Giant 550 plans listing • OS .61VR review

$1.50
(ISSN 0015-4849)
MARCH 1981
47506

FLYING MODELS

flying models

R/C Boating

PHOTOGRAPHY: BOB ABERLE

Aberle's R/C Trainer

"The Next Step"

- R/C Car Section
- Midwest's T-Craft
- Caudron Racer
  National Rubber Champ
- Batteries and R/C - Part 2
- ½A C/L profile Spitfire

MORE PAGES
MORE FEATURES

0 71896 47506 03

A few words about me.

I am Electronic Engineer and this is my day job.

From tender age two things attracted my interest and I managed to have them in my life.

The first was electricity and the second the bluesky.

I´ve found the model airplanes hobby in October 1973.

I love the wooden structures from scratch airplanes and boats also.

I started collecting plans, articles, books and anything else that could help the hobby of many years ago and have created a very large personal collection of them.

Since 2004 I became involved with the digitization and restoration of them and started to share the plans from public domain with my fellow modelers.

Now after all this experience I have decided to digitize, to clean and to re publish in digital edition and free of all issues RC Modeler magazine from 1963 to 2005 and others books and magazines.

Certainly this will be a very long, difficult and tedious task but I believe with the help of all of you I will finish it in a short time.

I apologize in advance because my English is poor.
It is not my mother language because I am Greek.
I wish all of you who choose to collect and read this my work good enjoyment and enjoy your buildings.

My name is Elijah Efthimiopoulos. (H.E)
My nickname Hlsat.

My country is Greece, and the my city is Xanthi.

Λίγα λόγια για μένα.

Είμαι Μηχανικός Ηλεκτρονικός και αυτό είναι το αληθινό μου επάγγελμα εργασίας.
Από μικρός δυο πράγματα μου κέντρισαν το ενδιαφέρον και ασχολήθηκα με αυτά.
Πρώτον ο ηλεκτρισμός και δεύτερον το απέραντο γαλάζιο του ουρανού και ο αέρας αυτού.
Το χόμπι του αερομοντελισμού το πρωτογνώρισα τον Οκτώβριο του 1973.
Μου αρέσουν οι ξύλινες κατασκευές αεροπλάνων και σκαφών από το μηδέν.
Ξεκίνησα να συλλέγω σχέδια, άρθρα, βιβλία και ότι άλλο μπορούσε να με βοηθήσει στο χόμπι από τα πολύ παλιά χρόνια.
Έχω δημιουργήσει μια πολύ μεγάλη προσωπική συλλογή από αυτά.
Από το 2004 άρχισα να ασχολούμαι με την ψηφιοποίησης τους, τον καθαρισμό τους αλλά και να τα μοιράζομαι μαζί σας αφού τα δημοσιοποιώ στο διαδίκτυο (όσα από αυτά επιτρέπεται λόγο των πνευματικών δικαιωμάτων τους).
Σήμερα μετά από όλη αυτήν την εμπειρία που έχω αποκτήσει, αποφάσισα να ψηφιοποιήσω, να καθαρίσω και να ξαναδημοσιεύσω σε ψηφιακή έκδοση και ελεύθερα όλα τα τεύχη του περιοδικού RC Modeler από το 1963 μέχρι το 2005 και κάποια άλλα βιβλία και περιοδικά.
Σίγουρα είναι μια πολύ μεγάλη, δύσκολη και επίπονη εργασία αλλά πιστεύω με την βοήθεια όλων σας να την τελειώσω σε ένα καλό αλλά μεγάλο χρονικό διάστημα.
Ζητώ συγγνώμη εκ των προτέρων γιατί τα Αγγλικά μου είναι φτωχά.
Δεν είναι η μητρική μου γλώσσα γιατί είμαι Έλληνας.
Εύχομαι σε όλους εσάς που θα επιλέξετε να τα συλλέξετε και να τα διαβάσετε αυτήν την εργασία μου καλή απόλαυση και καλές κατασκευές.
Το όνομα μου είναι Ηλίας Ευθυμιόπουλος.(Η.Ε)
Το ψευδώνυμο μου Hlsat.
Η χώρα μου η Ελλάδα και η πολη μου η Ξάνθη.

Flying Models Magazine Editing and Resampling.

Work Done:

1)Advertisements removed.

2) Plans building plane removed and hyperlinked.

3)Articles building plane removed and hyperlinked.

4)Pages reordered.

5)Topics list added.

Now you can read these great issues and find the plans and building articles on multiple sites on the internet.

All Plans can be found here:

Hlsat Blog Flying Models Magazine (Covers - Plans - Articles).

http://www.rcgroups.com/forums/showthread.php?t=2445105

AeroFred Gallery Free Plans.

http://aerofred.com/index.php

Hip Pocket Aeronautics Gallery Free Plans.

http://www.hippocketaeronautics.com/hpa_plans/index.php

Contributors:

Scanning by Hlsat.

Editing by Hlsat.

Thanks Elijah from Greece.

flying models

including FLYING ACES est 1928

march 1981/vol. 84, no.3/522

aircraft features

r/c model boating

departments

on the cover

Les Hoffman's Contender 40 makes a simulated approach for a landing. This ship is flap equipped and is a spirited flyer. An HP .40 powers this new addition to the Top Flite line of fine kits. Kodachrome by Jim Boyd.

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This is a temporary.

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Flying Report

news and comment

Air Mail

readers' forum

1951 he was issued AMA license no. 8409 (30 years ago!). While still attending the Brooklyn Technical High School in New York City, Bob started flying R/C with an old Lorenz gas tube receiver and a MAC-II transmitter. As his interest in R/C grew Bob went after his HAM radio license in 1957 primarily to fly R/C on the six meter band. He has held call letters, W2QPP, since 1957 and in fact, upgraded the license to general class in 1960. At one point in time he did pursue the amateur radio hobby and had the distinction of working almost all 50 states on *10 meter mobile.*

An active flyer, but not a competition flyer, Bob limits his flying primarily to lunch hour sessions at a private Grumman field. This ability to fly almost every day permits Bob the opportunity to gather a lot of test data for his many and varied product reviews. Of all his magazine assignments he still likes doing original model designs the best. To date he has published an even dozen designs in FLYING MODELS including, stand-off-scale, gliders, racers and even a float plane. The accompanying photo shows Bob with his favorite model, a stand-off-scale version of the little known, Grumman G-63 "Kitten" which was published in the February 1977 issue of FLYING MODELS.

Lest we not forget, Bob is one of seven members of the AMA R/C Frequency Committee. He has held this position since 1975 and is a very active member. If we receive all those new R/C channels in the next year or so it will be because of the efforts of that committee.

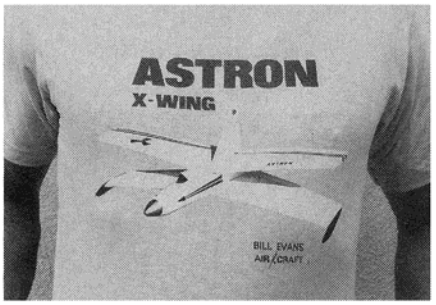
We look forward to Bob's continuing effort in FLYING MODELS and the R/C hobby.

Circus imports IM line

Circus Hobbies, Inc., 1241 E. Glendale Ave., Sparks, NV 89431, is importing the IM line of accessories. This line of products includes: motor mounts, tuned pipe connectors, tuned pipes, nylon hinges, polypropelene hinges, fixed and adjustable control horns, noiseless links, rubber exit guides, control rod couplers, balance weights, antenna retainers, switch levers, wheels, frequency flags, axles, fuel tanks, silicone fuel tubing, fuel filters, fuel pumps, fuel shut-off clamps, cockpit instrument kits, pilot figures, nylon coated wire, retracts and more. Watch for product releases that will be appearing monthly in FLYING MODELS Flying Report section.

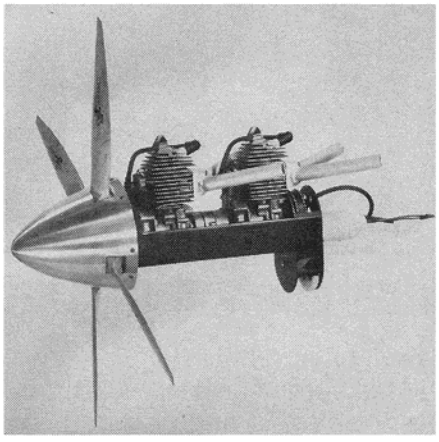
AEROTREND PRODUCTS, *44 West Prospect St., New Haven, CT 06515,* announces their new Easy Flex Aqua Blue fuel tubing for gasoline or diesel fuel. Easy Flex has all of the properties of their Aqua Blue semirigid type tubing: high heat resistance, is super tough, is translucent and is non-hardening plus it is extremely flexible. It is so flexible that it can be used inside the tank, which up until now has been a problem for Quarter Scale flyers. There has been no thinning of the wall to achieve this flexibility. The size available at the time of this release is ⅛" I.D. x ¼" O.D. with a smaller size soon to come. Easy Flex is available in a 2 foot package for $1.49 retail or on a 30 foot reel for $.69 a foot. Write to the address above for more information.

BILL EVANS AIRCRAFT, *20825½ Roscoe Blvd., Canoga Park, CA 91306,* introduces Radio Control T-Shirts that have one of three designs silk-screened onto the front. The designs currently available are: Eleck Rider, Simitar and Astron. These shirts are



made from 100% cotton and are available in yellow, tan or blue and in sizes small, medium, large and extra large. They are priced at $6.95 plus $1.00 postage and handling. For more information write to the address above.

COVERITE, *420 Babylon Rd., Horsham, PA 19044,* introduces new, improved Permagloss and three new colors. The package looks the same, but Coverite's Permagloss is new and improved. It is now 14.7% lighter, comparing now to the lightest plastic films. The new Permagloss is also thinner and is easier to work around compound curves. Permagloss Coverite now comes with a new adhesive coating that provides the sticking qualities of Balsarite. This is particularly noticeable on sheeted surfaces where bubbling is a recurring problem. The third improvement is the shrinking ability that is about the same now as Super Coverite. The shrink is controlled to prevent warping or damage to surfaces. Along with these structural improvements, Permagloss Coverite is now available in three new colors: Cub Yellow, Dark Blue and Bright Red, bringing the total number of colors available to 13. Each is available in three sizes: 38" x 43", 43" x 15 feet and 5" x 38". The finish on each is fuelproof and weather resistant. Four coats of paint are actually baked on, producing a finish that duplicates the scale finish of a fabric covered airplane. For more information write to the above address.

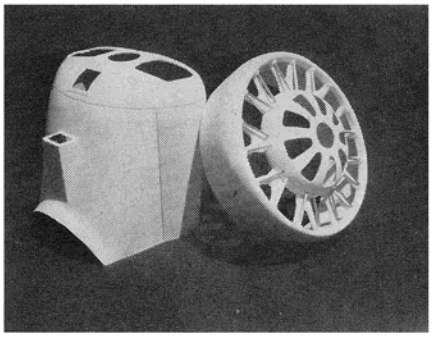


AEROMARINE ENTERPRISES INC., *709 Longboat Ave., Beachwood, NJ 08722,* introduces their Ultimate 2 Power Plant for ¼ and ⅓ scale models. The Ultimate 2 features two alternately firing Quadra's coupled together in-line. Each unit comes completely assembled and is factory tested and tuned before shipment. The Ultimate 2 Power Plant produces high torque to turn large, high pitch, props at very high r.p.m.'s. The Aeromarine Power Plant unit produces more than 2½ times the power of a single Quadra and the unit runs very smoothly with little vibration. The assembled unit package features: installed throttle linkages which syncronize the two carburetors, installed fuel lines, mounting bolts, and an installed Eastcraft Lectra-Starter. The unit cannot be hand flipped due to the large displacement of the motors and also due to the fact that the engines fire alternately. Hand cranking does not produce enough r.p.m. to get a good spark on both engines. The Lectra-Starter provides a safe and realistic means of starting the Power Plant. The displacement of the Power Plant is 4.4 cubic inches or 68ccm; it weighs 172 ounces and is 12" long. It is rated at over 5½ horsepower. The Ultimate 2 Power Plant is also available in a marine form for powering large scale boats. For more information write to the above address.

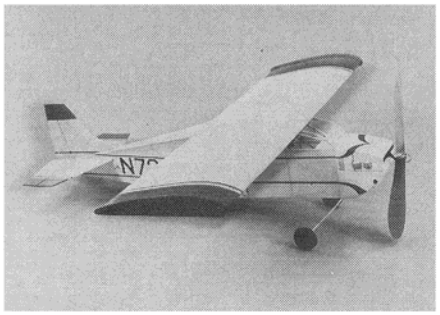
TOWER HOBBIES, *P.O. Box 778, Champaign, IL 61820,* introduces their new line of radios, called the System Four. Four and six channel sets are available in this series. Tower has teamed with a large Japanese firm to bring this series of radios to the United States. The transmitter features 10.8 volt operation with a 600mw minimum output and 200 MAH power consumption. The transmitter is of metal construction with a plastic mid-section and features closed-faced open gimbal sticks in a compact size case. Also included in the transmitter is a carrying handle, neck strap loop, switch guard and an accurate output meter. The receiver features a two ounce weight in a case that measures 2.5" x 1.6" x .8". Also featured in the receiver is three microvolts sensitivity (nominal), 10 MAH power consumption, crash-resistant glass filled nylon case and recessed connector blocks. The servos weigh 1.8 ounces and measure 1.5" x .75" x 1.6". Grommets are included to isolate vibration. The servos produce 30 ounce/inches of torque (nominal), and have a power consumption of 6 MAH at idle. Also featured on the servo is a 23 position splinded output shaft. The batteries feature a 500MAH capacity and measure 2.25" x 1.25" x 1.25" and weigh four ounces. The four channel system with four servos, nicads, servo trays and accessories is offered at an introductory price of $149.95. The six channel system with four servos, nicads, servo trays and accessories is offered at an introductory price of $169.95. Tower is offering a

full one year warranty, and is handling the repairs at their home office in Champaign Illinois. For more information write to the address above.

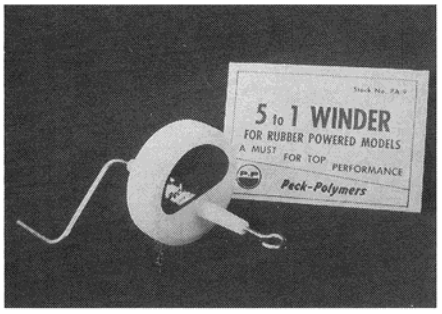
AMERICA'S HOBBY CENTER, *146 West 22nd St., New York, NY 10011,* announces that their latest Bargain Bulletin is now available. One of the largest of its type ever released from AHC, this catalog is chock full of sale items, new releases from manufacturers all over the world, and materials in huge quantities. Features include listings of model airplanes, boats, cars, radio control equipment, publications on hobby related subjects, engines and more. To receive this illustrated bulletin simply send your name and address to the address above and mention FLYING MODELS magazine. The bulletin will be sent to you free.



T&D FIBERGLASS SPECIALTIES, *30925 Block, Garden City, MI 48135,* has released six new models of fiberglass cowlings. First is the 1/3 scale Pitts S-1 with airscoop, oil cooler, valve covers and panel lines molded in. This cowl will fit the Byron and Sheber Pitts and retails for $28.95. Also new is the ¼ scale radial cowl with the cylinders, valve covers and nose piece molded in. All the modeler has to do is cut out the unwanted sections and add ⅛" aluminum tubing to simulate rocker arm pushrods and paint. This cowl was designed for Henry Haffke's Gee Bee Sportster Model Y, the Boeing P-26 Peashooter, the Boeing F-4B4 and any other aircraft using a narrow cowl and the P&W Wasp engine. This cowl retails for $29.95. The other four cowls are designed to fit the Hostetler line of new big birds that he unveiled at the 1980 Toledo R/C Trade Show. These are: the Bucker Jungmeister, Liberty Sport, Skybolt and Super Cub. For more information write to the above address.

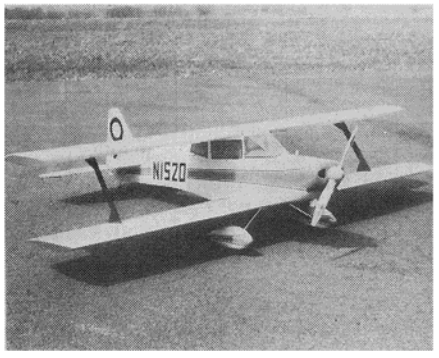


PECK-POLYMERS, *P.O. Box 2498, La Mesa, CA 92041,* announces their latest Peanut Scale kit, the Lacey M-10. The design features a 13" wingspan with 47 sq. inches of wing area, and all of the surfaces are to exact scale outlines. The model was designed by Butch Handland of England and is the design with which he won the English Peanut Scale Championship. The kit is complete except for glue and paint. It even includes items such as decals, 3-views and step-by-step pictures for construction. The Lacey M-10 is available from dealers for $4.95 or direct from Peck-Polymers at the above address.



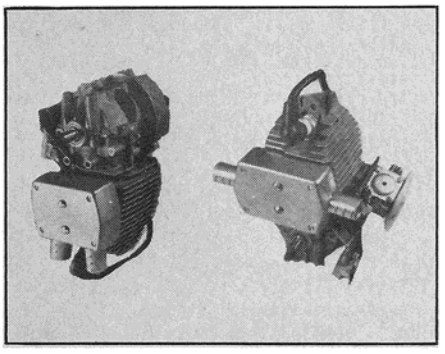
PECK-POLYMERS, *P.O. Box 2498, La Mesa, CA 92041,* has just released a 5-1 winder for Peanut Scale and other small rubber powered models. The winder has a rugged nylon case and features an anti-reverse lock so that you cannot wind the rubber motor in the wrong direction. This lock may be removed if necessary. The winder comes with instruction for use, and it is priced at $3.95. For more information write to the above address.

PECK-POLYMERS, *P.O. Box 2498, La Mesa, CA 92041,* introduces their new blade sharpener and honer, Sharpy. Designed to sharpen hobby knives, the Sharpy can also restore a sharp edge on scissors and fish hooks. Available from dealers or direct from the address above for $1.95.



MIDWEST PRODUCTS CO., INC., *400 S. Indiana St., Hobart, IN 46342,* introduces a new addition to their kit line, The Beercat. This is a realistic sport biplane designed scaled after the full-scale Beercat which once raced at the Reno Air Races. Designed for .40 size powerplants, the Beercat is easy and quick to build, and it is capable of all maneuvers. The kit features: Quickbuilding wings and fuselage with exclusive saddle jigs, molded ABS cowl and wheelpants, preformed landing gear and motor mount, extensive instruction manual and full-size plans. The Beercar has a 47" wingspan with 840 square inches of wing area. The ship is designed to four channel radio equipment. The Beercat is priced at $69.95. Write to the above address for more information.

ROBART, *310 N. 5th St., St. Charles, IL 60174,* is now producing Flat Hinge Pockets and Super Hinge Point Pockets. These pockets are designed to be mounted in the trailing edge of a wing, stabilizer or fin and in the leading edge of flaps, ailerons, elevators and rudder. Once mounted in position they are designed to accept either Robart Hinge Point Flats or Super Hinge Points. The hinges are held in place by a set screw. The threads for this set screw are molded into the pocket. These pockets let you take apart hinged surfaces during the building stages, painting or repairing. It is a simple matter to replace broken hinges right at the field if necessary. These pockets are also available for the standard size Hinge Points. For more information write to the address given above.



QUARTER HEADQUARTERS, *P.O. Box 12321, San Francisco, CA 94112,* manufacturers of quarter scale accessories, now have available two newly designed mufflers for the Quadra engine. These mufflers feature Dual exhaust pipes for inverted or upright engine use. The inverted twin pipe muffler, Cat. No. QM-TT2, can be used with any Pitts or Cessna type of cowling. The upright twin pipe muffler, Cat. No. QM-TT3, has side exhaust pipes which work nicely with many inline engine scale models. These mufflers are made of aluminum and attach easily to the engine with two screws provided. Two lengths of heat resistant, fuel proof neoprene tubing plus Nylon hose clamps are included to extend the exhaust out of the cowling if necessary. Prices for these new mufflers are $19.95 each. In ordering direct, add $1.50 for postage and handling, California residents add 6% sales tax. Write to the above address for more information.

CARL GOLDBERG MODELS, INC., *4734 West Chicago Ave., Chicago, IL 60651,* is now producing their cyanoacrylate adhesive, Super Jet, in two ounce bottles. The price of the larger bottle is $12.95. For more information write to the above address.

CARL GOLDBERG MODELS, INC., *4734 West Chicago Ave., Chicago, IL 60651,* announces the expanded version of their Hinge Slotting Kit. Added to the kit is a centering guide which will give the modeler perfectly aligned hinges. The unit works with both sizes of Klett hinges and the newer Flex Points. The seven piece kit retails for $2.95. For more information write to the above address.

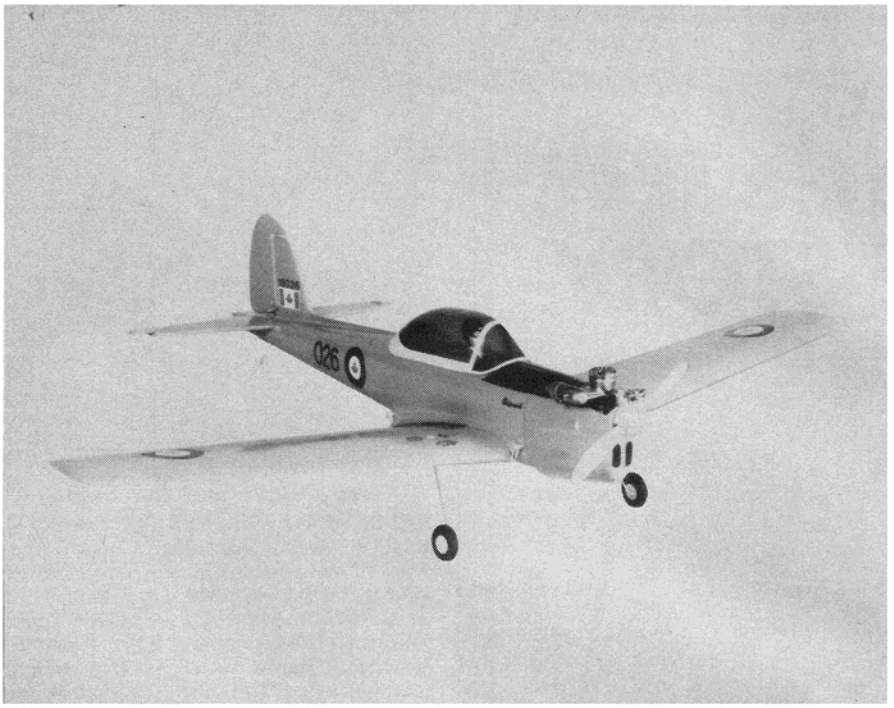
BILL EVANS AIRCRAFT, *20825½ Roscoe Blvd., Canoga Park, Ca. 91306,* now offers a new muffler especially engineered for the K&B 3.5. This new muffler is small, light weight, and mounts easily to the engine with more than adequate clearance with the firewall and fuselage. The compact size makes this muffler an excellent choice for planes, boats, cars and especially small helicopters. Available from your dealer or direct. Price is $12.95. For direct orders ad $1.00 shipping, CA., residents add 6%. For more information write to the above address.

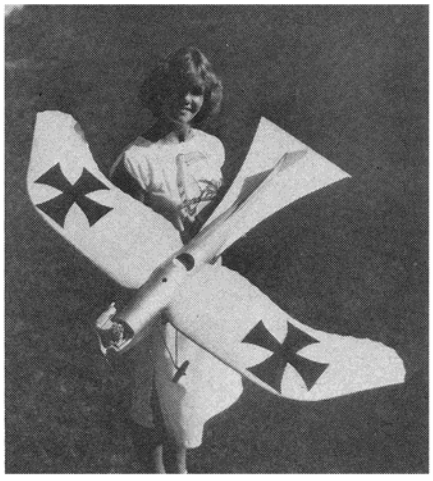
REPLA-TECH INTERNATIONAL, *48500 McKenzie Highway, Vida, OR 97488,* has announced the first in what they plan to be a long series of Bjorn Karlstrom Scale Drawing Packets which are enclosed in "showcase" envelopes. There are ten color sheets to a packet, with each packet selling for $2.50. The following packets are now available with many more in final preparation: Packet No. 1 World War I British Warplanes. Packet No. 2 Golden Age American Airplanes. Individual sheets may be obtained direct from Repla-Tech at $.75 each but the packets will be available only from dealers. Being purchased in packet form, they will average out at $.25 each. For more information write to the above address.

DAVIS DIESEL DEVELOPMENT, INC., *Box 141, Milford, CT 06460,* is now producing a diesel conversion head for the Fox .45 B.B. The unit is said to enable the Fox .45 B.B. to swing a 12x6 prop at 12.000 plus rpm or a 14x4 prop at over 9,000 rpm. The idle is said to be at 2,000 rpm with a fuel consumption of 2-3 minutes per ounce depending on prop and throttle settings. The conversion takes only a few minutes, with a simple head change being all that's required. The Fox .45 B.B. diesel convertor is priced at $40.00 and is available direct or through dealers. For more information write to the above address.

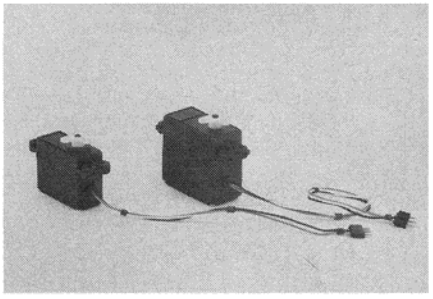
MODEL RECTIFIER CORPORATION, *2500 Woodbridge Ave., Edison, NJ 08817,* has released their new Dehavilland Chipmunk RTF. The Chipmunk is a 1/10 scale ready-to-fly, aerobatic model that comes complete with the MRC Enya .09TV engine factory installed. The elevator and rudder are prehinged and the control rods are prebent and in place. The hold-down dowels, canopy, muffler, propeller, spinner and tires are also factory installed. The kit is finely detailed and even comes with the pilot figure and instrument panel decals. The parts necessary to install aileron control are included. For more information write to the above address.

BALSA USA, INC., *P.O. Box 164, Marinette, WI 54143,* announces a new stand-way-off scale model of the World War I Taube. The 62" wingspan model is designed for use with .35 to .60 engines and four channel radios. The kit features rolled drawings, die-cutting, hardware bag, formed landing gear, balsa and hardwood. The Taube kit is

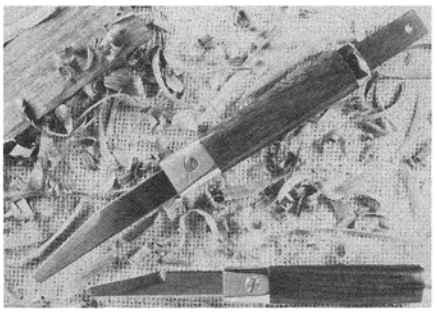




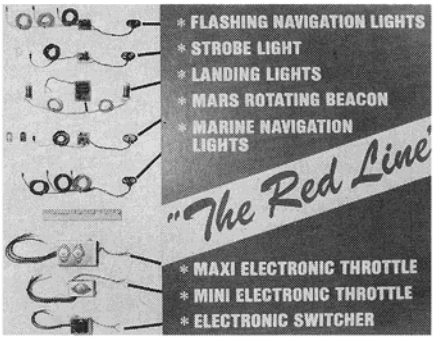
priced at $24.99. For more information, write to the address above.



ROYAL ELECTRONICS CORP., *3535 So. Irving St., Englewood, CO 80110,* announces their new RS-23 servo. The RS-23 is smaller than the RS-21, which was released in February of 1980, and should be very popular in 1/12 scale racing cars, sail planes and small sport planes. The RS-23 is capable of controlling .60 sized models but the manufacturer recommends the RS-21 servo if you fly large models. The RS-23 lists for $24.95 with connector and $23.50 less connector. Write to the above address for more information.



R. MURPHY COMPANY, INC., *Groton-Harvard Rd., Ayer, MA 01432,* introduces an all-purpose cutting and trimming knife with adjustable blade lengths. The knife features a rosewood and bronze handle shaped to fit comfortably into the hand. Secured by a recessed set-screw, the high carbon steel blade adjusts from ½" to 4" to perform a variety of jobs. The R. Murphy Adjustable Knife comes standard with a 4⅛" long handle and a replaceable ½" wide x 6" long bevel shaped blade. An 8" long blade is optional. The retail price of the knife is $18.60 for the handle only and $2.55 for each blade. For more information write to the address above.



RADIO CONTROLED MODELS, INC., *3631 N. Kedvale Ave., Chicago, IL 60641,* introduces The Red Line of electronic devices that include Lighting Systems, Flashing Navigation Lights, Strobe Light, Landing Lights, Mars Rotating Beacon, Marine Navigation Lights, Control Devices, Maxi Electronic Throttle, Mini Electronic Throttle and Electronic Switcher. For more information write to the above address.

timetable

PHOENIX, ARIZONA—February 14-15. NAMBA District 9 Points Heat Racing, hosted by All American Model Racing Team at Lake Pleasant. Contact: Stephen Mueller, 722 E. Belmont, Phoenix, AZ 85020. 602/944-0961.

CAMPBELL, CALIFORNIA—February 14-15. NAMBA Heat Racing, Steve Jeffries Memorial Hydro Regatta, hosted by Marine Modelers Santa Clara at Perc. Pond. Contact: Gary Frank, 234 Escuela, #2437, Mt. View, CA 94040. 415/968-7910.

OAKDALE, CALIFORNIA—March 7-8. NAMBA District 8 Points Heat Racing, hosted by Modesto Buccaneers at Woodword Lake. Contact: Tony Ascaso, 18301 Davis Rd., Patterson, CA 95363. 209/892-8821.

MAPLE RIDGE, BRITISH COLUMBIA—April 4-5. NAMBA Record Trials, hosted by Canadian Marine Modelers at Whonnock Lake. Contact: J.M. Fraser, 21816 Dover Rd., Maple Ridge, B.C. V2X 7V7. 604/467-3580.

MARYSVILLE, WASHINGTON—April 4-5. 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.

SALISBURY, MARYLAND—April 11-12. IMPBA 1/16 Straightaway Record Trials, hosted by Eastern Shore M.B.C. at Posey Pond. Contact: Ed Baker, Morris Rd., Pittsville, MD 21850. 301/835-2386.

KINGSBURG, CALIFORNIA—April 11-12. NAMBA District 9 Points Heat Racing, hosted by Fresno M.B.C. at Kingsburg Lake. Contact: Milt Post, 4580 E. Clinton, Fresno, CA 93703. 209/254-5144.

MAPLE RIDGE, BRITISH COLUMBIA—April 18-19. NAMBA Record Trials, hosted by Canadian Marine Modelers at Lake Whonnock. Contact: Chris Christianson, 163 E. Windsor, N. Vancouver, B.C. V7N 1J9. 604/984-0060.

SACRAMENTO, CALIFORNIA—April 25-26. NAMBA District 9 Points Heat Racing, hosted by Sacramento Model Boat Association at Beach Lake. Contact: Guy Davis, 1304 Rozan Ct., Roseville, CA 95675. 916/783-9315.

KENT, WASHINGTON—April 26. NAMBA Heat Racing, hosted by Seattle M.B.C., at Kent Lagoon. Contact: Bill Hornell, 2533 N.E. 24, Renton, WA 98055. 206/226-7454.

FM clinic

Staff tip:
Poplar "light" ply

For high stress areas that require additional strength try using poplar plywood instead of birch ply. Commonly referred to as "light ply", poplar plywood is substantially lighter than regular ply and has ample strength. Try using it for secondary formers, spars for foam wings, doublers on profile models, plate wing tips for simple C/L models and cowl facings.

Light ply is available through most balsa suppliers or at your hobby dealer.

Reader Tip:
Indoor instruments

Ever wonder how to make a light, scale-looking instrument panel?

The basic answer here is to use only the lightest possible materials. Thin card stock or 1/64" balsa sheet are best.

Cut two pieces to the outline shape of your panel. On one of these two pieces you can draw the instruments in the pattern they appear. You can also use the commercially available paper instrument faces or find some in an aviation magazine and cement them in the proper locations. This latter method does add a bit more weight than drawing them on, but it's not necessarily critical.

Now, cut out the proper circles, on the other panel piece, to fit over the instruments you've drawn or cemented to the first piece. Before cementing these together, sandwich between them a sheet of very light cellophane — cigarette pack wrapping is excellent. Be careful that cement doesn't get on the instrument faces or "glass" covers. This technique adds realism and depth to a very lightweight panel.

LOU ROBERTS
Denver, Colorado

Reader Tip:
Light wheels

Try this method of making light wheels for indoor rubber ROG models.

Four discs should be cut from 1/64" light balsa sheet. The best way to cut the discs is to obtain a piece of tubing of the proper diameter and sharpen one end. By twisting this gently as you press it to the sheet, you will get neat, perfect-circle discs. Now laminate two discs cross-grain for each wheel. Watch the amount of cement as it adds weight. Now, to further lighten the wheels, and give them that delicate indoor look, sharpen a couple of more pieces of tubing of different sizes and cut a pattern out of the wheel hubs — patterns are limited only by your own imagination. Bearings can be made from rolled tissue tubes or small indoor prop washers cemented to each side of the wheel. Another good trick is to use a very short length of the teflon tubing that comes as an applicator with cyanoacrylate cements such as Hot Stuff.

LOU ROBERTS
Denver, Colorado

The Next Step

by Bob Aberle

A logical progression in learning to fly Radio Control. Uses Ready-To-Fly parts.

PHOTOGRAPHY: BOB ABERLE

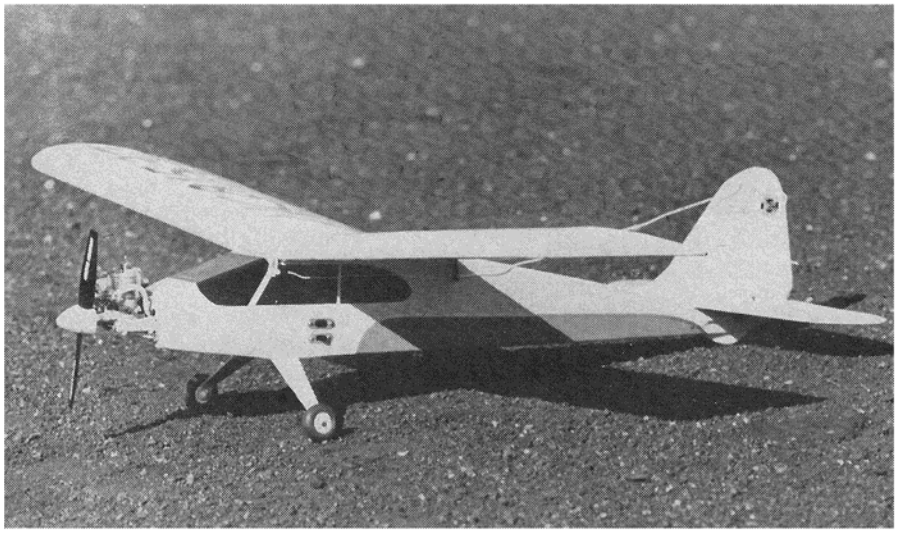
Looking at the lead photos of this article i'm sure you would conclude that this is just another simple little .09 powered R/C trainer. Well, in fact, it is. However, upon closer inspection of the photos and text, you would find that this particular model has a theme all of its own. My recent product review of an MRC chipmunk model (November 1980 FLYING MODELS) provided the actual idea for this design. Let's say you bought the little Chipmunk as an R/C trainer. It came ready-to-fly and included an installed Enya .09 engine. All you had to do was install a three channel radio system and head for the local flying field. But let's say you couldn't get help or made an error (with help) and parts of the Chipmunk were damaged beyond repair. What would you do next? Well you could buy replacement parts for the Chipmunk from MRC. An alternative (and one that isn't very costly) would be to build up a new trainer around the parts still available from the Chipmunk. Hence the "NEXT STEP" design.

Design Considerations

The *Next Step* has a very basic plan form. Since I couldn't know what parts of the Chipmunk might be available I decided to provide a complete aircraft design. Wing area was chosen at 275 square inches to be identical to the Chipmunk. The span was reduced to 36 inches so that basic balsa lengths could be used without waste. To get back to the same area the new wing chord (width) had to be increased somewhat. Fuselage length was roughly the same as the original Chipmunk. The big design difference was the location of the wing on the top of the fuselage. High wing designs are generally more forgiving for a beginner. For my new wing design I chose a modified Clark "Y" flat bottom airfoil at 13.5 percent thickness, the modification being that the curvature of the lower forward surface was eliminated in the interest of easier building for the beginner. The tail surfaces were intentionally oversized so that the *Next Step* could handle a variety of wing sizes, from several ready built models now available on the hobby market. All of the design variations discussed in this article centered around the use of the MRC/Enya .09 TV engine as the basic power plant. This was a very inexpensive and reliable engine. A perfect choice for a beginner project such as this.

Design Alternatives

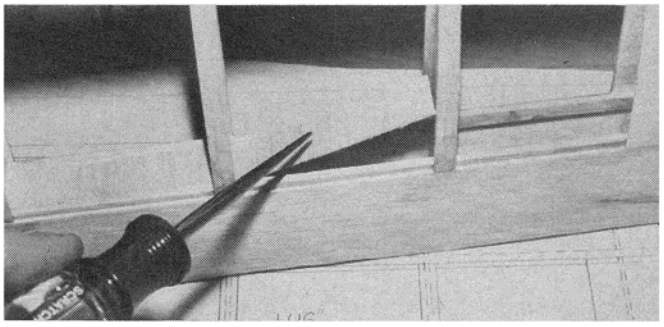
Assuming you have an .09 engine already, you might want to build the complete *Next Step* design. If it's still useable, mount the MRC Chipmunk wing. If not here are some options: First build my wing. It works fine. I have also successfully flown the *Next Step* fuselage and tail assembly with an MRC Eagle wing which has a 48 inch span and 375 sq. in. of area. Performance with this big wing is much like a powered glider. If you want that type performance, you can easily duplicate the effect of the Eagle wing by building my wing design to a full 48 inch span instead of the 36 inch version shown on the plans. Another wing tried is the Carl Goldberg Models Ranger-42 with a span of 42 inches and 240 sq. in. of area. This smaller wing makes the *Next Step* a hot performer which I don't recommend for the beginner. In any of these wing alternatives you will have to adjust the wing saddle to make the particular wing fit the fuselage properly. I use some foam tape or balsa shims to make some of the semi-symmetrical (round bottom) airfoils fit the fuselage properly. You may also adjust the location of the rear wing, rubber hold down dowel depending on the width of the wing you select. One more variable—the radio system! I use my usual Kraft lightweight airborne system with three KPS-18 servos which is a little on the expensive side for a beginner. To prove a final point I added a four ounce weight on the center of gravity (C.G.) of the model to roughly simulate the weight of a relatively heavy three channel R/C system. The extra weight was tried with all design variations just described. Quite honestly it has no effect at all. So that's it. An .09 R/C trainer with a lot of choices. Can a beginner "scratch" build (build from plans)? In this case I believe yes. The materials employed are relatively inexpensive and easy to find at most local hobby shops. If you succeed, you will have acquired a great deal of confidence at a very early entry point into the hobby, something you can't obtain when buying ready built models or when building kits. How about it?



Construction Sequence

Before actually cutting any wood I generally make up a set of templates or patterns. I use an extra copy of the plans because they are available to me as the designer. You can

Our cover girl, Patti Aberle, is holding Dad's favorite transmitter, the Ace Silver-Seven (**top**). The Next Step has Aeronca Champ looks (**left**).



Bob stresses that 1/16" vertical grain balsa webbing must be added between every rib station at the main spar and at the beginning of the trailing edge sheeting (**above**). Bob is shown here ironing Top Flite's Super Monokote onto a wing panel (**left**). It's the light way to go.

easily trace the various parts from the full size plans directly on to vellum (translucent) drafting paper. Next step is to rubber cement these tracings to the backs of manilla folders or simply lightweight card stock material. Let the cement dry overnight and then cut the templates to the outlines. It is then easy to mark the various parts directly to the balsa or plywood material using a ball point pen. The templates can be saved in a file folder for use later on, should repairs be necessary, or in case you want to build a duplicate model.

Wing (built up version)

I always start with the wing. If you decide to use the MRC Chipmunk wing or some other type foam wing then skip this section. First make up a set of wing ribs. You will need 14 ribs from 1/16 inch balsa and two tip ribs from ¼ inch balsa. I make up two 1/32 inch plywood rib templates (from the cardboard templates just mentioned). In this design all the ribs are the same size. Make up a stack of balsa blanks (over sized pieces) and place them between the two rib templates. Bolt the stack together with long 4-40 screws. Using a long X-Acto #26 carving blade knife, carve down to the plywood template surface, on both sides. Sand the entire sandwich. Mark the spar cut out locations and then separate the stack. Remember that the ¼ inch thick ribs are intended for the wing tips.

Construct the wing on a flat building board. In this case I use an old piece of Homosote model train board because it is easy to push pins in to. Cover the plans with wax paper so that the excess cement doesn't cause the wood to stick to the plans. Strip out the bottom leading edge and trailing edge sheeting from 1/16 X 3 X 36 inch soft balsa. Use a steel straight edge to cut these sheets accurately. Add the lower cap strips (1/16 X ¼) inch balsa- cut from scrap pieces) and the lower center and tip sheeting. Next the bottom ⅛ X ¼ inch *spruce* spars are pinned in place. *Do not use balsa for these spars!* Install all the ribs for one half of the wing. Add the ¼ X ¾ inch balsa leading edge and the top spar.

At this point I cut out the three 3/32 inch plywood wing braces (WB-1, 2 and 3) and epoxied them to the wing panel under construction. Finish off the wing half by adding the top leading and trailing edge sheeting; top and center sheeting; and cap strips. Lift this wing half off the building board and proceed to build the other panel in the same manner. As you build this second panel you may also join up the first panel at the center section (epoxy the other halves of the plywood wing braces). Make sure the dihedral ("V" angle) angle of the wing is as shown on the plans.

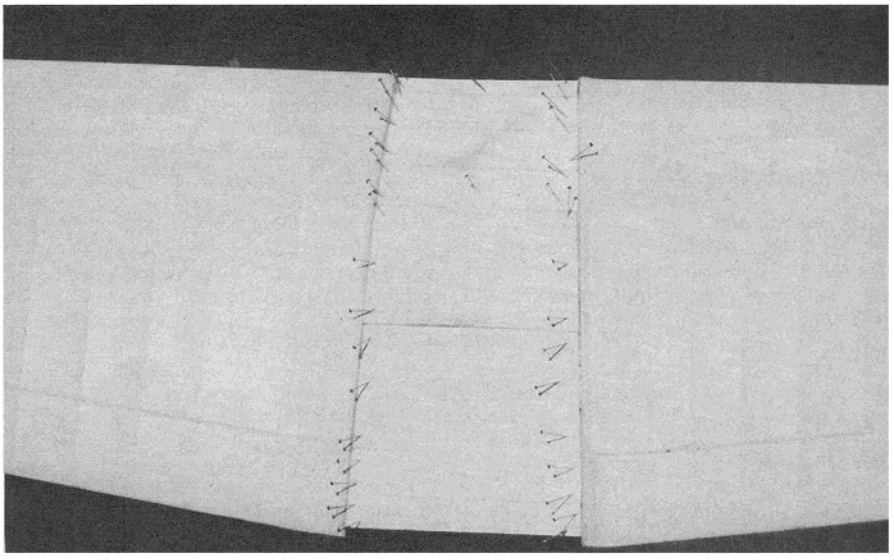
The finishing touch to the wing is to add 1/16 balsa with the grain running vertically between each rib station at the main spar and at the beginning of the trailing edge sheeting. This takes a little extra time but adds tremendously to the overall strength of the wing. Finally install a piece of 1/16 inch diameter wire at the trailing edge, center section, to prevent the wing rubber bands from penetrating the balsa wood.

MRC Chipmunk Wing

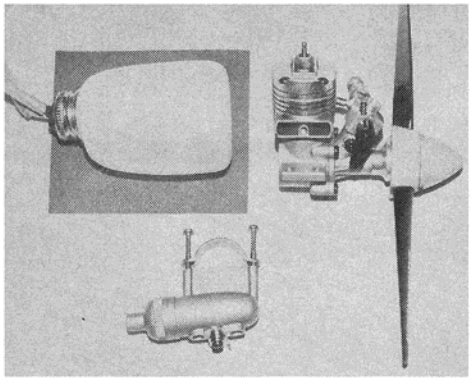
All you have to do here is sheet the center section of the Chipmunk wing with 1/16 inch soft balsa. Run the grain span wise and use epoxy cement. Don't use regular modeling type cements, such as Ambroid, since they will melt the foam material. This sheeting covers the aileron servo opening that is molded into the Chipmunk wing, when used in its intended low wing configuration. Also remove the landing gear struts since they can not be used in this application (high wing location).

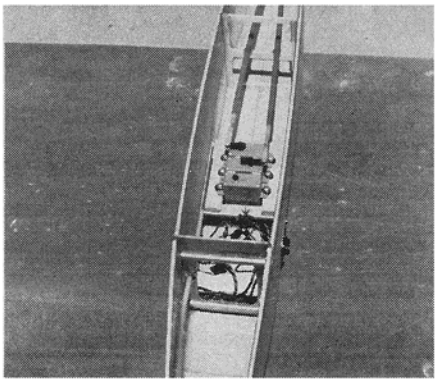
Fuselage

Using your templates transfer the fuselage side outline to the balsa sheet. Select two pieces of medium weight 3/32 X 3 X 36 inch balsa for the sides. Use some of the left over material at the tail area to splice in further forward where the sides are larger than three inches in width. I tack glue both sheets together and then cut both sides at the same time to make sure they end up identical. Cut out the 1/64 inch plywood doublers and cement them to the balsa sides with Hobbypoxy Formula II. Careful here—make one right and one left fuselage side. Add the rear spruce stab support and let both sides dry overnight. Cut out all the identified plywood formers. A small coping saw or better still a Dremel Jig Saw comes in handy for cutting plywood parts. You will need to purchase small sheets of 3/32, ⅛ and 3/16 inch thick plywood for the various formers. Keep



The MRC Chipmunk wing center section is shown sheeted with 1/16" balsa. Prime the balsa and then paint with Pactra's Formula-U paint.





These are some of the parts that Bob obtained with the MRC Chipmunk ready built plane (**above left**). Bob likes to pre-fit the entire radio system in place before the fuselage is finished (**above right**).

the excess material. You will always be able to use it on other projects. Note that the firewall (F-1) has a hole in the center for passage of the fuel lines. Former (F-2) also has a clearance hole for the passage of the fuel tank (which must be inserted through the R/C compartment). Make sure the tank of your choice clears this hole *at this time*. If you are not using the I.M. Products 2¾ ounce tank that is supplied with the MRC/ Chipmunk, you might try a Sullivan round (R-4) tank (4 ounces capacity). You may also be able to use a Tatone three ounce "Stick-A-Tube" tank. The 2¾ ounce tank will run the Enya .09 for approximately six to seven minutes (two ounces is a little too small and four ounces is a little too much fuel capacity).

Assemble the two sides (doublers facing the inside) with former (F-2) in place along with the ⅛ X 3/16 inch spruce longerons (by the wing trailing edge location). While this is drying bolt the engine mount to the firewall (F-1) using 4-40 socket head screws and "T" nuts. Epoxy these nuts to the firewall so they won't work loose later on. If you are not using the MRC radial engine mount you may select the Kraft KM-09 mount as a substitute. Install the firewall at this time and also draw the sides together at the rear. Use a clothspin or modelers clamp at the rear position while the epoxy cement dries. I generally place the forward fuselage very carefully in a large bench vise, applying just enough pressure to hold the sides against the firewall. Again use five minute epoxy cement at these joints. When this dries add the plywood formers (F-3), (F-4) and (F-5) which will provide the anchor point for the landing gear. Also add the 3/32 inch balsa bottom sheeting, both fore and aft of former (F-4). Do not install the top sheeting at this time with the exception of the small piece that fits under the vertical fin at the rear. Add a ¼ X ⅛ inch spruce wing saddle or support on both sides of the fuselage in the area of the wing mount. Insert the two 5/32 inch diameter wood dowels (wing hold down) in place and epoxy. Put the fuselage aside for the moment.

Tail Surfaces

Select a price of soft ⅛ X 3 X 36 inch balsa. I like the Sig contest balsa for this particular application. From the single sheet you will be able to cut out the complete fin, dorsal, rudder, stab and elevators. Pre-sand all the tail surfaces. Install the ⅛ inch plywood inserts on the elevator and rudder, to which the nylon control horns will be mounted later. Join the elevator halves with 1/16 inch diameter wire. Cut all the slots for the hinges and actually install the hinges briefly to make sure they fit and operate freely. I employed the Klett brand small hinges on this model (four on the elevators and three on the rudder).

Initial Assembly

Temporarily mount the wing to the fuselage using a few rubber bands. Pin both the stab and vertical fin in place. Align both of these surfaces with respect to the wing. Using five minute epoxy, cement both tail surfaces to the fuselage. Remove the wing for the next step.

Preliminary Radio Installation

This is always the best time to install your radio system. If you wait until the model is painted and finished you can easily end up with "unsolvable" problems. Plan your R/C equipment layout so that it is located as far forward (close to the wing leading edge) as possible. I made up my own servo tray out of plywood and scrap pieces of spruce. You can easily use a molded plastic tray if one happens to be available for your particular servos. Place the throttle servo forward and the rudder/ elevator servos behind it. Don't forget to make provisions for your power (on/off) switch and possibly a charging jack. Always mount these on the opposite fuselage side from your engine exhaust/muffler. Residual fuel and exhaust can easily ruin switches and jacks. Since the top fuselage sheeting in not in place you will find it very easy at this time to install the Sullivan brand Gold N' Rods (red-flexible type). These rods connect the servo output to the flight control surfaces (rudder and elevator) at the rear of the fuselage. One small diameter nylon rod actually moves inside a larger rod to transmit the control motion. Install the nylon control horns on their respective surfaces and temporarily "hinge them up". Don't cement the hinges in place until after the model has been painted. Run another Gold N' Rod forward, through former (F-2) and around the fuel tank, then through firewall (F-1) up to the engine throttle lever. Sometimes I run a soft brass cable inside the Gold N' Rod (outer jacket) since it is a little more flexible. Now temporarily connect up your receiver and battery pack. Operate the controls and make sure everything works correctly (left is left, right is right, etc.) without any unnecessary binding which could easily drain your battery down prematurely. Remove all the servos and radio equipment until after the final finishing.

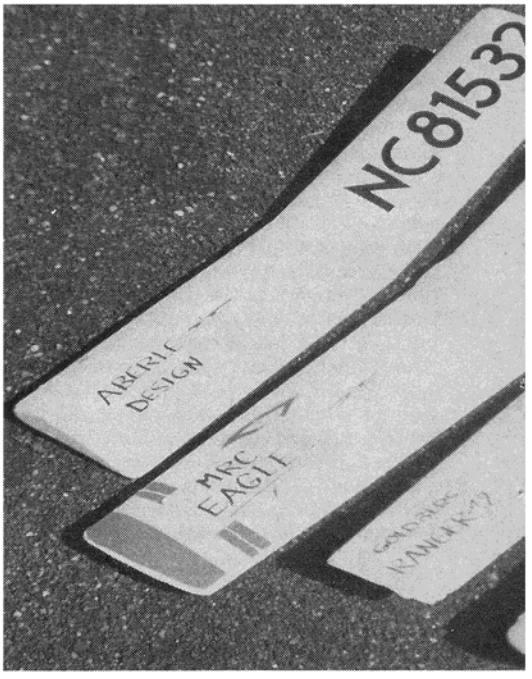
Final Fuselage Assembly

Add the top 3/32 inch balsa sheeting both fore and aft of the wing (cross grained is OK). Install the small dorsal back by the vertical fin. Depending on your choice of a wing you may have to adjust the location of the rear wing dowel and possibly some of the top sheeting directly behind the trailing edge. Drill the mounting holes in the Hallco landing gear. Drill the same holes through the formers (F-4) and (F-5) on the bottom of the fuselage. The gear will be installed after painting. Sand the entire model in preparation for covering and finishing. I suggest you use no. 150 paper lightly. Then go to number 220 and finally number 320 (black) paper (all dry at this time).

Covering and Finishing

I generally employ iron-on covering for the wings and epoxy paints for the fuselage and tail surfaces. You can't beat epoxy paints for durability. The entire fuselage and tail surfaces are given two brushed coats of Hobbypoxy Undercoater White (H-19) primer. Allow 24 hours drying time between each coat of primer or paint. Sand between both primer coats with number 320 paper (used very wet). After the second sanding let the water dry and then wipe off the surfaces with a tack rag (available from Hobbypoxy). I then brush on two coats of Hobbypoxy Cub Yellow (H-49). After masking off with black electrical tape, I apply a brushed coat of International Orange (H-56) on the lower rear portion of the fuselage. This tends to simulate an old Aeronca Champ color scheme. The parting line between the two paint colors is covered with ⅛ inch wide automotive type silver striping tape. Windows are simulated using black Monokote trim sheet material. Final touch involved a brush coat of Hobbypoxy Clear (H-08) over everything (including the Monokote windows).

The built-up wing is covered with opaque yellow Top Flite Super Monokote which roughly matches the shade of the Hobbypoxy Cub Yellow. Follow the instructions supplied with each roll of Monokote. This takes a little technique. Keep trying—don't give up after doing only one model. After awhile you will



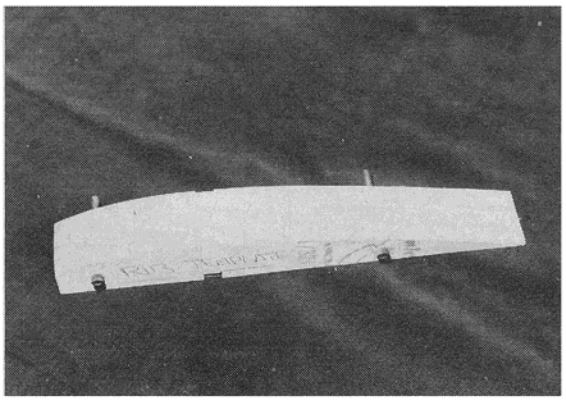
really appreciate this iron-covering (and it doesn't smell either!). Final touch involves adding some stick on decals, to the wing, simulating a full scale aircraft license number.

Final Assembly

In this order perform the following tasks: install the 1¼ inch diameter wheels to the Hallco landing gear: install the landing gear to the fuselage using 4-40 screws and "T" nuts (keep the screws as short as possible—a long screw might accidentally cause damage to the receiver or battery pack in the event of a crash); attach the engine mount to the firewall using 4-40 hardware; bolt the Enya .09 to the engine mount (again 4-40 hardware); install the fuel tank by inserting it from the R/C compartment through the hole in former (F-2); let the tank fill and vent lines pass out through the hole in the center of the firewall (F-1); install the inner Gold N' Rods running back to the rudder and elevator; install the rudder and elevator using Klett small hinges (epoxy carefully in place without getting excess cement on the hinge line); install the control horns and connect up the rods to the horns using mini nylon clevises; install the three servos in the tray or beam mount (your choice); install the switch harness and charging jack (if applicable to your radio system); install the receiver and battery pack wrapped in foam rubber for protection against vibration and crash damage; plug in all the servos and operate the system; run the radio antenna out the side of the fuselage, out to the top of the vertical fin; adjust all the controls neutral and finally install the throttle control rod and adjust it so that the servo is not stalled or overloaded at either extreme of control (high or low throttle).

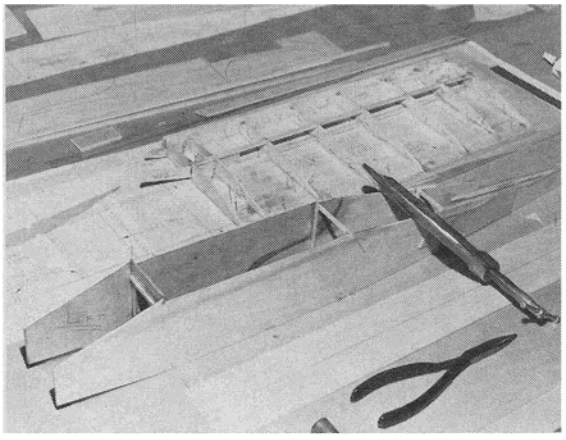
Check Out and Flying

You must make sure the model balances as

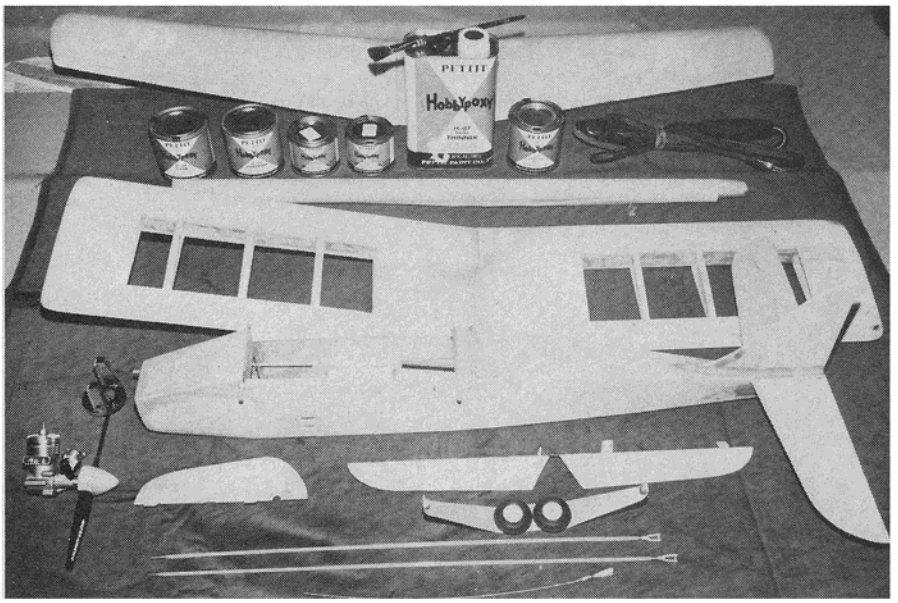


The ribs are made in a stack with plywood templates at either end of the stack and two 4-40 screws holding everything together for carving. Cut the spar slots while the ribs are still bolted together. It's easy.

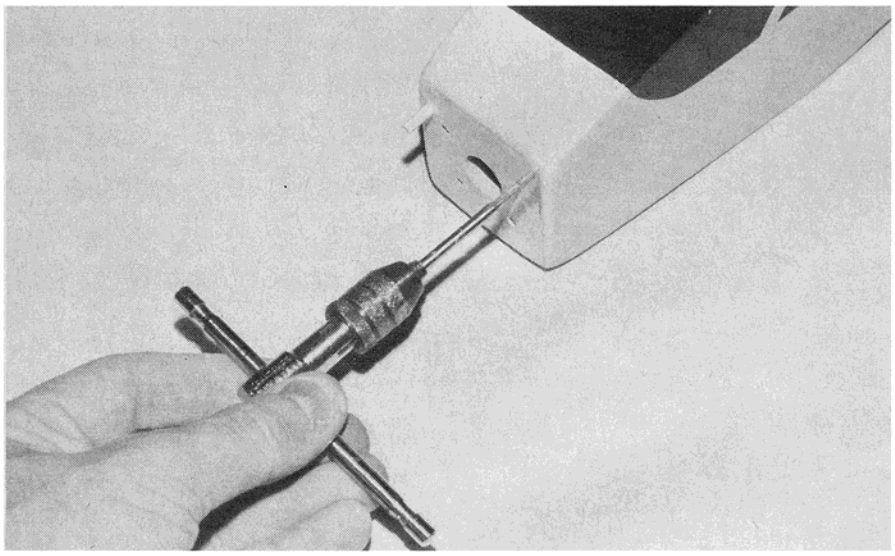
1/64 plywood doublers are laminated to the fuse. sides using Hobbypoxy Formula II glue. Be sure to make one left and one right fuselage side. Note template.

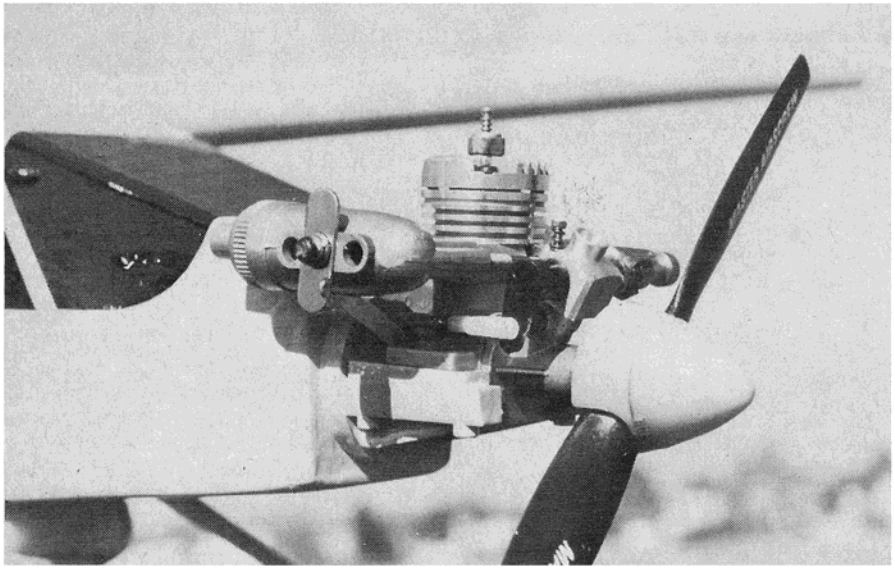


Here we see the fuselage and wing under construction. A "C"-Clamp holds the aft fuselage together. On the wing Bob has added the dihedral braces. Note pins.

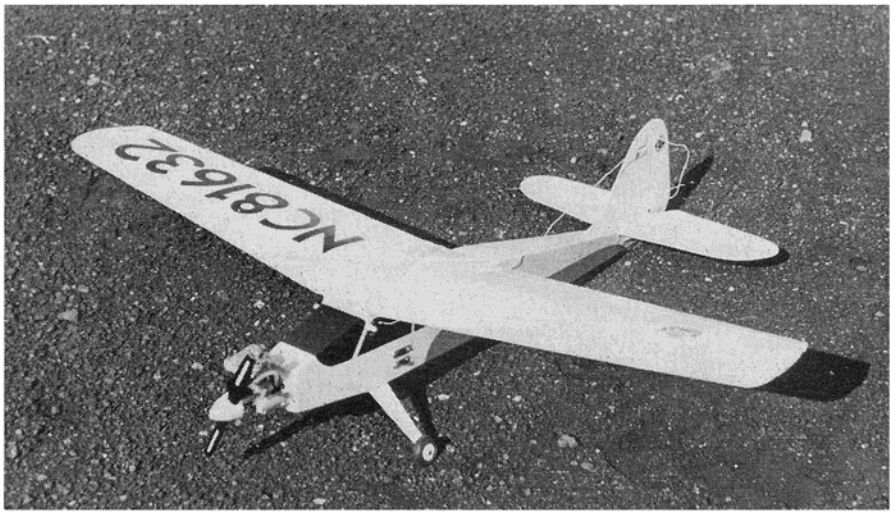


The completed model structure is shown here along with the Hobbypoxy brand finishing paints used on the fuse and tail (above). These are the four types of wing tried on the Next Step (left). Results in text.





Finishing paints tend to plug-up the "T" nuts; it's a good idea to run a tap through the holes to clear the threads (**top**). A close-up of the engine and mount shows the muffler baffle open for priming (**center**). The tank vent can be seen directly below the muffler. The engine is an Enya .09 from an MRC Chipmunk. Shown here is the Next Step with the MRC Chipmunk wing (**below**). Other wings can be used too.



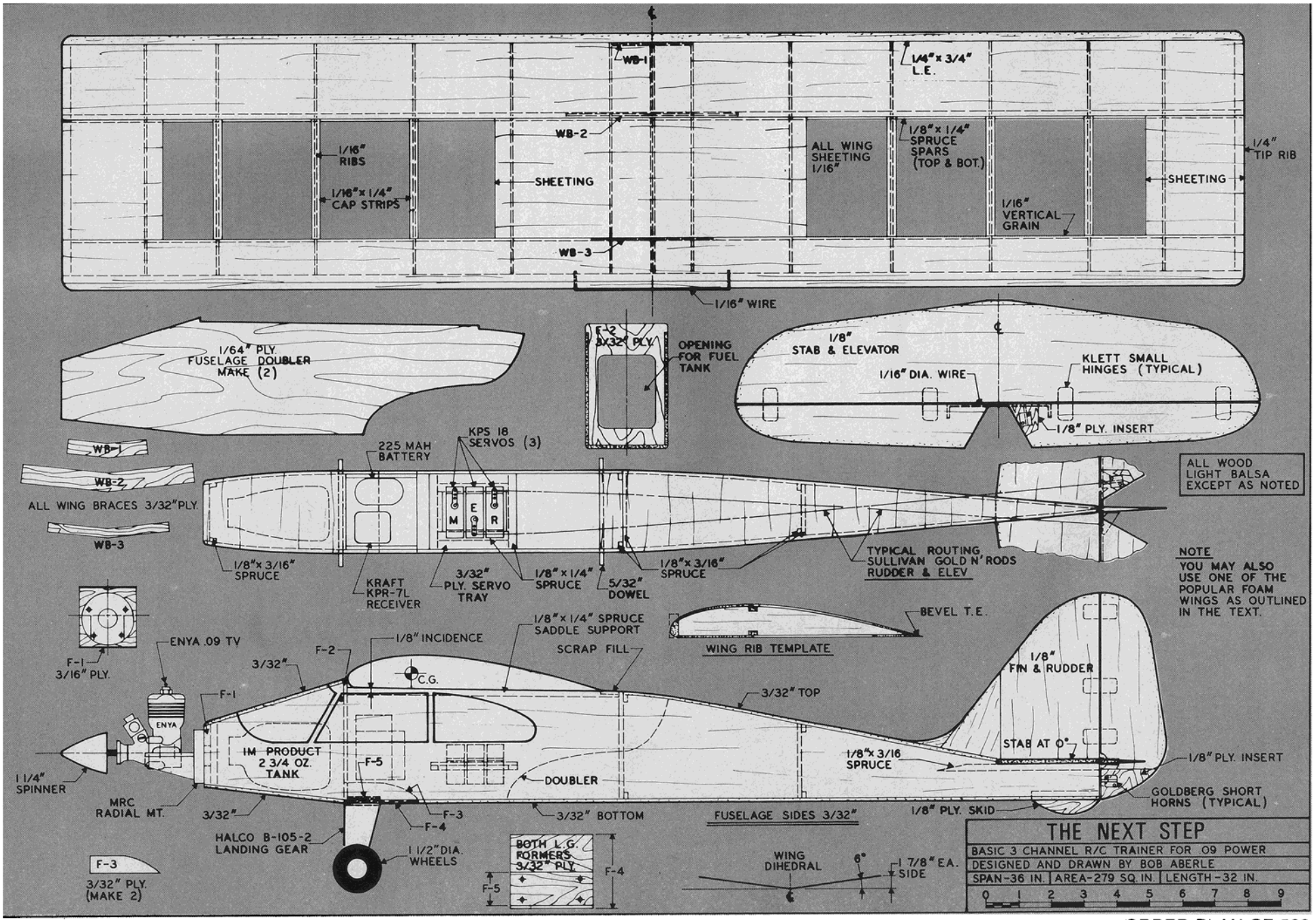
shown on the plans (approximately two inches back from the wing leading edge). The prototype model balanced perfectly with all the different wings mentioned earlier. If it doesn't balance, add lead fishing weights fore or aft to make it balance *before attempting to fly*. Pre-set your control surface movement as follows: rudder-5/8 inch either side of neutral and elevator-5/16 inch either side of neutral. I used a Master Airscrew black fibreglas 7-4 prop and 15 percent nitro fuel. I made sure the MRC/Enya .09 was well broken in before attempting to fly (some can be quite stubborn when new!). Final weight of the basic model with the built up wing was 27 ounces. With the MRC Chipmunk wing it was 28 ounces and about an identical weight with the MRC Eagle wing (even though it has almost 100 sq. in. more of area). At the 27 oz. weight the wing loading would be 14.2 oz./sq. ft. with the built up wing. As stated before, the additional four ounces of weight to simulate a "heavy" radio system, didn't harm the performance of the model.

All the flying to date has been by hand launching. Without a steerable tail wheel or skid, ground maneuvering at slow speeds can be very difficult. Have someone launch your model so that you will have your hand right on the transmitter control stick to give an immediate command (especially helpful in higher wind conditions!). The *Next Step* is basically a very forgiving performer. As a basic trainer the large 48 inch (375 sq. in.) MRC Eagle wing is about the best, provided you fly in winds less than 15 m.p.h. Best all around wing appears to be the MRC Chipmunk. It stalls gently and has a good comfortable sink rate on landing approaches. The built up (my own design) wing provides somewhat more of a "hot" performance. Much like you can expect from a "clipped" wing full scale aircraft. As you progress with this design you might find this wing more challenging. Remember you can simply add wing span to this basic design to obtain more area. A 42 inch span version (same width) has approx. 320 square inches. A 48 inch version would have 375 sq. in. (or the same as the MRC Eagle wing). The building experience you get is also very important if you hope to progress further in the hobby. The Ranger 42 wing turned out to be just a little too small to be considered as a basic trainer (for this specific application). The Ranger-42, as a total model is, of course, an excellent model for the beginner (just had to say that Carl!)

Conclusion

Try experimenting with different wings. Possibly a local modeler might have an old wing lying around that he could pass on to you. If so, build up the *Next Step* fuselage and tail, adapt the wing and go flying. In general you will find this design a very excellent basic trainer.

Is there a step beyond the *Next Step?* Of course, you might try a flat (no dihedral) wing with ailerons next. After that you could progress to a low wing configuration. If you readers would like a logical progression of designs in this same power class please write to us at FLYING MODELS and let us know. We want to react to your requests as best we can.



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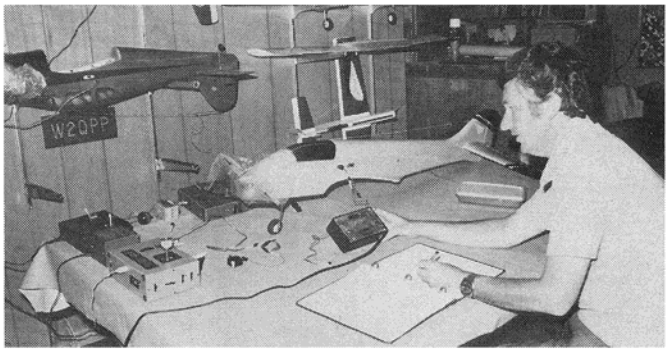
Part 2

Batteries

and the R/C hobby

by Bob Aberle

In part 2 we will investigate various methods of testing our batteries.



Bob Aberle is recording a discharge timer reading taken on his ACE R/C Digipace battery tester. Accurate record keeping is a must. A neat shop.

Last month I had the opportunity to discuss battery charging on a detailed basis, as it applied to the R/C hobby. This month, as promised, I intend to outline battery testing, both at home and at the flying field.

Up until as recently as 1973 nickel-cadmium, rechargeable batteries powered R/C systems until they died (many times causing crashes in the process). I suspect that modelers were so overwhelmed by the new found capabilities of digital proportional control that they treated their batteries the same as fuel in the tank (when you run out—fill it up!). Sometime in 1973 a Long Island firm, by the name of Misjon Industries, introduced a battery testing device, known as the "Flite Life". A lot of pros and cons were heard about this device, but no one could deny the fact that it revolutionized the R/C hobby (or at least the battery portion of it). The basic idea of the Flite Life was to place a load on the battery being tested. When the load was applied an external timer was started. A voltage sensing circuit then turned off the load and stopped the timer at some predetermined minimum setting. The time it took for the battery to reach that point was then related indirectly to capacity. The Flite Life was simple and cheap. Sure, you had to supply the timer (ordinary electric clock). It only tested one battery pack at a time and it didn't have any recharging capability. But it did work! There are still many in use to this day. Unfortunately, with the introduction of this new piece of test equipment, the R/C modeler now had something else to worry about. By todays standards, battery testing is mostly a routine. However, modelers (mainly beginners still are concerned about the interpretation of battery test results. Simply stated, when are they good (and what does "good" mean?) and when should they be replaced.

Battery Discharge Testing (General)

The two principle testing devices on the R/C market for testing nickel-cadmium batteries are the ACE/RC "Digipace" and the L. R. Taylor "Power Pacer". Both do the job in roughly the same manner. I personally use the ACE R/C Digipace. My particular unit, obtained in assembled form, lists for $94.95 (ACE catalog No. 34G15). By anyones standards that isn't a cheap price for a piece of test equipment. But then again, how much is your airplane worth after a crash which is caused by battery failure. A kit version of the Digipace is also available at $79.95 (ACE catalog No. 34G16) but it is a little complex (in my opinion) for the average modeler to assemble and calibrate. If you take to look it up, I did a complete review of the Digipace in the December 1978 issue of FLYING MODELS. Let me tell you briefly some of the advantages and disadvantages, as I see it, with the Digipace. It will let you simultaneously discharge and charge both a receiver and transmitter battery pack. A switch will let you select transmitter battery voltage levels of 6.0, 9.6 or 12.0 volts (a real plus!). The receiver charging circuit can be set at either the 50 MA. or 22.5 MA. charge rates. The 22.5 MA. current rate is ideal for charging the small 225 MAH capacity battery packs. A constant load is applied. And finally the digital clock readout is very accurate which is especially helpful when testing the very small 100 MAH packs. How about disadvantages? Well, it is purely an electronic device. If my 16 hour timer turns off the circuit *before* I have a chance to record the discharge time, the reading is lost. Should I accidentally connect up a battery pack backwards (reverse polarity), I will burn out an LM-324 I.C. almost immediately. With properly keyed connectors, of course, that problem is essentially eliminated. In the long run I still favor the Digipace as my prime means of battery testing.

Battery Testing Procedure

The first and most important aspect of battery discharge testing is maintaining a good record system. I keep all my records in a single loose leaf binder. One page is devoted to each and every battery pack in my possession. The record starts with the purchase date of the battery pack. If I have two or three of the same type of pack, I identify them individually with a felt tipped marker ("Pack A", "Pack B", etc.).

Before starting my first discharge test I make provisions for connecting each battery pack to the testing device. What I do is attach three pin Deans (male) connectors to the two outputs (receiver and transmitter) of the ACE Digipace. Using the Deans connectors I can easily do my own soldering. One word of caution, always use two adjacent pins on the three pin Deans connectors, *never the two outside pins*. As the Deans connectors get worn they can be easily plugged in backwards. With two adjacent pins the worst thing that happens is an open circuit. With the two outside pins it's possible to end up with a reversed polarity condition (which could damage both the Digipace and the battery). I make up a set of test cable adapters that interface between each of my R/C systems and the Deans connectors on my Digipace. Many of these adapters can be made by "cannibalizing" aileron extension cables. Not all transmitters provide easy access to the battery pack for test purposes. Some, have diode protection on the charger jack which makes testing impossible. The Pro Line sets employ two separate four cell packs in the transmitter. My test harness, in this case, makes provision for connecting these packs in series, before connecting it to the transmitter test circuit on the Digipace. Otherwise, I'm forced to test each pack separately, which is time consuming. (If you have a specific problem with regard to hooking up a battery tester properly, try to contact your R/C system manufacturer.) Several manufacturers have tried to discourage battery discharge testing. That is absolutely wrong in my estimation. Generally speaking if you have no desire to do any cable assembly/connector soldering, get your local service representative to prepare the necessary adapters for your system.

When I obtain a new battery pack I first give it a full charge (usually a full 24 hours for the first time). As soon as the pack comes off charge I hook it up to the Digipace and run a discharge test. I leave my timer (discussed in the Part I article last month) set for about 17 to 18 hours. After a one or two hour discharge period, there is still approximately 16 hours left on the timer for a full charge at the C/10 rate (capacity of the battery divided by ten. I record my discharge timer reading on

the Digipace, *before the power is cut off,* otherwise the reading is lost. This first reading (don't forget the date) gets recorded in my log as the initial reference point for that particular battery pack. This is very important, since all the future testing I do with this pack will be *relative to this first reading.*

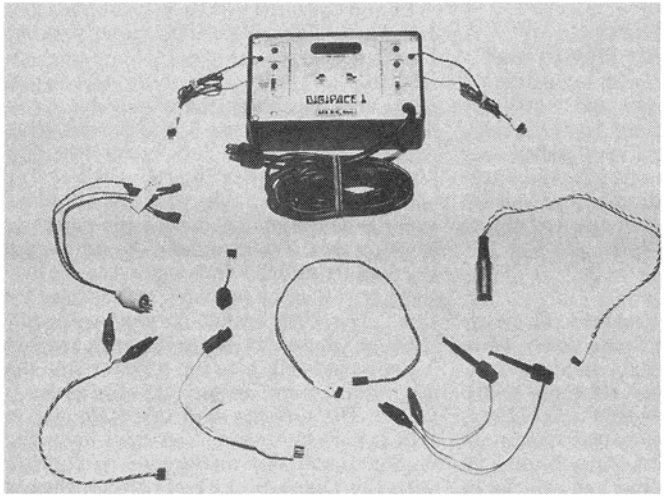
All of my regular battery discharge test readings are taken immediately after the battery comes off a full charge period. This is like a standard reference test procedure. There is another aspect of battery testing called "charge retention" which I will discuss a little later.

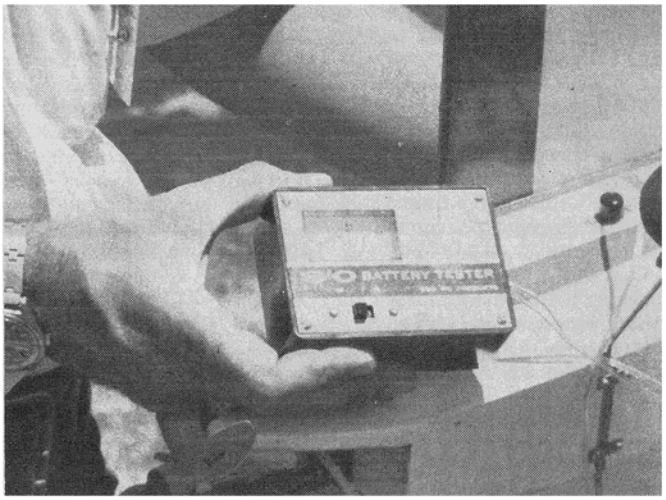
In the regular routine of discharge testing I always fully recharge the batteries after the discharge cycle is complete. The Digipace and the Taylor Power Pacer both do this automatically. I also suggest that you discharge test both a receiver pack and a transmitter pack simultaneously to save time. Always plan on recording the discharge times in a log book. Don't simply run a discharge cycle for the sake of erasing the so called "memory effect". Discharge readings on a *regular basis* will provide your best indication of a battery packs capacity (or general "state of health").

What Do These Discharge Time Readings Really Mean?

Lets use a 500 MAH (milliampere-hour) rated battery pack as an example. Very basically this rating means that a fully charged pack will take one hour to reach a voltage of 1.1 volt per cell, with a 500 MA. constant current load applied. If I have a four cell receiver pack it might have a voltage, at full charge, of 5.6 volts (4 times 1.3 volts per cell). The load cut-off point will generally be 4.4 volts (4 times 1.1 volts per cell). The big problem with battery ratings is that each manufacturer has his own standards. Not everyone will use the "one hour" rate. In the above example: a manufacturer could easily have called for a 50 MA. load for a ten hour period. Another manufacturer might only recognize a cut-off or discharge point of 1.0 volts per cell. These factors can contribute to ambiguous battery discharge test results, or the interpretation of the results.

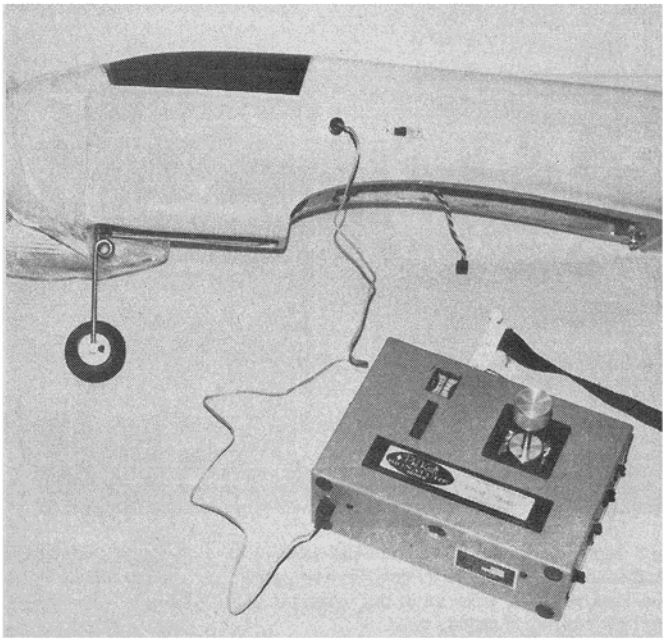
PHOTOGRAPHY: BOB ABERLE

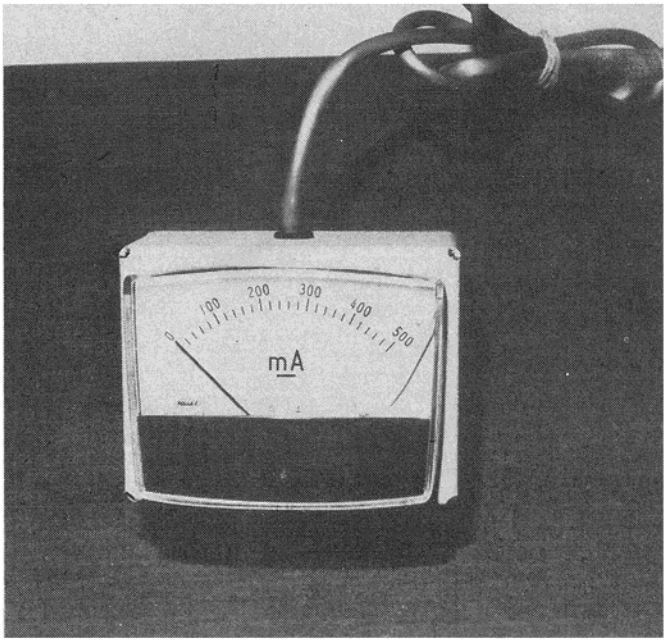




Ace R/C Digipace Tester is shown here surrounded by assorted adapter cables (**above**). Kraft Signature transmitter has built in E.S.V. (**below**). Connecting the special cable as shown, to the charging jack on the model, will give a receiver battery pack reading, under load, on the transmitter meter.

An inexpensive and very popular E.S.V. in this S&O Battery Tester, which is manufactured by Jim Oddino (**above**). This unit sells for around $20.00. This battery test meter is supplied by Proline expressly for checking out their own line of R/C equipment (**below**). List price is $25.80.





On my own personal Digipace I might obtain a timer reading of 110 minutes on a new 550 MAH receiver battery pack. If I convert the 110 minutes to hours (110/60) it is equivalent to 1.83 hours. I know my particular Digipace imposes a constant current load of 285 MA. (not the specified 300 MA.). Take 1.83 hours times 285 MA. and I have 522 MAH (or supposedly the capacity rating of that particular battery). Is that a good reading for a 550 MAH pack? If I consider all the variables, the answer is yes. But the important aspect of this reading is the *record* in my log with the appropriate date of the test. When my 500-550 MAH packs go below 60 minutes discharge time, I throw them out. 60 minutes represents roughly 50 percent of full rated capacity. This is my procedure, rather than a hard or firm rule (I'm usually very conservative!) I generally let a 225 MAH pack go down to about a 20 to 25 minutes discharge time before disgarding. But again, remember, this is strictly my own choice, using a Digipace battery tester with a known load of 285 MA. The L.R. Taylor Power Pacer employs a 500 MA. constant-resistance load, so the readings obtained will be a lot different from those obtained on the Digipace. A good rule of thumb, don't compare battery test results (discharge times) with another modeler unless you both use the *same* piece of test equipment on two different battery packs. The key word again is *relative readings*. If I note a discharge time of 112 minutes on a new 550 MAH pack, I might see this reading "settle in" around 100 to 105 minutes after several months of operation. That reading may then stay that way for a year or more possibly two. Then all of a sudden I may note a decline in the discharge readings. In most cases the deterioration process progresses quickly. Within a few months I may note that the discharge readings have dropped to 60 minutes. My best advice at this point is to stop using this pack (for airborne use). Most of my battery packs last around two to three years (with active use and charged weekly). (The most I have ever received out of a battery pack was five years of service on an old Kraft/G.E. pack.

I could write many more pages on this aspect of battery test data interpretation. Unfortunately publication space is limited. However, I do have a recommendation to make. The ACE R/C Operating Instructions for the Digipace are extremely well written, covering all aspects of battery testing and evaluation. Even if you don't own a Digipace, the material covered is still of great interest to many modelers. As such, I made an arrangement with Tom Runge of ACE R/C Inc. If you send Tom a brief note, mentioning this article and enclose a stamp, addressed envelope, he will send you a copy of the Digipace Operating Instructions (address is 116 West 19th Street, Higginsville, Missouri 64037).

How Often Should You Discharge Test Your Batteries?

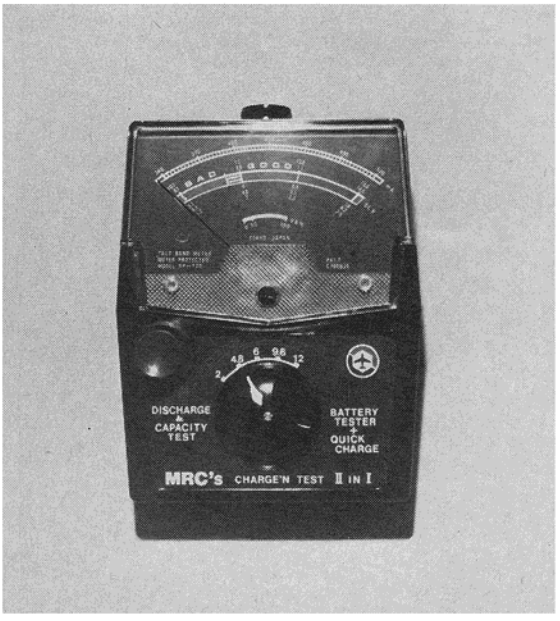
Once a week is *too often,* in my opinion. I try to run a discharge test and record the timer reading for each of my battery packs, on a once a month basis. I very seldom ever let a pack go two months without a discharge test. This frequency of discharging is more than adequate to break any memory effects that may develop in the cells.

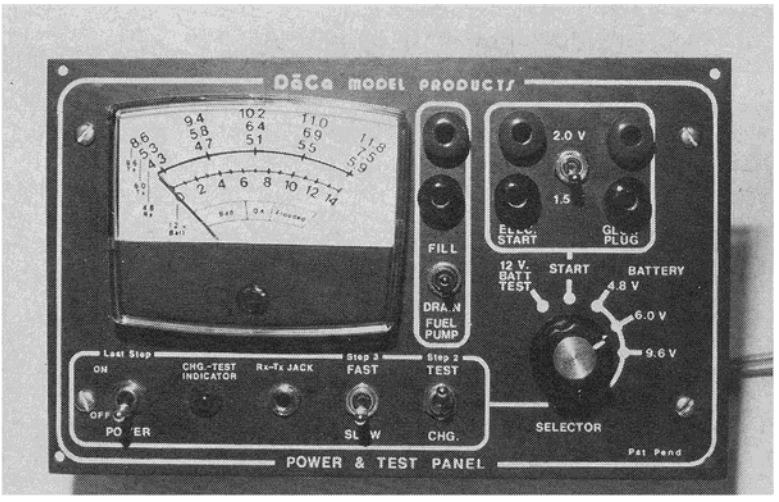
Charge Retention

As I stated before, I always fully charge my battery packs and then *immediately* place the pack on the Digipace for a discharge test. This gives me a standard reference point. Most modelers do exactly that and nothing more. If my battery exhibits poor charge retention it is possible that I could obtain a 90 percent of capacity reading and still be in trouble. How? Well, suppose I charged on a Sunday. Then, it rained for a couple of days. Then I went flying on a Thursday (four days later) and proceed to crash on the second flight. Why? Because, even though my battery shows excellent capacity right after recharging, it can't hold or retain it's charge. In other words it dissipated its charge during the couple of days before I got a chance to fly. The G.E. Battery Handbook indicates that a battery stored at 68 degrees F. should lose only ten percent of it's charge over a period of ten days. To check this characteristic I generally run two discharge tests, one right after the charge period is over and another about five days after charging. My rule of thumb is that any pack that loses 20 percent of it's charge during that five day period is a subject for the garbage can. I recognize that this is a rather time consuming test that I really have to keep track of to get any meaningful data. Even so I make sure I do it.

Testing Batteries Without an Automatic Testing Device

Do you really need an ACE R/C Digipace of L.R. Taylor Power Pacer? Technically no, but I don't recommend it over the long run, unless time isn't very important to you and you are a very careful person who is not easily distracted. You can use one of the available expanded scale voltmeters (to be discussed later), the L.R. Taylor Super Power Panel or simply an ordinary voltmeter and a load resistor to do the job. There isn't any real trick to doing this. You must note the time when the load (resistor) is first applied to the battery pack. A clock or stop watch is used for this. Then keep an eye on your voltmeter (ESV or whatever). When the pack reaches 1.1 volts per cell, note the time (or stop the stop watch) and record the the elapsed period. The problem with this technique is that it isn't automatic. You can't leave the battery under test unattended as you can with the Digipace or Power Pacer. Should you get distracted and forget about the load on the battery, they can easily head for zero volts or into reversal (resulting in possible permanent damage). Many modelers think





MRC's Charge N' Test provides E.S.V. reading under load for various voltage levels (**left**). DaCa's soon to be released Power & Test Panel has a very clear E.S.V. scale (**above**). Note choice of transmitter voltages. What all of this writing is about (**right**). A typical Kraft Systems KB-4E 550 MAH nicad battery pack.

they save a lot of money by not buying a battery tester until they ruin a transmitter pack at approximately $30.00 cost (sometimes more!). If I haven't convinced you, please write and ask for a brief procedure on using a voltmeter and a load resistor. But remember, **I told you so!**

Repair of Battery Packs

I see so much written in the model press concerning battery pack repairs. These articles detail at length how to find bad cells in a pack and replacing only those cells (to save hobby costs!). In general, this wastes time that could be better spent on model construction and/or repair. In the long run, it may not save money either, especially if you suffer a crash due to a bad battery. My personal policy is *never open up a battery pack under any circumstances.* If the pack shows up bad (deteriorating capacity) during a discharge testing, simply disgard the entire pack (out it goes!). In the same manner I don't get involved with deep discharging of the battery cells, no do I ever give the cells a high current "zap" to restore their capacity. Most of these techniques produce short lived results that make them *not worth the risk.*

My philosophy is justified as follows: I spend about $100.00 a year for fuel and props. I replace, on the average, only two battery packs a year. I consider the cost of batteries as expendable just as I do fuel and props. What results do I get? Well in 27 years of R/C flying I have never suffered a single battery failure *in flight.*

Checking Batteries at the Flying Field

Despite all the discharge testing you might do in your shop you still must be prepared to test your batteries at the flying field as well. This should be done at the beginning of each flying session. As you build up flying time during the day, you should check the batteries more often (during the flying session). How do you check the batteries at the field? Generally an expanded scale voltmeter (known as an E.S.V.) will do the job just fine. Whatever you use it must have its own built in load resistor that places something like a 200 to 300 MA. current drain on the batteries. What should you look for on the meter scale? The minimum reading should be around 1.15 volts per cell under load. This will work out to 4.6 volts on a four cell receiver pack and 9.2 volts on an eight cell transmitter pack. Always leave the load connected to the battery under test for a period of five to ten seconds to make sure the pack doesn't drop off sharply once the load takes effect. What meter should you use? They are all good! The S.&.O., E.S.V. manufactured by Jim Oddino is very popular and can usually be obtained for around $20.00. ACE R/C has two separate E.S.V.'s one intended for checking receiver packs the other intended for mounting directly in your transmitter to continuously monitor the transmitter battery pack (both are inexpensive!). Some of the better power panels offer built-in E.S.V.'s (such as the L.R. Taylor Super Power Panel and the DaCa Model Products Power and Test Panel). Several R/C transmitters include built-in E.S.V.'s that can be connected to the receiver battery pack through a special cable. Kraft, Futaba and the new Airtronics XL have this feature. Many modelers now use the inexpensive LCD digital voltmeters along with a simple load resistor (not a bad idea for a "make shift" E.S.V.).

I try to avoid the use of flashing L.E.D. or buzzer alarm type low voltage indicators. The problem with these devices is that they don't tell you where you are "on the scale". Until you hit 4.6 volts (for example), the L.E.D. doesn't go on or off (as the case may be) nor will the buzzer alarm sound off. You could be 4.62 volts and not know how close you really are to needing a recharge. During the next flight you might drop well below the 4.6 bolt level and not be the wiser (4.6 volts is safe for one short flight, but is dangerous in a plane with a big tank or a sailplane in a thermal). My recommendation is always use a meter.

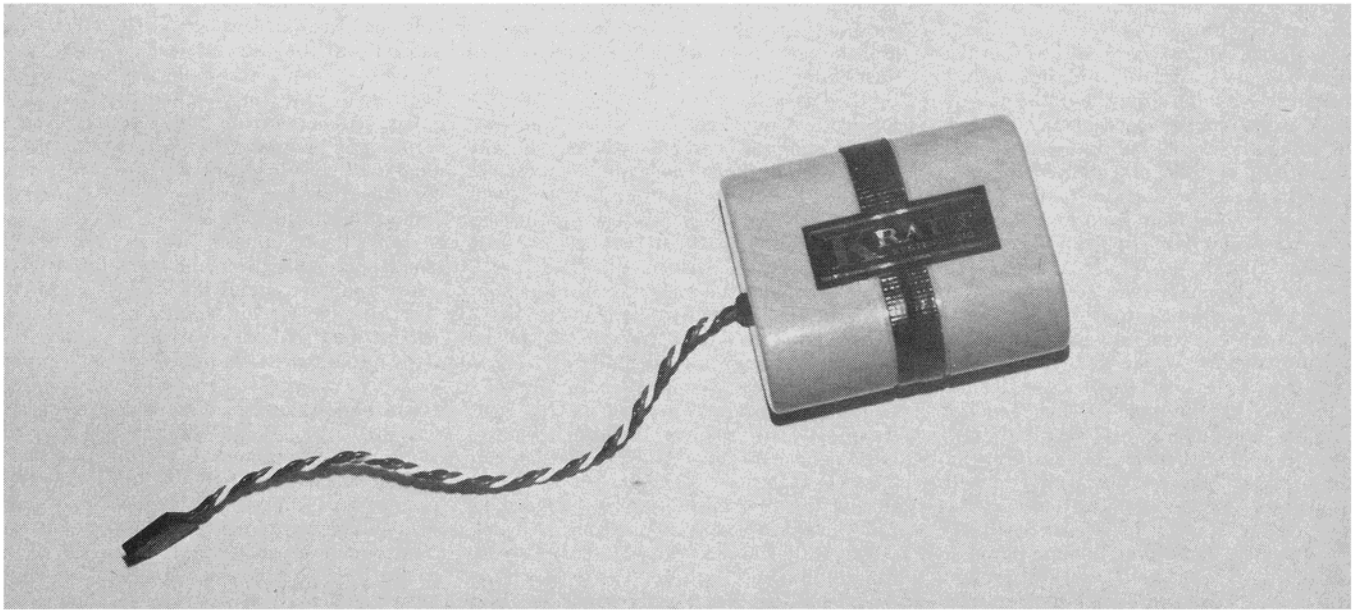
One final comment on this subject. The modeler that keeps flying until his/her servos move real slowly is another flyer inviting trouble. Again get in the habit of using that E.S.V. at the flying site all the time. It should never leave your field kit.

Partial Charging

Don't try to put back in an amount of charge that you feel is about equal to what you took out while you were operating the R/C system. Modelers try this in the interest of saving time. The procedure ends up with partially charged batteries (most of the time) or packs that lose capacity after a relatively short period of service. The regular C/10 charging rate is used for the 16 hour period as often as you like, without damaging the cells. Again refer to my once a week charging schedule, as outlined in the part I article, last month. A good conservative approach!

Conclusions

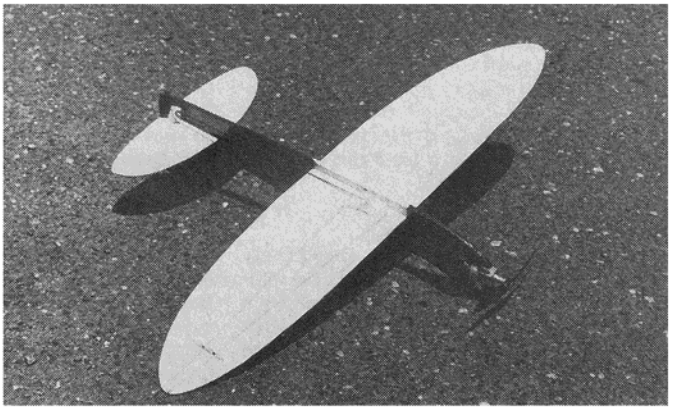
I'd like to think that after two detailed articles I finally put the subject of battery care to rest. But I honestly doubt that this will ever happen. Every article seems to prompt more questions. If you still have some questions on the subject of battery charging and testing, please write to me, in care of FLYING MODELS (P.O. Box 700, Newton, New Jersey 07860). Refer, on the envelope, to the battery articles for easy office identification. I can't answer all of you personally, but I will try to run a follow up article at a later time, containing a sampling of the most meaningful questions received along (hopefully) with some good answers. While you are at it why not tell me what other subjects you would like to see me write on. I'm always open to suggestions.



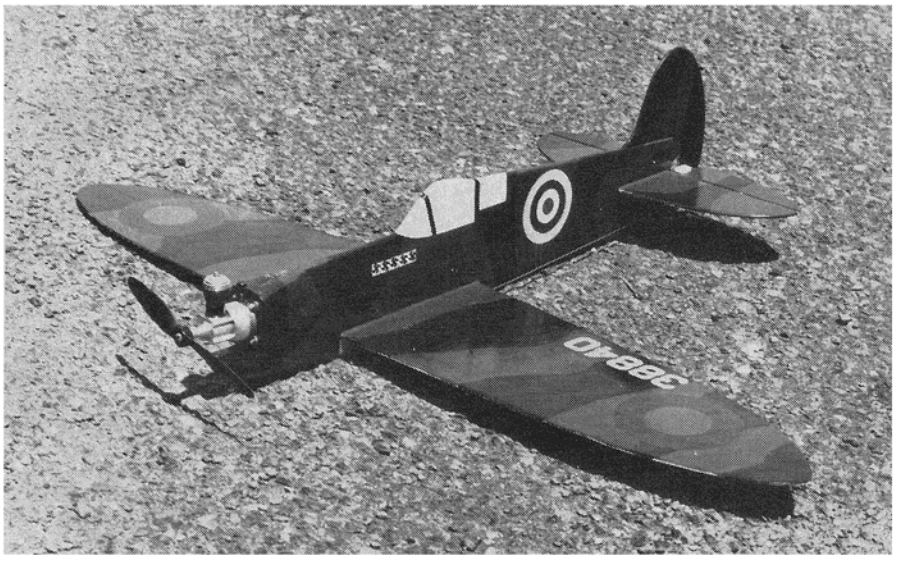
A profile
Spitfire

by Dick Sarpolus

This 1/2A ship is just the ticket for those schoolyard training sessions.



PHOTOGRAPHY: DICK SARPOLUS



External controls are a snap to install and maintain, the beginner should be able to handle them with ease (**top**). Note the offset on the engine. The ship is realistic in appearance (**above**). Easy to fly too.

For the half A control line enthusiast, here's another easy-to-build profile model. We feel this Spitfire offers a lot more than the brick-on-a-string performance typical of many half A C/L ships; this model can help you learn most of the precision aerobatic schedule of maneuvers, or provide a lot of casual flying fun for a proficient pilot. Why should it perform well? By going to a large enough size (29" wingspan, 25" length), sufficient wing area (about 140 square inches) and flying on 35 or 40 feet of .008 wire cable lines, an .049 model really can do a decent job of flying. The SSF's (serious stunt fliers) have already developed "full house" .049 models, with built-up or foam wings, full fuselages, landing gears, and exotic paint jobs. This profile isn't intended to compete with those models, but is really built as a basic and intermediate trainer.

My younger son wanted to learn to fly control line several years ago, but preferred a scale appearing model rather than a usual type trainer. The British Spitfire, easily recognzable by any aviation enthusiast, was his choice for a model. Knowing the desired size and moments for a good flying airplane, he utilized the prominent Spitfire appearance features to come up with this design. All sheet balsa construction made this a quicky project. With no landing gear, as all our flying would be done on a grass field, the elimination of the gear saved weight and drag.

For basic training, we used the inner bellcrank hole and outside elevator horn hole for minimum elevator throw, put the prop on backwards to cut the speed down, and after a few attempts, Scott was flying alone. This initial flight training also showed up a valuable attribute for a trainer aircraft; the ability to bounce back from just about any crash, on a grass flying field, and be ready for another attempt.

With the basic flying covered, we increased the elevator throw, put the prop on correctly, and discovered we had a maneuverable airplane. Inside and outside loops, figure eights, inverted flight were all easily done. The disadvantage of this model for learning maneuvers was its rapid flying speed; it called for quick reflexes. But compensating for this was its ability to withstand crash damage, enabling plenty of practice without time out for repairs. Any .049 would provide more than enough power for good flying; the original used a rather ancient Babe Bee which began its career in a short-lived plastic ready-to-fly. We flew similar models with Tee Dee .049 and .051 engines, also the Black Widow .049, all with success.

After one season of flying, Scott lost interest and the Spitfire collected dust in our aircraft hanger (cellar workshop). Two or three years later, the flying bug bit again, and the Spitfire went back into its basic trainer role for Scott. A quick refresher course, and the Spit was again busy on missions over the local baseball field. The support equipment was a little different than I had when I was learning. Nicad plug batteries and an electric starter with built-in power supply weren't available back in the fifties.

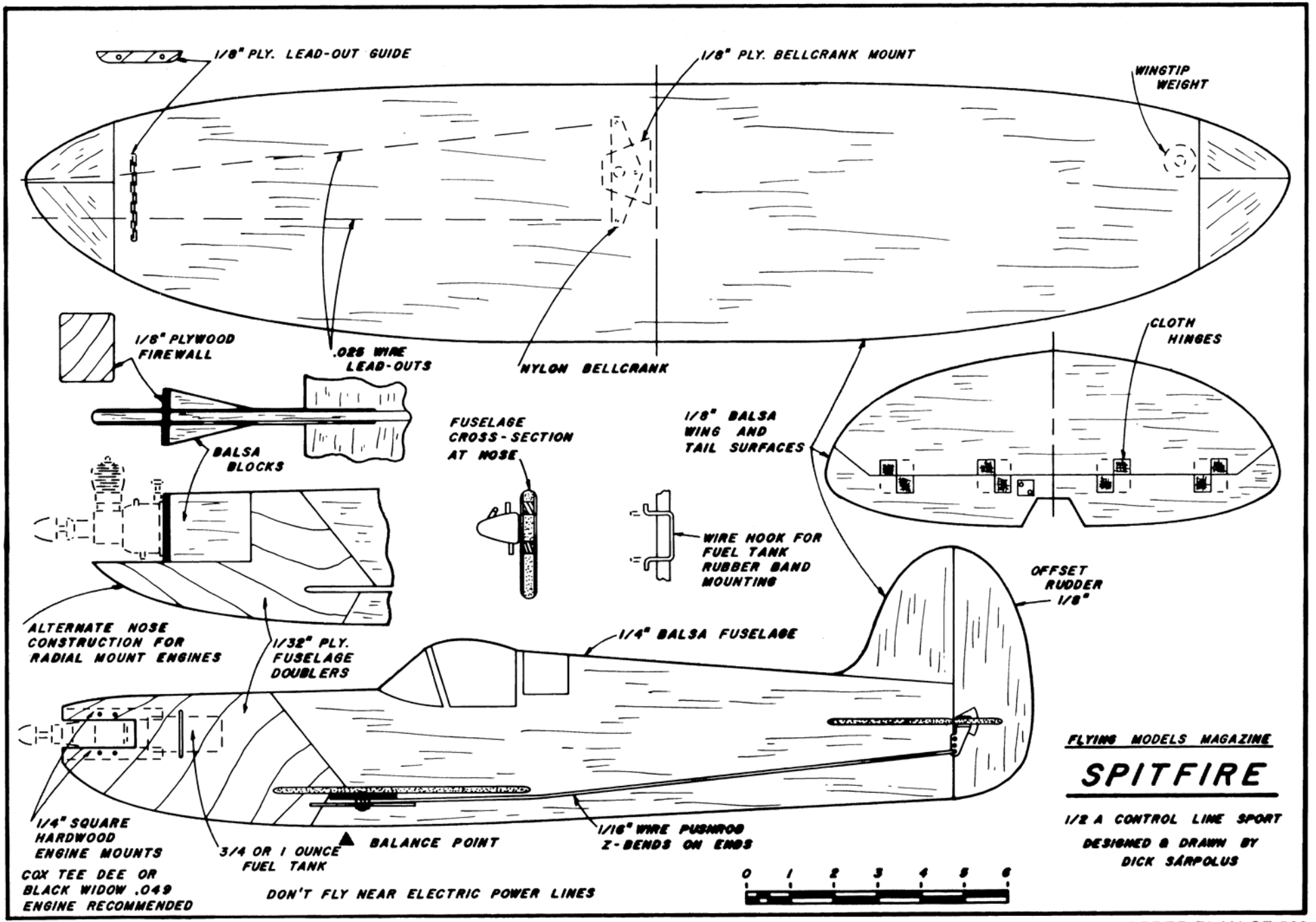
Well, on with the construction comments. With the all sheet construction and the use of five minute epoxy, the plane won't take more than several evenings' work. Only ¼" and ⅛" balsa are needed, some 1/32" and ⅛" plywood, and the hardware. All wood used is firm; weight is not a problem. If six inch wide ⅛" balsa is not available for the wing, edge glue 3" pieces together. The different grain direction at the tips will help prevent warping. The tail surfaces are all cut from ⅛" balsa, edges well rounded, and the usual cloth hinges used.

The fuselage is cut from ¼" balsa; edge glue stock together if necessary to get the width. For beam engine mounting, ¼" square hardwood is set into the fuselage, and the 1/32" plywood nose doublers are epoxied in place. For radial engine mounting, a ⅛" plywood firewall and balsa filler blocks are added over the plywood nose doublers.

The lead-out guide, bellcrank mount, and outboard wing tip weight are epoxied in place. Any available metal or nylon bellcrank can be used with a 1/16" wire pushrod and .025 wire leadouts. For beam mounted engines, use two washers under the front mounting lugs for thrust line offset.

Don't try for a perfect finish on a quicky model like this; just enough paint to look okay and keep things light. (We sanded everything very well, rounding all edges.) About four coats of clear dope, sanded between coats, are followed by the color coats, usually two, sprayed on. A coat of clear for shine and protection, and any desired decals finish the model off. Polyurethane varnish can be used to protect the decals from fuel.

The Spit was painted light blue on the bottom surfaces and the usual green and brown camouflage on the top; also light blue canopy and window areas. Set-up the elevator throw to suit your purposes, and have fun with your own Spitfire!



FULL SIZE PLAN AVAILABLE THROUGH CARSTENS FLYING PLANS

ORDER PLAN CF-563

PHOTOGRAPHY: CAROL REES

Caudron C 635 Simoun

by Dave Rees

Rubber Scale is perhaps the hardest fought event at the Nats. This ship won in 1980.

The "Simoun" was the immediate successor of the Caudron racers designed by the famous French engineer Marcel Riffart. Originally designed C 620, it was first shown at the 14th Aeronautical Show in Paris in 1934. It was powered by a 220 horsepower Renault "Bengali" six cylinder engine, and became the first civil aircraft to exceed 300 KPH (186 mph). The airplane was an immediate success and large numbers were ordered, including nearly 500 for the French army. It also served with the "De La Compagnie Air-Bleu" as standard light mail carrier. Many notable long distance flights were made in this tiny craft, speed records were established to all sorts of unlikely places such as Paris - Madagascar, Paris - Saigon, Paris - Hanoi - Paris, Paris - Tokyo and the crossing of the South Atlantic in 1936. (Ref: Bjorn Karlstrum and Heller Ref. 165)

I shall begin this discussion where any successful competition model must begin - with the documentation. Listed on the plan are the most readily accessible items, the first being available from Peck Polymers, P.O. Box 2498, La Mesa, CA 92041, for 60 cents. (Scale Drawing BH-163). The second is a plastic scale model kit available in most hobby shops for a dollar or so. Do buy both *before* starting construction, as there is much detail that cannot be shown on a building plan which you must work out ahead of time. Save the kit box and instructions as they will be cut up to provide color and marking proof. The kit shows two decorations, one for the Paris to Tokyo race in 1937, and the other a military scheme. I chose the former because I felt it had slightly more "dazzle factor" to a scale judge. These are all you need, so don't spend a lot of time searching—it is possible to have too much documentation according to the new AMA rules.

This model should not be considered a beginner's project due mainly to the scale detailing required, but construction is straightforward and a relatively inexperienced builder should be able to achieve a good flying aircraft. It is designed from the start with AMA outdoor scale rules in mind. For those who fly mostly FAC rules, you will find the Caudron lacking in sufficient handicap points for serious competition. The moments are good, the size is large enough to be less touchy in trimming, and there is plenty of room for a fully wound rubber motor. The landing gear is well placed for good takeoffs and allows a rugged mounting design. The only changes I make from scale, are to enlarge the stab a few percent, double the dihedral angle, and lengthen the landing gear just a trifle. The prototype flies very stably and may even work with *everything* to scale, although you're on your own here since I haven't tried anything but what's shown.

There is one factor which should be kept upper most in your mind while building and that is: lightness. You won't need to use anything but the four to six pound per cubic foot balsa. Don't add a harder piece here or there for more strength; this design will be strong enough if you use the lightest of material. I have listed some miscellaneous weights of things on the plan for those who like to keep track of how the weight is coming along as they build. This prevents unpleasant sur-

prises. There are often two schools of thought in structure design; one uses smaller cross section wood of a medium weight and the other uses larger cross sections and super light wood. They both arrive at the same weight and strength in different ways. You will notice that I adhere to the latter because of the greater section modulus effect and increased glue area at the joints when using larger wood. But enough of philosophy, let's get down to the balsa shavings.

The fuselage sides should be built on top of each other. Note the grain direction on the 3/32 thick fill-in at the nose. Drill a hole through both sides at once for the motor peg using a piece of brass 1/8 tubing sharpened by twisting a countersink bit in one end. This makes a cleaner hole then a drill and does not disturb the wood fibers around it. Soak around the hole with Hot Stuff. Ambroid glue is used throughout the airframe applied via a hypo. Also note that the four verticals from D3 through F5 are continuous while the horizontal member running along the thrust line is interrupted. It is a good idea to soak these intersects slightly with Hot Stuff for maximum strength. The 1/16 thick filler pieces at the wing joint are glued in place so they will be flush with the outer surfaces of the fuse. Acetate glues reach their maximum strength after 24 hours, so let the fuse dry at least overnite while pinned down. Then remove from the plan and sand both sides carefully until all is one even surface. Separate them with a double edged razor blade and bevel them on the inside edges for the rear joint. Add 3/32 cross members measuring from the top view, noticing that the lower cross member at one is shorter than the upper at A (see front view). At B2 both top and bottom are equal as are the rest. Next cut out the formers and glue them in place except for J. In case you are wondering why I picked 1/20 x 3/32 for the stringers, the reason is that a standard flat "pattern file" is exactly .050" thick (1/20") and you can use one to make those notches with great accuracy of width. Add the 3/32 square piece from B to C and cover with soft 1/32" sheet decking. The curves at the front of the fuse are so subtile and characteristic of the Simoun that I found it impossible to make them from thin sheet and look right—hence the blocks. I suppose you could vacuform them, but then I prefer colored tissue to color dope, and it is much easier to cover balsa than styrene with tissue. Use the very softest, lightest of blocks and hollow them to a wall thickness of between 1/16 and 3/32". The 1/32" plywood bulkhead ties it all together into a nose that will take a beating and not wear out. You may install the lower stringers now, but the top ones must wait until the stab and rudder are in place. Alert modelers may notice from the pictures that the prototype has only four stringers instead of the five shown top and bottom. This is done to reduce paper sag and improve the contour of the fuse. You get the benefit of my experimentation.

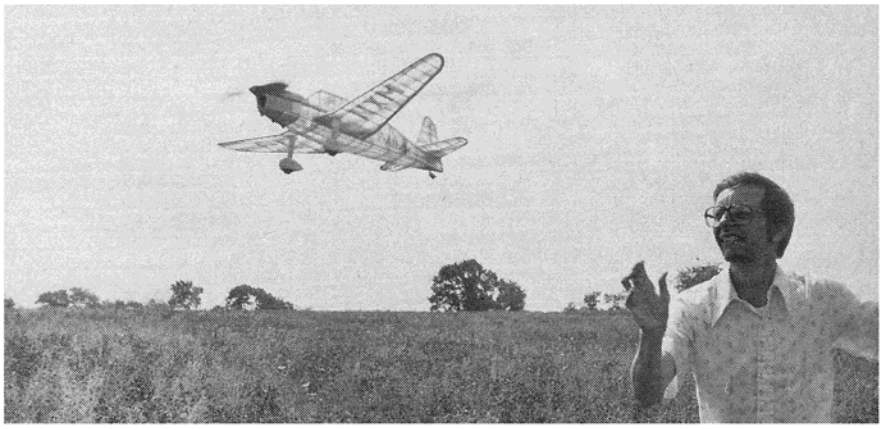
The next items to construct are the tail parts. You will first notice that I use movable control surfaces at the tail. I like them because I am constantly trying different improvements and ways of trimming, and movable surfaces make this easy. Their main drawback is that they are easily bumped *out* of adjustment, too. This is most important in mass launch events where you may not notice a bumped elevator when things get frantic. I use fairly heavy aluminum hinges which stay in place pretty well, but I get in the habit of checking the aircraft over carefully before each flight.

The stabilizer is one piece and has almost scale airfoil thickness, both of which make the stab strong and warp resistant. A flat stab is more prone to "potato-chip" warp on a hot day in the sun. You can cut the ribs individually if you like, or build the whole thing from 1/16 x 3/16, which I think is faster. Shim the leading and trailing edges until they are centered; then when the glue is dry, sand the whole stab to shape just like you would a hand launched glider wing. The fillet block is cemented to the stab spar and carved into fillets at the rudder joint. You can hollow a little from the underside where it fits on the fuse, but very light wood is a must for this piece. Make X-acto knife slots for the hinges but don't install them until after covering is completed. Bevel the leading edge of each elevator about 15° to permit movement at the hinges. Note that there are stab ribs 3/32 thick directly in line with the top of the fuse, although not very clear on the plan. These are necessary for a good joint with the fuse and as a paper anchor point. Next cover the stab, top and bottom, starting the tissue at these ribs and leaving the center open for now. Cut a hole for the fin spar in the 3/16 fillet block Cement the stab to the fuse with "Hot-Stuff" after poking some pin holes in the covering to improve penetration.

The fin and rudder are next, and can be built with exactly the same techniques as used for the stab. Nothing is more distressing than a fin that is simply glued to the top formers and gets knocked off every time the aircraft flips over on landing. This one won't. It is anchored at the bottom of the fuse and even provides the structure into which the tailwheel is cemented. When the fin is completed and sanded to shape, cover both sides beginning one rib above the stab. Slip the spar through the stab, align and cement in place. Now you can install that J former which fits just behind the stab leading edge, bracing it with a fillet of 1/16 sheet as shown.

Install the upper fuse stringers beginning with the outermost ones, and glue at the rear, first. You will have to do some fancy beveling at the end of the stringers to make them all come to a neat point right at the fin spar. This is the trickiest part of the airplane, so take your time and get a good fit. Dope the framework all around the windows with the color of the ship you have selected and glue the acetate on using Ambroid applied with a hypo. Ambroid softens the acetate and make the strongest wood-to-window joint I have found. Be very careful not to get any on the window parts. Cover from B to F and from the thrust line to the top in a single piece on each side. Carve a nose block from medium balsa and bush with tubing for the prop shaft at the angle shown. I use tubular beads from those mens necklaces that were so popular a few years ago. They are 3/8" long with an inside diameter of exactly .048", usually of plated brass. "Hot-Stuff" one at each end of the hole in the nose block. With this much rubber motor I think a ball bearing thrust washer is a good idea. Sig makes one that just fits .047 wire; their name for the size is "small". Make the 1/4" sheet plug-in to fit snugly in the plywood bulkhead, then saturate it with Hot-Stuff around the edges to prevent wear. The fuse is essentially done except for covering, so next make the wings.

The wings are made in two halves joined at the fuselage centerline. They will plug through holes in the fuse sides. Start by making an accurate template of the rib's upper surface from .025 sheet aluminum. Roofing flashing is a good source of this thickness and it is very soft and ductile for use in the tail hinges too. This airfoil is a high-speed-low-drag type to give minimum drag in the climb. It is called "French Curve No. 2", so named because I have two French curves. Slice up a pile of ribs from some 1/16 sheet using an X-acto knife and the template, aiming for 1/16 width as best you can. I used over and under ribs both for lightness and because I dislike plotting all those different ribs for a tapered wing. This way uses all the same ribs—you simply trim to the right length. Cut the leading edges and spars from sheet and taper them using the root rib and tip rib

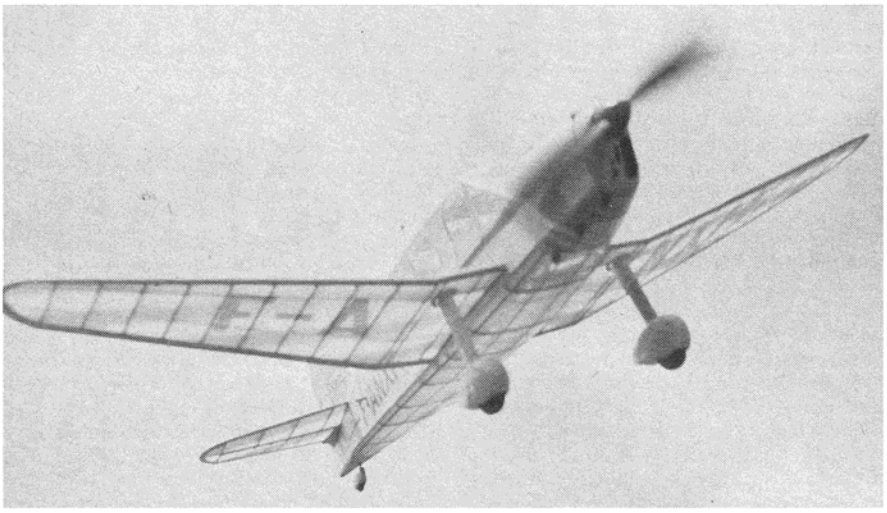


Take it easey for those first few test hops until the airplane is flying safely. Notice the high weeds to absorb trimming errors with no damage. The author won the 1980 Nats with this ship.

as thickness reference for either end with a straight line between them. See front view. Incidentally, those two ribs close together at the dihedral joint serve no mysterious purpose; they simply simulate the ones on the scale three view. Don't think you should use medium wood for the spars to increase the strength, it's not needed. This type rib permits a spar almost the full airfoil depth, so use as light a piece as you want. The bottom of the airfoil is dead flat, so you needn't shim up the leading and trailing edges or the tip. Pin them down to the plan and glue in 1/16" square pieces for the rib bottoms. Next glue the spars to the ribs, holding them vertical with pins. Glue the rib tops on, beginning at the fuse end, cutting each one to just the right length. Note that the end ones match the fuse curvature exactly. Cut off more from the tail of each rib to maintain the proper curvature as you progress toward the tip. When the glue dries, notch the spars and prop the tip up for two inch dihedral, cementing scrap pieces of 1/16 to reinforce the joints. Notice that the trailing edge ends at the lower fuse longerons. The straight crossmember is glued into the fuse so rearward impacts on the wing will not crush in the fuse sides. Sand the wings into a good airfoil shape, tapering the trailing edges to about 1/32".

Carefully measure down from the thrust line and cut the holes in the fuse for the wing spars and leading edges. Make sure you are correct, as this is the only control of the 1° incidence. Try the wings in the fuse to make sure the spars meet properly on the centerline, and trim as necessary. You will have to spring the spars slightly to fit through the holes.

Landing gear this short cannot absorb landing shocks without transmitting damaging loads to the airframe. The old torsion bar is the best solution with the one end anchored in the fuse filler sheets. Bend up the .031 wire measuring from the plan and install following the detail drawing. The wire size may seem too small to you, but it has been carefully selected to give optimum flexing and yet support for takeoffs. It is almost impossible to flex these far enough for them to take a permanent set. It is a good idea to add scrap pieces of 1/16 balsa to the sides of the wing spars where the landing gear legs meet the wing. These should be carefully cut to permit "sproing" clearance and yet suuport the tissue rather than leave a ragged tissue hole. See the section view A-A.



The powerplant of the Caudron is shown here. Notice the braided motor which keeps the rubber from bunching at either the nose or tail and upsetting the trim. The nylon bobbin prevents rubber stress at the prop hook. The 10 to 1 winder is a must for winding such big motors.

Covering is next. Cover the wings completely before installation into the fuse. Use a separate piece of paper from the last rib to the wingtip to avoid wrinkles. I use Ambroid glue instead of dope at the rib adjacent to the fuse to make sure the paper won't come off there. Do not shrink the paper until the wings are glued to the fuse as it will pull the end rib out of shape, never to fit the fuse again. I prefer to cover wings and tail with dry Japanese tissue rather than wet, because shrinkage is less severe and warps minimized.

The trickiest bit of covering is on the fin fillets, so start with them while the fuse is still uncovered. Cover the area bounded by J to the fin spar, and the first stab rib to the first fin rib. A separate piece is used on each side of the fin. Run the tissue grain spanwise with the stab, moistening it with water. After some fiddling with the position, dope the tissue fast to all the structure present. Hasten the drying with a hair dryer and take a look at your handywork. A nice taunt tissue fillet will result if all goes well. Pull it off and try again if too many wrinkles appear. Do not depend on the dope to pull them out. When both sides are covered satisfactorily, cover the elevator and rudder, shrinking them only with alcohol brushed on with a soft brush. Find your hinge slots and slice thru the tissue with a sharp blade. Slip the hinges into the stab and fin, fastening them with Hot Stuff. Now position the elevators and rudder on these hinges leaving perhaps a 1/64" gap so they can be flexed up and down. Take a piece of tablet paper and tear it into strips about one inch wide. As you apply the Hot Stuff to cement the hinges into the elevators and rudder, cement will try to run into the gap and glue everything up solid. Slide a paper strip into the gap and watch it suck up the excess. Keeping the strips moving prevents their becoming stuck fast. The rudder trim tab is installed similarly.

With the tail completed, the fuse sides are next. Lay a dry sheet of tissue, glossy side up, on the plan and trim to the fuse profile with about 1/4" excess all around. Holding it in place, cut the window outlines with a very sharp razor blade. The cuts must be exactly on the lines with no raggedness. You now have a tissue side with window holes that precisely fit the framework. Lay it on the fuse and position the window holes with the framing, ignoring the rest for the moment. Brush clear dope on the tissue around the windows, letting none get on the windows themselves. Dope the remainder of the tissue

to the framework and trim off the excess. Repeat the process, cutting the holes in a piece of tissue with the glossy side down, and cover the other side of the fuse. Now for the curved parts. These are all covered wet to avoid wrinkles. The fuse top can be covered with a single pice if you're experienced, or in two halves longwise if you prefer. Allow some excess at the windshield end to lap over and become the window edging there. Cover the scuttle in similar fashion, again, lapping up onto the windshield to form the edging. Keep your overlaps with the side tissues to the width of the framing (3/32") for best appearance. Remember, only tissue is used for color, so every piece of wood must be completely covered. Do not cover the fuse bottom until the wing is installed.

Cut through the tissue over the wing spar holes in the fuselage, and slide both wings into their places. I held the two ends of the spar together with a spring clothespin; the wing became perfectly level at the center section and aligned correctly with the stab. Holes had to be punched into the fuse fillers for the ends of the landing gear anchors. These holes may be moved as necessary until both landing gear legs are parallel and at the correct angle as viewed from the side. Hot Stuff all in place (not the clothespin please!), adding scraps to brace the spar and leading edge joints. You may now cover the fuse bottom and shrink the remainder of the tissues with alcohol.

Shape the two halves of the landing gear legs and cement onto the wires. I made the wheel pants out of .020 thick styrene pulled over a balsa form in a Mattel Vacuform. This is the lightest these parts can be made and looks best when painted with enamel sprayed from an airbrush. Balsa can also be substituted. All the little scoops, stacks, spinner, etc. can be made from one or two styrene sheets since they are small. Use only epoxy to glue them to the airplane as any acetate cement will melt styrene. Dope and sand the nose block with balsa filler using several coats, then airbrush the same color as the wheel pants. Brush a coat of clear dope on all tissue.

If you chose the color scheme used on the prototype, the stripes were put on the wings using red Pactra "Namel" from an airbrush. Notice that the stripes are *all* parallel to the leading edge of the stab, including those on the wings. I made the wing stripes 2.1 cm wide and the stab stripes 1.9 cm. The Heller kit gives good directions for these. The rest of the lettering was put on also with an airbrush.

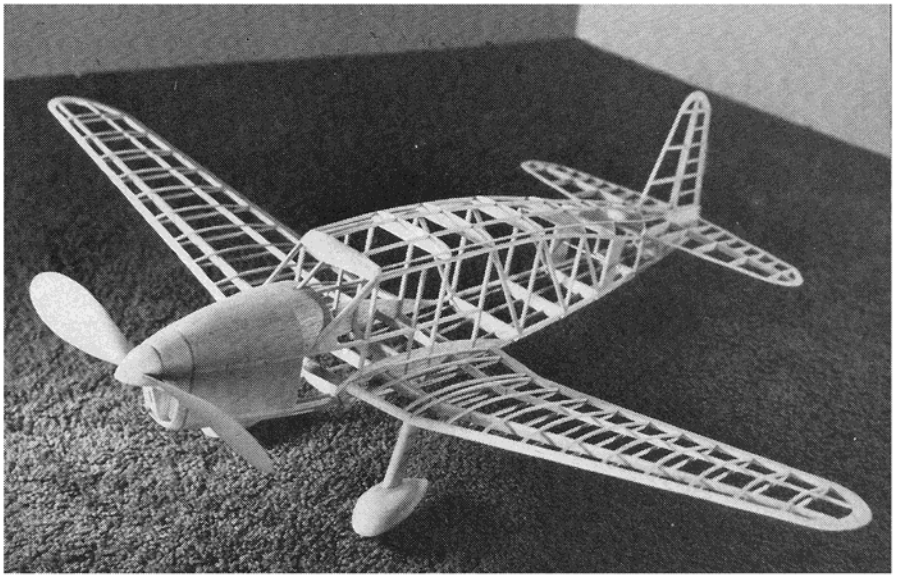
Just a word about masking. Don't try to use any kind of tape as this will rip holes in the tissue when removed, and doesn't make a crisp edge anyway. I used just plain typewriter paper laid on the surface and held in place with many 5/16-24 nuts along the edges to keep them from blowing up. A good airbrush will spray a small narrow band of paint with sufficient control to get a perfect stripe with this masking method. The fuse lettering was another matter. I cut these from .005 thick aluminum obtainable from offset printing houses. The metal is soft enough to be cut with an X-acto knife, yet stiff enough so that all those little points won't lift up from the spraying operation. Again, weight it with lots of nuts along the edges of the letters. The center of the A is separate and must be carefully held down with rubber cement, then removed immediately after spraying before the cement hardens too much. The small letters on the tail had best be done freehand.

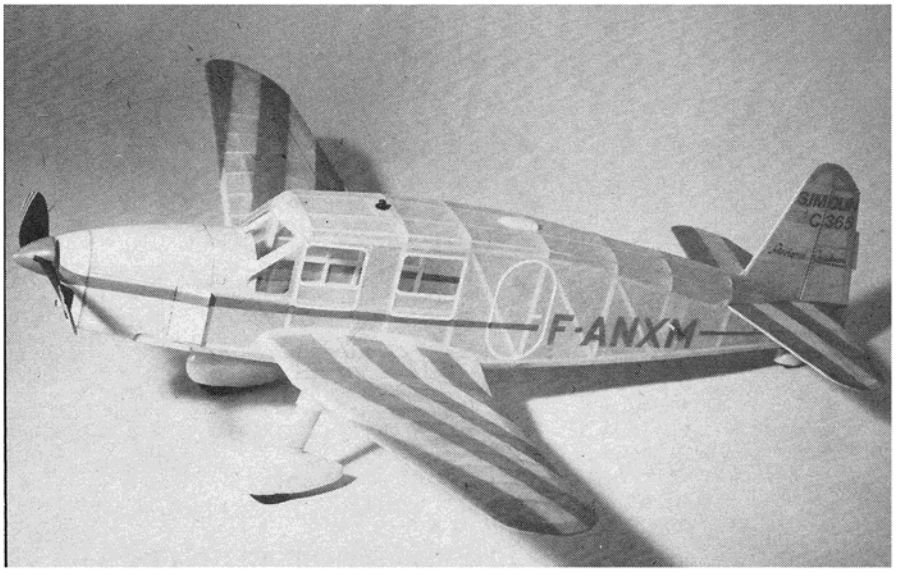
The window and door moldings were cut from a three x five file card, painted yellow, and cemented to the tissue.

The 1980 AMA rubber scale rules have undergone some changes for the better, making it now a really challenging, well-balanced event. Since all flights must be ROG, my strategy was to overpower the airplane for quick takeoffs in the wind, which was somehow always present at the meets. The thinner airfoil, low drag, and lightweight allow this model to climb rapidly above the ground turbulence and achieve maximum altitude. If there were any thermals about, my odds of catching one was greater the higher the ship got.

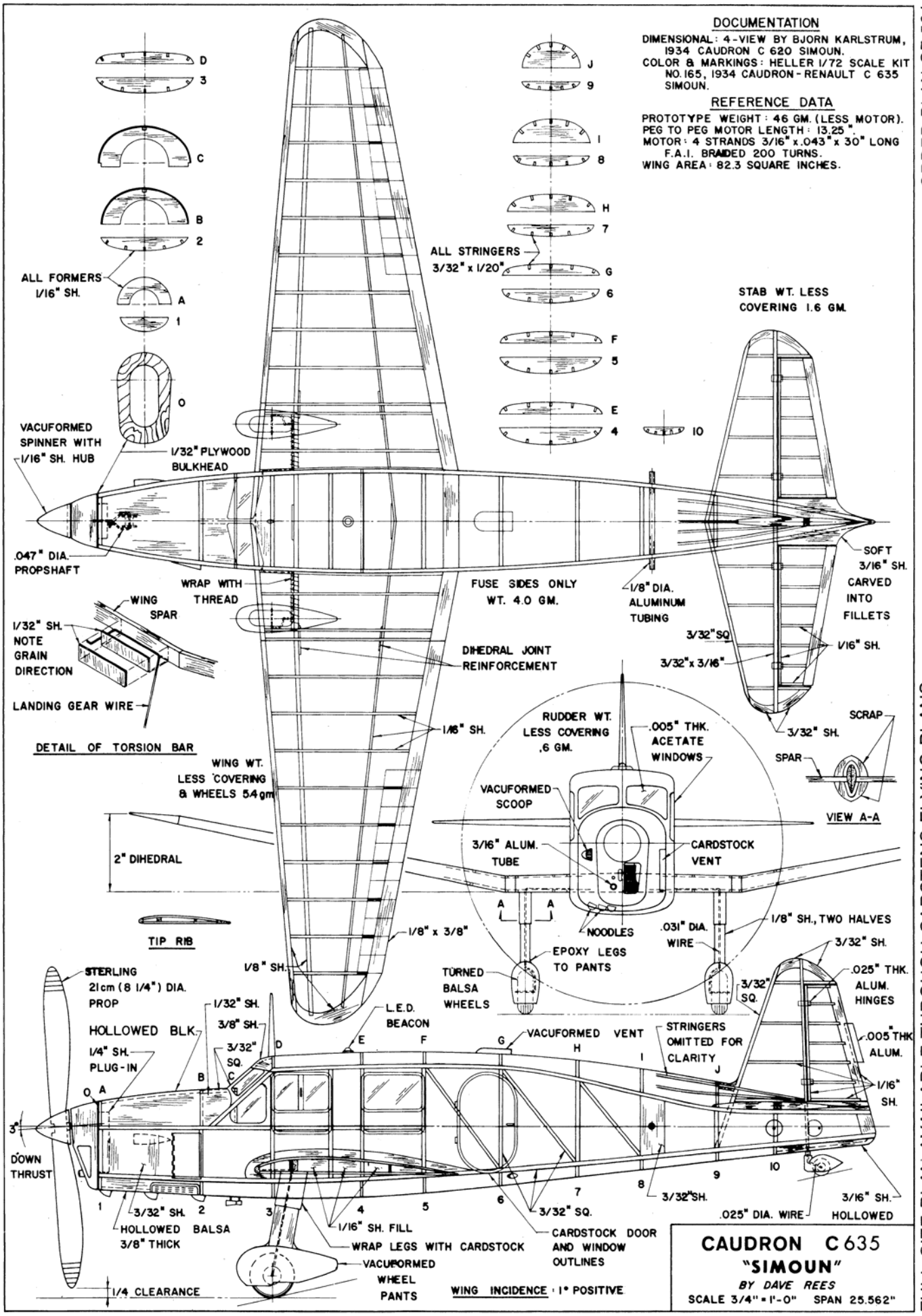
The Caudron has a strong tendency to turn left under all that power, so a little right thrust and rudder will probably be needed. The flight pattern is a steep spiraling climb to the left, a momentary transition when the power runs down, followed by a circling glide to the right. Be careful not to braid the motor with too many turns or prop free-wheeling will be inhibited and the glide sink rate increased as a result. If the day is a cold, damp one, without thermals, this power setup will not turn in maximum times. The objective should be switched from maximum altitude to maximum motor run. A larger prop with this power or a longer, smaller sized motor with this prop will give better results.

Best of luck and I hope you stay out of the trees.





The sheeting and hollowed blocks at the nose distribute the stresses to the rest of the airframe (**top**). Tissue covering on acetate windows gives a realistic appearance (**above**).



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An FM Engine Review:

OS Max .61VR

by Mike Billinton

Both marine and aero versions of this new hot one from Japan are tested here.

O. S. Osaka continues a long impressive march with their "heat machine" a top of the market marriage of high precision and mass production. In both .61 and .65 bored-out versions for marine or aero use, these VR motors established the OS presence in competitive racing areas. Designed mainly for tuned pipe operation, many users may well judge the whole range of this factory's products on the sort of performance reached with this motor. It is clear that OS intends to leave their mark in modelling technology, with their I.C. engine collection. Outstanding performances in both marine racing and C/L speed in the United States and United Kingdom are being reported. It seems that with this first big push in the larger capacity ABN racing motors, designer Kaauhiro Mihara and the whole OS team have a winner.

Mechanicals

The layout is as follows: single-cylinder/two-stroke/ABN/schnuerle-ported/rear exhaust/rear disc. The crankcase and the main castings are die-cast from aluminum alloy. The cylinder is brass nickel-plated—this "Nikasil" process provides the required hardness for the bore surface which untreated nicked does not give. It has a moderate exhaust tuning of 164° allowing operation with or without a tuned pipe; whilst a equally moderate effective compression ratio of 8.7 indicates that high or low nitro fuels may be used. The two faceted squish band (outer facet flat and inner at 5°) is set at .013" clearance. It confirms there is as yet no firm consensus on squish detail design. The ringless piston in this ABN set-up is a normal 22 percent silicon content alloy. A cut-away in the shirt clears the boost passage at BDC . . . (or would do so) if the piston is turned the right way.

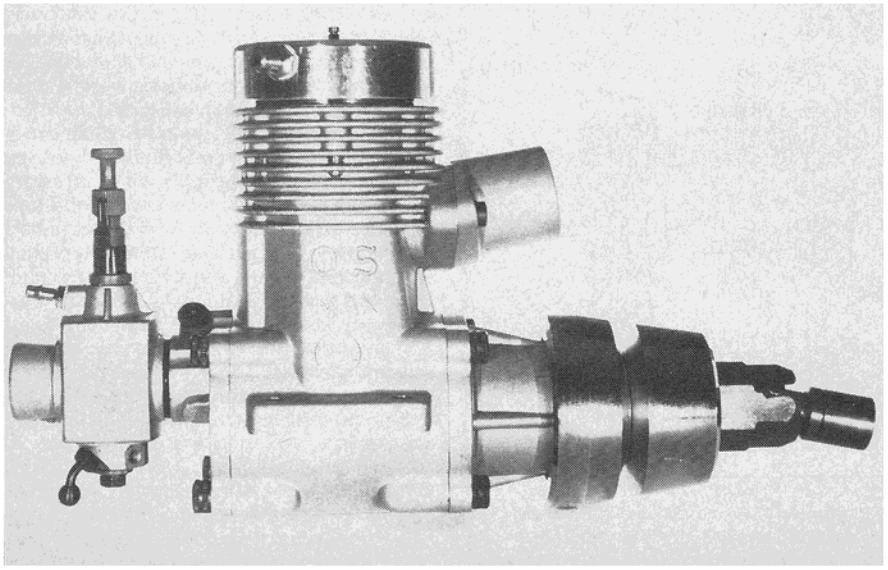
Readers may appreciate the sensitive nature of the last point from the following incident which has quite a nice "ring" to it. Last August at the British Nationals, the first UK 200 m.p.h. C/l speed was witnessed by the chief OS designer. Minutes after the new record was set, the pilot of the plane was asked by UK's new OS distributor, Ron Irvine, whether the little end assembly should be as clearly visible as it was? The piston being turned around meant that the "rantings" from the boost port theoreticians had yet to die away. Because transfer and boost timings were identical at 129°, designer Mihara reminded those present that this would be a matter of concern only with tuned-pipe. This leaves only one unanswered question, was the reversed piston an improvement or a detriment?

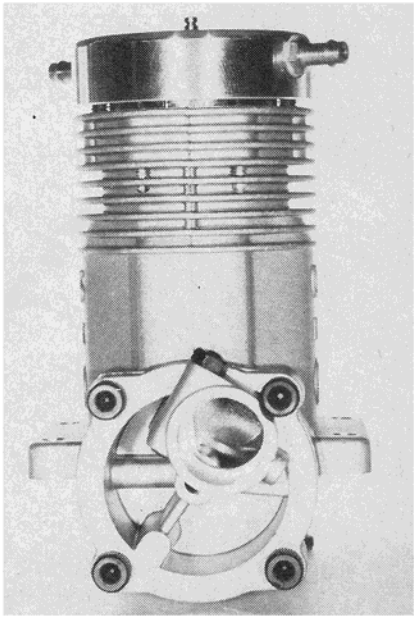
The chrome/molybdenum crankshaft was unshrouded as a reliability point. Occasional reports of brass or alloy web shrouds coming apart influenced OS to go for as much reliability as power. The front threaded end of the shaft looked equally reliable, being sensibly engineered for its marine flywheel application. The rotary disc was made of chrome moly steel—case hardened. The question of the design appeared to be a difficult area for the manufacturer to succeed in because of the conflicting requirements of light weight (to reduce centrifical bursting stresses) together with sufficient rigidity and-strength. With this disc, OS has landed on such compromises, using their particular material combination.

The next development, whether in metallurgy or basic layout, in the racing, induction area is likely to be radical though, because the standard design may not survive the next generation motors (of 10cc size) which could move into the 25K bracket or more. The remaining main components are as follows: The gudgeon pin (again of chrome/moly steel), and the aluminum alloy con-rod of 2024 spec. with fairly substantial dimensions.

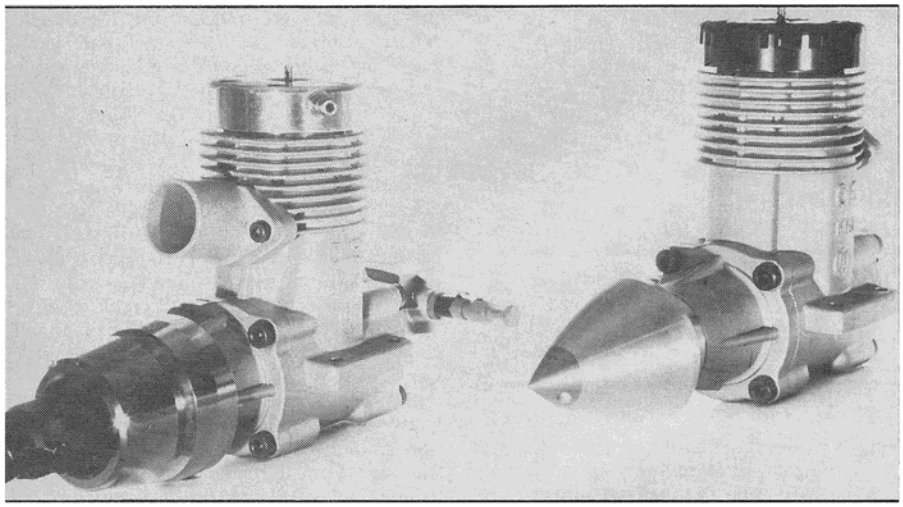
A final point on the overall structural rigidity: whilst these VR motors are similar in respect to their same-sized competitors, it is interesting to observe that larger 15cc marine motors are now appearing having structures far more rigid and uniquely capable of resisting the enormous "dunking" stresses following underwater travel. Water remains incompressible, so the question arises, where does the stresses release themselves with these new motors? Heat increase is the answer, but it's possible that distortion rather than breakage is now occurring, resulting in ruined engines. One wonders whether the "deliberate weak link" concept still has the hold it once had. In the meantime the VR motors continue with the older

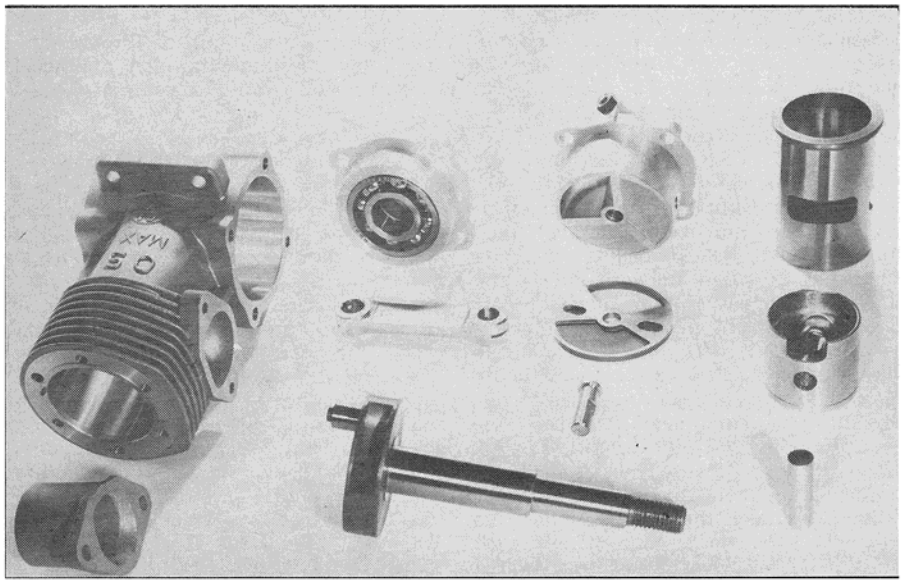
PHOTOGRAPHY: MIKE BILLINTON

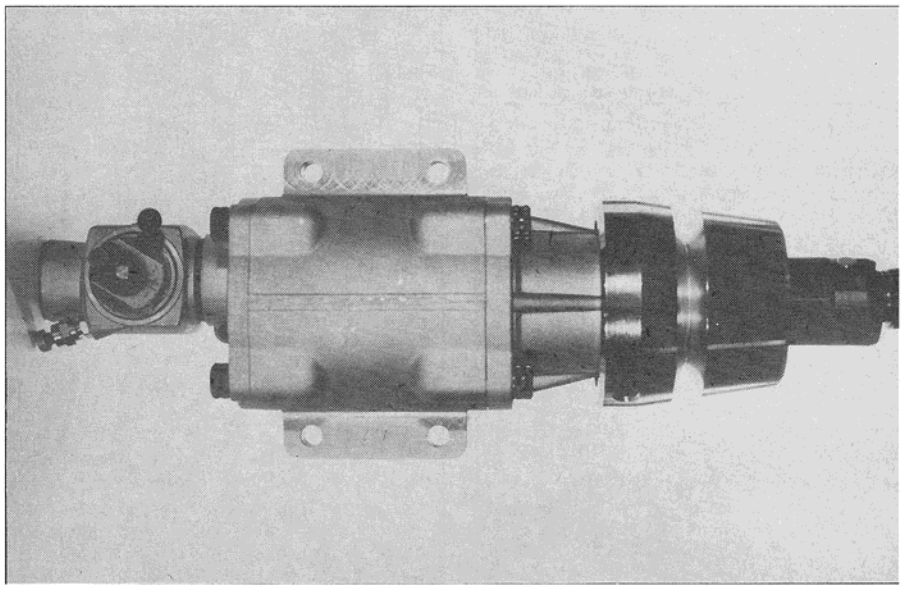




The OS Max VR Marine engine is shown here (**above and left**). Note the water inlets in head.







The OS Max VR Marine and Aero units are identical apart from essential accessories (**top**). Basic parts common to both Marine and Aero versions (**center**). The fine finish on the crankcase bore and the solid front end of the crank are visible. A bottom view of the marine unit shows strong crank housing (**above**).

theory—so parts still bend or break in extreme conditions.

Power Tests

Other than cylinder head cooling, the flywheel, its collet, and the carburetor the two motors shown here are physically identical. Performance is somewhat improved by the Aero carburetor which has an effective X-section area of 100 square mm opposed to 70 for the 7F R/C carburetor. Although it is felt that reversal of the crankcase for the tests should have only marginal effect, an attempt to quantify this will be made later in this series of tests. In the meantime though, marine users may wish to know that to allow the normal air brake beams to be used on the new Dynamometer and to obviate such beams from lashing the tuned pipe, marine motors have re-assembled both the carburetor and exhaust at the opposite end from flywheel. However, the irreversible CMB 90 marine unit is looming as the next likely test so a rethink is now necessary. Aero and marine users will be secure in the knowledge that, conversely, the position in these tests is the "right way round".

Three sets of figures (50 runs in all) were arrived at with the intent of covering some normal useage in both marine and aero fields. More curves on the one graph tend toward visual confusion. In any case, the motor itself decided the matter by ending the sequence of tests slightly earlier than required.

OS wisely placed much stress on test runs (such as it was with ABC style motors) in the environment of the motors expected use. This resolved some differences on the matter. Although they were against the idea of test runs on the bench. (This clearly does not apply to this test motor, because its normal use will only be on the test bench, and it is unlikely to perform so well if now put into actual model use.) In accordance with their advice, several progressively harder runs were administered before power tests commenced. During the tests air density was such that a British Standards correction factor (1.017 in this case) was applied to the BHP figures.

Curve 1. Open exhaust, R/C carburetor, five percent nitro and 20 percent castor; suction tank raised three inches above the jet level. Glow-plugs throughout were Taylor L/R two volt—two were consumed.

This particular test enabled comparison with a large number of tests undertaken over the years by Peter Chinn, in which he established the norm of open exhaust and five percent nitro. Avid followers of this standard parameter know that the 2.16 BHP reached was appreciably above previous figures and indicated a new plateau of standard performance for full racing schnuerle 60's in ABN/rear disc/rear exhaust format. The significant point (for a large capacity motor) is the maintenance of considerable torque, way up the r.p.m. scale in comparison with earlier standards.

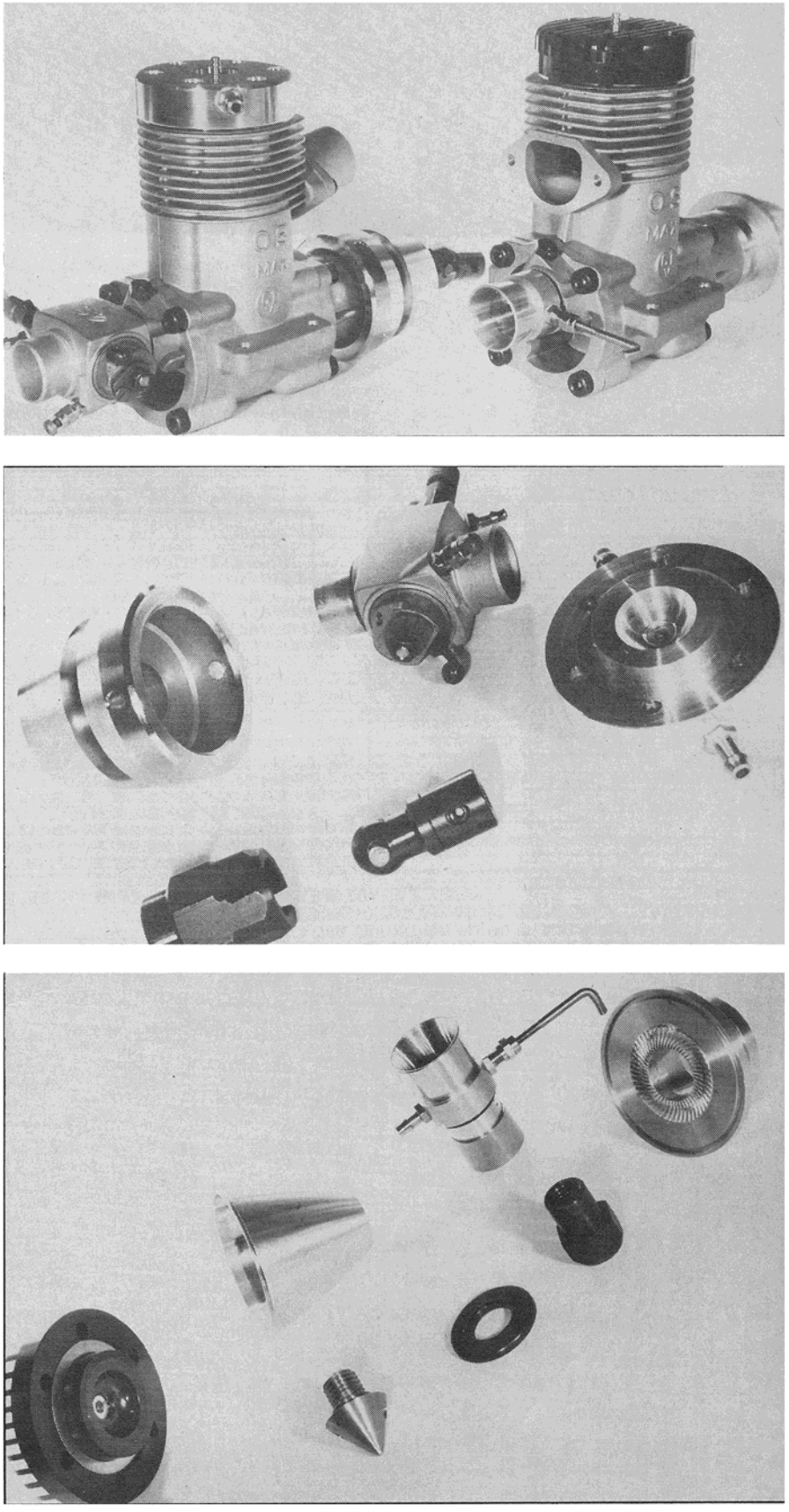
Curve 2. A standard USA pipe (Mac's Quiet Pipe) is set at 11" from maximum diameter to piston face. The R/C carburetor and straight fuel with 20 percent castor running on pipe pressure is a standard combina-

tion in the marine racing field. The wide r.p.m. range capability of the OS 61 VR is revealed in these tests, but strictly when operating on a tuned pipe. However tests reveal some interesting facets; so here's a look at the continually harmonizing effect, as r.p.m.'s rise. As can be seen, the result of using one fixed length of pipe (and then conducting torque tests with gradually reduced loads comes up with an unusual, but expected "Helter-skelter" curve). The surprising thing is the reluctance of power to decline quickly after pipe reaches its 20K peak. This normal expectation is delayed much later to 23K. The motor/pipe combination ends up with a useable band, six K wide. From previous tuned pipe tests the effect of changing to different fixed lengths is to move the whole curve (largely unaltered in shape) rightwards up the r.p.m. scale. Shortening the pipe was an uplift in the actual value of BHP. From tests to date, it is not certain that this progressive effect upwards goes past the r.p.m. point where it is maximum. BHP is reached on open exhaust. Tuned pipe theory should allow considerable uplift past a particular speed, but other factors intrude such as the overall volume of the pipe system (thus its inherent back-pressure effect). This hasn't been observed.

Curve 3. The following are factors in this test: 50 percent nitro and 18 percent ML70 synthetic oil, simple Aero carburetor, mini pipe, surgical tubing fuel tank. This is a standard medium-to-hot fuel situation in the USA and UK C/L speed aero sector. The USA normally operates .65 cubic inch motors in this class so these test findings can reasonably be uplifted around six percent to account for the capacity difference). As in the tuned pipe curve, the beating effect is clear even with a much milder form of exhaust wave device—the mini-pipe. Here this is a plain open tube of .97 inch I.D. and 4.4 inch end to piston face. The 2.98 BHP reached with this set-up indicates an even higher figure if a tuned pipe with high nitro is used.

These three curves revealed much of the different style and amount of power release possible with modern racing two strokes when variously operated. What continually impressed me with this type of motor was the surprisingly wide r.p.m. band of available performance revealed in the open exhaust tests. This followed the motors capacity to go on breathing effectively, further up the r.p.m. scale than was the case with more normal sports timing and induction systems. It certainly resulted in a vast reservoir of power into which the user could dip as required.

As attempts in this third test were for the purpose of extracting a large proportion of total potential. It was of no surprise that near the end of these 50 percent nitro runs a stoppage occurred. A subsequent parts inspection suggested too little lubricant reached the bronze rotor pin bearing. Conclusions were difficult to draw, but O.S. was studying the parts and if any changes were needed they would come. From reports though, this was a rare occurrence and so could indicate shortcomings in any one of the various areas (not necessarily within the motor itself). Successive runs brought the moment of pos-



The Marine unit is shown with an R/C carb, and the Aero unit displays a C/L venturi for speed flying (**top**). This photo shows some of the Marine unit's parts (**center**). Note the heavy-duty flywheel and water-cooled head. The parts necessary for the Aero unit (**above**). The spinner cap is a brass item.

sible failure nearer. It was well known that both disc and rod were problem areas in the racing classes and so were being given close scrutiny by those manufacturers involved in this most demanding section of I/C two-stroke performance. Meanwhile informed comment suggested that the modern 10cc units were operated at over 22K could be in a dangerous area.

It often seems a minor miracle that such release of power occurs without any incident. If one is looking for balance of motor qualities of say 80 percent and 20 percent, a Mills 1.3 could suit. The OS61VR motor style offers the reverse compromise and so it's not reasonable to automatically expect hundreds of maximum power runs without any problems.

Another feature such engines share with their full-size counterparts (top-fuel drag engines 300bhp/litre) is the very rapid arrival at maximum power point from zero speed. One shouldn't suppose equalling deceleration rates when mercifully rare instant engine seizure occurs at that high speed. The speed of onset of any warning signs is far too great and rarely allows any warning signs or any preventative measures. Safety sheilds are needed when pushing racing motors to maximum capacity.

Carburetor

For R/C use (marine or aero) the OS type 7F rotating barrel was fitted as standard. It was used during tests 1 and 2 and proved an efficient transmitter of required fuel/air mixtures at any degree or speed of opening. The main needle was a pleasure to operate, having an almost ideal degree of sensitivity. A careful inspection of the instructions should inform the owner of the proper fuel needle valve adjustments to avoid flooding.

Summary

In this first approach into a quite stressful area, O.S. recognized current best ABC racing engine practice and built on this to produce a very refined mass produced engine which continues to cause agitation in the competitive racing world. Considering the generally enhanced quality of Japanese engineering during this decade, it must be a matter of interest to all followers of the two-stroke racing scene as to future possible developments. There certainly are some clearly defined areas which could benefit from competition. In the meantime, there's enough stunning HP in this machine to keep all users on their toes, and enough very good workmanship to satisfy the connoisseur.

O.S. Max 61VR Racing Engine

Dimensions & Weights:

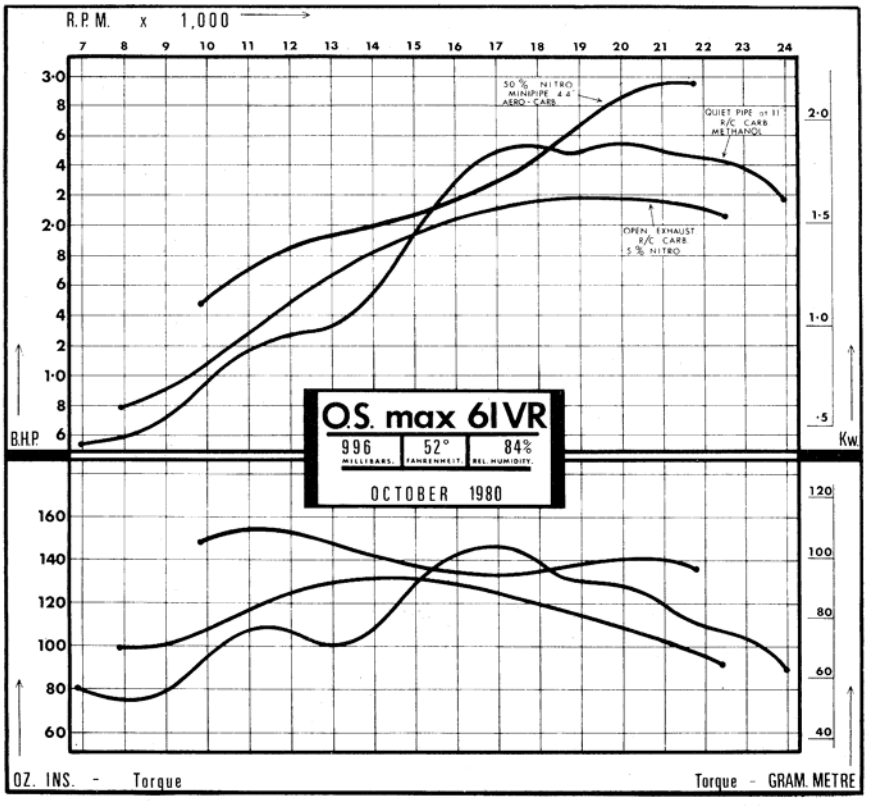
Capacity	— .606 cu. in.	(9.94 cc)
Bure	— .945"	(24 mm)
Stroke	— .865"	(22 mm)
S/B ratio	— .915/1	
Timing periods	— Exhaust 164° Transfer 129° & Boost Induction 199° (opens 35° ABDC closes 54° ATDC)	
Combustion vol	— .05 cu. in. (.82 cc)	
Compression ratios —		
Theoretical	13.12/1	
Effective	8.7/1	
Ex. port height	— .315" (8 mm)	
Cyl. head squish	— .013"	
Squish band width	— .16" (4.06 mm)	
Squish angle	— outer band 0° inner band 5°	
Overall height	— 3.9"	
Length	— 6.5" Marine. — 5.45" Aero.	
Width	— 2.4"	
Frontal area	— 6.6 sq. ins.	
Carb. bore R/C	— 11.22 mm.	
Aero	— 12.5 mm.	
Crankpin dia.	— .255" (6.47 mm)	
Mainshaft dia.	— .472" (12 mm)	
Gudgeon pin dia.	— .236" (6.0 mm)	
Con-rod shank	— .142" x .38" to .35"	
Weights — Aero	— 20 ozs. with spinner. (.567 Kilo)	
Marine	— 28 ozs. with flywheel. (.794 Kilo)	
Mounting hole spacing	— 52mm x 25mm. (4mm dia.)	

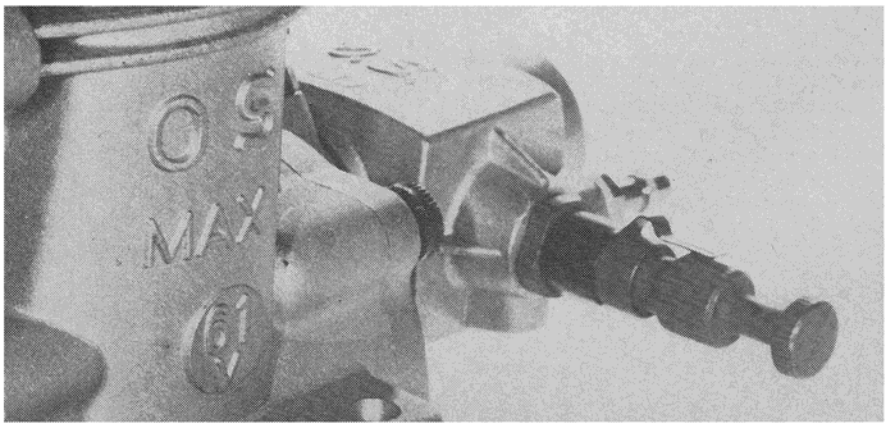
Performance:
Max. BHP
2.98 @ 21,500 rpm (Minipipe/50% nitro/Aero carb.)
2.54 @ 20,000 rpm (Mac's Quiet pipe/R.C. carb./Straight)
2.18 @ 19,200 rpm (Open Exhaust/5% nitro./Aero carb.)
Max. Torque:
155 oz. in. @ 11,120 rpm. (Minipipe . . . as above.)
146 oz. in. @ 17,000 rpm. (Quiet pipe . . . as above.)
131 oz. in. @ 14,500 rp.m. (Open Ex. . . . as above.)
R.P.M. Standard propellors:
11 x 7 Zinger — 13,300 (Open Ex. & 5% nitro.)
11 x 7 Zinger — 12,000 (Quiet pipe @ 11" & Straight.)

Performance Equivalents:

BHP/cu. in	— 4.9
BHP/cc.	— .30
Oz. in/cu. in	— 255
Oz. in/cc.	— 15.6
Gm. metre/cc.	— 10.86
BHP/lb.	— 2.38 Aero (1.45 Marine.)
BHP/Kilo.	— 5.25 Aero (3.20 Marine.)
BHP/sq. in. frontal area.	— .45

Manufacturer:
O.S. Engines Mfg. Co. Ltd.
6-15 3-chrome Imagawa
Higashisumiyoshi-ku
Osaka 546, Japan.





Midwest's T-Craft

by Ron Farkas

This sport pattern ship has good looks and even better performance.

The Live Wire T-Craft is sort of a wolf in sheep's clothing. At first glance it appears to be a simple low power, three channel, high wing trainer dressed to look like a Taylorcraft. Upon closer inspection it turns out to be a .40 powered, four channel, aerobatic sport model dressed to look like a Taylorcraft. Not that the T-craft can't be flown low and slow, but the relatively high power and thick semi-symmetrical airfoil provides performance that one would not expect from a realistic looking high wing monoplane. It is a refreshing change from the typical shoulder or low wing, weekend warriors that don't even resemble airplanes that real people fly in.

It is nice that someone finally kitted the clipped wing, aerobatic Taylorcraft in the popular .40 size. The full-scale version has the personality and talent that really appeals to the sport modeler. The original design dates back to the late thirties and it has always been recognized as one of the finest basic trainers. Mr. Taylor's choice of a semi-symmetrical airfoil, as opposed to a Clark-Y for instance, makes it a natural for aerobatics. Pilots who desire to do serious competition shorten the wing by about eight feet. Among these pilots is the famous Duane Cole whose easily identifiable color scheme is the one chosen for the prototype kit model. Duane was the National Aerobatic Champion twice in the early sixties using his clipped wing Taylorcraft, and used it for many years in the Cole Brother's Air Show.

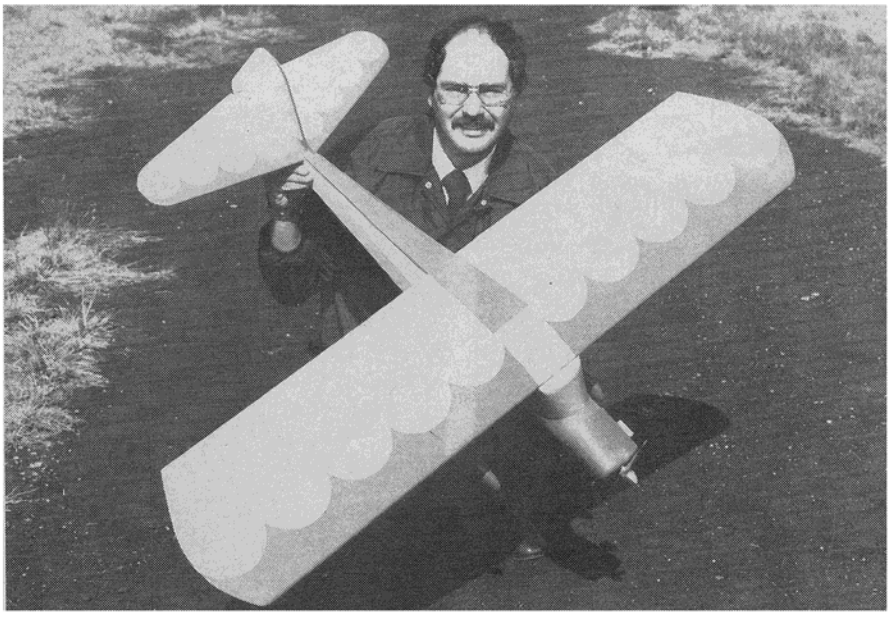
The Live Wire T-Craft is not intended to be a faithful reproduction but to be a pretty good likeness, with great flying qualities. The model is designed and engineered by Harold deBolt who is a pioneer in model aviation and is now on the staff of Midwest Products Company, 400 S. Indiana St., Hobart, Indiana 46342. The T-Craft spans 55½ inches for an area of 615 square inches and has a recommended weight of 4¾ pounds. The retail price is $64.95. It can be powered with any engine in the .29 to .45 range and requires a four channel radio. The construction is almost all balsa except for the cowl and wheel pants which are molded from ABS plastic. There is also a rather complete hardware package, preformed dural landing gear and an aluminum motor mount.

The T-Craft is aimed right at the sport flyer with an experience level between competent novice and advanced intermediate. It has a very broad performance range, combining slow and docile characteristics with AMA pattern capabilities. For these reasons the manufacturer is justified in advertising it as an aerobatic trainer. Beyond that, however, even an accomplished pilot is at a disadvantage competing against the modern pattern designs found at most contests. The T-Craft is really a pleasure to fly for fun and most of the AMA pattern maneuvers can be done with sufficient practice.

As far as construction is concerned, I would judge the kit to be tedious for an experienced builder and perplexing to a novice. For an outwardly simple design the parts count is very high and the engineering is complicated. For example, the construction manual includes 40 steps for wing construction and 36 steps for the fuselage, not all of which are easily understandable. Add to this the fair die cutting and rather poor wood quality and it becomes a real challenge to build a straight and strong airframe. With care and patience you will be rewarded with a sharp looking and exceptionally good flying airplane.

In the following construction notes I will try to concemrate on the most troublesome areas in the hope that you can benefit from my experience building the T-Craft. First I suggest that you read the entire manual and use the bill of materials to mark the die-cut parts before punching them out. There are a number of pre-cut blocks that should also be measured and marked before you start building.

PHOTOGRAPHY: RON FARKAS



Construction

The wing has no dihedral and is assembled in one piece over the plan. The first step is to erect five wing saddle jigs that will suspend the wing off the building board. These jigs are contoured to the bottom of the airfoil. Next the bottom leading edge sheet is pinned securely to the jigs. If you sheet is extremely soft, as mine was, it will sag between the saddle jigs. I suggest using more saddles or substituting firmer sheet, or both. The spar is a full depth piece of 3/32" balsa sheet. It is glued on-edge against the bottom sheet. Make sure that the spar is exactly 90 degrees to the workbench and that it has no warps. The ribs are die-cut in front and rear sections. Glue and pin the front pieces firmly against the spar and bottom sheet. Then pin the trailing edge sheet to the jigs and glue the rear portion of the ribs in place. When this assembly is dry you can add the center section spar doublers and glue on the shaped leading edge spar stock. You will probably have to block sand the front of the ribs to get the leading edge to fit well. Now you can apply the top sheeting. Be sure that you do not trap any pins that were holding the wing to the jigs. The trailing edge is then block sanded and capped with ¼" stock.

It was at this point that I realized how badly my wing was sagging between the jig saddles. I had to rip all the trailing edge sheet away, reposition some ribs and re-sheet the wing with firm wood. The remaining tasks were to add the capstrips, tip sheet and install the ailerons. The only modification that I made was to make a provision for a bolt and dowel hold-down method instead of rubber bands.

The fuselage of the full scale Taylorcraft is fabric covered and has a distinctive beltline. In order to approximate this shape in a fully sheeted structure the fuselage is assembled in a lower half and then an upper half is added. The lower half is assembled in an inverted position on the building board. The formers are die cut in left and right halves which must be glued together and then pinned in their respective positions on the building board. (This wood was really soft, and was crushed wherever the die had made a crossgrain cut.) The lower halves of the sides are then glued against the formers. After addition of the landing gear block and some internal reinforcements, the fuselage is removed from the board. The upper portions of the formers are then added in their respective positions and the cabin sides glued in place. The seam joining the upper and lower fuselage sides is a compound curve, therefore some trimming is necessary to achieve a good joint. Be aware that an uneven trimming job may affect the angle of incidence of the wing saddle so take off a little at a time from each end until the upper and lower pieces mate well. Enclosing the nose section is a bit troublesome since it requires both sheet and blocks. The instructions say to first glue these blocks (called stiffeners) in place and then add the sheet between them. Put the sheet on first so that it's a little oversize and trim it as necessary until the blocks fit well. That seems easier to me. Either way, it is wise to make a paper pattern before you cut the sheet to shape. The aft portion of the fuselage bottom is fully sheeted with two die-cut pieces and the top is open with two stringers supporting the covering material. Replace the stringer material with harder stock to prevent it from breaking during normal handling.

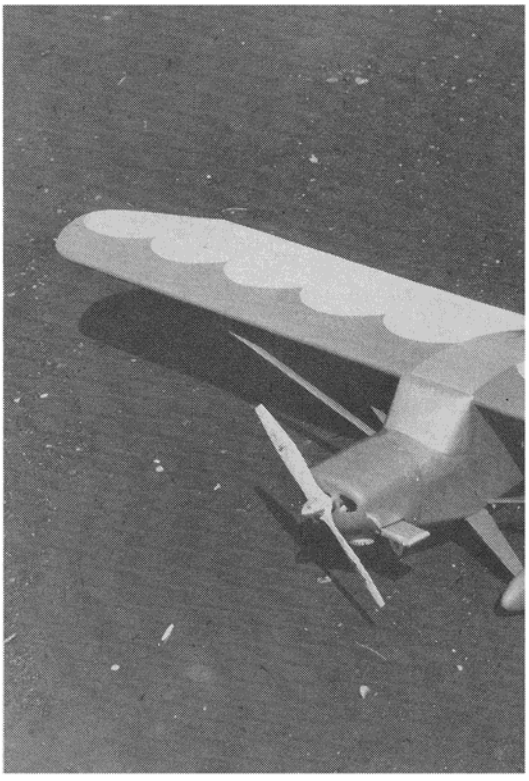
The kit comes with a nicely formed plastic windshield. However all of the side and top glass areas must be simulated with paint (or Monokote trim). So, just for consistency I sheeted the windshield area and later covered it with silver Monokote along with the rest of the windows. The other preformed parts included the one-piece cowl and the two-piece wheel pants. The plastic was tough ABS variety that held its shape well and cut fairly easily with an X-acto knife. The pant halves were easily joined with Hot Stuff. I couldn't get the recommended 2½" Kraft Slimline wheels to fit inside so I settled for two inch wheels instead. The cowl was a good fit on the nose of the airplane. Engine access holes were best made by drilling a pilot hole and opening it up with my knife and a round file.

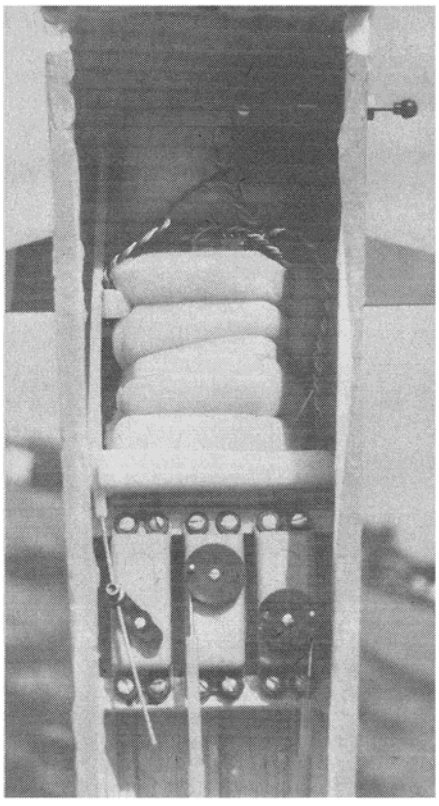
Assembling the tail unit was no problem except that all the die-cut pieces were soft and badly crushed around the edges. The stabilizer was constructed of a top and bottom sheet separated by a stick framework. It was light and very warp resistant. All the other surfaces were of 3/16" balsa sheet. The fin and rudder were each comprised of two pieces and the entire elevator was one piece. Triangle stock was used to reinforce the fin-stabilizer joint and the stabilizer saddle.

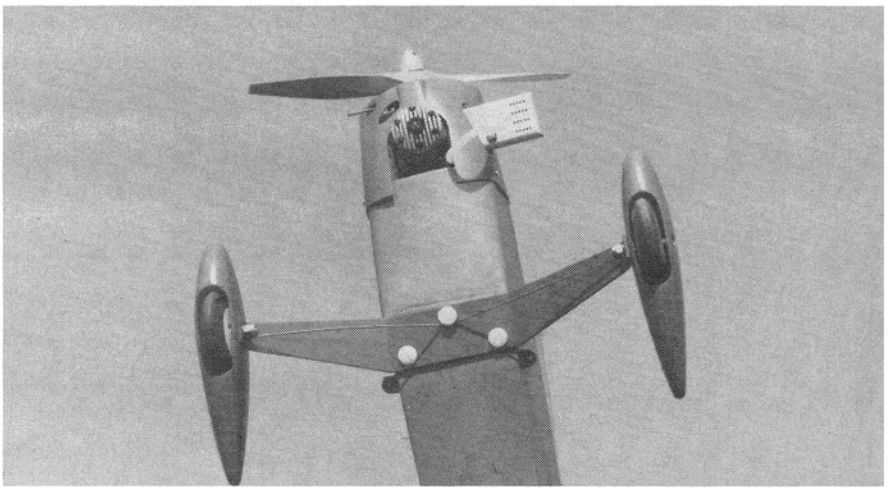
I chose to cover the entire airframe with Super Monokote and to paint the molded ABS parts with Hobbypoxy enamel. If you were inclined to cover with silk and dope then the instruction manual had a good section on this method. The manual also showed how to duplicate the scalloped pattern of Duane Cole's airplane. After ironing on all the solid areas with Super Monokote, I applied the scallops and simulated windows with Monokote trim sheet. I sealed all the edges of the trim with a fine line of Hobbypoxy clear to keep out fuel residue. I also used clear to seal the firewall and tank compartment. Finally I sprayed Hobbypoxy Bright Red on the cowl, wheel pants and the dural gear.

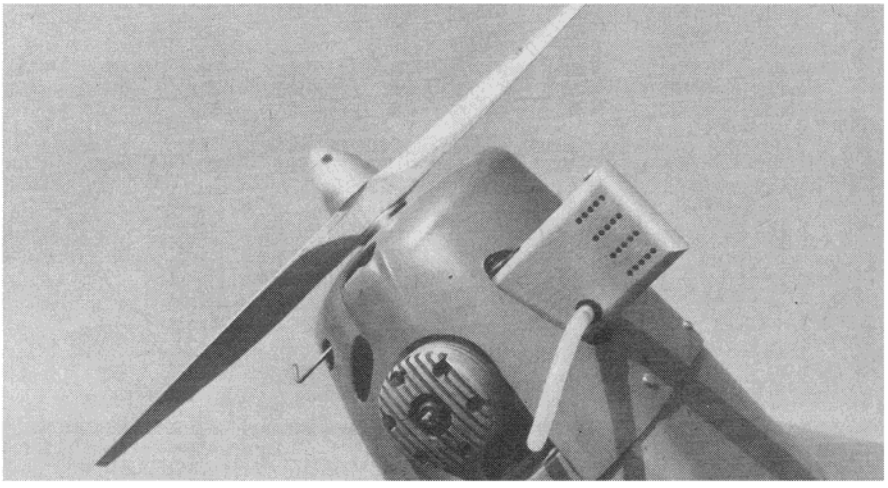
I installed my favorite powerplant, a K&B .40, which is near the top of the recommended range for this kit. My radio is a Kraft seven channel system with KPS-14 servos. With all the equipment in place the T-Craft required six ounces of weight under the fuel tank to achieve the recommended balance point. This brought the total weight to four pounds ten ounces, giving a wing loading of 17.3 ounces per square foot. This is fairly

The contents of the kit include die-cut sheets, wing sheeting, strip wood, bags of blocks and a molded cowl (**left**). This is a view of the uncovered framework (**below left**). Note the optional struts. The completed ship shows off the very clean appearance of the inverted motor (**below**).

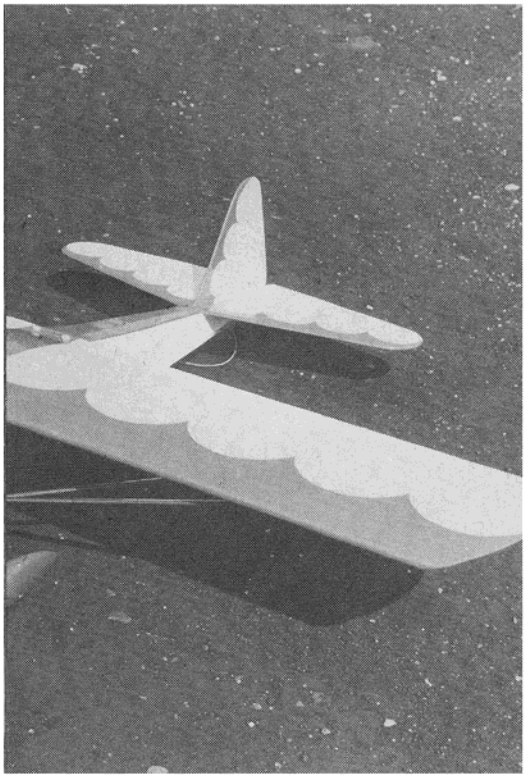








Plenty of room for modern radio equipment (**above**). The installation is detailed on the plans. A bottom view shows the landing gear installation (**above right**). Notice the anti-spread wire on the gear hold-down. A close-up of the cowl and engine details (**right**). A Slimline muffler.



light and suggests an easy flying airplane.

Flying

As I expected, a .40 engine is way too much for realistic flying but scale flying speed is not necessarily the goal here. In time you will recognize the advantage of having power to spare for pattern performance. Nevertheless, 3/4 throttle is a comfortable setting for most all maneuvers and half throttle is fine for making lazy circles in the sky. Using the control throws shown on the plan provides outstanding aerobatic capability although perhaps too much response for the newer pilots. I would suggest using less aileron and elevator travel as a starting point.

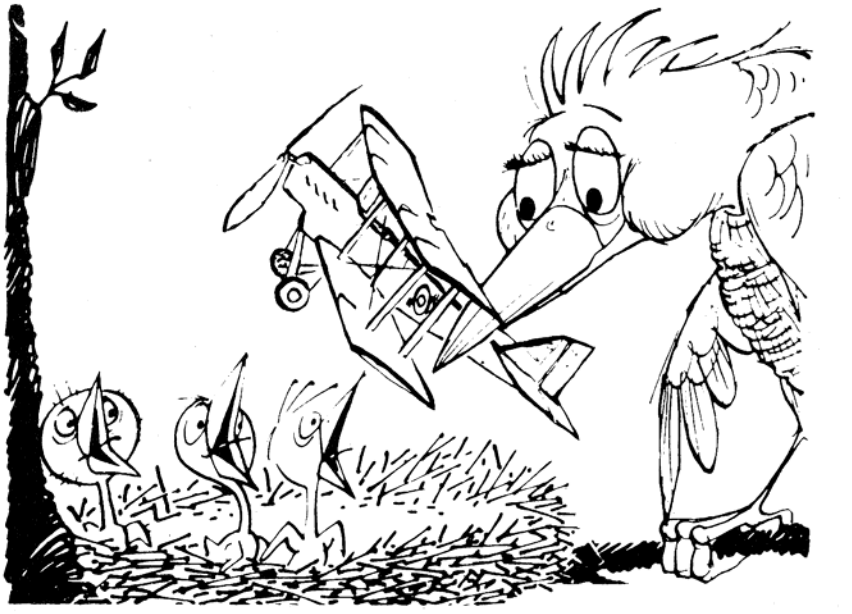
As with all tail-draggers, takeoffs should be performed with a gradual application of throttle and just enough rudder correction to maintain a straight run. The T-Craft is no more difficult than most, except that all this excess power literally pulls it right off the ground before you are ready. Go easy on the initial control movements because the T-Craft is very maneuverable as soon as it is airborne.

The flat semi-symmetrical wing is undoubtedly the major factor in the aerobatic performance of this model. In spite of its high wing configuration it does beautiful axial rolls using only aileron commands. Loops, snaps, spins, etc., are all easily done and most all of the AMA pattern maneuvers are possible. One of the consequences of this design approach is that smooth realistic turns require rudder and aileron coordination. While not mandatory, this is a good habit to get into anyway. By the way, the manual has a good section on how to learn the maneuvers.

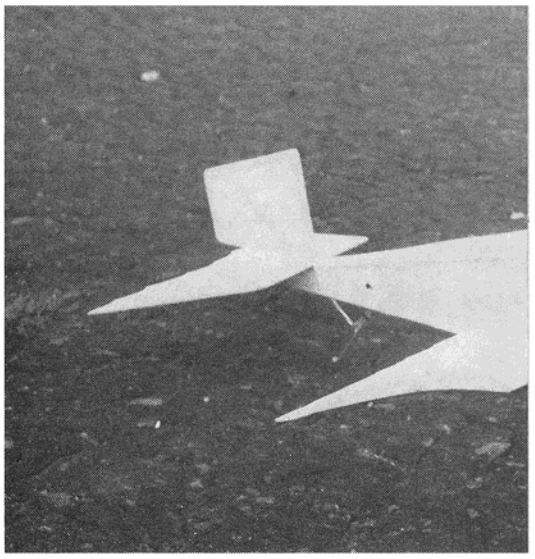
At low speeds the T-Craft is extremely well mannered. It appears to tip stall only if you try to mush it around for prolonged periods. In other words it is unlikely that it would get into trouble in normal flying unless you are very clumsy on the sticks. I'm sure that moving the balance point ½" forward makes it really goof proof. The T-Craft has a long and shallow glide on the landing approach and you can set it down on the main gear or enjoy those three point landings that are so characteristic of full size taildraggers.

In summary, the Midwest, Live Wire, T-Craft offers a combination of good looks and good performance in a popular size package. It takes some extra effort to build correctly, especially if you run across some bad wood in the kit. It can be flown by anyone who is ready to graduate to an advanced aileron trainer. Best of all, the T-Craft helps the pilot to progress right up through pattern maneuvers. He can grow with the T-Craft instead of outgrowing it.

Flyin' things for fledglings



More news from the gang By Earl VanGorder



Well, now he can work along with his Dad and actually build a model of his own. I had another thought, too. How about you young Fledglings who have troublesome little brothers or sisters who want to cut in on your building and usually manage to bust up some of your best work? Here's a thought. Ask Mom and Dad to get a "Two-gether" kit for 'em and you can both do your own thing.

All of the kits feature selected, hardwood machine cut to shape with positive alignment of parts. All needed hardware is furnished and all that you have to come up with is glue, sandpaper, and maybe a hammer and screwdriver. When complete, the model can be colored in any way that the child chooses—felt markers, paint, or whatever.

Brrrr! Yeah, it's really cold here in the northeastern part of the country at this time of year. Make sure that old hangar door is closed tight, grab yourself something to sit on and gather around the old pot bellied stove for a bit of "hangar flyin' "—that's old-time slang for swapping a few lies. Yep, this is the time of year—at least in the north country—when we have to consider doing our flying indoors.

That brings me right to the point of one of the letters I received recently. Frank Renaut, of Baltimore, Maryland, told me about an indoor contest he dreamed up with a few basic objectives in mind. The contest would be held in a standard gymnasium, use easy to build aircraft, promote independent design and, most importantly, be inexpensive. Now, if that doesn't turn you on—especially some of you teachers and group leaders—I don't know what will.

Here are the basic contest rules: 1. fuselage must be made from the cardboard tube from a roll of paper towels. The tube may be tapered, but not shortened and must retain its original diameter at some point. 2. The power must be rubber which must be inside the tube. 3. Flights must be unassisted R.O.G. 4. Any kind of landing gear may be used, but it must remain with the aircraft—no drop-off types. 5. Flight timing starts when the model leaves the floor—not when you let go . . . and stops the first time the model retouches the floor—or gets hung up on an obstruction. You can work out your own scoring rules, like flight time plus points for originality of design, workmanship, etc. Sound like fun? I think it does and the photo I'm showing you of Frank's own model shows what can be done with a little imagination. Be sure to let me know if any of you give this a try—and, don't forget to send a photo of your own creation. Oh yeah, maybe you'd better let your mother, or wife, use up the towels before you try to get away with the cardboard tube.

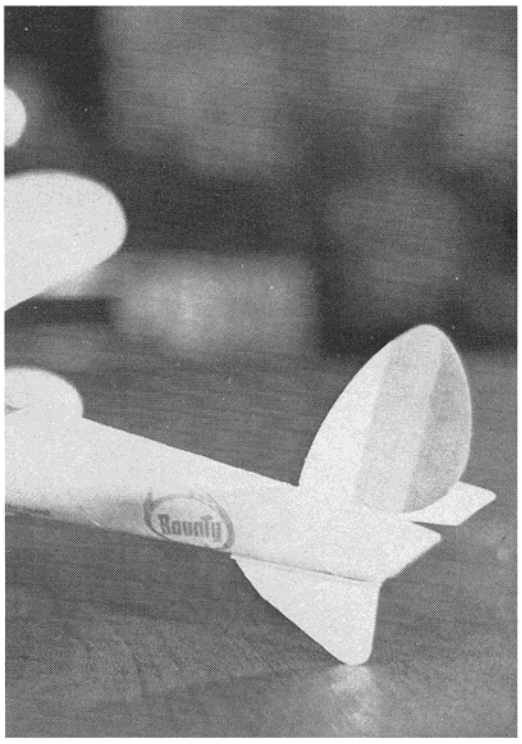
Oh, by the way, before I forget it, I've got to tell you about a line of models that *don't* fly. That's right, they don't fly. I'll bet you never thought you'd hear about anything like that from me, did you? Well, the reason I want to tell you about them is that they are absolutely terrific for the purpose for which they were designed. They're called "Two-gether" kits and they're meant for the very young child—about ages four to seven. Here's the idea for you young, married modelers with small children whom you can include in the fun. There's nothing a little fella' likes better than to be doing something with his Dad, but we all know that, at that age, he's far too young to tackle the delicate flying models.

Melissa Groebe and her father prepare her P-30 model for a winning flight (**above**). Eric Anderson's 1912 Caudron was built from the R/N kit (**left**). Frank Renaut's classy model built around a cardboard tube from a roll of paper towels (**below left**). Original!

PHOTOGRAPHY: EARL VANGORDER

The best part is that the end result is a very sturdy toy that will give lots of play value and take all the punishment that can be handed out. There are lots of types available, too. Four different helicopters with rotors that really whirl, a jet fighter type, a business jet, a crop duster, and both single and twin engine propeller types.

Prices for this line of kits run from $2.50 to $12.95, so there's quite a choice in the ten different models offered. These are manufactured and distributed by Hobby Hideaway, RR#2—Box 19, Delavan, Illinois 61734. Dave Shipton, who runs Hobby Hideaway and is the originator of this kit for the "ultimate fledgling", and he puts out a nice catalog with photos of all the Two-gether models.



Unfortunately, he forgot to tell me the price of his catalog, but try sending him a couple of 15¢ stamps—I think he'll send you one.

You know, we frequently talk about some of the new fledgling groups getting started around the country. Well, I heard of a new group recently that really surprised me. I don't really know why I was surprised. . . . heck, everyone likes to build and fly models. I guess it was just that I had never thought of a fledgling group getting started in this particular place. What place, you ask? Would you believe the United States Military Academy at West Point? That's right—a new fledgling group has been formed among the cadets at West Point under the leadership of Major David Barber of the Academy's Department of Mechanics. I always told you that fledglings came in all ages, shapes and sizes. . . . now, they even come in uniform.

I must bring you up to date on something else, too. Some time ago, I told you about a company called Oldtimer Models and gave you the address so you could get a catalog. Well, Jim Noonan, a well known old time modeler has sold the business and retired. He didn't let it die, though. He made sure that the new owner was well advised on the sources of all the great products and supplies that he carried. So Oldtimer Models goes on. For those of you who don't remember my telling you about Oldtimer. . . . this is the place where you can find lots of hard to get items along with some of the best prices on strip and sheet balsa anywhere. Many kinds and grades of tissue are available and even a new one has been added. It's called "antique tan" and should be great for you scale buffs who like to build models of oldtimers. There's all kinds of tubing, washers, thrust bearings, rubber lube, three kinds of rubber in eleven sizes, and so many "goodies" that I don't have room to mention them all. It's easy to see for yourselves, though, because I'm gonna give you the new address and all you have to do is send a 15 cent stamp and ask for a catalog. Here's where you send to, Mike Mulligan's Oldtimer Models, P.O. Box 913, Westminster, CA 92683. You'll be glad you got this catalogs.

Got a nice letter from Eric Anderson out in Chicago, Illinois. Eric tells me that both he and his wife have joined the Chicago IMACS club and he feels that they're in pretty good modeling company. Eric's not exactly a beginner, but he enjoys our fledgling gang get-togethers, anyway. That's good—and I'm sure all the gang welcome he and his wife. He sent a photo of his model of the 1912 Caudron which he built from an R/N kit. Eric says it flies great and is always good for a minute and a half, or better. He also sent a photo of Melissa Groebe and her father. Eric says that Melissa is the pilot and her father is the mechanic. In the photo, they're getting her P-30 model ready for a flight. Eric also tells me that Melissa won "Top Junior" in a contest in the Chicago area last summer. Congratulations Melissa, we're all proud of you. You know, gang, we keep hearing about all these young gals that are taking the first places. It looks to me like some of you young fellas are going to have to really go all out to stay in the race.

Gee, gang, I seem to have a lot more to tell you about, but we're getting to that time again. I will whet your appetite, however . . . next month, Bill Baker (last month I showed you a photo of Bill launching one of his Jim Walker Ceiling Walkers) will tell us how to make one of these little wonders . . . as well as telling us how to fly it. I know you'll want to be around for that cause they're easy to build and they're loads of fun.

In the meantime, don't forget to keep sending those black and white photos to me so we can show the rest of the gang what you're doing and what you look like. Let's face it . . . all fledglings look great. I'll try to have some more news for you of new products . . . new techniques, new clubs, and all the kind of stuff that we're all looking for.

I'll be watching my mail for the latest news and photos from all around the country and be ready to pass everything on to all the rest of the gang. So—keep warm warm . . . keep building . . . and from your old modeling buddy here at 10 Brothers Rd. in Wappingers Falls, N.Y. 12590, I'll just say . . . so-long for now and Happy Modeling.

Sterling's "Kid Series" Aeronca

by James A. Hunt

Designed with the beginner in mind, this new line of kits offers easy building.

PHOTOGRAPHY: BOB HUNT

Not long ago my grandson approached me about building a rubber powered model called the Sterling Aeronca Champion. Although I had built models since I was eight years old, it had been many years since I had last glued one together. I approached this challenge with a nostalgic feeling in my heart. And then renewed my skills by building just for fun.

Before jumping into the building phase of the airplane, I read the well written, easy to understand instructions. Pleasant memories of gluing and covering rubber powered models came back to me. Just to make sure I was doing it right, I reread the instructions once more and started to build.

Breaking out the die-cut parts I found them to be of excellent quality. The wood was of light but firm and of consistent grain. With my number eleven X-acto knife, I trimmed the parts so they were nice and clean.

Since I only had three evenings to complete the project, I decided to try Hot Stuff and Hot Stuff Super "T" adhesives to speed up the building. I had not had the pleasure of using such super adhesives before, but after a few tips from my son on how to use these materials, I found them to be a quick answer to strong, light construction. Quite an improvement over the glues I had used in the past. (Be sure to read the directions on the adhesive bottles for proper use.)

Starting at step one, the Aeronca's fuselage went together fast. I sanded all of the parts by laying them on my flat building board and using a sanding block. All sanding was done in the direction of the grain of the wood. Most of the numbers printed on the wood came off with ease but others were imprinted so deep that they would not come off. So I faced these pieces towards the inside of the plane.

I quickly assembled the wing, using Hot Stuff. When this had set, I sanded the edges of the wing panels and sanded in the dihedral angle. Then I glued the wing panels together.

Now I had to make a decision, whether to finish the model for the best flying characteristics or for the best scale appearance. After looking at the pictures on the box and in the plans, and remembering how I enjoyed flying the full size version of the Champ, I chose to make it look as scale like as possible. Reading that portion of the instructions on finishing the model, I followed the recommended procedure.

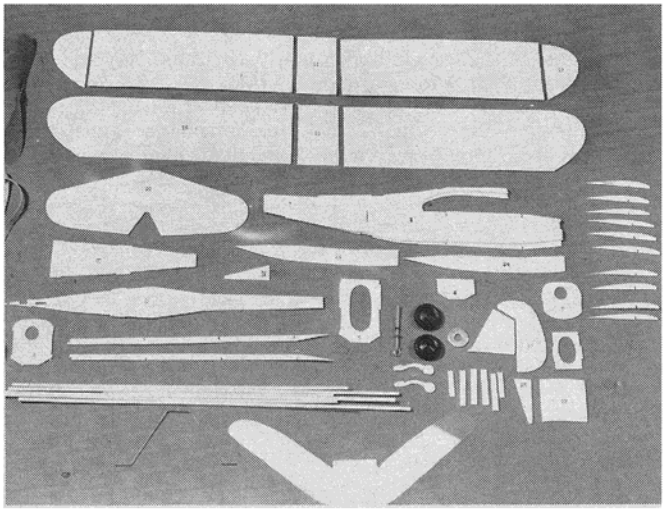
I applied two coats of thinned dope, and carefully sanded between each coat. The colored paper was cut and applied to the fuselage. The rudder, elevator, and stabilizer were finished with decals and ink lines. These details added weight, but helped the model have that scale like appearance that made it look more like the full size plane.

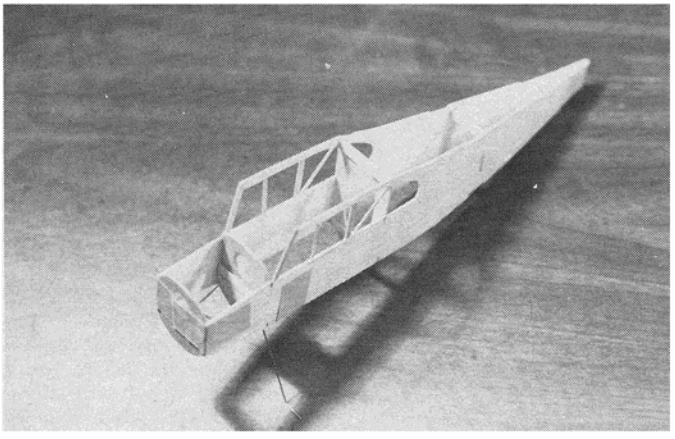
The final assembly went smoothly until the rudder and fin were ready to be glued together. The shape of the fin did not exactly fit the rudder, and a small sliver had to be trimmed from the fin to get the two parts to fit together properly.

All other parts assembled without any trimming or adjusting. The propeller shaft was inserted into the propeller and bent to allow a rubber winder to be hooked on for winding the rubber motor.

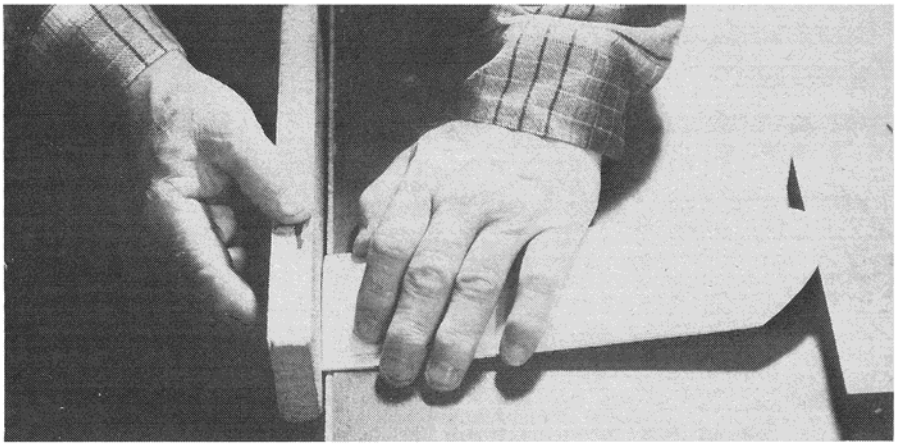
After testing the balance point, the ship proved to be a little tail-heavy. So I added some weight to the nose to compensate. Since the cowl was already glued in place, I had to drill a small hole in the underside of it to add lead shot. After a proper balance was attained, I squirted some Hot Stuff through the hole to secure the shot. Extra shot can be added, if needed, by gluing it inside the metal washer provided in the kit.

The Sterling Champ flies very well and provides the beginner with a tool to learn the cause and effect of trim changes. I think the flight characteristics could be improved if the model was left uncovered, because the extra weight shortens the flight time. Overall though, the Aeronca was a lot of fun to build. It seems I had forgotten just how much fun it was to construct a plane. So I'm gonna' build another. But you have fun with this one.

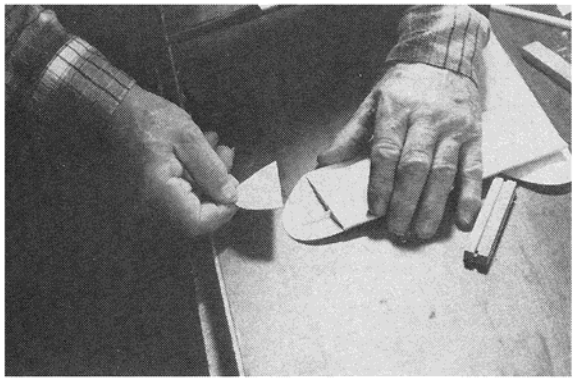


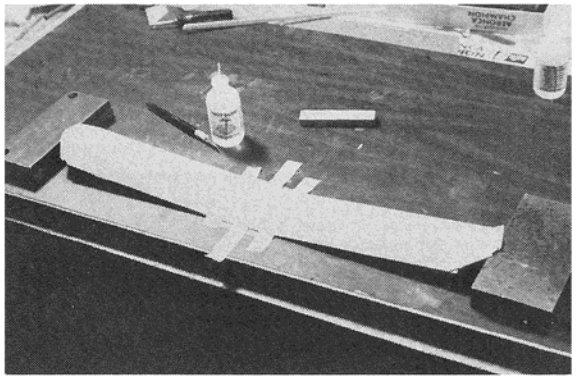


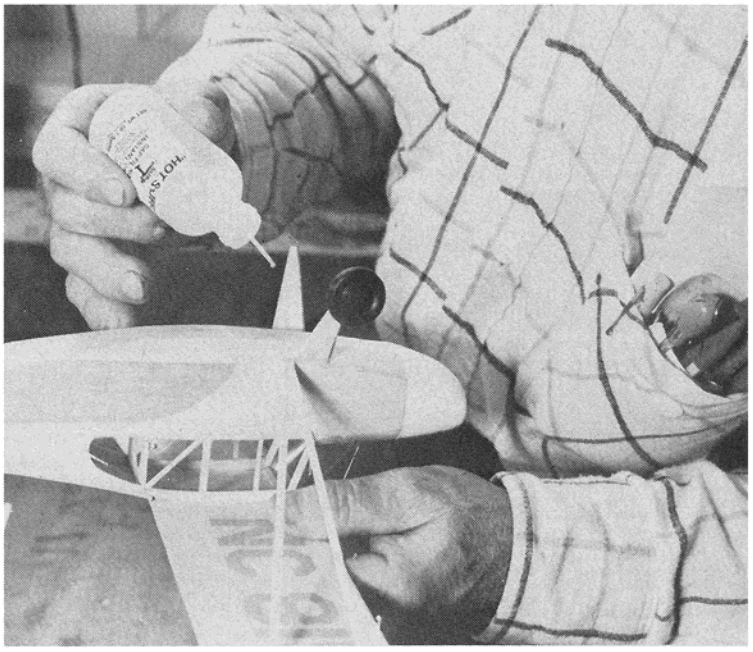
The Kid Series Aeronca Champion's fuselage is nearing completion here (**above**). These are the parts of the kit (**left**). Fine wood and die-cutting.



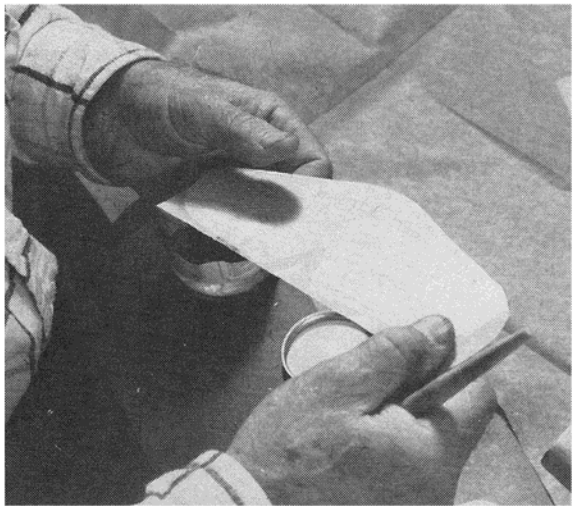
The finished product is very scale-like (**left**). The details do add weight, be careful. The author is shown here block sanding the dihedral angle into a wing panel (**right**).

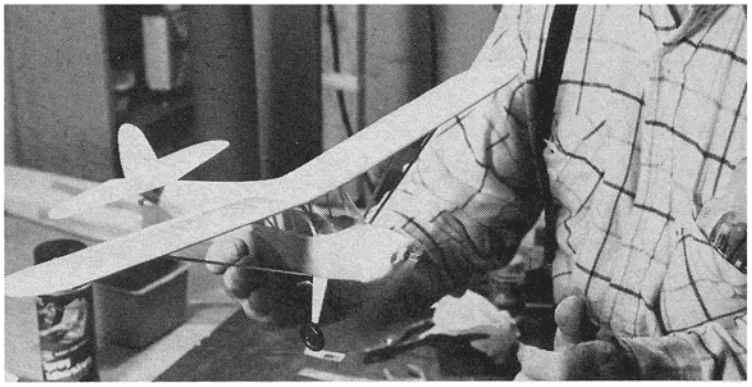






After the wing is sheeted, the wing tip sections are glued in place (**above left**). The wing center section and two outer panels are joined with the correct dihedral angle (**left**). Note the use of masking tape to clamp parts. Hot Stuff Super "T" was used throughout construction (**above**). This glue is strong and light.





The Aeronca was covered with the tissue provided (**left**). The very complete instructions detailed this optional procedure. Weight can be saved to make a better flying model if the tissue is ommitted. The completed model ready to fly (**above**). Construction time was approximately eight hours. A good first model. Enjoy!

R/C sport scale

by Rich Uravitch

First, I'd like to lay out my game plan for the reader. I hope to present material that will benefit both the newcomer and seasoned builder/flyer. This column will consist of articles on kit selection, new product reviews, techniques, design hints, kit conversion methods, documentation sources, contest coverage and articles on rules, in addition to pointed comments on what we don't like and why, since we hope that manufacturers will read this also. That may sound self-serving, and it probably is, but I've read too many times about a particular kit that "fell together" or "flew right off the board." The only saving grace about "flying off the board" is that you only have to walk to the workshop wall to recover the wreckage rather than wasting time going to the field. Ideally, we'll have the straight scoop as we see it.

Everyone should get something from the column, and if you've got a question, point of view or suggestion, send it in, and I'll try to help out. Since you're a scale modeler or becoming one, you probably know what a select band of guys we are. Look around at your next club meeting, notice how only a handful in the entire club are dedicated scale buffs. If you don't belong to a club or live in Unalakleet, Alaska, you'll have to look in the mirror to find the other scale enthusiasts. I know that out there in the woodwork there are some really exciting projects underway. Let's hear about them. New techniques are being discovered all the time . . . how about sharing them?

The first top we'll discuss is subject selection. To the newcomer to Sport Scale this is usually easier than for the experienced builder because the novice *knows* what he'd like to have (not necessarily what's best for him) and the veteran has probably already done it. The experienced guy has developed guidelines or requirements for his next model and possesses a "gut feel" for what works best for him. So, listen up, novice type, your introduction to this segment of the hobby depends on a number of these considerations:

1. An *honest* apprisal of your building and flying experience.
2. The amount of time you want to spend on your new project.
3. The level of assistance you have available from other scale flyers/builders.

Taking these one at a time, let's start . . .

Assuming your flying experience has progressed you through basic trainers and sport airplanes to the point where you can *comfortably* execute novice pattern maneuvers and *predictably* land it every time somewhere close to where you aim it, you can be reasonably certain that you'll be able to handle a Sport Scale model.

If you're a newcomer, your best approach will be to select a high wing subject with relatively light wing loading . . . something like a Sig J-3 CUB or Pica Cessna. You'll find both these machines are large enough to allow your first experimenting into detailing without going overboard. An added advantage is that you'll get your first taste of the documentation search. The Cub will teach you some of the differences in flying techniques required in scale, such as coordinated (aileron/rudder) turns, side slip landings and the like. If you think, "what's the big deal about coordinated control?" . . . observe some of your local sport flyers and note how few of them use the left stick for anything other than throttle.

Simply stated, your progression in Sport Scale should follow the general path you took when first becoming interesting in R/C modeling. Simple, easy flying subjects first, more complicated, detailed, higher wing loading airplanes later.

I would not, under any circumstances, recommend that the beginner choose a high performance fighter type model for his first attempt. Unfortunately, newcomers are most fascinated by this type of model and generally learn, the hard way, that such machines are not trainers.

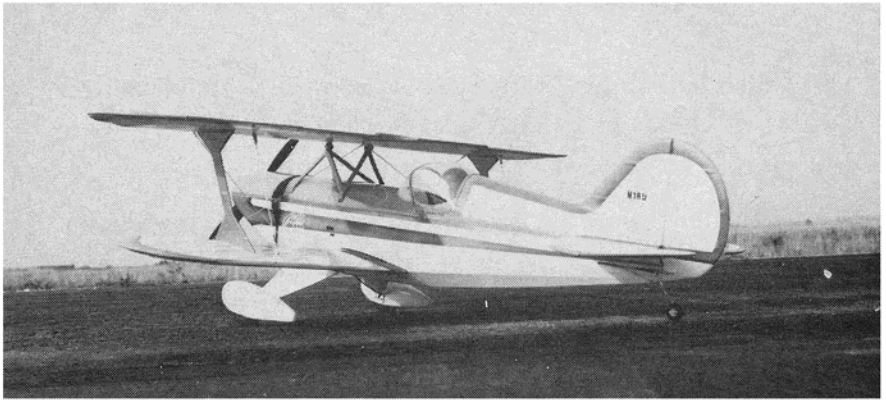
Scale modelers have always been considered better builders than flyers . . . this image is gradually being turned around due to these factors: **a** There are a greater number of excellent flying kits available. **b** The higher reliability radios are being used. **c** The large expansion of modelers are in scale, creating a bigger base for information exchange, which incidentally is one of the primary functions of this column. As a result, today's Sport Scale model frequently surpasses the AMA (Precision) Scale model of ten years ago which indicates wider spread participation with the resultant higher levels of detail, quality and flying ability.

The next consideration is the time you will want to spend on your project. The more complicated the full scale airplane is, the more time your model will consume. Much of the time expended will be in research . . . looking for that one paint scheme that really knocks you out. You will become more aware of full scale airplanes, probably take your camera anytime you might be going near an airport, and spend more money on aviation books than you ever have before. Your first few sport scale models will probably be built from kits since there are so many good ones available, this in itself will save a great deal of time. Generally speaking, a good kit will frame up in three to four weeks of spare time, faster if you plan your work properly. An additional two to three weeks should enable you to cover, finish and install the powerplant and radio.

The third area to be considered is the help you can get from fellow modelers. This can, and should, include building hints, finishing techniques, and most importantly, since we're talking about R/C flying, first flight help. Bear in mind that a pattern flyer, or pylon racer, although qualified in these areas, may not be well equipped for Sport Scale flying. They will, however, very likely be able to trim your airplane out for you, providing it is ultimately capable of controlled flight! What this all really means is, *before* you seek flying help, *do your homework* . . . Check that the controls follow the stick, the engine rpm range, especially the low (idle) end, is reliable and the CG is where it belongs. Don't waste your instructor's time by going to the field unprepared. If the buddy who helps you is a scale flyer, all the better since you'll probably become closer associated through your common interest.

This ends part one on kit selection. Next time we will take a look at a list of popular kits and discuss the merits of each as a first Scale job.

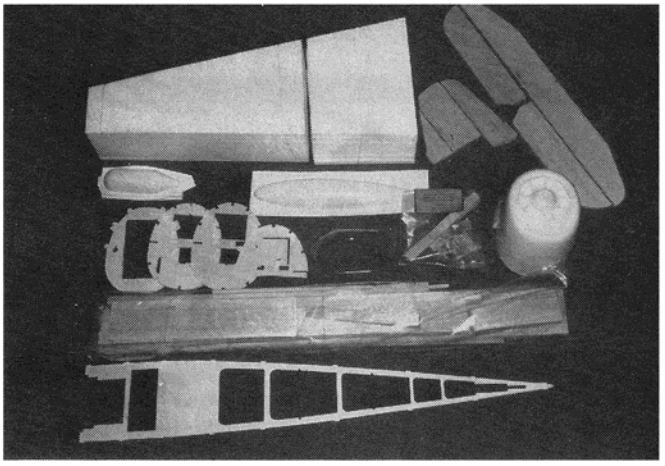
PHOTOGRAPHY: RICH URAVITCH



The House of Balsa Pitts S-1 is a good first subject for Sport-Scale. The kit is very complete.

R/C sport & pattern

by Ron Farkas



PHOTOGRAPHY: RON FARKAS

An example of a kit with foam wings and an assortment of molded plastic parts. Sheet wood is stacked together and bagged. Note die-cut formers.

We sport modelers buy, build and fly lots and lots of planes made from kits. If it were not for kits many modelers would not enter the hobby at all. Most of us are content to let someone else do the designing, testing, engineering and cutting for us. While designing your own airplane is very rewarding, the average sport modeler is generally not equipped to tackle all the associated problems successfully. So kit designs probably outnumber original designs at the flying field.

Because of this demand, dozens of manufacturers are producing hundreds of kits in all shapes and sizes. There is something for every taste, ability and budget. Since kits vary widely in complexity, materials and price, these factors have a big influence on your happiness and success. With so much variety to choose from, the modeler owes it to himself to make an intelligent choice, based upon his own individual needs.

After building many kits, I have come to be pretty fussy in my choice. I shop carefully and therefore I am rarely surprised or disappointed after I start building the kit. When I'm shopping I have a mental checklist of things to look for when examining the contents of a kit at the local hobby shop. Most hobby dealers let you look through the kit if you are serious about making a purchase. Just don't overdo it and ask to tear apart every kit in the store.

Here are the things that I look at, in my order of importance, and some of the variations that I usually find. You should determine what factors are important to you and then make your own checklist. If you decide that the design is not for you, or that the quality is not up to your standards then look for something similar by another manufacturer.

Plans

More than any other factor, the plans are the key to success or failure. They must be clear, easily understood and accurate. Accuracy is hard to judge by eye, but right in the store you should be able to understand where most of the parts go. Not every builder needs the same amount of detail. Generally the beginner needs more information than the expert. A sample radio installation is a good example. Likewise, a very complex design may require additional detailed views in order to be clearly understood. The point is that if you are going to build the kit, then the completeness of the plans must suit your own abilities.

Beyond the basic planform views (wing, tail and fuselage profile) it is nice to have a top view of the fuselage. Most plans have it, some don't. Also look for full size drawings of all the bulkheads and special pre-shaped parts. These are especially important if you have to cut some replacements later for a repair. Finally, it is really handy if the designer includes some exploded views or isometric drawings.

Engineering

After studying the plans, I have some idea of the design's complexity and the parts count. I expect a trainer to have a simple structure as compared to a scale model for example. This is not always true since each designer has his own favorite building methods. Just be sure that you feel comfortable with his design and, unless you are an experienced builder, do not attempt to make any radical changes to the kit.

There are a couple of other things to look for. Take note of any flimsy structures or an excessively large number of small detail parts. Also observe the use of solid balsa blocks. Later, when you are checking the materials remember where these parts are used.

Instructions

The manufacturer knows that an experienced builder doesn't need to be led by the hand, but that a beginner needs all the help he can get. Skim over the instructions. If you don't think that they provide enough information for you then be wary of the kit. As a minimum, a few typewritten pages are usually necessary to assure the success of the project. A construction manual is even better, especially if the manufacturer has gone to the trouble of numbering each step so you can check them off as you go. As a real bonus, some of these manuals have construction photos.

Wood

In a wood kit the most important thing is that the type and density is chosen to match its use. In general, look for firm pieces in which structural strength is needed and soft pieces where there is no particular load. Cosmetic areas such as fillets and cowl blocks should be very soft and light for easy shaping. Doublers, landing gear mounts, and dihedral braces should be plywood. Spars should be hard but not brittle. Fuselage sides should be of the same firmness to avoid distortion when assembling them. Steer clear of soft mushy wood for ribs, wing sheeting, fuselage sides and tail surfaces. Also examine all the wood for warps and splitting.

Cutting

Generally the higher quality kits have bandsawed parts instead of die-cut (stamped) parts. You might want to check some of the precut parts against the plans for accuracy of shape. However, don't punch out any of the die-cut pieces in the store. These can be inspected for crushing which is often caused by dull dies or extremely soft wood. Unless the cutting is very bad you can probably clean up the fuzzy edges with sandpaper anyway. The best situation, of course, is when the parts fall cleanly from their sheets. Another thing to look for is die cutting that is off-register. Examples are corner cuts that do not meet and straight lines that are crooked or wavy.

Accessories

Many kits come with an assortment of screws, hinges, horns, etc. Frankly, I don't much care for the manufacturer's choice anyway. If you can use the stuff, fine. moulded plastic parts are becoming more common these days. Cowls, wheel pants and scale-like details are big time savers if they fit well and are strong enough. Check them for cracks, distortions and thin spots.

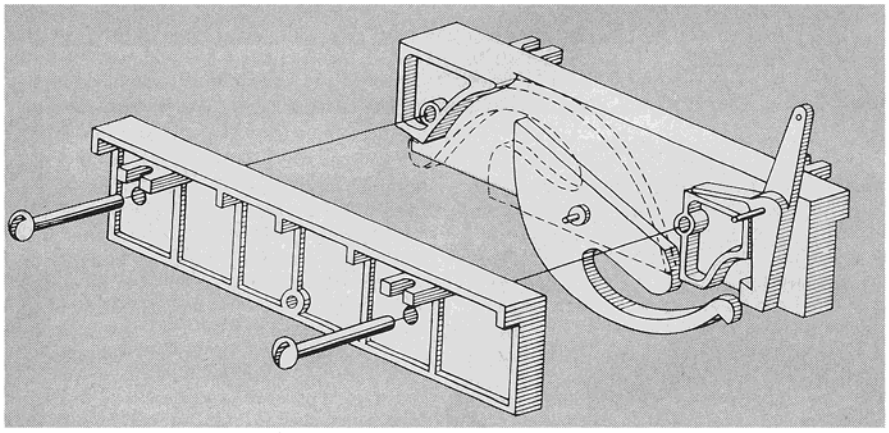
Foam and Fiberglass

The all-foam trainers are nice but they usually don't survive major crashes. They do, however, survive most minor ones very well. Be on the lookout for distorted parts in the box because they can't be fixed later when you are putting the thing together. For the more advanced builder, cut foam wing cores are another real time saver. Examine them for warps and any damaged areas. If you are considering a fiberglass fuselage then look for cracks, pinholes and thin areas. Also check to see if the halves are joined properly and that there is no twist in the fuselage or fin.

Well, as the saying goes, "You pays' your money and takes your choice." A kit is an investment in your future pleasure, choose wisely.

R/C Soaring

by Bob Crane



ARTWORK: FOURMOST PRODUCTS

This is a drawing of the Fourmost Products Captured Towhook Release. The hook retracts into the body of the unit after release of the towline. Bob reviews several releaseable units in this months column.

This is a new column about R/C Soaring written by two avid sailplane enthusiasts. The purpose of the column is to keep you abreast of current developments, the latest AMA rules changes, new products, NSS and LSF news and any tidbit of soaring information I can conjure up to pass along. There is no formal format for the column—just pure sailplane stuff.

There are two seasons for the sailplaner, spring, summer and fall which is the Flying season and winter which is the building season. By the time you read this column, building season is in full swing for most of us. But for some, we need a new project, maybe a scale bird. Scale is becoming very popular now and I would like to feature the services of a company in Pennsylvania.

Archaeopteryx Avion Associates is a premier company for scale. Jim Ealy has over 350 three views and over 50 plans in 1/4 and 1/5 scale. The three views are on standard 8½x11 inch paper. All plans are black line dimensions and instructions. The plans are usually two sheets, three foot by five foot blue line. Also available are self adhesive sheets containing the ribs and formers for cutting and attaching to the balsa as a template.

Jim now features scale packets which include three views with color pictures of the sailplane showing necessary detail. Most popular sailplanes of the world are in stock as well as vintage and hard to find ships. One of the fine services Jim offers at a reasonable rate, is custom building any plan into a kit. If you are like me and disdain the arduous task of cutting ribs and formers out, this sounds like the way to go. Four scale kits are now offered for sale which include the SG 35/38, 104.7 inch wing span, 1670 sq. in. of wing area; Granau Baby II, 108.0 inch wing span, 1136 sq. in. of wing area; Monarch C, 100.5 inch wing span, 1125 sq. in. wing area and the Tandem Tutor, 104.0 inch wing span, 980 sq. in. wing area. All of the above mentioned kits are complete with all wood, hardware and rolled plans. Contact Jim at Archaeopteryx Avion Associates, P.O. Box 120, Pottstown, Pennsylvania 19464.

One of the secondary functions in the sailplane most overlooked and of critical importance is the towhook. I am not going to discuss towhook location at the present, but will reserve a future column for that purpose. What I am prepared to elaborate on is retractable/releasable towhooks. I am taking for granted that your optimum towhook location has already been established for your sailplane and type of launch equipment used. There are many advantages using releasable/retractable towhooks. Wind is a constant variable, with different wind speeds and wind directions. Many times at flying sessions the wind shifts enough not to allow you a maximum launch or you have to "crab" your sailplane into the wind to obtain a respectable launch. At times on the launch, I crab into the wind so much that I become concerned about a premature release off the tow line. Sometimes I even fly right through a thermal on launch. If you could release then, you could concentrate on launch technique instead of worrying about premature release.

In launching, additional altitude may be gained by a winch—sailplane technique. If you operate a two meter standard size sailplane with a 12 volt winch in a ten mph wind, a slingshot type top off on the towline could results in an additional 100 foot of altitude. A non captive tow hook could not sustain this type of manuever, in most cases.

Parasitic drag to some pilots is a prime concern. All efforts in the reduction of parasitic drag is beneficial to the performance of the sailplane. What is parasitic drag? In simple terms, parasitic drag is any external appendage which impedes airflow over the surface. For instance, externally mounted on/off switches; rubber bands; control horns and your tow hook. A retractable hook would certainly solve this problem.

The following retractable and or releasable towhooks are currently available on the market. I am not recommending any particular unit, but I'll give you an overview and brief description of each towhook for your personal evaluation or application. The release mechanism of all the units may be actuated by your elevator or spoiler servo or by an independent servo. If you choose to operate the unit by your elevator or spoiler servo, the momentary elevator down function or the opening and closing of the spoilers won't adversely effect the launch altitude.

The THR-2 is a very reliable servo actuated tow release with an adjustable captured hook. The unit is not retractable. A return spring is provided for hook reset. The captured feature is fail-safe and adjustable from outside of the glider. This is the original release hook updated for the competition flyer. It's available from Logictrol International Corp. P.O. Box 3565, 3322 Stovall St., Irving, Texas, 75061 for $4.98.

Pro-Tow is a servo actuated tow line release mechanism that mounts completely inside of the fuselage. Nothing is left outside of the fuselage to be damaged on landing. Pro-Tow is adjustable and can withstand forty pounds of pull as furnished. It's available from Rocket City Specialties, 103 Wholesale Ave. N.E. Huntsville, Alabama, 35811 for $4.98.

The Captive Releasable Towhook by NAME Inc. is molded strong, tough and precise. The hook portion of the unit remains outside of the fuselage after release is initiated. The unit comes completely assembled and ready to install. A return spring is incorporated to permit a snappy reset. It's available from NAME Inc. North American Model Enterprises, P.O. Box 1473, Hurst, Texas, 76053 for $5.95.

The new Fourmost Captured Towhook Release is a simple reliable device. After the towline is released the hook retracts into the body of the unit, leaving nothing hanging on the outside of the fuselage. A hardwood box should be constructed to mount the unit. It's available from Fourmost Products, 4040 24th Ave., Forest Grove, Oregon 97116 for $6.90.

Servo actuated towhooks whether releasable or retractable should be given serious consideration by both the sport flyer and the competitive flyer.

I need your input to make the column work. Please drop me a line or put me on your club mailing list. All correspondence should be addressed to Bob Crane, FLYING MODELS Magazine, P.O. Box 700, Newton, N.J. 07860.

Till next month. . . . Green Air.

on engines

by Henry Nelson

I have written elsewhere, and will continue to write, that model engines are a bargain. At the same time model engines are junk. To demonstrate to yourself that the first statement is true, all you have to do is take your chisel in one hand, a block of aluminum in the other and build an engine. Conversely, if you're interested in competition, you know that there is a substantial difference between a stock engine and a *properly* reworked though nominally identical engine.

As the months roll by, I'll try to talk about some of the techniques involved in building "the hot setup." First, it's necessary to lay some groundwork which is what this month's page will be about.

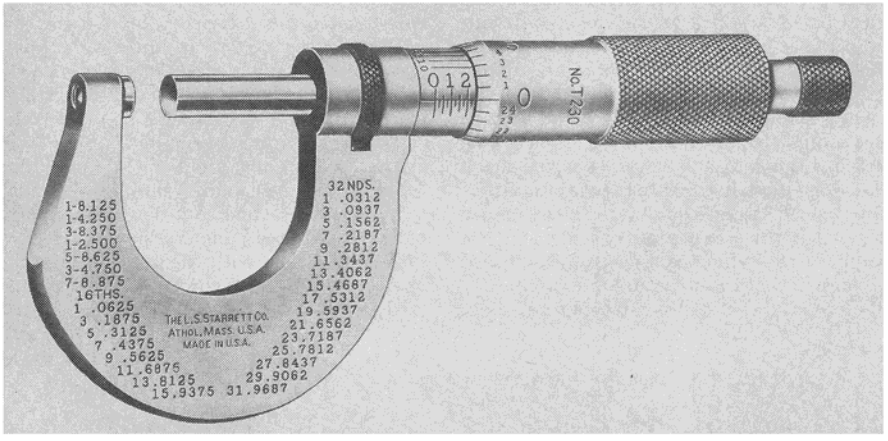
Rule one, which I'll repeat often, is that engine rework requires time and money if it's to be done correctly. It should be obvious that since an engine manufacturer spends many thousands of dollars on equipment to build an engine, he's unlikely to ignore some "trick" that you can perform with a nail file.

Rule two is that even if you have enough equipment to do the work, you still have to discover what a particular engine needs. Unless you hang out your shingle as an expert and experiment on your customers' engines, you'll have to finance a pile of scrap parts.

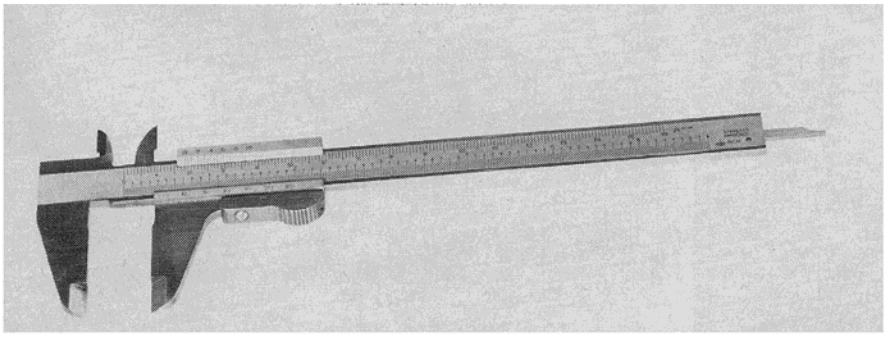
If you want to limit your engine purchases to one engine for your Sunday sport plane, keep it stock. It is true that some engines are produced that over their life will never perform as well as they would if properly set up. However, if you can't afford to ruin it, don't mess with it.

One of the reasons I have accumulated a fairly substantial machine shop is that less skilled operators need better equipment to produce acceptable results. Given a lot of time, a skilled craftsman can do some fantastic work with minimal equipment. How you trade off time and skill for equipment is your own decision.

In one area, I believe you can't afford not to purchase some tools. This concerns measuring instruments. I consider the following list to be a minimum. If you can't measure what you are working on you have no way of knowing what you are doing.



PHOTOGRAPHY: HENRY NELSON



The proper tools are a must when undertaking the modification of a model engine, and this 0-1" Micrometer which reads to 1/10000" is a necessary item (**top**). A 6" vernier caliper (**above**).

First, buy a 0-to-1 inch micrometer measuring in 1/10,000 of an inch, and learn how to read it and use it. A "tenth" is a pretty ephemeral quantity and it is necessary to develop a "touch" to be able to repeat measurements. Unfortunately, for some key parts, the difference between good and bad can be a few tenths. Most features which need to be measured to this accuracy are smaller than one inch so you can get by with a one inch micrometer.

Second, for measuring bores larger than ½ inch you need a set of telescoping gages. The horizontal bar is two pieces which spring apart to touch opposite sides of an inside diameter. By rotating the stem they are clamped solid and the gage is then read with a micrometer. For bores smaller than ½ inch, the split ball type is used.

For accurately measuring the absolute value of a bore there are pernicious devices which require a double dose of touch. First, to set the gauge, and second to measure it with a micrometer. Fortunately, we are rarely required to obtain an absolute dimension for most parts. Being able to repeat a measurement is more important.

Where it is necessary to measure part features larger than one inch, a vernier caliper is usually adequate. You'll need to learn how to read a vernier to read a micrometer, so this inexpensive instrument should present no problem. It will measure to 1/1000 and can measure inside as well as outside dimensions of five or six inches.

A good vernier caliper can be purchased for $15-$20. Also available for an extra $10-$20 are dial calipers which allow you to read a round dial instead of the vernier. My advice is to ignore them. The rack and pinion mechanism which runs the dial is susceptable to dirt and metal chips and other disasters like falling off the workbench. Save the extra money for other toys.

Last is a depth micrometer. They read in 1/1000s like the 0-1 micrometer except sort of backwards. Not to worry, in an hour or so you can be an expert on them all.

The depth micrometer is important for measuring the timing edges of the sleeve ports. Also it should be used to measure the timing of the intake port. Although most articles show timing numbers being measured by a degree wheel on the prop shaft, that's really a pretty inaccurate method. On a .40 engine, one degree of crank rotation is about .005 height change of an intake or exhaust window.

To calculate timing numbers, you'll need to measure the length of the connecting rod. Measuring from bottom dead center (BDC) the height change of the piston (h) is as follows:

$$h = \sqrt{l^2 - \left(\frac{S}{2}\sin\Theta\right)^2} - \frac{S}{2}(\cos\Theta - 1) - l$$

where Θ is crank rotation from BDC (degrees
l is connecting rod length
S is stroke of engine (BDC - TDC)

F/F rubber

by Gene Sellers

Rubber scale models present the builder with many challenges. Maybe that's why they are so satisfying to the modeler who enjoys building.

One of the biggest challenges is building a round fuselage and keeping it straight and true. Frequently, despite the utmost care, there is a decided curve to one side or the other, or a twist that makes aligning the stabilizer with the wings next to impossible.

Round fuselages traditionally are made by assembling half formers on top and bottom longerons over the plans. When the side longeron has been added, the partly built side is lifted and the second half of each former is attached and the other side longeron added. Stringers are added symmetrically about the vertical to keep from pulling the body out of line. Because these operations are carried out in mid-air, the second half formers are frequently not in line with the first half and the body may have a curve or twist. This can be especially troublesome to the builder who must leave his fuselage partly finished before the structure is complete enough to be rigid.

These problems of alignment and stability can be avoided if the formers are held in place on a jig while longerons and stringers are added. Ordinarily, this would be too much trouble for the average modeler who builds only one model at a time. However, there is a simple way to build a light, temporary jig using a new 3M tape, called Post-It. Post-It Tape is a double sided tape for use in place of thumb tacks on bulletin boards. The first side of the tape is usual kind of adhesive and holds it to the board. The second surface is less aggressive adhesive that holds the papers, etc. and is re-usable again and again.

The jig is made by first laying out reference lines on the building board. A center line and perpendicular lines marking the location of the formers are needed. A strip of Post-It Tape is laid down along each side of the center line and parallel to it. Each former is attached to a supporting fixture which is held in position by the tape. For this purpose the formers can be cemented to a piece of corrugated cardboard and the other end of the cardboard attached to a piece of 3/4 inch wood molding. The molding provides enough surface to hold securely to the tape and give the vertical support for the formers.

Every fuselage has a longitudinal reference line that can be used to set the formers at exactly the same height on the fixtures. Generally, it is the location of the side longerons. An easy way to use this reference line is to transfer the shape of the formers onto tracing paper, along with the location of the longerons and any other references needed and to rubber cement the tracing paper onto sheet balsa. Leave it on the wood while cutting out the formers and only remove it when the fuselage is nearly complete and it has served its purpose.

Once the formers are in place and aligned on the jig the side and top longerons can be added. Stringers and sheet balsa covering are added next, using care to make sure that unbalanced stresses don't pull the structure up out of line. Repeated checking of the height of the reference lines from the board to confirm that the structure is straight. If it starts to pull up, weights can be strategically placed to hold it down.

After the stringers and sheeting have been added to the top half of the fuselage, remove it from the jig and place it upside down in a second jig for completion. The use of rubber cement makes it easy to separate the formers from the support fixtures. A stronger cement might make it impossible.

The second jig is made by using a tracing of the outside outline of the formers rubber cemented to cardboard. The cardboard is carefully cut to this shape and fastened to molding as done before. This makes a cradle to support the fuselage upside down over the same reference lines on the building board. Three fixtures are enough to hold the fuselage while the bottom is finished. Care is again taken to align the reference marks to assure accuracy.

The photos show better than words how this all works. They show how the formers are positioned on the supporting fixtures and how the fixtures are aligned on the building board.

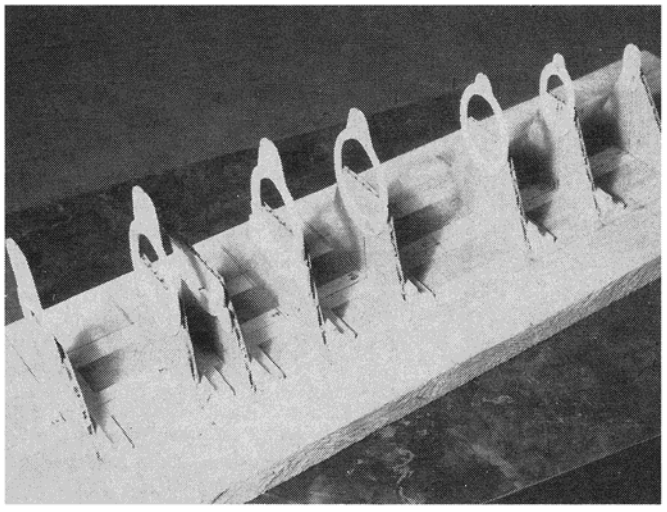
The fuselage shown is for a Howard "Pete" I am building from my own drawings. This technique should be just as useful when building from a kit. Half formers can be adapted by pre-assembling them into whole formers and then following the method described above.

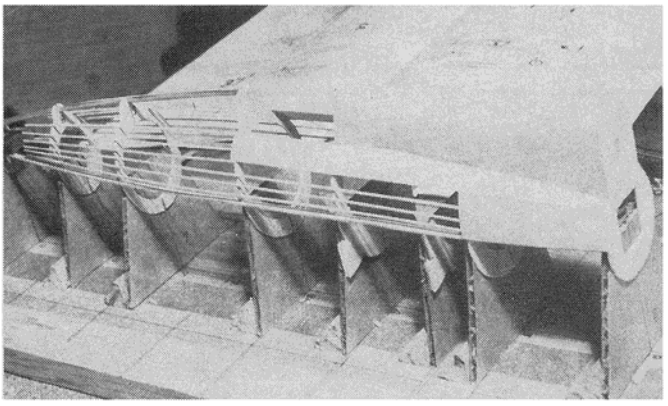
If you are like me and have to leave your models in various stages of completion until you can snatch a few minutes to work again, this method is a life saver. Everything you have done so carefully stays just where you line it up. Nothing shifts or warps as long as it stays in the jig.

The success of using cardboard in the jig was a pleasant surprise. Clean fresh cuts with a jig saw or Exacto knife were easily accomplished and it accepted rubber cement very well, which was essential if the fixtures were to do their job and still be removable.

The technique described above was worked out to solve problems I'd had with a lot of models over many years. I owed much to modelers who had gone down these paths before and shared their experiences. I hope it may help others with their model building challenges and encourage more original models and more scratch building.

PHOTOGRAPHY: GENE SELLERS





The formers are shown here attached to the cardboard supports and aligned on the building board (**left**). Partly completed fuselage shows corrugated cardboard and molding used for support during construction (**above**).

C/L stunt

by Bob Hunt

One of the most colorful and beloved characters in the sport of Stunt flying passed away recently. Rene Mechin, while not one of the name flyers, was known by most of us that attended the Nationals or FAI Team Selections as one of the most fastidious and dedicated craftsmen that our hobby has ever known.

Rene was an Engine Man; a constant experimenter and modifier of the powerplants for aerobatics. He understood the subtle timing requirements and had a master's feel for the fit of metal parts. If an engine had more to give in horsepower reliability or consistency, Rene could bring it to the surface. More than once an engine prepared by Rene had powered a contending ship in a National Stunt contest or crossed the ocean to help defend our long tradition of winning on the world scene.

This was a giving person, one who would rather help a fellow modeler for hours on end with a technical problem than compete himself.

Rene was Gene Schaffer's chief mechanic during the years Schaffer was a member of the U.S. World Team (1973-1976), and prepared all of the engines used by Gene.

Rene was not one of the name flyers, but he did like to fly in competition. I remember one instance at the 1976 Nationals when Rene was flying during a qualifying round and was performing well above his usual standard. We were all surprised to see him doing that well and naturally cheered him on. Rene had just finished his Outside Squares and went directly into the Vertical Eight maneuver, thus leaving out the Triangles, Horizontal Eights and Square Eights. The mistake would cost him any chance of qualifying. When he landed we asked him what had happened, and he said that he realized that he was flying much better than he normally did and the thought struck him that he just might qualify. He said that the prospect of it scared him so much that he forgot where he was in the pattern!

Rene lived on the upper east side of Manhattan just a block from Central Park where he had an apartment filled with modeling memoribilia from a lifetime in the hobby. This collection became known throughout the Stunt world as "The Museum." Here were examples of planes belonging to some of the greats of our sport; an original "Gypsy" by Jim Silhavy, a brace of Bob Lampione's georgeous stunters, Bill Simon's trend setting "Gemini", Gene Schaffer's modified "Genesis" that was used to make the 1974 World Team, all in perfect shape and looking like they were still being used in the pattern wars. He had at least one example of each of the famous motors used in our event over the past three decades. These were his true love, and he would spend hours expounding on the virtues of each just as if he were speaking about an old friend.

Rene's home was a mecca for traveling Stunt flyers from the world over. Many was the time he would call and say that a flyer was in town and arrange an impromptu get together of the local troupes for a skull session that would often last far into the morning.

Rene is gone but his spirit is still with us and many of us will think of him each time we hear a fine running motor . . .

Why a .40?

A quick look at the results from the major Stunt contests held during 1980 would tell you that the .40 size engine has emerged as the standard powerplant for competition aerobatics. There are several reasons for this switch down in size from the larger .46 engines or up from the .35. If you have been flying a .46 size motor in a 60" span Stunter then you are probably using .018 stranded lines. A few may be using .014 solid lines. Each of these types of lines have disadvantages; .018 cable is heavy and adds too much drag, and the solid lines are prone to stick together when more than two twists are wound into them. Solids are also very prone to kinking and require much more attention than do strandeds.

If you have been flying .35 size ships you have most likely been using .015 strandeds and don't have the added problem of severe line drag, but the .35's just aren't putting out the steam that you are looking for. Sure, there are some who are content with their set-ups, but many have begun to look for the advantages of extra horsepower without the problems that added displacement brings.

The reason for this sudden awareness of the .40 size advantages is the abundance of good Schnuerle ported .40's that are now available. Among these are the OS.40 FSR, HP.40 Silver Star and the HP.40 Gold Cup. These engines offer more horsepower than do the loop scavenged .46 size motors. To prove this point to myself, I put an OS.40 FSR into a ship that had been powered by a .46. No other changes were made except to use a larger diameter propeller (the .46 wouldn't carry the larger prop). The FSR allowed the lap times to slow an average of 5 to 6 tenths of a second. The biggest plus was the constant line tension provided by the extra power. The .46 would start to run out of steam in the vertical maneuvers and had to run faster during the rest of the flight just so it would pull through these sections of the pattern. The same experiment was tried using an HP .40 Silver Star with similar results.

The only problem it seems is how to properly set-up a Schnuerle .40 to run in a Stunter. Many have reported problems in getting a consistent "Stunt type run". Next month we will begin to cover the use and care of these powerhouses and do a step-by-step breakdown on setting up a new Stunter with one. Till Then Fly Stunt.

PHOTOGRAPHY: CHRIS LELLA

Bill Simons is shown here starting his Scorpio at the 1977 Atlanta FAI Team Trials. Rene Mechin is waiting with a thinner coated rag to wipe the solid lines, prior to flight. Bob Hunt holds.

with model builders

by Ed Whalley

Soaring Standings Posted

The DCRC bunch has a very active Soaring group, and from time to time we've been keeping an eye on their season-long points race. The gang flies about once a month and has more fun than just about anyone else. The points are important, but the fun is paramount. Anyhow, things went right down to the wire in the past season, and here's how they ended-up.

In the Expert category, the ultimate winner was Don Clark with 41 points. He was followed by Barry Drew (37), Gus Bergin (35), Bud Booth (31), and Ken Troxell (28). In Sportsman, Tom Dickey amassed 72 points for first. Following him came Don Thompson (63), Chuck Wells (58), Steve Szalai (57), and Tom Ball (56). Note that things got a bit tight in this race. And this list runs on to 27 places. Anyhow, it's evident that the group had a good basis for competition.

In '81 however, they're going to make things even more competitive. What they're gonna do is to quit counting *all* their scores and make just the high scores count. If they fly eleven meets, instead of counting all scores for year-end standings, they'll count only the nine best scores each guy posts. This way, the results will be somewhat more qualitative and a bit less quantitative. Anyhow, they think it'll make 'em all try a bit harder.

Archer Sweeps FF Champs

At the Arizona FF Champs over October 18-19, Randy Archer took Sweepstakes via wins in Replica, ½A, and CD, plus a third in A/1 and A/2 Combo. Tom Heiser took OT Sweeps via wins in Pylon and Cabin. The meet was marked by an excellent turnout, an upswing in Junior entries, and beautiful, fall weather. The Junior Catapult Glider event drew the most entries. And the proposed CO_2 Scramble was dropped. But all in all, it was a satisfying meet.

Toby Blizzard had a good time. He picked-up wins in the glider Combo, AB Gas, and a second in CD. He also came third in OT Pylon. Al Lidberg took Mulvihill, beating Roger Gudhal and Tom Burwell. John Patton won in P-30 over Dick Voigt and Julie Forzano. Ken Kear picked-up seconds in ½A and AB, and Heiser added a third to his string in Replica. Don Cross had a coupla' seconds in Replica and OT Pylon. He also had a third in AB. Forzano took Handlaunch, and Chris Lidberg took the Junior P-30 event.

In more ways than one, the meet is a tune-up for the 31st Annual Southwesterns at Buckeye. Set for Jan. 31st and Feb. 1, the meet is really the kickoff of the '81 season. We'll bring you the results.

Talent Abounds at Clovis

The Clovis North-South Meet over October 25-26 probably saw more Stunt talent outside of the Nats than any other meet in the country. The south was represented by Bart Klapinski, John Poynter, Kirk Mullinnix, Jim Armour, Bob Whitely, Jerry Silver and Ed Allen. The lineup of northerners included: Gil Rodrigues, Arlie Peszler, Dave Fitzgerald, Ted Fancher, Bill Howe, Bill Kipp, Duane Stork, Rod Johnson and Max Boyd. Claus Maikis of West Germany was also on hand.

Bill Howe who is the Nats Stunt Director for '81 as well as the current WAM Stunt Director provided much of the equipment. Doss Porter who flew a lotta Combat did a lotta legwork for the session, and the Clovis club provided barbequed hamburgers and pop. Bill Fitzgerald spent the whole day judging. Even the weatherman did his part: the sun shone and the winds laid low.

Here's how things went. In ½A, Dave Fitzgerald proved unbeatable as he bested Bart Klapinski and Bill Howe. Max Boyd took Beginner, beating Ed Allen. In Advanced, Jerry Silver bested Bill Kipp and Bill Howe. And in Expert, it was Fancher, Whitely and Klapinski.

After the session was over, the group repaired to Charlie's eatery for an evening of socializing and shop talk. We'll bet it was a lively time.

Fall Rally Draws Well

The third annual venue of the Hanson Wing Busters at Legion Field drew some of New England's top talent to the Bay State. Held early in the fall, the Rally enjoyed spectacular weather and flying of a high order. Four events, Carrier, Ballooning, Slow Combat and Mini Combat were carded along with a Static Scale show. The most popular event was Ballon Busting followed by Profile Carrier. Half-A Combat seemed to be gaining in popularity in the area and drew almost as many entries as Slow Combat.

George Higgins proved to be the man to beat in Ballooning. He was followed by Rod Adair and John Flynn, in that order. Will Rogers topped the list in Combat, with Glen Simpson and Steve Sacco following. Joe Robinson won in Mini Combat and was followed by Kevin Barrett and Bill Smeltzer. Simpson posted 211.9 to take Profile. Joe Dzialo was second in 207.5, and Adair thirded with 186.3. Jack Patrolia took the Static event with a Fokker D-8.

Glen Simpson flew his familiar ST .35-powered Mauler to win in Carrier, an event in which landings made a lotta' difference. Dzialo's ship, a TBD-1 Devastator, was undoubtedly one of the prettiest profiles in the region. Finished in pre-WW II markings, the ship turned-in an 18.8 MPH low on its first flight. Sam Albro managed 75 mph for the fastest high speed. Of the landings attempted, only 43% were completed successfully. And only three flyers made 100-point landings. On a final note, we must point out that Dzialo's fine low-speed run of 18.8 mph was accomplished in a dead-level flight attitude—no hanging on the prop.

With this evidence of interest in Carrier, the regional Association (CLAN) proposes a second CLAN Carrier event for '81. The concept envisages profile models being flown in an event similar to AMA Carrier I with quite a lotta latitude in engines and tanks allowed. New Jersey does something similar with its Non-Scale Class I in which profiles and Scale are flown together sans the usual 100 bonus points. CLAN proposes to allow only profiles and to award 10 bonus points for profile fidelity. However, the rest of the scoring system will be based on WAM practice in which points are scored on takeoff and low-speed runs earn a point-per-second. Commenting on the proposal, editor Mike Nassise sez: "Speed will not be the whole ball game in CLAN Carrier I." The point is that the regular AMA events have simply not appealed to area Carrier buffs. The new event will give them a second class of Carrier to fill the void.

Bits 'n Pieces

•Sold-out. That's the way the SACRATs feel after learning that their flying field had been sold-out from under them. Ironically, they had recently paid the real estate agent their rent on the site.

At this writing, their money has not been refunded, and they are anxiously waiting word on the new owner's plans for the land. It may be that they will be able to continue using the property; in the meantime, they have started a site search.

• Fresno Flyfest Flying continues up in the Central Valley. Now, they're adding Indoors to the schedule. "Come a day early," they say, "and fly Indoors." The idea was to combine the activity with the usual Sunday contest. Anyhow, at the October meet, Joe Lobbia turned-in six maxes to take Class A. He flew a Satellite 450 on Cox .15. This was the best time of the meet. Steve Jensem took B with a Starduster on K&B .23 in 11:24 for second hi-time. Bill Haught took ½A, and Harry Mullen took Replica with a Miss America. Pete Sahlberg took Glider with an Eaglet. From the results list, it appeared that the boys were flying an awful lot of Stardusters.

• *Fred makes the big time.* Talking 'bout the Fresno gang reminds us that Fredbill Morgan has finally arrived. Fred's been foolin' around with FAI Power for a while and has been doing well. At major meets this season, he's just missed placing by a cat's whisker. At the WFFA (Western Free Flight Ass'n) Meet in Taft last October, Fred finally did it. Yep, he got into a flyoff with Doug Galbreath and won the durned thing.

1980 ROAR Super Nats

by Chris Chan

1:12 Scale Production Champion
Gary Kyes

Gary Kyes, one of the most talented and versatile radio control car drivers around, gave the promising new MRP GP-12 its first major victory at the 1980 Nats.

Working closely with MRP's Bob Welch, Gary has quickly developed the GP-12 into a real contender. His win in the Production class demonstrated the competitiveness of its basic design.

Production class rules are strict and designed primarily to control costs, primarily for novice drivers. Expensive modifications like ball bearings and differentials are not permitted, and even chassis lightening is illegal.

However, for optimum performance, proper set up is critical. Here are some tips from Gary—CHRIS CHAN.

In preparing for the 1980 ROAR Nationals, I found myself extremely short on time. A trip to Monaco for the 1:8 World Cup Race and an extremely heavy work load, made me question whether or not I should even try to attend at all.

Since the production class of electric racing requires the use of basically stock kit cars, I worried least about it. I did take an evening to build a super lightweight (actually too light) stock/ modified car. The production car was actually built by the girls and guys on the MRP production line. I picked up a #923 assembled car less radio, a .75 ohm resistor (#539), a Lotus Esprit body, and jumped on an airplane for California.

While I was busy installing the Bantam Midget servos and Futaba receiver, Jim Welch line bored the bushings with a ½" drill. Jim also polished the axle with number 600 sand paper. I added ¼" super thin bearing shims (#3019) at either side to cut down on side load friction. Similar ⅛" shims (#3013) were used up front. I also opted to install adjustable steering linkage. This was done by using a single ⅛" collar and two stock tie rods per side. As can be seen in the pictures, this set-up allowed for infinite toe-in adjustment which was a definite tuning aid. I was later to find out that on this particular track the stock items would have been adequate. But, I still liked to know I could make adjustments if necessary.

The unique square drive gear was drilled slightly oversized (5/16) to allow it to "float" on the square drive (this is no longer necessary, as MRP has made this change in production). This allowed the gear to find it's best running position which meant the least amount of friction. Additionally, it allowed small rocks and other damaging material room to go through without causing damage as on fixed gears. Final assembly was completed using Tri-Flon lubricant and checking to be sure that everything was free of binds.

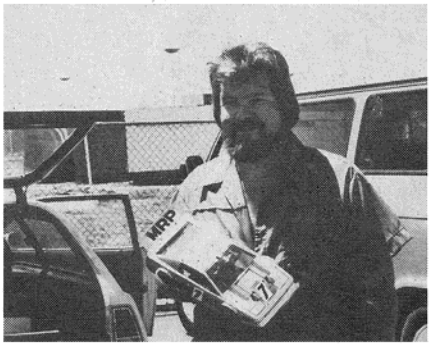
The last and most important part of the set-up took only thirty seconds. By placing the finished chassis on a flat surface, I used the tip of and X-acto knife to pick up the front of the car from the center of the bumper. As I did this I watched the front tires to see if one lifted off the ground first. Fortunately, the chassis was found to be perfectly flat and no adjustment was necessary.

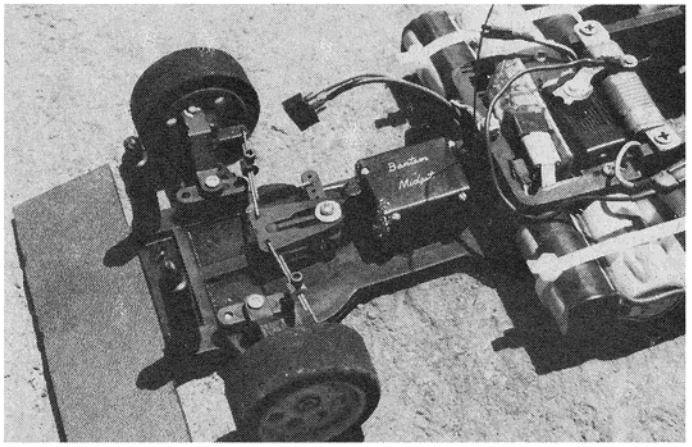
If one tire had lifted first, the chassis would be "tweaked" and not handle correctly. The best method of correcting this would have been to add shims under the heavy (non-lifting) side until both sides lift off the flat surface simultaneously.

This entire procedure was accomplished during an episode of MASH and Star Trek.

At the track I found that my box stock production car handled better than my trick drilled out stock/modified version. As a result, I lent out my modified car and drove the production car into all three A-mains.

PHOTOGRAPHY: CHRIS CHAN





Gary Kyes is holding his winning MRP/Lotus Esprit (**above**). Gary's GP-12 shows side-mounted Sanyo nicads (**right**). Note the Futaba receiver.

1980 ROAR Super Nats

by Chris Chan

1:12 Scale Modified Champion Kent Klausen

Modified Champion, Kent Clausen, celebrates his victory flanked by motor whiz, Mike Reedy (left) and sponsor, Gene Husting. A happy crew.

1:12 Scale Modified
1980 R.O.A.R. National Champion:
Kent Clausen (The Factory)
Chassis: Associated RC12E
Motor: Reedy Modified
Radio: Futaba FP2F/R2F
Servos: Novak Bantam Midget

The Modified class is the glamour event at the Nats, with all kinds of unique and experimental cars entered. Using high-powered rewinds, the Modifieds are the ultimate test of 1:12 scale racing equipment.

With all the factory participation and trick machinery around, it comes as a mild surprise that Kent Clausen's National Champ Modified car is a fairly straightforward RC12E. Kent is one of several Northern California drivers co-sponsored by Team Associated and Al Chuck's "The Factory", and his car more closely resembles the instruction manual than most of his teammates.

Despite the conventional appearance of the Clausen car, there are a few important detail changes. For starters, Kent uses Sanyo "Yellow Jacket" NiCads for power. Already popular with most factory hotshots, the Sanyos are noted for increased output and a delicate nature. The important thing to remember with Sanyo NiCads is using a lower amp charge rate to avoid venting.

A dual ball-bearing Reedy Modified motor supplied the horsepower to the Clausen racer, driving through Associated's adjustable VariLok differential. For the bumpy, dusty Nats course, Kent used a pretty loose diff set up and soft front tires. Ball-bearings are installed on both front wheels and the rear axle to minimize friction and power loss.

If you notice something odd about the chassis parts on Kent's car, it's just that he liquid dyes all the nylon parts in black. Liquid dying RC12E is another fast growing craze out west, with parts showing up in all colors of the rainbow. Kent's fiberglass radio tray is also black, but it must be painted because fiberglass doesn't dye well.

Kent's radio gear is typical of many California expert drivers, a Futaba 2F transmitter and receiver and Novak Bantam servos. Kent uses a specially-made, vacuum-formed cover on his receiver to save weight.

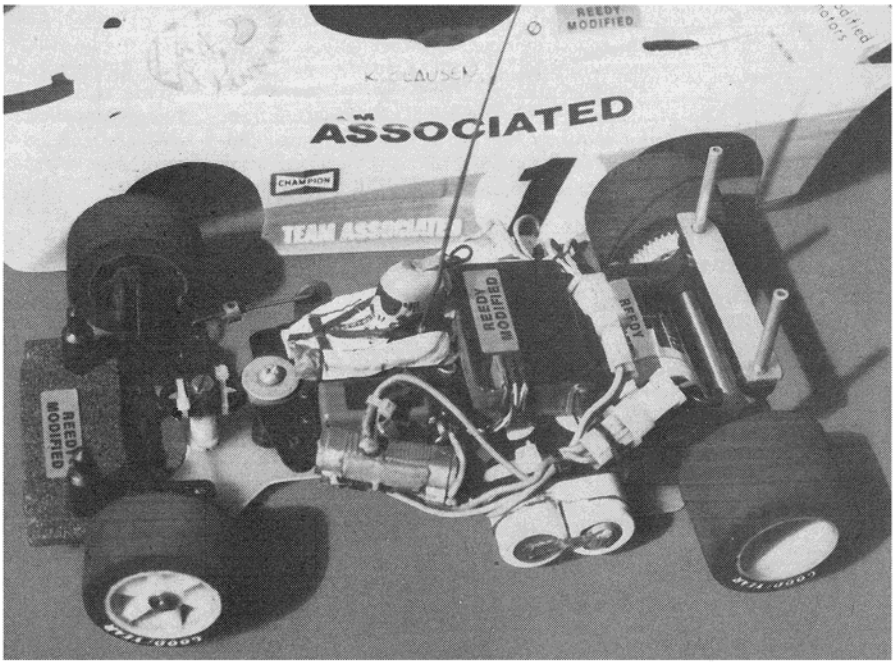
Some little modifications also contribute to the overall performance of the car. Most important probably is Kent's "roll over" spring steel antenna. The metal whip antenna replaces the old nylon tube, and actually helps flip the car back on its wheels should you roll over while hitting a corner dot. A simple alteration, it really beats waiting for a turn marshall to right your car.

Another clever item is the throttle wiper-by-pass. Kent attaches a second wiper arm over the full-on end of the throttle resistor. This effectively eliminates full-throttle arcing and power loss and gives much better response.

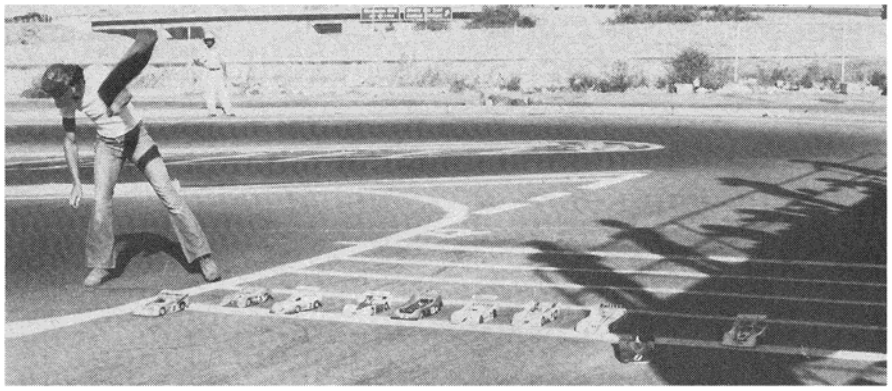
The final touches include, tie-wraps over the servo-saver (to eliminate play) and around most of the wiring. Kent's car is topped off with Associated's Toj 302/Cosworth body and runs a furniture-packing foam front bumper.

Incidentally, Associated was so delighted with Kent's big win they will be selling Clausen-replica Team Nats Cars, complete with all the goodies Kent used. It's a great package deal, and all the components are available individually to update your RC12E or similar car.

PHOTOGRAPHY: CHRIS CHAN



Kent Clausen's Factory RC12E is shown here. Kent uses Sanyo "Yellow Jacket" nicads for powering his Reedy modified, dual ball-bearing, motor. An Associated adjustable VariLok differential is also used.



Starting Line

by Chris Chan

The Racing Season.

This is just the beginning of FLYING MODELS' new model car racing section and it's a good time to reflect on the past season of competition. Let's check out the winners and losers that made 1980 such an exciting year for R/C car drivers.

This year's big one, the ROAR Super Nationals, was a two-week event held late in the summer in San Jose, California.

Sponsored by BARCAR, the racing took place at the legendary Golden State Raceway on a newly designed course.

Week one belonged to the Gas cars, with the 1:8 scale cars competing in Super Stock and Open CanAm classes. All the factory teams were there, all looking very serious and professional. A sprinkling of foreign entries added a touch of glamour with England's Wally Bailey, Japan's Fujio Sasuga and a whole contingent of quick South American Delta drivers making the show.

With world class racers like Gary Kyes (MRP) John Thorp (Thorp) and Bill Jianis (Associated), you'd expect the competition to be fierce. Well, fierce it was. But, when the dust finally settled, Mr. Art Carbonell had doubled.

Driving his works Delta rocket, Arturo was in a class by himself all week, giving his sponsors, the Campbell Brothers, good reason to celebrate.

The second week of racing brought in the electrics, and quite frankly, it was a big disappointment. Again, the manufacturers' teams were entered—Associated, MRP, JoMac, Leisure, Bolink and Parma were represented—but that was about it. Among other things, it seems that the local club (BARCAR) got into a tiff with ROAR President, Rick Perry, and boycotted the whole affair.

This amounted to a pretty weak turnout. In fact, it had fewer entries than most local races. Still, the overall skill-level of the drivers present was good and fewer entries meant more practice.

1:12 scale this year was broken into three events, Production, Stock and Modified (with no driver classification no more Expert, Amateur, etc.). Also eliminated from the 1:12 scale agenda was the 4-cell, indoor class, which is primarily an East Coast event.

The A-main (top nine drivers) for the production class showed plenty of evidence of the current youth movement in radio control car racing. Frank Killam (Leisure) and Gary Kyes (MRP) were the only finalists old enough to drink. The race started with Team Associated's, Mike Lavacot streaking off into the lead and Team Associated's Curtis Husting streaking nowhere. A broken throttle wiper lead wiped out Curtis' chances before he even got started. Meanwhile, Kyes began reeling Lavacot in and looked ready to snatch the lead. Several times Gary would try to pass, only to drop back again. Finally, after eight full minutes, and on the final lap, Lavacot found Jim Welch head-on, entering the straight. Kyes passed by in a flash, winning the out-of-the-box class with his GP-12.

Associated's Mike Lavacot finished strong in 1980 with wins in the Stock class at the Nats and the Western Regionals.

It was 16-year old Mike Lavacot's turn to come from behind in the Stock class. This time Butch Berney (The Factory) led from the flag with his bright blue RC12E running a smooth, tight line. But Mike kept closing in, finally taking over and leading an amazing seven-car RC12E sweep.

Last of the three events was 1:12 Modified, the fastest and most expensive of the electric classes. The cast of drivers and cars remained pretty much the same as in Stock, but now powered by rewound, ball-bearinged, balanced motors. As the speeds increased, many drivers started massaging WD-40 into their tires for more bite. As it turned out, the course was pretty tough on batteries, with plenty of corners followed by short straights. That meant only the mildest of rewinds could run the eight plus minutes strong all the way. Kent Clausen (The Factory) had just that motor. He charged to victory in his Modified A-main. Despite being pressured and even passed by Bill Jianis, Kent just stood on it and won going away.

Probably the nicest thing about the 1980 Nationals was the many competitive cars. A quick review of the three electric A-mains show that Associated, MRP, JoMac, Leisure, Parma, Bolink and Speed Design all were represented.

The Biggest Little Club Race in the World

The Third running of S.C.A.R.'s Western Regionals was everything the Nats should have been, with an incredible field of 250 novice, amateur and expert drivers.

Held on the newly-renamed Vehle R/C Raceway (formerly Thorp's) in Pomona, the Regionals were probably the biggest 1:12 electric event anywhere.

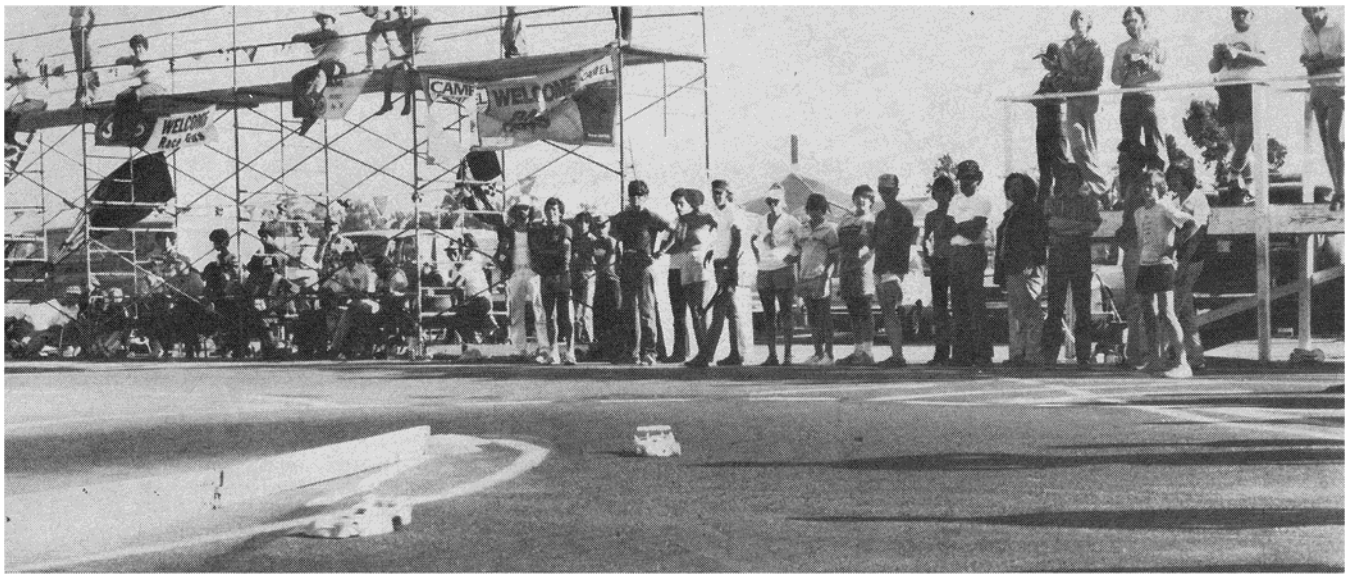
Built originally for 1:8 scale gas cars, Vehle's was hardly a "driver's course". It's long length and sweeping curves seemed immense at times to the smaller cars, and produced laptimes of over 20 seconds.

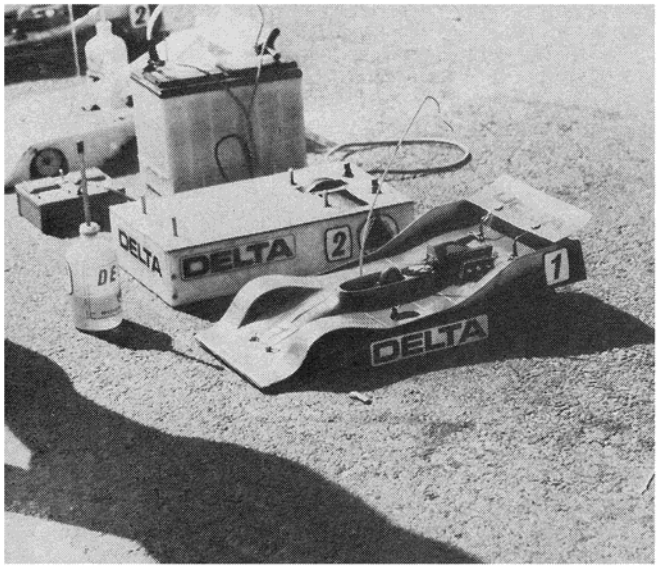
Like the Nationals, the Regional race was an important one to the manufacturers. A good showing at events of this caliber would be invaluable in terms of promoting sales and the factory teams were out in force.

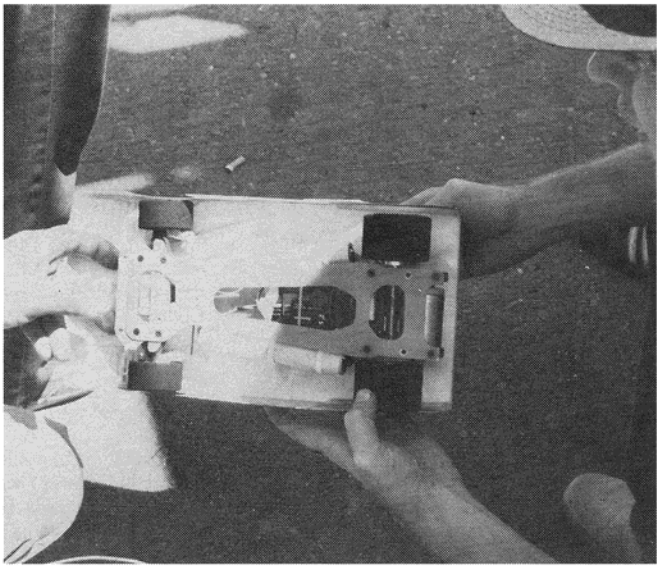
New at the race was John Thorp's first electric car. The 1:12 scale Thorp had a pretty straightforward approach, all executed with typically-Thorp quality and finish. And the car worked, making the Expert A-main in its maiden voyage.

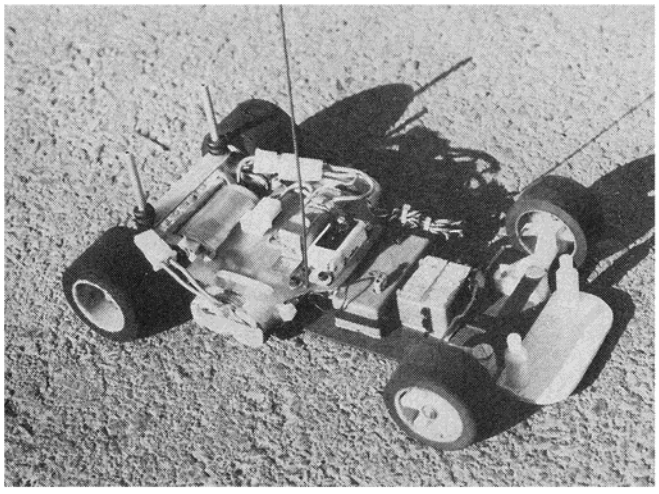
Another car looking very sharp was the MRP Prophet of Stockton's Ed Janis. Ed, who also won Concours at the Nats, easily dominated the Amateur Stock class for a wire to wire victory. Amateur Modified went to Monterey's Derek Coopersmith (RC12E) for the second year in a row. In one of the weekend's best races, young Derek fought off MRP drivers, Janis and Rene Cortez, for the win.

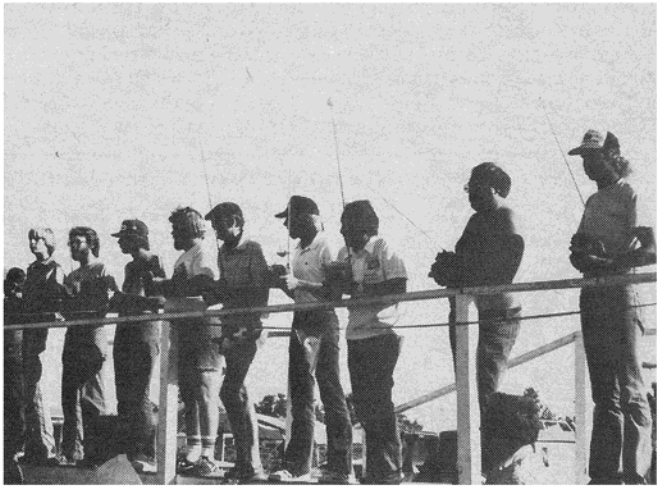
In the Expert category there was just one winner, Associated's Mike Lavacot. Running his unique, graphite-chassised RC12E, Mike dominated both the Stock and Modified A-mains for a brilliant double.









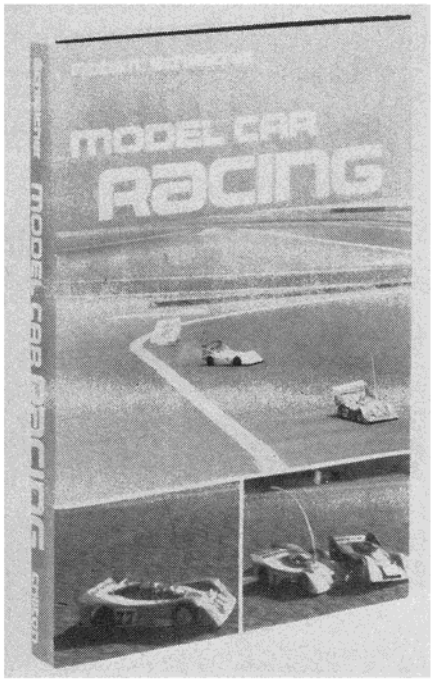


Delta's Argentinian Factory cars seemed particularly well suited to the bumpy Golden State Raceway track in the 1:8 Scale Nats (**center**). Mike Lavacot's unconventional Associated car uses a graphite pan with RC12E suspension parts (**above**). A Novak servo is used also.

This Bolink works entry came all the way from Norway (**center**). Note the unique battery configuration and the behind-the-axle motor position. In the 1:12 Stock A-main, it's Fusco, Lavacot, Berney, Welch, Kyes, Reedy, Clausen, Aguirre, Jianis and Husting on the stand (**above**).

Pit report

An FM book review:



Radio Control and Tabletop Model Car Racing, Robert Schleicher, Chilton Book Co., 173 pp, color cover, softbound, $5.95.

Chilton is a publisher well known for its technical and "how-to" books. Bob Schleicher is an author well known for his "overview" books in the hobby field. This collaboration of the two has produced what we would expect, a sound overview on model car racing with enough how-to to satisfy most readers, especially beginners.

FM readers will notice that about 50% of the book is devoted to tabletop (slotcar) type racing. But do not reject this book out of hand without closer inspection. There are 88 pages of good sound R/C model car racing data in this book, and at only $5.95, it is well worth the money.

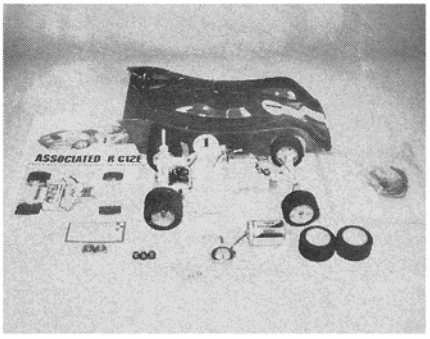
Author Schleicher does not waste words. His style is economical and to the point. While the reader might expect the usual preambles so popular with wordy amateurs, Schleicher has already gone for the guts of the topic and left the slow starters far behind. Nor, does he short change the reader with too-brief, superficial coverage. He includes 37 sub-topics pertaining to R/C, cars. They include R/C fundamentals, both gas and electric powered cars, gear ratios, driving, chasis alignment, batteries, suspension systems, racing, painting and finishing

The book is well illustrated with one or more photos per page. Many are procedural or how-to oriented. It is also a satisfying book that can be a great help if you want to get into R/C model car racing. The book was put to this test. I made a list of every topic or area I could think of that you, the reader, would expect to find covered in a sound overview. Comparing the list to the book I found each one was included and contained worthwhile and generally complete information. The photos were useful, not just excess baggage, and the text covered areas I had not even expected.

Schleicher has some pertinent things to say about current racing rules, and how he thinks they will develop in the future. It is fascinating to compare the different tracks that are pictured and the list of existing available tracks is helpful.

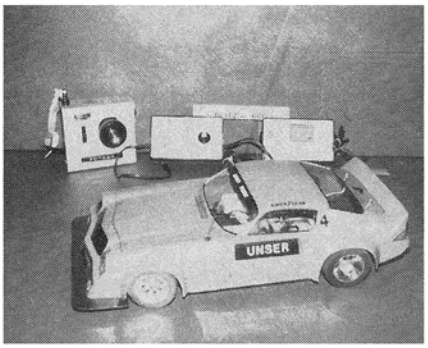
The book closes with an appendix of manufacturers and retailers who specialize in model racing cars.

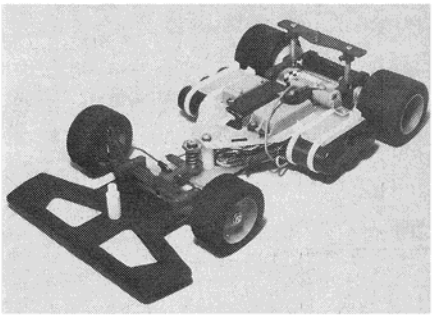
If you want a comprehensive introduction to the topic, this book seems to be the best in print.—WAYNE DANIELS



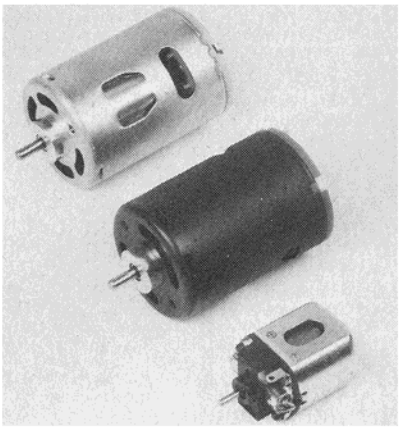
ASSOCIATED ELECTRICS, *1928 East Edinger, Santa Ana, CA 92705,* presents the Team Associated Nats Car (#3040/kit and #3050 assembled), a 1/12 scale machine that is proven competitive in National Championship events. Designed for the serious competitor, the Team Nats Car is based on Associated's lightweight RC12E (#3016), with high performance options. Included in the package are a Reedy Modified rewind (#3511), a VariLok differential (#3430), a full set of pinion and spur gears and precision rear wheel ball bearings. Also included are special soft racing compound front tires (mounted and trued) plus a stock motor and tube rear axle for production and stock class (ROAR) competition. The kit lists for $199.00 with a clear Toj body and wing. The ready-to-run version lists for $219.00. For more information write to the above address.

MINI MARINE RACING EQUIPMENT, *542 N. Yale, Villa Park, IL 60181,* has released a complete 1/8 scale electric race car. The Blitz 1600 is not a kit, but a complete race car system. Powered by an Astro 15 motor and 16 cells, the Blitz comes complete with the radio system installed (a Futaba FP-2F with S-7 servos), a clear body and a quick charging system which charges the car in approximately 15 minutes from a 12 volt auto battery. The concept of the Blitz is in between that of 1/12 scale electric racing and 1/8 scale gas powered racing. The Blitz 1600, complete with radio and body lists for $475.00. Without the radio the list price is $350.00. A conversion kit is available to change a 1/8 scale gas powered car over to electric power. This conversion kit contains all electrical components mounted to a shaker plate, an Astro 15 motor, motor mount and pinion gear. The conversion kit comes complete with a charging system for a list price of $225.00. For more information write to the above address.





JOMAC PRODUCTS, INC., *12702 N.E. 124th, Kirkland, WA 98033,* introduces their latest entry into 1/12 scale electric racing, the Lightning 2000. The Lightning features: a .060 epoxy board chassis and a .060 radio tray. These components are routed to eliminate stresses and rough edges. Both are precision drilled for accurate alignment and easy assembly. Other features include: adjustable center of gravity cams for the rear axle, spring loaded servo-saver and a one-piece nylon front end assembly. Several different Lightning 2000 kits are available from JoMac: the basic assembled 2360 lists for $125.00, the 2370 features electronic speed control and lists for $155.00, and the deluxe 2380 with differential and modified motor lists for $155.00. For more information write to the above address.



ARISTO-CRAFT, *314 5th Ave., New York, NY 10001,* introduces a new Black Red Top RD540SD super-speed motor for 1/12 scale competition. Aimed at R/C modified class racing, this motor features ball bearings and it is balanced and epoxied for the serious racer. The list price of the RS540SD is $29.95. Also offered is the RS540S, priced at $8.50. These Mabuchi racing motors are part of a wide range of D.C. "Cermag" motors dedicated to the model hobby trade and are sold through full-function hobby shops and hobby distributors. For more information write to the above address.

Crapshooter

by Don Bilsky

Another superboat from the company that produces record-breakers. A formidable machine.

Since 1975 there have been 18 possible IMPBA National Champions and 14 of them were Crapshooters, along with three Excellence of Performance awards and two Presidents Cup awards. Of all the 80 mph patches held by boaters today, approximately 80 percent have used a Crapshooter boat. And, last, but not least, the first official 90 mph pass was achieved with a Crapshooter.

An impressive record for a kit boat that is 70 to 80 percent built when you get it and almost fool proof. In a quite little part of Indianapolis, Indiana, at 4120 Richelieu Rd 46226, Precision Boats does its "Thing". That "Thing" is the building and designing of the most successful kit boat available. Some of the reasons for Precisions success are the quality of workmanship and durability of the boat, complete instructions, and performance in the water. One other reason is the testing done for improvements in design. I understand that in two days alone there were 21 hours of testing done on the 20 boat. This type of testing on all the kits goes on week after week. With this type of interest and research it's no wonder their winning record is what it is. What this translates into is more wins and confidence that you can race with the best. All this sounds like just what alot of people want, so lets see if this boat is all it's cracked up to be.

Parts

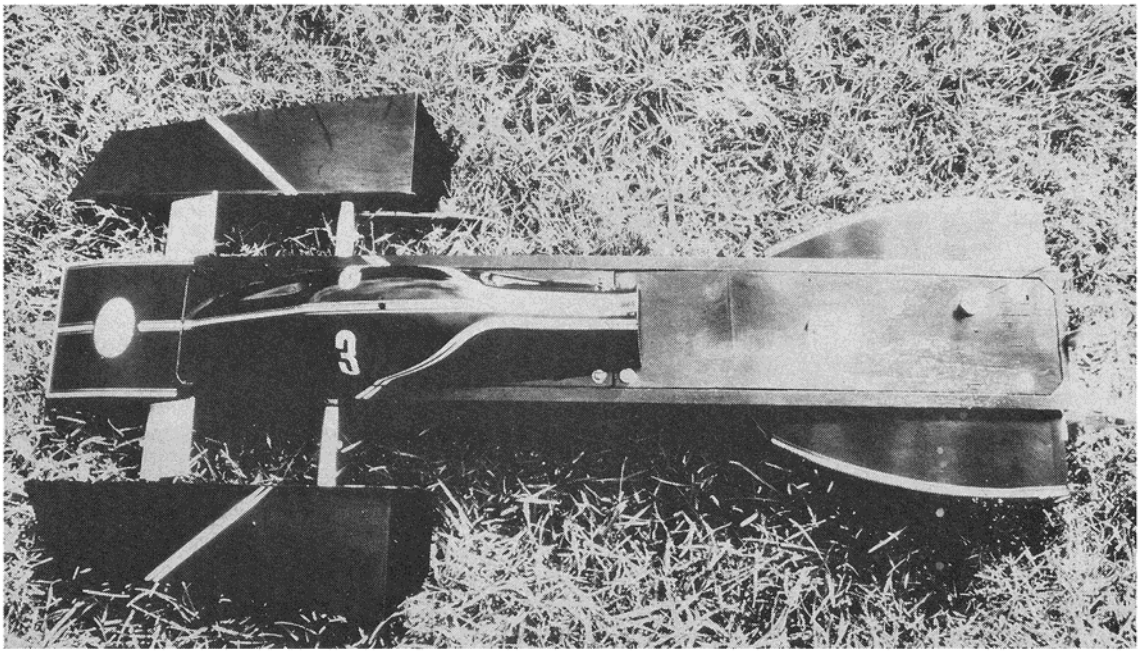
The first step in completing this kit is to consider any extra parts that might be needed. After inventorying everything, you will need: Hobby poxy glue (5 min. and 45 min.), paint, water proof seals for the radio box, propeller, male U-joint (depending on your engine), and camlocs. The only reason these items are not included is because everyone likes to use a different method or type of product. All of the hardware provided is the best available and shows that much thought goes into providing the most competitive and durable boat possible.

Construction

The first project in the construction phase is to lay out all parts and read the instructions to become familiar with them. The steps are well defined and understandable with pictures and drawings to aid you. Because the instructions are so complete I will not go step by step into the construction but will try to cover some of the important points.

The front sponsons have tubes which are glued into a piece of wood and then glued into the sponson itself. These tubes need to be ruffed-up with coarse sand paper prior to gluing them into the blocks. After doing this, you will want to drill a hole to accept two small finishing nails. By drilling a hole through the block and tube and putting a

PHOTOGRAPHY: DON BILSKY



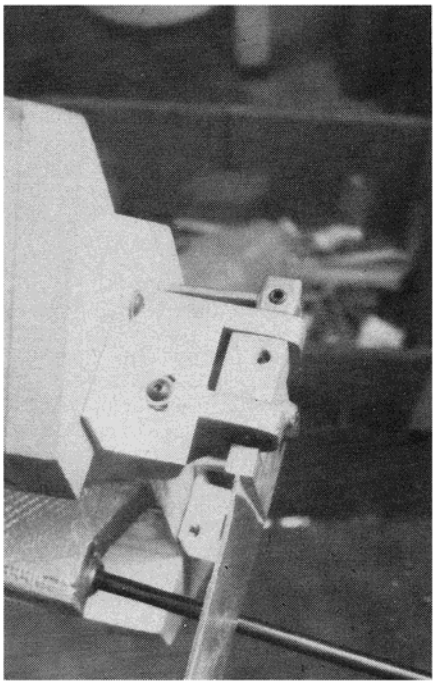
nail through it you will keep the tube from turning if it should ever break loose. You'll need to cut the point of the nails so they are flush with the block.

Motor mounts can be a problem if they crack, but one way this can be prevented is by drilling small holes in the motor mounts about 3/32" deep with a 1/4" drill. Drill about 20 of these holes, randomly, on the sides that will be glued. Other areas that crack are at the bulkheads and transom. (At this point, this boat shouldn't developed any structural cracks, but *all* hydroplanes whether they are home made or kits can crack in the same areas if preventative measures are not taken). At the corners of the bulkheads you should put triangular braces and at the bottom of the radio box bulkheads also. The transom and the rear radio box bulkhead should be braced using 1/4" plywood cut in a triangular shape. Two other areas you should pay attention to are the places where the drive line goes through the radio box and where it attaches to the bottom of the boat. Both these places are reinforced with two layers of medium weight fiberglass cloth.

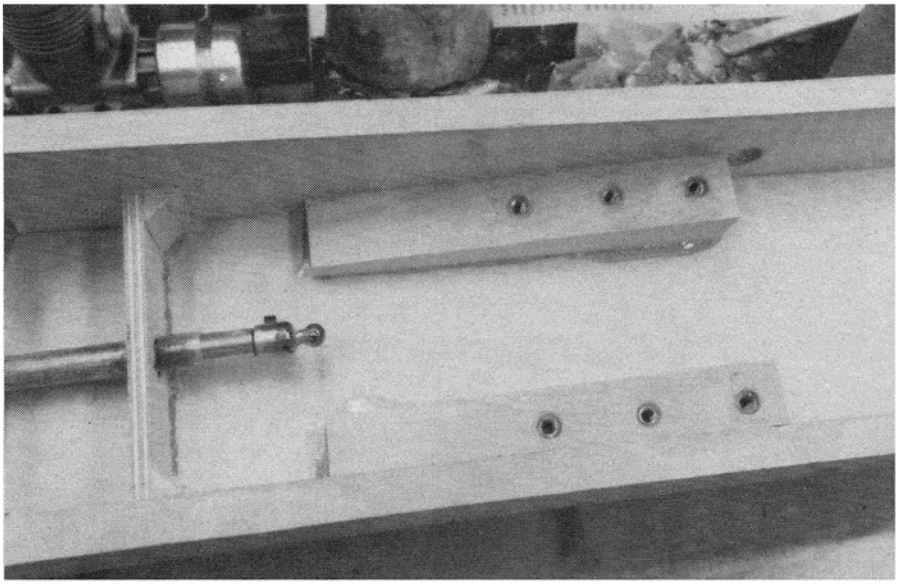
The front and rear sponsons are foam core sheeted with plywood. The front sponsons have a piece of wood glued to the front. The front tip has to be sanded back a little to give a flat surface to glue to. The reason you put a piece of solid wood on the tip is to prevent it from cracking when it hits something and thus absorbing water and soaking the foam inside. The front of the center section is done the same way. The rear sponsons are capped at the back with a 3/8" piece of wood. The reason I do this is to have a solid piece of wood to attach "L" brackets so I can have adjustable rear sponsons.

Another area to give extra attention to is the radio compartment. The front and rear bulkheads have bracing at the bottom. This prevents stress and possible leaks. Reinforce the brass drive line tube with medium weight fiberglass cloth. This tube has stress on it too, not only where it comes into the radio compartment but on the bottom where the strut is. I use two layers of cloth here. If you don't get the strut solid it can crack and cause more problems than doing it right the first time.

The cowl that comes with the kit is fiberglass and like the rest is of excellent quality. You need to cut a piece of 1/16" plywood to cover the fuel and engine compartment. Once you have done this you can do one of two things. Either glue the cowl, as is, to the plywood or, cut a 2" piece from the end of the cowl (not the front), turn it around and glue, at a slight upward angle, to the inside rear of the cowl. This gives the cowl an appearance of being flarred at the back. If you do this, do it prior to gluing the cowl to the plywood. You need to glue 1/8 inch square stringers 1/16 inch deep along the sides of the fuel and engine compartments for the cowl to rest on and also put a lip on the front to hold the cowl in place. The rear is held down by Cam-locs. Now, cut the plywood so the assembly fits over the engine and the cowl is finished.

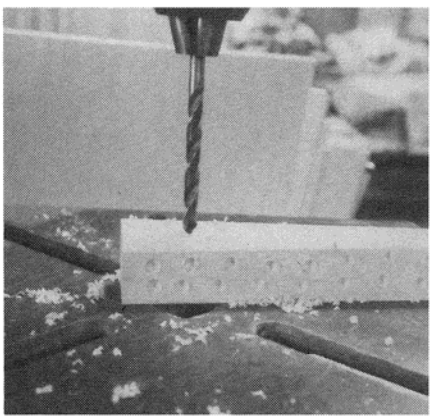


The cowl is glued to a piece of 1/16" plywood and then another piece of 1/16" plywood is glued to the bottom to form a lip (**above left**). "L" brackets allow the rear sponsons to be adjusted (**above right**). The motor mounts are shown here (**below**). Note the corner bracing. Holes in mounts aid gluing (**below right**).



Performance

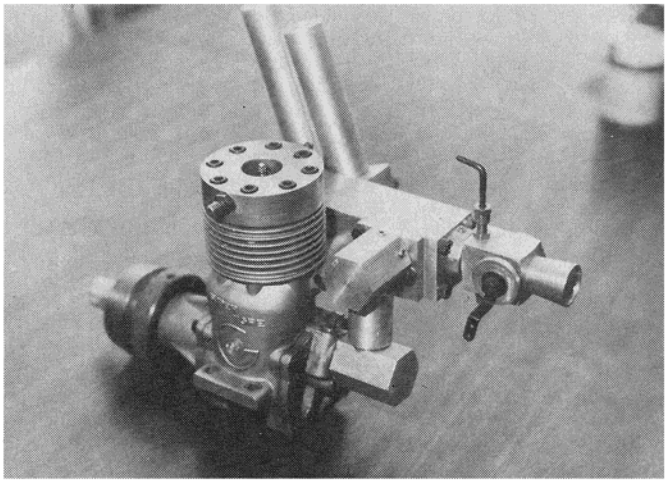
Think about what I said about the records and championship titles that Crapshooter boats have held. Right out of the box this boat is capable of everything these boats have done in the past. They care fast, stable, and turn as if they were on a string. And if you want more speed, throw an OPS 65 in it. It's just as stable and "Shakey Hands" fast. I used an Octura 1465 prop and a K&B 7.5 for power. With these combinations the boat will more than impress you. The hours and hours of testing done by Precision Boats has really paid off. The Crapshooter is an enjoyable boat. The Crapshooter kit with hardware lists for $235.00.



Turbocharger

by Al Berry

After receiving a lathe as a gift from his wife, the author produced this power adding accessory.



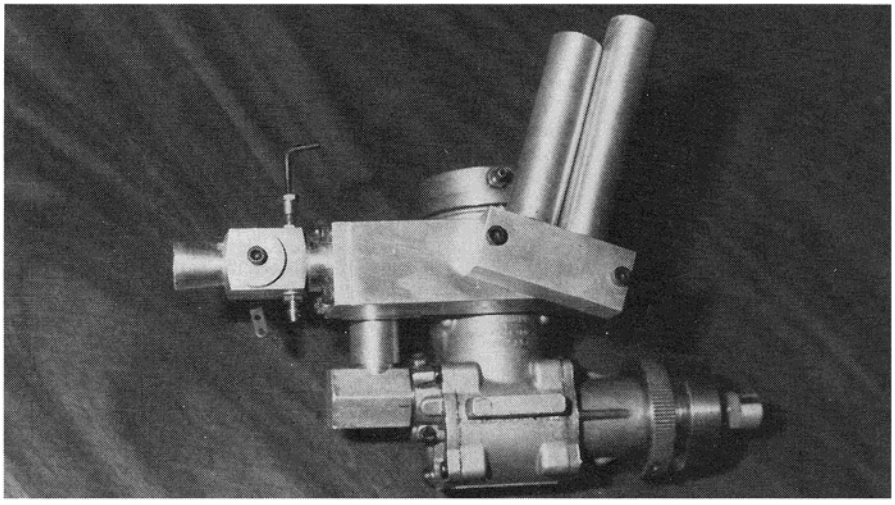
PHOTOGRAPHY: AL BERRY

The rising cost of fuel and the fact that my wife bought me a new Taig Micro Lathe last year were the two main things that prompted me to build the first prototype exhaust driven turbocharger. I looked for some way to maintain the high power output that I was getting from the 50 percent and higher nitro fuel I used and stop buying the high dollar fuel at the same time.

There are several different types of turbochargers that I could build. For instance, there is the belt and gear driven types, but they put a drag on the engines. The type I choose requires no power from the engine at all, because the exhaust from the engine drives the turbo like the wind drives a windmill.

When I started I had no idea how well it would work or how efficient it would be. I worked with a few turbochargers back in the late 60's and knew it should work on a model. I tried to keep the turbo as simple and inexpensive as possible. By doing so I felt that anyone that wanted one could build one or have some one build for them. In fact it was designed to interchange from one engine to another by only changing the intake and the exhaust manifold adapters. In other words the turbocharger unit was complete without the manifolds. The manifolds only determined what engine the turbo would fit, and run on. The unit I built was designed to fit a S.T.-65, but ran on engines as small as the K&B 3.5's. The only thing I found by using the unit on the smaller engines was that the exhaust impeller wheel needed to have smaller cut grooves and be a little more precise than the larger engines. I had a lot of people ask me how I determined the size, the boost, the oiling and on and on. I will try to tell you the best I can. The size wasn't critical due to the fact I only wanted to relieve the engine from having to pull fuel. So I used a small intake impeller wheel that was very limiting. I also tested the wheel at speeds up to 40,000 rpm. I didn't want the wheel coming apart and filling the engine with extra metal parts. As for the boost, I started with a small impeller wheel and worked our way up to bigger and more efficient impellers, as shown in the photos.

The oiling problems and the other questions are answered later in the text. By running a turbo you get the benefit of two things, you get atomization of the fuel and air mixture (a much higher, faster, and more even burning mixture) and the boost relieves the engine from having to work for its fuel. At any rate the turbocharger shown here performs better then I expected it to. Caution please take note this is a precision made unit and if you have any reservations about building this unit don't try it on your own, consult a machinist.



This exhaust driven turbocharger was designed with the idea of fuel savings. The unit was built entirely on a Taig Micro Lathe, a gift to the author from his wife! A fine do-it-yourself project.

Construction

Parts list

1-mild steel rod 5/16" dia. x 4".
1-alum. square bar 1" x 1" x 6".
1-alum. round bar 1" x 4" (you can use brass if you wish).
1-alum. hex bar 5/8" x 4".
1-alum. round bar 5/8" x 4".
2-precision high speed bearings 1/4" ID x 3/4" OD x 9/32" wide.

This is what it takes to build the prototype: 1- It takes the same parts to build the prototype, but, 2- just more of it. If you can't get the above parts from a machine shop, you can buy most of the aluminum at any large lumber yard.

Case

To make the case I took a piece of 1"x1"x6" aluminum bar stock, put it in my four jaw chuck and cut two pieces from the end 3/16" wide. These are the end caps after the unit is finished, see photos. Now I machine the case to a total length of 2 7/8". Next I drilled a 3/8" hole all the way through the center, (be sure your dead center). After which I drill both ends out with a 5/8" drill, one end to a depth of 1" and the other end to a depth of 5/16". This removes a lot of excess metal, so I can make the finish cuts. The finish cuts on each end are done with a boring bar and machined out to 3/4" diameter x 1 1/32" deep on the intake and 1 11/32" on the exhaust. The 1/32" deep hole is for the intake impeller and bearing and the 1 11/32" deep hole for the exhaust impeller and bearing to run in. Now cut the exhaust ports in the side of the case. These ports are 7/8" long and 1/4" wide. Cut one on each side. *Caution.* These ports have to be cut at an angle in the lower portion of the 3/4" diameter impeller hole. The angle has to slant downward to approach the impeller at the proper angle (see photos). When cutting the port angles *do not* let the cuts meet in the center of the hole. Cut them so you

have at least 1/8" of the 3/4" diameter hole radius that remains. This is to seal the impeller and case with the exhaust gases, so the exhaust gases don't bypass the impeller and make it spin.

This takes care of the exhaust end, so lets start on the intake ports. The intake ports can vary somewhat, in accordances with the engines ports and carburetor sizes, but be sure to cut them in the same manner as the exhaust and in the same locations as shown in the photos. The location of the ports in the case are very important. Now lay the case aside, drill and tap screw holes in it later.

Shaft

The shaft was built from a piece of mild steel rod 5/16" diameter x 4" long. I used a three jaw chuck and machined the shaft to a total length of 2 13/16". Now my bearings had an inside diameter (ID) of 1/4" and my shaft was 5/16" so I had to machine the shaft down on each end. One end I cut to 1/4" diameter x 1". This would be the intake end. The exhaust end was cut to 1/4" diameter x 1 5/16". This would leave me with a 1/2" gap between the two bearings when I installed them, (see photos). Be careful *not to cut* the 1/4" diameter undersize. In fact I left a few thousands oversize for a nice tight fit between the shaft and the bearings and also the impellers.

Exhaust Impellers

The exhaust impeller was a round cylinder cut from either aluminum or brass. The first one I built I used aluminum, and the second one I used brass. They both ran very well, the only difference I could find was that the brass impellers took a little longer to wind down, causing a split second lag between the time I backed off the throttle and the time the engine rpm's backed down. Even with this problem, I still liked the brass impellers the best. I chucked up the 1" round bar stock and turned it down to a finished diameter of 23/32" x 1 1/32" long. Then I cut 1/32" off one end to a diameter of 3/8". This gave me a small built on washer on the end that rode against the bearing and held the rest of the impeller away from the bearing surfaces, (see photos). Now I advanced to the tough part. I had to cut the vains in the cylinder to make an impeller out of it. The vains were cut with an end mill and cut 1/8" deep x 1/16" wide. They ran at a 3° downward angle toward the end that fit next to the bearing. (I'll explain why later, but the angle toward the bearing is a must.) Keeping in mind the angle toward the bearing I had another angle to cut at the same time. It made the vains form more of a pocket for the gases to push the impeller around. I cut this angle at 20°. This also made the impeller turn in only one direction and voided the chances of the turbocharger running in reverse. Last I drilled a 1/4" hole all the way through the center of the impeller.

Intake Impeller

The intake impeller had only eight vains instead of 16 like the exhaust and were spaced out to 1/8" wide x 1/8" deep. This made the impeller have a beating or mixing effect. The intake impeller was cut from the same piece of bar stock as the exhaust. It measured 23/32" long x 23/32" in diameter and had the same 1/32" machined down on one end to a diameter of 3/8". There were no angles in the vains of the intake impeller. They were all straight cut. Now I drilled the 1/4" hole in the center.

Bearings

The bearings I used were Fafner precision sealed high speed bearings. I had to remove all the seals, except one, leaving one seal on one bearing, (only on one side). This was the bearing that went on the intake side. The bearing size was 1/4" ID x 3/4" OD x 9/32" wide.

Lubrication

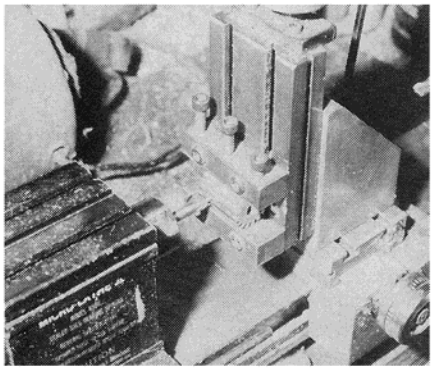
The most asked question was, what kind of oiling system do you use? Well it's very simple, the oil from the fuel was used to lub the entire unit. Remember the first angle I cut in the exhaust impeller? This angle slanged the oil into the bearing on the exhaust side. The exhaust pressure from the engine also helped, in fact the pressure blew the oil all the way to the intake bearing. Once it got to the intake I had to stop it or I would have had exhaust and oil bleeding back into the intake. This was why I retained the one seal on the intake bearing. The seal had to be put to the outside end of the unit. In this manner the oil traveled through the exhaust bearing, through the shaft hole and to the intake bearing and stopped after oiling the far bearing.

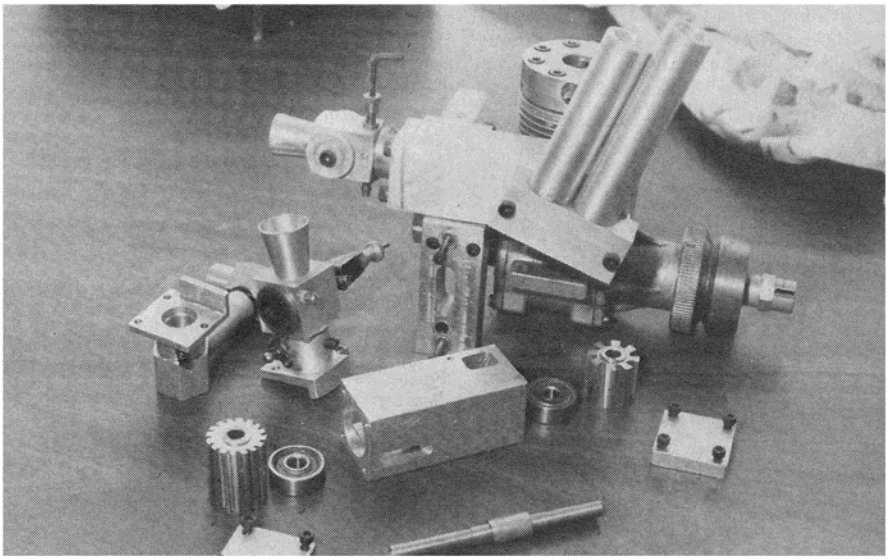
Assembly

When I started the assembling of the unit, I started by pressing on the exhaust bearing and the exhaust impeller onto the shaft. Then the impeller, bearing, and shaft were slipped into the unit. Next the intake bearing was pressed on, (with the seal toward the end cap). Then the intake impeller was pressed on. I was now ready to drill and tap the end plates. I used 4-40 screws and put one in each corner, (see photos). I now had to seal the end caps with a small amount of gasket sealer, (*caution* don't use to much and let the sealer get into the impellers). This completed the unit itself, and all I needed now was to make the exhaust adapter to fit the unit on one side and your engine on the other side, (see photos). Last was the intake plumbing from the unit to the engines intake. This plumbing could vary, just as long as I got from point A (the unit) to point B (the engine) with no air leaks. I made sure to seal each seam or connection with a good sealer. I used Epoxi-Patch from the Dexter Corporation, which was available at your local hobby shops. I wanted to use something not so permanent, because when I used Epoxi-Patch on a connection its put together for ever.

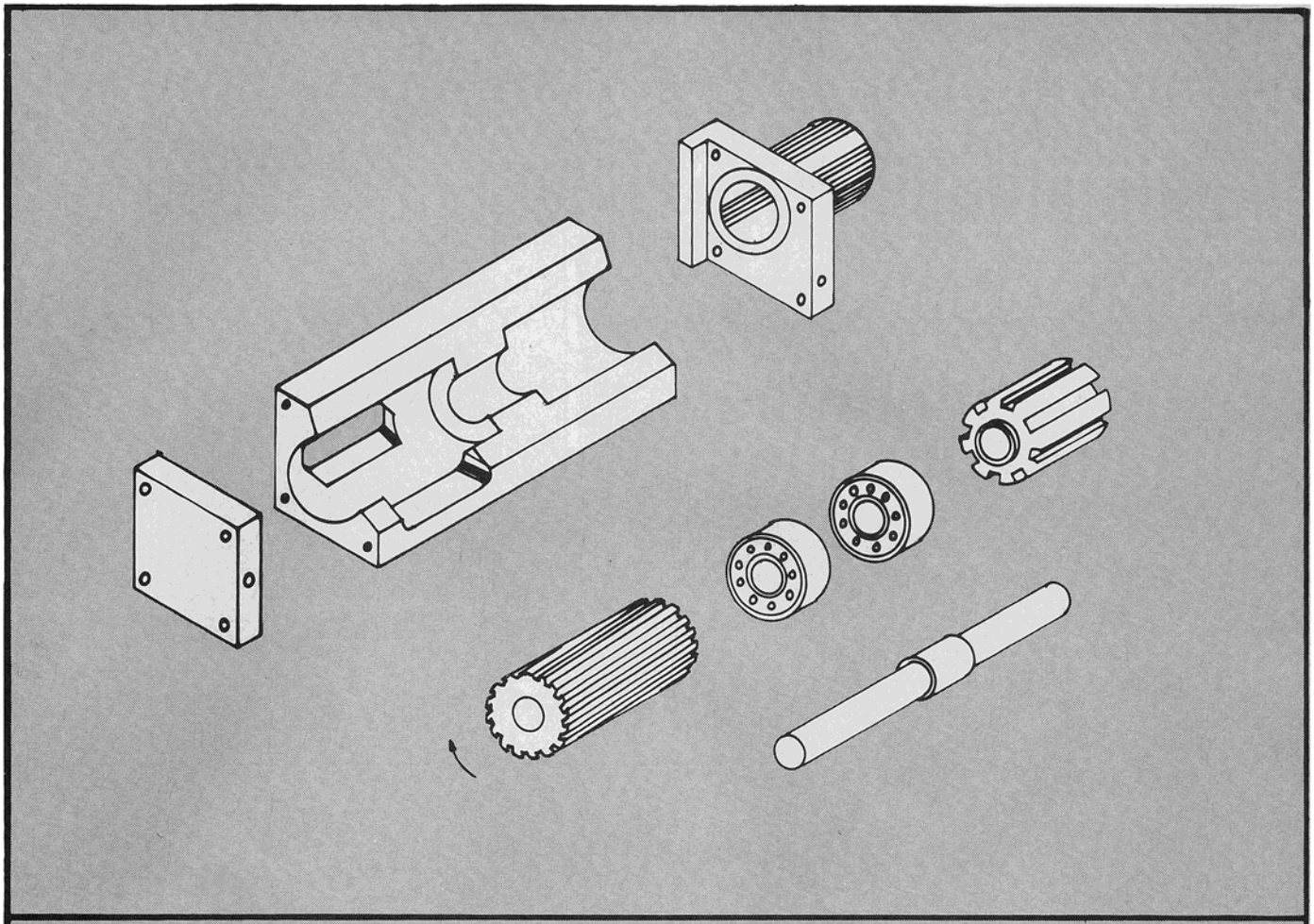
The only changes I needed to make to my engine was to add more head clearance. I had a total of 40 to 80 thousands head clearance when I was through, depending on the engine I was using and how well I built my turbo. As for the carburetor I used the stock or I made one like on the prototype #2, which was more controlable and more responsive to the turbocharger. (One word of caution if you use nitro fuel the head clearance has to be increased much more.)

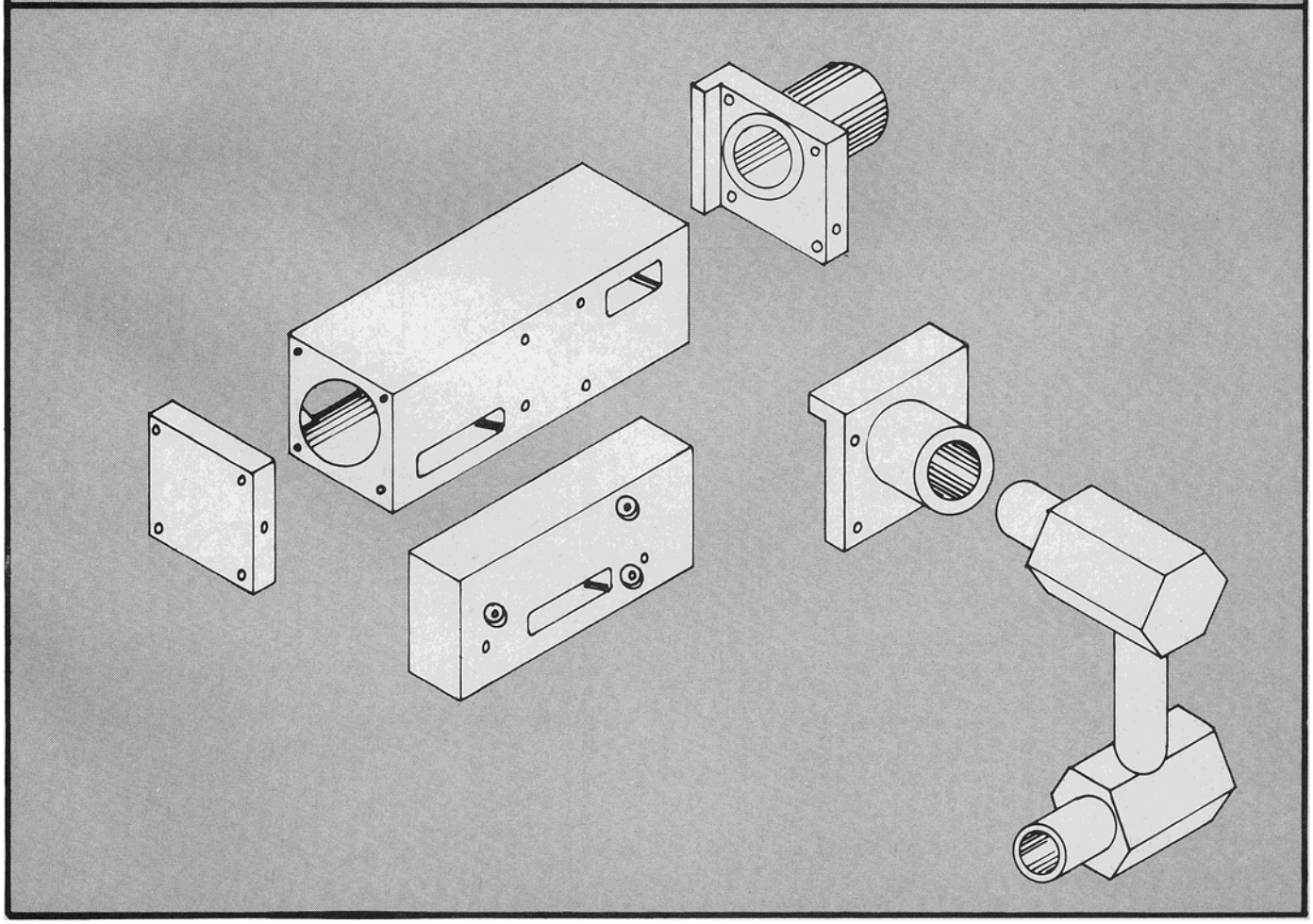
Good luck in building and running your turbocharger. I hope you enjoy it as much as I have.

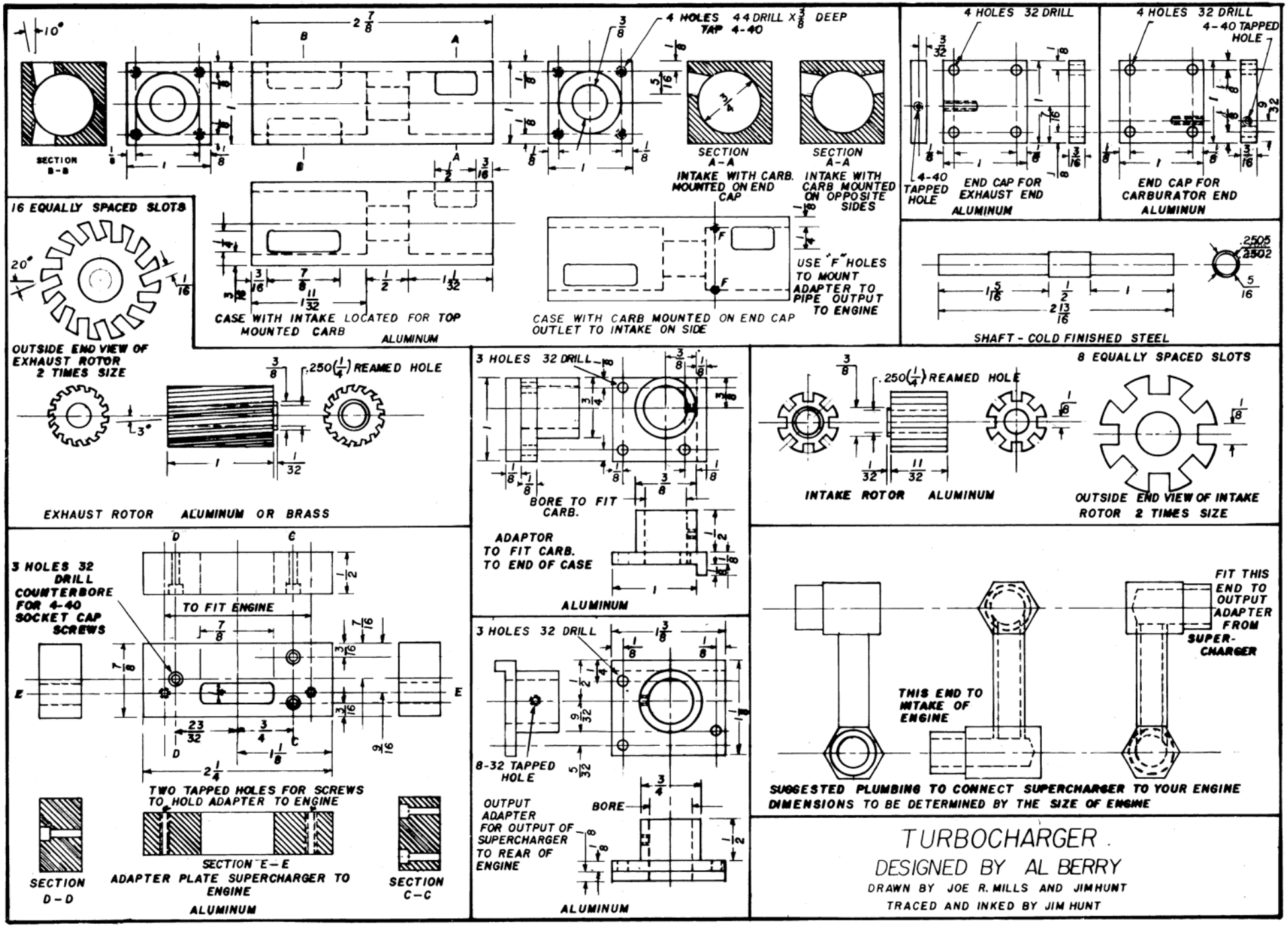




Prototype unit No. 1 is shown disassembled next to the second version, shown mounted on a motor (**above**). An exhaust impeller is being machined on the Taig Micro Lathe (**left**). Proceed with care.






10°
2 7/8
B
A
4 HOLES 44 DRILL X 3/8 DEEP
TAP 4-40
3/8
5/16
1/8
3 1/4
SECTION B-B
SECTION A-A
SECTION A-A
INTAKE WITH CARB. MOUNTED ON END CAP
INTAKE WITH CARB MOUNTED ON OPPOSITE SIDES
4 HOLES 32 DRILL
4-40 TAPPED HOLE
END CAP FOR EXHAUST END
ALUMINUM
4 HOLES 32 DRILL
4-40 TAPPED HOLE
END CAP FOR CARBURATOR END
ALUMINUM
16 EQUALLY SPACED SLOTS
20°
1/16
OUTSIDE END VIEW OF EXHAUST ROTOR 2 TIMES SIZE
3/8
.250(1/4) REAMED HOLE
3°
1
1/32
EXHAUST ROTOR ALUMINUM OR BRASS
3/16
7/8
1/2
1 11/32
1 11/32
CASE WITH INTAKE LOCATED FOR TOP MOUNTED CARB
ALUMINUM
CASE WITH CARB MOUNTED ON END CAP OUTLET TO INTAKE ON SIDE
F
F
USE "F" HOLES TO MOUNT ADAPTER TO PIPE OUTPUT TO ENGINE
.2505
.2502
5/16
1 5/16
1/2
1
2 13/16
SHAFT - COLD FINISHED STEEL
3 HOLES 32 DRILL
BORE TO FIT CARB.
ADAPTOR TO FIT CARB. TO END OF CASE
ALUMINUM
8 EQUALLY SPACED SLOTS
3/8
.250(1/4) REAMED HOLE
1/8
1/32
11/32
INTAKE ROTOR ALUMINUM
OUTSIDE END VIEW OF INTAKE ROTOR 2 TIMES SIZE
3 HOLES 32 DRILL COUNTERBORE FOR 4-40 SOCKET CAP SCREWS
D
C
1/2
TO FIT ENGINE
7/8
7/16
3/16
7/8
E
E
23/32
3/4
C
D
1 1/8
9/16
2 1/4
TWO TAPPED HOLES FOR SCREWS TO HOLD ADAPTER TO ENGINE
SECTION D-D
SECTION E-E
ADAPTER PLATE SUPERCHARGER TO ENGINE
SECTION C-C
ALUMINUM
3 HOLES 32 DRILL
1 3/8
1/8
1/8
1 1/2
1/4
9/32
8-32 TAPPED HOLE
5/32
OUTPUT ADAPTER FOR OUTPUT OF SUPERCHARGER TO REAR OF ENGINE
BORE
3/4
1/8
1/2
ALUMINUM
FIT THIS END TO OUTPUT ADAPTER FROM SUPER-CHARGER
THIS END TO INTAKE OF ENGINE
SUGGESTED PLUMBING TO CONNECT SUPERCHARGER TO YOUR ENGINE
DIMENSIONS TO BE DETERMINED BY THE SIZE OF ENGINE
TURBOCHARGER
DESIGNED BY AL BERRY
DRAWN BY JOE R. MILLS AND JIM HUNT
TRACED AND INKED BY JIM HUNT

1980 Gold Cup

by Roger J. Newton

An added dimension of R/C boat racing is realized when you run a "Thunderboat".

August 24, 1980 wasn't just another lazy Sunday afternoon. The district 8 R/C Unlimited Contest Board was about to put on the largest model boat race for scale unlimiteds. There were 48 boats present along the banks of the Brown Bowl in Kint, Washington. Referee Mike Tutino called the drivers meeting to order and after a quick speech on the do's and don'ts, the first of 32 elimination heats got underway. The course sprawled out over 1187½ feet and four laps were required to finish a heat. The event was NAMBA sanctioned and many planned an assault on the 1:26 heat record.

To win this total point event, a driver had four elimination heats and a final to look forward to. Top drivers like Ed Fisher, Ron Erickson, Jack Haugen, Butch Melewski, Roger Newton and Les Ruggles pounded their way through the eliminations. Big name boats like the Budweiser, Circus Circus, Squire Shop, Atlas Van Lines and Pay'n Pak were all present in miniature. Oldies like the Miss Exide, Bardahl, Notre Dame, Miss U.S. and $ Bill were all ready to challenge the pickle forks for this 7th annual event.

The points began to pile up as the day wore on. The top boats and drivers began to stand out over the also rans. Les Ruggles and the Notre Dame, Jack Haugen with the other Notre Dame, along with Jolene Fridell, fastest lady on the circuit with the Miss Esquire Products had out performed over 40 other teams. Jolene was the top lady Unlimited driver in the country that day. John Earnest was doing well as was Gary Duback with his giant white Thriftway, Too. Then it happened, Ed Fisher drove the Coral Reef to a new World record with a heat time of 1:22.98. If anyone could have done it, it was Mr. Fisher. Other teams shook their heads and said, "We can't go that fast."

On the beach, ballots were passed out for scale judging. Two classifications were offered, one for the best appearing boat on the bunk and one for the best appearing boat in the water. Ron Wolfe won the award for the best looking boat on the bunk with the Wayfarers Club Lady. Rocky Fridell won the best looking boat in the water award with his Squire Shop.

The spray had settled and the elimination heats were over. Celebrities like Ron Jones and Dave Knowlen wandered through the pits talking about boats large and small. Spectators were everywhere and had to be asked to clear the pit area several times. Judges were frantically adding points and arranging the two consolation heats and the final.

Les Ruggles had won his 2nd Gold Cup with a perfect score of 2000 points. His Karelson Notre Dame performed flawlessly all day. Jack Haugen and his pickle fork Notre Dame jumped the gun in the final but managed to work his way back to a second place finish.

It was a fantastic Gold Cup to say the least. Nine solid hours of boat racing and 48 hydros made this one the grand-daddy of them all.

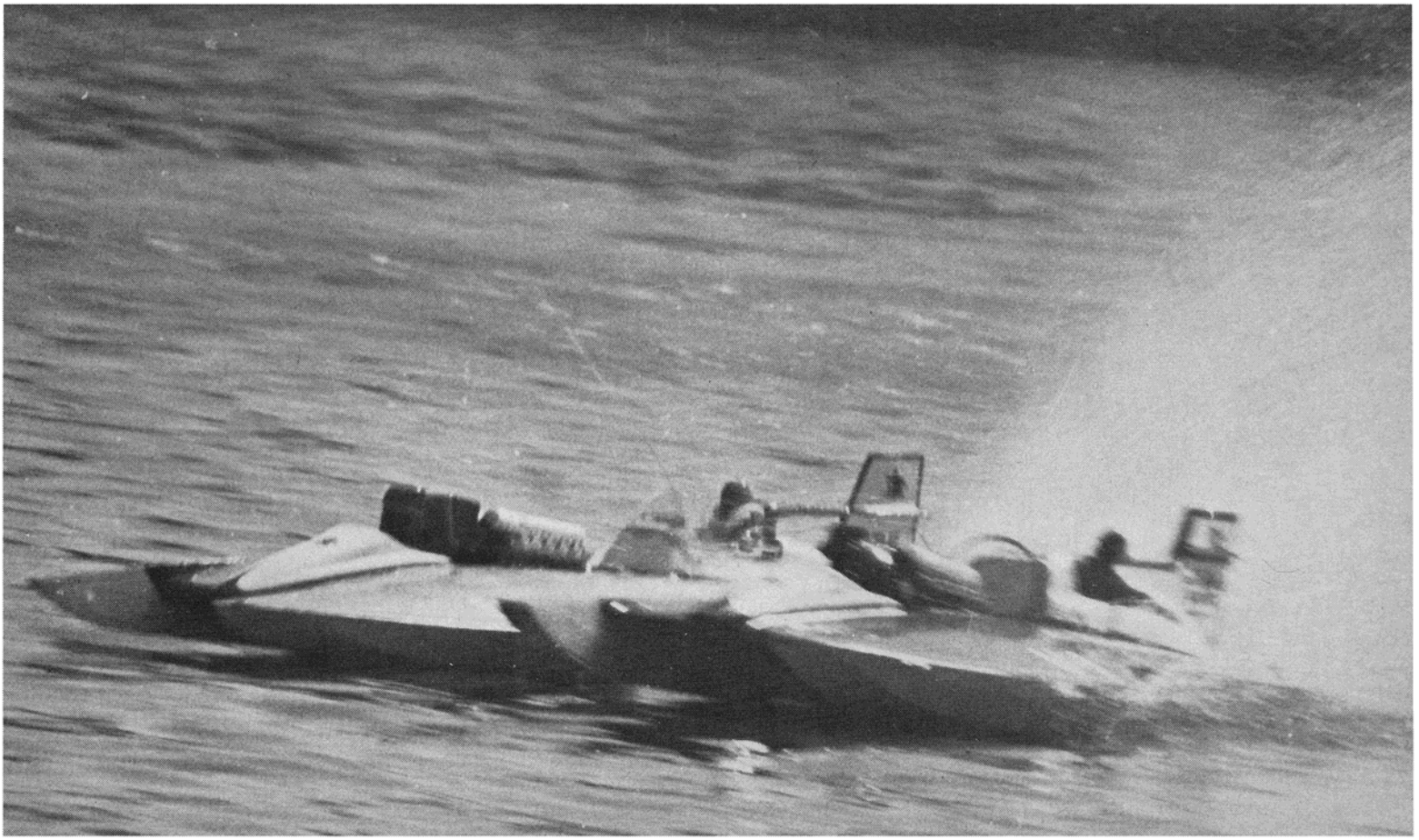
1980 Gold Cup results

2nd Consolation
1. Miss Bardahl—Butch Melewski
2. Tahoe Miss—Doug Tumlinson
3. $ Bill—Jim Johnson
4. Miss Excide—Rick Barnes

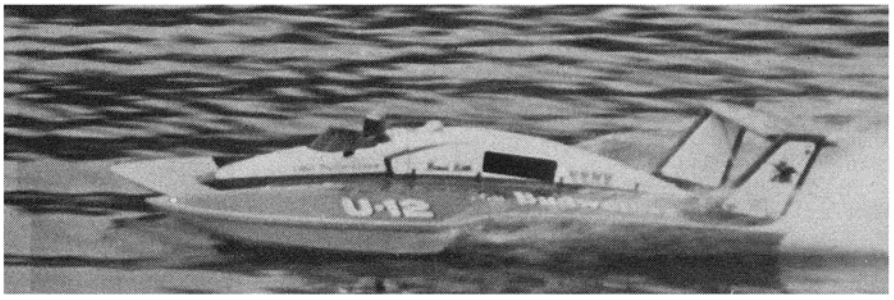
1st Consolation
1. Miss Circus Circus—Gale Whitestine
2. Red Man—Bill Osborne
3. Miss Bardahl—Dallas Cook

Final
1. Notre Dame—Les Ruggles
2. Notre Dame—Jack Haugen
3. Miss Esquire Products—Jolene Fridell
4. Country Boy—John Earnest
5. Thriftway Too—Gary Duback
6. Bootheads—Doug Tumlinson

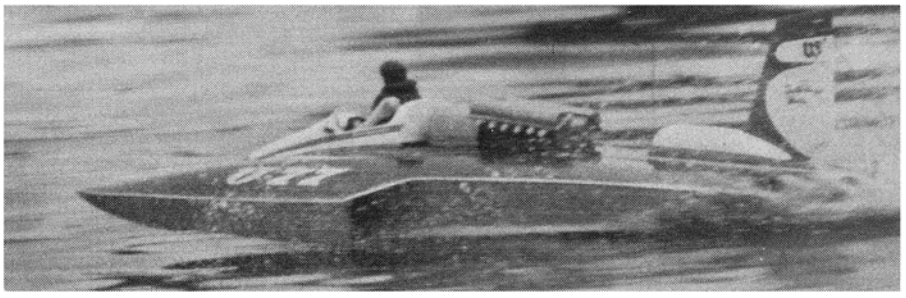
PHOTOGRAPHY: ROGER J. NEWTON



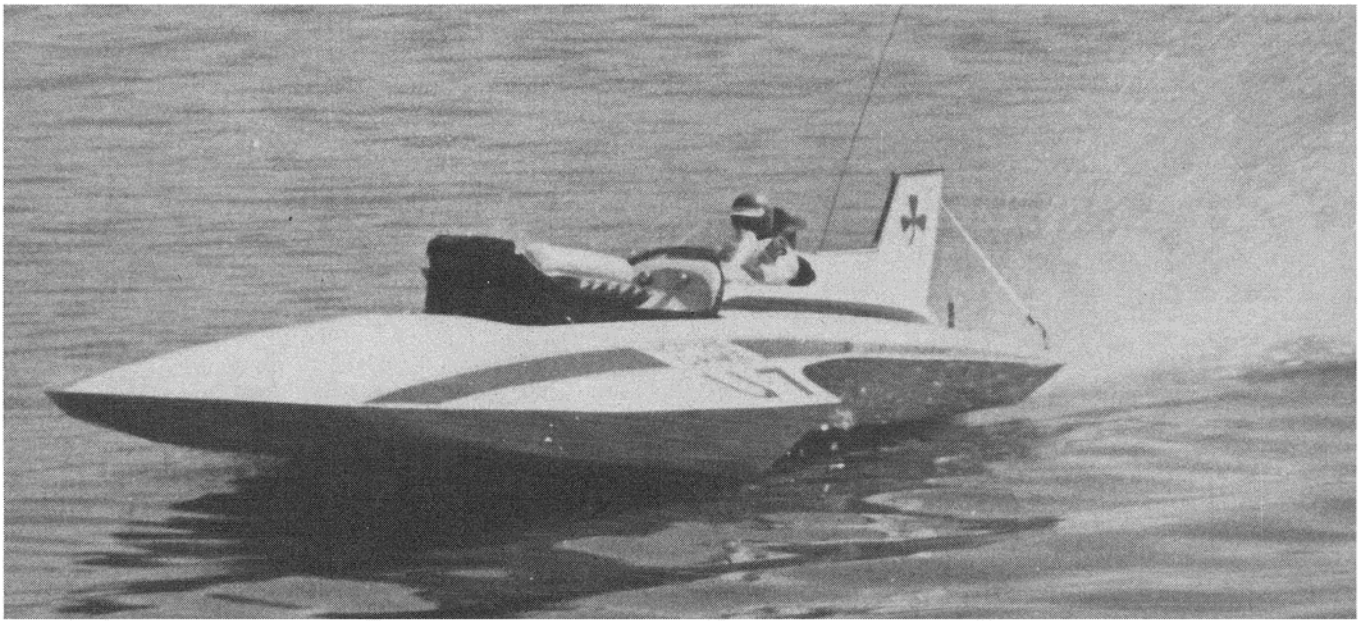
1980 Gold Cup



The drivers and pit persons show the concentration that is needed to run these "Thunderboats" (**above**). Left to right are Jessie Cray, Roger Newton, Rocky Fridell and Gale Whitestine with an assortment of unlimiteds (**above left**).



This Miss Budweiser, belonging to Roger Newton, had the new boat "blues" and failed to place (**above**). A consistent runner throughout the day was John Earnest's Country Boy (**right**). John finished fourth. 1980 Gold Cup winner was this Notre Dame, driven by Les Ruggles (**below**).



letter rip—

IMPBA Internats results

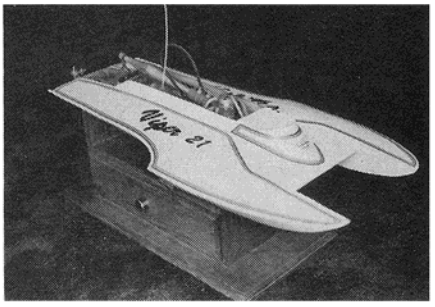
In the January 1981 issue of FLYING MODELS we presented Ed German's report on the 1980 IMPBA Internats. Missing from Ed's coverage was a list of the results. Ed did include them with his report but we didn't present them with the article. We are listing them here along with our congratulations to the winners and an apology for the omission.

Straightaway	Oval	Multi
AB Mono		
1. Dave Preusse	John Shannon	John Shannon
2. John Shannon	Dave Preusse	Gary McGee
3. Tony Federlein	Tony Federlein	Tony Irminge
National Champion—John Shannon		
AB Hydro		
1. Ed Hughey	Ed Hughey	Gary Preusse
2. Jay McGuire	Jay McGuire	Ed Hughey
3. Cal Lange	John Shannon	John Shannon
National Champion—Ed Hughey		
CD Mono		
1. Don Turner	George Grossman	Bud Swenson
2. George Grossman	Don Turner	Richard Jones
3. Dianne McGuffin	Ed German	Dianne McGuffin
National Champion—George Grossman		
CD Hydro		
1. Bob Finley	Ed Hughey	Eric Swenson
2. Fred McBroom	Len Skwiera	Randy Williams
3. Len Swiera	Bob Finley	Len Skwiera
National Champion—Len Skwiera		
E Mono		
1. George Harris	George Harris	George Harris
2. Scott McGuffin	Scott McGuffin	Scott McGuffin
3. Carl Coco	Dave Field	Sid Broughton
National Champion—George Harris		
E Hydro		
1. Roger Moran	Marten Davis	Len Skwiera
2. Gary Preusse	Scott McGuffin	Marten Davis
3. Don Pinckert	Len Skwiera	Leroy Peters
National Champion—Len Skwiera		
F Hydro		
1. Charles Chauvin	Sid Broughton	Roy Cogburn
2. Sid Broughton	Chauvin	Cal Lange
3. Jay McGuire	Jay McGuire	Ed Schlee
National Champion—Charles Chauvin		
Deep Vee		
AB	**CD**	**E**
1. Tony Irminger	Don Turner	Norm Dicks
2. Gil Moll	Norm Dicks	Bob Gettle
3. Gary McGee	Dianne McGuffin	Bill Ryan
Outboards		
1. Bob Finley		
2. Jim Fetters		
3. Dave Preusse		
Scale		
Consolation: George Lammlein		
Championship: 1. Jay McGuire		
2. Lyn Fugate		
3. Sam Riney		
Concourse Judging: Jay McGuire—1969 Pride of Pay-N-Pak		
Excellence of Performance: Ed Hughey—B Hydro		
Presidents Trophy: Len Skwiera		

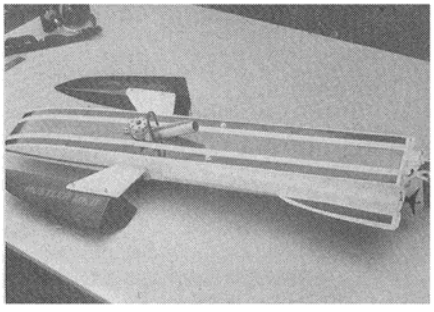
HOBBYPOXY PRODUCTS, *36 Pine St., Rockaway, NJ 07866,* has a number of "tip" sheets available to the modeling public. These information sheets are designed to help the modeler make better use of the Hobbypoxy product line and achieve the proper results in building and finishing. Available at no charge is a booklet entitled, "Hobbypoxy Painting Pointers" and a tip sheet entitled, "Build Boats Strongest With Hobbypoxy Glues and Quick-Prep Polyester Resin." The Painting Pointers booklet is divided into the following sections: The Hobbypoxy System, General Information, The Products, Finishing Techniques and Painting. Each section is then further sub-divided into specific areas of use and tips on Hobbypoxy products. The boat tip sheet discusses the various areas of use in building and finishing for Hobbypoxy products in that field. For more information write to the above address.

RADIO CONTROLLED MODELS, INC., *3631 Kedvale Ave., Chicago, Il 60641,* has available the Electro Mate, a unit that mates the Astro Flight 25 electric motor to the K&B 3.5 Outboard drive unit. The Electro Mate features: all metal construction, a plastic semi-scale Mercury engine cover for realism, construction that does not require any modifications to either the Astro Flight motor or the K&B drive unit and fast interchange of parts. The unit retails for $24.95. For more information write to the above address.

REPLA-TECH INTERNATIONAL, *48500 McKenzie Hwy., Vida, OR 97488,* is now a sales agent for the collection of scale ship drawings prepared by Edward H. Wiswesser. Mr. Wiswesser has been preparing these drawings for a period of 35 years. These drawings are generally in either 1/32", 1/16" or 1/8" = 1' scales or as otherwise noted in the catalog. They are blue line or black line prints, which are shipped rolled. All necessary arrangement views are shown, plus cross-sections and ship lines. Catalog #14, Ship Scale Drawings is available from Repla-Tech. For more information write to the above address.

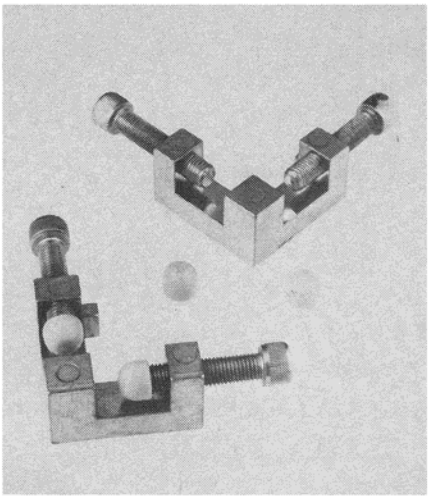


FUTURAGLASS DESIGN, *One Cannon Dr., Nashua, NH 03060,* introduces the Viper 21 scale hydro, designed by Frank DeSimone. Intended for 3.5cc class racing, this boat features a 301/2" length and a 16" beam. Included in the kit is a joined deck and hull, urethane foam filled sponsons and a gel coat finish. The Viper is priced at $89.95, and a hardware kit is available at $53.95. For more information write to the above address.

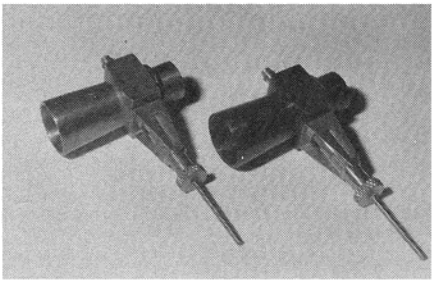


MINI MARINE RACING EQUIPMENT, *542 North Yale, Villa Park, IL 60181,* introduce new sponson kits for their 3.5cc, 7.5cc and 10cc Hustler MK II hydro design. The sponson kits are complete with hardware and instructions, and are available factory direct only. The 3.5cc kit is priced at $20.00, the 7.5cc kit sells for $25.00 and the 10cc kit sells for $30.00. Also featured in the sponson kits are band sawn parts and spruce stringers. For more information write to the above address.

RADIO CONTROLLED MODELS, INC., *3631 Kedvale Ave., Chicago, IL 60641,* is producing the O-Bee-30 Sport Trainer stand off scale boat. An ARF (almost-ready-to-float), the O-Bee-30 features: molded and trimmed plastic parts, only five structural parts, one evening assembly, proven Tri-Hull design, step-by-step photo instructions, molded radio mounting box, molded fuel tank mount and a flotation chamber for a virtually unsinkable boat. The O-Bee-30 is designed for use with any two channel radio system and a .15-.21 outboard engine. For more information write to the above address.

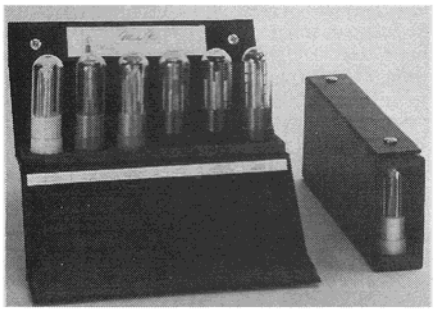


PANAVISE PRODUCTS, INC., *14024 Sylvan St., Van Nuys, CA 91401,* introduces their new Dual 90° Corner Clamps. Made of sturdy, lightweight, cast aluminum, these clamps have a myriad of uses and can be combined to handle a variety of hobby clamping jobs. Featuring a full ¾" capacity, the Dual 90° Corner Clamps assure an accurate 90° angle every time, whether the pieces to be clamped are cut at 45° or 90°. For more information write to the address above.



R/C BOATING PRODUCTS, *1623 Missouri Ave., Chickasha, OK 73018,* has released three new venturis designed to improve the already outstanding performance of the K&B engines. They come in three different models: 3.5 inboard, 3.5 outboard and the 7.5 inboard. This new venturi design features an aluminum body that is anodized and comes in three different colors: red, blue and black. The spray bar has a special Twin Hole design that gives greater efficiency and more power for the stock engine as well as the fully race-prepared engines. It has a bore of 9.5mm and will handle any load with or without pressure. These venturis have been run and tested for three years. They sell for $24.95 postage paid anywhere in the U.S.A.

For more information write to the address above.



MOODY TOOLS, INC., *42-60 Crompton Ave., East Greenwich, RI 02818,* presents the MMK-6 Master Tool Kit (stock no. 39-0122) from their consumer oriented Moody (R) product line. Moody's six most popular individual tool kits are stored in sturdy, functional, (award-winning) packaging making the MMK-6 ideal for the hobbyist's or technician's work bench *and* field kit. Each of the six kits is complete with its own solid-locking, chuck-type, knurled handle with its Swivltop™ and is packaged in a see-through dome. Contents include: Screwdriver and Awl Kit with .055", .070", .080" & .100" blades and awl, Drill Kit with 3/64", Nos. 53, 50, 47 & 43 Drill Bits, Offset Open End Wrench Kit with 5/64", 3/32", 7/64", 1/8", & 5/32", Tap Kit with 0-80, 1-72, 2-56, 3-48 & 4-40 Taps, Phillips and Allen Kit with No. 0 & No. 1 Phillips Blades and .050", .062" & .078" Allen Wrenches and Socket Wrench Kit with 5/64", 3/32", 7/64", 1/8" & 5/32" Socket Wrenches. The suggested retail price is $60.00. For more information write to the address above.

IMPBA Roostertail

The results of the IMPBA Presidential Election are as follows:

Fred McBroom- 207
Ron Walker - 101
Gene Taylor - 97

My thanks to everyone who voted, and each of you will receive free, a new membership list in the next printing.

The 1981 Internats to be held at Indianapolis are beginning to take shape. They are to be held from August 8th through the 15th. The Indy Model Boat Club has plans to add some events to make the activity prior to actual championship events (Heat racing and Trophy Trials) more interesting. Be sure and see your quarterly reports for further details as they develop, and also watch this space.

IMPBA has again been able to hold their dues to $15.00 per year, which includes quarterly reports to all members. Our insurance registration is $10.00 for the first pond per club and $5.00 for each additional pond.

Our treasury is in good shape currently. Your directors and secretary are to be commended on being able to hold the line on dues cost. As you know, many other organizations do not have this enviable record.

As I write this, I am preparing to go to Naples, Florida, for Transcom Twisters' November 29-30 race. This is an event that I will be attending for the fourth straight year and I am looking forward to it.

During the coming year we will have an article by Bill Le Feber entitled "I Remember When", and I'm also hoping to have some history of IMPBA by Tom Perzentha. Beth of these gentlemen were active back in the Tether Boat days.

We hope that you all had a Merry Christmas and that Santa left those most wanted boating goodies under your tree. We also hope that each and everyone of you had a great New Year.

Fred McBroom

Hisat H.E Plans

Savannach VG

Savannach VG

Savannach TM

Savannach TM

Savannach ADV

Savannach ADV

Savannach Bingo

Savannach Bingo