in the transmitter, make it a "state-of-the-art" system. Of course, the bottom line is that the price is right! ☐



PHOTOGRAPHY: JOHN PRESTON AND TOM SCHMITT

Don Srull's Free Flight Rubber Scale version of the Kyushu Shinden is a Flying Aces Nats winner. A most unusual subject. Fine workmanship.

In early August, 1945, the most unusual Japanese fighter of World War II began flying from Kyushu Airfield in Japan. Only three short test flights would be completed before the war brought an end to the development of this innovative warplane. The Japanese had high hopes for the Shinden, or Magnificent Lightning, as a short range, high speed, interceptor to help defend against the impending B-29 blitz.

Development work in Japan on the pusher canard configuration began in 1943 with glider and low powered test vehicles. Success with the MXY-6, an all-wood 32 hp aircraft, led to the decision to design and build the J7W1 prototype interceptor. The J7W1 was an all-metal, low wing canard, powered with a rear mounted 18 cylinder radial Mitsubishi engine of 2030 hp. A 6 bladed propeller of minimum diameter was used to keep the landing gear as short and light as possible. The gear had to be long enough to allow for proper clearance when the aircraft rotated at take-off and landing. Even with careful planning, the first flight test attempt was aborted when the pilot over-rotated during the take-off run and the six bladed prop dug into the runway. As a temporary fix, small wheels were added to the bottom of the fins, which protected the fins and prevented the aircraft from rotating too much at take-off.

Subsequent tests proved successful, and the Shinden was ordered into production. Several minor modifications were planned to be made as a result of the test flights. The engine cowling was re-shaped to improve cooling and to eliminate prop flutter. In addition, automatic aileron trim tabs were added to help compensate for a strong starboard torque pull at high power. (More about this idea later.)

The Shinden was to carry four 30 mm cannons in its nose, and was estimated to have a top speed of 468 mph at 28,560 feet altitude, with a ceiling of 39,000 feet. It had a span of 11 meters or about 36 feet, and an empty weight of 7,600 pounds. Only two prototypes were built and when the war ended the single remaining vehicle was sent to the Willow

Grove Naval Air Station for study. It eventually wound up in the Paul Garber restoration facility of the National Aerospace Museum in Silver Hill, Maryland. The Magnificent Lightning hopefully will be restored some day, so all aviation buffs can have a closer look at one of the most unusual and interesting aircraft of World War II.

The Model

The Shinden makes an off-beat and interesting subject for rubber power free flight scale. It is an outstanding flying model, and, because of its unusual configuration, is particularly suitable for the popular Flying Aces Club scale events. These scale events reward unusual configurations, such as canards and pushers, with bonus points to make them more competitive with conventional, easier to fly configurations. The model has done well in these competitions, winning the 1980 FAC Nats and several other FAC scale contests in 1980.

During all phases of building the model, keep in mind the importance of holding the model's weight down to a minimum. This is especially important for pusher canard configurations such as the Shinden. One peculiarity of any pusher-type model is that there is no high speed prop-wash being blown over

the model's surfaces, since the prop is in the back. This means at take-off (or hand launch) there will be much less help from control surface trim settings, compared to tractors (models with the prop on the front). This is less of a problem if the model is kept very light so that a fairly small, low torque motor can be used. If the model weight is too high, a stronger rubber motor is necessary and controlling the initial torque becomes more difficult. So remember to be a little more careful to keep weight down on rubber-powered pushers.

It would be possible to borrow the full-scale Shinden idea of an automatic aileron tab to handle the excess torque problem, especially if the model is overweight. But it's best to avoid this complexity and get better performance by simply using lightweight materials.

Construction

Construction follows conventional rubber scale practices throughout. The fuselage is built by the "half-shell" method directly over the plans. The top and bottom keel pieces are laminated from two strips of 1/16 square balsa, using white glue, and pinned onto the plans. Formers and stringers are added next. The only unusual area is the large side air

Shinden

By Don Srull

A rubber powered version of the powerful Japanese canard/pusher fighter of WW II.

Shinden

scoops. Build the nose section first, back to former F-10, including stringers. Fit and glue on the diagonal scoop former F-9A and then F-11 through F-14. The rear stringers can then be added from F-9A rearward.

The wing should be built next and fitted to the fuselage carefully. Wing fillets are not added until covering and assembly are complete. Build the canard surfaces from firm balsa and add the 1/16 piano wire pins. Aluminum tubing retaining sockets are then fit to the fuselage, and after aligning the wing and canard surfaces, reinforce and epoxy the sockets in place. The canards are held in place for flying by small dabs of model cement, such as Ambroid. They should be snug, but should knock off easily if they strike anything during landing.

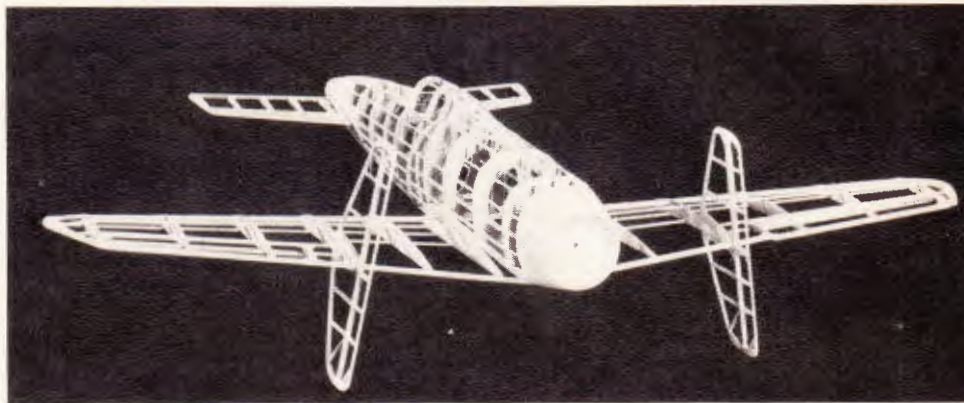
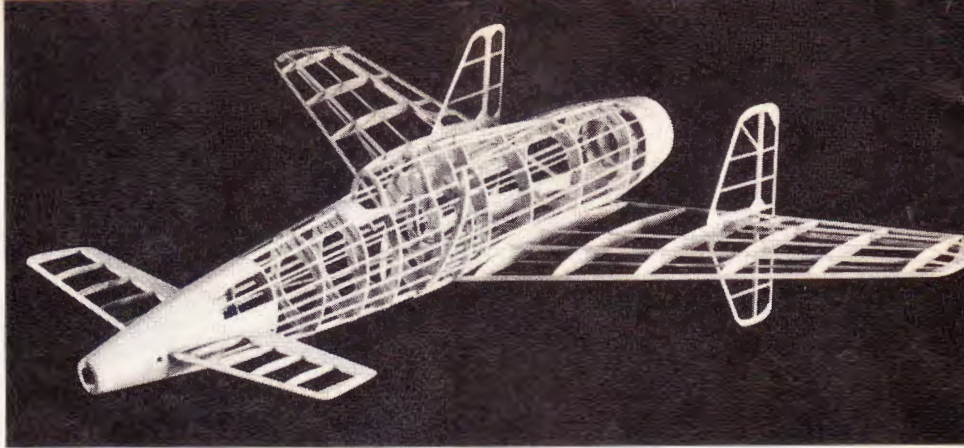
Build up the prop nose block (tail bock?) from very soft and light sheet balsa. Remember that everything behind the wing leading edge should be kept light as possible to avoid having to add nose balast later. The prop and prop block, unlike tractor rubber models, must be kept very light. This means we cannot use one of the commercial plastic props, which otherwise are ideal for rubber scale models. Laminate the prop blades from two layers of 1/32 sheet balsa and form on a coffee can, or on a carved wooden form. The prop I used was left-hand (opposite normal props), with 10 inch diameter and 12 inch pitch. The hub is a piece of 3/16 dowel, drilled at the center for the 1/16 music wire shaft. The blades are carefully notched for the hub, and glued to the hub so that they have 45° pitch 2 inches from the prop centerline. Sand and carefully balance the prop before finishing the prop and block with several coats of sanding sealer. Use an "S" hook to keep the rubber motor from crawling off-center as it unwinds. In this case, the hook should look like an "S" when viewed from the front of the fuselage toward the rear. You might be wondering why a left-hand pitch prop was chosen. You can, of course, use either, but with the left hand pitch you will wind the rubber motor the same direction as a conventional model. That way, you don't have to remember to wind backwards and you will be less likely to be embarrassed by launching a model with the motor wound the wrong way!

Add the 1/32 wire landing gear now, if you choose to use a gear. It will protect the model if you fly from hard surfaces, but it will add a little extra weight.

Covering and Finishing

Finalsand the airframe until smooth and free of irregularities. Add the nose machine guns before covering the fuselage. They are made of aluminum tubing. First "drill" 4 holes in the nose by hand with a piece of sharpened 1/8 O.D. brass tubing. Glue small pieces of 1/8 O.D. aluminum tubing sockets into these holes, and fair the tubing into the nose sheeting with dabs of epoxy. When dry, add machine guns made of lengths of 3/32 and 1/16 aluminum tubing.

Cover all surfaces with light model tissue, shrink with water, and coat with 3 thin coats of Sig Litecoat dope or clear lacquer. Plain dope, nitrate or butyrate, shrinks too much and will tend to cause warps. If you do use



This bare bones shot (top) shows off the Shinden's former and stringer type construction. Use light balsa to keep framework light (above). Designer and plane after F.A.C. Nats win (below left). Flying Aces rules give points for unorthodox craft. Don prepares Shinden for flight (below right). Stooage holds plane.



these dopes as sealers, pin down the flying surfaces after they are doped, and leave for 2 or 3 days until most of the shrinking is done.

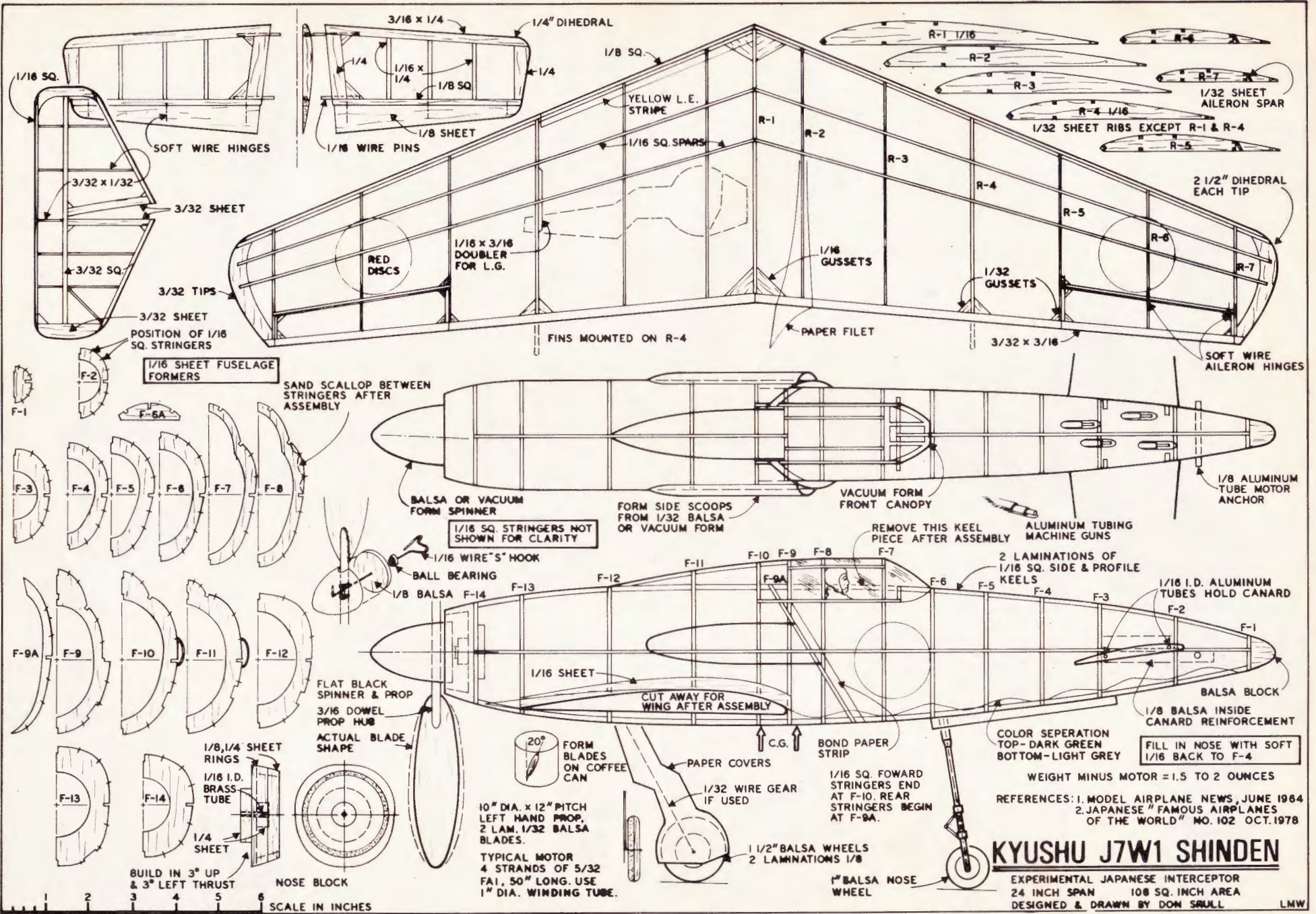
The wing is now assembled to the fuselage and formers and stringers below the wing added. After this area is covered and doped, a small wing fillet of paper is added. Add the small balsa side scoops, and give them several coats of sanding sealer.

Next airbrush the model with a thin coat of dark flat green paint on the upper surfaces, and light grey on the lower surfaces. I used Floquil Railroad Colors enamel, RR40 "Dark Green" and Sig "Polar Grey" dope for my model. Thin the paint well and just fog on a single coat. Use a light cardboard, hand held mask for the red disc insignias, and spray these on. The canopy is now added. The forward section should be molded on a Vacuum-Form if you have access to one, but it can be made from flat acetate sheet if necessary. Finally, add a vacuum-formed or

balsa spinner and paint the prop assembly flat black. Panel lines and other details added with a drafting pen completes the model.

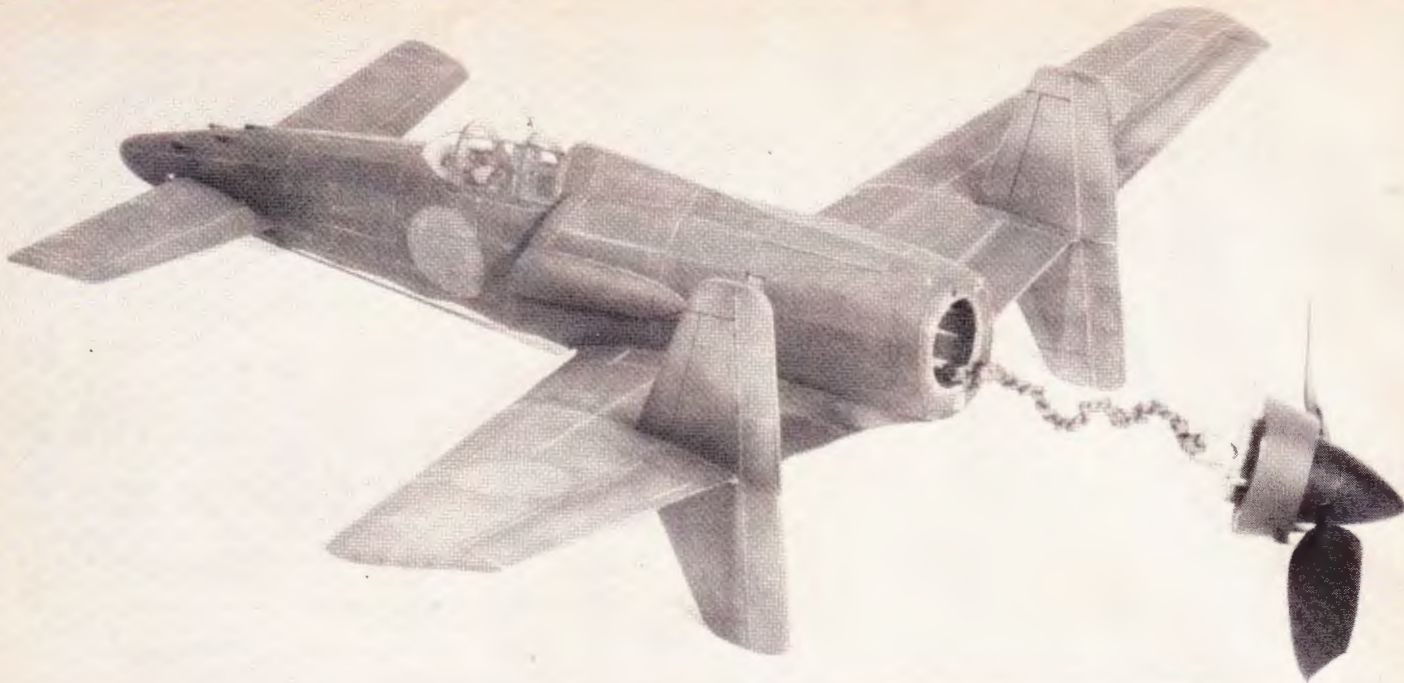
Flying

Your model should weigh between 1.5 and 2.0 ounces before the motor is added. Check for warps and remove any that have developed. A little left rudder, about 1/16" to 1/8", should be built into both fins. Everything else should be straight. Thrust line should be about 3° up and 3° left. In other words, the prop shaft should point above and to the right of the nose. Make up a test motor of 4 strands of 1/8" rubber about 20" long. Balance the model as shown by adding clay to the nose or tail as required. Put in about 300 turns and, grasping the model by the prop and rear fuselage, launch straight ahead. It will take a little practice to launch the model with the wings level and at the proper flying speed.



KYUSHU J7W1 SHINDEN

EXPERIMENTAL JAPANESE INTERCEPTOR
 24 INCH SPAN 108 SQ. INCH AREA
 DESIGNED & DRAWN BY DON SMULL LMW



Don't add any more winds until you have a consistent smooth, long powered glide with just a hint of left turn. At this stage, only use the ailerons and canard tabs for adjustment. Keep the C.G. within the limits shown. Only after the low power behavior is O.K. and your launch technique is consistent, start to add turns a hundred at a time. Make minor adjustments to keep a wide left pattern, with good speed and no stall. Before changing anything, try 2 or 3 flights to make sure it wasn't your launch or a shift of wind that caused a problem. By the time you reach about 600 turns or more, only use thrust adjustments to achieve a smooth, slight left climb and glide. As more winds are added, begin to launch the model harder and in a climbing altitude. The perfect launch would be at the initial climb angle and climb speed. This is an important aspect of flying the Shinden, since as mentioned previously, there is no prop wash to initially provide control forces. A too slow launch at high power will usually cause torque roll problems. When the trim is okay on the test motor, you may want to pack in more rubber for longer

flights. If so, try a motor of 4 strands $\frac{5}{32}$ " rubber (or 4 mm if you're using Pirelli) about 30 inches long. Braid the motor to remove some of the slack. Make sure the C.G. is in the right place with the new motor. With this motor near max winds, the Shinden should climb rapidly almost straight out, or even slightly to the right until the power burst is over. It then will cruise and glide in large left hand circles. Dead air flights of between 1 and 2 minutes should be possible. It's a lovely model to watch on those warm and calm summer evenings.

Footnote

An automatic aileron tab was built into the original model to compensate for torque. The front motor anchor tube was spring loaded and allowed to travel about $\frac{1}{8}$ " in a slot on one side. Under full winds the motor pulled the anchor tube back against the spring. The tube pushed a thin flexible cable which operated a small plywood bellcrank back in the wing center section. The bellcrank pulled a thread which was attached to a small ply horn on the bottom of

the right aileron, which was spring loaded to the neutral position. The result was that under full winds the right aileron was deflected down about $\frac{1}{32}$ " to $\frac{1}{16}$ ". As the winds ran down, the aileron returned to neutral. How did it work? I found that with a 4 strand $\frac{5}{32}$ " motor, the variable tab was not needed at all. At full winds (which I hardly ever use on scale models), a hard launch, banked a little to the left, worked fine. After much flying and several repairs to the model, and adding a larger prop, I went to a 4 strand $\frac{3}{16}$ " motor, since the model had grown to over 2.5 ounces minus rubber—definitely overweight! With the larger motor near full winds, the tab was needed along with a hard launch. It worked, but was tricky to tune up and had to be kept operating smoothly, with no hang-ups or catches. At full winds on that 40" long motor, the motor run is about 2 minutes and the climb is spectacular. With the tab working well the flights are impressive and tend to wander a little—starting left, then straight, next right and finally a wide left turn! Build it light and keep the gadgets off—unless you like gadgets, as I do, in which case. . . . ☺

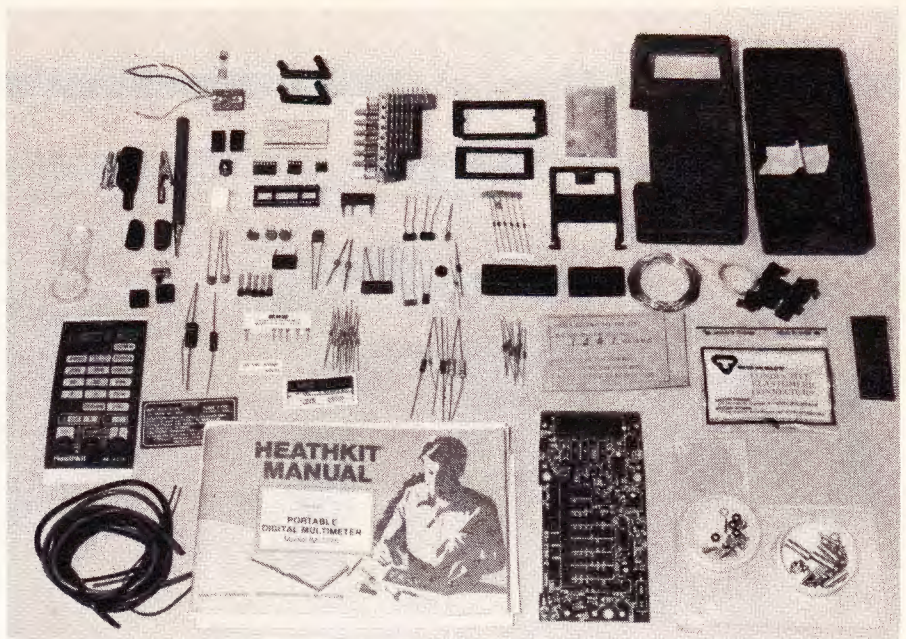


Quite often I receive letters from modelers asking about electronic kit building. Specifically the question always gets down to a single thought, "Can I build a complete R/C system and have any hope of it working reliably when I am finished?" It has always been my personal opinion that a modeler should have some electronic kit building experiences before attempting the construction of any radio control system components (transmitter, receiver or servos). The next logical question then is, "How can I gain that experience?"

Probably the best way to start your electronic kit building is with a basic piece of test equipment. I have always advocated that every R/C modeler should own a multimeter (general purpose meter) that will enable him to monitor some basic electrical parameters such as voltage, current and resistance. Keeping those thoughts in mind I recently decided to build a new Heathkit Model IM-2215 portable, hand held, digital (L.C.D.) multimeter kit. The main purpose of this product review was to answer the question of how easy (or difficult) the kit would be for a rank beginner in electronics. Thereafter, I wanted to determine if this one experience would be enough to permit a modeler to go on to the assembly of R/C system components. In addition to all that, I wanted to be able to describe some of the practical uses for a D.M.M. (digital multimeter) in terms of the R/C hobby.

The basic kit offered by the Heath Company (mail orders should be addressed to Benton Harbor, Michigan 49022) lists for \$94.95, plus shipping. The price may seem a little high to you because I'm sure you have seen what looks like comparable units on sale, already assembled, in the \$70.00 price range. The key item here is basically one of meter accuracy, as I will explain later. I was, quite frankly, surprised to find so many parts when I opened the kit box. The initial reaction might scare a newcomer. It takes several hours to sort out and identify all the components. If you have never built a Heathkit, you will be pleasantly surprised to see the detail included in their instruction manual (almost 90 pages in this instance). Part of the manual (a supplement) provides a complete "parts pictorial" which definitely helps in the sorting of the parts. My particular kit checked out perfectly without a single missing part or wrong value. I had only one component I couldn't clearly identify, and I was able to identify it by a process of elimination. Heath supplies a small magnifying glass which is most helpful in reading the color bands on the resistors. This sorting of the resistors is very important since some are of the 1 percent tolerance variety and have four color coded bands for identification purposes.

Very few tools are required for the assembly operation. The most important, of course, is your choice of soldering iron. I continue to use an Ungar iron with a 37½ watt heating element (P/N 1235) along with a PL-340 3/64 inch spade tip which is available from most local electronic stores. You may also wish to choose one of the special soldering irons offered by the Heath Company in their general catalog. The remaining tools necessary for



PHOTOGRAPHY BOB ABERLE

An FM Product Review: **Heathkit's Digital Multimeter**

By Bob Aberle

This moderately priced digital multimeter kit
features extreme accuracy.

the assembly job should include wire cutting pliers, a small pair of needle nose pliers, a wire stripper or an X-Acto knife if you prefer, small screwdrivers (both a standard and a Phillips head). That's about it. Nothing very sophisticated. Heathkit provides a really generous amount of solder with the kit. I had more than half the supply left over at the completion of the assembly.

Actual construction (mostly soldering) of the multimeter took me a total of two nights (one extra night to read the instructions and check all the parts). I would estimate that the total reading of instructions, parts inventory check, assembly and calibration took me approximately 12 hours of labor. Yes, I have built many Heathkits in the past. However, this is the first one for me in over 12 years (the last one being the Heathkit Model GD-47 R/C System in 1968). Just as a little tip, you must read everything carefully. Several times I thought I caught an error in the instructions only to find out that I had either misread something or else didn't read it at all. The information is all there, believe me!

Assembling the main printed circuit board will require some high density (close spacing) component installation. Soldering in some cases gets a little tedious, but is tolerable. In general, I would rate this D.M.M. kit assembly as easier than an R/C transmitter, receiver or servo. If you are able to build and get this meter working you should be sufficiently qualified to tackle at least an R/C transmitter assembly job. If you cannot get

this meter working and have to resort to a local Heathkit Electronic Center to correct your errors, most likely you are not ready for an advanced project (unless a faulty component, beyond your control, proved to be the problem). Soldering ability is the key to the assembly process. If you are not comfortable soldering and know you are getting cold solder joints, I wouldn't run the risk of building an R/C system with its potential dangers (possibility of a crash, etc.).

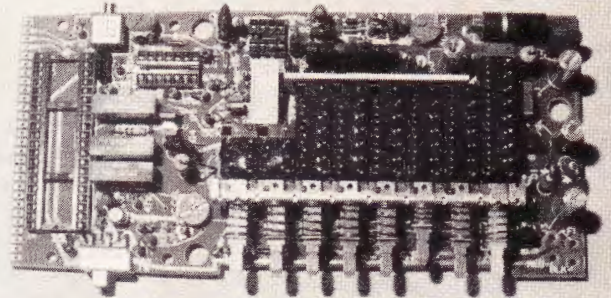
There are several things you must be careful with when assembling the D.M.M. First of all you are cautioned to only handle the main printed circuit board by the edges since it is possible to contaminate the board with just the natural oils in your skin. Second you must observe some special precautions when handling two of the C.M.O.S. integrated circuits since they are susceptible to static charge conditions and can be easily destroyed. One I.C. in particular is a 40 pin variety and lists for almost \$15.00. Finally you must be reasonably careful in assembling the L.C.D. (Liquid Crystal Display) components. I personally found this aspect of the assembly very informative since I had never previously had the opportunity to work the L.C.D. devices.

The mechanical assembly went together without incident. Everything fit perfectly! Final calibration is very easy. Heath supplies a special internal standard for this purpose. I used this approach and I doubt if it took more than 15 minutes to follow the full

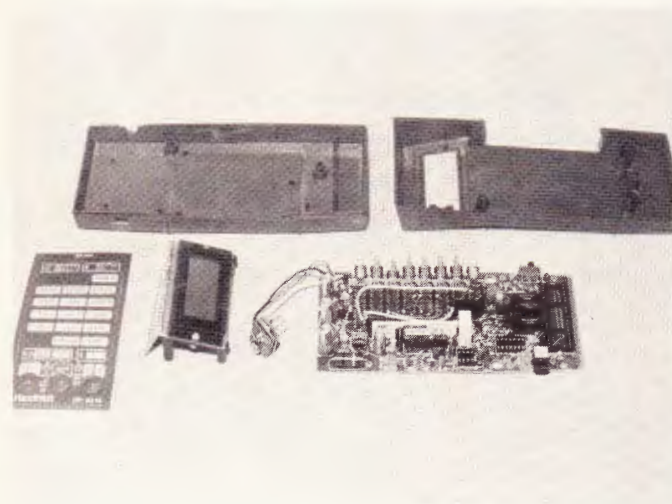
Digital Multimeter



Simple assortment of tools is all that is necessary to put the Heathkit IM-2215 Digital Multimeter (above). Major components ready for final assembly (below). L.C.D. display gets soldered to the main board.



All the components assembled to the main printed circuit board (above). I.C.'s not plugged into sockets. Using the Heathkit D.M.M. with a simple load resistor for discharge test (below). Procedure outlined in August FM.



procedure. You are also given the option of calibrating to an external laboratory standard, but this does require a source of 190 mV at $\pm 0.05\%$ accuracy. I didn't feel it was necessary to go to that extreme.

I think it would be appropriate now to tell you a little more about the finished product. The Heathkit IM-2215 D.M.M. measures $7\frac{1}{2}$ inches long x $3\frac{1}{4}$ inches wide x 2 inches high. It has a collapsible stand mounted on the rear of the case which is a nice convenience during electronic bench testing work. Weight of the meter is just 14 ounces including the battery. Battery power is a standard 9 volt alkaline type which is claimed to give 200 hours of operating time. After 80% of the battery power is depleted a "Lo-Bat" indication will appear in the left corner of the display. You may also purchase an AC outlet cord for either 115 VAC operation (Heath No. PS-2350 for \$4.95) or for 220 VAC operation (Heath No. PS-2450 for \$14.95). Display is a liquid crystal type of $3\frac{1}{2}$ digits (1999 is the maximum count). Numbers are 0.5 inches in height. This display is very easy to

read in bright sunlight and certainly comfortable to read in normal room light conditions. DC voltage ranges are as follows: $\pm 200\text{mV}$, $\pm 2\text{ V}$, $\pm 20\text{ V}$, $\pm 200\text{ V}$ and $\pm 1000\text{ volts}$ (unit is overload protected up to 1000 V-DC). DC current can be measured to the following scales: $\pm 2\text{ MA}$, $\pm 20\text{ MA}$, $\pm 200\text{ MA}$ and $\pm 2000\text{ MA}$ (which is the same as 2.0 Amperes). Overload protection, by fuse, is 2.0 AMPS maximum. That is the highest current value you can read on this particular meter. You can also measure AC voltage and current along with resistance in ranges up to 20 MEG OHMS. Input impedance on DC voltage is 10 MEG OHMS which makes it comparable to a VTVM in performance.

Let me talk now specifically about the DC voltage measuring accuracy of this unit in terms that will have the most meaning for the R/C modeler. Discharge battery testing techniques makes it necessary to read certain voltage cut-off points to a reasonable degree of accuracy. The voltage cut-off point for a typical four cell airborne (nickel-cadmium)

battery pack is generally accepted as 4.4 volts (1.1 volts per cell). To measure this value you would set the DMM on the 20 volt DC scale. A typical reading on that range would be 4.40 volts. If you accidentally had the meter set for the 2 volts range you would see an overscale display of "1.". Using the internal calibration source the claimed accuracy of this D.M.M. is $\pm .035\%$ of reading + one count. This is a lot tighter spec than some of the comparably priced, assembled meters, whose accuracy is stated as a percentage of full scale reading. Getting back to our 4.40 volt level and using the accuracy of $\pm 0.35\%$ of reading plus one count you end up with a voltage reading that could be as high as 4.42 volts on the (+) side or as low as 4.37 volts on the (-) side. That is still excellent accuracy for our purpose. As another example, let's see what our typical eight cell transmitter voltage cut-off of 8.8 volts (1.1 volts per cell x cells) would look like. Normal reading would be 8.80. On the (+) side this could be as high as 8.84 volts. On the (-) side it could go as low as 8.76 volts. The last digit



A typical reading of an airborne battery pack at roughly full charge. Numerals are 0.5 inches in height. Quite easy to read. Nice feature.



This is what you would see if you attempt to take a reading in excess of the selected scale. Unit has good overload protection. Good unit.

in all cases can "float" +/- one count and that is normal. On the 20 volt scale the maximum reading you could obtain is 19.99 volts before going off scale. If you have your meter scale set too high for a given value being measured, you will end up with an extra "0" in front of the number, for example: on the 200 volt DC scale you might measure 64.1 volts while the same value on the 2000 V DC scale would appear as 064 volts. With a little experience and common sense you will easily get the hang of it.

From a modeling application standpoint this D.M.M. will permit you to run your own battery discharge tests and at the same time let you plot a very accurate graph of voltage (under load) vs. time. From this you can interpret such info as cell capacity. You could also keep the D.M.M. in your field kit and use it along with a suitable load resistor (see August 1981 FLYING MODELS article, "More on Batteries") to check your batteries' capacity between flights at the flying field. One word of caution, the L.C.D. (display) can be affected by prolonged exposure to sunlight. It

might be wise to purchase a Heathkit leather carrying case (P/N IMA-2215-1 for \$14.95 list) for added protection.

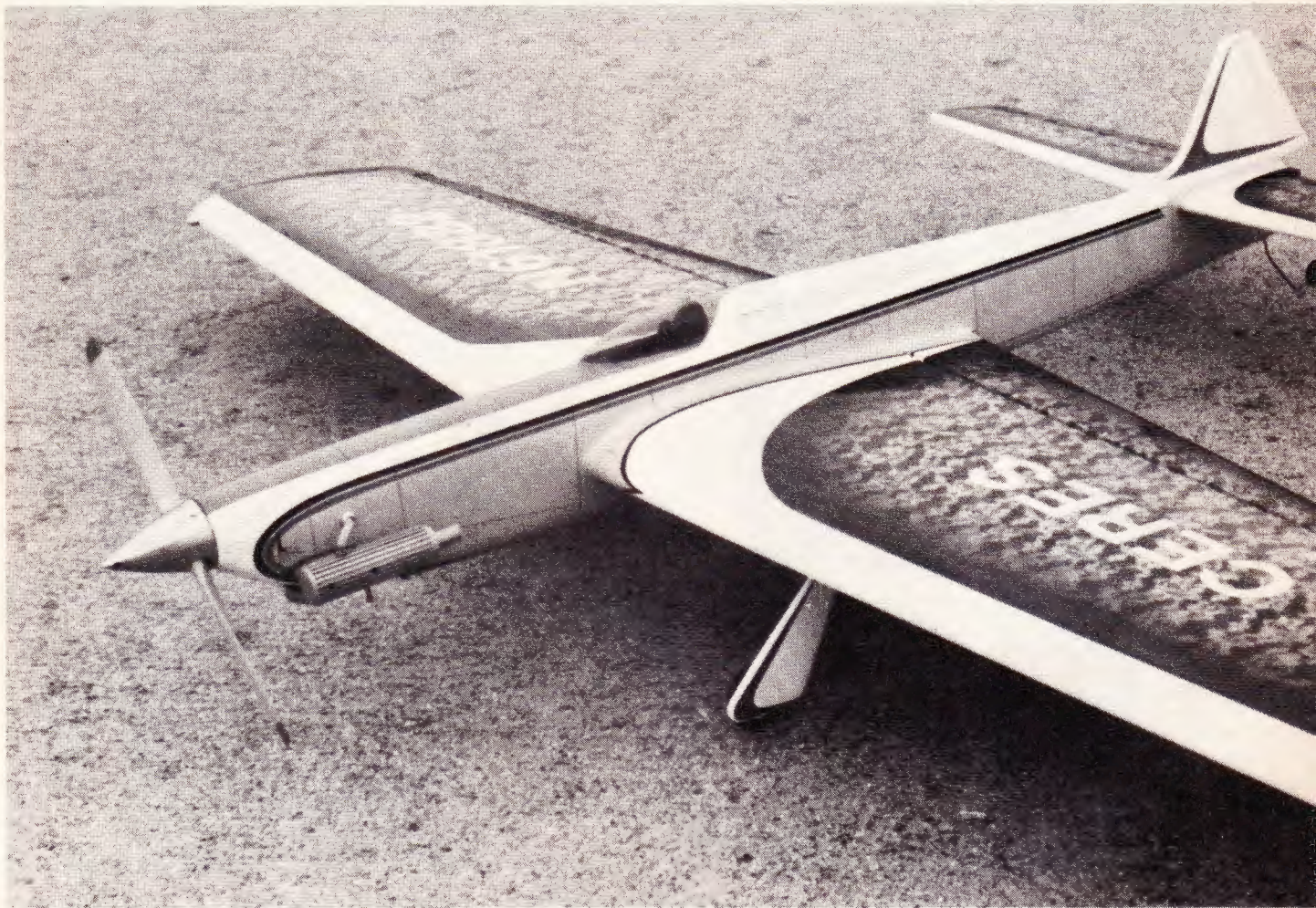
R/C electric powered car enthusiasts will find excellent use for the Heathkit D.M.M. The standard technique these days is to fast charge six cell packs consisting of 1.0 AMP/HR cells, at a constant 4.0 AMP charge rate. Charge voltage is monitored continuously with a digital readout meter until a characteristic peak is noted. As soon as the slightest voltage drop off is noted the charge is terminated. The ability to read voltage to a hundredth of a place is essential in this application.

In addition to battery checking you can also measure the current being consumed by your flight pack (receiver and servos). You can do this easily with the help of an aileron extension cable inserted in the battery cable. Break into the red wire and connect up the D.M.M. cables to the ends of these two wires. Set the meter to the 2000 MA (DC current) scale and check to see if you are experiencing any unusually high current drain which

might indicate that the servo linkage was binding somewhere or possibly that you had a faulty servo motor.

The resistor measurement capability of this D.M.M. will permit you to verify resistor values when sorting out all those tiny parts found in the average R/C system kit. And, if you run out of hobby related applications you will always find uses for it around the household (AC voltage measurements, etc.).

The Heathkit IM-2215 has a lot to offer. It is reasonably accurate and therefore worth every penny of its almost \$100.00 price tag. Considerable electronic kit building experience can be gained by the assembly of this meter which can easily advance you into more complex projects. Finally, you end up with a valuable piece of general purpose test equipment that will remain "state-of-the-art" for many years to come. You may also wish to write to the Heath Company (address listed at the beginning of this article) and request a copy of their general catalog which lists all of their kit line, including a series of R/C systems and components.



Ceres

By Bob McDonald

Unusual sheeted "I" beam construction
is featured in this competitive ship.

If you regularly read this wonderful modeling magazine, you will, undoubtedly, remember (I hope) my previous article in the April 1980 issue. You're probably asking yourself, "Why on earth would old Bob write another article about an airplane which looks so similar to his last one?" Well, Ceres does look a great deal like Aquila, with the exception of a different cowl and the addition of a turtle deck. In addition,

the wing and tail plan views are, for the most part, the same, as are the nose and tail moments. There are, however, some very important differences about Ceres that make it a unique experience both to fly and build.

First, let me begin by explaining how Ceres came about. After the FAI trial in 1979, where all my "toy" airplane stuff was stolen, I had to start over. This meant I would need to build more than one new air-

plane, since I had no adequate spares. Well, to make a long story short, I decided to build an exact copy of the Aquila because I knew it would work well. After the new Aquila was under way, my Dad and I, decided to build two more, incorporating some new ideas we had been kicking around for the past few years. We decided not to change the size of the airplane, or the powerplant, because they had proven to be ideally suited to each other. Ceres is the most unique of my 1980 efforts.

The first, and most important, new thing about this airplane is the airfoil. After a quick glance at the plans, you should notice something a bit odd about the wing, that is, the flaps are an integral part of the airfoil. The idea behind this was to make the flaps more efficient. Higher efficiency in the flaps naturally means you don't have to move the controls as far to make the airplane turn. The advantage of using less movement is that you create less drag in the corners and, therefore, lose less velocity. Less air speed loss means the aircraft is going to pull out of the corners more quickly, making it easier to fly nice flat bottoms on your square maneuvers.

Because of superior efficiency in the turns, you can get away with longer control horns without damaging the sensitivity of the aircraft. I use horns of about 1 1/4" in length, which are nice because they give you an ad-



PHOTOGRAPHY BOB HUNT



Bob McDonald assumes the "classic" pose of builder with plane (above). In this case, the plane is Bob's own design Ceres. The stylish stunter features "I" beam wing construction and elegant lines (left).

vantage in leverage, which makes it more difficult for the control surfaces to wash out. You may also notice greater ease in the control effort, which I like.

Ceres, aside from its aerodynamic marvels, also contains several neat construction features. Again I used my trick control system, which I will expand upon later because I feel it is a very important feature for this airplane, or any other you might build. Ceres also features a rather different way of mounting the motor, and last but not least, a *sheet covered I-beam wing*.

Sheet covered I-beams are not exactly a new idea. The first attempts at sheeting I-beams were made by Jack Sheeks, who's been at this longer than anyone living can remember. What Jack's reasons for trying this were I can't say, but they were probably much the same as mine. First, I thought, because the planked wing would require less dope than the paper covered wing, it would finish at about the same overall weight. This fortunately turns out to be true. Second, there would be a number of positive construction features. Like any I-beam, it would be quick to build. Further, it would be considerably stiffer and less prone to warping, although I haven't had much trouble with the conventional I-beam warping. Last, but certainly not least, it would be much easier to

finish than the paper wing.

Now that I have pointed out the wonderful features of Ceres, you doubtlessly can't wait to begin construction. Before you start, there are two things you better have: a flat area of adequate size to build the wing on, and a scale to weigh your wood on. I use a gram scale for this because it is more sensitive than most kitchen ounce scales. My weight limit for acceptable wood is 5 lbs. per cubic foot or less. Figuring out what a given piece of balsa should weigh in grams is simple. Just take your trusty calculator in hand and multiply the volume of the piece in cubic inches by 1.31. If your piece of wood weighs more than the answer to this calculator, don't use it. Believe me, when you consider the amount of wood in a stunter, a gram too much here and there really adds up.

Once you have your stock together, and have somehow found a good surface to build on, it's time to get started. I will not detail the more basic areas of construction, because anyone attempting a project such as Ceres should have at least a stunter or two under his belt. This is not a simple airplane to build, but with a little care, it is not a difficult task.

Spar

I begin with the spar, which is not truly an

I-beam. I no longer use caps on the spar because I found they are not necessary to the strength of the wing. This is particularly true for a sheeted wing.

The spar is built from two pieces of $\frac{3}{16}$ " \times 2" fairly hard balsa, spliced together with $\frac{1}{16}$ " bass wood doublers laminated to each side. Care should be taken to select straight pieces for this because more than a very slight curve can cause problems later on.

Once the lamination is complete, draw a center line on the spar and use this as a basis for the layout of the front view.

When the spar is cut to shape, cut out the center to clear the pushrod, and to accept the bellcrank and allow adequate swing.

When the spar is complete, the fuselage sides can be built. It is best to use 4" wide stock for the fuselage sides, because it is very important that the top edge of the fuselage sides be straight. Since the sides finish at about $2\frac{7}{8}$ " it sometimes is hard to get 3" stock to work. I would also suggest using 48" long stock, but if you can't get it, you can splice a little bit to the rear end as long as the joint is behind the elevator hingeline.

First, laminate the plywood doublers to the sides in the areas shown, then after straightening the top edge of both pieces, fasten them together back to back with a few

pieces of double face tape.

Lay out the spar, leading and trailing edge cutouts and the bottom edges. Make your cutouts carefully, particularly the one which accepts the main spar.

Separate the fuselage sides and cut the cowl lines to suit the engine and mufflers selected. Save the pieces removed to be used later as cowl sides.

The motor mount and bearers are now epoxied to the fuselage sides. Be very careful at this point to see that the bearers stay flush with the fuselage side top edge.

You will note the drawings show a $\frac{1}{16}$ " aluminum motor mount plate which is wood screwed and epoxied to maple bearers. The metal mount is stiffer than plain wood. This plate is also easier to make and lighter than the aluminum beams I used to use. The plate can be cut and carefully filed to the shape shown in the drawing. The bearers have been routed out behind the plate to form sort of a C-tube structure in which $\frac{1}{4}$ " holes are drilled as shown. Care should be taken in cutting the slot where the plate goes, because this must be at the proper depth.

Fuselage

You are now ready to build the fuselage. I begin by drawing the fuselage centerline and tacking square blocks down to jig the fuselage sides in place. It's also a good idea to have a wooden block cut to suit the width of the fuselage to be inserted at the front.

Slip the fuselage sides onto the main spar, install the spacer block, and set the assembly into the jig blocks. Check the centerline of the spar with a surface gauge to be sure it is level. You can now put in the spacer pieces which serve as bulkheads in the rear of the fuselage and install the firewall behind the fuel tank and tank floor. The main spar could be glued in now, but I prefer to take it out until I've carved the top and bottom blocks. When the sides are assembled the engine and mounting plate can be installed, which allows the nose ring and filler blocks forward of the engine to be installed. The cowl side pieces can now be tacked in place and the filler blocks installed around the engine.

The top and bottom blocks are now tacked on. The fuselage is then carved to shape, and the blocks are cut off and construction of the wing can be started.

Slip the main spar back into the fuselage and put the assembly back into the jig blocks. Check the spar centerline height again and epoxy the spar in place. At this point the holes for the landing gear J-bolts should be drilled and the gear temporarily installed to see that the wings sit level and that the prop clearance is correct. When you are satisfied that the attitude is right, remove the gear and begin wing construction.

Wing

Wing construction is started by cutting two rectangular tip plates from $\frac{1}{8}$ " \times "3" stock long enough to fit between the leading and trailing edges at the tips. Draw a line on these plates corresponding to the height of the spar centerline from the building surface and draw a vertical line showing the correct location of the spar at the tips.

Slip the leading and trailing edge pieces into the fuselage sides and glue them to the tip plates. Take great care at this point to see that the height of the centerlines of the leading and trailing edges corresponds with the spar centerline. Any misalignment at this point will result in a built in warp in the wing. It is also wise at this time to fasten several blocks to the board at intervals along the leading edge to keep it from bending when the ribs are installed. If you don't do this, it is easy to build a bow or S-curve into the top view of the leading edge.

Sometime prior to this point the ribs need to be cut out. Cutting the ribs is very simple, and doesn't take long. Cut several pieces of $\frac{1}{16}$ " \times "3" balsa to the length of the template and pin them together in stacks of ten or so. Pin the template to the stack of balsa, and cut around the rib shape with a jigsaw. Lightly block sand the cut surface, move the template down, aligning the edge with the pin holes and take another cut. Presto, ten ribs. Cut four ribs from $\frac{3}{8}$ " sheet to be used as the base ribs at the fuselage and we're ready to start.

Trim the inside edges of the wide ribs to get a good fit against the fuselage sides and glue them in. Next, start putting in the ribs at the intervals shown. As the ribs all start out being over-length, you simply cut the rear of each rib off with a razor saw to suit. When this is done, put in the shaped filler blocks between the ribs where the landing gear wires come out.

Now comes a tricky part. Get a good straight stick, pine or mahogany, about $\frac{1}{4}$ " \times "2" \times "36" or so, and glue fairly coarse sandpaper to it. Mark the top of all the ribs with colored chalk so you can tell where any high spots are, and while somebody holds

the airplane still, use the sanding stick to remove any high spots and start the leading edge contour.

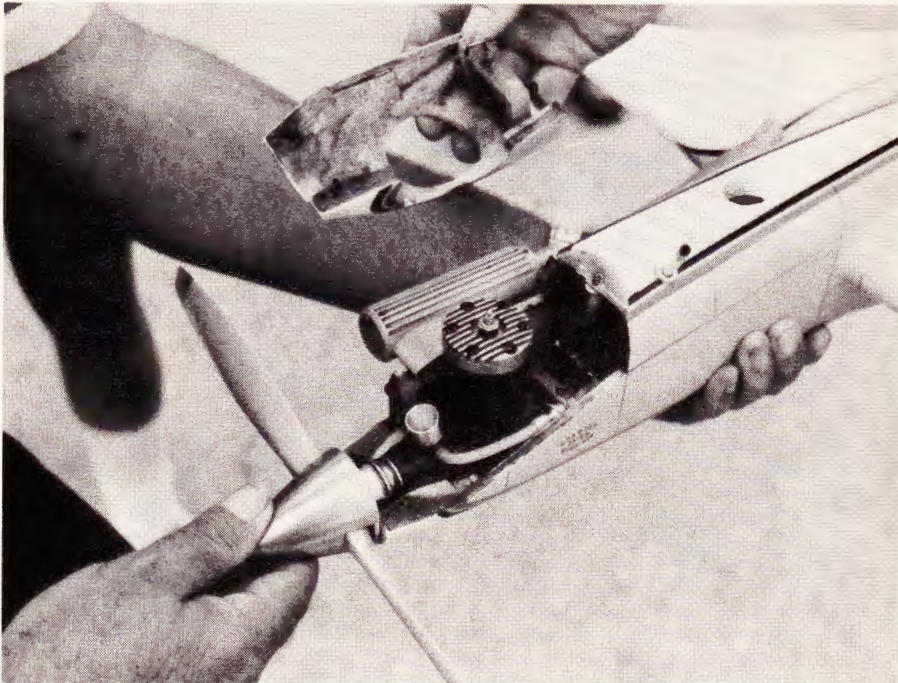
After you have done this, it is time to sheet the bottom of the wing. First you need to join the $\frac{1}{16}$ " balsa wing skins. Titebond glue seems to work best. Be sure you make nice clean joints. Sand the skins smooth before covering the wing, excessive sanding after the wing is covered can result in ripples and the like.

You must jig the leading and trailing edges to keep them from bending under the weight necessary to hold the sheeting in place. Now brush a watered down solution of titebond glue on the wing frame, put the skins in place and tack glue at the corners of the trailing edge with hot stuff.

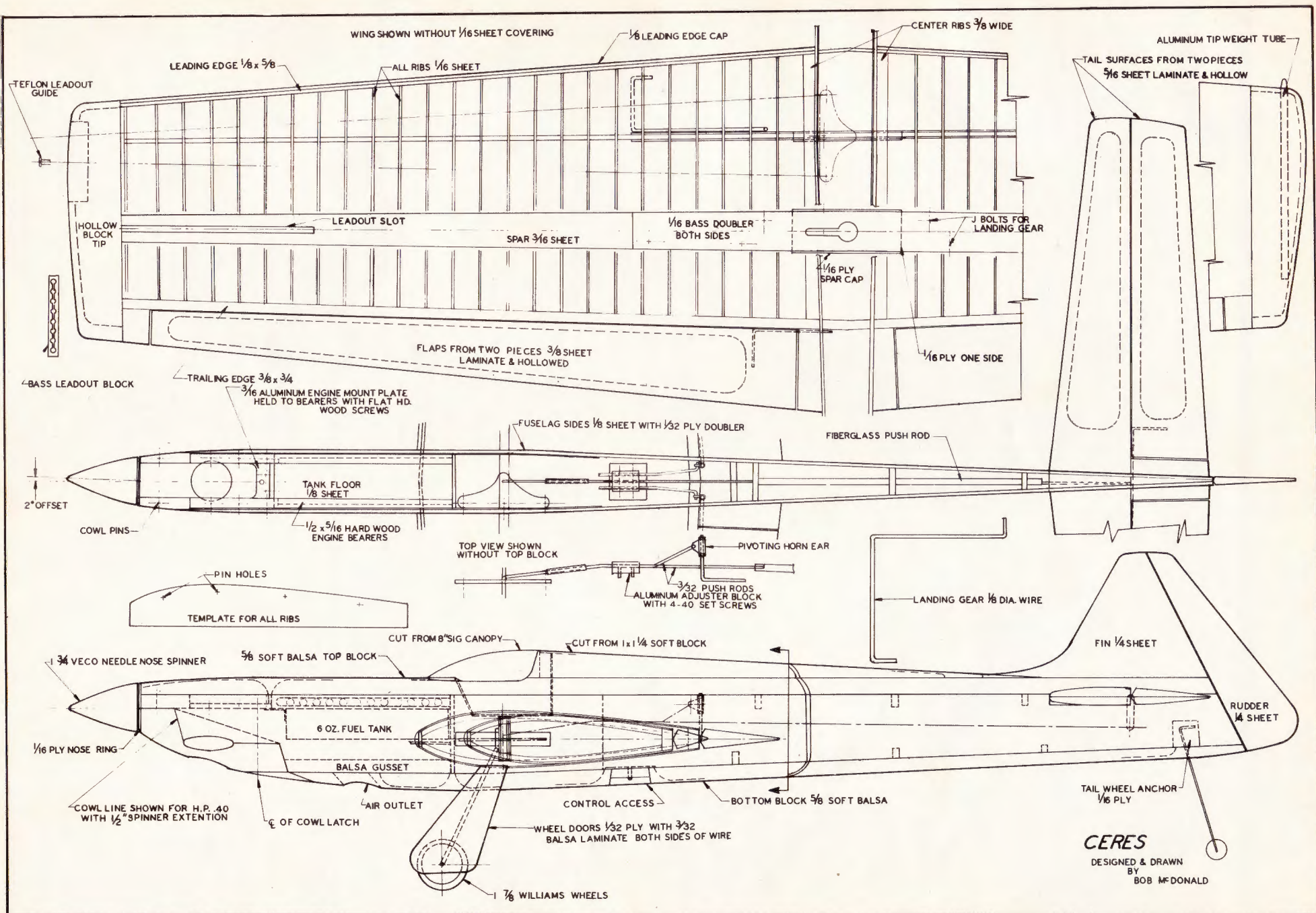
I have devised a good way of holding the wing skins down while they're drying. I sew brass rods into an old piece of bed sheet that drops over the wing panels, but does not touch the working surface. This gives you fairly even pressure over the entire surface of the wing, and it seems to work well. You may need an extra weight here and there to keep the sheeting down.

After all this is dry, turn the airplane over and install the landing gear and bellcrank permanently. Don't forget to cut the slot for the leadout in the spar at this point. Now simply install ribs and sand as described before.

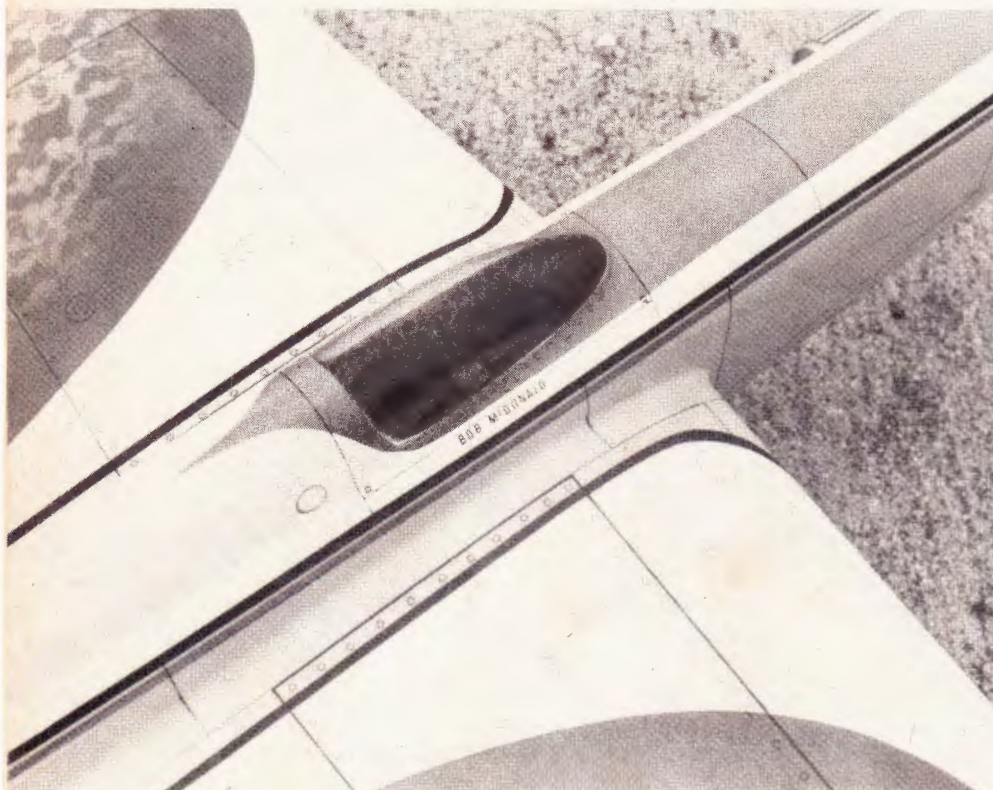
Prepare your upper wing skins as before and jig the airplane in the upright position. I use a large wood block attached to the bottom of the fuselage sides, just ahead of the spar, because this area is parallel to the top line of the fuselage. This block should be high enough to get the gear off the table. Then, as before, jig the leading and trailing edges to



Ceres with cowling removed. Engine is mounted inverted. This ship features some advanced construction techniques and should not be attempted by the rank beginner. All that work will pay off in the air.



CERES
 DESIGNED & DRAWN
 BY
 BOB McDONALD



The cockpit and wing fillets are nicely done on the author's Ceres. This is the area of the plane where neatness definitely counts. A slick job here helps the overall impression made by plane.

take the load of the sheeting.

Note: the wing may have sprung a bit from the previous sheeting application. This can be corrected by jiggling so the centerlines of the leading and trailing edges check with one another. This may take some time, but it is important.

After the airplane is jiggled sheet the wing in the same manner as before.

Flaps and tail surfaces

Next build your flaps and tail surfaces. These are shown as being carved from two sheets of $\frac{3}{8}$ " or $\frac{3}{16}$ " sheet, hollowed and laminated together. This works well if you can get enough acceptable wood, but I have also used a geodetic structure for the flaps and elevators, covered with $\frac{1}{32}$ " sheet, with good results.

Controls

Now it is time to install the controls, so I will describe the workings of my rather unique control system.

The elevators are driven by a pushrod which is connected directly to the bellcrank, and the flaps are connected to a sliding adjustable block held on the main pushrod with setscrews. You will note that each flap has a separate horn and pivoting "ear" from which runs a short pushrod that passes thru holes in the adjusting block and is secured with setscrews.

This adjustment system gives me two things. First, I have an accurate, easy way to "tweak" the flaps to level the wings. Second, I have found that if an airplane tends to turn

a little differently up than down, I am able to correct this by trimming the neutral position of the flaps and elevators relative to each other. If you have some trouble with binding or springing when you first put this system together, just be patient and play with it a bit. Once you have the shape of the flap pushrods right, the system is as smooth as any I've used.

From this point on, construction is completely conventional. The normal caution involving getting the tail glued on straight is, as always, of great importance. After the tail is on, hollow the blocks and reattach them to the fuselage. Now, add fin and rudder, landing gear doors, tail and flap fillers, and you're ready to start finishing.

Finish

If you have a favorite method of finishing that yields both high quality and low weight, by all means use it. However, if you have been coming out a bit heavy on your finishes (I define too heavy as anything over 10 oz. from bare wood), you might try my methods.

Begin by brushing two coats of 50% thinned dope on the entire airplane. Now cover the whole thing with light grade silk. Next brush two coats of K&B superpoxy clear over the silk. Be careful to wipe each coat down with paper towels as it is being applied so no excess builds up. The silk and epoxy are much like fiberglass in strength, but are much lighter. Further, they provide an excellent base for the rest of the finish.

Once the epoxy is allowed to dry for a day or two, it should be lightly sanded with 360

or 400 grit wet or dry. At this point you can fix any seams you might have in the silk by simply sanding them flat.

Next add wing and tail fillets and blend in the rudder and turtle deck. You will probably find that because of the epoxy, it will be quite easy to blend these fillets compared to doing the same operation on bare wood.

Brush, or preferably, spray 3 or 4 coats of dope on the hole thing. Allow 6 to 8 hours curing time between each coat, the after completion, allow the dope to cure about a week before sanding with 40 wet or dry. During this curing period, I usually spray a little filler on the cockpit area, sand it, install any details I see fit, add the canopy and fillet, and then everything is ready for filler.

I use standard dope and talc filler, with a little silver to help show flaws. The filler should be sprayed in two fairly heavy coats, then allowed to cure again for about a week before carefully sanding with 400 then 600 wet or dry. After you fix all the little pits and flaws, spray a dust coat of silver to make the airplane a uniform color.

For color, I have used either dope or lacquer with equal success. Lacquers are nice because you never have trouble with it pulling up or bubbling the fillets, and it's quicker. However, if you're not careful, and pick a color that won't cover in one coat, it could prove to be heavier than dope. If you do use lacquer, you should only need one coat of each color and about 3 or 4 coats of clear top coat. Further you don't have to wait more than about two days for it to cure and you can rub it out.

Dope is probably a little lighter, but does take more time, and is likely to be more trouble. If you choose dope, allow about a weeks' curing time before rubbing and use about 6-7 top coats of clear with plenty of time between them.

Before closing, I would like to say a bit about the motor-tank combination I have found best for Ceres. I have used both the H.P. .40 and the S.T. .46 and have found the H.P. superior in my case. The H.P., being a .40, allows lighter lines and also provides as much or more power as the .46. Further, the H.P. seems to be quite durable, and not very finicky. I should point out however, I do not use stock H.P.'s, mine are modified by Art Adamisin, who lowers the port timing and performs several other changes, to make the engines more docile.

I have tried several tank and muffler combinations, on both the ST and the HP. For tanks, the best thing seems to be a uniflow tank running on muffler pressure. You can try making your own, but I suggest trying one of Mike Mustain's tanks. I've had good luck with them and he delivers quickly at a reasonable price. Mufflers had been a pain in the neck until recently, when I switched back to my old Adamisin muffler. Art's muffler seems to reduce power the least, and it certainly runs cooler than any other.

I'll end by reminding you that if you decide to build one of these planes, with care and attention to detail, you will doubtlessly find it a rewarding experience. Good luck, and I hope to see you at the Nationals with a Ceres, as long as you don't beat me with it! ☐

The trend in R/C soaring today is toward two meter aircraft. With the emergence of the "Two Meter World Cup Challenge" the smaller size sailplanes are becoming more popular. Sophistication is the name of the game in two meter circles, with the addition of flaps, ailerons, flaperons, spoilers, ballast chambers, etc.

The "Petrel", by Archaeopteryx Avion Associates, is a current two meter design. Although the "Petrel" can be built in 2 meter, 2.5 meter and 3 meter versions, I elected to build and fly the two meter ship. This sailplane holds 5 U.S. records. Jim Ealy, designer and President of Archaeopteryx Avion Associates has produced a well thought out kit. The sailplane truly lives up to it's flying ancestry. The kit is not for beginners. However, if you have a couple of sailplanes under your belt, you should have no trouble with this kit. The fuselage lines of the sailplane have that glider design flow, the end product being a very streamlined, realistic looking sailplane. The wings are a polyhedral configuration with a constant chord to the polyhedral break and a double taper planform to the wing tip. Spoilers and ballast tubes may be incorporated into the wing construction if the pilot chooses to do so. The tail features an aerodynamic balanced rudder and stabilator (full flying stab). The design is very clean and, as you will see, a very good performing sailplane.

Jim includes a detailed set of plans and a construction booklet, gearing it more towards the novice builder, and adding a little more detail.

The wing

Before you begin wing construction be certain that your building surface is flat and true, no warps. Your sailplane will only fly as true as it's wings are built. The airfoil is a flat bottom design with a fully turbulated wing. The ribs are band sawed and sanded and the balsa quality is very good. In place of spruce for the spars and turbulators, Jim uses redwood. This was my first experience with redwood, especially in critical areas of the wing. In fact, I was very skeptical at first as to redwood's strength, especially on tow. After numerous hi-start launches and winch tows no excessive wing flexing was noticed. Case closed.

The construction of the wing is very straight forward. Two optional items may be built into the wing if you so desire. One item is ballast tubes. The ballast tube is located directly in front of the main spar. The tube, which is of brass, extends into the wing for 6 ribs or 11½ inches. The end of the tube is butted by a rib and, therefore, needs only to be closed on one end for flying. Lead shot may be added for weight. The tubes are epoxied into the wing. The spoiler setup is semi-conventional with the blades of the spoiler opening on top and bottom. The spoiler spans a full 12 inches and is activated by the pull-servo system. The blades are held under tension by using part of a bent safety pin. (A very clever idea by Jim.) A ¼ inch I.D. fiberglass wing rod tube is epoxied in place to accept the steel joiner rod. A screw eye is attached to the root rib for attaching rubber bands through the fuselage. Finally, a ⅛ inch alignment dowel is

FLYING MODELS



PHOTOGRAPHY JIM WATERS AND BOB CRANE

Kim Crane holds her dad's new Petrel sailplane. The 2 meter soarer is kitted by Archaeopteryx Avion Associates. Petrel is aimed at the more experienced pilot, but features straight forward construction. Pretty.

An FM Product Review:

Archeopteryx Avion Associates

Petrel

By Bob Crane

A well designed, record setting sailplane
for the popular 2-meter class.

glued into the top of the trailing edge.

When first laying out your wing, fasten the plans to your building surface and cover them with wax paper. Lay out your bottom spar and position it in place. Notch your trailing edge to accept the ribs and position on the plans. Carefully align your ribs on the plans and check for proper alignment with a square. If you elect to incorporate turbulators in your wing do so at this point. Follow the instructions to the letter for correct polyhedral degrees. The plans come complete with a left and right wing panel illustrated.

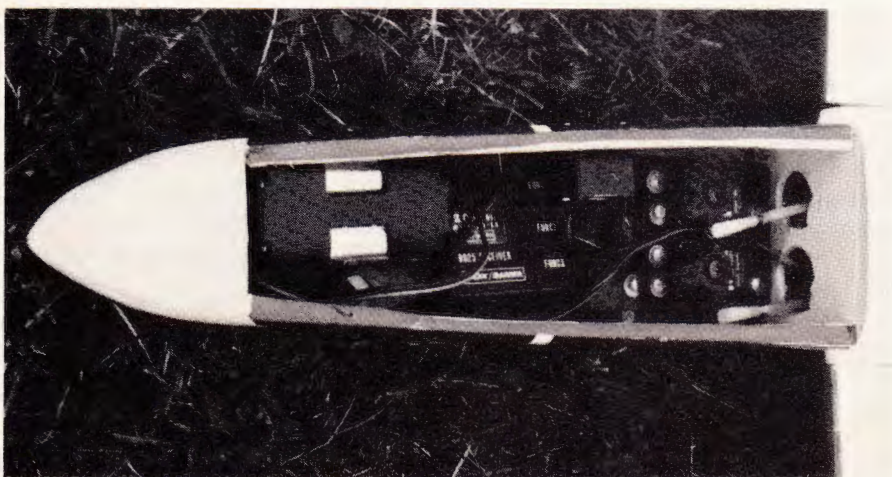
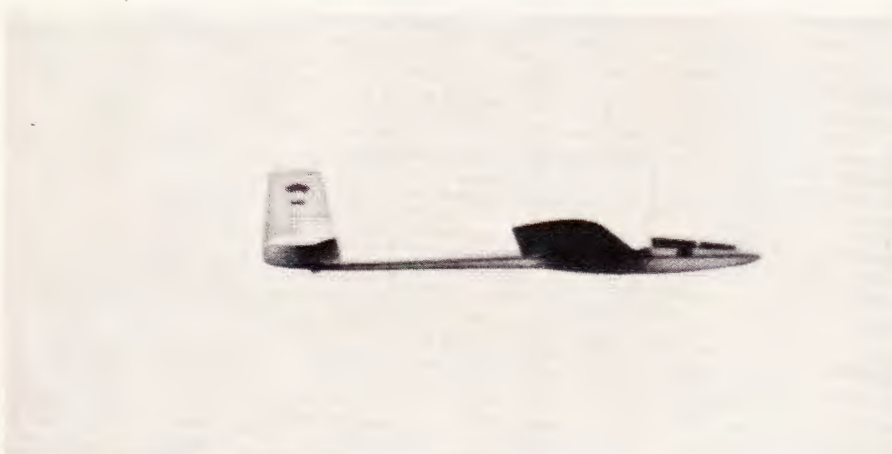
The fuselage

The fuselage of the "Petrel" reflects a semi scale appearance in design flow. All surfaces are rounded not squared off as are some sailplanes. Jim incorporates full length ⅛ inch plywood fuselage sides that are laminated to ⅜ inch balsa fuselage sides. Triangular stock is glued to all appropriate sides so that when sanded a rounded shape may result. The nose block is hollowed out to accept more ballast. The hatch cover is ⅛ inch plywood laminated to ⅜ inch balsa. Be sure to tape the hatch

cover to the fuselage when laminating to maintain the correct curvature. The hatch is secured in place by means of a ply hatch tongue. Radio gear is held in place on ¼ inch square redwood servo rails which are epoxied in place. On this sailplane I elected to install an antenna accessory called "Shove It." By using this product you can interchange your receiver without the hassle of re-routing your antenna through the fuselage. The antenna connector is produced by Sukarta Hobbies, 51 Hawthorne Ave., Park Ridge, N.J. 07656. The tail section of the fuselage is built up to accept the bellcrank for the all moving elevator (stabilator). Be very careful on the alignment of the bellcrank so as not to have any sloppiness in the movement or mis-alignment. An area of special attention is the wing root fairing. After you glue the ¼ inch balsa wing root ribs to the fuselage and drill your holes for openings, toughen the surrounding balsa with "Hot Stuff." The only item in the kit that I did not care for was the tow hook supplied. Jim gives you a curtain hook and you must rebend it to the specified shape. I personally installed an adjustable tow hook in my "Petrel" so that I



Our thermal minded author sends the Petrel off on one of its first flights (above). Petrel in flight (below). This sailplane can handle varying wind conditions with appropriate ballast. Radio installation (bottom). Roomy fuse should accept most radios. Bob made antenna detachable. Text tells how.



could experiment with different tow hook locations vs. launch altitudes. Finishing of the fuselage will be covered later.

Tail feathers

The assembly of the tail feathers (rudder) and all moving elevator is very simple. Again, cover your plans with wax paper and begin building. I cut out the elevator from the rest of the plan and built it on a separate building board. Be sure that the rudder is sanded to the required shape, as well as the elevator. When installing the brass tubing for the support wires of the bellcrank use the stabilizer bellcrank as a drilling guide. Again insure proper alignment. The tail feathers are very straight forward and pose no building problems.

Covering and finishing

The method that I use for covering/finishing my fuselage may be a little old but I enjoy the finish achieved. After the fuselage has been final sanded and wiped down with a tack rag I then coat the fuse with two coats of clear dope, sanding between each coat. I purchase medium weight silkspan from my local hobby shop and wet the silkspan. The method for wetting the silkspan is to place it between a section of wet newspaper. By using this method the silkspan gets only damp not soaking wet. The pieces are then fitted to the fuse and doped as I go along. After the silkspan has dried I lightly sand the surface with very fine sandpaper, and tack rag the surface. The color scheme selected for the "Petrel" is all white surfaces, with complimenting red on the bottoms of the wings and stabs. (I know that white is a lousy color for visibility, but I have always wanted a white sailplane just like the full scale jobs.) I then sprayed three coats of white dope thinned 50/50 with thinner. I fine sanded and tack ragged between coats. I then sprayed two coats of clear dope thinned 50/50 on top. The resulting finish is light and very smooth to the touch. The top of the wing was covered with white monokote, while the bottom was covered with red monokote. A word of advice when applying your covering like this. Secure all the edges and ribs both top and bottom before shrinking the covering. I use a heat gun for this purpose. On the leading edge of the wing where the white meets the red monokote I cut a 1/4 inch strip of chrome monokote and covered this seam. The resulting overall appearance with your choice of pin-stripping is very clean and to me really authentic looking. But, to each his own.

Flying


I am assuming that you have already installed your radio gear and checked that right is right and up is up. Your sailplane should balance almost exactly on your wing rod location. Be sure that your model balances at this point. I always mark this location on my fuselage permanently for a ready point of reference on the field. Check your wings for warps by sighting along the trailing edge while holding the sailplane at arms length, nose on the floor and also sighting the leading edge at the same time. This may take a little practice but once you get the hang of it you can really pick out the warps. Re-heat the monokote in the warp area. Twist in equal amounts of wash

out in the wing tips and heat them in the monokote.

Take all your gear to the field and lay out your launching system. Give one final check of the controls and you are ready for a hand launch. This launch is very critical in that if done improperly severe damage could result to the sailplane and your ego. Point the nose of the sailplane slightly downward and run with the plane into the direction of the wind. Again be sure that your radio is on. While running give the sailplane a medium heave. Be alert for a stall if you have thrown the plane slightly upward. The plane should settle in to some sort of glide angle. Watch the plane carefully for any internal trim changes that may have to be made. When you are satisfied,

with the glide, go get the hi-start or winch line. I prefer to do my test gliding in the evening when the air is relatively calm. Connect the sailplane to the tow ring and do your thing. I was very pleased with the towing capacity of the "Petrel." The ship towed straight with very little rudder control. I eased back on the stick and attained a respectable launch altitude for the first time. Upon release from the tow line I circled to the right and then to the left to check the control response. Remember, you have an all moving elevator and it is more sensitive than a conventional set up. I then tried a series of figure eights in the sky and again was very pleased with the performance. By this time it was getting low and landing time was approaching. My "Petrel" does not

have spoilers but the ship settles in very nicely with a little bit of down trim. The final approach was made a little faster than most pilots fly, but this is my style. The glider flared very nicely on touch down. The "Petrel" can handle varying wind conditions with the proper amount of ballast. I recommend that you keep an accurate record of wind speed and sailplane weight.

This glider is very competitive and is a proven winner in the two meter class. The "Petrel", by Archaeopteryx Avion Associates, is an excellent kit and superior flying machine. The kit is available from Archaeopteryx Avion Associates, c/o Jim Ealy, P.O. Box 120, Pottstown, PA 19464. Approximate cost is \$44.95, plus postage and handling. 



Petrel zero's in on landing spot (above). Kit does not include spoilers, but author found it easy to handle. Classic plane and radio pose (below).



Bob Crane releases Petrel on high start launch. Ship tows straight with little need for rudder control. Up elevator adds launch height.



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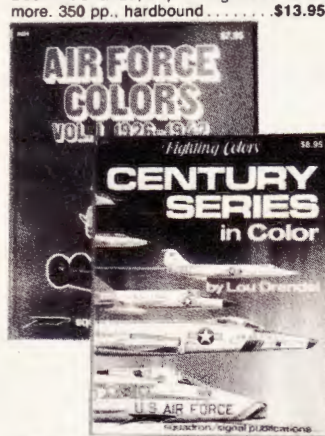
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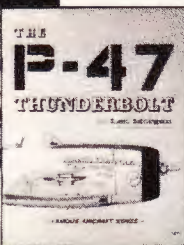
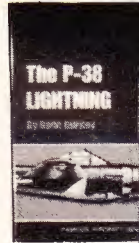
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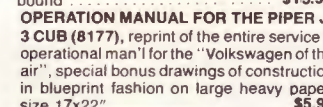
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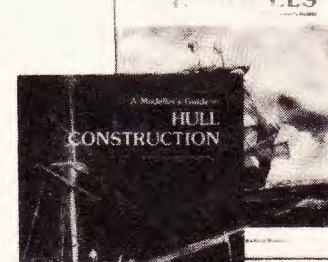
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Flyin' things for fledglings

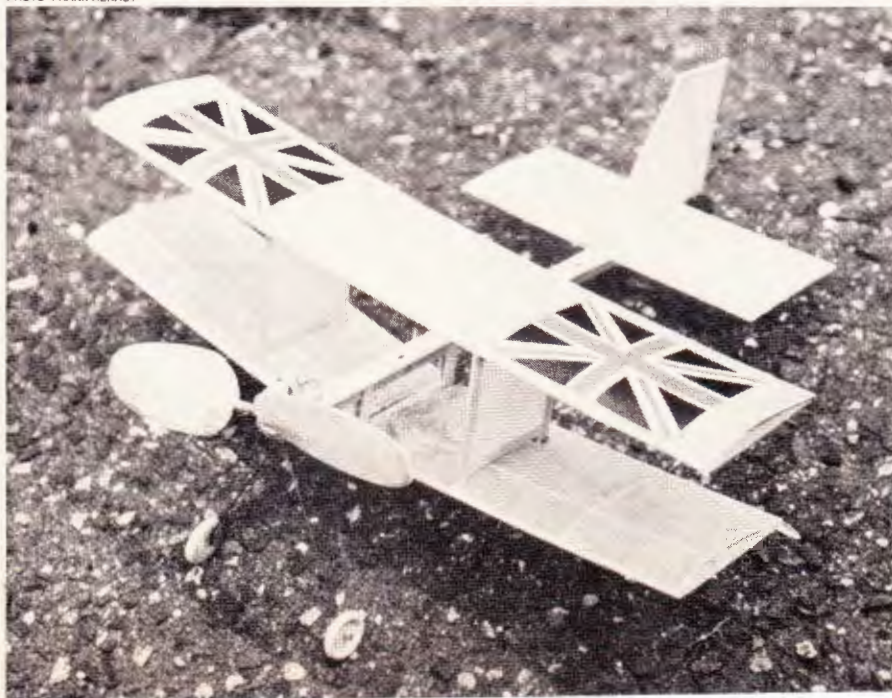
More news from the gang. **By Earl VanGorder**

Hi gang - come on in and gather round the workbench. . . . I have a lot of things to tell you. You can leave the hangar doors open and we'll enjoy the good weather while we can. It won't be too long until we'll be stoking up the old pot-bellied stove.

We had another month of very interesting mail and a good number of the gang sent in photos. That's always good, because I know you like to see what the rest of the fledglings around the country are doing.

We heard from Frank Renaut again. You remember Frank, the guy who builds airplanes out of paper towel tubes. He's a pretty inventive guy and he sent us a photo of one of his latest experiments. It's a rubber powered stick type biplane which Frank calls the "Bristol Box". Frank reports that it is a pretty good flyer and you could probably build one of your own just from the photo he sent. Incidentally, gang, you'll notice, in the photo, that the area between the wing struts is covered with tissue. That's a trick used by many modelers when using a flat wing (like the upper wing of the "Box"). It seems that this method makes up for the lack of stability caused by the lack of dihedral in the wing. I heard from one builder who built a scale model of a biplane that had no dihedral. Well, he wanted to keep it scale, but still wanted it to fly well. He accomplished this by covering the area between the wing struts with thin cellophane. Since it was totally transparent, it didn't ruin the scale appearance and it did give the necessary stability for good flying. It's a neat trick.

PHOTO: FRANK RENAUT



Old friend, Lou Roberts checked in with a photo of his latest effort. It's a really beautiful peanut scale model of the Grumman Guldhawk. Lou says that it's too bad he couldn't show it to us in color . . . says it's really pretty with its blue and orange sunburst design separated by black striping cut from black tissue. Lou built this model from a kit that was put out by Vintage Aero Co. a few years ago. It was a reproduction of a much older Megow kit. Now, at present, the Vintage Aero kits are not available, but there may possibly be some good news. Recently, I saw Phil Koopman, the gentleman who originally started the Vintage Aero firm and he told me that maybe, just maybe, he may start up the operation again. I sure hope he does, because there were some great models and reproductions of older kits in the Vintage line. I'll keep you all posted and if anything develops, I'll be sure to let you know right away.

Oh, yeah, I didn't forget . . . last month, I promised to show you a photo of the latest beginner's U-control kit from Hobby Hide-away out in Delevan, Illinois. Well, here's the photo and it's a neat little control line model. It's a profile semi-scale kit of the Hawker Sea Fury that came out right at the end of World War II. It was one of the fastest propeller driven aircraft produced and most of the Sea Furies that are still around are used in air racing. Don't try to buy that scale five-bladed prop, though, Dave made that one up special! Last month's issue has all the details on price and how to get your kit.

We got a letter from Andy Abbott in Hous-

ton, Texas, too. Andy has a request he wanted me to pass on in the hope that someone could help him out. It seems that Andy has a taste for the unusual and more "offbeat" types of aircraft and he's trying to locate a drawing. Here's the story: Andy says he saw the thing in a magazine about six years ago and it was called the "Charybdis". He says it looks like half of a helicopter blade and flies like a boomerang. It had a "blade-span" of about 40 inches and flew free flight with a Babe Bee glow engine. It was comparatively simple to build and was a most unusual sight in the air.

Well, gang, I remember the Charybdis and I've even seen a model of it, but I'm darned if I can remember what magazine it was in and I don't have any copies of the plan in my own files. So, if any of you guys and gals out there can help Andy out in locating plans or information, I know he'll be really glad to hear from you. You can write to him as follows: Andy Abbott, 6425 Westheimer #1712, Houston, Texas 77057. Now, gang, I've got to tell you about some new items that have hit the market since the last time we got together.

I got a nice letter from Ed Toner who runs the Buzzer Model Airplane Co. and he sent along some samples of some of his new items. You may remember that I told you about Buzzer once before. They manufacture a great line of plans for the scratch builder and also have some semi-kits which consist of plans and all the necessary printwood. They have a wide choice of model types and for you oldtimer lovers, some versions of the old time

PHOTO: J. ARONSTEIN



Dave Aronstein shows off his rubber powered antique Fokker "Spin" from Buzzer Model Airplane Company plans (above). Frank Renaut designed this ROG Biplane (left). He calls it the Bristol Box. Note the tissue covering on wing struts. Sneaky.

"gas" models which have been reduced for the CO₂ engines. There are also scale types for both rubber and CO₂ power, as well as some for electric or glow engines.

The most fascinating of the new plans is a neat little seaplane called the "Swish". Ed Toner designed this one himself and it's really good looking. Looks a lot like some of the racing seaplanes of the 1930s. It's designed around the Telco Turbotank 3000 CO₂ engine and has twin floats and a gull wing. I wouldn't kid you, gang . . . you'll fall in love with this one! The plan sells for a sensible three bucks and is a sharp black on pure white. Of course, all patterns are on the plan, as well as plenty of construction hints. Instructions for mounting a Cox .010 glow engine are also included on the plan . . . just in case you have one of these around. Ed says it's a real "screamer" with the .010.

Buzzer is a dealer for the Brown Jr. CO₂ engines, too, and Ed reports that he has a good stock of the new Brown A-23. This is the new, and very tiny, CO₂ engine which is meant for peanut scale models. Did I say "tiny"? To give you an idea of size, from the bottom of the crankcase to the top of the cylinder head only measures $\frac{1}{8}$ of an inch! It's a real jewel of craftsmanship, too, with the tiny cast crankcase and the turned metal cylinder fins which are anodized black. The tank isn't much bigger than a jelly bean, but you still get a good run out of it. It comes with a $\frac{3}{8}$ inch propeller and I can personally verify that it runs as good as it looks.

Now, machine work and castings this small don't come cheap, but Buzzer is trying to give you the best possible break. The engine sells for \$40.00, but Ed says to just send him the forty bucks and he'll spring for the postage and handling charges and get it to you by the best, and safest, form of delivery.

I also learned that Brown Motors is making a special CO₂ engine for this company which will be called the "Buzzer CO₂". It's a larger CO₂ engine and the displacement is .016. Here's the good news, the initial batch will be sold for only \$32.00. Don't know how long that price will hold, but you can send in half the price (\$16.00) now and reserve your engine. You pay the other half at delivery time. A pretty good deal. Don't you think, gang? Again, no extra charge for postage and handling.

Just to keep me excited, Ed told me about some of the things that will be coming from Buzzer in the near future. How would you like a peanut scale Sopwith Camel that uses plastic parts from the Monogram kit such as cowl, rotary engine, wheels, decals, etc. which are mated to stick and tissue construction for a super scale model. A little on the heavy side, but Ed figures it'll fly well with the little Brown A-23 installed. Man, I can't wait for that one!

Here's a real "wild" one that's a little farther into the future although the plans are

FLYING MODELS

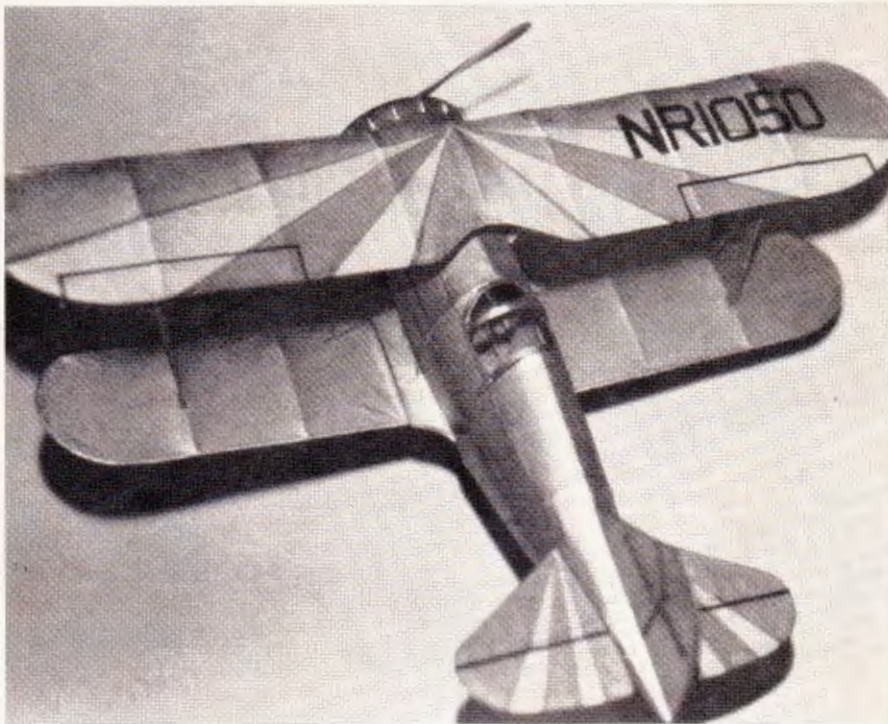


PHOTO: LOU ROBERTS

Lou Roberts' offering for this month's column is this Peanut Scale Bipe (above). It's a Grumman Gulfhawk. Beginners in Control Line should take a look at this Hawker Sea Fury from Hobby Hideaway (below).



PHOTO: DAVE SHIPTON

almost drawn up. How about a 22 inch wingspan Consolidated PBY Catalina for two Brown A-23s running from a common tank? I guess that would shake up your modeling buddies when you showed up with it! I can just see that little beauty taking off the water at a nearby pond. Beautiful!

Now, if you want to find out about all the good things at Buzzer, Ed is making this easy on you, too. No need to send in cash for a catalog. Just send a self-addressed envelope with a first class stamp on it and all the flyer

sheets from Buzzer will come in the return mail. Believe me, you'll have a ball! Send your SASE to - Buzzer Model Airplane Co., P.O. Box 124, Howell, NJ 07731. It's as easy as that.

And, now, it looks like it's that time again. Time to close the old hangar doors on another good get-together of the fledgling gang. Keep the letters and photos coming to your old modeling buddy here at 10 Brothers Rd. in Wappingers Falls, New York 12590. Until next month . . . See you in the mail!

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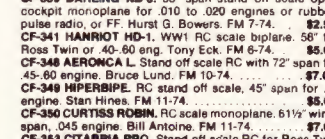
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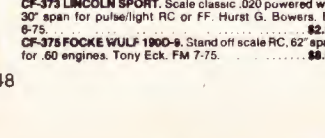
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CF-431 GRUMMAN KITTEN G-63. 48" span stand off scale RC ship for 40 engines. Bob Aberle. FM 2-77. \$5.00.
CF-434 NAKAJIMA Ki-84. Stand off scale RC for 60 engines. 54" span. C. S. Hines. FM 3-77. \$5.00.
CF-441 BERG O. AVIATIK D-1. Austrian SOS RC WW1 biplane with 40" span for 35 to 40 Frank Dellamura. FM 6-77. \$5.00.
CF-446 FOKKER T-2. 66" span stand off scale RC for 40-60 engines. Don Martin. FM 7-77. \$5.00.
CF-452 DOUGLAS A-IH SKYRAIDER. RC stand off scale for 60 engines with a 58" span Rolyed plywood fuselage. Dan Reiss. FM 10-77. \$5.00.
CF-453 DOUGLAS DC-3 SOS. RC twin for two 45 engine. 96" span. Used commercially around the world. Tony Lombardo. FM 11-77. \$7.00.
CF-462 CP-85 PORTERFIELD COLLEGIATE. Stand off scale RC ship with 74" span for 35-45 engines. D.B. Mathews. FM 2-78. \$7.00.
CF-464 MISS COSMIC WIND. RC stand off scale 58" wingspan for 60s. Dan Reiss. FM 3-78. \$5.00.
CF-475 AERONCA C-1 SCOUT. Stand off scale 58" span for 19-29 engines. Al Wolsky. FM 4-78. \$5.00.
CF-476 GEE BEE MODEL D SPORTSTER. Scale RC with 58" span for 40 engines. Henry Hafke. FM 7-78. \$5.00.
CF-480 DRONE TURBULENT. Stand off scale RC with 60" span for 40 mil. Don Mathews. FM 11-78. \$5.00.
CF-491 1938 PORTERFIELD ZEPHYR. 76" span RC ship for 40-60 engines. Doc Mathews. FM 12-78. \$5.00.
CF-494 SPIRIT OF ST. LOUIS. Stand off scale RC of Lindbergh's classic 93" span 2" scale. for 40-71 engines. By Don McGovern and Tony Lombardo. FM 1-79. \$10.00.
CF-497 GEE BEE R1/8 LONG TAILED RACER. Scale RC ship with 56" span. for 60 engine. Henry Hafke. FM 2-79. \$10.00.
CF-500 BEBE MODEL D-9. RC stand off scale with 57" span for 35-40 engines. Doc Mathews. FM 3-79. \$5.00.
CF-502 MILES M-202. RC stand off scale ship. 58" span. 60 engines. Stan Hines. FM 4-79. \$5.00.
CF-510 MR. MULLIGAN. RC stand off scale 67" span. 60 engines. Tony Lombardo and Don Palumbo. FM 7-79. \$7.00.
CF-512 LOCKHEED LITTLE DIPPER. Stand off scale RC for 60 engines. 81" span. Dan Reiss. FM 8-79. \$5.00.
CF-515 MITSUBISHI A-5 M4 CLAUDE. Stand off scale RC for 35-46 mil. 58" span. Jack Sheeks. FM 9-79. \$5.00.
CF-520 PIPER TOMAHAWK. RC stand off scale for 19-30 engines. 60" span. Dick Sarpolus. FM 10-79. \$5.00.
CF-522 THORP T-18. RC stand off scale for 30 engine. 50" span. Tony Lombardo and Don Palumbo. FM 11-79. \$5.00.
CF-523 1931 ALEXANDER FLYABOUT. RC stand off scale for 09-15. 57" span. Al Wolsky. FM 11-79. \$4.00.
CF-530 WACO 10. 1930s vintage scale biplane for 049 power and three channel RC. Net Kragnes. FM 2-80. \$5.00.
CF-532 TOMMYCAT F-14. Semiscale ducted fan delta. RC. Bob Kress design with 33" span. uses 3 5cc engines and Midwest RK-20 fan unit. Ron Farkas. FM 3-80. \$5.00.
CF-534 1930-A CLASSIC. Semi-scale low wing monoplane for 60, 60" span. inspired by goldenera of aviation. George Rizkalla. FM 4-80. \$5.00.
CF-538 CITABRIA. Quarter scale model of the famous aerobatic trainer for Quadra power. 102" span. Plans on two sheets. Tony Lombardo. FM 5-80. \$10.00.
CF-543 KLOUD KING XL. 1938 Mickey Deangelis design for RC with 72" span. Doc Mathews. FM 7-80. \$5.00.
CF-552 LINCOLN BEECHER. Sport scale version of famed monoplane. 62" span for 36 mil. Al Wolsky. FM 11-80. \$5.00.
CF-556 C-130 HERCULES. RC sport scale 4-engine monster on two plan sheets. 90" span. two 19s and two 40s. Dick Sarpolus. FM 12-80. \$10.00.

CF-571 GEE BEE MODEL D SPORTSTER. This 77" span, RC Quarter Scale version of the classic Gee Bee is drawn on two large sheets. Henry Hafke. FM 6-81. \$12.00.

CF-220 BRAZEN RAVEN. 84" multi pattern RC. Super Tigre 60. 4 sheets. \$12.00.
CF-229 RAMPANT. Toledo RC pattern class winner. 60 mil. wing retract in tandem. 62" span. Jerry Worth. FM 7-77. \$10.00.
CF-232 VICTOR. Open pylon RC. 56" span. for 45 mil. Gene Rogers. FM 8-77. \$5.00.
CF-236 BANSHOE. RC design for full AMA/FAI patterns. Webra 61 and Pro Line gear. Jim Martin. FM 9-77. \$5.00.
CF-237 SHOESTRING. 57. semiscale for Fox. 35. Paul Simmons. FM 9-77. \$5.00.
CF-238 BEHEMOTH. Giant 14" T tail craft. Takes 29 to 60. Humphries. FM 9-77. \$5.00.
CF-239 INDY 500. A maneuvering RC monster that'll deliver pattern performance. Jack Sheeks original has 61 Marco. EK Logipoltr. FM 10-77. \$5.00.
CF-249 INTIMIDATOR. RC pattern ship for 60. 7 1/2 lbs. Marty Meyer. FM 1-77. \$5.00.

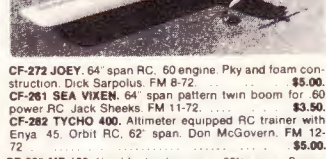
CF-252 D.D.T. Sport RC design easy and cheap. 15-23 Jack Sheeks. Jerry Caldwell. FM 2-72. \$2.50.
CF-255 XP-400. Formula II and Fal pylon racer. 56" span. 40. Dave Gierke. FM 3-72. \$5.00.
CF-256 SPRINTER. Sport RC tail 2 channel. 42" span for 049-15 mil. Gene Rogers. FM 3-72. \$2.50.
CF-261 AETEROID. RC sport. 61" span. K&B. 40. Dick Johnson. FM 4-71. \$5.00.
CF-266 DREAMER. RC sport biplane with 38 1/2" upper span. 37 1/2" lower. with 40 eng. Don Foster design. FM 6-72. \$5.00.
CF-269 FAJMEISTER. 65" span RC pattern ship. 61 power. retract gear. Bob Caplan. FM 7-72. \$7.00.



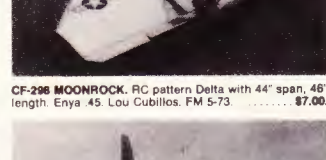
CF-270 ESCAPADE. RC tail dragger with Goldberg retracts. 60 eng. Gene Rogers. FM 8-72. \$5.00.



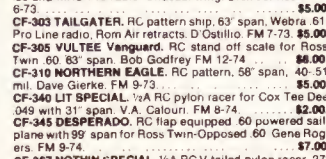
CF-272 JOEY. 64" span RC. 60 engine. Ply and foam construction. Dick Sarpolus. FM 8-72. \$5.00.



CF-261 SEA VIXEN. 64" span pattern twin boom for 60 power. RC Jack Sheeks. FM 11-72. \$3.50.



CF-262 TYCHO. 400. Altimeter equipped RC trainer with Enya 45. Orbit RC. 62" span. Don McGovern. FM 12-72. \$5.00.

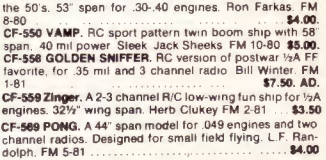


CF-265 ME-109. 1/4 midget pylon racer. 39 1/2" span. Super Tigre. 15 Super Blue Max RC. Jack Sheeks. FM 2-73. \$3.50.
CF-262 BLUE FLAME. Open pylon racer. 54" span. 505 sq. in. 15. Blue Tig 40 ABC. Dave Gierke. FM 4-73. \$5.00.

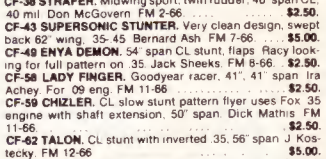
CF-405 78 SPECIAL. Quarter midget RC trainer with T tail. 15 mil. 36 span. Bob Aberle. FM 5-76. \$5.00.
CF-410 CANNONBALL. Microsize RC pylon racer for 020 engine and Cannon Tiny RC. 22" span. Bob Aberle. FM 5-76. \$2.50.
CF-415 REVISION A. Single or two channel RC trainer. 09 engine. 44" span. Howe Applegate. FM 8-76. \$3.50.
CF-417 SUPER WHIPLASH. RC sport pattern ship with 54" span and 40 engine. Dick Sarpolus. FM 9-76. \$5.00.
CF-420 SUPER SPAD. RC sport biplane with 38" span for 19-30 engines. Gene Weaver. FM 10-76. \$5.00.



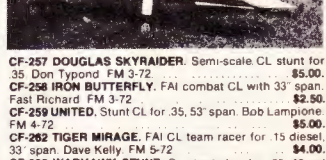
CF-426 WREN. RC sport biplane for 15-19 engines. 38" span. Norman Rosenstock. FM 12-76. \$5.00.



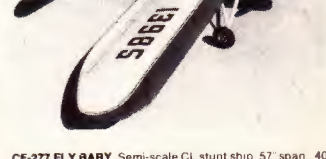
CF-429 INDY RETRAITER. Sport RC with 50" span for 30 engine. Jack Sheeks. FM 1-77. \$3.50.



CF-471 BOXCAR. 3 channel RC trainer for 09-10 engines. 49" span. Howe Applegate. FM 7-78. \$4.00.



CF-483 MAGNUM 80. Twin 40 power RC pattern ship with 76" span. Dick Sarpolus. FM 9-78. \$5.00.

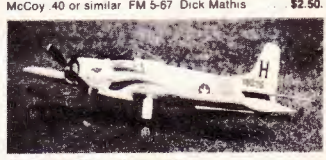


CF-486 CHIPSTICKS. 57" pattern RC ship for 60 engines. 25-18 A. B. Swanson. FM 6-85. \$7.50. AD.

CF-490 SPEEDO. Sport flyracer. 40" span for 19-25 engines. Dick Sarpolus. FM 2-79. \$4.00.
CF-505 THE NEW ANGLE. RC 4 channel. 049 pattern ship. 22 ounce. 34" span. Bob Aberle. FM 5-79. \$4.00.
CF-527 G P 700. General purpose airplane for glider tow. 60" span. 60 mil. Bob Aberle. FM 1-80. \$5.00.
CF-531 MINI POINT. Club racer for 35cc engines. Delta configuration. Bud Roane. FM 2-80. \$5.00.
CF-537 OLD BEAVERTAIL. 4 channel sport model featuring high aspect ratio wing and lifting fuselage. 56" span for 15 size engines. Hank Stumpf. FM 5-80. \$5.00.
CF-540 VIRGINIA SLIM. Sport pattern design with molded plywood fuselage. 56" span. 60 engines. Dan Reiss. FM 6-80. \$5.00.
CF-544 RC CHIEF. RC conversion of famous CL stunter of the 50's. 53" span for 30-40 engines. Ron Farkas. FM 8-80. \$4.00.
CF-550 VAMP. RC sport pattern twin boom ship with 58" span. 40 mil power. Steek Jack Sheeks. FM 10-80. \$5.00.
CF-558 GOLDEN SMIFFER. RC version of postwar 1/2A FF favorite. for 35 mil and 3 channel radio. Bill Winter. FM 1-81. \$7.50. AD.

CONTROL LINE

CF-3 COMBAT P-38. Profile fuselage CL craft. twin tail. 29-35 engines. Nick Zirolli. FM 4-65. \$2.50.
CF-77 BOXCAR. Sport pattern design for use with 35 engines. Doc Mathews. FM 12-79. \$5.00.
CF-527 G P 700. General purpose airplane for glider tow. 60" span. 60 mil. Bob Aberle. FM 1-80. \$5.00.
CF-531 MINI POINT. Club racer for 35cc engines. Delta configuration. Bud Roane. FM 2-80. \$5.00.
CF-537 OLD BEAVERTAIL. 4 channel sport model featuring high aspect ratio wing and lifting fuselage. 56" span for 15 size engines. Hank Stumpf. FM 5-80. \$5.00.
CF-540 VIRGINIA SLIM. Sport pattern design with molded plywood fuselage. 56" span. 60 engines. Dan Reiss. FM 6-80. \$5.00.
CF-544 RC CHIEF. RC conversion of famous CL stunter of the 50's. 53" span for 30-40 engines. Ron Farkas. FM 8-80. \$4.00.
CF-550 VAMP. RC sport pattern twin boom ship with 58" span. 40 mil power. Steek Jack Sheeks. FM 10-80. \$5.00.
CF-558 GOLDEN SMIFFER. RC version of postwar 1/2A FF favorite. for 35 mil and 3 channel radio. Bill Winter. FM 1-81. \$7.50. AD.



CF-559 ZINGER. A-23 channel RC low-wing fun ship for 1/2A engines. 32 1/2" wing span. Herb Kluey. FM 2-81. \$3.50.

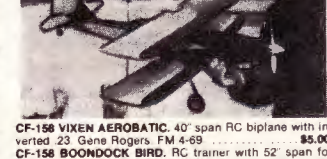


CF-569 PONG. A 44" span model for 049 engines and two channel radio. Designed for small field flying. L.F. Randolph. FM 5-81. \$4.00.

CF-3 COMBAT P-38. Profile fuselage CL craft. twin tail. 29-35 engines. Nick Zirolli. FM 4-65. \$2.50.
CF-77 BOXCAR. Sport pattern design for use with 35 engines. Doc Mathews. FM 12-79. \$5.00.
CF-527 G P 700. General purpose airplane for glider tow. 60" span. 60 mil. Bob Aberle. FM 1-80. \$5.00.
CF-531 MINI POINT. Club racer for 35cc engines. Delta configuration. Bud Roane. FM 2-80. \$5.00.
CF-537 OLD BEAVERTAIL. 4 channel sport model featuring high aspect ratio wing and lifting fuselage. 56" span for 15 size engines. Hank Stumpf. FM 5-80. \$5.00.
CF-540 VIRGINIA SLIM. Sport pattern design with molded plywood fuselage. 56" span. 60 engines. Dan Reiss. FM 6-80. \$5.00.
CF-544 RC CHIEF. RC conversion of famous CL stunter of the 50's. 53" span for 30-40 engines. Ron Farkas. FM 8-80. \$4.00.
CF-550 VAMP. RC sport pattern twin boom ship with 58" span. 40 mil power. Steek Jack Sheeks. FM 10-80. \$5.00.
CF-558 GOLDEN SMIFFER. RC version of postwar 1/2A FF favorite. for 35 mil and 3 channel radio. Bill Winter. FM 1-81. \$7.50. AD.

RADIO CONTROL

CF-136 MUSTANG PROFILE. RC equipment is buried in foam wing. 45 with 56" span. Sterling Models. FM 10-88. \$4.00.
CF-137 TIGER TWIN. 62" span trike geared design for two 23 cc. RC. Gene Rogers. FM 10-88. \$5.00.
CF-138 JUNKER KLUNKER. Put a 45 to 60 in this Zober design. Looks like German WW1. FM 10-68. \$4.00.
CF-151 URCHIN. Small RC sport tail dragger for 23 and mini-gear. Gene Rogers. FM 2-69. \$2.50.



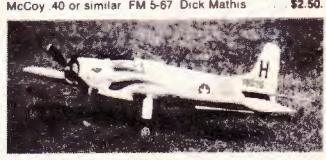
CF-156 VIXEN AEROBATIC. 40" span RC biplane with inverted 23. Gene Rogers. FM 4-69. \$5.00.
CF-158 BOONDOCK BIRD. RC trainer with 52" span for 15-19 and 20 mil gear. Wally Zober. FM 4-69. \$4.00.
CF-161 SNIPE. RC sport flyer. 68" span with 56 engine. Wally Zober. FM 5-69. \$4.00.
CF-185 BOOMERANG. Big aerobatic biplane. 58" span. 60-81. RC. Wally Zober. FM 3-67. \$5.00.
CF-187 VERT-A-GO. Rocket scale RC VTO with 38" span. uses 19 engine. Nick Zirolli. FM 9-69. \$4.00.

CF-298 MOONROCK. RC pattern Delta with 44" span. 46" length. Enya 45. Lou Cubitts. FM 5-73. \$7.00.



CF-299 GULL. 66" span RC sport for easy flying. Fox Eagle 60 and MRC 710 radio. Unusual wing. Dick Johnson. FM 6-73. \$5.00.

CF-303 TAILGATER. RC pattern ship. 63" span. Webra 61. Pro Line radio. Ron Air retracts. D. Ostillo. FM 7-73. \$5.00.
CF-305 VULTEE Vanguard. RC stand off scale for Ross Twin. 63" span. Bob Godfrey. FM 12-74. \$5.00.
CF-310 NORTHERN EAGLE. RC pattern. 58" span. 40.51 mil. Dave Gierke. FM 9-73. \$5.00.
CF-340 LIT SPECIAL. 1/2A RC pylon racer for Cox Tee Dee 049 with 31" span. V.A. Calout. FM 9-74. \$2.00.
CF-345 DESPERADO. RC flap equipped. 60 powered sail-plane with 99" span for Ross Twin-Opposed. 60. Gene Rogers. FM 9-74. \$7.00.
CF-367 NOTHIN SPECIAL. 1/2A RC V-tailed pylon racer. 27" span. Bob Aberle. FM 5-75. \$3.50.
CF-383 FLICON. RC pattern trainer using Falcon wing kit with T tail. 15 engine. 36" span. Bob Aberle. FM 5-76. \$5.00.



CF-257 DOUGLAS SKYRAIDER. Semi-scale CL stunt for 35. Don Typpod. FM 3-72. \$5.00.



CF-258 IRON BUTTERFLY. FAI combat CL with 33" span. Fast Richard. FM 3-72. \$2.50.

CF-259 UNITED. Stunt CL for 35. 53" span. Bob Lampione. FM 4-72. \$5.00.
CF-262 TIGER MIRAGE. FAI CL team racer for 15 diesel. 33" span. 72. Dave Kelly. FM 5-72. \$4.00.
CF-265 WARHAWK STUNT. CL stunt ship for 35-40 mil with 56" span. Bill Simons. FM 6-72. \$5.00.
CF-267 BE-BITCHED. Twin boom stunt CL. 51" span for McCoy 40. Jack Sheeks. FM 7-72. \$3.50.

CF-277 FLY BABY. Semi-scale CL stunt ship. 57" span. 40 McCoy. Jack Sheeks. FM 10-72. \$3.50.
CF-283 PINTO. 1/2A stunt CL for Cox Tee Dee. 049 with 34 1/2" span. Dick Mathis. FM 12-72. \$3.50.

NEW PLANS

CF-576 GULFSTREAM. A 60 powered RC pattern ship with a 86" span. By Bruce R. Lund FM 8-81 \$3.00
CF-577 SHINDEN. F/F Rubber. Scale version of the Japanese canard fighter from WWII. A 24" span. By Don Snail FM 9-61 \$3.50
CF-578 CERES. This 58" span C/L stunter features 11" beam construction with sheeting. For 40-45 engines. By Bob McDonald FM 9-91 \$5.00
CF-574 ME-163 KOMET. A Semi-Scale version of a WW II German Rocket plane. for .049 engines 33" span. Archie Adamsin FM 8-81 \$ 3.50

SAILPLANES

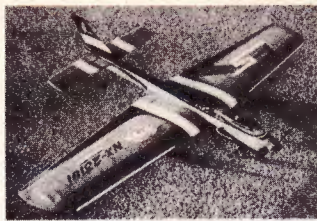
CF1 SPOTTER. A/2 Nordic with 79" two piece wing. Joe Bilgrin FM 4-85 \$4.00
CF14 SEAGULL. Giant 84" span RC soarer with supplementary 09.15 power. Don McGovern FM 8-62 \$7.00
CF-19 THERMAL QUEEN. RC soarer uses Eppler 385 airfoil. 144" span with light wing loading. Carl Lorber FM 11-70 \$4.00
CF-20 LIL' T. RC 74" rudder only with T tail. Bob Hann FM 6-65 \$5.00
CF-34 SCHWEITZER 1-26. RC 1/6 scale glider with 67" span. sport camber. Don McGovern FM 5-86 \$5.00
CF-41 SPECTRE WING. 92" span RC flying wing. Thermal soarer with 15 power assist. Don McGovern FM 6-66 \$3.50
CF-44 CASTAWAY. Nordic A/1 51" span. Low cost competition glider. Joe Bilgrin FM 7-66 \$5.00
CF-46 SLOOPSBY SKYLARK 4. 119" span. high aspect ratio. RC soarer / thermal. Ira Achey FM 8-66 \$5.00
CF-65 FOAMIN'S BAT WING. RC modern foam wing soarer. Rollin McPherson 72" span \$4.00
CF-69 BONG BOOMER. F/1 RC glider, one time world record altitude holder. Maynard Hill 136" span FM 2-67 \$5.00
CF-70 THUNDERHEAD. 54" span towline trainer. Don McGovern FM 5-86 \$2.00
CF-86 SOAR SAM. A/1 Nordic for NATS. etc 48" span Bill Dunwoody FM 7-67 \$2.50
CF-92 1931 NORTHRUP PRIMARY TRAINER. 72" span RC glider. Walt Kessler FM 8-67 \$4.00
CF-99 PEREGRINE. 89" span A/2 Nordic with fibreglass fishing rod fuselage. Ken Whiting FM 10-67 \$2.50
CF-101 RAINBOW. 100" span RC power and boom design with power assist. 15 mil. 12-67 \$5.00
CF-102 HYPODERMIC NERDEL. A/2 Nordic with 47" span by D. Mathis FM 10-67 \$5.00
CF-108 LA MILA. 96 NATS winner. Hand launched. Major Mel Allen FM 2-68 \$2.00
CF-112 DANCER. RC glider. pod and boom V tail soarer for thermals. Carl Lorber FM 3-68 \$5.00
CF-118 ENKELWOT. A/1 Nordic easy to build with undercarriage. rudder. Dick Mathis FM 4-68 \$2.00
CF-120 AMERICAN CROW. A/2 Nordic 77" wing. Different approach to competition model. Dick Mathis FM 5-68 \$2.50
CF-127 NORDIC EXTRA LARGE. 113" span. Pod with fibre glass boom. Chet Lanzo FM 7-68 \$4.00
CF-139 MOLLYMAWK. Superstreamlined 100" RC thermal soarer. Carl Lorber FM 10-68 \$4.00
CF-142 PTERODACTYL. Hand launch light weight glider. 20" span. Tom Peardon FM 11-68 \$2.00
CA-148 TRI BELLE. RC glider. slope, thermal, power. 105 span. Marley Michaelis FM 1-69 \$5.00
CF-166 GAGGLER. RC soarer. 117" span. pod and boom design. Carl Lorber FM 1-69 \$5.00
CF-169 MISKEET. 149 glider with fibreglass fuselage. Harvey Michaelis RC FM 7-69 \$5.00
CF-176 SCARAB A/2. Nordic FF with 79" span. Fibreglass fishing rod fuselage. Dick Mathis FM 8-69 \$2.50
CF-179 US KID. ZING. FLASH. Three hand launched RC gliders by Bay Mathis. Peardon Great Fun FM 7-70. \$4.00
CF-189 INVADER. 73 1/2" sailplane. 15-35 powered. Gene Rogers FM 4-70 \$4.00
CF-194 HALF MACH. 120" span thermal or slope soarer. Optional power. RC Carl Lorber FM 5-70 \$3.50

CONTROLINE SCALE

CF-10 FOKKER DVL. 33" span WW1 fighter biplane. CL 049-09. Paul Del Gatto. Two sheets. FM 6-64 \$7.00
CF-23 SPIRIT OF ST. LOUIS. 46" scale UC. Lindbergh's plane. Paul Palanek FM 12-66 \$2.50
CF-33 SEA VIXION. Royal Navy jet fighter. 35 mil with prop. 56" span. CL scale. Jack Sheeks FM 4-66 \$2.50
CF-40 EXTENDED GEE BEE. CL semi-scale lengthened for better flying 35 sport B Miller FM 6-66 \$2.50
CF-71 LOCKHEED HUDSON. 41" span twin 19 powered scale CL WW2 bomber. Paul Palanek FM 4-62 \$4.00
CF-84 CURTISS HAWK 75. CL scale 36" span. 35 mil. French radial engine P-40. Paul Palanek FM 4-62 \$4.00
CF-67 RYAN SC. Semi scale CL 51" wing. 35 mil. Jack Sheeks FM 7-67 \$2.50
CF-106 FOCKE-WULF FW-190. 50" span CL profile WW2 fighter. 35-45 eng Jack Sheeks FM 1-68 \$2.50
CF-130 BELL P-39 AIRCobra. 56 CL stunt W. Simmons. for 35 mil FM 8-68 \$4.00
CF-167 MESSERSCHMIDT ME-109. Near scale 48" span combat CL design for 35 mil. Vince Micchia FM 6-69 \$4.00
CF-186 RYAN PT-20. CL stunt with 55" wing. 35 eng Famed 2-place trainer. By A. DiMezza FM 3-70 \$4.00
CF-195 MUSTANG. Controline stunt for 35. semi scale. Joe Berry FM 8-70 \$2.50
CF-197 P-96D. Sabrejet CL stunt 54" span with 35 mil. Bob Lamphone FM 6-70 \$5.00
CF-210 MESSERSCHMIDT ME-262. Semi scale CL 55" span. Single inverted & throttle. 35. Vornort FM 3-67 \$2.50

CONTROLINE

CF-575 SWEEPER. A giant C/L Stunt ship with a span of 78", for 61 size motors. Foam wings and tail. Windy Urtnowski FM 8-81 \$10.00
CF-90 STARLIGHT. CL stunt. 58" wing for hot 35 Charles Mackey FM 8-67 \$3.50
CF-96 PIPER CHEROKEE. CL stunt. 51" span semi profile, easy. Dick Mathis FM 9-67 \$2.50
CF-95 MAG JET. 44" profile stunt for 29-35. fast building. Vince Micchia FM 10-67 \$2.50
CF-103 FOXEY. Twin boom sport for 049-051 mil. 20" span. Bob Adair FM 12-67 \$2.00
CF-111 NOVI III. 51" span stunt CL 1st at 67 NATS. Dave Gierke FM 2-68 \$4.00
CF-113 GRUMMAN TIGERCAT F7F-1. CL profile with two 15's. Bob Adair FM 3-68 \$3.50
CF-119 BOOMER. Twin boom stunt profile for 35 mil. Vince Micchia FM 4-68 \$2.50
CF-121 FREEDOM 45. CL stunt with 45" span. foam core wing. 45 mil sheet covered. Jack Sheeks FM 5-68 \$3.50
CF-129 NOVIETTE. Swept 49" wing sleek stunt CL design profile. OS Max 35. Norm Dion FM 7-68 \$4.00
CF-134 SPITFIRE STUNTER. Semi-scale CL 49 1/2" span. 35 engine. Jack Sheeks FM 9-68 \$2.50
CF-140 COYOTE. Long lean CL stunt for 35-40. 54" span. Dick Mathis FM 10-66 \$4.00
CF-141 FURY. Stunt CL trike gear. Fox 35 engine. full span flaps. 54" wing. Don Bambrock FM 2-67 \$4.00
CF-144 WINDER. CL combat 42" span high speed. 35 Terry Prather FM 1-68 \$2.50
CF-162 PEGASUS. CL stunt 83 sq. in. 57" span. McCoy 40 engine. Bob Howard FM 11-69 \$4.00



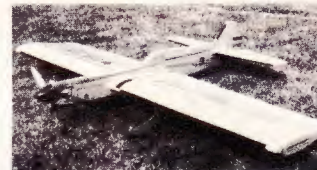
CF-147 FORMULA S. 55" stunt CL. 2nd at Olathe NATS. J. Kostelky FM 12-68 \$4.00
CF-149 TORINO S. 53" span CL stunt with 35 mil. Modern. Jack Sheeks FM 1-69 \$3.50
CF-153 SCOTTSMAN. 53" span CL stunt swept wing design with full flaps for 35. Jack Sheeks FM 2-69 \$2.50
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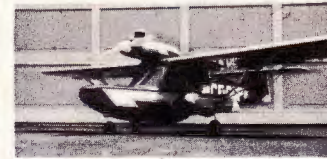
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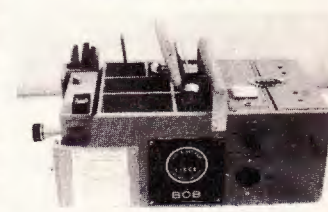


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R/C sport scale

By Rich Uravitch

Let's talk about contests for a moment, specifically Toledo, but contests in general. Competition, as we know it, involves a number of key ingredients, among them, contestants and rules. If a contestant understands the rules, he enters the competition. Sounds simple enough, right? Wrong!!

Two main thoughts occurred to me while viewing the models on display in Sport (Stand-Off) Scale at Toledo. One was the incredible progress made both in quality and subject matter; the other was how little a competitor knows about the "yardstick" being used to judge his entry against all the others in the same category.


The Toledo rules (remember, we're not sin-

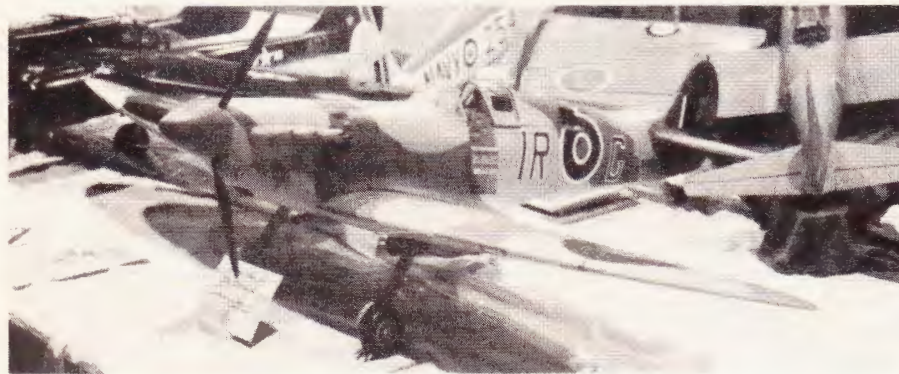
gling out this contest, only using it as an example) state that any Stand-off Scale entry with a dummy engine and/or raised rivet detail will be judged in the Scale class, not Stand-off. All entries are also required to have engines and radios installed. (This one escapes me entirely!) Now take a look at the pictures of Toledo coverage showing some of this year's entries. All in Sport or Stand-off Scale! Notice any rule infractions? This is not meant to detract in any way from the outstanding quality of building and finishing in evidence, only that static (non-flying) contests, especially those as prestigious and widely attended as Toledo, WRAM and similar gatherings, need to consider adopting, publishing, and distributing a set of stan-

dardized rules. These could easily be the static portion of the AMA Sport Scale rules, or a set developed by the sponsoring club or organization. In any event, to make the competition equal, *any* or *all* rules established should be adhered to with no exceptions!

Let's examine some of the psychology behind all of this. The prizes at Toledo are outstanding, from AM/FM radios, complete 7-channel radio systems, even a color T.V. for "Best of Show". The Weak Signals Club sure knows how to provide incentive!! So you go to Toledo one year, scan the potential competition, and decide to give it a shot the next year. You now have a *full year* to complete your entry. As you get further into your project, and the models you saw that provided the spark slip into history, you tend to add a little more to the airplane, remembering the little point getters you noticed at the last Toledo show. If you're a better builder than flyer, you're probably ahead of the game since you realize you won't even have to fly it!! Okay, now you bring your newly completed, paint-still-damp model to Toledo, along with fifty other guys who have been thinking exactly as you have and we now have a proliferation of *scale* (not *sport scale*) models. Where did your Stand-Off category go? The guy who builds a legitimate Sport Scale model, if the rules were enforced, would be capable of winning some hardware, since everyone else had been upgraded to the Scale category. This same guy can also leave a specialized static show, take his airplane home and fly it, since he didn't spend the last year building a museum piece. It would be interesting to determine how many Toledo airplanes have actually flown . . . maybe bonus points could be awarded if you prove that it did.

I guess what this all is supposed to mean is: know what the rules are and build your airplane to conform to them (ask the sponsoring club for a copy); decide if you want a static model or one you plan on flying. Engineering masterpieces are terrific if you can justify the time required. Develop some "chutzpah" and enter SCALE if you think your entry can hack it. If the judges think you're "sandbagging", you might well end up there anyway!!

As a final note, my overall impression was that the Weak Signals put on one fine show and they are to be congratulated for their organization of events, security and gracious attitude. It's, I'm sure, an overwhelming talk and one that frequently goes without thanks so, from one who appreciates your efforts . . . Thanks! 



This ducted fan F-80 by John Hodgson (top left) is an excellent Sport Scale ship. Spitfire (center left) is heavy on the inked lines for panel detailing. Our columnist likes the way the panels and rivets look on this British fighter. This P-47 (left) took second at Toledo.

R/C sport

By Ron Farkas

Learning to fly well requires a considerable investment of time and effort. You must make a conscious effort to learn good habits and practice them in your own flying. No amount of watching and talking to other flyers can substitute for actually being at the sticks yourself. Even though I have heard several stories of people who taught themselves to fly in record time (with hot airplanes yet), these are truly the exceptions to the rule. If you are a beginner by all means start with a trainer and get some instruction from local flyers if possible. You must learn some basic fundamentals of flying before moving on to a higher performance aircraft. A trainer style airplane is more forgiving of the mistakes that beginners make. However, this learning process should continue long after you have graduated from your trainer. Regardless of how experienced you are, you can always aim for the next higher goal. If you ever feel that there is no growth with the style of airplane you are flying, you can always try something else.

However, not all modelers have the same goals or the same amount of time to spend on the hobby. This probably accounts for the wide variety of kits on the market, from simple to complex. Unlike the competition R/C flier, the sport modeler is his own judge, and his own interests and ambition determine what kind of airplane he flies and how well he flies it. Within reason, it is totally a matter of personal preference. Where the reason comes in is that the airplane chosen should match the pilot's ability or provide a moderate

amount of challenge.

It has been my experience that modelers, especially beginners, do not always choose what is best for them. One reason is probably that the pilot makes an unrealistic assessment of his ability. This is often coupled with an impatience to really learn the basics. If you think that I am being too critical just watch the number of guys at the field who can loop and spin their models but still mess up their landings. Another reason may be that the flyer has a poor understanding of how much effort is required to master a particular style of aircraft. Trying to fly the wrong kind of plane for your ability level can be very frustrating and usually results in slowed progress. This while situation is compounded by flamboyant advertising, exaggerated claims and, occasionally, a misleading magazine review. (Never in FM-Ed.)

As far as proficiency goes, I am pretty demanding. I see too many flyers stop learning once they can take off, fly around and land the plane in one piece. That doesn't even meet my personal standards for safe flying. You must also be capable of handling some common emergency situations such as dead stick landings, getting back from downwind, stalls, spins and avoiding obstructions on the field. Further, you should eventually master flying in windy conditions, otherwise you may spend a lot of time on the ground watching the more proficiency flyers have all the fun. When you can fly comfortably in all these situations than you have attained a reasonable level of proficiency as a sport flyer.

In general, you will not reach a great level of proficiency with your first airplane. Even if it survives a long time, no single design can take you through the entire learning process. It is common for an R/C pilot to start with a high wing trainer and graduate in steps to low wing sport models and then go on to high performance designs. Once you reach an acceptable level of proficiency you can either stick with sport models, try competition or even do some experimenting with unconventional aircraft configurations. Your interest, ability and level of effort will be the deciding factors.

There are several major categories of aircraft type, each presenting different challenges and each requiring a different amount of effort to master. Each type has some general advantages and disadvantages which you must weigh before deciding to build. Table 1 lists five common types and some very general characteristics of each. Even though there are exceptions, you can use this list as a "rule of thumb".

Remember, developing good flying skills is important for safety and your enjoyment of the hobby. It is more important to become proficient at flying a plane that suits your ability than to fumble around trying to fly an airplane that is fighting you. If you are not flying well with your present airplane, consider switching to something that requires less effort. If, on the other hand, you have mastered a style of airplane and feel that its design is limiting your growth, graduate to the next level of difficulty. The decision is up to you.

CC

Table 1

Type	Effort	Challenge	Advantages	Disadvantages
2-3 channel trainer	low	Learn basic control functions	Slow speed, slow control response, built-in stability	Poor wind penetration, poor control authority
4 channel trainer	low to moderate	Learn emergency procedures, become self sufficient	Gentle and predictable control response	Fair wind penetration
Low wing sport	moderate	Be in full control, become self confident, do some stunts	Crisp control response, wide speed range, good wind penetration, fairly aerobatic	Too responsive for most beginners
Full house pattern	high	Perform precision aerobatics	Precise control response, fully aerobatic, neutral stability	Demands high skill level, quick reflexes and pilot concentration
Scale	moderate to high	Duplicate full scale flight	Could be easy or difficult to fly depending on subject, very challenging and satisfying	High risk of being overweight with unpredictable flight performance

PHOTOGRAPHY: RON FARKAS



The Goldberg Skylark 56 Mark II (above) is a fine example of a low wing sport model. Long moments, generous areas and forgiving airfoils make these ships fun to fly. Ron's chart (left) describes his definition of a number of different types of sport ships from trainers to scale craft. Newcomers to R/C should heed the recommendations our columnist makes regarding aircraft suitable for beginners. The biggest mistake most R/C flyers make is to pick a plane beyond their ability.

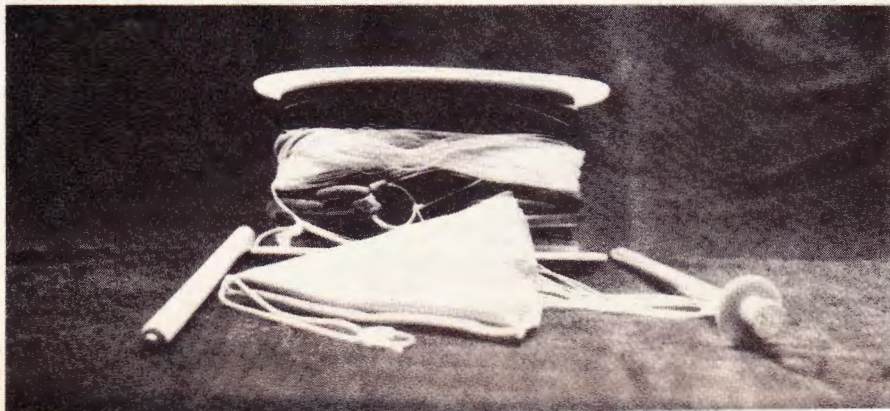
R/C Soaring

By Bob Crane

There are varied ways to launch your sailplane. The following methods are the ones more commonly used. They include hand tow; power pod; hi-start and electric or gas powered winches. Hand tow and power pod need no introduction. All that is required for a good hand tow is a durable friend and tow line. Power pod launches can be accomplished by attaching any external gas engine to the sailplane. There are three variations to the power pod launch. In one variation the engine and pod are a permanent attachment to the sailplane. This creates unnecessary amounts of drag on the sailplane inhibiting optimum glide performance. A second variation of power pod launch has the engine drop back into the fuselage, as on the Jetco "Eastwind 100". The pod is out of the airstream, thereby reducing drag on the power pod. The third variation uses a para pod as produced by Craft-Air. This system has the power pod located beneath the fuselage. At the end of the engine run the pod unit detaches itself from the fuselage and floats back to earth via a parachute. The name of the game is soaring flight and these systems will get you into the air fast and within a confined area.

I would like to concentrate on hi-starts for the remainder of the column. We will discuss winch systems in a future column. I frequently address different groups on R/C Soaring and the most frequently asked question after "How much does that plane cost?", is "How do you get that thing into the air?" I answer, "By hi-start." A hi-start is made up of approximately 100 feet of surgical tubing with 300 - 500 feet of monofilament line attached to the tubing. A stressed parachute and tow ring is attached to the end of the tow line. You stake the tubing down into the ground facing in the direction of the wind. You now connect the tow ring to your tow hook, stretch this whole assembly for about 350 feet (roughly 125 paces), and heave the sailplane at a 45 degree angle to the horizon. You should reach approximately 400 - 600 feet of altitude, depending on your launch style. Once you are at the apex of your launch the chute slides off or is nudged off by slight down elevator, opens and carries the tow line back toward the launch area. Simple!

PHOTO CRAFTAIR



Two areas are critical to a good launch. Tow hook location and launch technique. Some sailplanes tow with the hook forward, on, or aft of the C.P. (Center of Pressure). Many pilots confuse themselves about the relation of CG, tow hook position and CP (Center of Pressure of the wing). When changing the CG of the ship it is not necessary to change to tow hook location. What is critical to a glider under tow is the tow hook location in relation to the center of pressure of the wing, i.e., the center of pressure is about 48% of the wing chord, but this is dependent on the exact wing planform. If you are skeptical that the CG does not mean anything under tow consider that the CG is determined in the horizontal and we tow pretty much in the vertical mode. You may want to use the CG for a reference point of the tow hook location. Follow the instructions in your kit for tow hook location or use an adjustable tow hook and keep a log of your flights and altitude gained. On my "Mirage" sailplane the tow hook is located $\frac{1}{4}$ inch behind the CG (reference only). Experiment on your own sailplane with your tow hook location for optimum launch. Future columns will include more detailed information on tow hook location and launch technique. The following hi-start systems are currently available on the market.

Airtronics. Airtronics offers two hi-start systems. The standard system is for models in the 16 - 40 oz. range and most sailplanes up to 100 inch span. The heavy duty system is for models in the 40 - 80 oz. range. The H.D. system is for Aquila, Olympic size sailplanes. Both systems include a 100 foot length of continuous latex surgical tubing, lightweight stressed parachute, 400 feet of 30 lb. test monofilament line, line storage reel, stake, swivels, split rings and welded rings for the tubing. Available from your hobby shop or Airtronics, 12160 Woodruff Avenue, Downey, CA 90241. Write for prices.

Craft-Air. Craft-Air offers four hi-starts. The standard class unit, open class unit, super duty unit and the small 2 meter Upstart. The standard and open class units, as well as the super duty hi-start, feature a molded custom reel, one piece Ultra Violet stabilized surgical tubing, nylon tow line,

lightweight parachute, steel stake, steel tow ring, and wooden handle. Prices range from \$49.95 to \$59.95. The Upstart is a new concept in hi-starts. This unit is designed for launching two meter sailplanes or standard class sailplanes from a limited field. (Great for lunch time flying). This hi-start produces over 200 feet of altitude and requires only 300 feet of field. The Upstart kit features the same quality surgical tubing and all the related items as the larger hi-starts and a plywood take up reel. Price for the Upstart is \$19.95 from Craft-Air, 20115 Nordhoff St., Chatsworth, CA 91311.

Superwings. A division of Hi Johnson Model Products. This company offers this all purpose hi-start. "One step of stretch for each inch of span of your sailplane." This unit includes 100 feet of laid up surgical tubing, 400 feet of seine twine line - 120 lb. test, 100% nylon sheathing cloth parachute, two 10 inch steel spikes with nylon collars, hi-impact 10 inch diameter reel for \$49.95. Superwings, 11015 Glenoaks Blvd., Pacoima, CA 91331.

M.E.N. Model Engineering of Norwalk offers three items in the hi-start field. Their surgical tubing is of excellent quality, and is also laid up, not extruded. The tubing is dowel spliced. This tubing can be stretched 400% at 18 lbs. pull. The M.E.N. take up reel is the fastest on the market. Your speed at winding is limited only by how fast you can walk. The unit is machined ply and in kit form. Also available is their stressed chute. Write to M.E.N. for current prices. Model Engineering of Norwalk, 54 Chestnut Hill, Norwalk, CT 06851.

Archaeopteryx Avion Associates. Jim Ealy of the aforementioned company offers seven hi-starts to choose from. The two meter thru the Horse Choker comes completely ready to fly, with 100 feet of surgical tubing, plastic reel, 100 yards of 30 lb test monofilament line, ball bearing swivels, plastic stake, custom made parachute and split "O" rings. In addition, Jim has two FAI hi-starts available. The FAI standard and FAI heavy duty comes with 164 feet of tubing and all of the above mentioned accessories. Jim will also custom make any size hi-start to your specifications. Prices range from \$27.95 to \$49.95. Archaeopteryx Avion Associates c/o Jim Ealy, P.O. Box 120, Pottstown, PA 19464.

The Sailplane Factory. Kenn Rolin of the TSF, offers a wide variety of launching systems. His systems will launch almost any size sailplane. Prices are not yet available. Drop Kenn a line at The Sailplane Factory, P.O. Box 341, Red Lion, PA 17356. Till next month, Green Air!

Craft Air's high start (left) has all the right components. Look for a high start with high grade surgical tubing, one piece if possible, good tow line and parachute. Many available. See text.

FM sport

By Larry Kruse

Last time around I used a considerable amount of ink haranguing you, fearless readers, into getting actively involved in promoting sport freeflight. Seeing as how that topic did manage to rattle a few cages, judging from the letters I got, we'll briefly look at some ways of doing just that before moving on to other things.

Modeling friend Bill Baker was one of those who wrote to advance a couple of good ideas on promoting sport freeflight. Bill feels that only so much can be done with kits, magazine plans, and other design sources to attract the sport flyer. The crux of the problem lies in teaching potential sport flyers how to trim their models, an art that seemingly can be learned only via the crash and re-crash method, unless experienced help is available. Although the new or casual modeler may do an adequate building job, his or her creation will either "fly off the board", or probably not fly very well at all without trimming help. Bill's solution is to get the inexperienced flyer with an older hand. As he points out, those of us who have been in the game a while are relatively few in number and somewhat scattered, but the simple inclusion of a name and address of a flyer willing to help on a regionally distributed list or in a club newsletter might do a lot to give the novice the successful experience he or she needs to get hooked on freeflight.

For my part, if you want to help potential flyers become proficient freeflighters, send your name and address to me at the address appearing at the end of the column. I'll see if I can't construct a nucleus of sport flyers willing to help expand our segment. Likewise if you are a flyer needing some assistance, I'll be glad to try to put you in touch with an experienced modeler in your geographical area. Let's give Bill's idea a try and see what happens.

Other small ways of promoting sport freeflight which have worked for me are so obvious that I almost overlooked them. First of all, I visited with my local hobby shop owner and suggested several freeflight kits and accessories that seemed to have appeal to sport modelers - nothing elaborate or expensive that would gather dust on his shelf - just some good stuff that would not require a large investment on his part. Then I asked him to keep track of who bought them so that I personally could contact them and offer help if they needed it. You'd be amazed at how many good friendships can begin that way, and how eager people are to receive help. Simple, isn't it?

Also, I've gone to youth organizations, especially Scouting groups, and offered on be-

half of my club to set up Delta Dart contests so their kids could earn model building merit badges. The result? A gym full of 400 Cub Scouts and their parents all enthralled by the flight of their first aircraft - and eager to build again. Several of these same parents and youngsters later joined our club and have continued their growth in modeling, having been first introduced to the hobby through sport freeflight.

As a parting shot, with a "can't see the forest for the trees" mental attitude, let's not forget about those modelers already within the hobby. Fellow club members, in particular, will prove susceptible to the charm of sport freeflight if exposed to it. An informal indoor flying session, a challenge match between ukie and R/C flyers, a one-design contest to keep the sap flowing during the winter months are all ways of getting folk involved.

And, once a modeler is successfully involved in freeflight, it's just like eating one salted peanut.

Columnists who read columnists

Bill Hannan's nice note concerning FM's new look also included some information about the popularity of the new "Bostonian" class of scale-like rubber powered ships begun in the East by Ed Whitten and now making themselves known on the West Coast. Bill relates that a recent Friday evening meet in a small San Diego gym netted more than 30 of the little beasts present.

About the same time I received Bill's note, Walt Mooney presented us with a most appealing "Boston Found" in the May issue of *Model Builder*. The requisites of the class include maximums of 16" wing span, 3" chord, 6" prop, and 14" fuselage length from thrust button to opposite extremity. The rules also specify ROG take-offs, required landing gear with at least two 3/4" wheels, and a minimum weight of 14 grams (1/2 oz.) without the motor. What these rules mean is that anybody can construct a ship out of 1/16" square balsa,

cover it with tissue, fly it with a plastic prop, and be competitive. Hurray for our side! This event makes some sense.


Teaching an old sport new tricks

I had the pleasure last summer of covering the Society of Antique Modelers Championships held the weekend before the AMA Nats in Dayton, Ohio. Out of that experience came a new delight with the old - old engines, old designs, (yes, in some cases old modelers) and old fashioned fun during a relatively highly structured contest.

The ships shown and flown at the SAM Champs lend themselves very well to the sport as well as the contest scene. All that needs to be done in many cases is to downsize the engines in order to turn these ancient ones into docile sport flyers. One of the prettier designs that showed up was Mike Granieri's "MG" series which first took to the air in 1938 or thereabouts. Mike mentions that he remembers vividly a 1938 meet at Hadley Field in New Jersey during which Frank Ehling and his buddy George Brown threw rocks and tin cans at the "MG" as it flew overhead because it was in first place at the time.

Mike's "MG" series has been done in several sizes, ranging from the original 9 1/2 ft. wingspan down to a Peanut scale sized rubber version. Mike is considering doing a 300 sq. inch. If you'd like to encourage him or get a set of "MG" drawings in a scale you'd like, his address is 3 Dryden Road, Box 78, Pottersville, N.J. 07979.

Other plans for aircraft of this era are available through the several plans services that advertise in *FM* as well as other magazines. Also, the Frank Zaic books, particularly the early ones 1935-1938, have an absolute wealth of designs that look to be fun to build and fly. Old timers make charming sport models and might be a welcome change of pace.

My address is Larry Kruse, 1801 North Kansas, Liberal, Kansas 67901. 

PHOTOGRAPHY LARRY KRUSE



Ken Hinton, of Suffolk, England, is the builder of this classic "Answer" old timer designed by Scotty Murray (right). Powered by a Mills 1.3 diesel, it's a great sport or contest ship.

FLYING MODELS

CA combat

By Phil Cartier

I've received a long, interesting, letter from Larry Miles of San Diego, California. Larry says he isn't a competition flyer, which is fine with me. This column is really for all the flyers who aren't diehard competitors.

Larry brought up an interesting point. "It seems to me that we need another combat event that is particularly suited to the beginner in combat. As presently structured, there is no logical AMA event, provisional or otherwise, that is very suitable for the beginner in combat." I couldn't agree more. Slow combat started out as an event that was good for the beginning combat flyer, but it was ruined by becoming a regular national event. This has happened more than once. Consider what has taken place in Scale Racing, Slow Rat, Profile Carrier, and "beginner" events in free flight and radio control.

I collected all the ideas I've heard for a more laid-back, easy to run, fun, combat event that would be good for the beginning combat flyer. Let's discuss them one by one and point out some of the good and bad points. This isn't a rules proposal, just a forum to pass around some ideas and get folks talking about what might be done.

National versus local. Every event that has gone from local to provisional to national has escalated into a battle amongst the diehard experts. Combat hasn't had the same degree of problems as the engine events like racing and carrier, but the problems are still there. Local events are much easier to tame down and control, even to the point of saying Harry can run anything, but Phil can only use a Stunt 35.

Club Support. A strong club program is the best medicine for lagging participation. Have regular times and places for flying. Schedule

club events regularly. Remember, it can take several seasons for interest in an event to build. Scheduling it once won't do.

Equipment restrictions. This is what most people think of first. There is no magic formula to make the beginner and expert equal, outside of rolling dice. (That's called craps and is illegal in most places.) But the equipment can make the beginner's task a little easier. Basic engineering tells us what to limit and whether to set maximums or minimums. Actually, the current crop of slow combat planes is nearly ideal for the newcomer if the horsepower is kept down. A typical set of restrictions might look like this: wingspan- 43 inches maximum, to keep out overgrown, high aspect ratio monsters; wing area- 400 sq. in maximum, no flaps, to allow most kits to compete while putting an upper limit on turning ability; weight- 26 ounces minimum, to limit turning ability and provide a certain amount of crash resistance; horsepower- either a speed limit or restrictions like plain bearing, non-Schneurle, engines and 10% nitro fuel. (Neither is easy to do, but some limit on horsepower and top speed is a must.) On a local level, the sponsoring club could easily specify approved designs and engines and supply the fuel.

Limit the number of planes. The WAM association in northern California does this quite successfully. It does have some safety implications if repairs are allowed between matches without adequate inspections.

Random draw rounds. Nothing says a combat contest has to be an elimination tournament. With only one event to run, a ten entry contest could have four or five rounds in the same time it takes to run fast and slow. The advantage here is that more people get more flying.

Smaller engines. Some of the suggestions

I've heard are 15's in slow combat ships, half-A's, or 09 engines in a new size plane. This is another method of reducing horsepower and speed. It has the same problems of enforcibility and obsoleteing equipment that other horsepower limits have. An added problem is that smaller, under-powered ships don't handle the wind as well as the usual 35 plane.

Reducing mid-air collisions. Even the airlines still have this problem where it's a life and death matter. I'm not surprised we can't solve it on the combat circle. The best preventive for mid-air is experience. Good pilots rarely have collisions with other good pilots. After getting burned enough times they learn to recognize and avoid collision prone situations. A good entry level event would concentrate the learning under controlled conditions.

During the previous rules cycle, somebody, unfortunately I forget who, proposed an event like this in the MACA newsletter. The poor guy was laughed at by us "experts", but the idea was a good one. Each match was very tightly controlled and required the pilots to demonstrate increasing skills. It went something like this. Each man starts his own engine. The first one airborne gets one point. Then each pilot has thirty seconds to try for a cut while the other plane flies straight and level. They take turns. The cut, if any, counts one point. Next they try and trade cuts again, but the target plane is allowed to climb and dive. Finally the judge positions the planes half a lap apart and lets at it. The greatest number of cuts wins. The judges would clock air time, but it would only be used if the number of cuts was tied. Experts would get through the preliminaries rather quickly. Beginners would have some concentrated practice and still have an opportunity for some all out combat flying.

Slow combat tournament. If a club is fairly good-sized, a combat tournament can work really well. The tournament director draws up a number of rounds, pairing off every one who is interested in flying. The individuals involved get together and arrange a mutually agreeable time to fly, and then report the results to the director. Each round has a final date to fly the match for that round so it doesn't drag on too long. At the end of the summer, have a banquet and give out awards.

Hopefully these ideas will trigger a little response. I'd be interested in hearing from anyone who has tried these or similar ideas. Especially, what worked, what didn't and any speculations as to why. ☐

Steve and Carol Sacco pit Steve's slow combat ship at the spring contest at Middlesex, New Jersey. The plane, *Supernova II*, uses a unique cast foam leading edge and balsa rear structure. It took over 100 hours of work to make the mold for the leading edge. That's a lot of work!

PHOTOGRAPHY: PHIL CARTIER



CA stunt

By Bob Hunt

Trimming a new ship can be the single most important part of learning to fly stunt. A poorly trimmed plane will always be, at best, a "semi-bomb". The trimming of the ship actually begins during the building phase, with very careful alignment of the surfaces. Warps are also a problem to be aware of during construction. No amount of flight trimming will help a poorly built and misaligned plane. I cannot stress this point enough.

Assuming that you have a carefully built plane with straight, warp free surfaces and proper alignment, let's go to the field and prepare for the first flight.

The urge to fly a newly completed plane can be overwhelming, and many a ship has been crashed on the first flight because of impatience. A final field check of all systems is a must. Check once again for warps and alignment. Also check the pushrod. Have you installed a keeper? Pushrods will bow under flight loads and must be supported or loss of control can result. Is the tank securely mounted? Have you checked for leaks? A poor engine run during the maiden flight could cause a crash. Check also for proper engine offset, leadout rake, rudder offset, flying line condition, connectors, leadouts, hinges, wheels and anything that could cause a problem. Even after the ship is well broken-in this check list should be followed before each flight.

The engine and tank arrangement is perhaps the second most important ingredient to success, after alignment. Without consistent power output, the plane cannot be trimmed properly. Take some time and break-in the motor according to the manufacturers recommendations. Be sure that the mounting is solid and that there is no down or up thrust incorporated.

The placement of the tank behind the motor is very critical. On a profile ship, the tank should be mounted directly behind the head of the motor with the tank's centerline in line with the centerline of the motor. If the tank is mounted above the centerline of the motor, then it will tend to run richer in upright flight and leaner in inverted flight. Minor adjustments may be made after checking the lap times upright and inverted to even out the run of the motor.

Prior to the first flight, attach the flying lines and hold the plane at shoulder height. Have a helper hold the handle in a manner that suspends the lines in the air. Position the airplane on your thumb and forefinger at the centerline of the fuselage. If the inside wing falls towards your helper, then you should add some tip weight. Continue this process until the outside wing just falls slowly. This is a good starting place for the tip weight, but remember that flight trimming will dictate the final amount of weight.

The last thing to check before flying the new plane is the C.G. or center of gravity.



PHOTOGRAPHY: BOB HUNT

Proof positive that profile ships can be competitive on a national basis. Jim McClellan took second in Junior Stunt at the 1979 Nationals with his Sig Banshee. Note large tank, wing mounted gear, Monokote.

Most kit planes will have a suggested C.G. on the plans. If you have modified your kit, as suggested in last month's column, then you won't have a positive starting point. I like to make the first flights with the ship obviously nose heavy. A nose heavy plane will be sluggish and unresponsive, but it will have a better chance of flying again than a ship that is tail heavy. Weight can be removed slowly until the desired sensitivity is achieved. Even on a kit ship, the C.G. suggested on the plans may not be comfortable for you, and should be looked upon as only a starting place.

Now you are ready to fire up the engine and enjoy the first flight. This flight should have a plan. Fly the plane level and observe the key points. Is the plane stable or over-sensitive? Is the engine running smoothly? Are the wings banked severely in either direction? Your helper should be observing the wing too. He can see best from outside the circle if the wings are level. It is also a good idea to time the engine run during the first flight. This will tell you if the engine and tank combination is providing enough flight time for the stunt pattern. A safe time for the pattern is six minutes and thirty seconds of engine run. Even if you cannot fly the complete pattern at this time, the plane should be set-up properly for learning.

After the first flight it is time once again for a complete inspection. This time you are looking for loose bolts. Check the engine and tank mountings, control horns, pushrod guide, wheels (for binding), and anything that could have worked loose due to vibration. This inspection should be done after every flight for the first month or so of flying. As parts "seat" they will tend to loosen.

If all went well on the first flight, then fuel up and go again. The plan for this flight is much the same as for the first. Observe the plane's attitude and build confidence in the motor run. Try a few mild climbs and dives. Does the plane seem to respond the same to up and down control? Does the wing seem to roll when the controls are reversed?

At this point the ability of the pilot will determine how far the trimming process can proceed. If you cannot fly inverted, then it is advised that you find an experienced pilot who can and let him fly the remainder of the trim flights for you. This will also let you watch the ship from outside the circle and see first hand

any trim problems that may be present.

Let's take the most likely problems you may encounter and go through the proper sequence of corrections. The first adjustment that should be made is the pitch C.G.. If the plane is too responsive (over sensitive), then add nose weight until the plane is comfortable to you. There are several methods for adding this weight. Ideally it should be as far forward on the plane as possible. The further forward you can put it, the less you will need. It uses brass flywheels, of various weights, mounted under the spinner and in front of the prop. This gets the weight as far forward as possible. Many flyers argue that putting the weight on the shaft of the engine will wear the bearing. I have never had any such problems. Another way to add nose weight is to melt solder into the backplate of the motor and then hold it in place with a tinstock cover that is secured with the backplate bolts. Be sure to remove the backplate from the engine before melting the solder into it.

The opposite of this problem is a plane that isn't responsive at all. Tail weight must be added to move the C.G. aft and increase the responsiveness. Clay, or adhesive backed lead weights can be used here, or bolt small washers against the fuselage. Add small amounts of tail weight at a time. It won't take much weight to move the C.G. aft due to the longer moment arm. Test fly carefully after each change and only make one trim change at a time.

The next area of trim on a new ship is the roll axis. Are the wings parallel to the ground during level flight? If not, the problem can be caused by too little or too much tip weight, a warp or a combination of both. Let's deal with the tip weight first. Let's suppose, for example, that the outside wing is high during level flight. If this condition isn't too severe, maneuver the ship into inverted flight. If the outside wing is still high, then there isn't enough tip weight. If the outside wing becomes the low wing in inverted flight, that is a sign of a warp. If the outside wing is low in both upright and inverted flight, then there is too much tip weight. Keep flying and adjusting until the wings are level both upright and inverted.

Warps are the most complex of the trim adjustments and we will look into them next month. Until they fly Stunt. ☐

with model builders

By Ed Whalley

Drizzle Tour

Dick Salter of Seattle and Mike Hazel of Salem, Oregon, are the new race champions of the Northwest's Sport Race tour, the Drizzle Circuit. John Thompson, Cottage Grove, Oregon, finished behind Salter in the NWSR (Fox .35) series and behind Hazel in the Super Sport events of the five-meet series. Salter and Hazel were presented with huge perpetual trophies at the Northwest Regionals in late May. Also awarded were first, second and third-place trophies and fast heat trophies. The presentations marked the end of the third year of campaigning on the circuit which included venues in Portland, Seattle, Astoria, Yakima and Eugene.

Salter won every heat he entered to post a perfect 10 for 10. He also turned the fast heat time (4:31) and the fast feature (8:57). He won the second, third, and fifth feature races to garner a total of 42 points. Thompson made it into second place with a 32 point total. He made the feature four times and won once. Dave Green, with 26 points, was third.

Hazel piled up 38 points for his win. Like Salter, he posted fast heat (3:54) and fast feature (8:00) in his event. He won nine out of ten heats and made the final all five times. His second place (to Green) in the last race of the season ruined his perfect record. His wins came in the first and fourth races. Thompson finished second with 25 points, a position for which he was tied by Dave Mullens. The tie was broken on the basis of fast feature race times, and Mullens settled for third. Thompson won the second and third features. Mullens made the feature three times and finished second once and third twice.

Salter used the same ship throughout the series, a Ringmaster dubbed the Screaming Yellow Zonker and powered by a very fast, stock Fox .35 Stunt. Hazel's ship for the new breed event (Super Sport) was his Cromagnon SS with K&B .35 (Slow Rat type). The very clean profile featured a fuel shutoff and fastfill tank. Other designs fielded included Flite Streaks and similar profiles. Vic Garner and Zinger props were used by many as were Fox and uniflow tanks.

Racing to the Northwest rules seems to be catching on in many parts of the country. It's been tried in Florida, in Utah, and in Southern California. The idea is to provide events for which readily available stock components can be used and in which the technology is not allowed to get out of hand. The use of Fox .35's in Sport Race makes it a good, entry level event. The slightly more sophisticated (and expensive) Super Sport event allows room for both innovation and experimentation. K&B .35's get the nod here. For a copy of the rules write to John Thompson at 1411 Bryant Ave., Cottage Grove, Oregon

97424 (a buck for copying and postage should cover it).

WAM Records Set

Good ol' Stan Patterson was the CD of the 21st annual Fun Day hosted by the Model Engineers in Concord, California. It was a beautiful day at the Hillcrest Park site, and eight new WAM records were set. The Park provides an excellent flying site, and the quality of the set up was further enhanced by the provision of a huge motor home for use as a field office. Ol' Stan does things up right.

A number of factors contributed to the new records, including the addition of Mouse Race to the list of official events and some changes in Carrier rules. Also, the participation of event specialists like Vic Garner was a contributing factor. Anyhow, when the results were all in, Joe Armstead and Bob Elies had both set a couple of Air Race records; and Ernie and Bobby Reece had set records in Carrier. The M&M Team had set a record in Mouse. Vic Garner came through with a new B record in Ten Mile. This last should be of more than passing interest as Vic's sizzling 6:06.0 gives everyone something to shoot at.

In other flying, Merle Machen posted 100 in Baloon Advanced, and Bob Boling posted 105 in Expert. John Salvin had Combat wins in A Open and BC Fast Advanced. Andy Prior took Fast Expert. Len Norred took Beginner honors in Fast and Slow. Joe Pearson and Don Chandler slugged it out in Economy and Endurance, both posting wins. The M&M's came up with a win in Five-Inch Glider, while R. Frank posted 1:19.8 in Expert with the little things. Frank also won in Ten Inch Expert with a posted 3:47.0. Frank Hampton, Bob Riggio and Tom Moore had wins in various Scale classes. Kathy Magyar and young Mitch Williams were standouts in the kids' Stunting, and Bill Howe posted wins in 1/2A, A and BC Advanced. Paul Magyar took BC Expert. Gary Buffon and Gary Crawford provided much of Garner's competition in Ten Mile. Crawford seconded twice, and Buffon pulled up third twice. On a final note, WAM has a couple of new Stunt flyers to keep an eye on: Mitch Williams and Bill Savage. Savage had a win in A plus a third in BC.

Cardboard Contest on Tap

In Salt Lake City, Kirk Robinson has come up with a good idea for a fun meet. Kirk's been foolin' around with crates made out of cardboard cartons and recently published one such plane in Model Aviation. The extension of the cardboard concept to the crate-race event is both natural and logical, but this is only step one in Kirk's four event package. In addition to spot-building a cardboard crate and getting it into the air, Kirk

plans to pit all the survivors of step one in a kamikaze Combat event. In this one, if there's no winner after five minutes, the victor is decided by a crash-off! The survivor is the winner, and survivors meet each other. This provides two events for on-site creations. But, Kirk also has two other events to challenge the ingenuity of cardboard engineers: one is for the "most unusual" aircraft; the other, for the "best looking." All planes, by the way, must fly 10 laps and pass a pull test. On-site building is not required for the last two events. Only reed-valve 1/2A's are allowed.

Of Interest to Free-Flighters

- Two bulletins that have been around for a long time (41 years) are the Phoenix MAC Newsletter and the Fresno Model News. Don't know about the Phoenix sheet, but the Fresno bulletin has enjoyed continuous publication, first under old Ocie Randall and, since 1972, under Bill Booth.

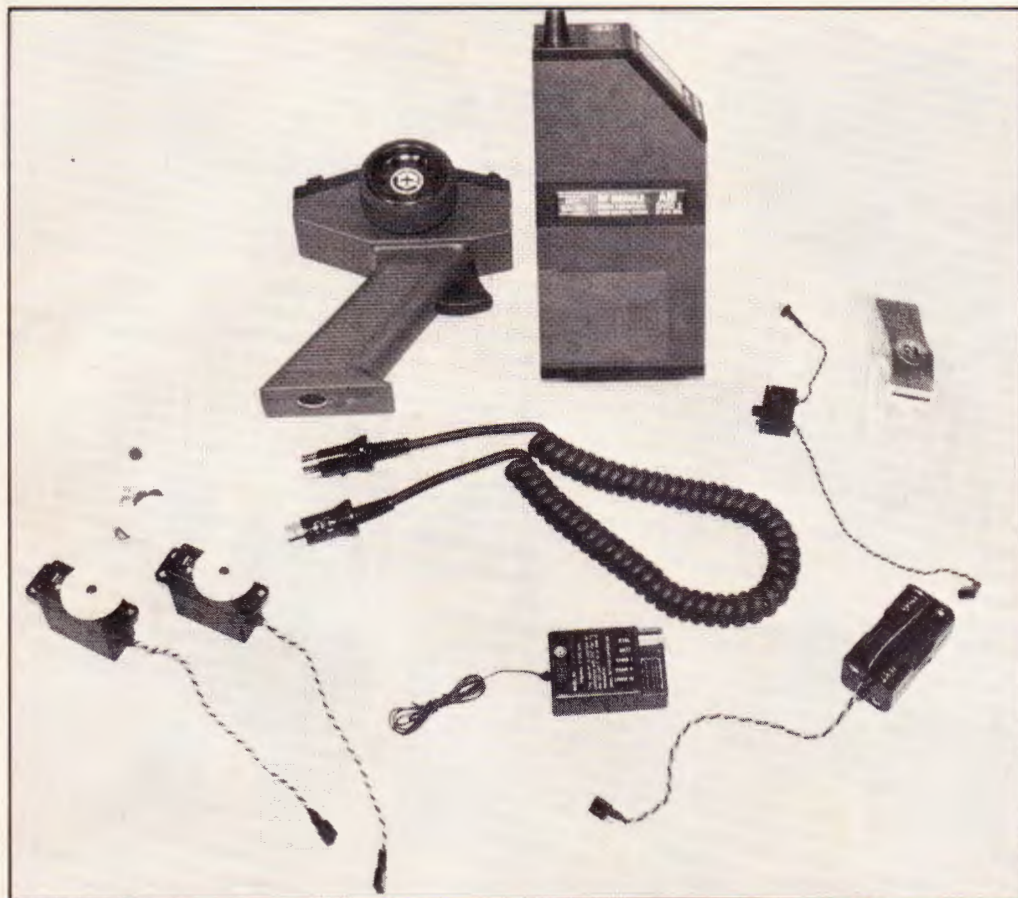
- Society of Antique Modelers (SAM) Chapters continue to form. The Phoenix gang has formed the Cactus Sam Chapter (Ch. 31), and Jack Perine, 304 West Edmonston Dr., Rockville, MD 20852, is looking to form one in the DC area.

- Jim Thornbery (Doctor Jim), well known FAI flyer from the Northwest, will be transferring his activities to the Mid-East. Nope, he's not going over to OPEC country, he's due to finish off his residency at the Mayo Clinic.

- Looking for a good addition to your event card? Try a 1N28 event. That's "One-Nite Twenty-eight". It's named after the popular kit. Where it's been tried, it's done well for the sponsors. Look at some of the times posted in Fresno: John Keppler, 5:28; Betty Kiracofe, 5:20; Channing Booth, 4:46, and Bucky Gaines, 4:19—they really fly. Probably the cheapest thing next to HLG, and you don't need an arm like Lou Ferrigno's.

- It hadda come sooner or later. They just don't run many like this anymore—an all-ROW FF meet. Yeah, you guessed it. It's being billed as a "Gathering of the Ducks." This one is being staged by the Stockton GMA at the Thermolite After-Bay near Oroville. It's their 12th annual. CD's included Joe Bilgri, Bill Davis and L. Armstrong.

- The CIA Informer tells us that clubs flying at Wright-Pat must now enter via the Museum Gate (29B). Gate 19 off National Rd. is now closed to flyers. Take a right by the front of the museum, cut thru the parking lot, turn left onto the taxiway behind the museum, head for the buildings at the base of the hill, and turn right on the wide taxiway paralleling the hill. The new way is shorter anyhow. The Central Ohio FF'ers will hold their 20th Annual here on August 23rd. Write Bob Lyle, 1338 Molly Ln., Columbus 43207. ☐



PHOTOGRAPHY BOB ABERLE

An FM Product Review:

MRC's Grand Prix Radio

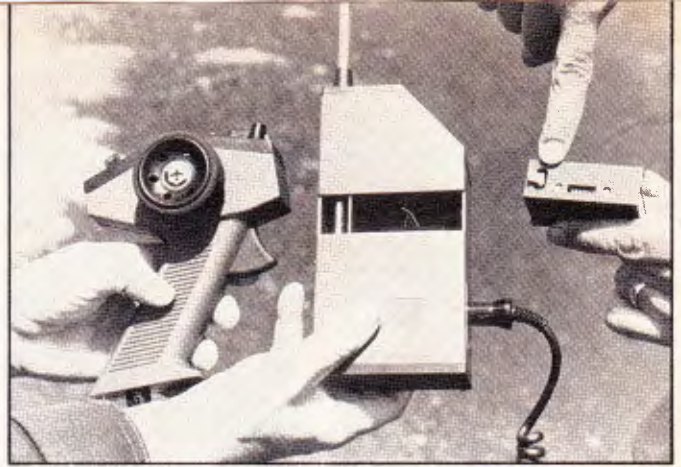
By Bob Aberle

A new concept in radio systems for
the R/C car or boat racer.

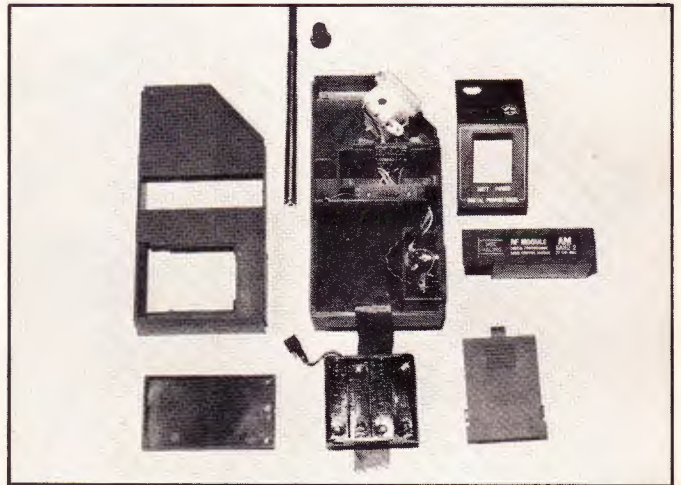
This past February, while attending the WRAM Show at White Plains, New York, I got my first introduction to several new radio systems designed expressly for the R/C car enthusiast, but with possible application towards R/C boating as well. The interest in these areas has grown to the point where manufacturers have finally decided it is time to offer R/C systems to meet their special needs.

One of the first of these systems to reach me for product review purposes was the MRC Grand Prix series three channel unit.

The specific system I received was MRC's Model HJ-105 which lists for \$214.95. It contains the new and separate speed handle control, dry batteries, two waterproof/ball bearing servos and is on 27 MHz. MRC indicated that this particular system would be best suited for 1/8th scale gas cars and also off-track electrics (because of the rugged servos). Also available is the identical system as just described, but on 72 MHz (Model HJ-110) for \$219.95 list. Finally, MRC will offer a Model HJ-115 which is essentially identical to the above, except for the substi-



R-F module removed from transmitter (above). Author points to the removable crystals in the module. Assembled transmitter and Speed Handle Control unit (left). Transmitter mounts on belt or pocket. Remote transmitter completely disassembled (below). Requires 8 A-A penlight batteries.



tution of two VR-62, standard (not waterproof and no ball bearing) servos and available on 27 MHz for a list price of \$194.95. This system, with its smaller and faster servos, is best suited for the 1/12th scale electric powered cars.

Now, let me describe the MRC Grand Prix Model HJ-105 system in detail. The \$214.95 list price buys you the following items: a remote three channel transmitter module; new speed handle control; battery boxes to hold dry, non-rechargeable alkaline type battery cells (both for receiver and transmitter); a three channel receiver; two VR-120 servos; switch harness; frequency flag; assortment of servo output wheels and mounting hardware and an instruction manual (although I didn't receive one with this particular system). The system just described is available on all the 27 MHz R/C channels. You can also obtain the same system on the allowable 72 MHz R/C channels by specifying MRC's Model HJ-110 (which lists for \$5.00 more). Remember, you can only change transmitter frequencies legally on the 27 MHz channels, but not on 72 MHz. In fact on the 72 MHz R/C channels you can only legally operate a "non-aircraft model" on the following frequencies: 72.160, 72.320 and 72.960 MHz.

MRC Grand Prix Transmitter

If you still haven't noticed, the key feature of this new system is the *two part* transmitter. Years ago electric powered slot car racing was extremely popular. These cars followed a slot in the race track (which provided the

electric power and steered the cars as well). You, the modeler, simply operated a hand grip (trigger) for the speed control. Eventually, slot car enthusiasts got into full R/C control where steering came into play as well as speed (throttle) control. Many car modelers still like the trigger speed control and, in fact, in many cases modify their R/C transmitter for that type of throttle control. This new MRC system has been "human engineered" around the needs of the R/C car operators. Both the steering and the throttle controls are contained in a separate "Speed Handle Control". This is connected through a coiled cord type cable to a "Remote Transmitter Module". In actual practice the transmitter module is attached to your belt (towards the rear of your body). You hold the speed handle control in your left hand (your left index fingers operates the throttle control) while the right hand does the steering using a standard wheel type control.

The remote transmitter module measures 7 1/4 inches high x 3 1/2 inches wide x 2 inches thick. It weighs just 17 ounces with a full compliment of eight (8) dry (A-A size) alkaline batteries. These batteries are accessible through a removable trap door located on the lower front portion of the case. These eight cells will cost you approximately \$6.00, so you may want to consider eventually installing rechargeable nickel-cadmium cells. A charging jack is already included in the circuit, permitting direct change over to nickel-cadmium batteries when you are ready. MRC offers the rechargeable batteries

as an option. I measured the transmitter current drain (with alkaline cells) at 125 MA., and with Nickel-cadmium cells at 100 MA. Measured R-F output was 800 MW (8/10th of a watt) with alkaline cells and approximately 600 MW while using nickel-cadmium cells. The reason for this difference is that the alkaline cells have a slightly higher characteristic voltage.

The antenna, mounted on the transmitter module, is an eight section whip which measures only 29 inches when fully extended. It will also fully collapse for storage purposes. On the angled side (top) panel of the transmitter you will find two individual meters. One for monitoring R-F output, the other to check on battery voltage. At the rear of the case is a metal bracket measuring 1 1/4 inches wide x 3 1/2 inches in length which hooks on to your belt and provides a positive attachment for the remote transmitter module without any fear of it falling off.

Now lets talk about the speed handle control which I like to refer to as simple the control head. A 2 inch diameter, rubber lined, wheel is provided for the main steering control. On the top of the control head is a power switch (rotary type) with an L.E.D. indicator to let you know when the power is on. This is the only switch that will allow the transmitter to be turned on. So you can only operate the transmitter with the control head plugged in. In the middle of the control head is a steering channel trim lever. With this control you can fine tune your neutral steering position. The amount of trim authority

was measured at ± 10 degrees (20 degrees total travel). There is also a dual rate switch and a rate adjust control located in the center portion of the control head. The dual rate switch is not marked "high" or "low" rate. When positioned to the right you get full steering control which amounts to a servo rotation of ± 40 degrees (80 degrees total travel). When the dual rate switch is moved to the left position, you will be able to use a "Rate Adj." pot control to reduce the steering servo travel all the way down to only ± 6 degrees (total of 12 degrees travel). In actual practice I can see the R/C car operator leaving the dual rate switch on (to the left) all the time and simply using the "Rate Adj." as a span control to set up the steering for the particular track conditions. Switch it or adjust it, the choice is there for you to make. On the left side of the control head is a third channel level. It is proportional (but without a separate trim) and will provide a total servo travel of 80 degrees. This extra channel would be better for the R/C boat enthusiast since most car operators require only two channel type control. If you use the third channel function on the transmitter you must purchase an extra servo since only two are supplied with the basic system. "Throttle Trim" is the last control on top of the control head. The actual throttle channel is operated by a spring return trigger on the hand grip. Unfortunately, the trigger can't be moved past it's normal stopped position for the purpose of applying brakes. You would, therefore, have to use the throttle trim lever to do this which means that you would have to momentarily have to take your right hand off the steering wheel control. Possibly someone will come up with a simple modification to cope with this minor problem. The main steering wheel control moves only 35 degrees off center in either direction (70 degrees total movement from full left to full right).

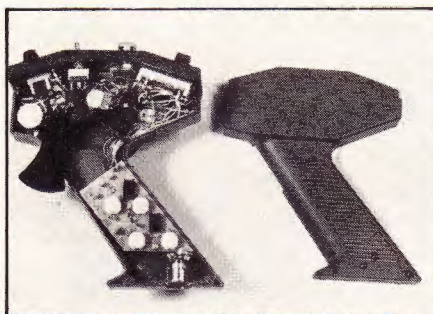
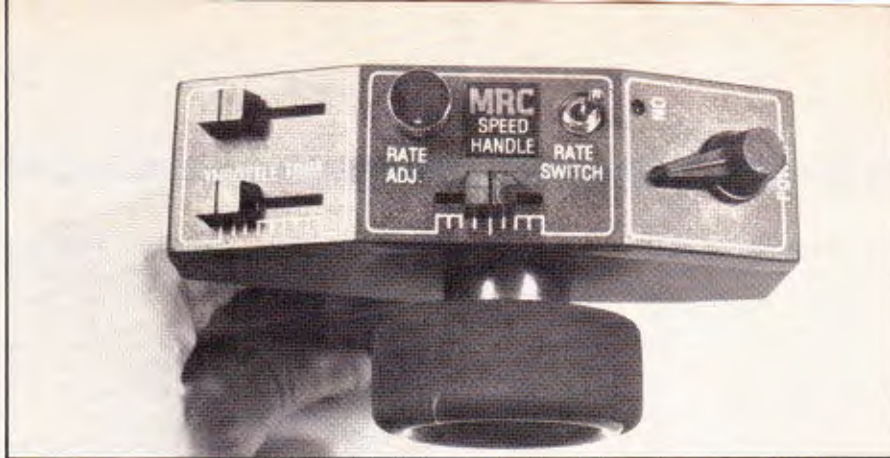
Now for the big surprise! If you remove two small screws from the hand grip portion of the control head you will find a series of extra controls. I must admit that I missed these features while observing this radio at both the WRAM's and Toledo shows. Inside the handle you will find a servo reversing switch for both the steering and throttle channels. Likewise you will find separate end point servo travel adjustment pots for both the steering and throttle control functions. That means you can set up the servo for more right than left control or for more servo excursion on either end of the throttle control function.

Car Pack Description

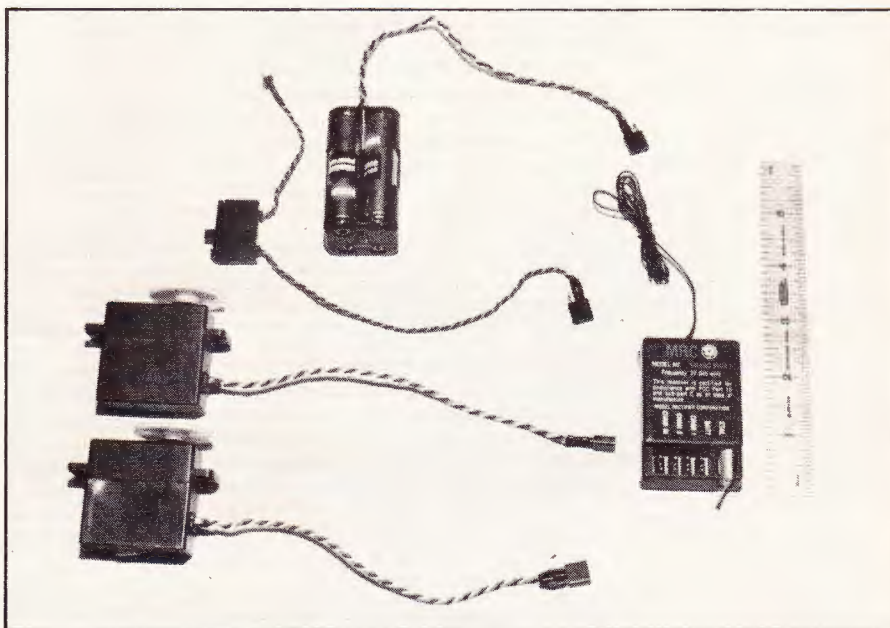
The new MRC Grand Prix three channel receiver measures $2\frac{5}{16}$ inches long x $1\frac{1}{16}$ inches wide x $\frac{3}{4}$ inch thick and weighs just 1.3 ounces. Crystals can be easily plugged into one end of the receiver case for quick frequency changing. All connectors plug directly into the case. The connectors are Mitsumi type with gold plated pins. They can be soldered by the modeler quite easily which is a real plus if maintenance is ever required.

Servos supplied with this system are the new MRC VR-120's. They measure $1\frac{1}{8}$

FLYING MODELS



Bob Aberle shows how the MRC Grand Prix radio is used in actual operation (above). Top view of Speed Handle Control (top). Major controls visible. Inside Speed Handle Control unit (above left). Quite an assortment of electronic parts here. Additional controls found by removing one side of handle grip (left). Steering and throttle channels have reversing switches. Each of these two channels also have individual throw controls. All in all, a very versatile radio. Loaded with features.



Road pack for the Grand Prix radio. Receiver is at right, with battery pack at top center. Servos at left are standard with this radio. Smaller servos are available with other models.

inches long x 1 $\frac{1}{8}$ inches high x $\frac{3}{4}$ inch thick (less output wheel and mounting flanges). Each servo comes with both a 1 inch and a 1 $\frac{1}{4}$ inch diameter output wheel (with no pre-drilled holes in either case). Output shaft has a spline gear which permits easy neutral position adjustments. The VR-120's have a waterproof "O" ring seal around the case halves along with a ball bearing supported output shaft. Individual servo weight is 2.0 ounces including the 6 $\frac{1}{2}$ inch long cable.

A battery box is provided for the car park (equipment that goes in the car) which measures 1 $\frac{1}{4}$ inch square x 2 $\frac{1}{4}$ inches long and weighs 3.8 ounces when holding four alkaline type cells. You can substitute rechargeable nickel-cadmium cells or you may even wish to tap off the main power supply if you are running an electric powered race car (or boat). A simple switch harness is provided (without a charging jack) which weighs 0.2 ounces. Total weight of the car pack (re-

ceiver, two servos, dry battery pack and switch harness) is 9.3 ounces. Without the battery pack it is just 5.5 ounces.

Current wise the receiver idle drain is 21 MA. With two servos added the total idle drain is approximately 35 MA. With one servo in continuous motion I measured 300 MA and with two servos in continuous motion I measured a total, average current drain of 500 MA. These readings were taken with alkaline battery cells which have a slightly higher voltage level than nickel-cadmium batteries. I think this is a good indication that the alkaline cells won't last too long while powering the receiver and servos. The nickel-cadmium rechargeable cells or the direct power tap off the R/C car battery seems the better approach.

Comments on Operation

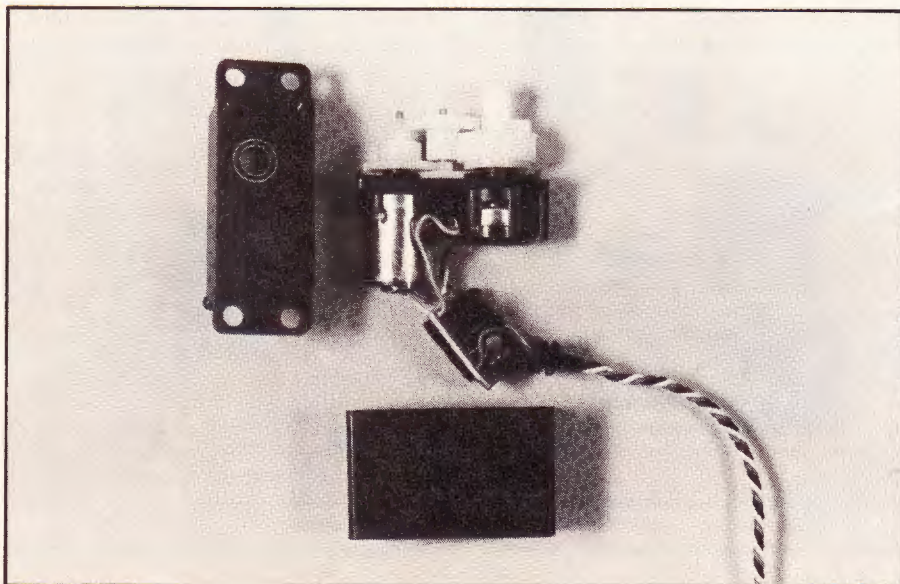
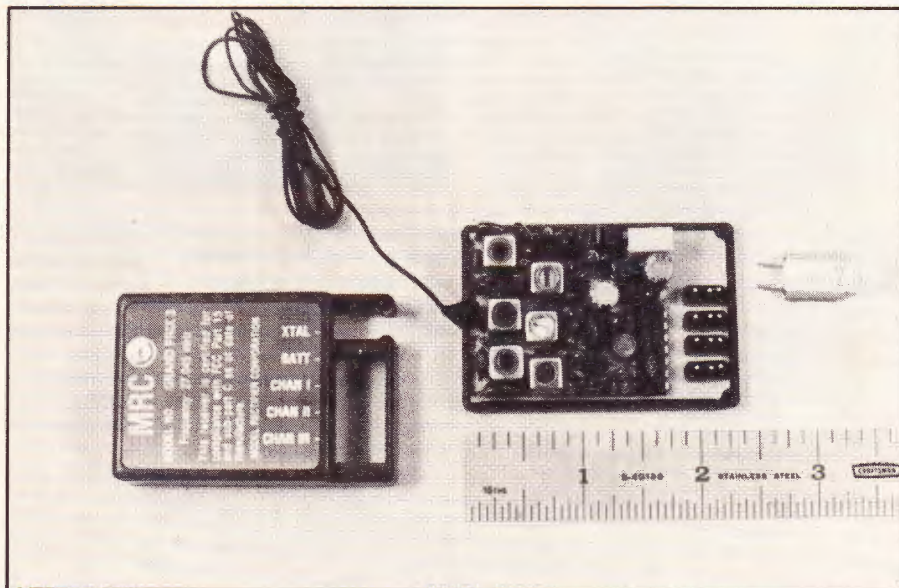
Since this is the first real departure from standard R/C control of cars (or boats for

that matter), I predict that it will take a little getting use to. The experienced competitor may very well stay with what he has for the moment. In the future I see the "Speed Handle Control" concept will catch on and possibly replace the standard two stick R/C transmitter. For my initial testing standpoint I found it quite easy to find a comfortable location for the transmitter module on my belt. Something towards your right, rear, is about optimum. In that location you can still see the transmitter's meters and yet not have the whip antenna get in your way. One of the things missing that I think would be helpful is a hook on the speed handle that would let you hang the handle on the transmitter module when not in use. Otherwise you need an extra hand to constantly hold on to the handle. A microphone attachment connector from a CB set would work out fine for this application. When you are ready to operate the car or boat all you have to do is reach around and disconnect the speed handle from the transmitter module.

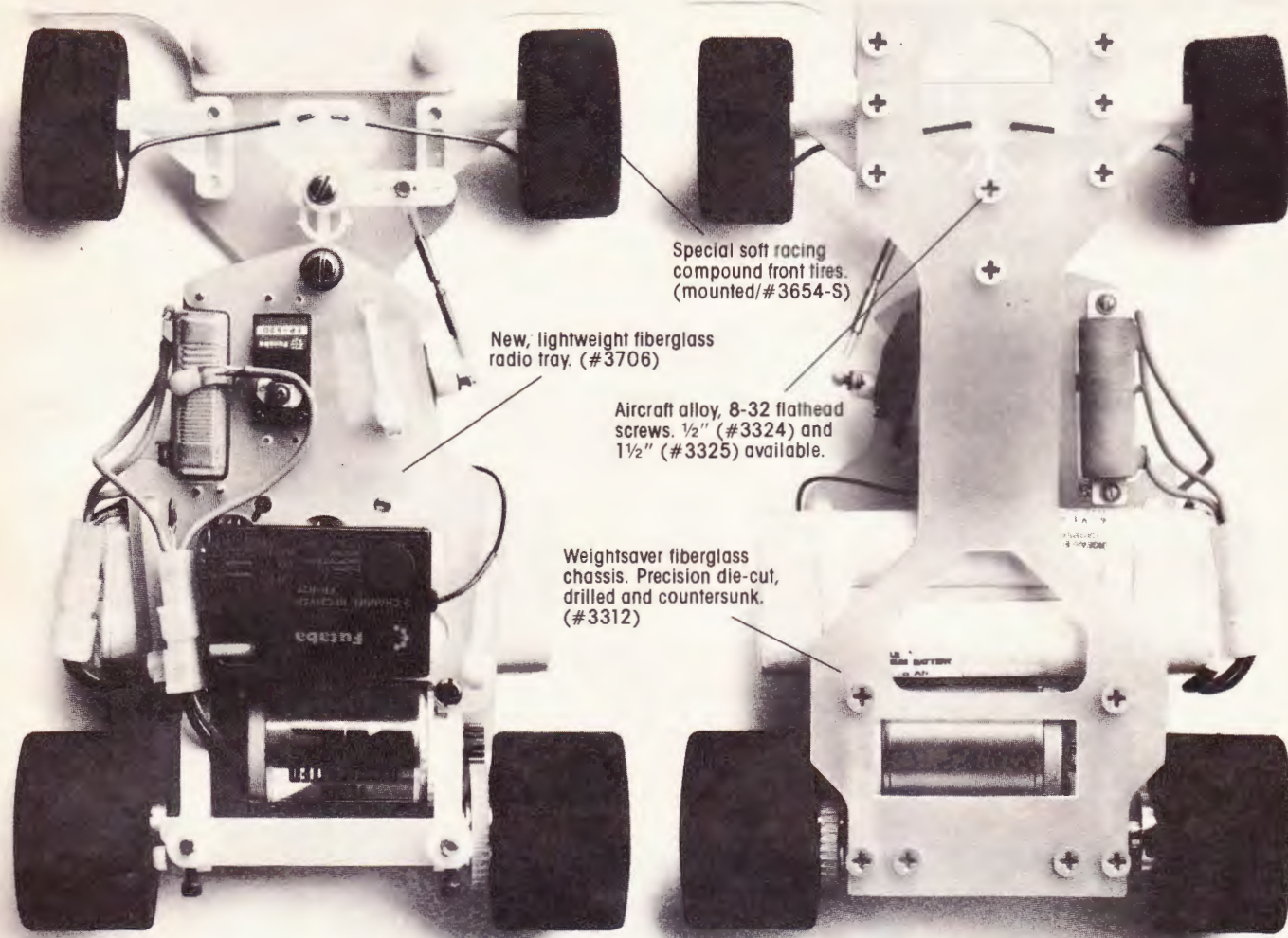
The servos applied with this system were both fast (around 0.4 seconds for full rotation) and responsive. Centering accuracy under no load conditions was under 1 degree when returning from full travel. I did notice some shift in the neutral steering position when switching on the dual rate function (when a lot of steering trim was being used). If you keep your dual rate switch on all the time as I suggested before and use the "Rate Adj" pot as a span control, then you wouldn't be bothered by this neutral shift. About the only thing I feel that still needs resolution is the application of brakes after the throttle control is released (idle or stopped position).

I might also mention that MRC is also offering an alternate "Twin Grip Handle" for those who wish to have a separate control head, but don't necessarily want a speed handle control. The twin grip unit would be ideal for both R/C boats and aircraft operators. Space limitations unfortunately will not permit a review of that option at this time.

My review system was a prototype and therefore did not come with an instruction manual so I can't comment on that. The regular MRC one year limited warranty applies to the new Grand Prix system as well. If you still have questions or would like a detailed brochure I suggest you write to the folks at MRC. Their address is: Model Rectifier Corp., 2500 Woodbridge Ave., Edison, New Jersey 08818.



Inside the MRC Grand Prix three channel receiver (above left). Note that crystal is removeable on this 27 mHz receiver. This compact unit weighs in at 1.3 ounces. Inside the MRC VR-120 servos (left). Output shaft has ball bearing support. For boaters, the servo is sealed with a water-tight "O" ring. This servo, designed for $\frac{1}{8}$ scale gas cars, is fast and accurate. Smaller servos for $\frac{1}{12}$ scale also available. The Grand Prix radio also comes with a dual stick transmitter for use by those who prefer sticks to steering wheels. Take your pick and go racing.



Special soft racing compound front tires. (mounted/#3654-S)

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Starting Line

By Jack Russell

Indoor championships

Yes, all you laid back California racers, there is an indoor R/C championship. Parma International decided it was time to give the indoor crowd a major race to decide a national champion, so the U.S. Indoor Championships were born. All the "Orphan Annie" indoor racers can thank Parma president Ken MacDowell for being their "Daddy Warbucks". The race took place on April 25 and 26, at Brookpart National Guard Armory, in Cleveland, Ohio. Sixty seven racers registered for the championships and 64 actually took part. The field included racers from Michigan, Illinois, Indiana, Texas, New York, New Jersey, Ohio and, for that international flair, Canada.

When the dust settled Sunday, it was Ralph Burch, Jr. who came away as the first ever U.S. Indoor Champion. The young Texan won the "A" main by a lap and a half over Todd Little of Illinois. Terje Haugen, of Indianapolis, was third, followed by Steve

Koepp, Bruce Shaffstall and Tom Miller, all of Ohio. The "B" main was won by Buddy Bartos and John Huron took the top spot in the "C" main. For Ralph Burch, Jr. this was his second big indoor win of 1981. He's really established himself as one of the best drivers in the country, and he's done it at the ripe old age of 13. (That's okay. One of these days Ralphie, and Mike Lavacot and Kent Clausen will start taking girls a little more seriously and leave some room for us older guys with bad reflexes to win a couple of trophies.)

Congratulations to the winners and all the other participants in the first U.S. Indoor Championships. The N.O.R.C.A.R. club did a fantastic job of running the race, and as an indication of how well things went, there were no disagreements between racers and officials at any time during the entire weekend of racing. Not bad, when you consider there were 64 racers on hand.

Credit should also go to Parma, American

Modeler and Hobby Hut hobby shops for their sponsorship of this event. Ken MacDowell, of Parma, tells me they hope to make this race an annual event.

U.S. Gran Prix East?

There will be a U.S. Gran Prix East in 1981. The 1/1 scale guys may not have their act together, but the 1/12 electric racers can count on a big Formula One bash in October, courtesy of FLYING MODELS.

Mark October 4th as a red letter day on your calendar. That's the date of the FLYING MODELS Gran Prix East. As if you couldn't guess, F1 bodies will be used and the cars will be run under ROAR Modified class rules. ROAR membership and an FCC license will be required for registration!

We'll have more details about the FM GP East in the September issue. In the interim, get your F1 cars ready. The race will be held in northern New Jersey at a venue convenient for racers in the northeastern part of the U.S., as well as racers in the eastern portions of the midwest. Stay tuned for further details.


Curvaceous bodies

How are you at picking out svelte bodies? No, not the kind displayed by the Dallas Cowboys cheerleaders, but the kind that goes on your red hot racer. Are all the curves in the right place? (Not the blonde, your race car, remember?)

Just like members of the opposite sex, curves in the right place can be great. Curves in the wrong place can be a drag. You wouldn't want your latest missile (or the blonde) to have any excess drag, now, would you?

Bolink Industries is trying to clear all this up. I don't know how much research they've done on blondes, but Bob Rule tells me they have been wind tunnel testing a number of 1/12 scale bodies, both their own and other manufacturers. The figures they have come up with show total drag of each body tested, as well as pressure (or in some cases, lift) on the front and rear wheels. I have seen some of the results, and they are interesting.

The real question is: how much practical use do these figures have under real running/racing conditions? Anyone who has done any work with model airplanes knows that full scale aviation formulas do not always apply to models because of the vast difference in the Reynolds numbers under discussion. The same holds true with 1/12 scale cars.

When all the information is available from Bolink, FLYING MODELS will present the findings. Although you may be skeptical about the real value of the wind tunnel tests, I think you will be surprised at the negative effect an old, beat up, body has (at least theoretically) on the handling of a 1/12 scale racer. Stay tuned for the results. 

PHOTOGRAPHY: DENNIS CALKINS



Bird's eye view of track at Brookpark National Guard Armory (above), site of U.S. Indoor Championship. Track surface of indoor-outdoor carpet. Some of the racing action (below). NORCAR club hosted event.





An FM Product Review:

Delta's Pocket Rocket

By Dean Hughey

The smallest R/C racer to date turns every living room into a speedway.

Have you ever been snowed in for an entire winter and the only place flat enough and dry enough to run a car is just a little too small? Not everyone has this problem, but for those of us who do, it can sure drive you crazy waiting for the spring thaw. Delta Manufacturing has been working on this problem for some time and has come up with one solution and a great one at that. It's called the Pocket Rocket. It's a 1/18 scale car packed with performance and is specially suited for confined area racing.

At a quick glance, one might think this car is just another toy, but on closer inspection

you will find a full-fledged race car. Don't let the size fool you, this tiny car is as potent as a baby rattle snake.

The basic components are much like that of its 1/12 scale sister. The chassis and radio plate are 1/32 fiberglass. The front suspension consists of a one piece aluminum cross member with nylon steering blocks. The steering blocks are connected to a special servo arm by ball joint tie rods. This set-up makes for a very precise steering system. The rear end is fairly standard with one exception, the rear motor pod is a one piece aluminum extrusion. This not only makes the rear end as solid as a rock, it also acts as a

heat sink to disipate motor heat. All in all, a very straight forward chassis layout.

The electrical system consists of a 6 cell 250 mah battery pack and a very efficient electronic speed controller. The speed controller has a dual mode feature that is really nice. Mode 1 has forward and reverse with electronic brakes while mode 2 is forward only with dynamic brakes. Mode 2 gives you a little better acceleration, but you give up the capability of being your own track marshall by not having reverse.

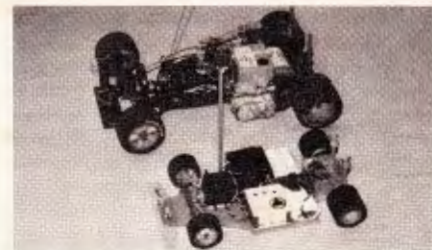
The car is very well engineered and goes together in a very short time. This is mostly do to the excellent fit of all of the parts. The kit is quite complete, only the radio gear is needed. This also saves time in assembly because there is no need to run to the hobby store for more parts.

The body comes unpainted and is highly detailed, all the way down to a molded in driver. The first bodies released for the Pocket Rocket are the Kroll Can-Am and Porsche 935 GT. Soon to be released will be a Corvette, Spyder Can-Am, Schkee and for those dirt track oval fans, Delta will have two bodies in the near future which should be of interest. One is a modified Pinto and the other is a Sprint car body. Both are by Roy Moody.

Although there is no official racing circuit for the Pocket Rockets yet, there are a few tracks springing up that are specially built for them. One such track is inside a restaurant in Canada. It just so happens, the owner of this establishment is none other than Formula 1 driving ace, Gilles Villeneuve. Gilles has a small fleet of Pocket Rockets running now and is so pleased with the performance and the response towards the cars, that he intends to expand his fleet. In fact, he is planning on a chain of these restaurants with Pocket Rocket track inside. Definitely a different experience in dinning out.

I feel the Pocket Rockets are going to give more people the opportunity to get involved in car racing due to the fact that these cars can be raced in almost any garage or medium sized basement. Available space to run has always been a big problem. With the Pocket Rocket, space will no longer be such a big factor. So if you need a car that will give you great performance in a confined area or you are just looking for a new experience in R/C car racing, I highly recommend you try one of Delta's new Pocket Rockets. ◀

PHOTOGRAPHY: DEAN HUGHEY



Delta's Pocket Rocket is 1/18 scale, which is slightly smaller than established 1/12 scale electric cars (above). The Pocket Rocket comes as a kit (left). All the parts are there and the end result is a real racer. A fun car.

R/C Auto clinic

By Jack Russell

Have you sent your car to the R/C racing fat farm? It's all the rage these days, you know. It seems like everybody who goes fast or wants to is trying to shave grams, or good ole' American ounces, off their cars. The process can become an obsession if you're not careful.

The latest rage here on the east coast is the graphite chassis pan and drilled out, hogged out parts mounted there on. This craze began right around the time the March issue of FLYING MODELS hit the news stands. March FM had a photo of Mike Lavacot's experimental, graphite chassis Associated car. Since Associated's trend setting carries the weight of Orson Welles and his twin brother, Slim, graphite chassis pans sold out in most hobby shops within a couple of weeks.

Shortly after the graphite buying spree, I was in Toledo for the Weak Signals show and caught up with Associated's Roger Curtis. Roger and I talked about many things, including graphite chassis. Surprisingly, Roger told me that Team Associated had gone back to fiberglass chassis! Why? It seems that graphite chassis worked well on certain tracks, but became a real handful on others. Since the Associated team runs on a number of differing tracks surfaces, they feel it is better to have a single chassis which will work on all surfaces, rather than have a graphite chassis car for certain tracks and a fiberglass pan car for the others. It makes sense.

In addition, Roger told me that Associated has a new fiberglass chassis, ready for delivery, which places the flex point of the pan in a slightly different position. Also, Associated's team racers have been running a Kydex chassis stiffener down the center of the fiberglass pan. Quite a departure from the light, stiff, twisty graphite chassis which became the overnight rage in Yankee land.

I got into the lightweight discussion recently with Don McKay of JoMac. In case you haven't been paying attention, the JoMac Lightning 2000 has been cleaning up, at least indoors, over the past winter. JoMac has been experimenting with making their car lighter, and the results are pretty much the same as those obtained by Associated. Graphite is nice, but . . . it has drawbacks. Don told me something which took me by surprise. Graphite will stress, and breakdown quicker than a quality fiberglass chassis. In the wings at JoMac is a Lexan chassis for the Lightning 2000. This chassis, with the lightweight front bumper for the 2000 brings the car close to ROAR minimum car weight. From what Don tells me about

the Lexan chassis, it is doing very well under the stresses of actual racing. That directly contradicts some popular notions about Lexan, which have that material being very pliable and susceptible to taking a set (becoming permanently bent) warp very easily.

In the final analysis, the jury is still out on graphite. If it works on your track, and you do not race elsewhere, then it may be a good material for you to use. If you do your racing at a number of tracks, with different surfaces, graphite may not suit all conditions. Fiberglass will work on most tracks, but may not be optimum on some surfaces. Lexan is still in the experimental stages. It, too, may become a popular chassis material. You pay your money and takes your chances.

Don't just follow the leader. If you think you have a chassis material that will work, give it a try. You just might come up with the special hot track that will become the next big rage!

The chassis material is only part of the lightweight story. In order to reduce weight, many folks have been drilling, filing, and generally cutting away all unnecessary material on such assemblies as the "A" arms, front blocks, rear blocks and radio trays. Another favorite for a visit to the fat farm is the set of wheels on your car.

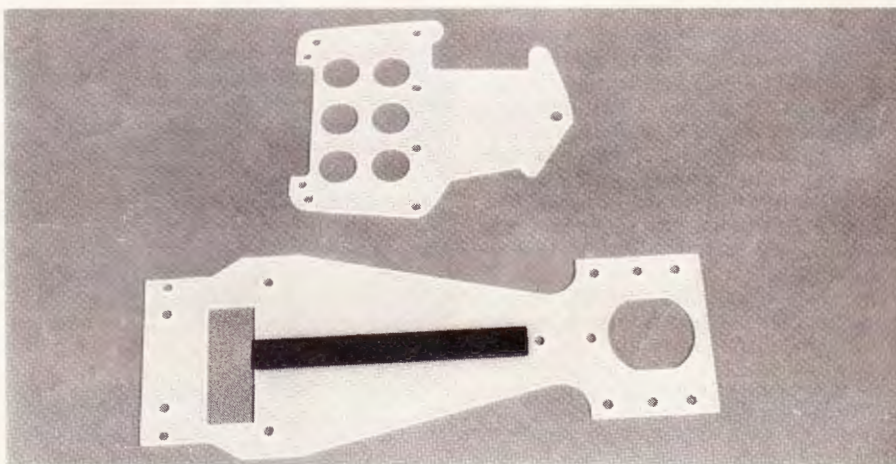
Starting with the front end assemblies, remember just one thing. In most cases lighter

also means weaker when it comes to drilling or filing. If you run without a front bumper to protect the wheels and tires, lightening such parts as the front blocks could be disastrous. There is a tradeoff between ultimate light weight and ruggedness.

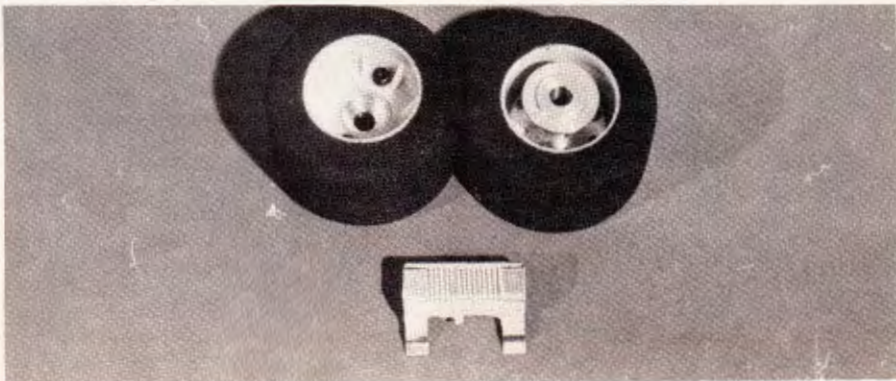
Moving back to the radio tray, there are a number of things being done to remove weight. For those who drive stock Associated cars, there is the lightweight, fiberglass radio tray. Lightweight fanatics will not be satisfied with this though. Bob Emott, proprietor of B.I.R. Hobbies in Union, NJ, has come up with the ultimate lightweight shaker tray. He doesn't use one! Bob has devised a way of mounting a mini-sized speed control resistor on a Bantam Midget servo, and it totally does away with the need for a shaker plate. Bob tells me he will be marketing these little gems, too.

Finally, we arrive at the back of the car. A lot of people have been grinding the rear blocks to remove excess weight. Again, don't overdo it. You can weaken the back blocks with too much filing and cutting. A simple way to save weight in the rear portion of the car is to use a graphite axle. As for the wheels, both front and back wheels can have every other spoke cut out, if you're that much of a fanatic.

Personally, I'm working on helium filled sub-C nicads to help make my car lighter. After all, it works for the Goodyear blimp!

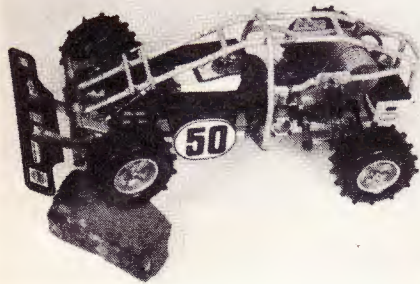


PHOTOGRAPHY: BOB HUNT



Associate's new "wedge" chassis and lightweight radio tray (above right). This fiberglass chassis and Kydex dampener is an alternative to graphite. Parma's lightweight resistor and wheel/hub assembly for cars on a diet (below right).

Pit report



MODEL RECTIFIER CORPORATION, 2500 Woodbridge Avenue, Edison, NJ 08817, announces the ultimate in off road racers . . . the Land Jump 4WD. This four wheel drive vehicle is designed to be used with a .19 to .21 sized engine, with MRC recommending either an Enya 19X or 21X. The four wheel drive is accomplished by using chain drive with a torque clutch on the front sprocket to even out the power between the front wheels. The chain tension is adjustable. A disc brake and centrifugal clutch are standard, as is a radio box for protection of your R/C system. A special muffler and fuel tank come with the kit to retain scale appearance and give good use. The trailing arm suspension system with oil shock absorbers soak up the bumps, while the chassis and roll cage gives great handling in the rough stuff. For further information write to the above address.



BOLINK INDUSTRIES, 420 Hosea Road, Lawrenceville, GA 30245, has come up with a new, non-toxic, water soluble paint for R/C car bodies, and it's called "Mr. Concourse". This paint comes in two ounce, wide mouth jars. It has been formulated to be used on Bolink Tuffak bodies and any other type lexan car body. "Mr. Concourse" paint comes in 7 colors, and can be brushed or sprayed. Water is all that is required for clean-up of either brushes or spray guns. This new Bolink paint is used and recommended by Frank Pupello, winner of the 1981 Winternational Concourse award. For more information write to the above address.

DELTA MANUFACTURING, 27 Racecar Court, Lorimor, IA 50149, is producing a conversion kit to turn any resistive type quick FLYING MODELS



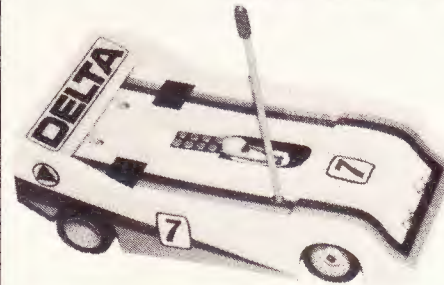
charger into a constant current charger. The model ACK-800 includes all parts necessary to make the conversion, even solder. Com-

plete instructions are included with the kit to aid in assembly. Price is \$15. For more information write to the above address.



Announcing

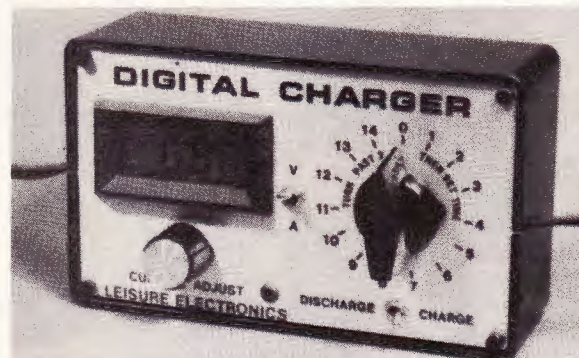
The Delta Pocket Rocket A NEW RACING CLASS 1/18th SCALE



Delta Manufacturing, Inc.
27 Race Car Court, Lorimor, IA 50149
tel. 515/763-2220

not a toy -
a precision quality
competition designed
R/C Racing Car
several body styles available
dealers & dist. inquiries invited
see your local dealer
manufacturers of 1/8, 1/12
& 1/18 race cars & accessories

New LEISURE DIGITAL Auto Charger



\$99.95



New digital charger designed for the serious modeler who wants to obtain top performance from NiCd batteries. Features a large (1/2" high) LCD readout, which stands out even in strong sunlight. Digital meter is designed to read both current and voltage to better than 1% accuracy. Unit also contains a variable rate charger which allows selection of a constant current charge rate up to 4 amps. Permits charging any size NiCd from 250 ma up to 1.2 AH. Built-in equalizer circuit tops off battery overnight for top performance at that big race. As with all LEISURE chargers, this digital unit is manufactured with original, quality electronic components, and is warranted for 60 days from date of purchase.

See your local dealer, or order direct.

LEISURE ELECTRONICS, 11 Deerspring, Irvine, CA 92714
Phone (714) 552-4540

DELTA MANUFACTURING, 27 Racecar Court, Lorimer, IA 50149, has a complete line of tires for 1/12 scale cars. Delta grades each individual rubber donut for hardness to ensure consistent rubber density in each range of tires. Delta produces both front and rear tires, with the rears available in two different diameters. For more information write to the above address.



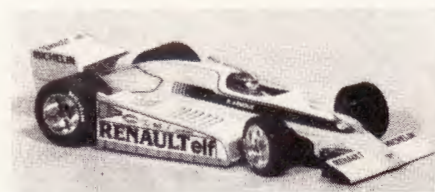
TEAM TRINITY

TRINITY PRODUCTS, P.O. Box 86, Brooklyn, NY 11228. For those racers who would like to modify their motor with a different wind, but are afraid to tackle rewinding, Trinity Products has an entire series of hand wound armatures for Igarashi motors. All Trinity armatures are hand wound with the best wire available. All contact points are welded and the armature is epoxied in a vacuum chamber. The commutator is diamond trued and the armature dynamically balanced to the lowest tolerances available. Winds available include number 22, 22½, double 25, and 25/26 double wire. For more information write to the above address.

TRINITY PRODUCTS, P.O. Box 86, Brooklyn, NY 11228. Double sided tape is used in a number of applications in R/C race cars, and Trinity is now marketing its own tape, model RC#11 Super-Stik Servo Tape. This foam tape measures ½"x1/16", and comes on a 62" roll. The tape can be used for mount-



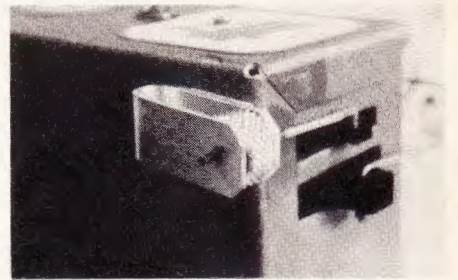
ing receivers and servos, and it features a very high tack adhesive to keep things in place during the rigors of racing. For more information write to the above address.



MODEL RACING PRODUCTS, 12706 N.E. 124th Street, Kirkland, WA 98033, has released the Renault RS23 Formula One body. The RS23 is the latest in F1 technology and its superior aerodynamics and design yields a superior handling 1/12 body. The RS23 has plenty of room for chassis and batteries. It is available either clear or painted, #933 or #933P. For more information write to the above address.

MODEL RACING PRODUCTS, 12706 N.E. 124th Street, Kirkland, WA 98033, has engineered a wiper arm and button specifically

for use in 1/12 scale electric cars. The model 534 wiper arm features a special phosphorous-bronze contact that cuts wiper resistance and increases power. The wiper arm is designed to fit all electric car applications. For more information write to the above address.



PARMA INTERNATIONAL, 13927 Progress Parkway, North Royalton, OH 44133. To allow the racer to get an infinite brake setting from his Futaba steering wheel radio, Parma has introduced a new brake adjuster. This unit uses a threaded rod and wheel to fine tune the trim tab on the popular Futaba radio. Use of the brake adjuster eliminates the detent clicks on the trim tab and allows fine adjustment of brakes for varying track conditions. For more information write to above address.



PARMA INTERNATIONAL INC., 13927 Progress Parkway, North Royalton, OH 44133, makes it easier to change tires and wheels on an Associated Differential with the introduction of their new Tiger rear wheels and hubs. The Tiger wheels allow the racer to change wheels without removing the lock-nut which holds the differential together and keeps it adjusted. For more information write to the above address.



PARMA INTERNATIONAL, 13927 Progress Parkway, North Royalton, OH 44133, announces the latest addition to its line of 1/12 scale bodies, a Go-Kart. This body, complete with molded in driver, is made of lexan. The Go-Kart will fit any 1/12 chassis currently on the market. For more information write to the above address.

WANTED!

RACERS WHO DARE



TO BE DIFFERENT

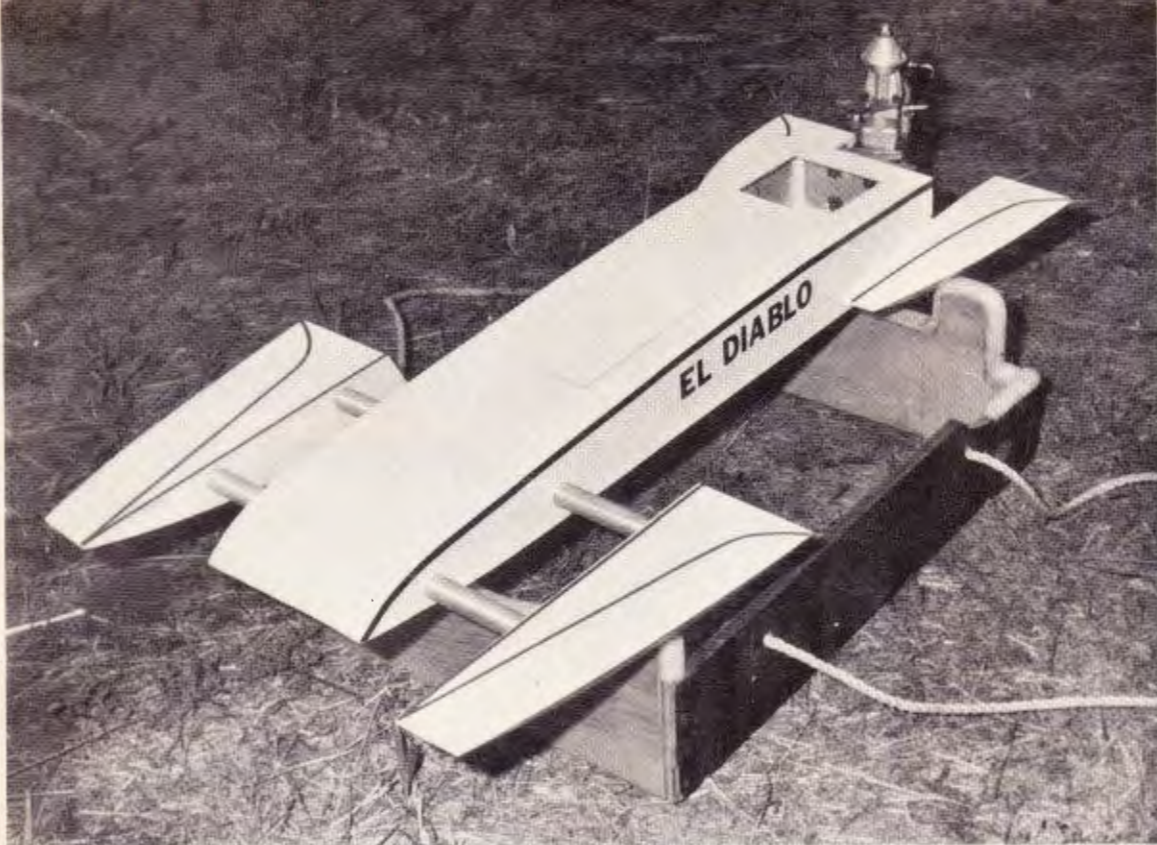
The **CHALLENGER** is now available in Mid-engine and European Rear Engine styles. Both styles are available for ROAR legal production racing or complete with a hot modified hand-selected motor & a BolINK/Schumacher differential ready for serious racing right out of the box.

- Working Wind Tunnel for testing bodies
- Hot New Open-Sports Body - C.A.C.-1 (pictured above, #BL-2087)
- (MR. CONCOURS) Paint - 7 exciting colors - Water Soluable, Brushed on or sprayed

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PHOTOGRAPHY AL BERRY

An FM Product Review:

Precision Boat's El Diablo

By Al Berry

This outboard/outrigger hydro kit is fast to build
and goes like the devil.

The El Diablo ("The Devil" in Spanish), an outrigger outboard from Precision Boat Manufacturing Company, 4120 Richelieu Rd., Indianapolis, Indiana 46226, is a good example of another fine product by Marten Davis. Marten Davis is the owner of the world famous line of boats called the "Crapshooters" which have set or broken nearly every record in all classes of R/C boating. The Crapshooter boats are noted for their speed and stability and the El Diablo is no exception. The El Diablo was first produced back in 1978, with a constant upgrading for the past three years. With all this, it has produced the world's best all around O.B. outrigger. The kit comes from the factory 60 percent completed. With 60 percent of the boat already built and nine pages of instructions that feature ten illustrated drawings and photos the El Diablo can be finished in about two work sessions.

CONSTRUCTION

This is the most completed kit, that you

can buy. First familiarize yourself with all the parts and read the instructions carefully before trying to put anything together. Once you have looked every thing over you can get started gluing the rear sponsons in place. They will extend behind the transom on this model. Next, reinforce all the joints, and bulkheads with filet in the corners. You can use epoxy and micro-balloons to form the filets. While you're at it, go ahead and put filets on the rear sponsons. This will add strength and smooth lines to the appearance of your hull. The front sponsons use aluminum tubing that telescopes together for ease of construction. Next install the turn fin and the strut ride plate. The ride plate will hold the boat level while running and add to faster acceleration. Now install the radio box section rails needed to mount the radio box lid. The boat is now ready for sanding and painting.

FINISHING

Sand the hull with 220 grit sandpaper, then shoot a coat of epoxy primer. Let dry and

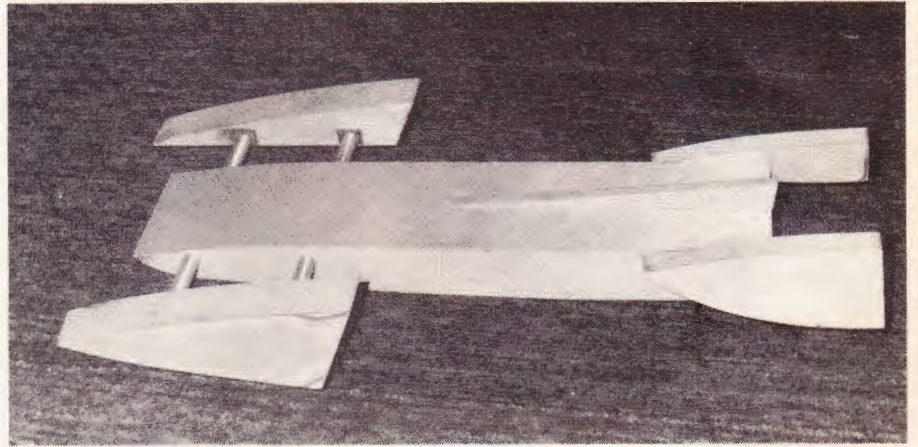
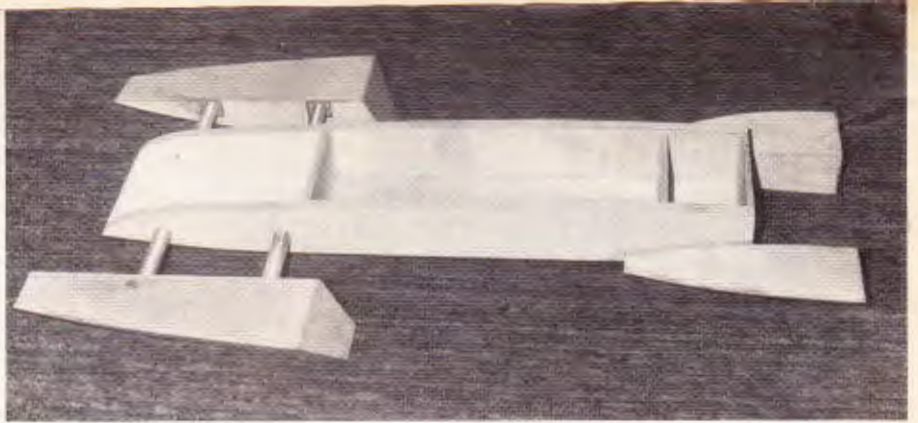
El Diablo

sand with 320 grit sandpaper and shoot a base coat of epoxy paint. Next, add trim paint. Now, you're ready to install the radio and the engine back in the hull. With all construction completed head out to the lake for some trial runs.

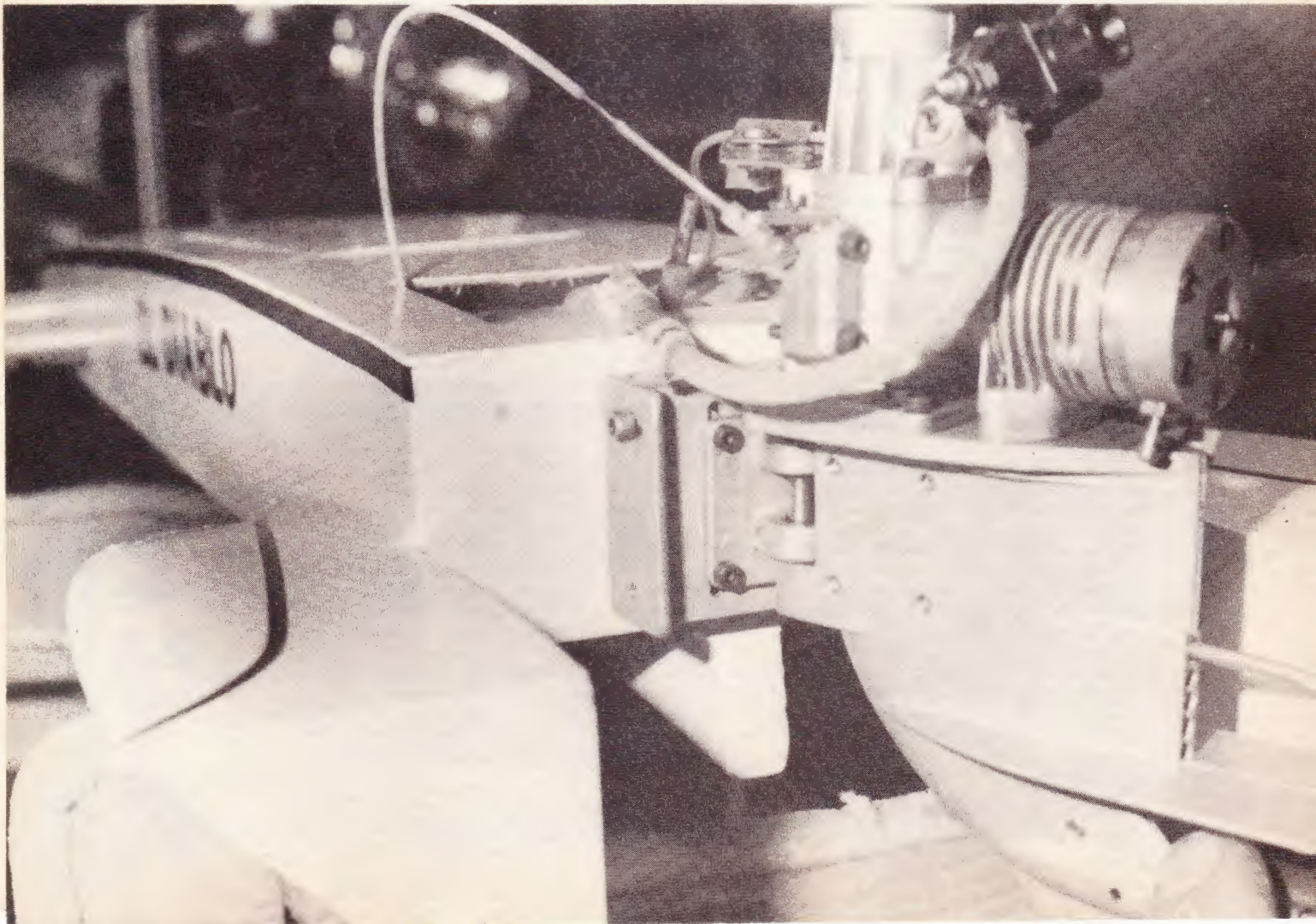
TESTING

Once at the lake we tested our El Diablo with a stock K&B 3.5 outboard first, then later with a fully modified one. The stock engine was very pleasing and quite fast. We used a J.G. G-20 first, then a J.G. H-22, then we went to a Steve Muck O.B. prop which gave us good all round performance on the entire track. With the modified engine we tried the Steven Muck O.B. prop again (which ran well on this engine too), then we went from a J.G. F-25 through a J-30. The F-25 seemed to give us the best all round running with this engine. The stock engine ran in the neighborhood of the high high 40's straight out of the box. The modified engine ran very close to the 60 mark, and that doesn't have any flies on it. All in all, we have been running our El Diablo for several months now and it runs better each time out. If you enjoy yours just half as much as we do, you'll just love it. Take a friend out boating with you and show them how much fun it can be.

C



Top view of hull with sponsons glued in place (top). Note flotation block in bow. Underside of hull with sponsons in place (above). Engine installation (below) shows outboard K&B mounted on El Diablo. Fast.





PHOTOGRAPHY TONY CONTRABASSO

The U.S. Navy's PCE-842 class vessel was chosen by Scale Model Ships Unlimited for their next kit for many reasons. It fills a gap between the P-T boat models and the battleship kits currently on the market; it features a stable and roomy hull that will adapt to any motor/battery/radio combination, and it's $1/48$ th scale allows plenty of detailing without being a big model.

The PCE, or Patrol Craft Escort, was built to a design nearly identical to the *Admirable*-class minesweepers, and was used for various tasks during World War II. Forty-nine saw service in the U.S. Navy, and many more were lend-leased to Great Britain. Displacing 795 tons, the ship had a 184-foot length, a 33-foot beam, and a $9\frac{1}{2}$ -foot draft. Two diesel engines gave it a top speed of 16 knots, and the armament consisted of a 3" 50-cal. mk. 22 gun; three or five 40-mm. guns, and five 20-mm. guns. Depth charge racks and K-gun projectors provided anti-submarine capabilities, and she was manned by a crew of 110. Designed as convoy escorts, the PCE's served from the icy Murmansk run to the tropical Pacific islands. Several were modified into rescue ships and amphibious assault control ships. After the war, some were transferred onto the Great Lakes as training vessels.

SMSU's model was scaled from BuShips drawings (available from the Floating Drydock, Kresgeville, Pa., 18333) made by a Navy draftsman. Several books provided reference photos for detail differences and paint schemes, and the camouflage measures were researched from the Floating Drydock's *U. S. Navy Camouflage* book.

As the prototype hull was to be used as a pattern for the production fiberglass piece, particular attention was paid to the accuracy of the contours. Fourteen bulkheads were erected on a plywood keel, alignment being held true by the use of jigs. All frames, and the keel, were made in half-sections to enable the hull to be split down the center when complete, allowing proper molding techniques to be used. The assembly was held together with four bolts and some tape. The hull's rounded

FLYING MODELS

An FM Product Review:

Scale Model Ships Unlimited's Patrol Escort

By Eric Goldschrafe

Plenty of scale detailing is possible
with this moderately sized ship.

bottom was fabricated with the plank-on-frame method, and the sides sheeted with $1/16$ th" plywood. Many templates were used in the sanding process to ensure accuracy, and when the woodworking was completed, the unit was finished with Hobby epoxy resin. The kit hulls will require only bonding the halves together and locating wood mounting blocks in appropriate locations for the motors and equipment to be used.

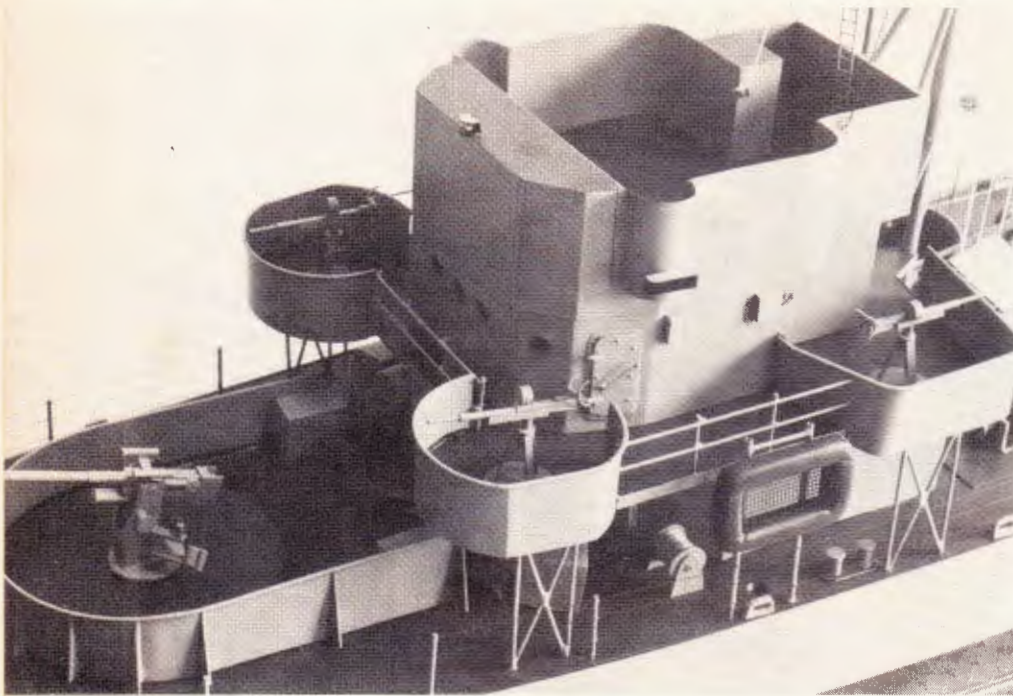
The kit supplies two plywood main deck sections which are cut to fit snugly along the inside upper edge of the hull, and are removable with all of the topside gear attached. This provides easy access to the entire hull area for mechanical maintenance.

The forward deckhouse, the base for the stack, and the bulkheads at the break in the deck line are built up from balsa sheet, using the full-sized templates in the plans as a guide. As the individual levels are completed, they are covered with index card stock. This saves a lot of time later on as filling and sanding of these parts will not be necessary, a few light

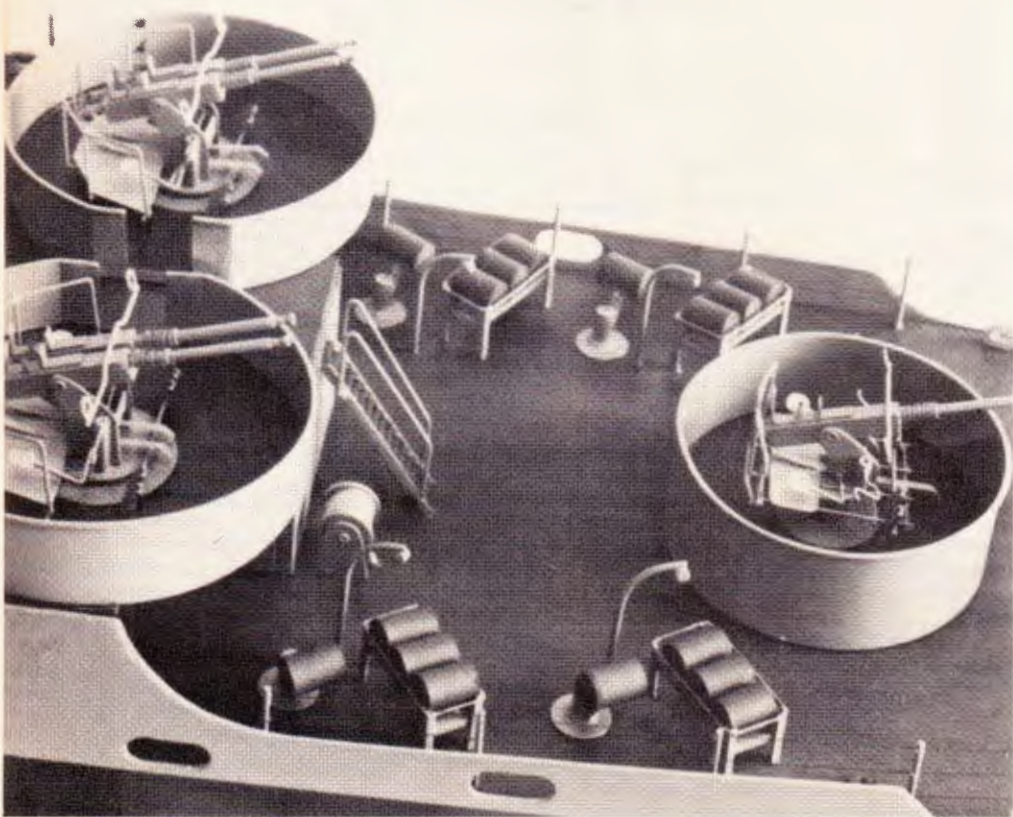
spray coats of clear varnish or enamel will seal the pores in the cardstock and it will be ready for painting. The various splinter shields and gun tubs are built around balsa bases using card stock, although some modelers may find thin sheet metal (from a tin can), sheet styrene or Plastruc ABS easier to form. A piece of $3/32$ " dia brass wire is formed around the base piece of each tub, and then cemented or epoxied around the outer top edge to give the proper appearance and add strength to the shield.

The remaining work is the assembly of the many super-detail parts that make this such an outstanding model. Most of the sub-assemblies involve cutting stock size pieces to lengths shown on the plans, using plastic shapes, brass wire, and aluminum tubing. Detailed drawings show how these parts get assembled into the gun mounts, depth charge racks, depth charge K-guns, the mast, railings, and deck fittings. The motor whaleboat could be a carved block with a simulated tarpaulin cover, but as it is almost 7" long, com-

Patrol Escort



Forward three inch gun mount is enclosed in tub (above). Bridge and 20 mm guns. Aft deck with two twin 40 mm mounts (below). Aft quarter deck has 40 mm mount, "K" gun and depth charge launchers.



plete detailing is easily added. The kit contains enough material to make all of the parts, but if any pieces get damaged or misplaced, replacement stock material is available at most hobby shops.

Before the model is rigged, in fact, before the sub-assemblies are attached to the decks, the painting should be done. While diagrams are supplied with the kit, photographs are helpful in understanding the camouflage patterns. One may even wish to obtain a color chip card from the Floating Drydock to ensure accuracy.

Our research uncovered four basic paint schemes used on this class of vessel, with some variations on the splinter, or "dazzle" patterns. The easiest paint scheme is the wartime U.S.N. Measure 21, overall navy blue. This color is a deep blue and was intended as a defensive scheme against air attack, particularly Kamikazes. While easy to do, the dark, flat color tends to hide a lot of detail. Another fairly easy paint job is Measure US27, the haze gray and deck blue-gray scheme in use today. The subject model of this article is painted in Measure 22, similar to US27, except that the lower portion of the hull (up to the lowest part of the main deck) is painted in navy blue. The most difficult scheme is the splinter camouflage, Measure 32. The decks are done in deck blue-gray, and the dazzle pattern is in haze gray and dull black.

All schemes have the red-orange anti-fouling bottom paint below the waterline, with the black boot-topping at the waterline. Some weathering could be done on the hull, but generally, U.S. Navy ships are maintained from the main deck up while underway, the paintwork being kept up in all but extreme conditions. If needed, the hull would be repainted only in port or in drydock.

The model in the photos was given some light rust stains in the usual places, along the waterline, below the anchors, and in a few other spots at random along the sides, as if a boat or barge had come in contact while at anchorage. Some light gray streaks were air-brushed along the hull to simulate salt staining from wave action. This was done mostly on the lower section where the dark blue color was applied.

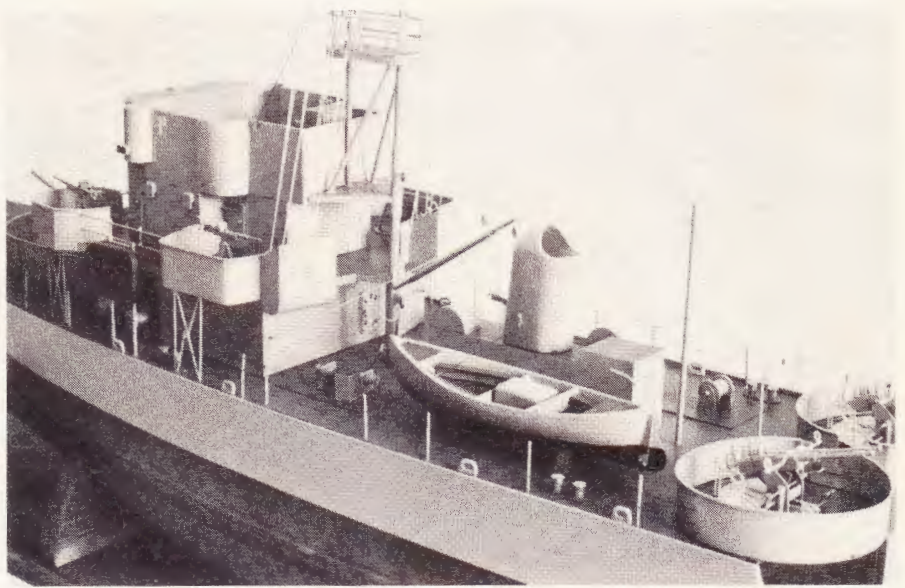
Wartime markings consisted of small hull numbers forward in white, and the ships had no names. Some vessels did receive names after the war, and any post-war ship would have the large black and white shadow numbers in use today. Post-war ships could have their battle ribbons and award ribbons painted on the bridge, and efficiency "E's" painted on the bridge, gun tub, or funnel, in an effort to give the ship a little color.

Rigging of the mast, boom, halyards, and life lines should be done with model rigging thread, as household thread is too fuzzy. Black thread should be used where the rigging is wire cable, such as the mast stays, boom topping lift, and lifelines. White or light tan is used to simulate rope. The plans give complete rigging details.

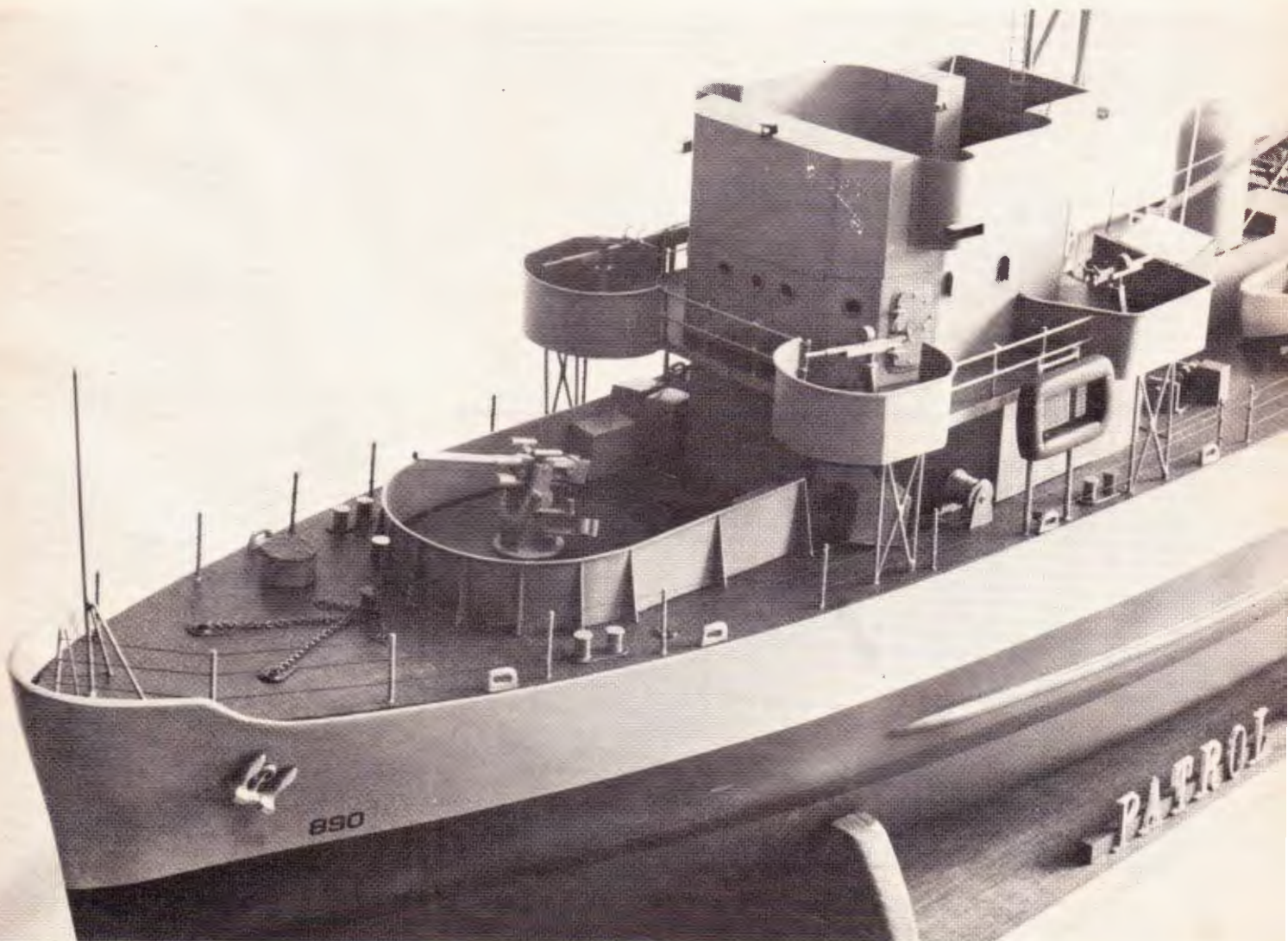
Further detailing could be added with operating running lights, a working horn, or figures (converted from 1/48th scale armor or O gauge model railroad figures). On a model like this, the possibilities are almost endless.

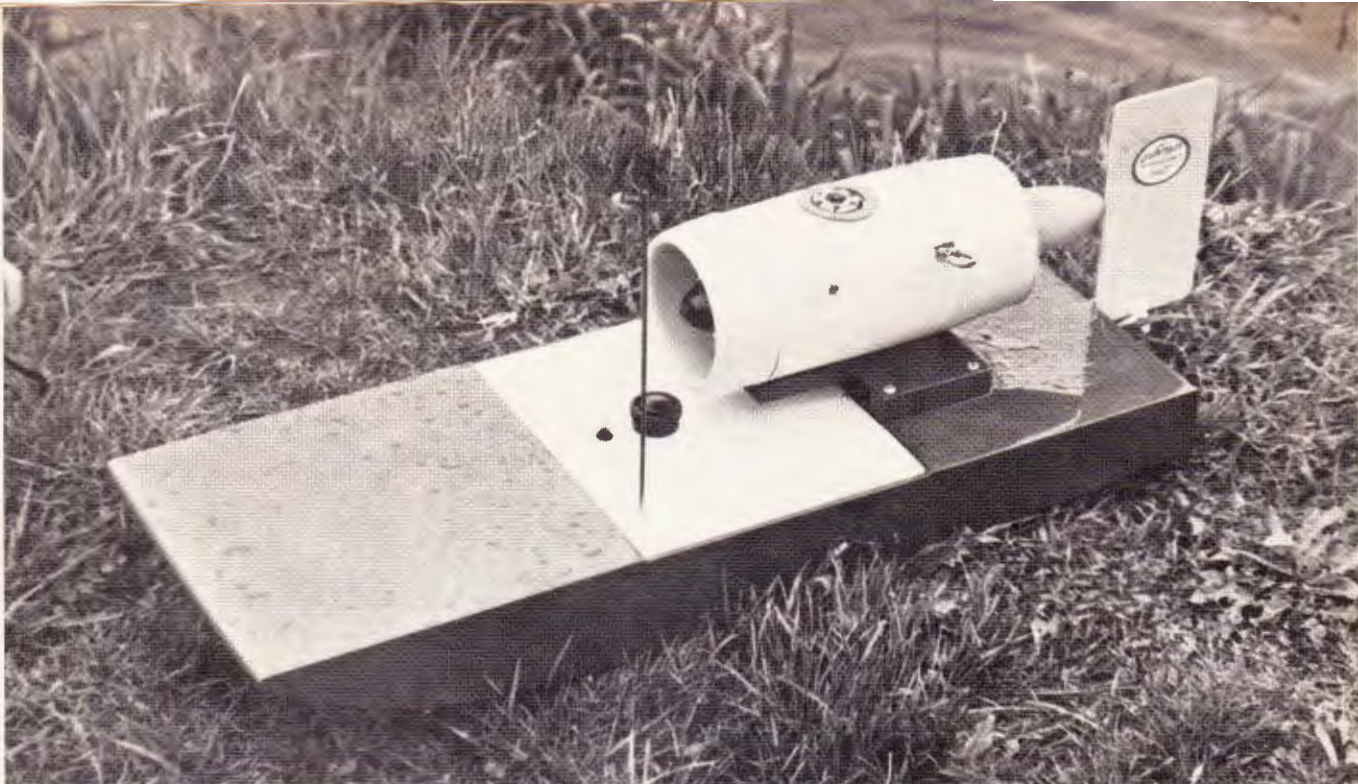
For sailing, the model should be ballasted if necessary to make it float at the waterline; this guarantees stability. The weight should be kept centered fore-and-aft, and side-to-side, and kept as low as possible. You can figure on between five and ten pounds of ballast, depending on the weight of your internal hardware. If prototypical twin-screw propulsion is used with individual speed controls, the model's performance and handling will be precise and realistic. The kit is provided with a plain stern; no nubs for the exit of the propeller shafts. This allows you to choose between one or two props. The roomy hull allows for plenty of power and lots of experimentation with the mechanical controls. While this hull is strong and the components used for the propeller and rudder shafts and housings quite watertight, insurance in the form of styrofoam blocks or lunch bags filled with plastic "popcorn" may be added for floatation in the event of a tragedy.

While at first appearing too complex for the average modeler, this kit will provide hours of enjoyment, not just in building, but in sailing, too. It also happens to look great sitting on a shelf in the den.



Midship shows stack and life boat with boom attached (above). Starboard bow shows shear of hull (below). Anchor chains with anchors attached are also visible. This ship is clean and straight forward.





PHOTOGRAPHY DICK SARPOLUS

The January 1981 issue of *FLYING MODELS* contained an article on Dumas Swamp Buggy racing, as it is done by an enthusiastic group in New Jersey. Basically fun racing, modifications to the stock Swamp Buggy kits are limited to changes only on the top of the hull and use of any engine up to .25 displacement.

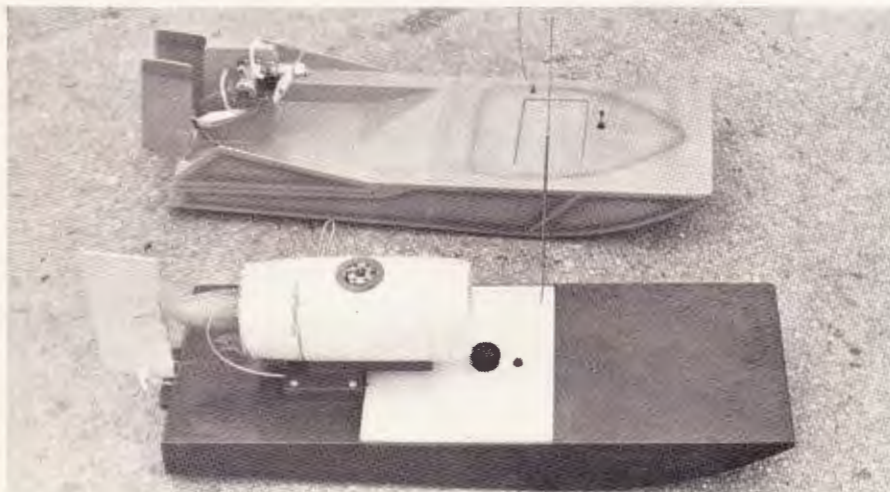
Some pretty wild boats have shown up for the races, but the winner is still liable to be a stock kit boat with a tired old engine. Windy weather makes it a little tough to keep these boats right side up during a race, and the element of luck still plays a big part in these races.

Recently, Army Captain Bill Johnson

a ducted fan Swamp Buggy

By Dick Sarpolus

A popular ducted fan unit takes to the water
aboard Dumas' Swamp Buggy.



The Midwest RK-20B ducted fan unit mounted on a Dumas Swamp Buggy (top). Boat is powered by a K&B 3.5 engine. Modified Swamp Buggy poses with ducted fan version (above). Fan blasts single rudder.

showed up with a Swamp Buggy that really got some double takes due to Bill's choice of a powerplant. He has mated a Midwest RK-20B ducted fan unit and a K&B 3.5 engine to the Buggy.

Bill's planning involved two ideas, stability due to a lower center of gravity, and maneuverability due to the air blast on the rudder. The RK-20B ducted fan unit could be mounted close to the deck due to the small diameter of its five bladed fan. This lower engine mounting should help stability, and if streamlining is a factor, the fan unit is certainly streamlined. The midwest fan unit is made up of molded nylon parts, quick and easy to assemble. The K&B 3.5 is an ideal engine choice, with its high r.p.m. Schnuerle porting, rear exhaust, and still a reliable idle from its Perry carburetor. His setup uses a molded short inlet and special exhaust duct available from Kress Technology Inc. The fan assembly is mounted so it just clears the standard air rudder, and Bill used the special large capacity 6.5 ounce fuel tank now sold by Midwest.

Cooling of this engine certainly shouldn't be a problem, with the large volume of air that the RK-20B pushes through the duct. This stream of air, aimed directly at the steering rudder, should permit terrific turning ability. A real unknown was the speed which could be expected from this rig. Used in an airplane, ducted fans have slow acceleration on the ground, but once in the air, they can really move.

With the boat ready to go, Bill tested it on a cold, windy day. It did accelerate slowly, but seemed to get up to a speed comparable with a standard Swamp Buggy and the new K&B wasn't yet fully leaned out. Even in the wind, water spray didn't cause any problems and it did turn tightly.

The true test, of course, will be in competition. To show Bill's cautious approach, his entire fan unit can be removed from the boat with only four bolts, and replaced with a standard engine/prop arrangement. We're looking forward to seeing this unique ducted fan airboat perform in the next race.

R/C Sport Boats

By Vic Macaluso

Last month we discussed the problems of being unprepared early in the season. This month I'd like to discuss a very vital piece of equipment involved with *staying* prepared, the field kit. Each phase of modeling calls it by whatever name it chooses, but the bottom line is, if your modeling involves any sort of motorization, you absolutely *need* a field kit.

Field kits come in many shapes and sizes and are outfitted in an infinite variety of ways. How yours is outfitted will depend largely on what type of boating you do. Believe me, a well equipped field kit can cost as much, even more than your model does! A basic rule of thumb to follow is to fill your basic needs first, then add spare parts and other goodies as you need or can afford them.

Pictured here is the type of field kit I use. It is both compact and, yet, able to contain just about everything you need to completely unrig and rig a power R/C boat. Because I run both outboards and inboards I carry tools and various other items pertaining to both. Like I said before, depending on your specific boating needs, a field kit can get quite elaborate! I boat with one gentleman who is very competition oriented and his field kit takes up the entire back of his station wagon. He can literally stock a hobby shop for competition boaters with just his spare parts and engines. Now that extremes are out of the way, let's see what we really need to enjoy an afternoon's boating and cope with minor breakdowns at the lake. Believe me, you always have some minor problem when running even if it's just a blown glow plug.

Let's start with some of the basic tools you will want to carry with you. I've compiled a list of tools that I carry with me:

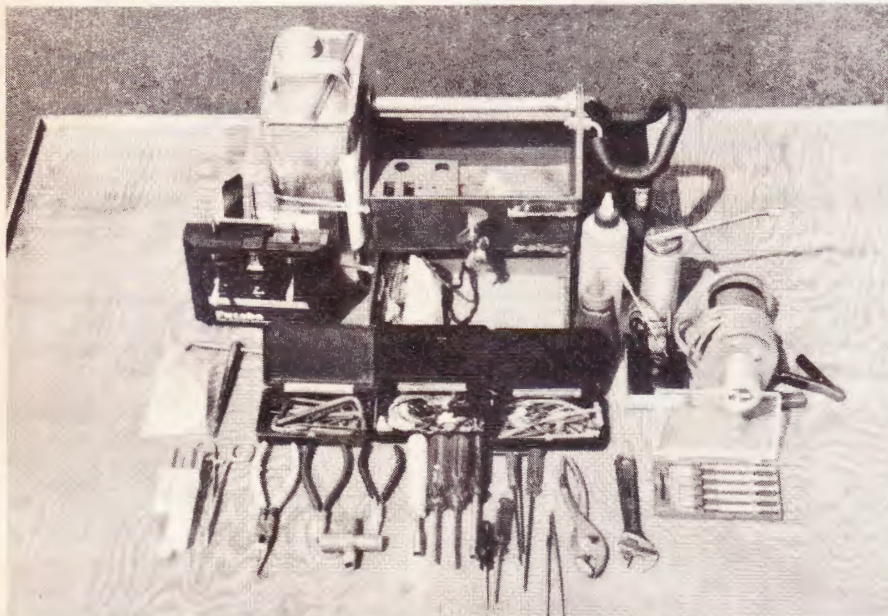
1. Pliers: 1 needle nose, 1 flat nose, 1 diagonal cutter
2. Screw Drivers: 1 large slot head, 1 small slot head, 1 large philips, 1 small philips
3. A complete set of allen wrenches from 1/4" down
4. An X-acto knifehandle with assorted blades
5. 1 - 4-way wrench
6. 1 - small, adjustable wrench
7. 2 or 3 nut drivers of various sizes
8. An assortment of jewelers screwdrivers

Some extra items I find very handy to carry with me are: 5 minute epoxy, a small bottle of Hot Stuff, and an extra set of glow plug leads.

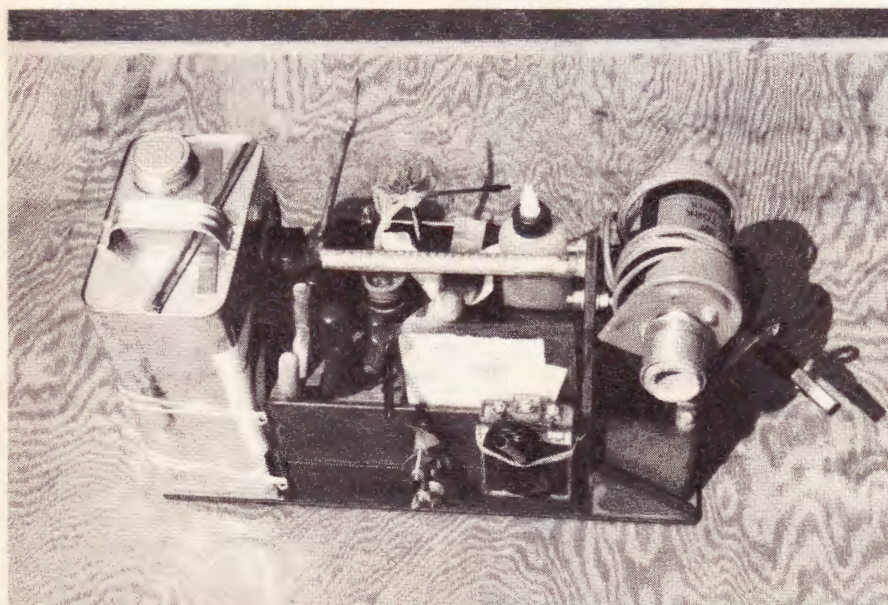
You will notice I also carry some small parts boxes with me. These I find extremely valuable. Anytime I find some extra set of screws, glow plugs, mounting bolts, servo parts or anything else I think I might need I stash them in the boxes. You never know when you might need them.

As you've probably noticed by now, I'm using a field kit made by Goldberg. This comes as a kit and can be built in one evening. It's the most compact one I've seen and in addition to all of the above tools and spare items it also carries 1 gallon of gas, a 12V motorcycle battery for your electric starter, and the starter itself, a squeeze bulb, a squirt can of STP (for the flex cable and strut bearings) and a plastic squeeze bottle that I use to flush the cooling system and drive train when I run in salt water (an absolute must).

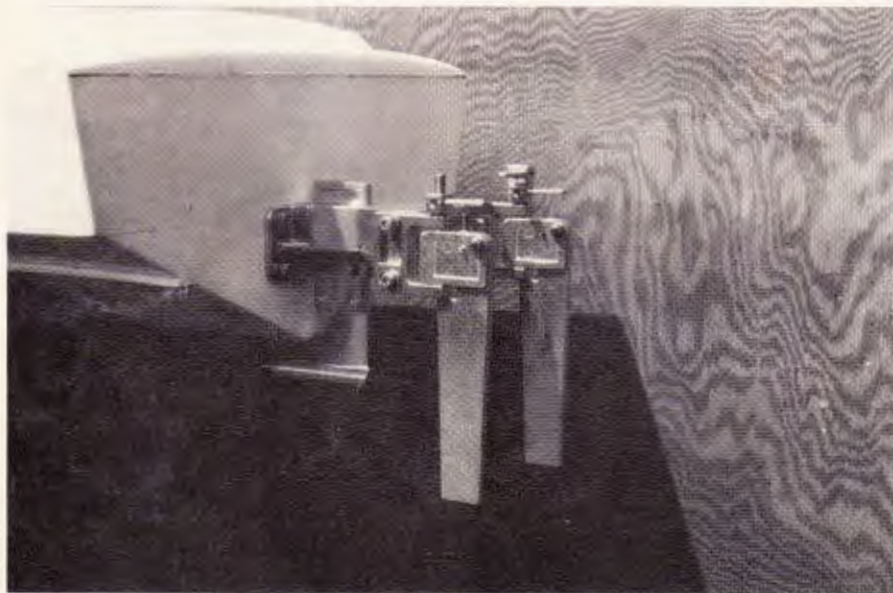
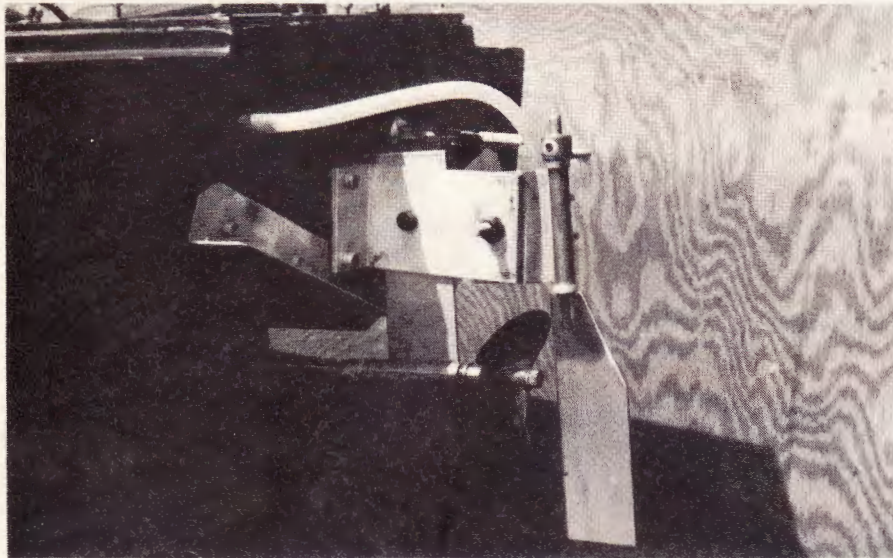
I've presented a fairly complete list of what you will need to properly run and maintain your model boat, be it a sport model or all out competition machine. The amount of spare parts (shafts, props, rudders, glow plugs, engines, tuned pipes, etc. etc) you carry is strictly governed by what you feel you need.



PHOTOGRAPHY VIC MACALUSO



Our author's Handi-Tote field box by Goldberg (top) with its contents on display. This box is extremely compact, yet can carry an amazing amount of equipment. Handi-Tote packed and ready for a day at the races (above). All the items in the top photo are packed neatly away. Handi-Tote is rugged, too.



Single Rudder, flex cable outdrive (top). This is a popular set up with competitors and sport boaters. Double rudder, flex cable outdrive (above) has slightly more drag than single rudder and much more stability in rough water. Outboard (below) is simplest to rig. Outboard is reliable and excellent beginners choice.



There will always be the complete hobby shop in a car and the guy who borrows everything. Try to fall somewhere in the middle.

Drive trains

The selection of a specific drive train in a model boat can be confusing, particularly to the novice boater. What I'll try to do here is present the various drive trains and their general uses. (The space in this column precludes going into specific detail about each one, but I'll welcome any and all questions)

Straight drive

A straight drive is probably the simplest and least expensive drive train to use. It consists of an engine coupling, stuffing box, angled drive shaft, support strut, prop and rudder. You will find this type of drive on most scale type boats, tug, P.T., cutter, etc., because this is the way most real boats do it and it's also the simplest of all drives. There are few if any adjustments and it will practically last forever.

Outdrive

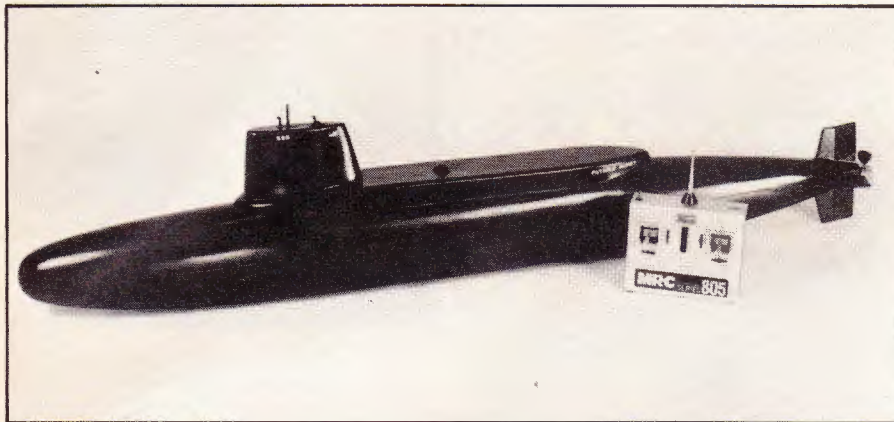
Outdrives come in two versions. I personally feel that the single rudder drive is better for competition because of less drag in the water. Both outdrives are set up for flex-cable operation. I prefer flexdrive because you have more of an adjustment latitude with this type and initial rigging alignment isn't as critical with a flexdrive as it is with a hard shaft. Hard shaft drives do have their benefits, the main one being less overall drag in the drive line. The majority of competition boaters I've seen seem to favor the flexdrive for durability and ease of alignment. You're probably asking yourself if single rudder is so great, why the double rudder on my new deep-vee? I plan to run this boat strictly in salt water and mainly on the Long Island Sound. This boat is being outfitted to run nonstop across the L.I. Sound and the purpose of those twin rudders is to keep it pointing straight ahead in waves that will sometimes be higher than the length of the boat (48"). The outdrive configuration is the mainstay of the competition set. It's lightweight, extremely rugged, easy to repair or replace parts and the main benefit is you can run surface piercing propellers at any depth you choose, just with a simple adjustment.

Outboard

This is the type of drive I would recommend to any beginner coming into the hobby. It's completely self contained, easy to rig and only requires steering, throttle, and gas hookups to be in business. An outboard can be adapted to almost any type of hull and on a properly trimmed tunnel hull might give you more of a thrill than you bargained for! The outboards on the market today are very rugged and reliable and are quite capable of satisfying the speed needs of any weekend boater.

That's all for this month folks! Keep those cards, pictures and letters coming to me at: 34 Campo Ave., Selden, N.Y. 11784 ☐

letter rip



MODEL RECTIFIER CORPORATION,
2500 Woodbridge Avenue, Edison, NJ 08817, is introducing its first R/C submarine, a 1/80 scale model of the USS Patrick Henry. The sub features a fiberglass hull which is strong enough to take abuse and protect the radio equipment. There are two ballast tanks which are powered by a pair of heavy duty Mabuchi 540S electric motors to allow the sub to dive and surface. The Patric Henry is designed so it will automatically "blow" its ballast if it dives too deep. This model requires a 4 channel radio to control diving planes, forward speed, rudder and ballast tank levels. The kit comes complete with all necessary hardware including a highly polished brass propeller. The Patrick Henry is a fast moving submarine that is prototypical in all its control functions. Suggested retail price is \$659.95. For more information write to the above address.

Hobbypoxy helpers

If there is one predominant adhesive used by today's R/C boaters, it's epoxy. Not only is epoxy used as a glue, it is also the most popular finishing system on the water. The Hobbypoxy Products company, of Rockaway, New Jersey, has long been a leader in the field of epoxy adhesives and paints for modelers. Now, Hobbypoxy has come up with a new line of literature which describes the best way to

use their products in the construction and finishing of model boats.

If you are into wood or glass boats, the Hobbypoxy pamphlets will assist you in your quest to use the right product in the right place. Hobbypoxy Formula 1, 2, 3, and 4 glues all have uses in model boats and if the different numbers and formulas have thrown you for a loop make sure you read the latest offerings from Hobbypoxy.

Basically, the Formula 1 Hobbypoxy glue has a working time of about 15 minutes. It gives you more working time than the quick hardening Formula 4 Hobbypoxy. Formula 1 is fine for large areas, and such jobs as laminating keels. It has other uses which are explained in the Hobbypoxy brochure.

Formula 2 Hobbypoxy is the standard, slow setting epoxy most modelers are familiar with. Formula 2 gives about 45 minutes of working time and can be used for such varied jobs as planking and coating the interior of a hull. Tips on how best to handle Formula 2 are included in the Hobbypoxy tip sheet.

For vertical joints and gluing jobs, Formula 3 Hobbypoxy should be your choice. This adhesive takes about an hour to set up, but, because of its special chemical composition, it will adhere to vertical structures without running or sagging. Formula 3 is also discussed in the tip sheet.

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The Products

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Hobbypoxy also makes an item called Quick-Prep polyester resin, and this is a perfect glue for use with fiberglass boats and hulls. If you are looking for a filler to fix dents, chips or ripples in fiberglass boats, Hobbypoxy PFC should do the job. PFC is also a polyester product and its uses are explained in the new instruction sheet for Hobbypoxy products.

Once the building portion of the job is completed, it's time to finish and paint your latest creation. When it comes to the topic of finishing and painting, Hobbypoxy also has an elaborate instruction sheet called Hobbypoxy Painting Pointers. The four pages of tips and

AT LAST . . . SOMETHING A BIT BIGGER

We have received many requests to produce larger scale boat kits from you folks in R/C. While our present kits accept R/C readily, you seem to want the option of building a larger boat—and sailing it farther.

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Muscongus Bay Lobster Smack



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The Muscongus Bay Lobster Smack, 33" hull length, beam 10 1/4", scale 1 1/2"=1', simplified plank construction ... \$119.50



Seguin Tug Boat



Maine Lobster Boat

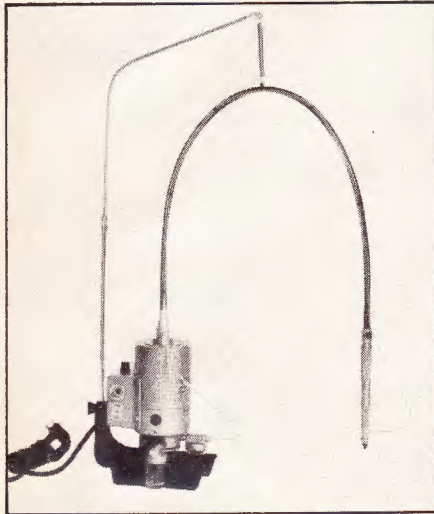
All these kits accept R/C very nicely. All are quality designed, de-bugged and contain quality pre-cut basswood & mahogany, plus necessary hardware like drive shaft and propeller. We omit universal couplings because the size depends on your choice of engine or motor. These kits build up into fine, authentic models for sailing and displaying. Simplified plank construction is easiest for beginners but planked hulls are not too difficult.

See your Hobby Dealer before you order direct.

THE LAUGHING WHALE Box 191, Wiscasset, Maine 04578

hints on the use of Hobbyoxy paints should answer almost any question you might have regarding the proper use of this particular brand of epoxy paint. In addition, Hobbyoxy has a number of hints and suggestions for the use of support products like Stuff and Polyester Filler Compound.

So, if you are trying to master the art of using epoxy glues and paints, Hobbyoxy is ready to help. Just write to Hobbyoxy Products, 36 Pine Street, Rockaway, NJ 07866, and ask for their tip sheet on the use of Hobbyoxy glues in the construction of boats and the Hobbyoxy Painting Pointers sheet. The information is there. Take advantage of it—
JACK RUSSELL.

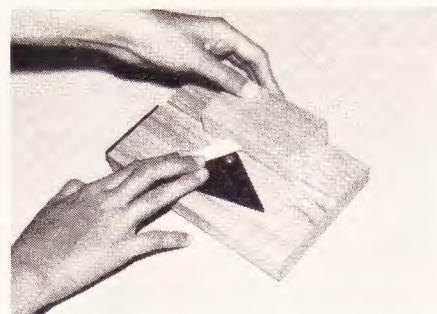


head size. For more information write to the above address.

INTERNATIONAL ADHESIVES CORPORATION, 475 South Dean St., Englewood, NJ 07631, introduces a new rapid bonding adhesive with up to 5,000 pounds of holding power. Called Fantastic® super glue, the cyanoacrylate adhesive is designed for a wide variety of household tasks. One drop of Fantastic super glue will bond rubber, metal, plastic, ceramic, glass, porcelain or any other non-porous material. Because Fantastic super glue sets in seconds, there is no clamping required. Fantastic super glue is packaged in a 2 gram or 3 gram tube.

PAASCHE AIRBRUSH CO., 1909 Diversey Parkway, Chicago, IL 60614, has a new, colorful, 20 page airbrush catalog available. A complete line of airbrushes, related equipment and instruction books for the amateur and professional are described in Paasche's new full color catalog. Helpful four color illustrations throughout the book show airbrush technique by artists, ceramists, hobbyists, as well as many other users, including photo retouchers, baker stylists, T-shirt colorists, taxidermists, finishers and component manufacturers showing spray techniques. For more information write to the above address.

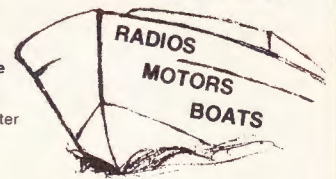
FOURMOST PRODUCTS, 4040 24th Ave., Forest Grove, OR 97116, recently announced an addition to their product line. It is called their "Miter Master" (catalog No. 122) with a list price \$7.50 (assembled). This device is essentially a small scale sanding fixture



FOREDOM ELECTRIC COMPANY, Bethel, CT 06801, has introduced special TORX® type driving bits for use in the Foredom Miniature Power Screwdriver providing optimum utilization of the TORX® drive system on small screw sizes from 000 to 4. The Foredom Screwdriver features vacuum pickup and retention of fasteners, adjustable torque from 0-5 inch pounds, and a counter-balanced hand-piece for virtually weightless operation. In addition to TORX®-tupe bits, the Foredom also offers drivers for hex nuts, headless screws, and for slotted and cross recess screws in any

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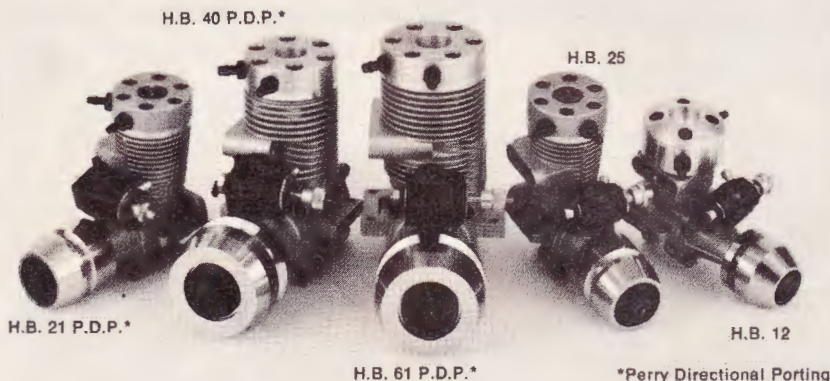
which permits precision sanding of small balsa wood parts. A slider block is provided with two different grades of production type sandpaper contact cemented to opposing surfaces. The slider block, in turn, rides in a track or groove which is milled into a heavy wood base. Two molded nylon guides are supplied. One allows you to select various angles which is great for truss type construction as found in many "old timer" type models. A second guide, located on the end of the base can be raised into position and acts as a squaring fence to make precise 90 degree angles. When the sandpaper wears down you need only to peel it off and contact cement another strip in place. Non-skid pads are mounted under each of the four corners of the base to prevent it from sliding around while you are sanding. Ralph Cooney of Fourmost



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use to, but it does do the job as claimed. Give it a try!—BOB ABERLE, Contributing Editor R/C.

IMPBA Roostertail

Two new records were set on May 16, 1981. Fred Gimbel in an E Mono ran 68.285 in a 3-D Demon and Ed Baker ran 90 with a D Hydro. Congratulations to both.

You should have received your second Quarterly Report by this time, please read it.

At our spring Board meeting nine directors were present. The directors approved adding the word "consecutive" to our By-laws. They rejected both the Broughton and Skwiera proposals with the recommendation that we go back to the membership with a proposal to double heat racing points when calculating the Championship winner.

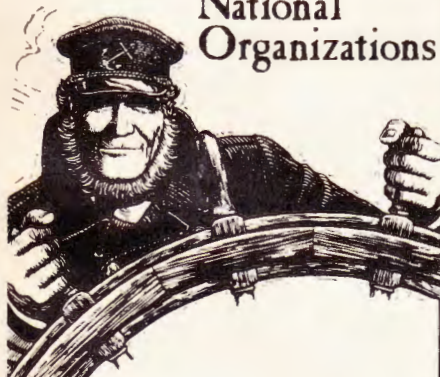
Skip Horstman was elected to the Board as district 4 director and Ron Selk was elected National Scale Chairman. Doc Turner was appointed chairman of a committee to encourage reading FLYING MODELS and also submission of more articles to FLYING MODELS. Jay Brannon of Dumas will receive the Manufacturer of the Year Plaque for 1981.

The following were nominated for the Hall of Fame: Don Pinckert by Bill Le Feber, John Brodbeck by Mike Wisniewski, Charles Potol and Mert Mischnick by Skip Horstman. The final decision will be made at Indy in August.

Read your Quarterly Report for further information. I hope to see many of you at Indy for the Internats in August.

FRED McBROOM
IMPBA President

R/C Model Boating National Organizations



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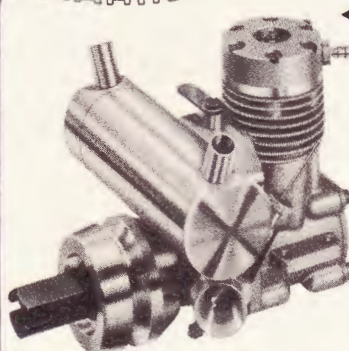
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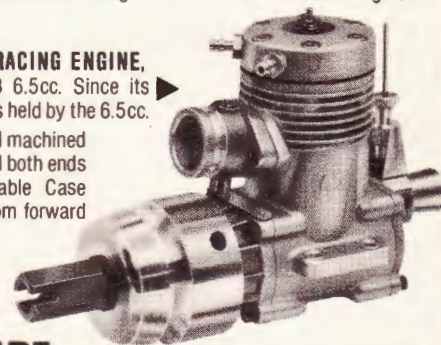
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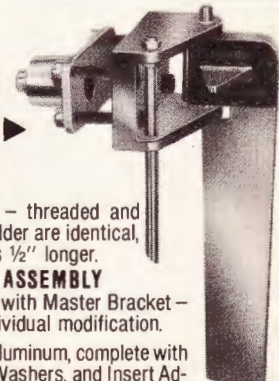
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BH	Wray Freitas	2.74	82.11
CH	Wray Freitas	2.64	85.23
XH	Wray Freitas	2.64	85.22
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AM	Ed Fisher	4.70	47.84
BM	Bruce Kaiser	3.54	63.42
CM	Bruce Kaiser	3.27	68.70
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advertising index for September 1981

Ace R/C, Inc.	17
America's Hobby Center	13,15
Associated Electrics	61
Bavarian Precision	78
Best Models, Inc.	76
BoLink.	66
Cannon Electronics	9
Carstens Flying Plans	48,49
Carstens Publications.	44,45,18
Delta Manufacturing Co.	65
DGM Industries.	7
Dumas Boats	2
Dynamic Model Products, Inc.	78
Empire Model Marine Supply	77
Fiberglass Master	7
Flying Models Magazine	10,11,6,16
Fox Mfg. Co.	5
Futaba	Cover IV
Gemini Models	5
Gene Dubois.	7
Hobby Warehouse	76
J.H. Design & Sales	6
K&B Mfg.	79
Laughing Whale, The.	76
Leisure Electronics	65
Mac's Products	12
Model Rectifier Corp.	Cover III
Norco Marinecraft.	77
Octura Models	75
Peck Polymers.	8,12
Pegasus Aero-Art Corp.	6
Pipeline, The.	79
Prather	77
Repla-Tech Intern'tl. Inc.	16
Rhom Products.	7
Richardson Precision Machine, Inc.	8
Saf-Flite Models	5
Satellite City	3
Sid Morgan Plans.	5
Spider Hobbies.	75
Sterling Models.	9
Steve Muck's R/C Model	78
Taig Tools	16
Tarno Aero Engines	8
Taubman Plans Service	75
Tiny Tools	12
32nd Parallel.	76
Twinn-K, Inc.	8
VL Products	17
Verdel Instrument Sales Co.	8
Warships Unlimited.	78

MRC'S GRAND PRIX WILL LEAVE EVERYONE ELSE EATING YOUR DUST OR FLOUNDERING IN YOUR WAKE

Races are won in the corners:

Competitive car and boat racers know how important it is to have precise control through the turns or around the buoys... they'll tell you how tough it is to win if you can't put that model right where you want it... lap after lap after lap.



The racer's radio: MRC's Grand Prix radios are designed to give you that control. They're designed specifically for cars and boats, whether you race them to win or run them for fun. Check out these special features: **LIGHT-WEIGHT.** The transmitter and battery hang on your belt—all you have in your hands is the lightweight control unit. That makes a big difference in enduro races. **BUILT-IN SERVO REVERSING.** Makes throttle and steering installation a breeze—no more mickey-mouse linkages or special servos needed. **ADJUSTABLE DUAL-RATE STEERING.** With the flick of a switch you go from sensitive steering down those high-speed straights to full-throw response for quick action in the turns. **THIRD CHANNEL.** Use it for onboard fuel mixture control, boat trim tabs, or any other third-function use. **PLUG-IN CRYSTALS*:** Change frequencies on the spot so you can race all day without interference. **RUGGED SERVOS.** Dual ball-bearings on the output shaft for smooth action, water resistant construction for protection.



Get into the future, now: Don't use a radio intended for airplanes. Get with the radios designed from the start for car and boat racing. The MRC Twin Stick or Speed Handle GRAND PRIX series. The radios you must have to be competitive.

*Per FCC requirements, plug-in crystals available only on 27 MHz.

Twin Grip
Easily held two-stick control features trimmable adjustable-neutral throttle stick on left, steering stick on right. Third channel and dual-rate controls and switches are on top.



Transmitter

Hangs on your belt with antenna out of the way. Transmitter features battery voltage meter, RF output meter, plug-in RF module with plug-in crystal* for quick frequency change.



Speed Handle

Human-engineered pistol grip puts everything in perfect position—steering on the wheel, throttle on the trigger, third channel and throttle trim under your thumb, dual-rate controls on top.



MRC 

Model Rectifier Corporation
2500 Woodbridge Ave., P.O. Box 710 Edison, New Jersey 08818

Contest competitors know they need all the control they can get, that extra margin of control only one Sport system delivers... the 7FG.

Our new Futaba 7FG/K has three dual rates with top panel switching to let you instantly adjust control surface linkages electronically (the 7FG/E system uses exponential rates).



Flat pack IC's keep the new RTF receiver compact. Triple-tuning keeps it super selective.

Mixing is part of the 7FG package, too. Program in two, independent mixing circuits and some truly memorable maneuvers are at your fingertips.

Just as important, the 7FG has a great set of gimbals. 100%

Futaba from drawing board to mold base dies, these precision open gimbals offer silky smooth action and sensitivity second to none.

Great gimbals deserve great sticks, so the 7FG gets knurled, non-slip alloy control sticks adjustable for both length and tension to give you just the right feel.



Futaba's 7FG/K system can also be ordered with exponential rate (7FG/E).

5 and 6-channel convertible systems are also available.



Dual rate, mixing, ATY and servo reversing controls are located in the 7FG's back panel.

Could there be more?

How about modular RF boards. A brand new receiver that's in a class by itself. Convenient transmitter stand and antenna storage. Even our exclusive trainer system.

But will Total Control really change your flying personality? Can you handle all the expensive features of the Futaba 7FG?

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Dual personalities, mixed motions, servo reversology and everything else it takes to give you Total Control.

