

R/C Aeronca Champ • Northrop Gamma story

FLYING
MODELS

flying **models**



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R/C Boats
Racing Cars



1981 AMA Nats

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 ψηφιοποίηση τους, τον καθαρισμό τους αλλά και να τα μοιράζομαι μαζί σας αφού τα δημοσιοποιώ στο διαδίκτυο (όσα από αυτά επιτρέπεται λόγω 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.

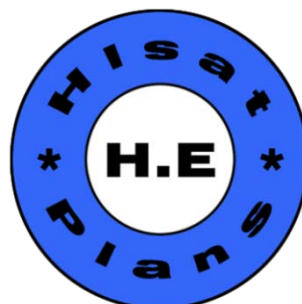
Δεν είναι η μητρική μου γλώσσα γιατί είμαι Έλληνας.

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 Ευθυμίουπουλος.(H.E)

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

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On the cover

Seguin, Texas was the site of the 1981 A.M.A. Nationals. Pictured here is the big winner in Masters class R/C Pattern, Tony Bonetti. Tony Flew his original "Intrepid" design. A J&R Unlimited radio for guidance. Kodachrome by Bob Hunt.



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editorial

'Tis the season

December editorials usually dwell upon good times past and friends both far and near. This year we thought we would do something a little different and commissioned FLYING

MODELS columnist Earl VanGorder to put per to paper and make like The Bard with a holiday poem.

Without further ado, here's Earl's poem and our holiday greeting to our readers . . .

A NIGHT BEFORE CHRISTMAS

Twas the night before Christmas and all through the shop,
Not a crankshaft was turning - not even a prop.
A wing panel was hung from a rafter with care,
The silk was still wet and it needed the air.

The modeler was nestled all snug in his bed,
While visions of fresh nitro danced in his head.
His wife, and his kids, and the dog in the hall
All dreamed of the morning when they'd all have a ball.

Then all of a sudden there arose such a clatter
He sprang from his bed to see what was the matter.
He saw such a scene that his heart darn near stopped.
He cried out in anguish, "I've blown my poor top!"

For what to his wondering eye now displays
But eight R/C planes hited to one small red sleigh.
St. Nick was the driver, and held in his hand,
An R/C transmitter - twas a well known name brand.

And Santa was talking to all those great planes;
And calling them out - each one by their names:
"Now Kadet, now Tri-Squire, now Kaos, now Hellcat,
Now Spitfire, now Cessna, now Piper and Bearcat.
Make sure this poor character will always remember
The year eighty-one in the month of December."

With that he unfastened them all from his sled
And stacked them all round the old modeler's bed.

Then Santa from his sled took a gigantic bag,
Full of presents that made his old knees start to sag.
There were servos and props and engines a-plenty,
Some old vintage kits from the year nineteen twenty.

There were peanut scale kits of every known type.
There were monoplanes, biplanes, and even a Tripe.
There was Monocote, Trim-Film and plenty of dope
And more Hot Stuff than a modeler could hope.

The modeler just stared and feasted his eyes,
It was hard to conceive such a mighty surprise.

And Santa looked down at all those great planes
And patted each one and called it by name:
" 'Bye Kadet, 'bye Tri-Squire, 'nite Kaos and Hellcat,
'Nite Spitfire, 'nite Cessna, 'bye Piper and Bearcat."

"I'm leaving you all with this old modeling friend
And perhaps I have helped to start a new trend."
Then he went to his sled and reached down inside,
And fired up a Dynojet for the rest of his ride.

Oh, doubt not my story - I swear it is true;
If you breathe enough dope - you'll see things, too!
But now I'm exhausted for something to write,
MERRY CHRISTMAS TO ALL, AND TO ALL A GOOD NIGHT

EARL VANGORDER - Christmas '81

flying report



Sid Axelrod

Sid Axelrod, who with Mike Schlesinger formed Top Flite Models in the 1940s, died August 21, 1981, following heart surgery. Top Flite has been a major producer of free flight, control line, and radio control model airplanes since its inception.

Axelrod became involved with the model aviation industry when his interest in building and flying model airplanes led him to become a designer at Comet Models, Chicago, Illinois, in the 1930's. Here he worked with such other well known figures as Jack Besser and Bob Reder, both later of Monogram Models, and Carl Goldberg and Mike Schlesinger with whom he would later form Top Flite. Carl Goldberg would later form his own Goldberg Models company.

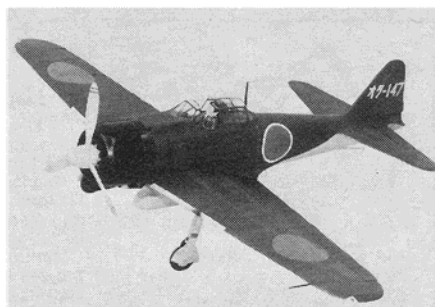
Sid was the inside production man, a genius in model designing, building, and flying; a talent that also extended to his innovation with the machines and methods used by Top Flite in creating their kits and cutting wood. His partner of many years, Mike Schlesinger, passed away three years ago.

Sid was a life long modeler and very active in both AMA and the Model Aeronautics Division of HIAA and its Flying Eight Ballers group. He is survived by his wife Carolyn (Carrie). The Top Flite firm continues without interruption.

Automatic field charger

In the July 1981 FLYING MODELS, Bob Aberle reviewed a special purpose field type fast battery charger. This device was identified to him at the time as being manufactured by Master Fabrication, 14 Gilman Street, Hartford, CT 06114. Since then, it has been learned that this product is actually manufactured by Master Kits, No. 2 Fairway, Hannibal, MO 63401. This information was jointly provided to us by Mr. Frank Massa of Master Fabrication and Mr. Rick Gerling, Jr., of Master Kits.

TOP FLITE MODELS, INC., 1901 N. Narragansett Avenue, Chicago, IL 60639, is adding the A6M2 Zero to its extensive line of Stand-Off Scale R/C planes. Designed by Nats winner Hal Parenti, the Zero has a wingspan of 61



inches, a wing area of 688 square inches and is 49 1/4 inches in length. This new model of the Japanese fighter will accommodate .60 to .90 size engines. The A6M2 kit features all balsa construction, with balsa sheeting for the fuselage, wings and stabilizers. Parts are die-cut with easy-to-read identification numbers. The kit also features a clear plastic canopy and realistic gun port detail. Authentic matte finish Mylar markings are included for added authenticity. A heavy duty ABS cowl is part of the Zero kit, along with full-size plans and a construction book with check-off steps. Top Flite has included scale documentation with the kit in the form of an 8 1/2" x 11" scale five-view and aircraft history. For more information write to the above address.

TOP FLITE MODELS, INC., 1901 N. Narragansett Avenue, Chicago, IL 60639, is out to keep the Giant Scale gang happy with a new assortment of 15 and 22 inch diameter props. In addition, these maple props, and other diameter props, are available in a variety of pitches. The line of large maple props includes 15 inch models in 6, 8, 10 and 11 pitch, while the 22 inchers are available in 8, 10 and 11 pitches. Sixteen and 20 inch props are also part of the maple propeller line with the 16 inch props available in 8 and 10 pitch, and the 20 inch airscrews have both 11 and 12 pitch available. For more information write to the above address.

STERLING MODELS, INC., 3620 "G" Street, Philadelphia, PA 19134, produces a set of nylon Thrust Wedges which have a number of modeling uses. The wedges come in 1, 2 and 3 degree angles, with two of each in the set. The wedges were originally designed for use in setting thrust angles in motor mounts, but they can be used for a number of different purposes. Wing incidence can be adjusted in many planes by using the wedges. Almost any setting which must be accurately adjusted to a precise angle can make use of the Sterling Thrust Wedge. For more information write to the above address.

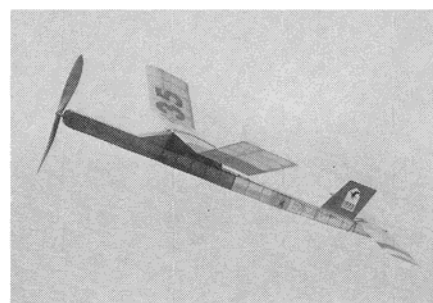
COVERITE, 420 Babylon Road, Horsham, PA 19044, announces a new product called Ironex. For years modelers have asked for something they could use to clean the adhesive from their tack irons. Now all they have to do is wipe Ironex on their tack irons after each use and Ironex will prevent adhesive build up. Ironex can also be used to thin Balsarite, which is a liquid adhesive which can make almost any material an iron on covering. For more information write to the above address.

TATONE PRODUCTS CORPORATION, 1209 Geneva Avenue, San Francisco, CA 94112, introduces a new muffler to its extensive line of products. The new muffler is de-

signed to be used with the K&B 3.5 engine when used in the Cricket helicopter by Gorham Products. The muffler comes complete with pressure fittings and mounting screws. It is available from Gorham Model Products, Tatone and local hobby shops. For more information write to the above address.



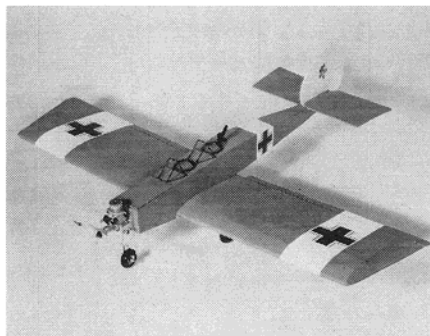
ROUSH MANUFACTURING, P.O. Box 251, Sandyville, OH 44571, has added the Kioritz Digital Tachometer to its line of products. The Tachometer is a spark impulse triggered unit which will measure rpm's to the nearest hundred. This tach reads from 100 to 19900 rpm. The Kioritz Tachometer comes in a glove soft leather case and will fit in a short pocket. The Digital Tachometer will work with a number of two and four cycle ignition engines. All that is necessary to get a reading is to point the tach at the spark plug from a distance of about six inches. For more information write to the above address.



CAMPBELL'S CUSTOM KITS, P.O. Box 5996, Lake Worth, FL 33461, introduces the Souper 30 Free Flight kit. The Souper 30 is designed for the P-30 rubber powered Free Flight class or sport flying. The stick and tissue kit includes pre-cut parts, front end hardware, dethermalizer, rubber, Japanese tissue and full size plans. Also available is the #30 Blow Tube. The Blow Tube will prevent model damage due to rubber breakage. For more information write to the above address.

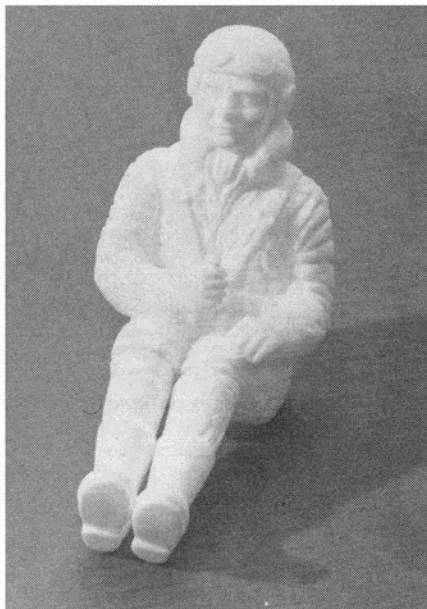


CAMPBELL'S CUSTOM KITS, P.O. Box 5996, Lake Worth, FL 33461, Tiny Piglet hand launch glider is designed for beginners and youngsters. The diminutive glider features a 14 inch wingspan with a dihedral wing. Although it's small, the Tiny Piglet is a high performance glider. The kit contains a $\frac{3}{16}$ inch tapered trailing edge wing and a spruce fuselage. Also included in the kit is a leading edge bumper, finger grip material and full size plans. For more information write to the above address.



MIDWEST PRODUCTS COMPANY, P.O. Box 564, 400 South Indiana Street, Hobart, IN 46342, is adding a new plane to its line of Stick Kits. The Sweet 'n Low Stick is a low wing version of the Sweet Stick. Fuselage sides are one piece lite-ply, with wing construction of the typical Stick type with spruce spars. Tricycle landing gear is provided in the kit with an alternate tail dragger version shown on the plans.

CIRCUS HOBBIES, INC., P.O. Box 5213, Reno, NV 89513, introduces I.M. Products Cockpit Instruments that are now available for all popular modeling scales. The small instrument package contains 1/16th and 1/12th scale instruments and the large instrument package contains 1/6th and 1/8th scale instruments. Both packages have an assortment of position, rate, navigational and engine instrument faces printed in black and white. Also provided are black plastic instrument heads to simulate front or rear panel mounting of the instruments, giving your instrument panel a three-dimensional look without the work. For more information write to the above address.



CIRCUS HOBBIES, INC., P.O. Box 5215, Reno, NV 89513, announces the I.M. Products line of Pilots. These light-weight pilots are highly detailed full-body figures, dressed in WW II flight gear. The lower legs are separate pieces to ease installation. These plastic pilots can be painted with most model paints. The medium size pilot is 1/12th scale and the large pilot is 1/8th scale. For more information write to the above address.

CIRCUS HOBBIES, INC., P.O. Box 5213, Reno, NV 89513, announces the I.M. Products Frequency Flags. These flags are available for all 72 mhz frequencies and attach to the transmitter antenna with a nylon snap ring. For more information write to the above address.

CIRCUS HOBBIES, INC., P.O. Box 5213, Reno, NV 89513, announces the I.M. Products line of wheels. These wheels are made from high quality neoprene and are said to be truly round. They are available in 2", 2 $\frac{1}{8}$ ", 2 $\frac{1}{4}$ " and 2 $\frac{1}{2}$ " diameters and will fit piano wire axles as well as I.M. Products' axles. For more information write to the above address.

TRINDEN MANUFACTURING LTD., P.O. Box 544 Canada Avenue, Huron Park, Ontario, Canada N0M 1Y0, manufactures the popular Quadra 35 cc ignition engine which is a popular power plant for Quarter Scale planes. In addition to its use in the hobby field, TML also makes Quadra engines for a wide variety of home, sports and industrial applications. For more information write to the above address.

DYNATHRUST PROPS, INC., 2541 N.E. 11th Court, Pompano Beach, FL 33062. If you fly jumbo scale, Dynathrust has a line of propellers for you. Dynathrust props come in 15", 18" and 20" diameters. The 15" prop is available in 6" pitch, the 18" prop comes in 6" and 8" pitch and the 20" prop is available in 8" and 10" pitch. Dynathrust props are designed with 100 per cent accurate pitch and airfoil. Prices range from \$7 to \$14. For more information write to the above address.

OHIO SUPERSTAR PRODUCTS, INC., 5630 Cherokee Drive, North Canton, OH 44720, has released the Two Easy, an everyday aerobatic twin engine model. The Two Easy is designed for .35 engines and a four channel radio. Wingspan is 64 inches, and flying weight is 8 pounds. The fuselage and nacelles use box construction, while the wing features foam cores. The Two Easy is designed to be used with fixed landing gear. For more information write to the above address.

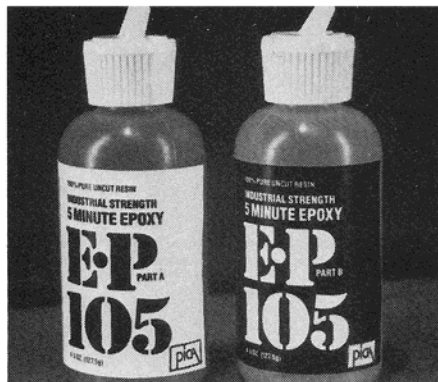
FOURMOST PRODUCTS, 4040 24th Avenue, Forest Grove, OR 97116, has released the Miter Master. This unique tool will enable modelers to make perfect joints in wood by accurately sanding pre-set angles. The unit consists of a solid alder base mounted on nonskid pads. A slider block, also of alder, carries sandpaper of two different grits. The unique guide parts are molded from filled nylon, attached to the base with wood screws, and are friction adjustable. The squaring fence allows for precise 90 degree angles and retracts below the surface. Any angle can be set with the triangular guide, and by using the adjacent side, the complement of that angle will be formed, making the Miter Master invaluable in truss construction. The new

cianoacrylate adhesives require accurately fitted joints to achieve full strength and the Miter Master will enable the modeler to make such joints easily. For more information write to the above address.

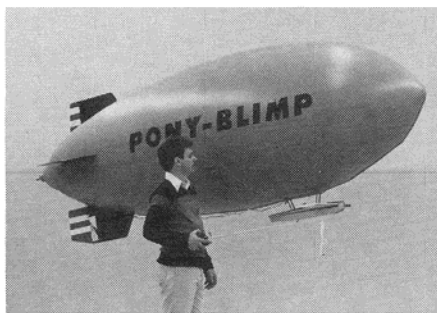
PICA ENTERPRISES, INC., 2657 N.E. 188th Street, Miami, FL 33180, has released the new Rapier R/C sport plane. The Rapier features a 57 $\frac{1}{2}$ inch semi-symmetrical airfoil wing with an area of 752 square inches. With a .40 size engine the Rapier exhibits gentle flying traits while a .60 will turn the Rapier into a ship with distinct pattern capabilities. The kit includes machined and die cut parts of balsa, ply and hardwood. The main landing gear is made from dural, while the nose gear is of coiled wire. Hardware is included. For more information write to the above address.

RHOM PRODUCTS MFG., CORP., 924 65th St., Brooklyn, NY 11219, announces a significant improvement to their 90 degree rotational retract gear. Rohm is widely known for their ROM-AIR brand of pneumatically operated retractable landing gear systems. The 90 degree mains are particularly suitable for scale subjects such as the Corsair, Hellcat and Warhawk, and have been on the market for quite a while. The improvement is specifically in the rotating linkage. The ball and socket joints have been redesigned and are now custom made by Rhom. They feature a heavy duty ball and a socket that is positively retained by a metal sleeve. This will greatly improve the unit's reliability and life expectancy. For more information write to the above address.

CAMPBELL'S CUSTOM KITS, P.O. Box 5996, Lake Worth, FL 33461, announces the availability of the Thermal Piglet hand launch glider kit. The Thermal Piglet is an 18 inch span glider which features dihedral. The kit contains high quality balsa and spruce. The wing is $\frac{3}{16}$ inch tapered balsa and the fuselage is made of pre-cut spruce. Also included in the kit is a swinging weight dethermalizer, leading edge bumper and full size plans. For more information write to the above address.



PICA ENTERPRISES, INC., 2657 N.E. 188th Street, Miami, FL 33180, introduces E/P 105 five minute epoxy. This is the 5 minute epoxy with a difference, it's sandable. Compatible with any resin coating, E/P 105 comes in a new flip top container. For more information write to the above address.



PECK-POLYMERS, P.O. Box 2498, La Mesa, CA 92041, moves into the field of lighter than air ships with the Pony Blimp. The Pony Blimp will lift 28 ounces and was designed to be flown indoors with two small electric motors, such as the VL Hytork or an Astro 02. The 11 foot treated vinyl helium envelope is completely fabricated and only the fins and gondola need to be constructed. The kit is very complete, with detailed, easily understood plans and photos. Contest grade balsa and plywood parts are printed or die-cut for easy construction. Included is hardware for controls and component installation. The Pony Blimp is easily broken down into sub-assemblies for easy packing and shipment. The entire blimp can be packed in a box measuring 1 foot by 2 feet by 2 feet. The overall length of the Pony Blimp is 11 feet, with a diameter of 4 feet and a volume of 80 cubic feet. The blimp is available with Pony Blimp printed on the side, and it is also available with no printing. For those who would like to build their own blimp the helium envelope is available separately. For more information write to the above address.

air mail

Sail fan

Just wanted to drop a line and tell you how much I enjoy your magazine. I am writing in regards to the R/C sailboat story by Tim Meyers in the October issue. I would like to see more of Tim's work on R/C sailboats for beginners. In addition, I also enjoy your articles concerning R/C sailplanes.

GEORGE ARDWIN
Sabina, OH 45169

Wants more

Sure do like the expanded scope of FM. You have made excellent improvements. Hope you intend to expand further to include Racing, Carrier, and other areas of FF and R/C as well.

Really enjoyed Bob Hunt's Stunt column in the August issue. That should be a big help to those just getting started in Stunt.

Don't know whose idea it was to make the changes in Flying Models, but I sure think the magazine is looking better all the time.

LARRY MILES

FM clinic

Crash protection

The radio installation is one of the most important steps in the construction of an R/C plane. Usually, the battery pack and receiver are wrapped in foam rubber to prevent, hopefully, any damage which a crash might cause.

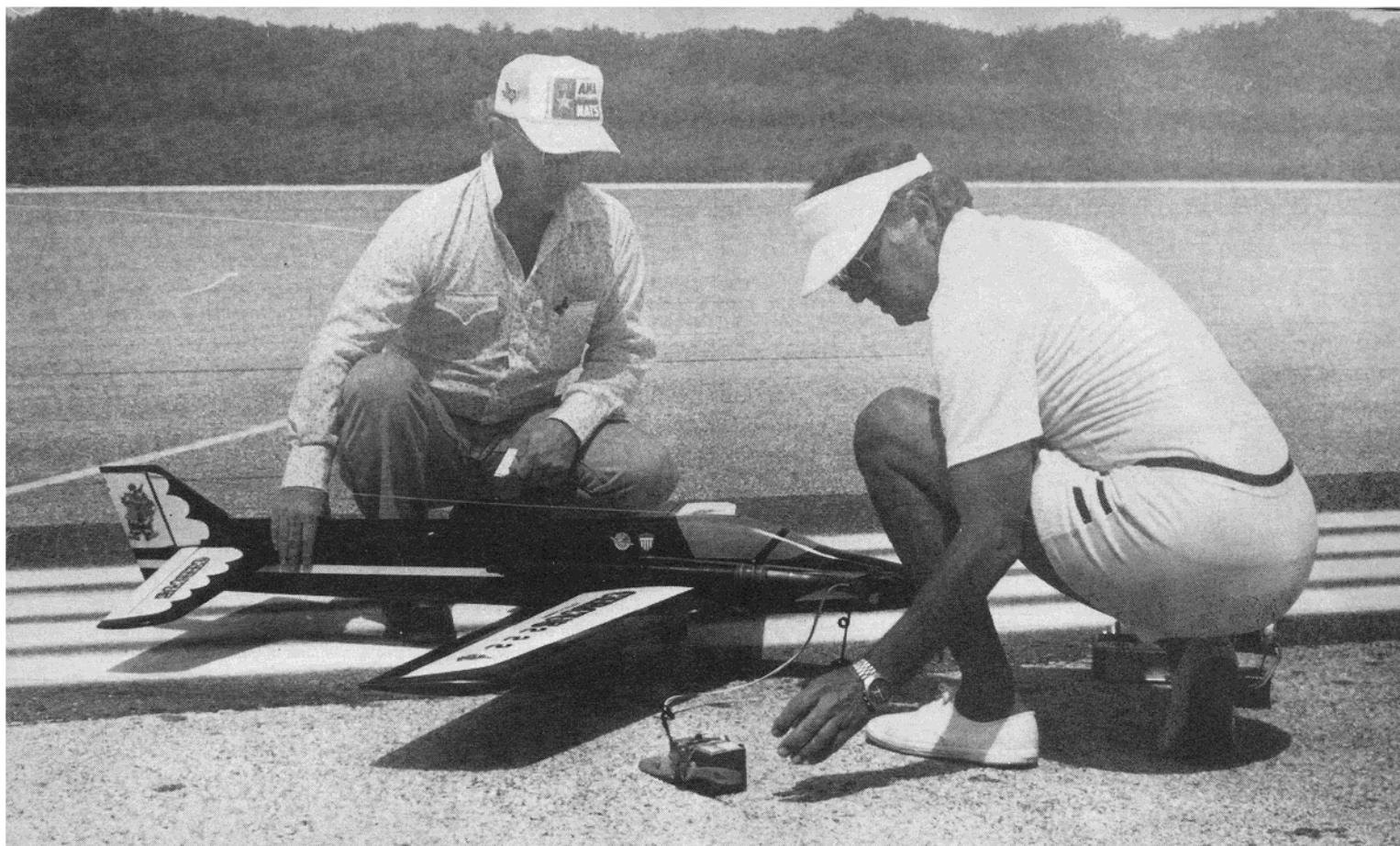
The usual procedure involves wrapping soft foam rubber, cut from sheets up to 1/2 inch thick, around the pack or receiver and wrapping the outside of the bundle with tape to hold the foam in place. There is another way to handle this operation.

Electronic equipment, cameras and many other items are packed in large blocks of soft foam rubber. These blocks make a fine protective barrier for R/C battery packs and receivers.

First, cut a block of foam rubber to fit the size of your plane's radio compartment leaving room for the servo installation. Once you have cut the foam to fit (an X-acto knife works well), measure your battery pack and receiver and sketch their outlines on the foam block you just cut to fit the radio compartment.

Using a model knife, begin to cut out an area of foam rubber just slightly smaller than the outlines which are drawn on the foam block. You will be hollowing the blocks from one end only. You want to end up with a pocket for the receiver and another for the battery pack. By hollowing these pockets from only one end of the foam the pack and receiver will be surrounded on top, bottom, both sides and one end by foam rubber.

If you have done the job properly, the battery pack and receiver will be a light press fit into the foam. You want just enough friction so neither member of the airborne components will slip out of the foam. The block itself should also be a friction fit in the radio compartment. This way, both the battery pack (which should be mounted forward of the receiver in the foam block) and the receiver will be mounted in a shock absorbing foam "overcoat" which will minimize damage in the event of a crash.



PHOTOGRAPHY: BOB HUNT

Master's Pattern champ Tony Bonetti fires up his Webra .61 powered Intrepid for official flight. Uses JR radio. Former champ Dave Brown holds.

1981 AMA Nats

By Bob Hunt

Texas hospitality results in another fine Nats.
Mother Nature even cooperated!

Yes sir we had an old fashioned Texas Nats alright, complete with wind, sun, extreme heat and super tough competition in all of the events. Randolph AFB auxiliary field in Seguin was the main site with most of the radio control events, freeflight and control line sharing the large facility. The R/C Soaring and R/C Helicopter competition was held in New Braunfels, Texas, on a high school field. Dave Elias will have a report on the R/C Soaring events in next month's issue of FLYING MODELS.

Unlike the 1980 Nationals in Ohio, the 1981 affair was blessed with adequate model facilities in the nearby area. Dormitories were also available to the competitors. Housing is one of the main problems with such a large gathering and is a prime concern of the A.M.A. when considering a possible Nats site. Very few sites fit the criteria specified by the A.M.A.

and this is the reason that separate Nationals for the different categories are being seriously considered.

Most of my week at the Nats was taken up with judging the C/L Stunt event. Even so, I did get the afternoons off to check out the happenings in the various categories. I spent several hours each day at the R/C Pattern flight line. R/C Pattern had the largest turnout of contestants with 132 flyers. I was personally glad to see New Jersey's Tony Bonetti pull out a win in Masters class R/C Pattern. Tony has been knocking on the door for several years. His flamboyant style of flying is thrilling to watch. He is the only Master flyer to do the reverse snap roll maneuver and it has become his trademark. Tony is featured on this month's cover with his Intrepid design. The ship is powered by a Webra .61 and features a J&R Unlimited series radio.

Steve Helms placed a close second to Tony, with the Ohio whiz kid, Dave Brown rounding out the top three in R/C aerobatics. Dave, by the way, had a streak of four years as number one in this event.

Without a doubt R/C Scale is the event with the most spectator appeal. The Scale flights were flown over the weekend at the end of the Nats to allow maximum exposure to the locals.

The Freeflight events were well attended with 219 entries in the many classes. Shifting winds caused a few problems for the Freeflight gang when the ships began dethermalizing into the C/L area. A quick call from Bev Wisniewski to the F/F event director about the problem resulted in a move of the F/F launch site and no further problems arose.

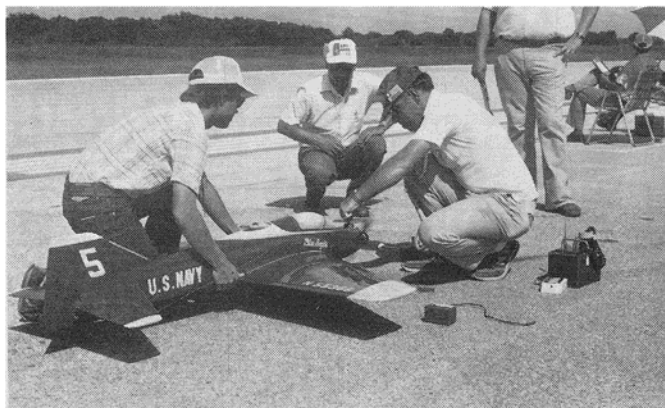
The Control line events had a total entry of 255 contestants. The site for the Control line events was an airplane parking ramp. Aside from an abundance of small stones and gravel covering the area, it was a good site.

C/L Stunt once again was the dominant event in C/L with 59 entrants. Strangely enough, the trend towards greater junior and senior participation that we saw last year has slowed again and very few young flyers were in attendance.

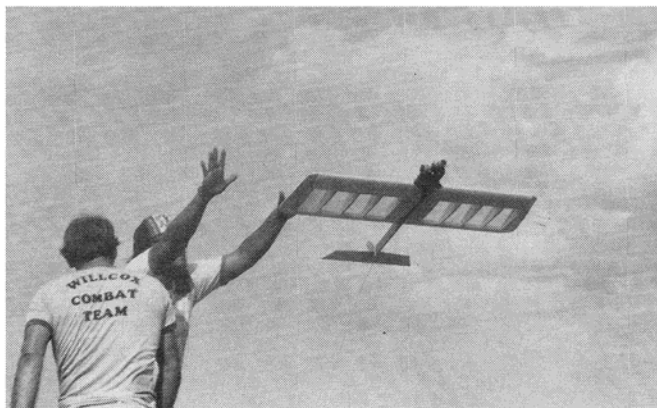
Open Stunt remains as strong as ever, and the format of flying two days of qualifying with two flights on each day and then a two round semi-final to end up with the final five competitors for the Saturday finals is proving to work well. A report of the Stunt and Combat events will follow in next month's issue.

I'm sure that the day is coming when the A.M.A. will decide to split the Nats into smaller contests. Try to make one before they do.

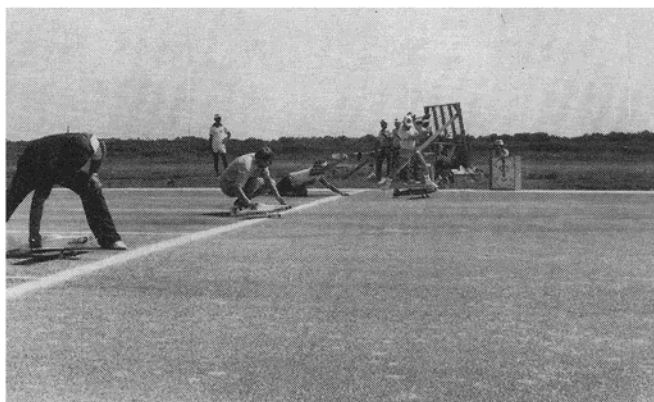
1981 Nats



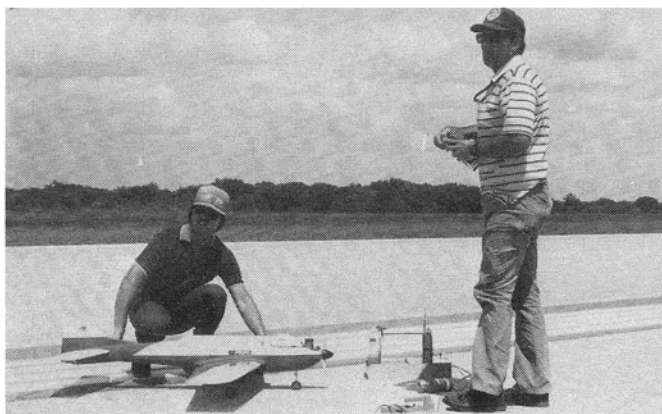
Dean Koger flips prop on his EU-1A pattern ship (**above**). Plane painted in Blue Angel color scheme. Finished 10th in Masters. Veteran George Perryman launches Unlimited Biplane (**below**). He flies most rubber events.



Joe McKinzie launches for George Cleveland in Open Slow Combat (**above**). George won the event. He beat Dick Stubblefield. Quarter Midgets on the line ready for launch (**below**). David Latsha was winner in Open QM.



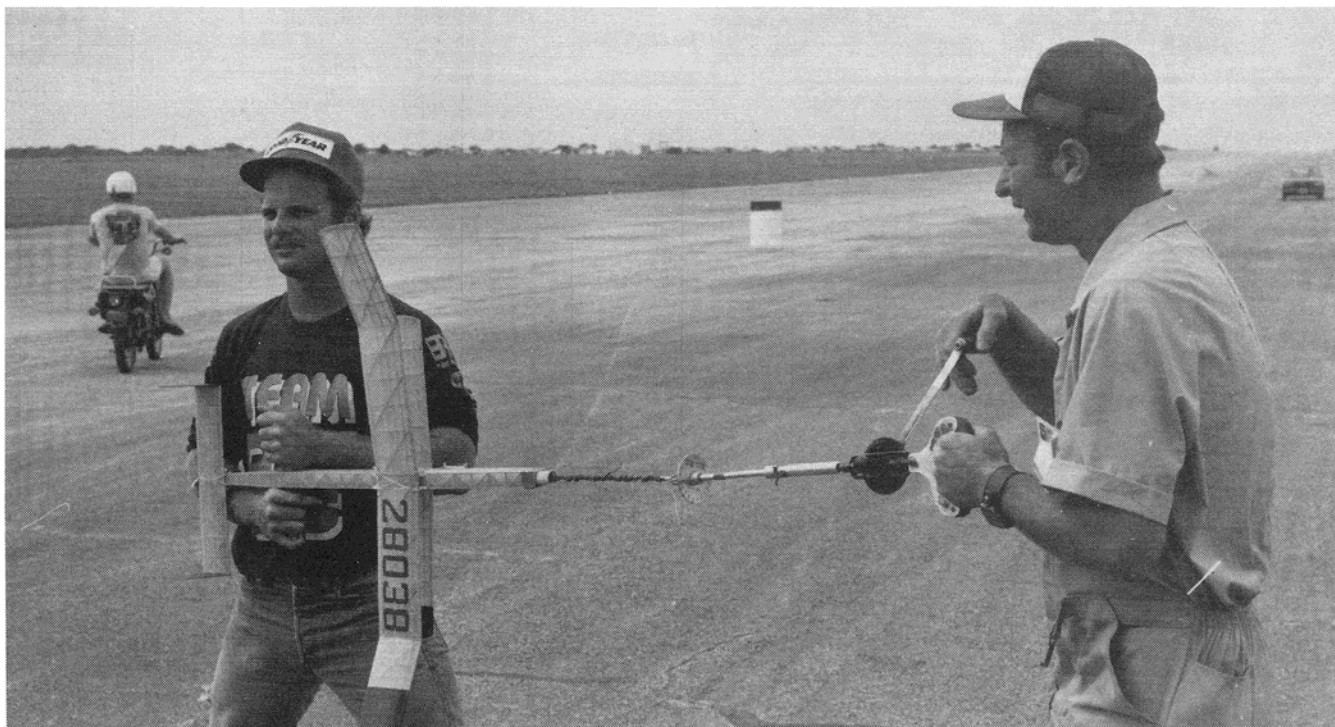
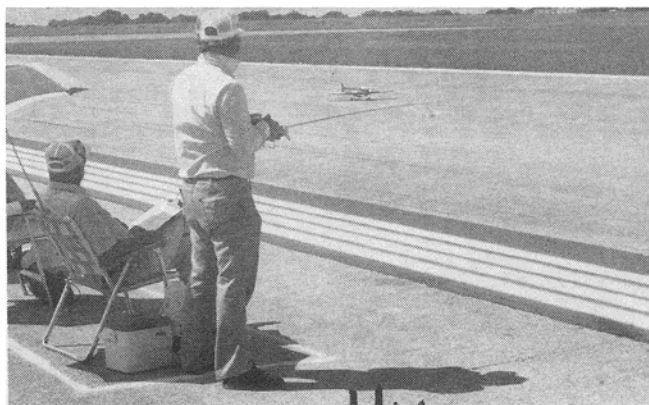
Stunt winners (left). Bill Werwage, kneeling, Open champ, beat Junior champ Jim McLellen, left, and Senior winner Jeff Anderson in Walker Cup flyoff. Werwage is five time Nats champ. Don Weitz finished 5th in Master Pattern (**above**). Don flew Hippo-Tippo with Webra engine and JR Propo radio.



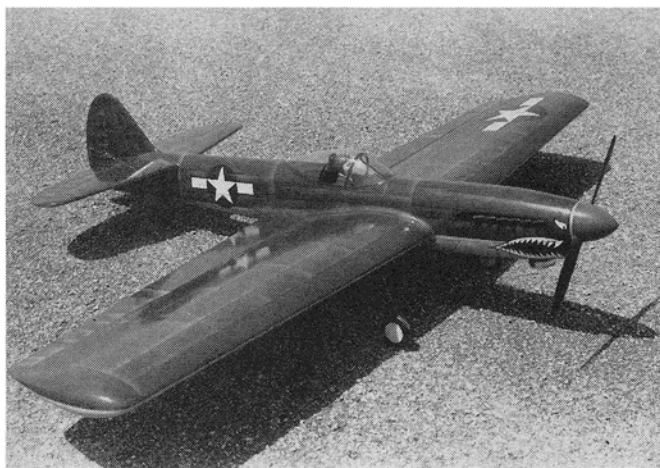
Steve Helms, 2nd Master Pattern, awaits start signal from judges as Don Weitz holds (above). Helms flew Arrow with JR radio. Charlie Chambers flew this Jet Hangar Hobbies Cougar to 8th in Open Expert Sport Scale (below).



Marilee McMillan launches hubby Frank's MB-5 stunter (above). Ship, which is powered by Como engine, will be future FM feature. Former Nats champ Dave Brown takes off for Master Pattern flight (below). Ship is Tiporare.



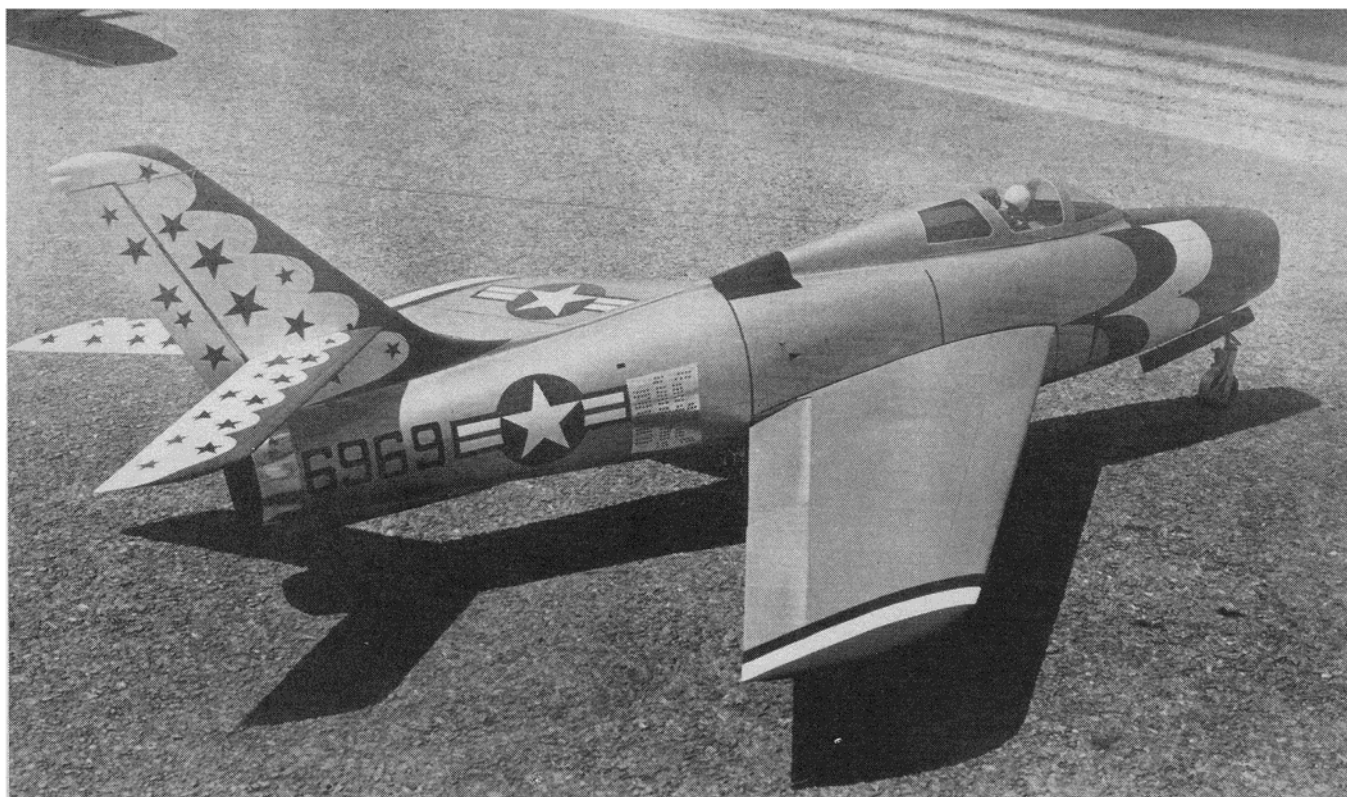
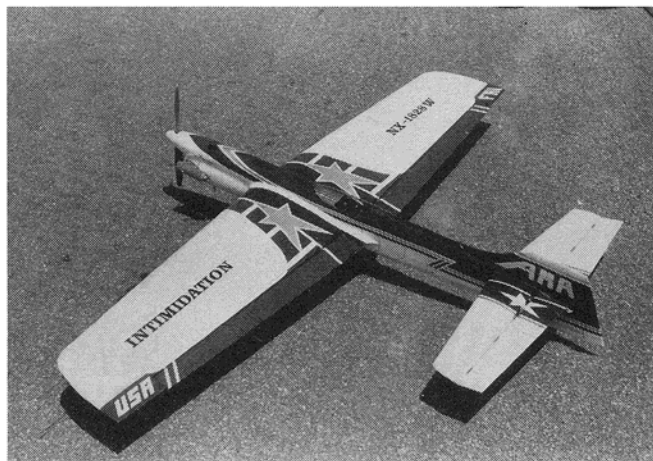
Irv Aker winds his Unlimited Biplane. FF action features Texas hat sucking thermals. Seguin site provided many facilities necessary for Nats.

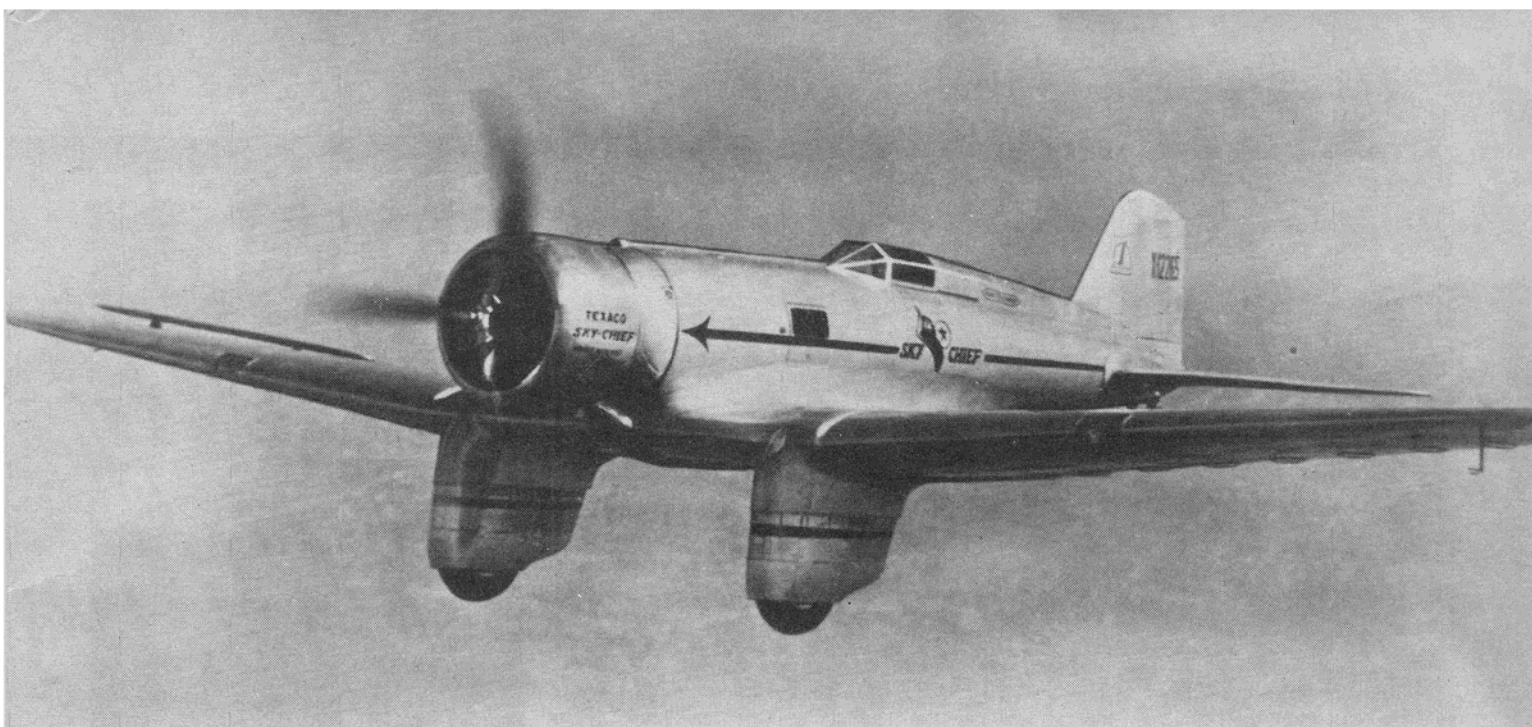


Keith Trostle's P-40 stunter (above) features OS Max .35 engine and weighs in at 35 ounces. The P-40 will be the subject of a future FM construction article. Motor bikes were favorite retrieve vehicle (below). Saves legs.



Flying Models Pattern columnist Tony Frackowiak finished 6th in Master Pattern at the Seguin Nats (above). Ted Francher's Intimidation took 2nd in Open Stunt. Edwin Couch's Standoff F-84F (bottom). Finished 14th.





There aren't many airplanes in the history of aviation which have the glamour and classic beauty of the Northrop Gamma or which have influenced aircraft construction techniques as much as this all metal mail plane and record smasher of the early 'Thirties. It was Gamma descendants which won the Battle of Midway and harassed and destroyed much of the Japanese Imperial Navy during the Second World War. The late Donald W. Douglas once stated that "Every major airplane in the skies today (circa WWII-ed.) has some Jack Northrop in it", referring to Northrop's outstanding Alpha, Beta, Gamma and Delta designs with their advanced construction techniques which set the standard for all metal aircraft design.

It all started in 1895 when John Knudsen Northrop was born in Newark, New Jersey, on November 10. By the time he was nine the family had moved to California. Jack Northrop's first contact with airplanes was during the First World War when he served in the U.S. Army Signal Corps which was then responsible for Army aviation. By 1923 Northrop had become a draftsman with the Douglas Aircraft Company, working on the famous 'Round the World Cruisers. Four years later he joined Allan Lockheed and two others in founding the Lockheed Aircraft Corporation, where he is credited with designing the world famous Lockheed Vega. Although of advanced design, the Vega and all subsequent developments were of wood construction while Northrop felt that metal was the best material for high performance aircraft. With this in mind he left Lockheed in 1927 and formed his own company, the Avion Corporation, to perform research on all metal and flying wing aircraft.

In 1930 Avion was bought by the United Aircraft and Transportation Corporation, an aeronautical conglomerate which included Vought, Sikorski, Pratt & Whitney and Hamilton-Standard, plus Stearman and Boeing, as well as several small airlines. Shortly after the purchase the first company bearing John Northrop's name was formed as a division of United. It was the Northrop Aircraft Corporation in Burbank, California.

Northrop's Gamma a record smashing classic

By Walt Musciano

This record setter was the forerunner of the
Dauntless dive bomber of WW II.

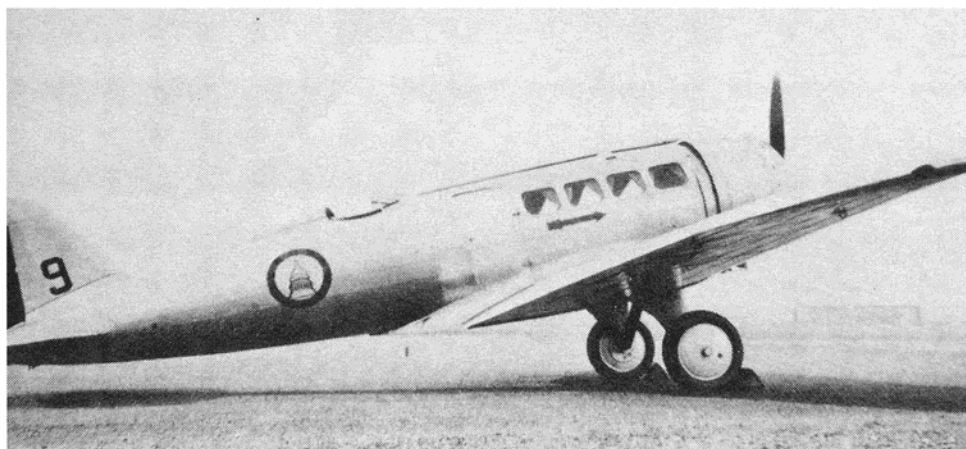
The talented designer continued with the project he had started at Avion, which was a mail or passenger design with the mail or six passengers carried in the fuselage space over the wing while the pilot sat in an open cockpit behind the cargo or passenger compartment. The outstanding features of this all-metal design were the flush-riveted, stressed-skin monocoque fuselage and the multi-cellular flush-riveted wing which became standard construction practice for all high performance and transport aircraft. The Northrop wing dispensed with the traditional one or two spars and Warren or Pratt truss ribs and used multiple dural hi-hat spars and stamped dural ribs. The wing was made in three sections with the center section built integral with the fuselage and deeply faired into it.

Rather than use numbers and letters to designate his planes, Jack Northrop decided to use the Greek alphabet and consequently this first Northrop design was the Alpha. The plane first flew in 1930 with a conventional unfaired landing gear and, after careful consideration, Northrop decided to employ a large streamline enclosure instead of the heavy and complex mechanism of a retractable landing gear. This streamline housing be-

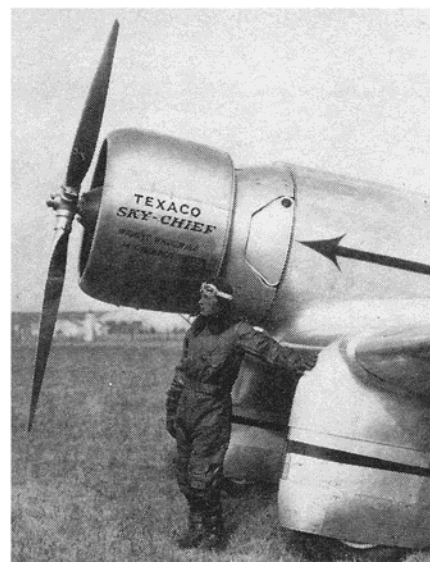
came Northrop's identifying mark for several years. The Alpha was followed by a smaller version, the Beta, in 1931.

With the depression in full swing, United decided to merge Northrop with Stearman Aircraft Co. and moved Northrop production into the Stearman plant in Wichita as an economy measure. Jack Northrop didn't like the idea. He left the company in January 1932 and started another firm in Inglewood, California. He named the new company the Northrop Corporation, and it was established as a wholly owned subsidiary of his former employer, the Douglas Aircraft Company. As a result of this association, Jack Northrop helped in the design of the DC-1, DC-2 and DC-3, which used his wing construction techniques.

It was at this time that Northrop designed the Gamma, which became famous for its classic beauty and high performance and will forever be the design most closely associated with the genius of John K. Northrop. This craft was a development of his earlier Alpha and Beta designs with a longer and thinner fuselage, plus a larger engine. It was intended for high speed freight and mail carrying service. As with the previous designs the pay-



Northrop Alpha (above) was Jack Northrop's first production design. C-19 Military version shown here was used to transport Army brass to Washington. The Texaco Sky-Chief as it originally appeared (**right**). Note window in mail compartment and absence of Texaco insignia on cowl. Hawk's Texaco Sky-Chief just before transcontinental dash (**below**). Only Hawk's Gamma had tailwheel streamlining. He used bench type ailerons.



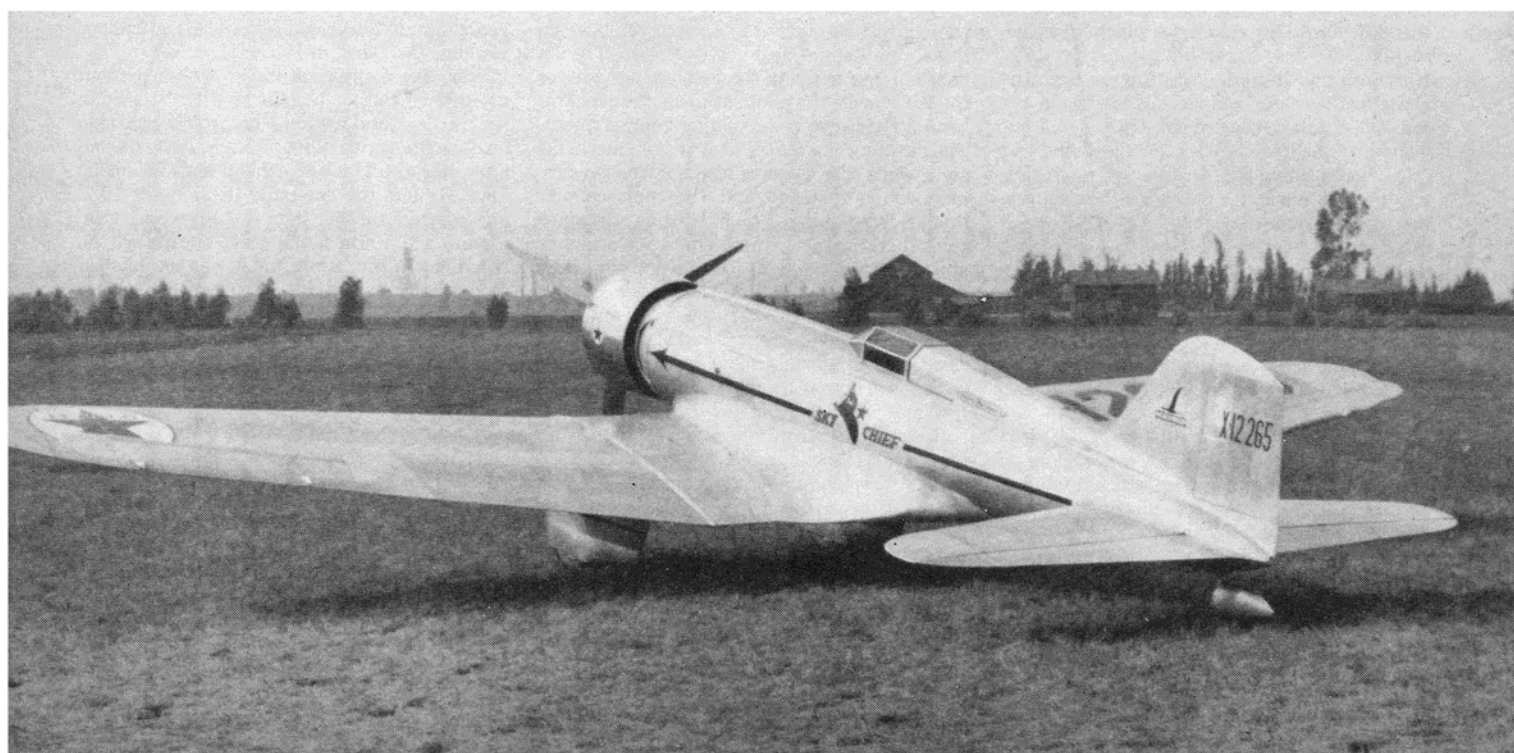
load was carried over the wing with the cockpit aft of the trailing edge. The first Gamma made its appearance in late 1932 and test flights at once proved successful. The prototype was powered by a Wright Whirlwind GR-1510 twin row, fourteen-cylinder, air cooled, radial engine, which developed 785 hp at sea level, 730 hp at 7,000 ft. and 600 hp at 12,000 ft. The Gamma attained a top speed of 248 mph at 7,000 ft, with a cruising speed of 191 mph. The empty weight was 3,600 lbs., while loaded it tipped the scales at 7,500 lbs. Cargo capacity was 1,173 lbs. in a 110 cubic foot fuselage compartment with a fuel capacity of 360 gallons carried in the wing center section. The rate of climb was 1,000 ft/min. and service ceiling was 20,000 ft., with an absolute ceiling of 22,500 ft.

Construction was all metal, following Northrop's system of a minimum of internal

framework. The entire plane was a stressed-skin multi-cellular structure using 24 SRT Al-clad which had just been developed at that time. This was an aluminum clad high strength Duraluminum sheet. With a wing loading of almost 20 lbs./sq. ft., and a high speed for that time, Northrop decided to employ the largest size flaps which could be installed in order to keep the landing speed down to about 40 mph. It was discovered that, with the flap technology of the time, the entire span of the outer wing panels was needed for the flaps. This created the problem of where to locate the ailerons. The ingenious designer solved that by mounting them above the wing! Another innovation was the method of securing the N.A.C.A. engine cowl on later models so it could be easily removed for access to the powerplant. Northrop eventually made the cowl in eight identical sections

with the dividing line between sections running fore and aft from front to rear of the cowl. The sections were held in place on the engine by means of a steel cable wrapped around the entire cowl forcing the sections together.

Realizing the tremendous potential of the new Gamma design, world famous speed record breaker Frank Hawks selected the very first Northrop Gamma as the plane to succeed his "Texaco 13" Travelaire Mystery Ship. Lt. Cmdr. Hawks was the Aeronautical Advisor for the Texas Company and, consequently, Texaco bought the plane for Hawks' use on December 6, 1932. By virtue of his previous speed record smashing, Hawks had been made an Honorary Sioux Indian Chief and was known as the Sky Chief. Although this Northrop Gamma was known as "Texaco II" by the company, it was decided to use the Indian appellation of Sky Chief. This became the



most famous Gamma of all and the name "Texaco Sky Chief" is often used as a synonym for the Northrop Gamma. The craft was christened at Glenn Curtiss Airport, North Beach, New York, by Mrs. Hawks.

Frank M. Hawks was born in Marshalltown, Iowa on March 28, 1897. He joined the Army during the 1914-1918 war and became a flying instructor. By the end of the war Hawks was the Assistant Officer in Charge of Flying at Brooks Field. He took to barnstorming in the U.S. and Mexico during the post-war years and first flew for Texaco in 1925. Three years later he became Manager of Aviation Sales and then Aeronautical Advisor for the Texas Company.

During the years 1929 through 1932 Capt. Frank Hawks established five U.S. transcontinental speed records, plus hundreds of intercity speed records in the U.S. and Europe. He also made the first transcontinental glider flight from San Diego to New York in the spring of 1930, thereby proving the feasibility of the military use of gliders.

Hawks never overworked the plane during his speed dashes, but, rather, tried to demonstrate the practical safe speed for commercial air transportation with optimum consideration for man and machine. One revolutionary modification which Hawks made to his "Texaco Sky Chief" was the addition of the then new automatic pilot in order to test the system during his proposed transcontinental dash in the new Gamma.

On June 2, 1933, Hawks took off from Los Angeles at 5:51 AM, Pacific Standard Time and headed for New York City in an attempt to better his transcontinental speed record of 17 hours and 36 minutes established in June, 1929. Commander Hawks handled the plane himself until the Sky Chief began to cross the Rocky Mountains at which time he turned the controls over to the automatic pilot and occupied himself with the important task of navigating. As the Gamma reached the Allegheny Mountains it began to get dark so he again took over the controls. Frank Hawks landed the Sky Chief at Floyd Bennett Field at 11:19 PM Eastern Standard Time and established a new U.S. Transcontinental Speed Record of 13 hours and 27 minutes. The average speed for the flight was 187 mph.

The following August, Hawks flew from Vancouver, B.C. to Quebec in 17 hours and 10 minutes. During this flight the "Texaco Sky Chief" ran into bad weather for 600 miles and Hawks was forced to fly blind for over three hours.

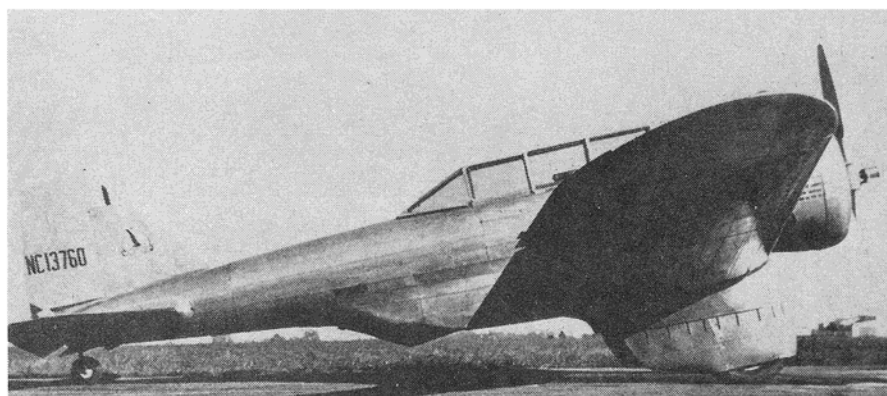
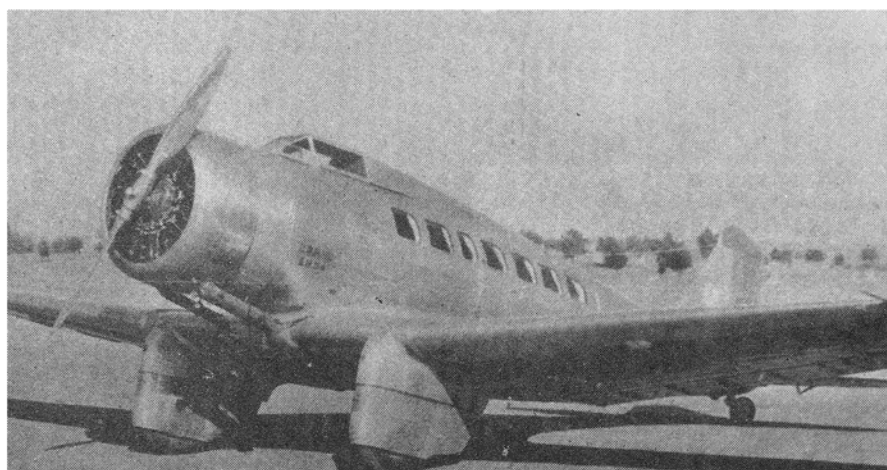
Both flights proved the value of the automatic pilot in preventing pilot fatigue during long flights and inclement weather. The system's success prompted many airlines to adopt it for their long routes. Today, no airliner is without an automatic pilot. That fact contributes significantly to air safety.

The Texaco Sky Chief was sold to Gar Wood in August, 1934. Frank Hawks retired from Texaco during the following year. This famous Northrop Gamma was entered in the 1935 Bendix Transcontinental Air Race, but caught fire in the air and crashed.

Although the beautiful Sky Chief met an untimely end, Commander Hawks remained active as an aviation consultant, test and



TWA Gamma (above) was used as an "over weather" laboratory. This project helped pave the way for safer air travel. Filling yet another role, the Gamma fuselage was enlarged to make the Delta (below). This version was used as a passenger transport. It was also the last in the line. Gamma 2E (bottom) broke ten intercity speed records in 1935. 2E was attack plane version of the original aircraft. Adaptable ship.



demonstration pilot, and continued his record smashing flying with another Northrop Gamma. It may be necessary at this time to explain why Frank Hawks is addressed as both Captain and Commander which are conflicting ranks. This is easily explained because in June 1932 U.S. Army Reserve Captain Frank Hawks swapped his commission with U.S. Navy Reserve Lt. Commander Alford Williams. Therefore, before June 1932 his rank was Captain and after that date he was Commander Hawks.

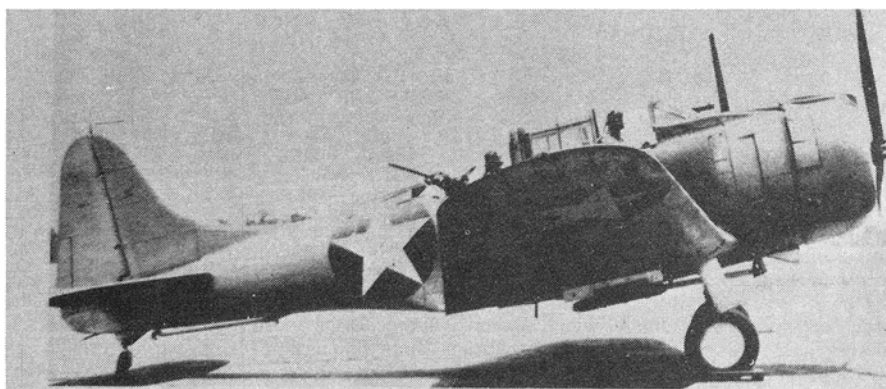
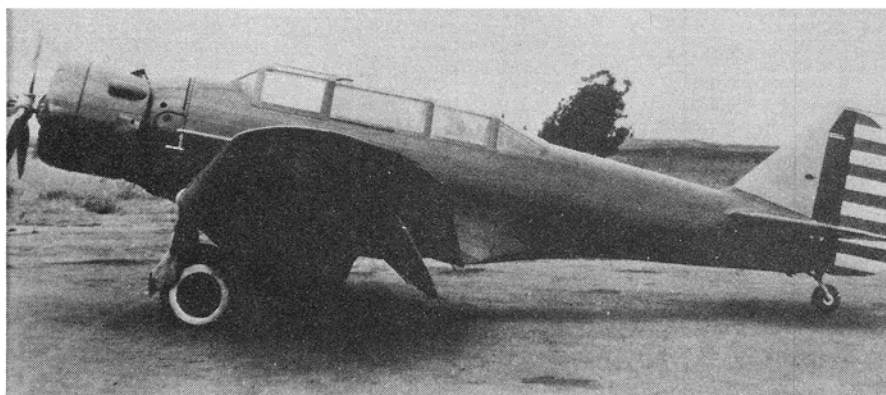
The Northrop Gamma became a popular Air Mail and fast-freight carrier, as well as a research and exploration plane. Famous explorer Lincoln Ellsworth used a two-seater Gamma on his Antarctic expedition. TWA flew the Gamma in their Air Express service, as well as for a flying laboratory in over-

weather, blind flying, and automatic pilot experiments. The commercial version changed little from Hawks' Texaco Sky Chief except for a slightly longer nose, modified aerodynamically balanced rudder, and a reduced size "Zap" flap design which permitted the installation of conventional ailerons. This raised the landing speed to a permissible 60 mph.

In view of the Gamma's superior performance, Jack Northrop began to investigate the military possibilities of his remarkable design. He moved the cockpit forward, added a gunner's seat, three machine guns, and bomb racks under the center section and came up with an excellent attack plane design, which was designated as the Gamma 2C. The Army was extremely interested, but, red tape and the depression years delayed a contract. The Gamma Attack when then further developed



Commander Frank Hawks thanks his wife for christening Texaco Sky-Chief at Curtiss Field, New York (above). A rare portrait of Commander Frank Hawks (right). The model 2F (below) was prototype for BT-1 dive bomber and A-17 attack plane. Gamma development resulted in Dauntless dive bomber (bottom).



into the 2E and was made available for export to foreign countries.

Northrop needed a pilot who was thoroughly familiar with the Gamma and who could demonstrate the finer qualities of the Gamma Attack to foreign governments. There was only one natural candidate for the job. Frank Hawks accepted the task of demonstrating the 2E Attack to several South American governments in the spring of 1935.

Gage Irving of Northrop accompanied Hawks on the trip.

While Hawks was demonstrating the Gamma 2E Attack to the Argentine Navy on May 2, 1935, he received a message to return at once to the Northrop factory and to arrive no later than May 5! Under normal circumstances it would have been impossible to cover the 8,090 miles from Buenos Aires to Los Angeles in three days in 1935, but with

Frank Hawks at the controls of a Northrop Gamma it became a distinct possibility. Hawks worked all night planning the trip and calculated that it could be done in forty hours of flying time while making eight refueling and rest stops on the way.

Taking off from Buenos Aires early on May 3, Hawks broke ten inter-city speed records on the way to Los Angeles! This included the 3430 mile run from Cristobol, Panama to Los Angeles which he covered in 17 hours and 50 minutes! The entire 8,090 mile flight took 39 hours and 52 minutes, eight minutes less than his estimate! This record flight was viewed with great interest by the world's air arms and Northrop sold fifty-one Gamma Attack planes as a result of this favorable publicity.

The U.S. Government finally awarded Northrop contracts for Gamma Attack planes which resulted in the Army A-13, A-16, A-17, A-17A and the Navy BT-1 attack planes and dive bombers. Power and armament increased and the retractable landing gear was adopted until the final development became the vaunted Douglas SBD Dauntless dive bomber of the second world war!

Frank Hawks continued his consulting work until he died in a plane crash in 1938. Jack Northrop went on his own in 1939 to form Northrop Aircraft, Inc., the entity that exists today as the Northrop Corporation. He developed several flying wing designs and directed the design and production of the P-61 Black Widow, F-89 jet interceptor, and the Snark missile. John K. Northrop died on Feb. 18, 1981. It is interesting how two talented aviation pioneers, one a gifted designer and the other a superb pilot/navigator/technician, helped their country in time of war through their activities almost a decade before the fact, with the never to be forgotten Northrop Gamma and "Texaco Sky Chief".

Next month's issue of Flying Models will present a profile control line replica of Frank Hawks' "Texaco Sky Chief". Don't miss it! ☺



STARS

Giant Scale Rally

By Bob Beckman

A big show for big planes. Two day meet gains in popularity.

Canadian Don Prentice is the builder of this Hawker Fury. This beautiful ship is just one of the Canadian entries the STARS rally seems to attract. The popularity of the big birds can't be denied.

The Southern Tier Aero Radio Society (STARS) of Olean, NY has been hosting a yearly RC scale rally that has become the premier Giant Scale event in the East. The 1981 edition was their fifth, and although any scale RC model was welcome, only about 10% of the 111 registered aircraft were not of Giant Scale size. One reason for this is that the STARS, as a group, is heavily involved in large models. In fact, one of their members has a hanger full of restored and scratch-built full size aircraft.

The STARS get tremendous cooperation from the local people. The Olean Municipal airport was closed to normal traffic for the two days of the Rally, and the Olean Exchange Club worked hard to help make the affair a success. An intensive campaign of newspaper and radio ads brought spectators out by the hundreds. This is the kind of meet that goes a long way toward educating the general public, while, at the same time, providing a lot of enjoyment for the modelers.

The only thing that didn't cooperate was the weather. Saturday wasn't too bad, although it was overcast most of the day. On Sunday, unfortunately, the rains came and

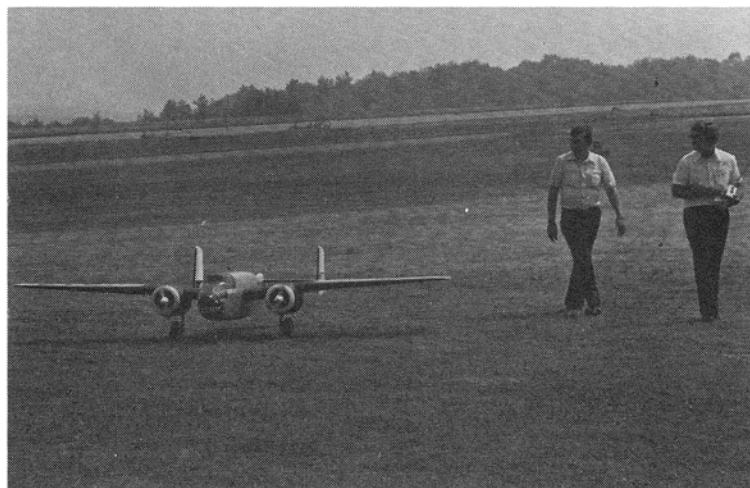
pretty well washed everything out. If Sunday's weather had been nice, I am sure that there would have been over 150 big birds or hand. The only larger Giant Scale Fly-in that I have attended was the '79 QSAA affair in Las Vegas. The STARS Spangled Rally has really come of age.

Due to Sunday's rain, one of the most fascinating models present didn't get to fly. In fact, I didn't even get to see it assembled. This was Ed Benjamin's quarter scale T-8 Talon, done up in the famous Thunderbirds color scheme. This twin ducted fan giant has a fiberglass fuselage that must be over eight feet long. Powered by two Picco 65 marine engines, the model has been successfully flown, but not, alas, that day. Water to cool the engines is carried in two 16 ounce tanks and circulated by Robart Super Pumpers. No radiator, as such, is used, but the coolant runs through long pieces of aluminum tubing that are in the path of the air intake to the fans. All in all, this aircraft is an outstanding piece of model engineering.

This seems to be the year for twins. I had seen several already, and there were three at Olean; the T-38 mentioned above, Don God-

frey's B-25, and Bob Campbell's Grumman F-7-F Tigercat. The Talon didn't arrive until Sunday, so it didn't get to fly, but the other two both flew on Saturday. Since models this size are outside the AMA limits, both in weight and total engine displacement, special arrangements were made to allow them to fly. All other activity was suspended during their flights, and the owners each had to provide proof of insurance coverage, since the AMA insurance does not cover them. The flying site, incidentally, is one of the few I know of that is adequate for aircraft like these. With the airport shut down, both grass and paved strips are available with sufficient distance between them and the spectator area.

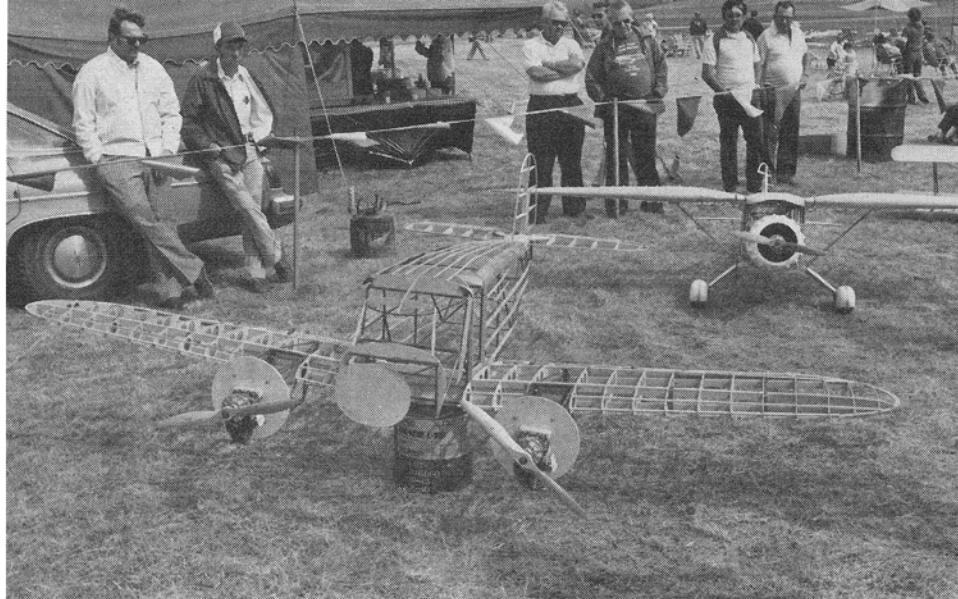
Godfrey's B-25 was first. With two Kioritz engines, the available thrust and the model weight of 50 lb. are close to equal. And the sound of those two engines ticking over together is beautiful. With MAN's Art Schroeder assisting, Don fired up and taxied out to the runway. He elected to use the grass strip, and the big twin had no trouble taking off. Flying left hand ovals, the Mitchell made one pass down the field and Don then said he was going to make one more pass and land



Don Godfrey taxis his huge B-25 onto the runway with moral support from MAN editor Art Schroeder. Twin engined bomber was impressive.



The Kioritz powered Mitchell lifts off on what was to be its last flight. Loss of radio signal did in the ship. Unfortunate accident.



Cessna "Bamboo Bomber" and Stinson SR-9 are two of George Clapp's projects (above). George recently completed full scale Sopwith Triplane replica. Fairchild PT-19 by Paul Wiegand (below). Performs well with a Kioritz engine. Rosenstock quarter scale Waco looks real as it lifts off (bottom). Nice action shot.

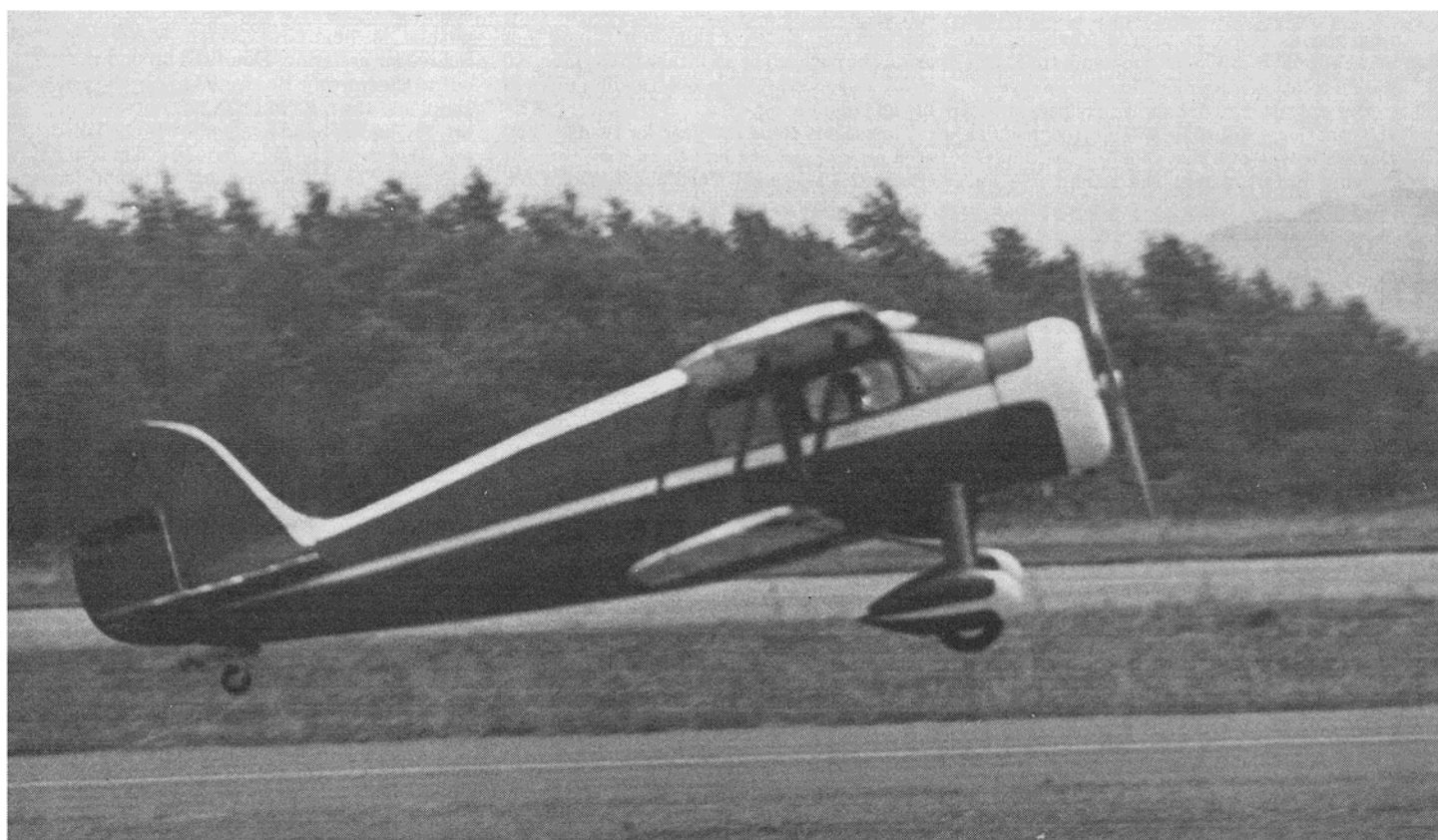


because he had felt a couple glitches he couldn't explain. Coming out of the downwind turn for that last pass, however, all contact with the plane was lost and it dove in at about a 30 degree angle. At this writing, no specific cause has been identified.

After trudging out to the crash site and sadly viewing the remains, I saw that Bob Campbell was getting ready to fly his Tiger-cat off of the paved runway at the other end of the field. I started back, hoping to get there in time to get some pictures. As I made that long walk, I reflected on my recent experiences with twins. In June I had been at Clearlake, CA when Dick Hershey's Grumman Goose was flown and crashed. Four days later I was at the Merwin Ranch near Sacramento when Phil Karafilis' A-6 crashed on take-off. A few minutes ago it had been the B-25's turn. I resolved that if the F-7-F went in I was never going to point a camera at another twin engined model.


Thankfully, I'm not going to have to restrict my activities. The sleek Grumman lifted smoothly from the runway, tucked up its wheels and proceeded to put on a beautiful demonstration of twin engine flying. Loops, rolls, and low level passes went off without a hitch, and the two Quadras never missed a beat. The landing, however, sort of spoiled the effect when the gear collapsed. Bob told me that only two landings had been made where he was able to taxi back. The largest retracts available at the time the model was built just weren't meant for aircraft of this size. Gary Rheault of Aeromarine was demonstrating his new Big-Tract units, and I think Bob was looking at them pretty closely.

There was always something interesting going on throughout the day, but some of the



most enjoyable flying took place after the official closing time. By six or seven o'clock all the spectators had gone, along with many of the participants. That's when people like Rudi Mayer, who came down from Canada for the Rally, get out and stooze around just having fun. Rudi gave a fantastic demonstration of low, slow, in-close flying with his light weight, .90 powered Cub. Then, as it got dark, he put lights on it and kept on flying.

Saturday night at the STARS' rally is worth the price of admission all by itself. There are always a lot of people staying right at the field in campers and motor homes, and those in the know stick around even if they don't have a bed right there. At this point no one is thinking about going to bed yet anyway, no matter how long the day has been. First there is a big bonfire, which even in July can spread some welcome warmth on a western NY mountain top at night. Then there is a keg or two of cold brew to cool off with if the fire gets too hot. Next come slides and/or movies and any number of conversation groups. I particularly enjoyed talking with some of the large contingent of Canadians that come down every year to join the STARS.

If you're getting the impression that I'm boosting the STARS and their STARS Spangled Rally, you're absolutely right. I won't let anything keep me away from next year's bash, and who knows, I might even have something to fly by then. The site is one of the best I've ever seen, with enough space to let everyone, including the non-modeling spectators, see everything that's going on without being in the way or in danger. The people and facilities are great. This one is bound to continue growing. 



Tom Rogenski's Pietenpol was used to tow banner which wouldn't fit on a single frame of film (**above**). A pair of helpers assist Bob Campbell as he runs up the engines in his Grumman F-7-F (**below**). Ship uses pair of Quadras. The Tigercat rotates for takeoff from paved runway (**bottom**). Bob says tail did not touch. Really?



Aeronca Champ

By Doc Mathews

A "Silhouette Scale" version
of an all time favorite.

I can hear the comments already. "Good grief, another Aeronca Champ!" "The subject has been modeled over and over again, the magazines are full of them and there's a whole bunch of kits". That may be true, but here's my side of the story.

When the long latent urge to build a "Champ" struck recently I checked over my extensive bibliography and some catalogs to determine what was available. Much to my considerable surprise, the preponderance of published Champs have been 1/2A free flight designs. Certainly several slab sided windowless "Champs" have been published and kitted, but I'll be darned if I could locate anything like I wanted.

While no obvious explanation for the oversight is apparent, it is certainly regrettable. Perhaps no other American light plane possesses more visual charm than Aeronca's Champ. If one were to draw a caricature of this pot bellied, stub-nosed charmer, it would no doubt resemble some talking airplane in a Walt Disney cartoon. This charm is the underlying motivation in developing the design for publication.

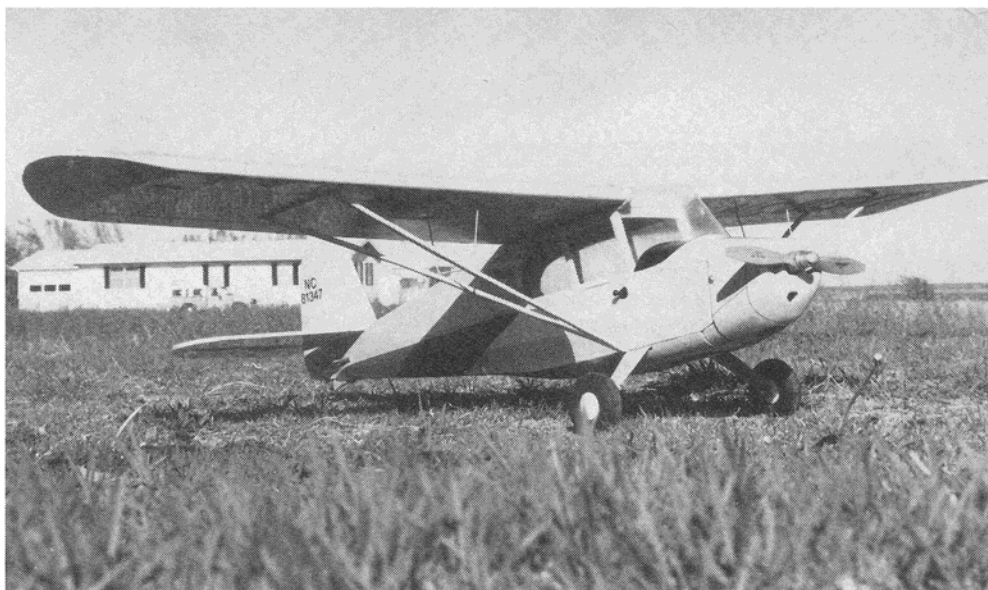
Although the "Champ", as presented in this article, is of scale dimensions, some deliberate liberty has been taken to simplify construction. At first glance, this "Champ" is identifiable either on the ground or in flight, yet it would certainly not satisfy the scale perfectionist with his 3-views and ruler.

Design and development was directed toward producing a light, well stressed, stable flying model that was easy to construct and maintain. It's silhouette is recognizable as a Champ, yet it is much less complex than a stand-off or museum scale. Therefore, we refer to these oversized 10¢ rubber models as "silhouette scale".

Originally powered with an inverted O.S. Max 15, the model was a very lively performer. After photographing and flying the "Champ" for a while in the original form, we opted to abandon the inverted engine with its associated annoyances. An upright 16 year old Enya .09 was retrofitted, converting the model into an absolutely delightful school-yard sized sport "putt-about".

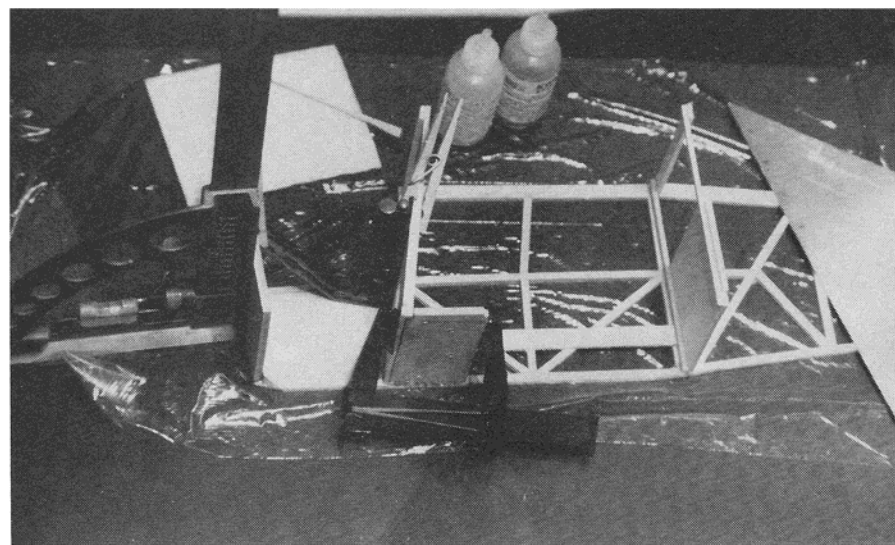
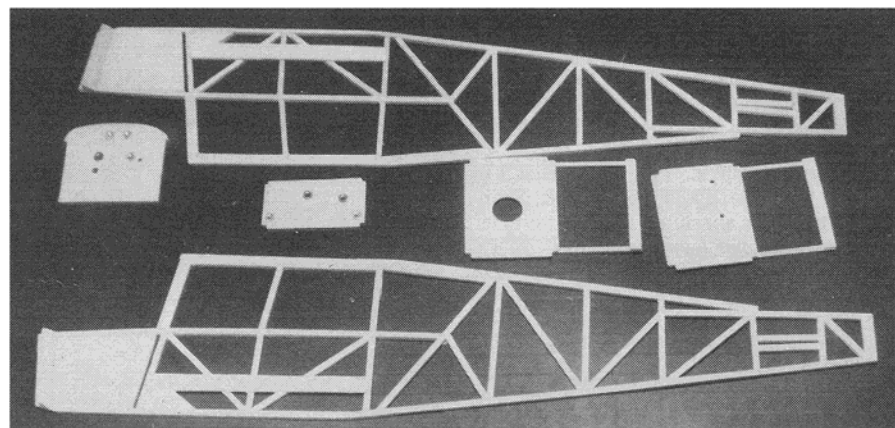
Potential builders who desire an inverted (concealed) engine are certainly encouraged to take that route. If, on the other hand, utility and ease of maintenance are more important than "impression points", stick the engine out in the breeze!

Flying characteristics are outstanding! With the .09 the model takes off the deck af-



PHOTOGRAPHY: DOC MATHEWS

Classic lines of Aeronca Champ show through in Doc's sport scale model (above). Finished sides, bulkheads and landing gear mounts (below). Mounting holes with blind nuts must match engine and gear used. Interlocking bulkheads being installed in fuselage (bottom). Fuse is built on flat surface. Easy construction.



ter a tail up roll of about 15 feet (dependent on wind velocity and grass length). She cruises around a 50-60% throttle for 10 minutes or more on just 2 ounces of fuel. Landings are slow, gentle and not the least bit unlike those of an old timer converted to R/C. Touch and goes are a thing of beauty even in brisk winds, and the "Champ" is willing to shoot landings as long as the pilot has the urge. This

model can be classified as an excellent trainer with the added bonus of scale appearance.

Construction

All balsa and spruce joints are glued with aliphatic resin such as Sig-Bond or Tite-Bond. All plywood joints use five minute epoxy. Wood sizes and hardware items are all standard stock. No unusual tools are required.

Some care should be exercised in wood grade selection, the model weight is not critical, but should not exceed 3½ lbs.

Tail group

The empannage is totally straight forward in construction. For the sake of simplicity, we like to cut the tip outlines after assembly. The elevator connector wire is more easily epoxied if this step is executed before cutting the halves apart. Hinges should be permanently installed, after covering, using tooth pick segments pushed and cemented into pre-drilled holes.

Wing

The wing rib ply master pattern can be developed with carbon paper, tracing paper, or by ironing a Xerox print onto the ply. Cut the ribs from a stack of light "C" grain sheet using a jig saw or by carving and sanding them.

Build the wing panels, from the bottom up, over the drawings. Cut bottom spars flush with the outside of the tip rib, position the light ply tips, then cut the top spars to match. The center section is built integrally with the left wing, then cut.

By tilting the inside wing ribs, using the jig, one need only block up the wing panel and sand in the bevel using a table edge as a guide.

No dihedral gusset is shown on the plans as our experience indicates a better way to develop a good fitting joint. After the three sections have been epoxied together at the correct dihedral, cut through the ribs using hack-saw blades taped together. Place a blank section of plywood into the slot and mark top and bottom spar lines. Remove the ply and cut to the lines, you now have a gusset that fits the exact dihedral angle you came up with.

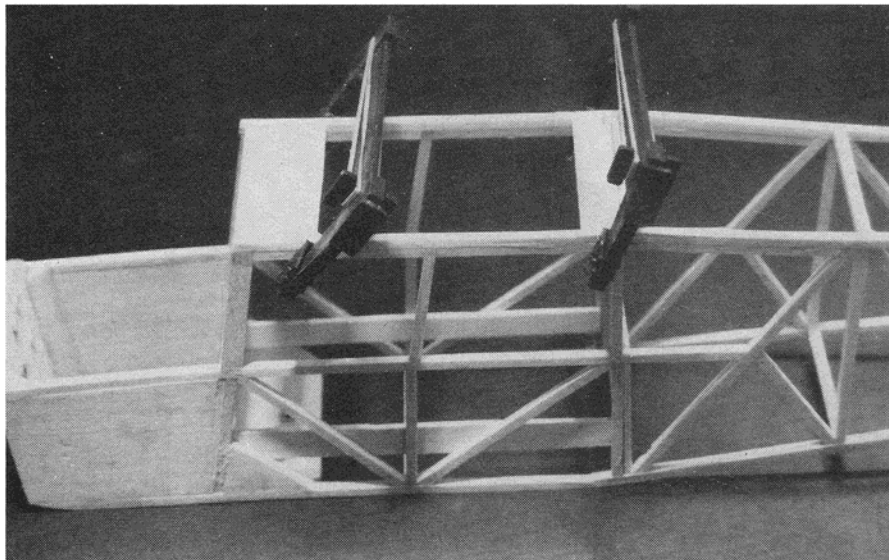
Carve the leading edge stock to outline, sand the entire wing and set it aside awaiting its use in the fuselage construction.

Fuselage

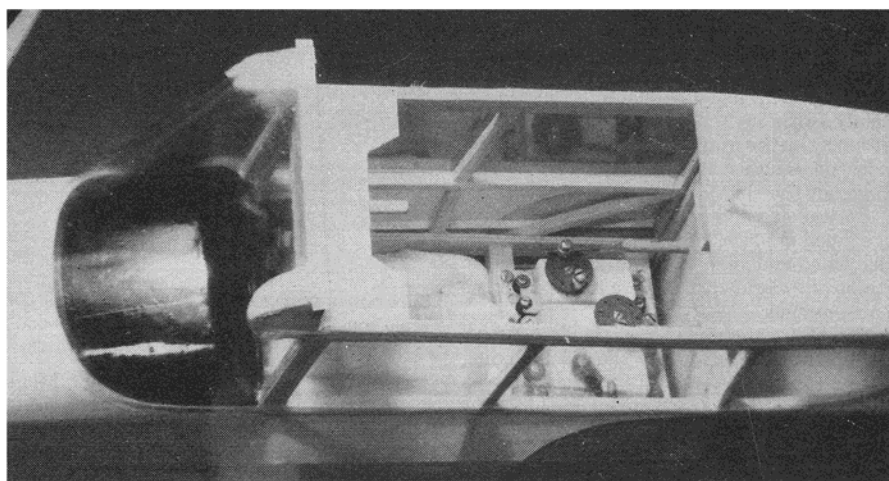
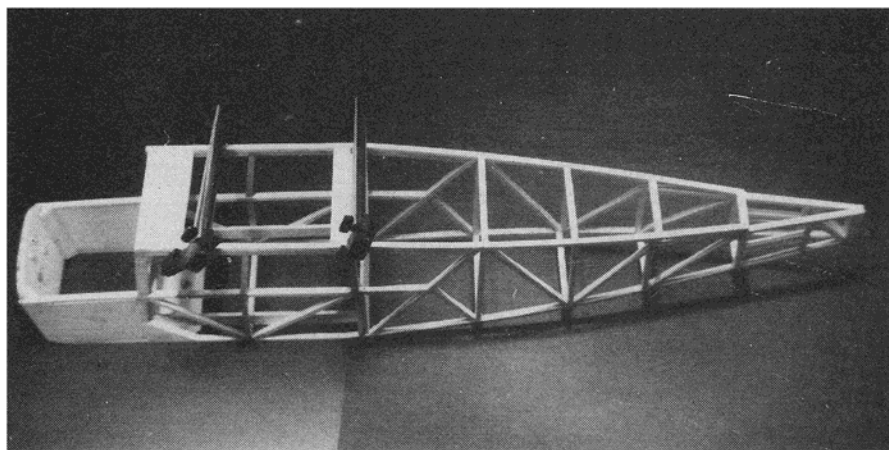
Two identical sides are constructed, one atop the other, in the classic 10¢ rubber model technique. The triangular stock is fitted for the firewall, the bulkheads fabricated directly over the plans, all holes are located and drilled and the box constructed. Pin the right unit flat over the side view, install the four major forward section units, checking for squareness with a triangle, and epoxy them into the slots in the right side.

Inset the left side onto the bulkheads to complete the forward fuselage box. Block up the tail post 1½" at the mid line and pull the left post down onto it (use epoxy here). Balsa cross pieces are cut to length over the top view and glued in place with the fuselage still pinned down on the board.

The ply wing saddles are epoxied in after the fuselage is free of the board. Epoxy the ⅜" dowel onto the front saddle with the fuselage inverted. This *does* need to be in the center line. Place the completed but uncovered wing onto the saddles and drill a hole through its trailing edge down into the ply mount. Epoxy a threaded hardwood block onto the underside of the ply by pulling it up with a lubricated bolt run through the wing and ply saddle.



Top wing reinforcements are added after basic assembly is removed from building board (**above**). Clamps hold parts in place. Fuselage with formers, firewall and reinforcements glued in place (**below**). Simple, but it looks scale-like. Radio installed on basswood cross members (**bottom**). Small blocks fill windscreen.

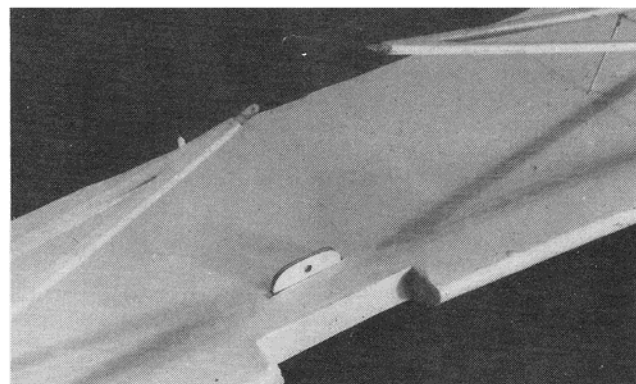
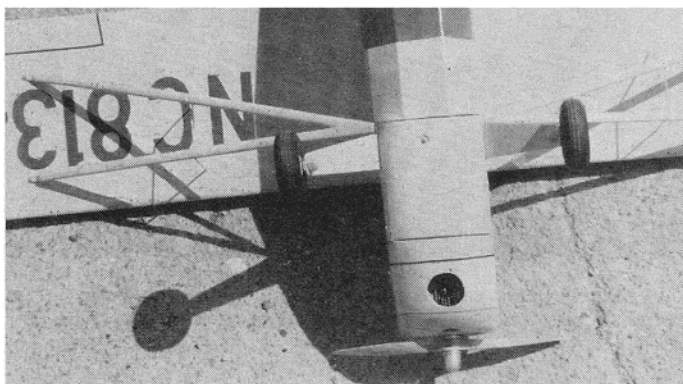
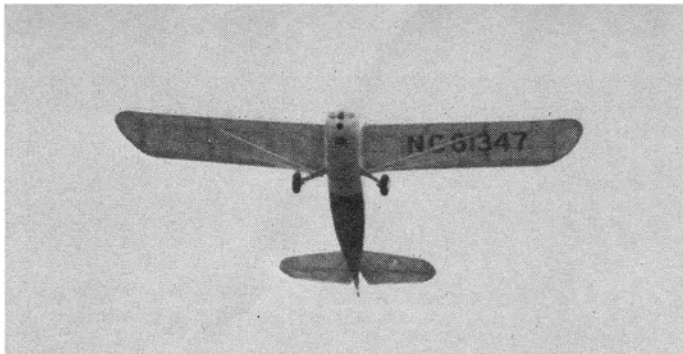


With the bolt still in place, position the wing "dowel grabber" onto the protruding dowel, then epoxy it to the spar rear faces. Add the windscreen frame and filler blocks with the wing still in place. Carve blocks to blend with the contour before removing the wing.

Cowl blocks are laid up and rough cut to outline, spot glued onto the firewall and

carved to shape. Pop the cowl loose, release its interior to clear the engine, and cut ample air passage holes and vents. Add cowl hold down blocks, replace the cowl and drill through it and the blocks for 4-40 bolts and blind nuts. Repeat for the removable bottom hatch block.

The aluminum landing gear is a stock Sig catalog item cut in half and redrilled for addi-



Champ in flight (top). Scale outlines make plane look realistic as it cruises overhead. Undercarriage (above). Note wing struts, hatch.

Another flight shot of Champ (top). Detail shot of wing center section and struts (above). Construction is simple but functional.

tional bolts. Use the gear halves as a drilling guide to locate the blind nuts and 4-40 bolts. Banner wheels and axles will require increasing the axle hole to $\frac{5}{16}$ " and are certainly worth the effort.

Radio installation utilizes $\frac{3}{8}$ " square bass or pine cross members for the servo trays, they are epoxied and screwed onto the integral light ply rails. Move the unit fore and aft to locate a slightly nose heavy C.G. (to compensate for weight build up on the aft end). The battery pack (450 mah on the prototype) and tank will both fit nicely inside the front compartment. Even a four ounce unit can be used if it is arranged with its long side flat against the fuselage side.

We used flexible tube pushrods for rudder and elevator, and cable for the throttle, if the builder prefers $\frac{1}{4}$ " balsa pushrods there is certainly sufficient room for them. Use rubber stoppers on the front of the bulkhead pushrod passage, roughen them, then epoxy the passage out the slots in the rear.

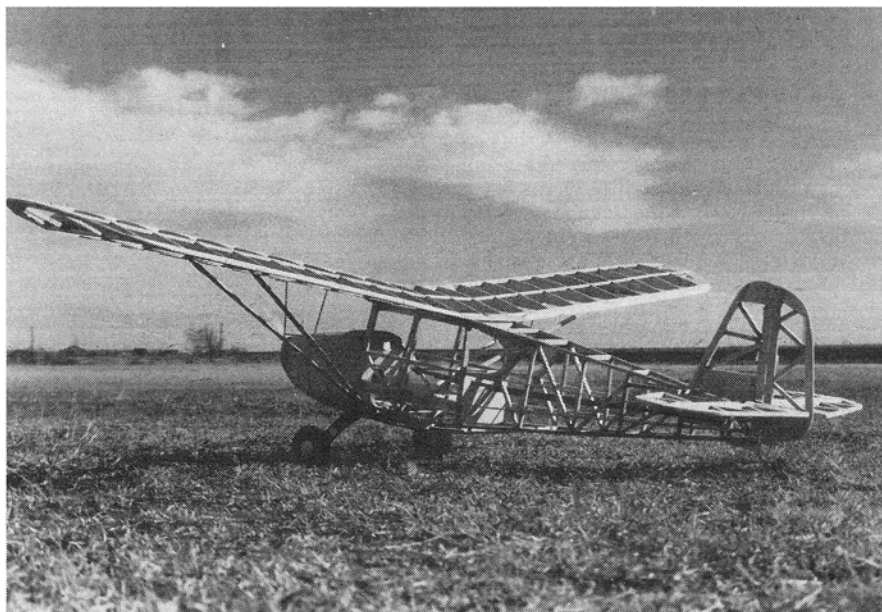
Spruce side and bottom contour stringers are glued in place, then block sanded to a taper front and rear to blend into the sides. Light ply window frames are installed in the same manner.

Struts are assembled over the drawing using epoxy, slots are cut for the nylon landing gear straps, then the struts are sanded to an airfoil shape. The straps are epoxied into the slots, then reinforced with toothpick sections placed into $\frac{1}{16}$ " holes drilled through the ends. The wire portion of the struts must be slightly wider than the outside of the Robart mini-hinge halves to prevent tearing.

Fit the struts with the wing bolted onto the fuselage. Push the straps tightly into the space between fuselage bottom and the block, then drill $\frac{1}{16}$ " holes through the nylon and into the wing plate. Repeat for the wire strut holes.

Finish

The "Champ" is sufficiently strong enough



Bare bones shot of Aeronca Champ shows off plane's construction. The framework gives the impression of scale construction with rather simple framework. It's another sport scale ship with charm. Give it a try.

for covering with most any material. Mono-Kote™ was used on the prototype's wing, while FabriKote™ was applied to the fuselage and tail. We sprayed the fuselage with yellow polyurethane, then masked it off with electricians tape and paper to apply the red polyurethane. The edges were trimmed with vinyl tape.

The numbers are sticky backed, die-cut, EZ Stick units from a office supply. The windscreen and sidelights were stuck down with Wilhold R.C. 56 adhesive, then edged with Sig Stripe Rite tape.

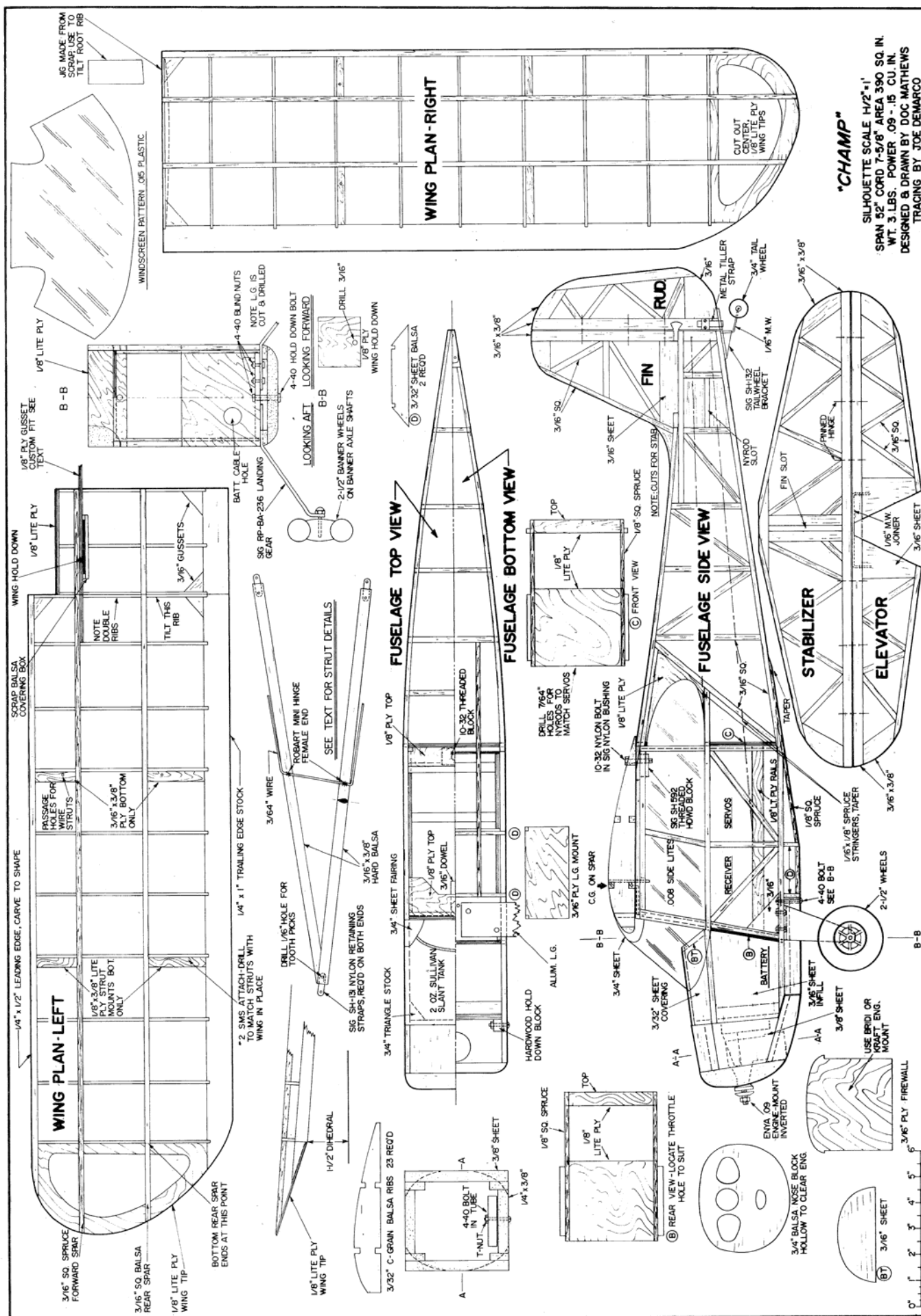
The cowl and other wood parts were first filled with Hobby Pox filler then sprayed with the paint. The interior of the cowl and

the tank compartment should be fuel proofed with polyester resin.

You can remove the wing with the struts screwed on, by unscrewing the nylon bolt, pulling the strut ends out of the fuselage slots, and sliding the wing clear of the dowel. Needless to say, access to the tank, R/C equipment and engine are excellent on this model.

Flying

There are really no precautions required in flying this model. Just point its nose into the wind and advance the throttle, she'll do the rest. To land her just reverse the power setting. In between these two steps, the flight envelope is for you to enjoy!



It probably doesn't come as any surprise that I have been using an ACE R/C Silver-Seven transmitter for the past two years. Many of my monthly articles contain photos of this transmitter. I particularly like the Silver-Seven because I was able to custom build it exactly to my own specifications. I have always preferred single stick control. Single stick availability in recent years has been quite limited, especially so in the "Super" transmitter class. My first review of the Silver-Seven transmitter kit appeared in the May 1980 FLYING MODELS. This review covered the construction of a dual stick prototype transmitter kit. In the September 1980 FLYING MODELS I ran a Part II article introducing my new single stick version of the Silver-Seven which is now the basic kit configuration offered by ACE for this mode. That same article covered a series of three new options to be used expressly with the basic Silver-Seven. These options included: exponential rate control (ACE kit No. 11G500 which lists for \$17.95); an electronic mixer (kit No. 11G505 listing for \$11.95) and programmable push button controls (kit No. 11G510 - \$8.95 or kit No. 11G511 - \$11.95 which handles two functions on one button). With these options you could obtain exponential rate control on three channels (usually aileron, elevator and rudder) or you could mix two channels (both input and output in the case of bi-directional mixing). However, you could *not*, up until recently, get both exponential rate control and mixing at the same time (it was strictly a choice of one or the other).

At the Toledo Show (1981) Tom Runge provided me with one of his new exponential rate/mixer option kits (kit No. 11G515 which lists for \$19.95). This new kit will permit both exponential rate and mixing, at the same time. Before describing the kit I think you should be made aware of several limitations that result from its basic design. First of all, this new option board can only provide exponential rate control of *two* channels, not *three* as is the case with the discrete expo rate board. You lose a one expo rate channel capability when going to the combined board. This is because the LM-324 I.C. simply ran out of functions in this combination application. An extra I.C. would have been necessary which probably couldn't have been packaged on a board this size. The second problem is discussed by ACE R/C in the introduction portion of their instruction sheets. In certain circumstances there will be a minute shift in the control surface position when engaging or disengaging the mixer. In most cases it is "only a noticeable problem in the most demanding situations". The discrete mixer (kit No. 11G505) will do away with this problem but you lose the expo rate feature. Should any of these problems bother you, ACE states that they will refund the kit price provided that the parts packages are still sealed. For my particular application, as you will see later, the mixer remains on all the time, thereby eliminating any problems.

The expo rate/mixer option board measures 2½ inches square. The parts count is moderate but there are quite a few resistors to be installed on this printed circuit board. Sorting out their values by the color coded bands



PHOTOGRAPHY: BOB ABERLE

New Ace R/C exponential rate/mixer option kit for use with their Silver Seven transmitter. Kit No. 11G515 lists for \$19.95. Printed circuit board is roughly 2½ inches square. Board mounts neatly in transmitter.

Ace R/C's Silver Seven Exponential Rate/Mixer Option

By Bob Aberle

Even more versatility for an already fine radio.
Bob explains the latest add-on feature.

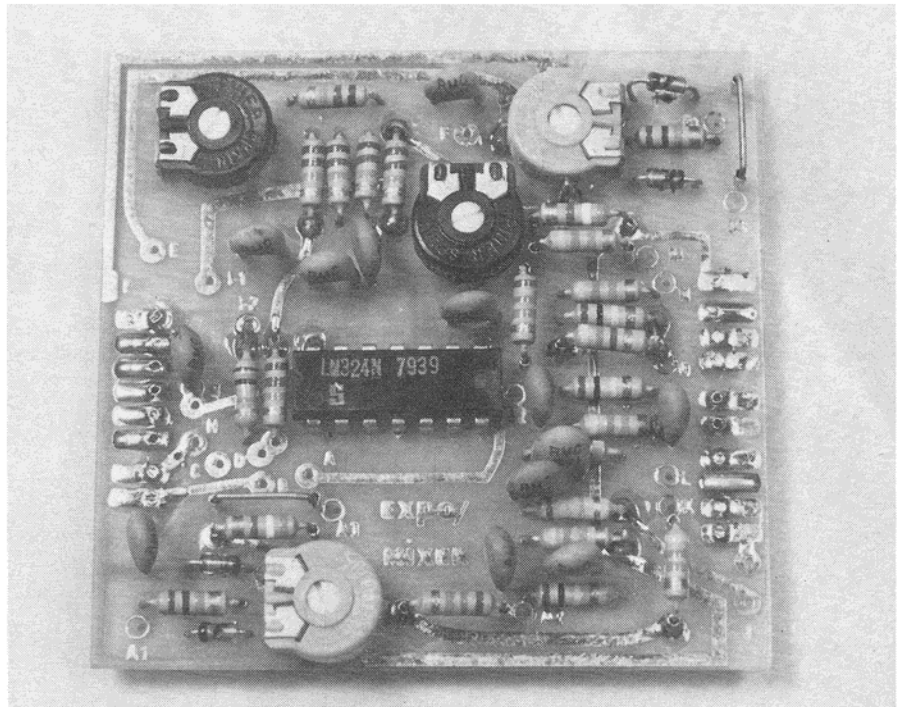
must be done carefully. There is only one I.C. to be mounted, several diodes and no transistors of any kind. This is a double sided P/C board, which means that the foil conductors are on both sides. Most soldering is done on the rear side of the board (the one without components). However, there are certain solder connections that must be made on the top or component side as well. Be careful of these. Failure to make a connection will give you fits later on. Very few tools are required for this assembly job. The most important, naturally, is the choice of soldering iron. Just to repeat once again, I still favor the Ungar soldering iron handle No. 777; heat element No. 1235 (37½ watts) and tip No. PL-340 (3/64 inch spade tip). ACE R/C sells this iron as one of their regular catalog items. Basic assembly time for this option board was a little longer than I

would have suspected. I'd say about three hours, possibly four, to get all the components on the board. You will have to decide on the values of the resistors that determine the expo rate curve slope (degree of desensitization around neutral). All the basic combinations of resistors are supplied with the kit (you will have quite a few resistors left over as a result). Since I was already flying the expo (only) option, I simply selected the same resistors for an average or medium level of exponential rate control. The expo rate/mixer option board plugs into the same Deans connectors on the Silver-Seven mainframe encoder as do the other options. You use the same small gold plated pins for connection purposes as with the other options.

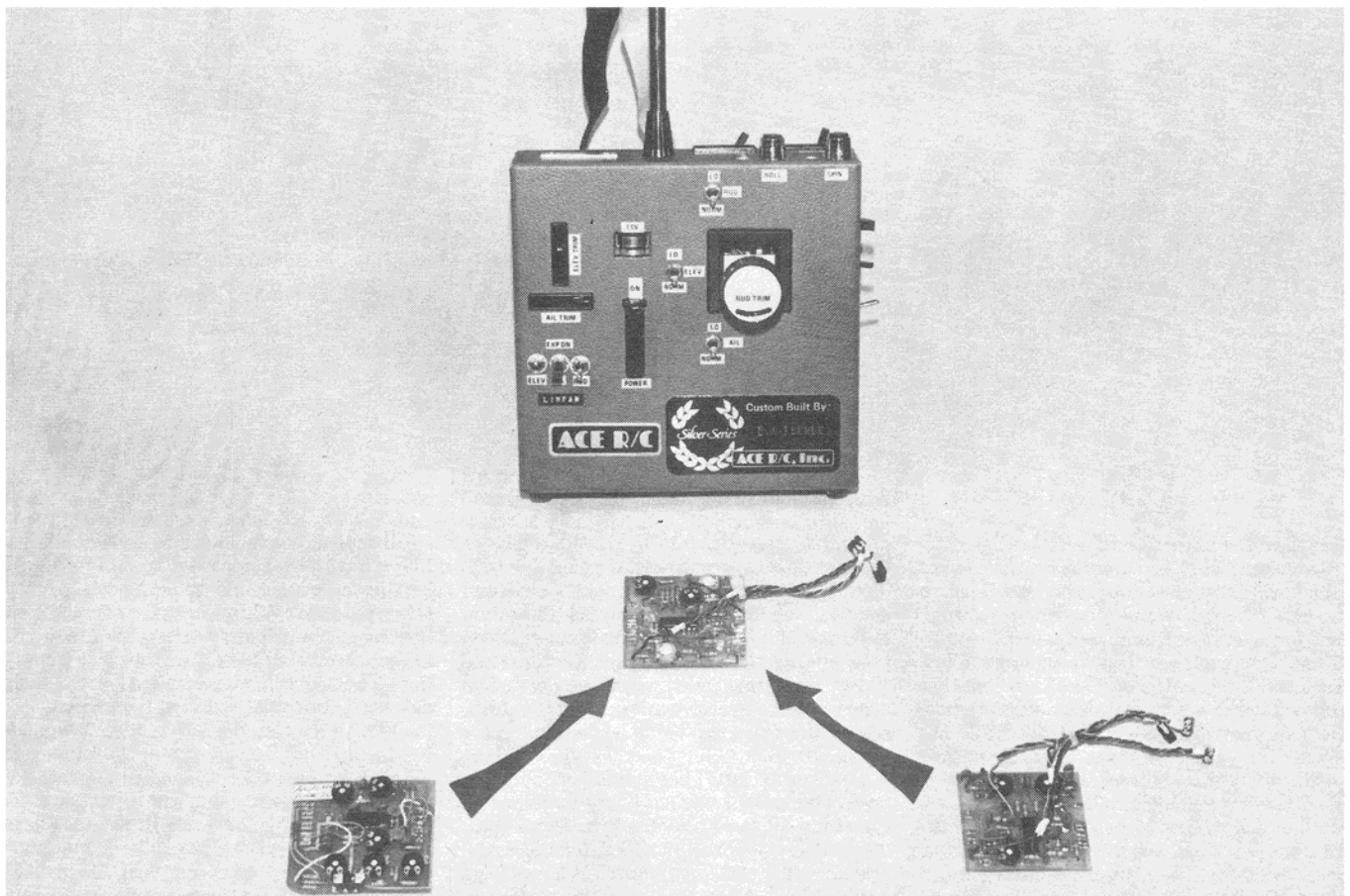
Now you are ready for the difficult part of this job, deciding what kind of mixer func-

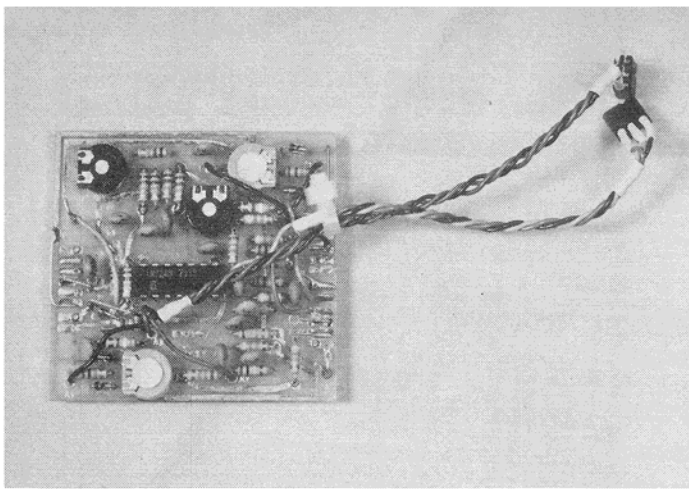
tions you want and then figuring out how to implement that decision. It may appear a little tough at first, but after studying the instruction sheets you should be able to understand the approach. Take a look at the mainframe encoder P/C board inside your Silver-Seven transmitter without any options or the trim adjust board in position. There are two Deans connectors (multiple pin variety) in the center portion of the mainframe board, into which your choice of options can be plugged. The connector at the right contains the control inputs from the control stick pots, auxiliary control pots and the various trim pots for the entire transmitter. The only exception is channel five, the retract channel, which is a non-proportional control (operated by a switch). Connections at the left side (Deans) go into the encoder where the processed controls are fed to the R-F section and then finally transmitted or "broadcast" to the receiver. If you did not want any of the special options you could simply use the jumper connections located in the center of the mainframe P/C board. When plugging in a specific option board you must remove the correct jumpers so that the signal is permitted to pass through for the "extra" processing.

The instruction sheets contain a good block diagram/board location chart which is a must if you choose to make up an unusual form of custom mixing control. What you basically have to do is hook up two separate exponential rate control amplifiers. You also have trim

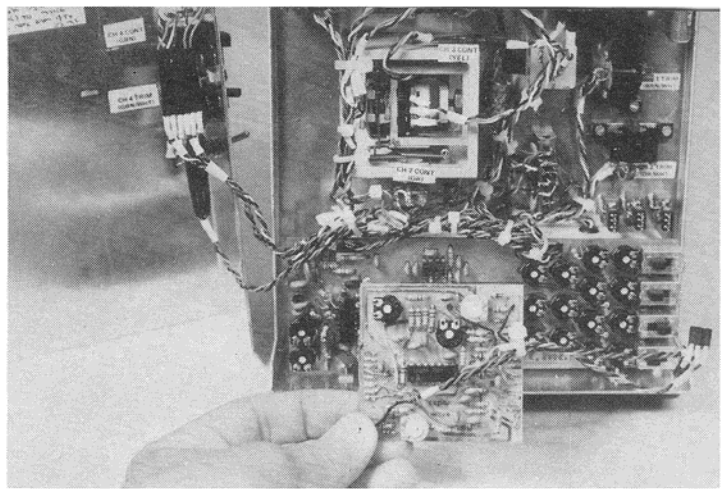


Close up of assembled board before all the jumper wires were added (above). Don't forget any of the solder connections on component (top) side of board. Discrete mixer option, lower left, with expo rate board, lower right, and Ace Silver Seven transmitter (below). Exporate/mixer board, center, combines both.

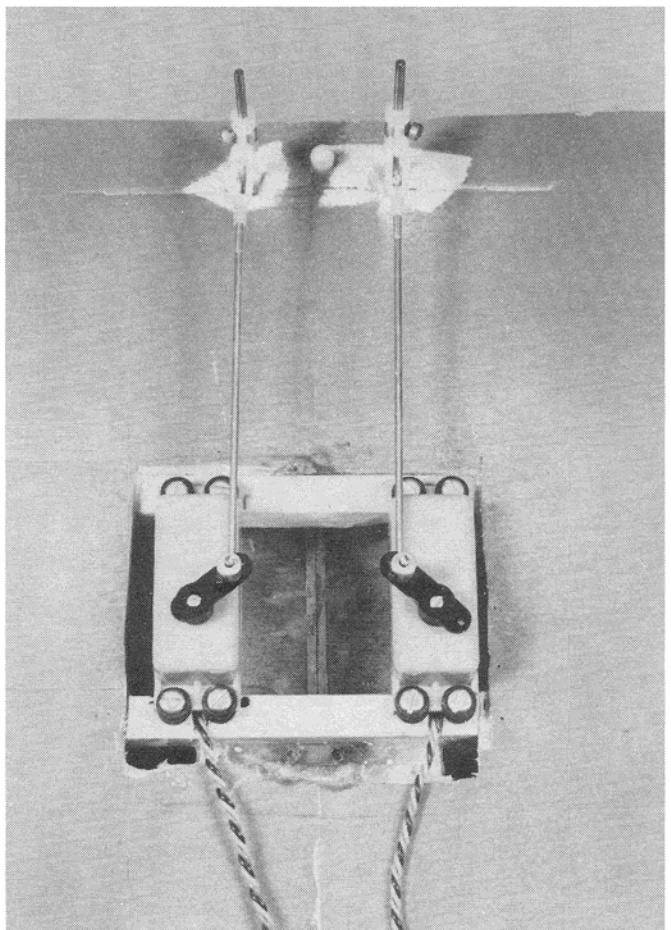
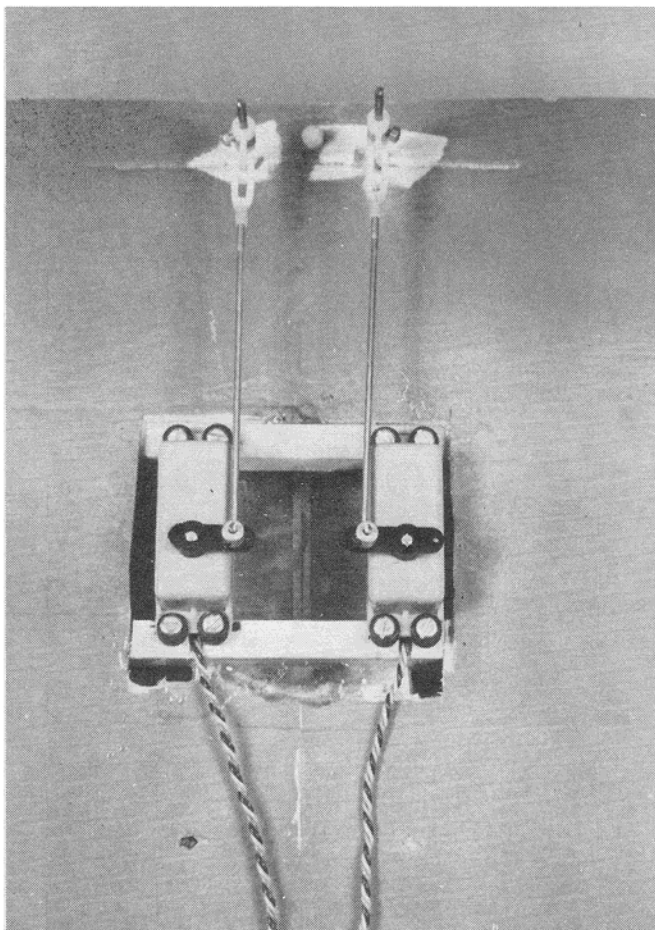




Finished expo rate/mixer option board ready to be plugged into transmitter (above). Jumpers are in place for flaperon application. Grumman Kitten wing with two separate aileron servos (below). One servo for each strip aileron.



Inside Bob's Silver Seven Transmitter (above). Bob is holding the new expo rate/mixer board in approximate position where it plugs into mainframe encoder board. Flaps at 20 degrees, ailerons at neutral (below). Interesting.



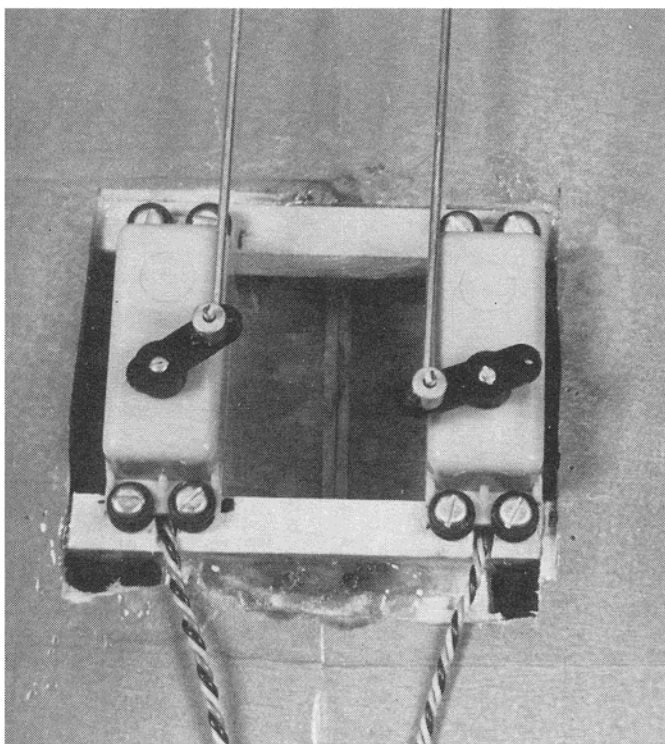
travel adjust provisions for a third channel (rudder generally). Finally, you have the mixer which will accept two inputs and provide two outputs. Then, of course, you can make provision for switching from linear to expo rate on the two channels which have that capability. You can also have the option of a switch that will engage or disengage the mixer function. None of these switches are provided with the kit.

ACE mentions four basic types of mixer applications in their instruction sheets as a general guide. For these four applications all the inter/intra board wiring connections are detailed for you. These specific applications include: (1) elevator and aileron exponential rate

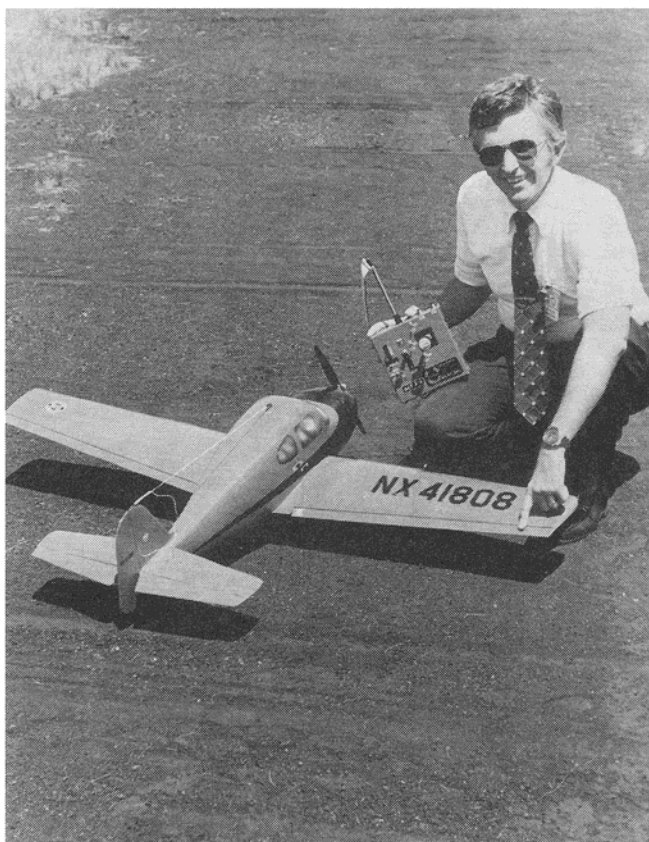
and mixer together for "V" tailed gliders or elevons, (2) aileron and elevator expo rate/uni-directional mixing of flaps (channel-6) and elevator (channel-1) for coupled flaps and elevator, (3) aileron and elevator expo rate/uni-directional mixing of ailerons and rudder for coupled ailerons and rudder and (4) ailerons and elevator exponential rate/uni-directional mixing of throttle and tail rotor pitch.

As it turned out, I chose a fifth application for my purpose. I wanted to try flaperons on my stand-off-scale Grumman Kitten (February 1977 FLYING MODELS). This model is surprisingly fast and streamlined. It has always been difficult to land at our Grumman flying

site because of the short fence boundaries. Flaps have always seemed to be in order, I just never got around to trying them until this opportunity came up. By my choice I hooked up the elevator (channel-1) and the ailerons (channel-2) to the two expo rate amplifiers. The trim controls for these two channels also had to be connected so that you could still maintain a certain degree of trim travel adjustment. I have always had switches (three in total) for selection of linear or exponential rate control when using the discrete expo board (kit No. 11G500). I still wanted these switches for the elevator and aileron functions on this new board. To accomplish this I had to run two cables from the expo/mixer board up



Flaps at neutral and ailerons at full position with one aileron full up and the other full down (**above**). Bob points to wing flaps in the 20 degree deflection position (**right**). Don't get your tie caught in prop, Bob.



to the switches which are mounted on the front panel of the transmitter. Deans connectors allow me to easily remove these cables for swapping of the option boards. I connected the rudder (channel-3) into the extra trim adjust circuit. Remember, I lost the expo rate control on this rudder channel because of the amplifier limitation on the expo/mixer board. Finally I had to connect the ailerons (after being processed by the expo amplifier) and auxiliary channel (No. 6) to the input of the mixer. The two outputs from this mixer provide control of two separate servos which I designate as *left* flaperon and *right* flaperon. To make this all work you will need a second aileron servo. As you can see in the photos, a separate servo goes to each of the two strip ailerons. The auxiliary channel control lever (channel-6) will let me lower both ailerons down to approximately 20 degrees (from the neutral position). At the same time normal aileron controls (from the aileron control stick) will be available.

I found the final adjustments on the expo rate/mixer board a little tricky, requiring some extra patience. You have to first balance both of the expo rate amplifiers for equal control throw. Then, you have to set both of the mixer amplifier gain controls to limit the total throw to approximately half of normal (typical of mixer operation). The mainframe encoder special controls on the Silver-Seven are especially helpful in this particular alignment procedure. When finished I could honestly say that this new circuit worked perfectly, without exception.

About the only suggestion I would make to

ACE R/C is to provide a pictorial view of the P/C board showing all the letter and channel number terminal points. This wasn't quite clear. The other problem is that the letters are actually etched out of the copper foil conductor material. They are not silk screened. As such it is somewhat difficult to read the connection point designations properly. This was especially a problem on my particular P/C board because the tinning coat, over the copper, was quite heavy.

In my application the mixer stays on all the time. I could have brought out two wires from the option board to a switch, which would have allowed me to cut out the mixer control when desired. That way I could go back to flying a regular model while still leaving the expo rate/mixer board plugged into the mainframe encoder. The "leftover" switch from my linear/expo function (rudder channel) could be used for this purpose. Remember, when engaging or disengaging the mixer there is a chance of neutral position shift according to the instructions.

How did the Kitten fly? Well, it took a little getting use to the first few times around. Because my airplane was never designed and built with flaps in mind the aileron hinges wouldn't allow me to obtain more than 20 degree flap deflection and still be able to obtain aileron control as well. The 20 degree flap position is a little marginal, with 25-30 degrees being a better choice. The ACE mixer can easily give you these amounts as long as your hinges can take it. Even at 20 degrees flap you do notice a reduction in aileron effectiveness. This is especially true on landings, which is,

why I was using flaps in the first place. I found that I had to turn off the aileron expo rate control (go back to linear control) because the desensitized control around neutral in combination with the reduced aileron control throw made me feel like I had no ailerons at all. There is also a tendency for the model to nose down when the flaps are first deployed. You could easily apply up elevator trim to compensate for this. However, if you have to make a go around, the application of full throttle tends to want to make the plane loop. I chose not to roll in elevator trim and simply "fly the plane". Landings were better with flaps than without. I can now get the Kitten on the ground and keep it there. The overall effect is not really that dramatic. But again, electronically, the new ACE R/C expo rate/mixer option board does everything it is suppose to do. The application aspects of it are strictly up to you.

When you take into account the three articles I have written on the Silver-Seven transmitter to date, you have "full package" (transmitter plus all currently available options). The next phase at ACE R/C is to package all of these special control circuits into a new case employing the precision Pro-Line control sticks and pots. As you must be aware, ACE R/C picked up the entire Pro-Line Electronics Co. back in February, 1981. I believe that this new custom transmitter will be made available in assembled form for those who don't wish to get involved with kit building. For more details I suggest you write to Mr. Tom Runge at ACE R/C Inc., Box 511H, Higginsville, Missouri 64037.

If you're looking for a 4 channel trainer that is stable in flight, easy to build, rugged, and with rakish lines rather than the standard boxy look, search no further. The Scorpion IV is all of the above.

Designed for a .30 to .40 power plant, the Scorpion IV has sweptback leading edges on its wing, stabilizer and rudder and a forward placed canopy, all of which give it the look of a modern jet. In fact, it could easily be customized with military insignia to improve on that image. At $\frac{1}{3}$ to $\frac{1}{2}$ throttle ("trainer speed"), the Scorpion IV is a stable flier and even at very slow speeds it remains airworthy and controllable. But, I'm getting ahead of myself. Let's talk about the kit first and flying later.

What you get

The basic kit, which includes all necessary wood parts, molded canopy, pre-bent, landing gear struts and aileron torque rods, lists for \$50.00. A hardware package is available from the kit manufacturer, Mark's Models, 1578 Osage Street, San Marcos, California 92069.

While the kit is recommended for the beginning builder/flyer, an experienced RC'er with clevises, tank, wheels, etc., from a previous plane (or wreck) will find the Scorpion IV a good alternative to other 4 channel shoulder wing planes on the market today. A beginner can get the accessory pack from Mark's or buy the components separately from a local dealer. With just a little help from an experienced builder, a beginner should have no trouble at all constructing a straight and true model.

As you examine the kit contents you notice at once the high quality die cutting of both balsa and plywood components. No die crunching here! The parts are not numbered, however, so the modeler must label them using the identification sheet provided before removing the parts from the die cut sheets.

The balsa wing ribs, 30 of them, each $\frac{1}{8}$ " thick (no cap strips necessary), slide easily out of their respective sheets, as do the plywood wing webs, trailing edges and other parts. The condition of all parts in the kit I received was excellent with the exception of the tip of one piece of the stabilizer which was broken off and a wing spar which was not of uniform thickness (a condition easily corrected with a Dremel tool sanding drum).

A lot of thought and effort went into making this kit easy to build. In addition to the assembly techniques which will be covered later on, the ailerons, wing center section trailing edges and elevator all come pre-shaped relieving the builder of the tedious task of sanding all these parts to airfoil cross section. Also, the hardwood center section trailing edges are grooved to accept the aileron torque rods. The kit comes with a concise plan sheet showing both wing halves (no need to oil it up and turn it over to build the second wing half) and a 24 page instruction book complete with construction photos and diagrams.

Wing Construction

The wing was constructed first, as recommended in the instruction booklet. The bottom of each rib is flat from the main spar to the trailing edge, so if you're working on a flat

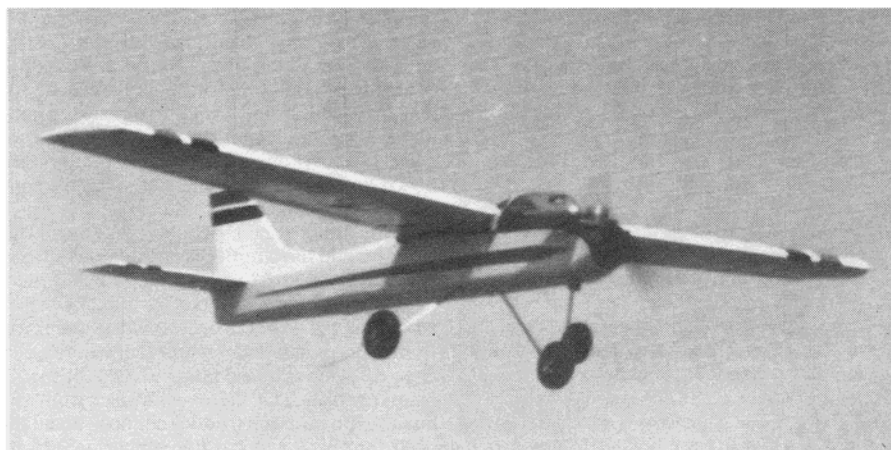


An FM Product Review:

Mark's Models Scorpion

By Joel Rindler

Four channel trainers need not look boxy.
This one is an easy to build beauty.



PHOTOGRAPHY: JOEL RINDLER

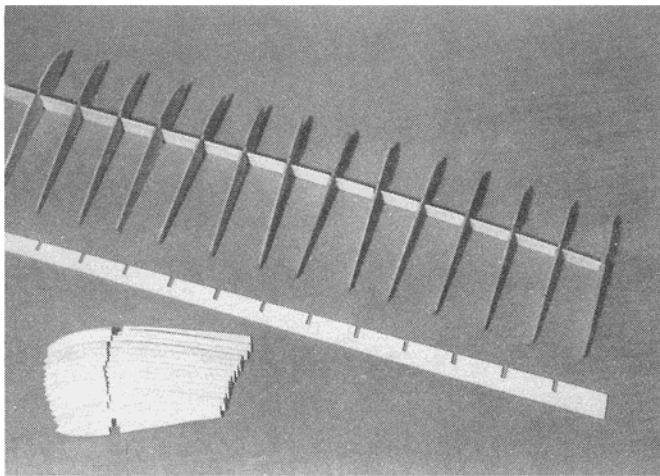
Mark's Models Scorpion is a trainer with style (top). It flies well, too (above). The Scorpion is a nice change from boxy trainers which fly well, but come up short when it comes to styling. Pleasing lines.

board you should wind up with a warp free wing. The ribs are placed egg crate style on the die cut plywood web, and this assembly is locked securely between top and bottom hardwood spars creating a very strong unit. Any spaces between ribs, spars and web can be filled in with balsa shims or baking soda and Hot Stuff.

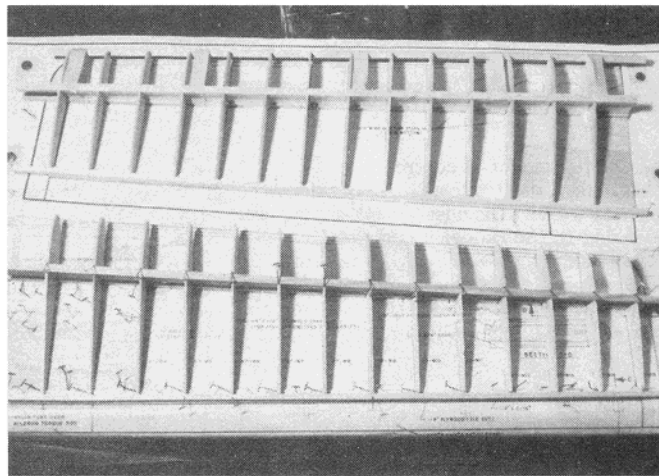
When the wing panels are complete, they can be joined with the plywood dihedral braces. Since the center ribs are added after the panels are joined this step is a little tricky,

and care must be taken to get the wing panels lined up properly. I decided to hollow out the wing tips and add two additional dihedral braces tying the main spars together. While neither of these steps was probably necessary, I felt a little better about reducing weight at the wing tips and strengthening the center section joint.

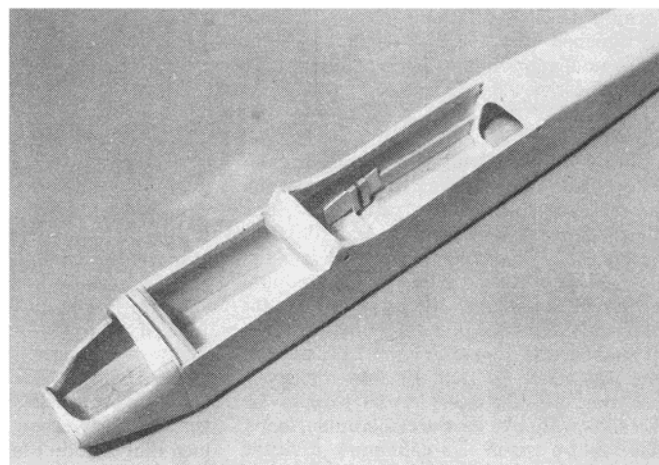
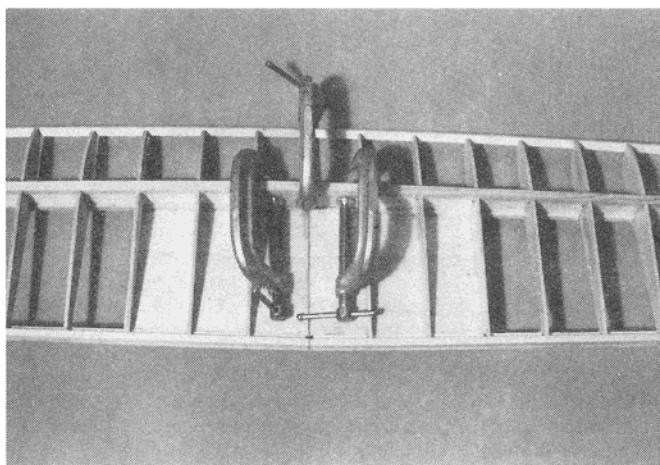
The strong spar/web construction results in a wing that just will not flex. However, my wing did twist some prior to covering. It's a good idea to take the manufacturer's sugges-



Wings ribs slip into slots in die cut spar web (above). Good quality wood is used throughout. Ply dihedral braces used to join wing panels (below).



Both wing panels can be built on plan at same time (above). Strange, it looks like a glider wing! Completed fuse (below). Nice rounded edges.



tion and cover the wing with Super Monokote or other strong covering material. I used Super Monokote and the twisting was virtually eliminated.

Fuselage construction

The fuselage sides and bottom are slabs of $\frac{1}{8}$ " light weight plywood. Triangle stock and balsa wing saddle doublers are added to the perimeters of these pieces before putting the fuselage together. The sides and bottom have die cut slots which accept tabs on the two main plywood bulkheads. These five pieces, the sides, bottom, and bulkheads go together in one quick step, resulting in an easily built, straight fuselage. A small hunk of balsa caps the tail end of the fuselage, and $\frac{3}{32}$ " balsa, laid crossgrain, covers the top from the trailing edge of the wing to the leading edge of the stabilizer. The plywood firewall (pre-drilled to accept a Kraft engine mount) completes the basic fuselage structure.

The cowl, built up around the engine of your choice, is composed of balsa blocks, triangle stock and a plywood nose ring. It took me just as long to build the cowl as it did to build the rest of the fuselage, perhaps even a bit longer. The extra effort is well worth it, however, since the appearance of the Scorpion IV is much improved by the addition of the cowl. Just a hint - drill all holes in the firewall necessary for fuel tubes and pushrods before building the cowl. Drilling them afterwards can be a real pain. Believe me, I know!!

Sanding the plywood corners to improve

the plane's appearance and reduce its weight can also be a pain, but it pays real dividends. You can get spoiled building this plane. Since so much of the structure builds easily, you start to resent anything that involves real work or building skill (and this plane does require some of both).

The plans and instructions carefully detail the construction of the canopy framework, but neglect to mention how to attach the canopy to the fuselage. In discussing this situation with Mark Smith, of (you guessed it) Mark's Models, I was assured that a supplement to the instructions was being prepared to cover this area as well as several other points which were originally overlooked in the instruction booklet. The canopy assembly serves as an access hatch to the fuel tank compartment. It should be mounted to pop off fairly easily since the canopy extends partially over the leading edge of the wing. In the event that the ground rises suddenly, violently and unexpectedly to meet the plane, the wing, which is rubber banded in place, should fly off. Under such circumstances the wing would certainly do serious damage to the canopy if it were permanently attached. To hold the canopy in place I decided to use a Goldberg hatch hold-down clip at the back of the assembly along with a small peg into the firewall at the front. Mark's supplement will suggest using a rubber band over the rear of the canopy (attached to the wing dowels) instead of the hatch clip (an equally satisfactory

though less esthetically pleasing solution). When trimming the canopy to fit over the wing, remove very small amounts at a time to avoid removing too much plastic. Once it's off you can't replace it. Finally, I chose to beef up the plywood parts which hold the landing gear in place. This step was necessitated by the fact that I fly at a very rough grass field.

Tail surfaces

The stabilizer and fin are $\frac{1}{4}$ " sheet balsa (3 pieces for each component) and only require some light sanding after the pieces are glued together. To cut down on the weight at the tail end I drilled a number of $\frac{3}{4}$ " holes in the stabilizer. Since the sides of the fuselage are not drawn completely together at the tail end, the stabilizer has a nice wide platform to rest on, while a tab in the fin fits into a slot in the stabilizer insuring a secure joint between the two.

Radio installation

There's enough room inside the Scorpion IV fuselage for any modern radio you might want to use. I installed a Cox/Sanwa 5 channel radio with the battery, receiver and servos mounted as far forward as possible for balance. The radio installation is straightforward, but I will comment on two points. First, the elevator pushrod exits out of a hole in the rear of the fuselage like the Sig Kadet. This insures an absolutely straight run from the servo to the elevator control horn yielding the least amount of push rod flexing and therefore the

Scorpion

maximum amount of control.

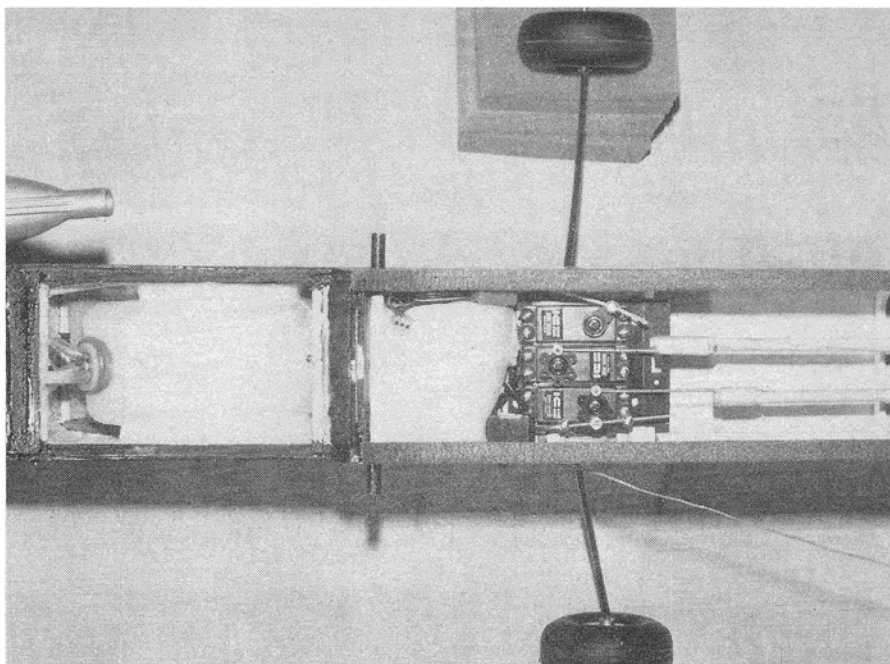
Second, I used a DuBro over-ride servo saver to connect the nose wheel steering arm push rod to the rudder servo. Our propeller eating field is also rough on servos hooked up to nose wheels and this little 98¢ item provides the necessary protection without any noticeable reduction in ground handling control.

Finishing

The fuselage and tail surfaces were covered with Flite Kote a lightweight plastic iron-on material available from Hobby Shack and, as mentioned earlier, the wing was covered with Super Monokote. Wing, tail and fuselage stripes were made from Monokote trim sheets and the fuselage and canopy trim was Pactra Formula U outlined with Sig striping tape. My finished Scorpion IV weighed in at an ounce under 5 pounds with a spanking new K&B 40 for power.

Flying

The day for test flying was warm, with blue skies, wisps of clouds and a light variable breeze. Like the song goes - "who could ask for anything more". Bert Dees the test pilot, Ron Farkas the photographer and I converged at the field and proceeded with the pre-flight check. The Scorpion IV literally leapt into the air on takeoff (some down trim helped make future takeoffs less dramatic). A little left trim was added to yield straight flight and then Bert put the Scorpion IV through its paces. Slow fly-bys for the cameraman, loops, rolls, split-s turns, Immelmans, inverted flight (requiring quite a bit of down stick) and then Ron suggested trying to make it stall. It wouldn't! The engine did quit, however, and




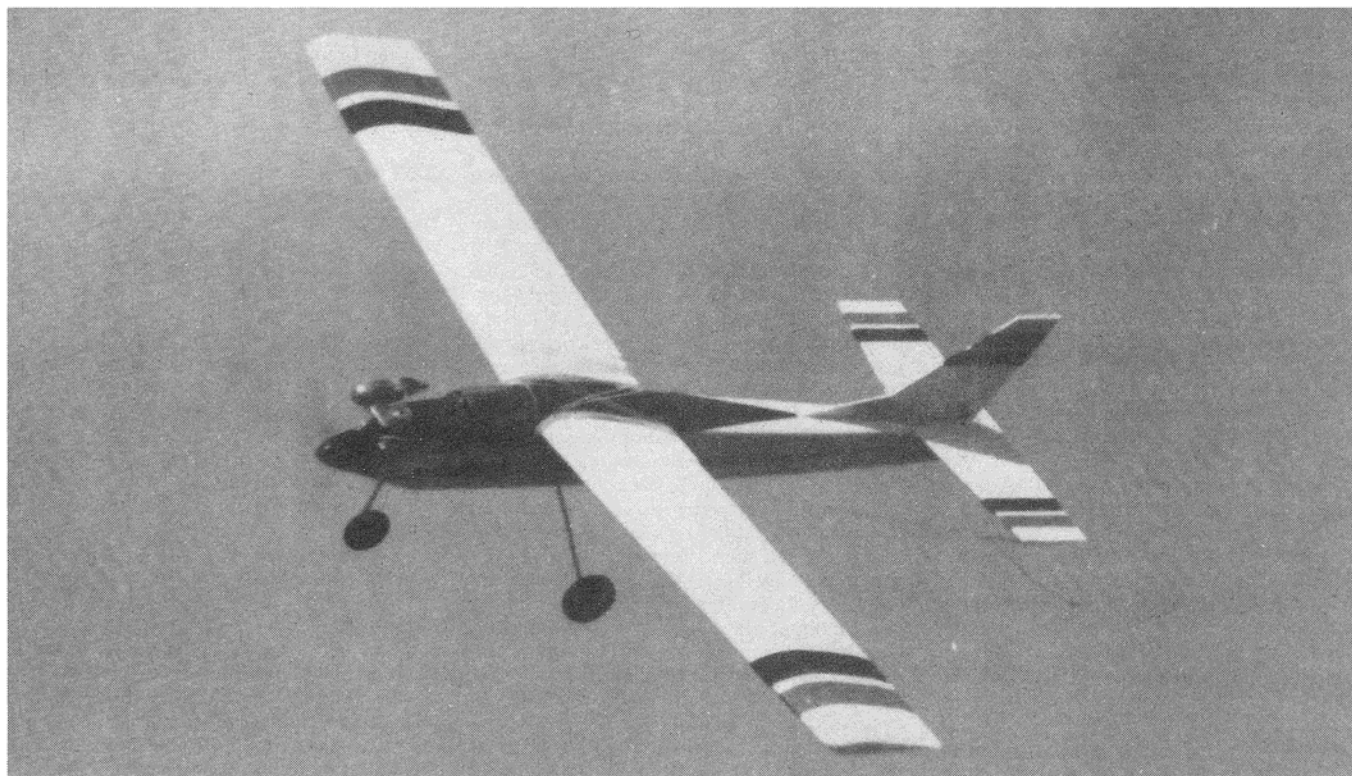
The servos, battery, receiver and switch harness are placed as far forward to help balance plane (above). Scorpion banks as it flies around Joel and photographer U-control style (bottom). Excellent trainer.

we got to witness the Scorpion IV's long gradual glide. (Did someone say Mark's Models manufactures sailplanes?) You'll have plenty of time to set up for a dead stick landing with the Scorpion IV.

During the next flight, Ron (our demanding photographer) had Bert fly the Scorpion IV u-control style, 8' - 10' off the deck in slow 40' - 50' circles. At times, Bert banked the plane so that it nearly stood on its left wing tip, yet incredibly it didn't fall from the sky. We all got to fly the Scorpion IV that morning and we had a great time doing it. The Scorpion IV has a slow roll rate, just right for a trainer. You

might want to move the CG back a bit if you're a more experienced flyer and want a more responsive, but less stable craft. However, don't mess with the specified CG until you've test flown the model balanced as per the manufacturer's specs. The Scorpion IV tracks well through all maneuvers, has a flat predictable glide and is very forgiving at slow speeds. Even the paint scheme shown on the box is right on target providing for excellent visibility.

If a 4 channel shoulder wing trainer is in your future, consider the Scorpion IV, you won't get stung. 





PHOTOGRAPHY: DAVE REES

A perennial problem for all competitive Free Flight Scale modelers is how to apply good numbers and letters. Decals work best on heavily doped models, and require a goodly amount of trimming to remove the clear overcoat to a less than noticeable level. Airbrushing lettering requires a lot of practice to get crisp outlines, particularly on the smaller sizes. I have never heard of anyone practicing spraying letters. You just take what you get, and be thankful you didn't end up having to cover the whole darn thing over again. But, that's the charm of this event, you must be a master of about 185 specialized skills just to complete one model! If you're careful, you can use numbers cut from tissue and doped on. This works well for larger numbers of plain styles, but it becomes a painstaking chore for $\frac{1}{2}$ " high numbers, and an impossibility for $\frac{1}{8}$ " high ones. For those of us who like to see the light through the structure when your plane's really up there for a good one, putting numbers and lettering on colored tissue definitely presents a problem.

I think no one will argue with me that the finest lettering medium available today is the transfer type (Chartpak, Letteraset, etc.). They come in all sizes and type faces, a number of colors like white with gold edges, and have all those fancy serifs and curliques. They have no decal edges to be trimmed off, and don't need "Solvaset" to make them lay flat. The only trick is to get them onto an airplane.

It's really not that bad if you simply put the letters on the tissue before covering the airplane. Wow, you say, sounds difficult. Here's how.

Large rub-on letters were used on the fuselage of Dave's Blackburn Allsteel which was built from Bill Hannan's plans. The transfers, which come in many sizes and type styles, are accurate. Looks neat.

Transfer lettering for F/F Scale

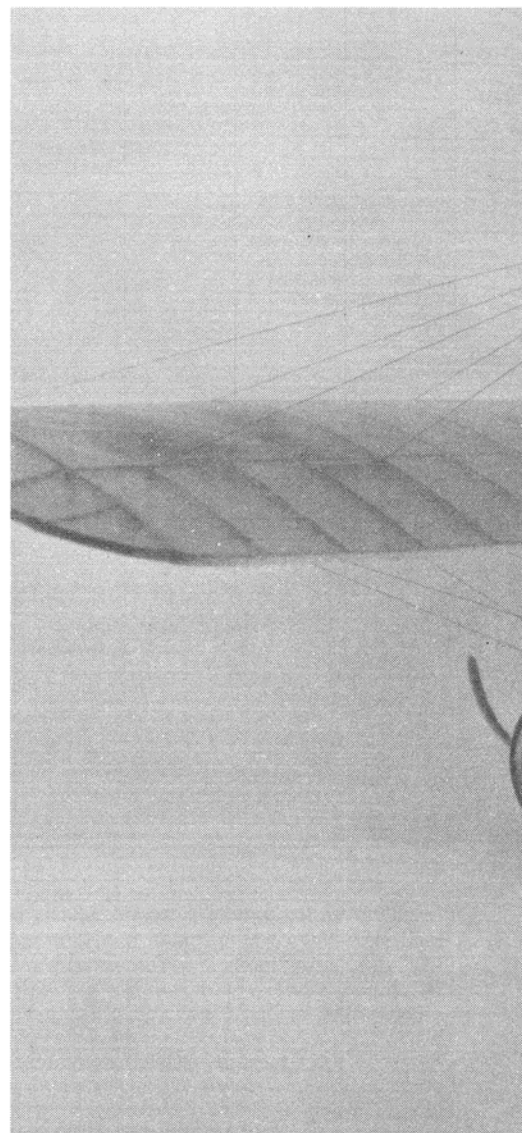
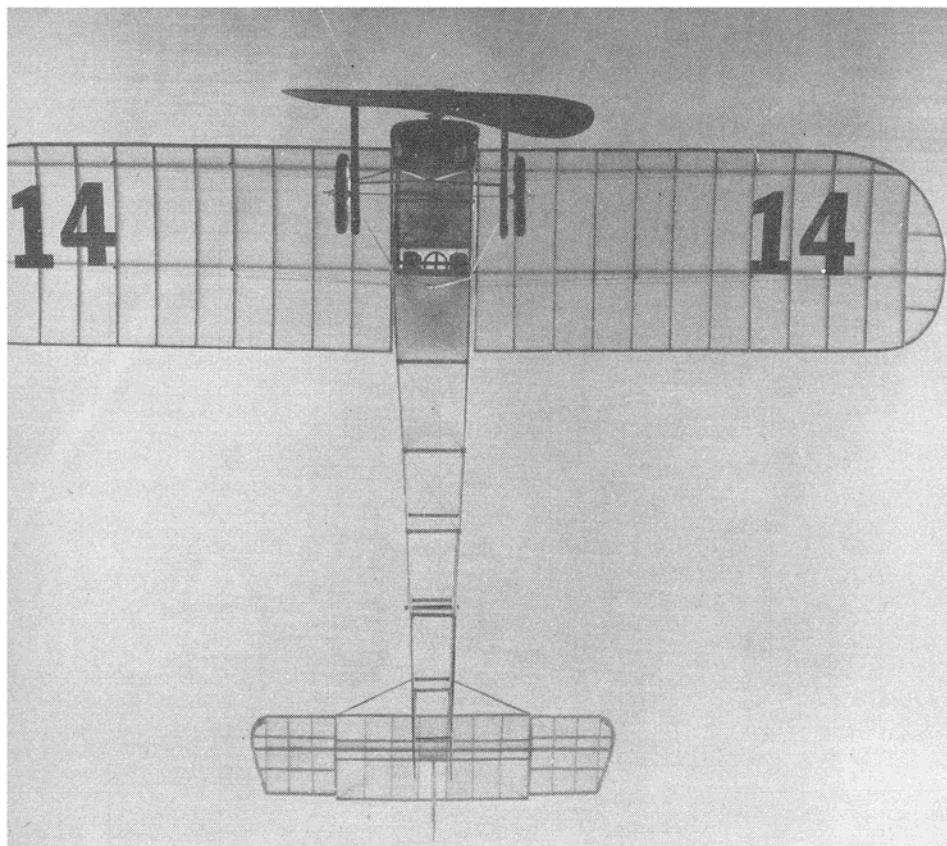
By Dave Rees

Rub-on letters make it a cinch to add even
the smallest details to your ships.

Start by getting a smooth, hard surface to work on, like a sheet of metal, glass or Formica. Not wood, which has a grain to it. The surface must be perfectly clean and smooth or some numbers and letters will be marred. Trim a piece of your colored tissue (shiny side up) to about $\frac{1}{2}$ " larger all around than the framework that will be covered. Lay it on the plans and make a few pencil ticks where you want the numbers to start and end. Place the tissue on the smooth surface and lay the sheet of numbers on top after removing the protec-

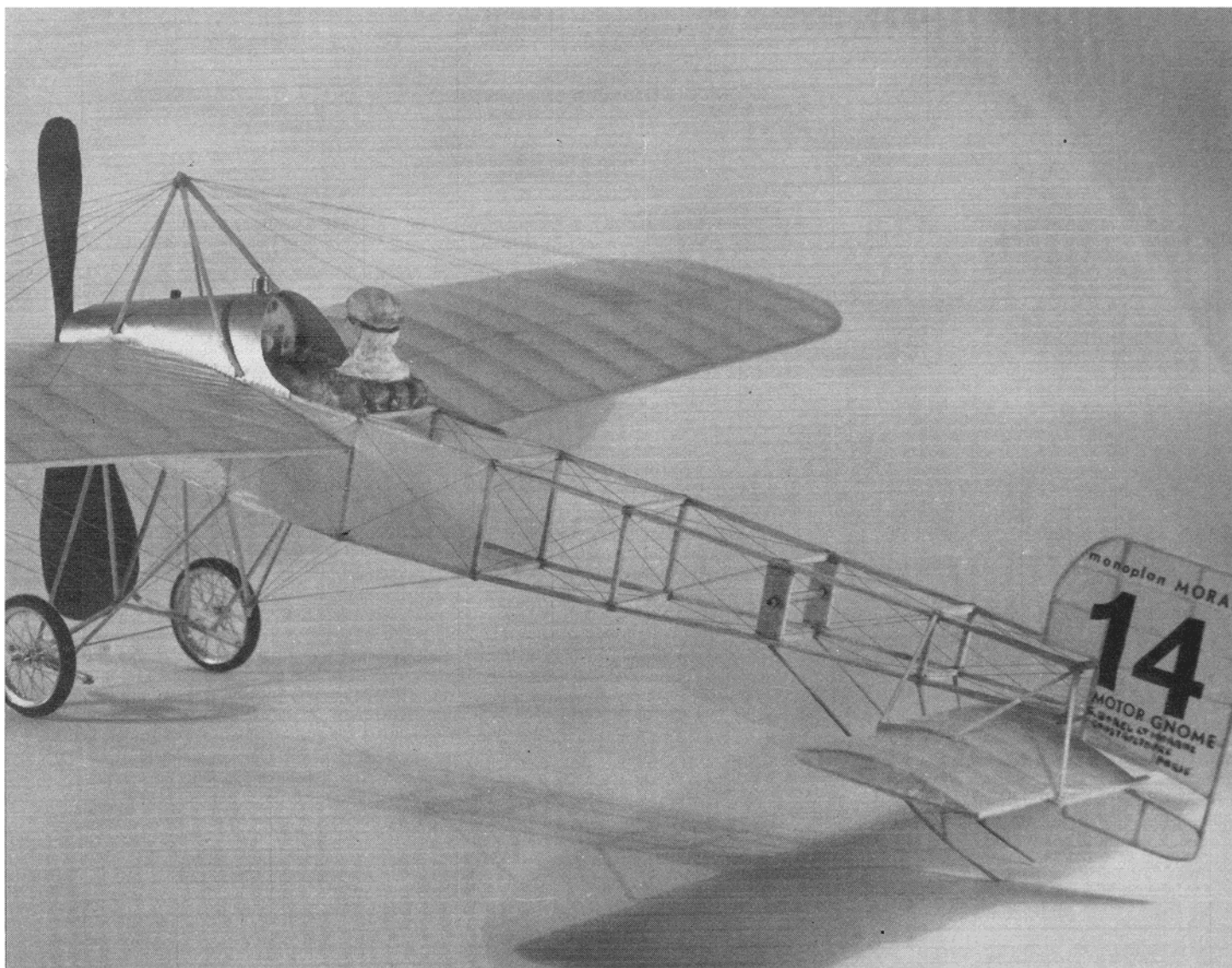
tive backup sheet. I use a burnisher designed to be used on these transfer letters which can be purchased at art supply stores. It looks, essentially, like a smooth $\frac{1}{16}$ " diameter ball on the end of a pen. I do not recommend using a ball point pen or pencil because the diameter is too small and tends to crack the letters when it is rubbed over them. Position the first letter so the pencil marks are just covered, then gently scrawl over the whole letter to set it and prevent one part from moving relative to another, which makes a crack. Next, go

Transfer lettering



Lightweight Peanut Scale model (above) is covered with condenser paper with rub-on lettering for detail. Dave describes system for covering scale models with condenser paper in text. Rub-on letters must be applied to covering before it is applied. Transfers are about the only way to put letters on this kind of covering. Another view of Berel-Moraine Peanut (right) with .047 inch transfer lettering on rudder. This plane, built from Benno Sabel plans, shows just how much detail can be packed into a 13 inch scale ship. Although most modelers would not want to go through the chore of working with .047 inch letters, it can be done. It does add quite a bit to the scale impression. Transfer lettering was used on this Avro 504 (below). The 504 was built from a Lee's Hobby kit. This is yet another Peanut Scale ship and is covered in tan tissue. Assorted sizes of rub-ons were used for the lettering on the fuse. As you can see, the technique really adds to any scale model. If only there were rub on insignias available. No such luck.





back and rub starting at one end of the letter until the whole surface has been covered thoroughly. Pay particular attention to the points and corners, as they have a tendency to pull away when the sheet is lifted. Some brands will change color slightly to a lighter shade when rubbed, indicating their release from the master sheet, which is helpful. Extreme pressure is not generally required, and will often result in a number full of cracks. If hard rubbing is necessary, it usually means the letter sheet is old. I can only keep them a year or two before the wax adherent dries out. Store them in a box or plastic bag to keep the air out, and never try to apply them below 70°F – they simply won't release.

Now comes the tricky part. Carefully lift the letter sheet at one side while holding the tissue down to the plate. Slowly peel the master sheet progressively across the letter, leaving it in place on the tissue. If a part breaks off, lay the sheet down again and rub some more until it stays on the tissue. Gently press on the completed letter with your finger, letting the warmth from your hand soften the

wax and insure good adhesion. Repeat this process for the remaining letters and you're all finished. Go run around the block and come back and try the next piece. With a little practice, you'll soon be doing those pilot names and "Experimental" lettering in the $\frac{1}{16}$ " high type.

Position the tissue on the framework exactly where you want it and cover in your favorite manner as you would with a plain piece. The numbers or letters on the wings of a larger model may be 3" high which gets to be expensive in transfer lettering because there are fewer to a sheet. You had best revert back to tissue letters. A word of caution – if you hit some brands of letters with a heavy coat of clear dope from your airbrush they may melt, so mist on a thin coat first. You probably wouldn't dope that heavily on a scale ship anyway. Never brush clear dope over transfer lettering.

I have used this method on condenser paper covering and find it to be the only way to get satisfactory lettering on this medium. The lightest grade of condenser paper simply will

not work, since the letter adheres to the master sheet sufficiently to rip a letter shaped hole in the paper. This grade is more than likely not being used much on scale models anyway, but even the medium grades require special attention. Do not rub the letters from the top of the master sheet as before. Instead, position the letter on the paper and only press on it with your finger. The paper will adhere easily and prevent shifting of the letter. Now comes the different part. Turn the whole business upside down. All transfer letters have a blank mask sheet as a protector when purchased. Lay this mask sheet onto the tissue which is now laying letter side down. Rub over the mask sheet in the area of the letter using the burnisher. Lift off the mask sheet and begin to gently peel the condenser paper away from the master sheet. Work around the letter to avoid tearing the condenser paper, peeling a little at a time, until completely free of the master sheet. You are finished at this point since no doping is needed on condenser paper. The weight of the lettering done this way is all but immeasurable. C



Flyin' things for fledglings

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

Hi gang, come on into the old hangar and gather around the pot-bellied stove ... it's that time of year again here in the northeast. And, that reminds me, since the cover of this issue indicates "December", it's a good time for me to take a minute to extend my very best wishes for a very Merry Christmas to all of you ... hope it's your best ever and that you find all those "goodies" you're looking for under the tree on Christmas morning.

You may recall that last month I said we would probably declare this month to be "control line" month. That's exactly what we're doing because I've learned that an awful lot of you guys and gals out there are interested in, and flying, U-control models. I got two letters with photos from two of our 12-year-old friends out in San Mateo, CA. Dan DeMeo and Angelo Tonini live just a few houses apart on the same street, so, naturally, they get together on their building and flying. They do very nice work, too. Maybe it's because they're willing to help each other where they can, which, of course, makes the results better for both.

We also heard from our old friend, Lou Roberts, who has also gotten back into control line flying. Lou always liked biplanes, but couldn't find any small biplane ukie kits that he liked. So, he did the next best thing ... he designed his own! It's a neat little .049 biplane

which he calls the Minibi. In fact, it looks so good that maybe we'll run a feature article on it in a future issue so you can all build one. Lou also had some fun building a real antique control liner. He got the plans for the 1949 "Infantwagon" which was designed by Hal deBolt and kitted by his company, Demco, back over twenty years ago. Lou built it up and finished it in bright red with black trim. It's always fun to own and fly a little bit of modeling history.

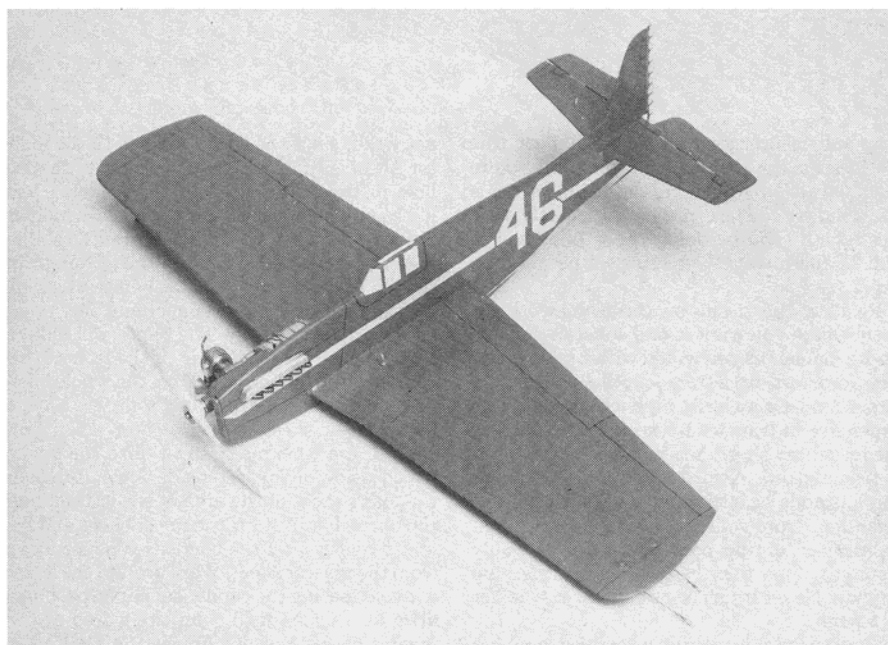
Hey, do you guys remember Bill Bain who I mentioned a few issues back? Bill is the Chairman of the National Correctional Recreation Association and has been instrumental in introducing modeling into the recreation schedule in various penal institutions around the country. Bill, too, is an ardent control liner and he particularly likes the stand-off scale types. He also likes to build large models and fly on 70 foot lines. He recently completed a scratch-built model of the Heinkel 113 which he built from plans obtained from a friend in West Germany. Bill says it's a great flyer and looks very realistic in the air. His current project is a very large Curtiss JN4 "Jenny" which he also plans to fly on 70 foot lines.

While we're talking about U-control models, I also wanted to mention the use of diesel engines with this type. I don't know how many of you are familiar with diesels, but they have some definite advantages. The

most important advantage is that they don't require starting batteries or glow plugs, so all you need when you go flying is a can of fuel. Not a bad deal, eh? You see, the diesel runs on a slightly different fuel mix than glow engines and actually fires from the heat of compression alone. Now, if you'd like to find out a little more about diesels and what ones are available, I can tell you how to do just that. Send one buck to Eastern Diesel Supply, 250 Outwater Lane, Saddle Brook, New Jersey 07662. Ask for the catalog and you'll get a nice 10 pager that has all kinds of good information. You'll find out about all the diesels that are available and their prices as well as general info on running diesels, what sizes of props to use, all about the fuel mix, and even full size detail drawings of what the engines look like. All are imported and come mostly from England. Alex Kulik, who runs Eastern Diesel, says he definitely recommends two diesels as good beginner's engines. One is the PAW 80. PAW stands for Progress Aero Works. This is an extremely well built engine that will last for many years. It sells for \$34.95. The other engine that Alex recommends for beginners is the M.E. Heron. This is also a well-built engine with a long lifetime of good running. The current catalog lists it at \$28.95.

Either of these engines will work just fine in any model in which you would normally use an .049 glow engine, but will also fly larger

PHOTO: DAVE SHIPTON



Beginner's P-51 U-control model from Hobby Hideaway kit (above). Note diesel engine. Mrs. Bill Bain shows off husband Bill's C/L Heinkel 113 (right). It's built from plans obtained from Karl Berghofer of W. Germany.

PHOTO: BILL BAIN



models. You see, a diesel, while not putting out as high RPM as a glow engine, generally gives more in brute power. I guess you can see the other obvious advantage, slower steadier flight with the power to keep your model out tight on the lines.

I own a number of diesel engines, myself, and have always enjoyed running them. I'd definitely recommend that you invest a buck and get the Eastern catalog. After all, just think of being able to go out to the flying field with nothing but your can of fuel and not have to worry about dead batteries or "blown" glow plugs. It's certainly worth considering.

Well, we've been doing a lot of discussing of control line, but I have to throw in one item that's not in this category . . . in fact, it's a category all its own . . . it's a kite! That's right, a kite . . . but what a kite! It's called the Mainliner and it looks like a modern jet airliner, especially when it's in the air. It was designed by Mark Romanowitz for Bill Bain's NCRA program (just like the Yardbird U-control model we covered a few months back). Marks says the kite flies beautifully with none of the usual kite "bad habits". It's easy to build and (here's the best part) you can get your own set of full size plans by sending your money to Mark, himself. The price is \$4.00 postpaid and Mark says he'll fill your orders on the day he receives them. The plan is big and it also contains loads of building instructions and hints.

Mark says that if anyone who buys a plan has any trouble with the building, they can write directly to him and he will help them in any way he can by return mail. How can you pass up a deal like that? Send your \$4.00 (cash or check - no money orders, please) to Mark Romanowitz, 2057 Lakeside Drive, Lexington, Kentucky 40502. Next month, I hope to show you a photo of the "Mainliner" in flight. Prison recreation officers can get a free copy of the plans by writing, on their letterhead, to William Bain, Department of Justice, Bureau of Training, Stratton 354 E.K.U., Richmond, Kentucky 40475.

Well, gang, I've got more things that I want to tell you about, but they're going to have to wait until next month. I had a lot of photos that I wanted to show you this month, but we don't have too much space left. We better just close up the hangar and shop for this session and I'll look forward to getting together with all of you again next time.

Don't forget to drop a card or letter to your old modeling buddy and also a photo of your latest model. Send it to me at 10 Brothers Rd. in Wappingers Falls, N.Y. 12590 and maybe some day you'll see *your* model on these pages. So long and Happy Holidays. ☺

The Mini-Bipe is another Lou Roberts C/L plane (right). This little gem is also powered by a Cox TD-049. The Mini-Bipe has a wingspan of only 15 inches but it flies very nicely. If you are interested in building one of these tiny biplanes look for the plans in a future FM.

FLYING MODELS

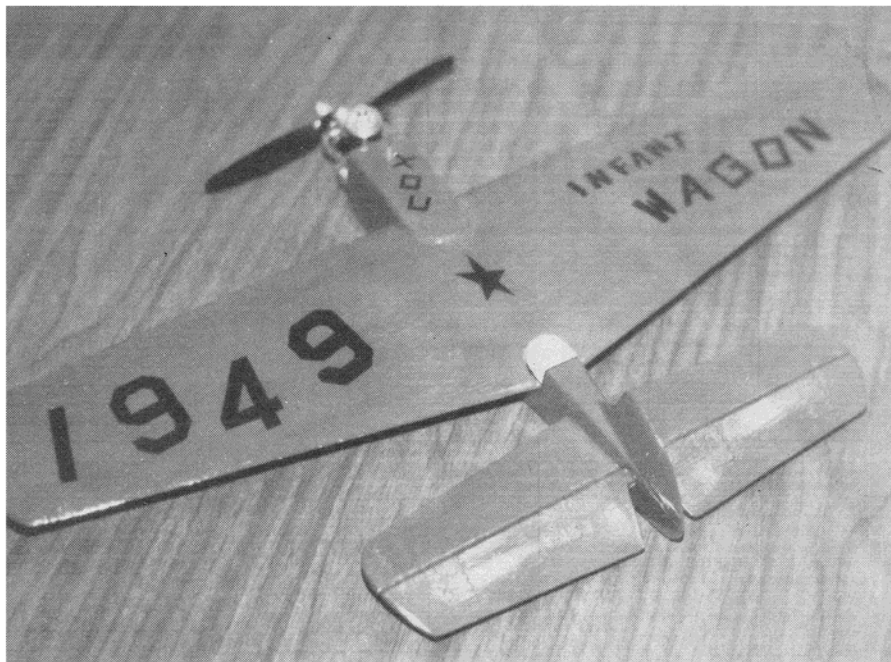


PHOTO: LOU ROBERTS

Lou Robert's version of the Infant Wagon by Hal DeBolt (above). Lou used a TD049 to power his model. Dan DeMeo built this Sig Twister (below left). Dan is 12 years old. Dan's friend Angelo Tonini built this Sterling P-51 Mustang (below right). Angelo and Dan live on the same street. They work together on their planes.

PHOTO: DAN DEMEO

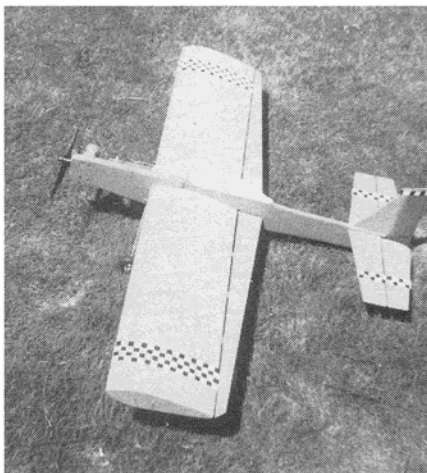
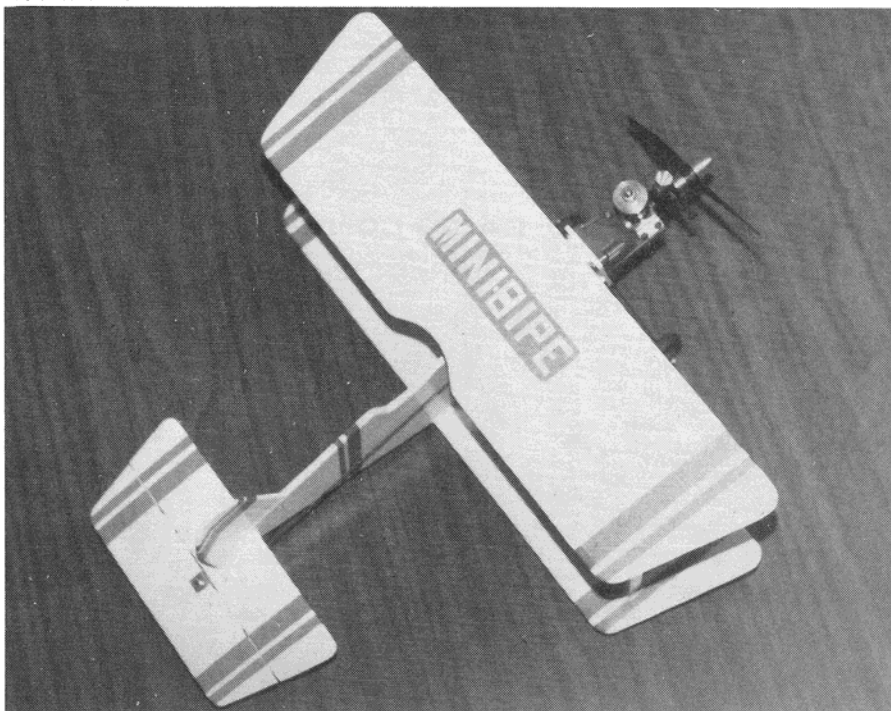


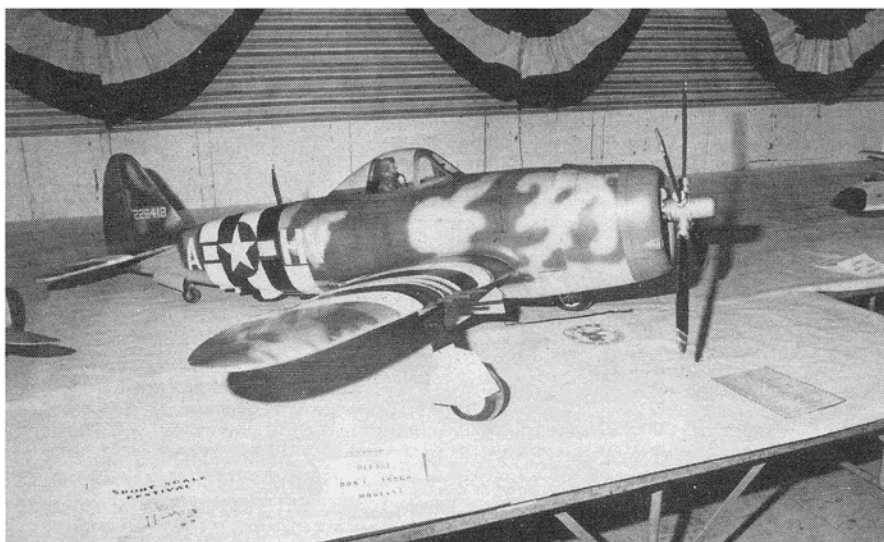
PHOTO: LOU ROBERTS

PHOTO: A. TONINI



R/C giant scale

By Nick Zioli



PHOTOGRAPHY: NICK ZIOLI

Ray Vaillancourt's 91 inch span model of Lt. Col. Francis Gabreski's P-47D-28-RA. Model is 2.3 inch scale. It's powered by 2.44 cubic inch Kioritz with a 22/8 prop. Construction took 950 hours.

This is the fourth season I've been flying my 93 inch wing span Corsair. Up to a short time ago I had been using a 20 X 6 prop and was quite pleased with its performance. Power is a Quadra and the model weighs a little less than 23 pounds. In close to 200 flights I never broke a prop, so I never bothered to try another size. At Toledo, Ray Colelli of Dynathrust Props Inc., 2541 NE 11th Court, Pompano Beach, Florida 33062, gave me an 18 X 8 and a 20 X 8 prop to try with the assurance that I would like the performance. I tried the 20 X 8 and he was right, it did improve the performance, in the air. The 20 X 6 did get the Corsair airborne faster with its swifter acceleration. However, the 20 X 8 is only a little slower at getting it into the air and offers a definite improvement in flight.

I'm sure a lot of models are suffering with poor performance due to a bad engine, prop, airplane match. A case in point is my own poor judgment in picking a prop for my then new P-40. My success with a 20 X 6 on the 23 pound Corsair led me to use the same size prop on the Quadra powered 30 pound P-40.

In the first place, a Quadra has no place in a 30 pound 1500 square inch model. It's just a little more than it can safely handle. As can be expected, performance with the 20 X 6 left a lot to be desired. A smaller, higher pitch prop would have been a much better choice.

My friend, Mr. Gail Phillips has a 25 pound P-40 and it flies very well with a Quadra and an 18 X 10 prop. It flew well enough to win second place in Best of Scale at the Fort Worth, Texas "Thunderbirds" meet and the Chuck Cunningham hosted, fourth annual, Southwestern Jumbo R/C Fly-in. The prop blades on Gail's P-40 only extend 5 3/4" past

each side of the 6 1/2" spinner. This doesn't seem like much prop, but it is this area which does most of the work.

In flight, variable pitch props may be the solution to the problem of matching props to a particular engine and airplane. With this device, the pitch could be optimized for any flight requirement, take off, climb or cruise. The Landert "Variprop" for .40 to .60 size engines is available from Hobby Lobby. A similar type unit for 2.0 to 3.0 cubic inch engines would probably find an eager market.

I have test flown a variable pitch prop built by local machinist and inventor Tom Marco, 19 Library Lane, Holbrook, NY 11741. It was built on a rather large West Bend engine, between 4.0 and 5.0 cubic inches, with the idea that if it would operate satisfactorily on the large engine it would also do so on a smaller one. It did operate as expected. A 22 inch prop was used with a pitch of 8 to 10 inches for take off and 14 to 16 for cruise. Unfortunately, an engine failure caused some damage to the plane after only a few test flights had been made. Tom is working on a unit for a Quadra that should prove interesting. Drop him a line if you can offer any input or desire more details.

The Somers R/C Club held the 3rd Annual Mammoth Scale Fly-In at their club field in Somers, NY on August 1st and 2nd. It was well attended with more than 40 models present. The field is smooth, well kept grass, which I prefer over a hard surface. The grass offers a cushioning effect that makes it easier to make a no bounce landing with a tail dragger.

It is a low key fun fly with flying the main object. As many as five models were allowed in the air at one time. Three trophies were

awarded and I was pleased to see that Roy Vaillancourt received the "craftsmanship" award with his fine 2 1/4" = 1' P-47D. This is a prototype for my soon to be released plan set. Roy has modified Dave Platt retracts and a Kioritz engine in this highly detailed 34 pound model.

I was doubly pleased when I received the "most realistic flight" award with my Corsair. Joe Wcela and his Nosen Mr. Mulligan took the "pilots choice" award.

August 15 and 16 was the date for the Long Island Sport Scale Festival at the Bayport, N.Y. Aerodrome. This was a stand-off and mammoth scale contest hosted by the Long Island Aero Radio Society, LIARS. I found this contest unusual in that the two day contest was just that, a contest each day. Prizes were given out to the winners on Saturday and then to the winners of Sunday's flying. Sport scale was poorly attended, with only two contestants on Saturday and three on Sunday. A total of 20 contestants competed.

Massachusetts' John Nicolaci brought out his 1/10 size PBM "Mariner" to compete. This is a magnificent twin engine (ST .71's) seaplane with an 11 foot wing span. It contains a lot of foam and fiberglass in its construction. I saw this fly at a local seaplane contest a few years ago and it was one of those performances you don't soon forget. John flies the model from land on a set of non-scale wheels. The fullsize aircraft was not an amphibian. It could be brought ashore on a set of hook on wheels.

Unfortunately, John ran into engine problems shortly after takeoff and went into the nearby woods. Damage was not too severe and I'm sure he will have it back in the air soon.

Saturday's results looked like this: Sport Scale, 1st J. Lewis-Gladiator, 2nd L. Schwab-Fokker E III; Jumbo, 1st W. Fuori-Pitts, 2nd M. Picard-Mauler, 3rd P. Cushman-Cap 10.

Sundays winners were: Sport Scale, 1st L. Saboto-Decathalon, 2nd L. Schwab-Fokker E III, 3rd S. Kuhl-Fokker Dr-I; Jumbo, 1st J. Lewis-Sopwith Pup, 2nd W. Fuori-Pitts, 3rd J. Behrens-Travel Air 2000; Craftsmanship, Nick Zioli-Bearcat; Realistic Flight, J. Lewis-Pup; Pilots Choice, Nick Zioli-Corsair; Safety Award, L. Schwab; Longest Distance Traveled, Wash Martin, Tamaqua, PA.

I received a new fuel tank from Kress Technology, Inc., 27 Mill Rd., Lloyd Harbor, NY 11743. This is a 16 oz. tank for use with gasoline. It is also available for glow fuel. Kress offers five different sizes, 1 3/4, 4, 8, 12 and 16 oz., in a distinctive orange color. What makes this tank unique, due to the "Simplstopp'r" plug and feedthrough, is that there is no metal in the tank other than the klunk weight. I have been using a couple of the 8 oz. tanks without any problems. Kress promises a 24 oz. tank which should be popular for our large gasoline engines. Send a stamp to Kress Technology for an info sheet.

R/C Sport.

By Ron Farkas

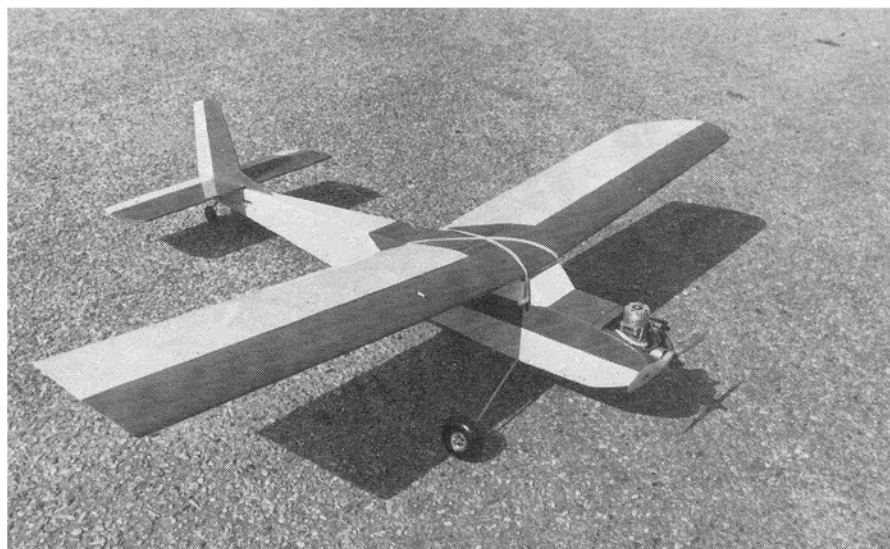
In my last column (Sept. '81) I discussed the effort required to fly well, and listed the pros and cons of several general aircraft styles. This month I want to talk about aircraft stability and its effect on how the plane behaves. Positive, or built-in, stability refers to the tendency for an airplane to seek and maintain straight and level flight of its own accord, providing that it is trimmed properly. Stability (or lack of it) determines the relative effort needed to fly a particular design. As pilots we should understand how much stability we need and how to recognize a design that best provides that amount.

There are all degrees of built-in stability, but, for the sake of simplicity, let's say that trainers have lots of positive stability, sport planes have a moderate amount and pattern ships have very little. This makes sense because the beginner needs all the help he can get, the sport flyer doesn't need as much and the expert shouldn't need any. You might wonder why, if positive stability is so good, anyone would want to do without it? Remember, the stable plane will try to correct for your mistakes and if you are not flying straight and level then you have made a mistake. That type of plane is not always necessary, however, especially if you are doing aerobatics. For this you would want neutral stability, that is, the absence of self-correcting tendencies. As we shall see later the two extremes require very different flying techniques.

Stability is a function of several design variables such as configuration, wing loading, power, center of gravity and center of lift. Let's consider the configuration here because it has the biggest influence and gives us the most obvious visual clues.

You can make a pretty good guess about an airplane's stability just from looking at the picture on the box. The general characteristics that identify a very stable design are a high wing placement, high lift airfoil (flat bottom for example), plenty of dihedral, and generous tail surface area. A neutral design is more apt to have a symmetrical airfoil, little dihedral and wing placement down near the thrust line. Model designers mix and match these characteristics to achieve their desired level of built-in stability. For example, a high wing with symmetrical airfoil and a little dihedral would fall somewhere between the two extremes. Easy right? Now run down to the hobby shop, look at every box and see how many variations you can find.

Let's see how the very stable design can provide its own restoring force. The high wing, high lift, high dihedral design creates a strong interaction between the yaw and roll axis. For example, a pure rudder (yaw) command causes the wings to assume a significant bank angle (roll). This is because the tail kicks over and presents the outboard wing panel to the airflow at a higher effective angle of attack. This creates proportionately more lift on that panel and banks the plane in the



PHOTOGRAPHY: RON FARKAS

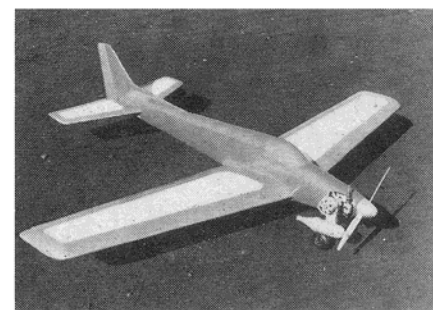
direction of the turn. (Consequently such a design turns well without ailerons.) Now this turn that was induced by the rudder created a disturbance from straight and level flight, and the stability of the design will try to make a correction after the disturbance is removed. As the plane with dihedral banks over, the projected span of the outboard wing panel rapidly decreases while that of inboard panel actually increases a little and then starts decreasing. The effect of this is less total lift (which accounts for the nose dropping), with the outboard panel losing the bigger share. Assuming that the plane is properly trimmed, the changes in lift owing to differences in angle of attack will be counteracted by the opposing changes in lift caused by the disproportionate change in projected span. The plane will attempt to raise the lower panel until a balance is achieved. While all this is happening the plane has been losing altitude. The nose down attitude causes an increase in speed which will also generate increased lift to the point where the plane tries to level-off by itself too.

Please recognize that I am deliberately oversimplifying the situation (Ron, the plethora of polysyllabic words in the preceding paragraph tends toward a verbosity which belies your intended oversimplification—ed.) to make the point that positive stability makes the plane *tend* to seek a straight and level path. The restoring forces from the factors that I have mentioned plus others are rather subtle. They give the pilot a little time to think about making a correction but cannot be expected to compensate for gross pilot errors.

A plane with less positive stability has less control interaction and less restoring tendencies. When a plane is neutrally stable rudder control does not induce a bank, nor does banking the wings (with ailerons) cause a turn, nor does increased speed necessarily generate increased lift. Therefore, the neutral design does not provide any restoring forces. If rudder were applied, as in the above example, the tail would still kick over, but the plane would attempt to continue on the same path with wings level and the fuselage skewed to the direction of flight. Removing the rudder control would simply straighten out the fuselage with respect to the flight path.

By now you should have guessed that the ultra stable designs can get along fine without ailerons but that the more neutrally stable de-

signs need them. For reasons that are too involved to discuss here, ailerons don't work well on very stable airplanes. Before leaving the subject, however, I want to stress that the three and four channel models are flown in a completely different manner. Consider something simple like a 90 degree turn. The three channel model is turned by applying rudder and holding it through most of the turn while simultaneously feeding in enough up elevator to keep the nose from dropping. Before the turn is completed both controls are neutralized allowing the plane to assume the final heading. To turn the aileron equipped airplane an aileron command is first given to bank the wings and then the ailerons are neutralized. Then up elevator is given to pull the airplane through the turn, and then neutralized. Finally, an opposite aileron command is given to level the wings, and then neutralized. The plane will now be flying straight and level on its new heading. With practice and coordination this will appear as one smooth maneuver. However, even after lots of practice on a three channel model you will still have to re-learn some of the basics when you switch to a four channel airplane. It is this fact that prompts many experts to recommend that a four channel trainer be used right from the start. So, with this rudimentary knowledge of stability and what characteristics to look for, you should be in a better position to pick the airplane design that is right for you.



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Carstens Flying Plans Favorites

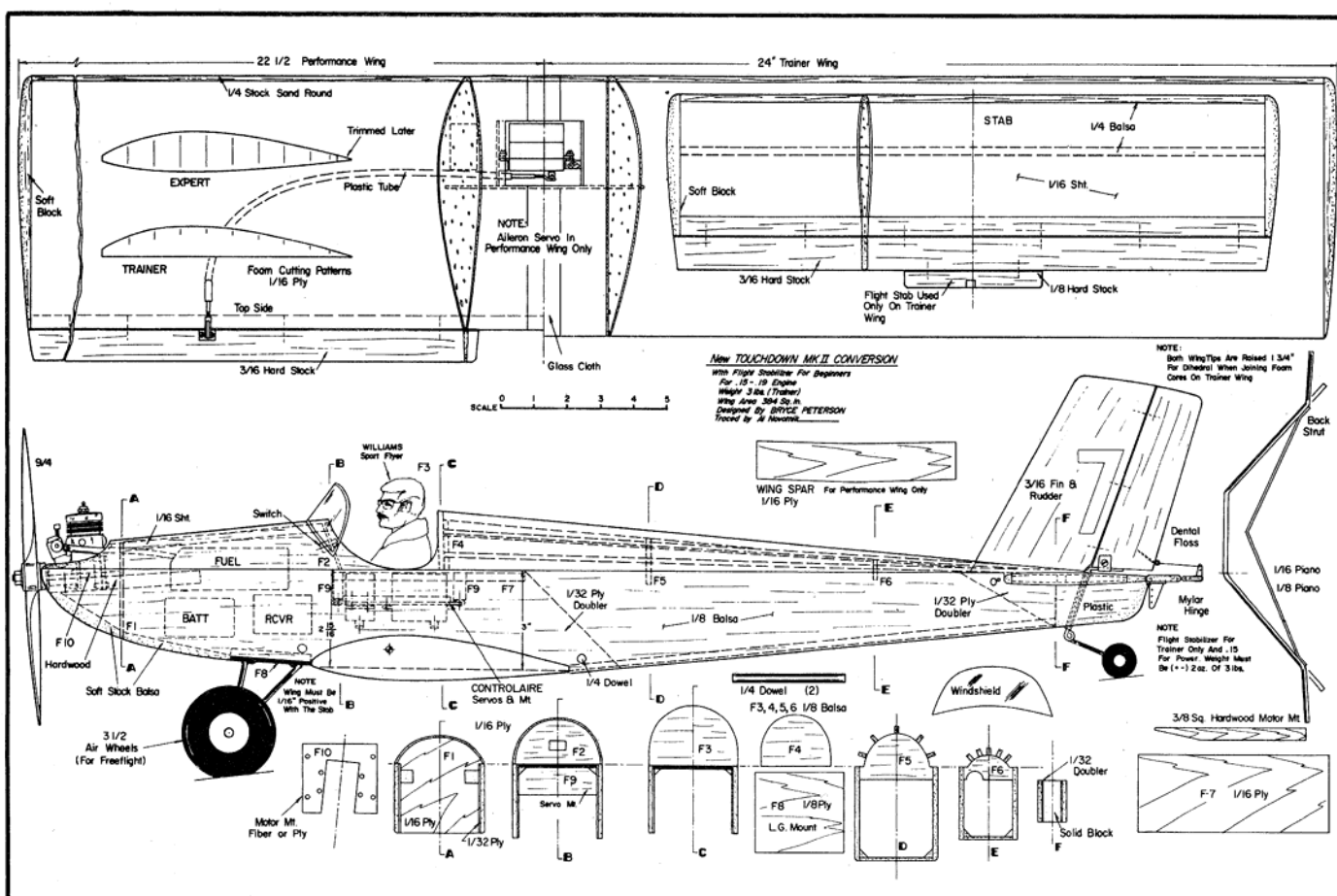
CF-190 Touchdown Mk II

Tough economic times call for strict money management, especially when it comes to our hobby. That's why Bryce Peterson's Touchdown Mk. II is such a practical plane. With one fuselage and a pair of wings the plane will go from trainer to aerobatic sport ship as the novice flyer progresses from beginner to experienced pilot.

The Touchdown Mk. II, which first appeared in the April 1970 issue of FLYING MODELS, was designed to be flown with 15 to 19 size engines. The flat bottom and semi-symmetrical wings are both of foam core construction with balsa sheeting. The stab is also of foam and balsa construction. The trainer version of the plane has a 48 inch wing span and flies on three channels. The aerobatic ship has a wing span of 45 inches and requires a 4 channel radio.

Plans for the Touchdown Mk. II are available from Carstens Flying Plans service. Order plan CF-190, \$2.00.

A complete selection of plans for R/C, Free-flight and Control Line is currently available from Carstens Flying Plans service. A listing of all available plans was printed in the March, 1981 issue of FLYING MODELS magazine. Back issues are available from Carstens Publishing for \$1.50.



FF sport

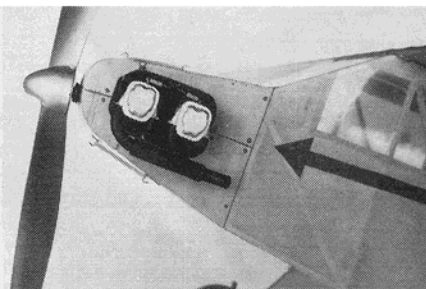
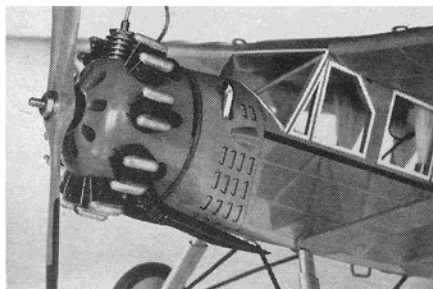
By Dave Rees

Having just spent the last few months relocating from the hills of Pennsylvania to the "Sun Belt" in Raleigh, North Carolina, I can now get back to some serious modeling — that is, if I can figure out which of those boxes my stuff was packed in.

This month, I will discuss some more SOTS ideas so you folks in other parts of the country can see what's going on in the East. First, let me introduce the SOTS. The Scale Old Timers Society (SOTS) was founded seven years ago by Bob Wedell as a club dedicated to the persuance of free flight flying scale as a specialty. The present membership of twenty men, most of whom began their modeling careers in the 30's and 40's, brings their combined years of model flying to nearly 500. In 1978 the first Flying Aces National meet was held at their field in Johnsville, Pa., and several events were staffed by SOTS members. Two AMA sanctioned all scale meets are held every year; one indoors at Lakehurst, New Jersey, and the other at Johnsville Naval Air Station plus the many backyard-bashes and fun-flies held each month for members only. A lot of ideas I'll be presenting come from this prestigious group.

Have you ever had trouble finding a source of the smaller sizes of music wire for peanut scale models? Well, a lifetime supply of it exists, and in most cases it's free. The present craze for ultra-loud guitar music brings a high level of attrition in guitar strings which are made out of — you guessed it — music wire. Strings run in sizes between .008" and .024" diameter and can be acquired at almost any music store. I usually try to find someone who does a lot of re-stringing and ask them to save all the strings they have replaced over a month's time. A basket sized wad of wire is usually the result and the cost is zip. If you really get stuck for a size, you could descend on your local store with a micrometer and buy a new string for somewhat less than a dollar. As an added bonus, some strings are overwound with wire to increase their mass for low frequencies, and these, when carefully removed, make ideal miniature springs for engine valve springs and landing gear on peanut pioneer models.

While I'm on the subject of inexpensive everyday items for scale details, here's one that solves a particularly nasty problem. Scale engine exhaust pipes are often a headache because of the small radius bends and thin walls, with the ever-present requirement for light weight. Next time you're on the way to your hobby shop, stop in at the local supermarket and visit the macaroni department. For about 75 cents, you can buy a box containing 70,000 different radii of elbow macaroni exhaust pipes. The material sands beautifully, adheres with any type of cement, and can be painted with all but water based paints. Just dump the box on your work bench, sort out the nine matching pieces having just the right radius for that radial engine you're making, and have



Macaroni is not just for dinner any more. The stuff makes great exhaust pipes, too. Dave used macaroni on this CO2 powered Bellanca Skyrocket (top left). Macaroni exhaust and milkshake straw collectors used here. More macaroni was used for exhaust system of simulated Continental engine in 24 inch span Fike E (top right). This is not Dave's pasta society (above). It's SOTS scale group. Dave's third from right front.

the rest for supper. Brushing the bench off first will keep the balsa frinsels out of your teeth during the meal. Several different cross sectional diameters are available, so I leave the shelf climbing in the local markets up to you. Properly painted and glued into place, they are waterproof and will withstand an amazing amount of impact. Try smashing one on your bench with a hammer. I have had models that encountered a frightening impact, which left little else intact BUT the exhaust pipes. Squirrels may be a problem though, for planes left overnight in trees.

The power scale events, both FAC and AMA, seem to be enjoying somewhat of a comeback, at least here in the East. This is possibly due to the improvements in CO2 and electric powerplants in recent years, but I am always amazed at the performance that can be achieved from a glow engine by someone who knows what he's doing. Here are some hints.

The ubiquitous glow engine for scale is the Cox 02 reed valve, "Tee Dee", because it is inexpensive and readily available. When first experimenting with a Tee Dee for scale use, you will immediately realize that the fuel tank size is too large. Even slowed down by running rich with a big prop, the engine run will be over two minutes — more than enough to lose a three or four ounce model. Timing part of the run on the ground before takeoff is cumbersome and looks un-professional to the flight judges. Here's a simple solution. Take

the tank off the engine by removing the four screws recessed into the tank backplate. Inside, you will find a short piece of clear plastic tubing pushed onto a fitting at the base of the needle valve. Remove this tube and re-assemble the tank to the engine. The engine will now run for about 45 seconds until the fuel level reaches the fitting, where it will stop. This is a nice length engine run to keep the flight close to the judges so they can give you lots of flight characteristic points. Just remember to remove the remaining fuel before storing the model away between flying sessions.

Running the motor slow for maximum realism of flight takes some doing, too. A large prop of around 6-3 will load it up sufficiently and can even be installed backwards to further decrease thrust. To get the engine to maintain a steady four-cycle when running very slow and rich will require a high percentage of nitro methane in the fuel. The standard Cox fuels won't keep the glowplug hot enough between strokes, so look around for a can with at least 25% nitro in it. Care must be taken not to get any raw fuel on the paint job, because nitro tends to mark or dissolve most finishes. Before the engine is buried in the airplane, install two small plastic tubes onto the tank vents and run one out each side of the cowling. Fill through one and let the excess escape out the other, thus saving the plane from any fuel contact.

I will be discussing more about the gas scale event in subsequent issues.

CA combat

By Rich López

There is a real need to increase participation in control line combat. Steve Hills and I have discussed this topic on numerous occasions trying to come up with a solution. Cost reduction seems to be a partial solution. Newcomers to combat have a tremendous outlay in cash to look forward to. They have to buy tools, motors, building materials and flying accessories. Those interested in competition flying have travel expenses also.

In order to increase the number of young participants, combat costs have to be made reasonable. The combat event itself has always attracted more spectators than any other control line event. Many of these spectators are interested in participating, but are discouraged by the cost or the fact that there is no one in their area to teach them or willing to teach them.

Fast, Slow or FAI combat are not the best events to start out with. The model and motor cost is high. In addition FAI requires the use of two models and motors. Remember, combat is an event where everything has to be considered expendable.

Half-A combat has to be the most economical way to get started in combat flying. Overall cost in models, fuel and motors is reasonable. Cost is the major reason why there isn't an overabundance of junior or senior combat flyers and why participation in the open classes is dropping off in contests throughout the country. Examples of high cost are fast combat props at about \$2.00, .35 size motors at \$60.00 and up, glow plugs reaching the \$2.00 mark, 25% nitro fuel at \$15.00 and up, and, as you know, balsa is quite expensive. In contrast, 1/2 A nylon props seldom break and are \$.75, Cox Tee Dee .049's are just over \$30.00, glow heads are \$2.00, but they seldom burn out, and there is less balsa in a 1/2 A model. A fast combat motor sucks down fuel at the rate of one ounce per minute, while an .049 will get four minutes out of an ounce of fuel. Half-A models tend to last a long time as they usually bounce when they hit the ground. Their weight of 4 to 6 ounces prevents extensive damage on impact with the ground.

Cox Tee Dee .049's and .051's are available at almost every hobby shop in the country and at a discount through mail order houses. If one sets the motor up properly and takes good care of it, it will last for years. This is how I set up my motors and care for them. You will need to buy some Semichrome aluminum polish, WD 40, a fine threaded needle valve and spray bar assembly and a piston ball and socket reset tool. The last two items are available from Joe Klaue at Kustom Kraftsmanship, P.O. Box 2699, Laguna Hills, CA 92653 (714) 830-5162. Start by reading the instruction sheet that comes with the motor. Disassemble the new motor and check for bits of extra metal. If you have an ultrasonic cleaner use it to wash off the parts. If you

don't, you can use liquid detergent in warm water and a tooth brush. Dry the parts. Using the instruction sheet directions for the reset tool, reset the ball and socket of the piston. Lap the crankshaft to the crankcase. Dab some Semichrome polish on the crankshaft and in the crankcase. Place the crank in the case, add the prop screw and spin the shaft in the case for two or three minutes. I do this to take out any high spots that may be in the case. You can use some WD 40 with the polish so that it will flow on the parts better. Clean the parts off with WD 40. Assemble the lower end of the motor. Lower end refers to the crankcase, crankshaft, carburetor body, retainer ring, flat washer, press fit thrust washer, prop, spinner, screw and backplate. We will now lap the piston to the cylinder. Hook up the connecting rod to the crankshaft and screw the cylinder on the case. Dab some Semichrome polish on the cylinder walls and add a little WD 40. Using the prop, move the piston up and down the cylinder for about three or four minutes. Make sure the cylinder walls stay coated with the WD 40/Semichrome mix. Remove the piston and cylinder and clean with WD 40. Replace the piston and cylinder. Start out with three head gaskets for the first ten runs, remove one, ten more runs, remove another one. Drill out the venturi to 5/32" as per the instruction sheet. I remove the little screen from the venturi, but this is up to you. Steve Hills likes to put a piece of large surgical tubing over the venturi so that dirt will not get in during crashes. Add your fine threaded needle valve and spray bar assembly, screw in the venturi and you are ready to go. I also cut off the needle valve and grind the sides flat so that it will not bend or break in crashes.

You do not have to bench run these motors. Run them rich and use a 5-3 prop. I have always had excellent results with the Cox Double Tuff 5-3 and the Cox Competition 5-3. Steve Hills likes the Cox Double Tuff 5-4 round tip props. I always balance my props and try not to use them after they have been severely bent or chewed up. The competition 5-3s won't allow you to bend them, they will snap first. I use 25% nitro fuels and get excel-

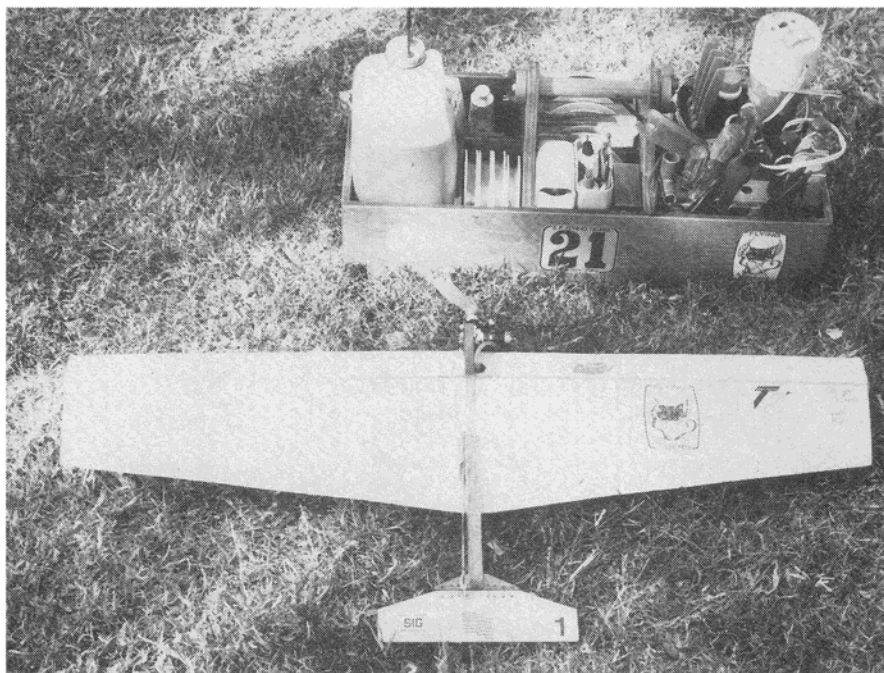
A Steve Hills design built by columnist Rich Von Lopez. This combat ship features state of the art foam wing. The Quick Pit flight box contains all the nuts, bolts and other goodies it takes to keep you in the air. Rich is an expert at having the right tools at the ready. He's experienced!

lent results. The Tee Dees will run better on higher nitro fuels, but I don't know if it is worth the extra cost.

If after two or three runs your motor feels tight, it may need to be relapped. This can be done on the field without removing the motor from the model. Just remove the glow head and gaskets, lap as was previously done with the WD 40/Semichrome mix. Clean without removing the cylinder and run the motor again. I had one stubborn motor that I had to relap five times. The motor will need to be reset after the break in period. I like to check the play in the ball and socket after I remove the first gasket. If it has only a little play I will wait and reset it after I remove the second gasket. During the break-in period there is more friction between the piston and cylinder than after it is broken in. This extra friction will cause the ball and socket joint to loosen up. After the motor is broken in check the play in the piston ball and socket joint about every 25 to 30 runs. Reset when necessary. As the instruction sheet states, "keep it immaculately clean . . .".

The only kit that I can recommend that will not need modification for Tee Dee motors is the Li'l Snip by Midwest. There are many other 1/2 A kits, but you will have to modify them. There are plenty of good designs available, but you will have to hunt through old magazines for them. Dan Rutherford published two designs: the Golly Gee Whiz and the Dirty Beaver. Steve Fauble published two designs: the Whetstone and Li'l Nemesis. I published three: Li'l Snip (Model Builder Feb. 1974), Li'l Matador (Model Airplane News Sept. 1976), and 1/2 A Samurai (Model Airplane News Feb. 1979).

If you have any questions you can contact me at 7742 Redlands Street Apt. D, 2039 Playa del Rey, California 90291, (213) 821-0857.



PHOTOGRAPHY: RICH LÓPEZ

C4 stunt-

By Bob Hunt

1982 F.A.I. Team Selection

I've just returned from the 1982 F.A.I. Stunt Team Selection contest which was held over labor day weekend at Wright Patterson A.F.B. in Dayton, Ohio. Event Director, Keith Trostle had asked me to fill in as his assistant since I had chose not to fly (everyone needs a vacation).

This is probably the only type of contest in the world in which a third place finish is just as meaningful as a first. The top three placers here will go to Sweden next year to defend our awesome record in international Stunt competition. That record includes 18 consecutive years as team champions and 12 consecutive years as individual champions.

I'm happy to report that we have chosen a team of outstanding flyers that I feel will continue the winning ways of previous teams.

Bob Baron was the big winner, flying his original design Avanti (FLYING MODELS plan CF-560). Bob hails from California and has been flying competitive C/L Stunt for more than 20 years. Bob chose the OS 45FSR for power and used a Mike Mustain tank. Other features include a J&K foam wing, Aerogloss paint, and an original design control system linkage (see February FLYING MODELS). Bob's forte is accuracy in maneuver shapes and very tight corners. Good 45 degree elevations and an overall appearance of smoothness also contributed to Bob's victory. He's going to be hard to beat fellas!

Placing second was another Californian, Ted Fancher. Ted has finally overcome his "snake bite" problems. Equipment breakage at the big contests has cost Ted dearly for the past few years. Ted flew his original design Intimidation. The ship features an ST 46 for power and "I" beam wing construction. This is the same ship that Ted used to finish second at this year's Nats in Texas. Ted's flying can best be described as flamboyant. He likes to fly a fast pattern and emphasizes tight corners.

National Champion, Bill Werwage rounded out the team, placing third. Bill again flew his old trusty USA-1 design. This is the same ship that Bill used to win the 1972 World Championships and this years Nats. Bill has made the team three times flying this same plane. Bill's choice for power was the ST 46 fueled by a Mike Mustain tank. The USA-1 features "I" beam construction and is finished in Sig dope. The USA-1 will be featured as a construction article in a future issue of FLYING MODELS.

The alternates (4th, 5th and 6th places) are Bob Gieseke, Wynn Paul and Dennis Adamisin. Les McDonald, the current World Champion, will compete in Sweden as an independent, giving the United States four shots at the individual title. Les and Bill Werwage each have two World Championship titles. They both are hungry for number three. It should be quite a battle.

Contests of this sort wouldn't be possible except for the unselfish few who administer,

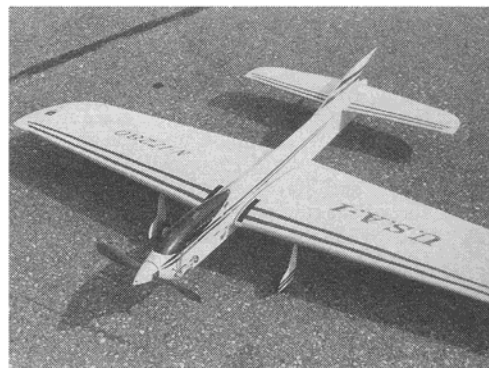


PHOTOGRAPHY: BOB HUNT

Bob Baron, from California, was the winner of this year's FAI Team selection meet. Bob flew his Avanti design to a convincing win. Ship was featured in the February 1981 issue of FM. Determination paid off.



Ted Fancher, also from California, finished second (above left). Bill Werwage, two time World Champion, flew his USA-1 design to 3rd place (above right). Windy Urtnowski was on hand with a new version of the Sweeper (below left). Jim Casale flips prop on his Spectrum (below right). Kirk Mullinex holds.



judge, record, tabulate, and do the many seemingly insignificant chores on and before contest day. Keith Trostle once again found such a group, and they performed flawlessly. A very special thanks goes out to the Dayton Buzzin' Buzzards Model Airplane Club for the many tasks performed by the members.

Perhaps the most significant result of this meet is the return to "rule book" patterns. For several years the pattern has been being flown by many top flyers without regard for the heights, angles and bottom placements prescribed in the A.M.A. rules. At the 1981 FAI Team Selection the word was out that the

judges were being trained to give more points to the tighter, harder to fly pattern. Big smooth maneuvers may look perfect, but they are perfectly wrong according to the book.

A very personal thanks goes out to Bill Werwage for loaning me last year's USA-1 for use in training and warm-up flights throughout the week. The ship served double duty as Bob Whitley also flew it in competition after his ship was lost in practice. A unanimous vote by the flyers present to allow this was an act of outstanding sportsmanship.

Next month we will return to our series on learning to fly the A.M.A. Stunt pattern. ☺

with model builders

By Ed Whalley

What your Uncle Eddie wants to talk about here this month is the sheer volume of news that's coming in. The model biz must be on a roll. It seems as though we're getting more bulletins, letters and phone calls than ever before. Ironically, space for this column is at a premium. It's like being plunked down in the midst of a lavish smorgasbord after being placed on a strict diet. Anyhow, we'd like to make a few, special acknowledgments of some of the key people who keep us informed. Up in the Northwest, the Thompson/Hazel team and Flying Lines keeps us posted on Control Line. The Bat Sheet, courtesy of Don Zipoy, Steve Helmick, et al, covers FF in the Intermountain Area, the Salt Lake Dope Bucket covers everything. In the Midwest, we rely on Harry Murphy's CIA Informer and Jim Mowrey's MACK bulletins. California news is supplied by the WAM Propwash, Fresno Model News, and Jim Scarborough's Bugs' Buzz. Terry Rimert supplies lotsa stuff on both CL and FF in the Deep South, and Fred Kom Losy of Palm Beach sends us a weekly RC bulletin. And we can't overlook Al Lidberg and the Phoenix bulletin down in Arizona. In addition, we have friends like Rich von Lopez, Ed Whitten, Bud Tenny, and Wynn Paul who fill us in on their areas of special interest. And finally, we must thank all of the editors of club bulletins and special interest publications who keep us on their mailing lists. The Big Picture wouldn't be complete without your dedicated efforts.

An Overview . . .

With Labor Day slipping into the past, most of the big meets have come and gone. The U.S. Control Line Champs in Winston-Salem were an unqualified success. Don Benesch turned 205.39 MPH in D Speed with a backup of 201.04. Al Stegens coaxed 124.17 MPH out of a carefully fitted TD .049, and speeds in Fast Rat went over 145 MPH. Goodyear (Scale Racing) was down in number of entries, Carrier was big—as usual. Bob McDonald took Expert Stunt; Mack Henry, Fast Combat; Carl Schaefer took Class II Carrier and placed second in Profile, third, in Class I. In the Racing events, Perkins/Albritton, Kelly/Parent, and Oge/Hughes were the ones to watch. Perkins/Albritton turned on heat in 3:33.3, whilst others were hard-pressed to beat 4:00.

The USFFC's at Taft were, as usual, "the greatest". Lotsa ships were lost in boomers and the famed "trash movers" tore up tents and awnings. The champagne flyoff in Wake brought a mass launch . . . and a bubbly libation to the top five when darkness put an end to flying. Night flying and campfire yarning were interspersed with visits from friends and seemingly vain attempts to put fluids back into desert dried bodies. There were Indoor events, too. Earl Hoffman took EZB and

Penny Plane. Nostalgia Gas was flown on all three days and is gaining as an event. Texaco was added this year, and Tom Rice won it flying between 6:00 and 10:00 AM. Tom beat Lee Norcross, 20:17 to 17:10. Gene Bartell of Oregon took Open Sweeps for the second year in a row.

Adding Local Color

- The Rebel Rally this year enjoyed good weather and a fine FF turnout, Control Line support was spotty. Combat drew the most ukie flyers with Dave Thompson taking 1/2A, Paul Curtis taking Slow, and John Duane taking Fast. Thermals were so strong that John Blair's Mulvihill continued on up in a DT mode spinning merrily into the cloud base, eventually coming down after 15 minutes to a spot 100 feet from launch. George Perryman and Jim Walston split top honors in FF, the former had wins in Mulvihill, Unlimited, and OT Rubber, plus a second in P-30 and a third in Wake, while the latter had wins in Replica, OT Cabin and A Gas, plus a second in Pylon. Ron Haase was the top banana in Control Line with a first and second in Carrier and a first and second in Racing. Bill Sprague took Expert Stunt, and Terry Rimert had wins in Mouse, Slow Rat and HLG.

- The Fiesta of Five Flags at Pensacola was a hot contest, both weatherwise and competitively. Jim McNeill again won the meet championship, followed by Jim Lewis, Mark Valerius and Doug Singer. McNeill made points in Gas, Lewis in Rubber and Glider. Ralph Joubert won in OT Gas and OT Rubber. Mark Valerius took both B Gas and CD. Walt Rozelle took P-30, and C.C. Johnson took Mulvihill.

- The sixth annual Bladder Grabber, up in Washington, saw Phil Granderson finally take the Kent classic and the lion's share of the \$3800 worth of Carver Corp. stereo equipment. Others getting the goodies were Norm McFadden, second; Gene Pape, third; and Gary Byerly, fourth. The meet was marked by much good flying and a lot of engine problems. About a dozen Combat Specials and a couple Supertigres were seen spewing their innards out the exhaust during the two day meet. Bob Carver, meet sponsor, himself went out in the fourth round. Granderson bested all comers in the triple-elim contest.

- The Boeing Management Meet this year was won by young Jim McClellan of Burlingame, California. We count Jim as a personal friend, and we can testify that he's a real, dyed in the wool modeler from the old line WAM family. Jim competed in 12 events over two days to earn his win. He's still a Junior, and he took Junior Stunt at this year's Nats. Here's his record at Boeing: firsts in Combat and Carrier, seconds in Goodyear and Stunt, plus placings in FF, Rocket, and Indoor events.

As usual, the Boeing Scholarship Meet was

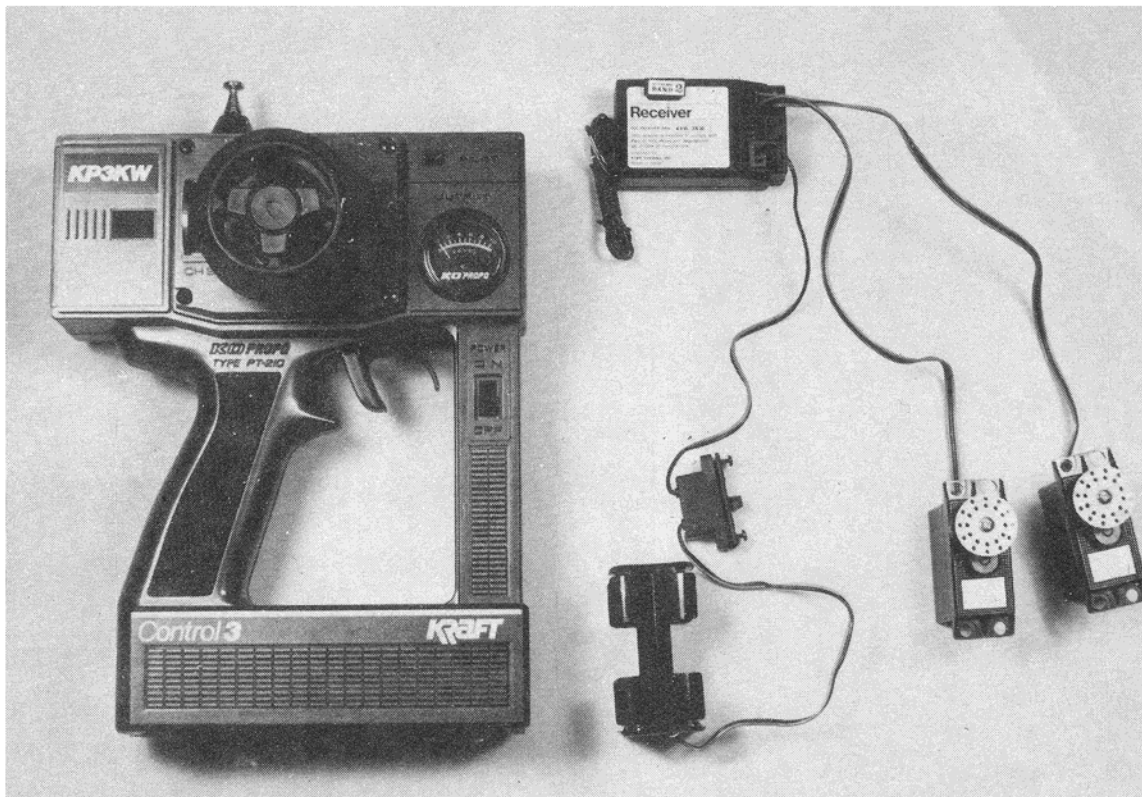
accompanied by an Open contest. Ted Fancher, Gary McClellan, Dan McClellan and Dave Fitzgerald all came up from the Bay area. Their attendance encouraged a good turnout of locals in Precision Aerobatics (Stunt). Fancher won in Open with scores of 555 and 522.5. Paul Walker came in second with 482.5 and 546.5 to beat Gary (Poppa) McClellan who thirded with 521.5 and 524. Dave Fitzgerald followed with 509 and 515. Bill Skelton took Open Carrier; Dick McConnell, FAI Combat. Dick Salter took the Northwest Sport Race with 8:39.6 in the feature.

- The Mini-Samchamps up in Michigan was a complete deal with a Saturday Nite Bean Feed and Engine Collecto. Bill Hale pulled a double win by taking AB Cabin with a yellow Dodger and Pylon (C) with a Zipper cum Vivell .35. Harry Murphy took first in Slag Engine with his Ranger and Thor .29 and followed this with a second in 1/2A Nostalgia with a Spacer. On Sunday, he pulled seconds in both Replica and AB Pylon (with a Zipper). Ken Hopkins took OT Rubber. Dave Willis took 1/2A Nostalgia with a Ram Rod 250; Elmer Jordan, ABC with a Ram Rod and a Fox .25. Bock Zehr's Playboy Cabin with Cyke took C Cabin, and Jim Robinson's Alert powered by an O&R .23 took AB Pylon.

- The Central Ohio Meet at Wright-Pat saw Rol Anderson take both A and B Gas. Norm Poti took C; Dick Covalt, D. Rudy Kluiber took Replica; Bill Hale, Nostalgia. Denny Dock took 1/2A. Wind direction was unfortunate and a few flyaways went off the field. Gib Robbins' Satellite went out over Huffman Dam and a couple local kids spent most of the afternoon getting the ship back on base through AF red tape.

- Other flying at Wright-Pat included the Central Indiana Mid-East OT's and the Northern Ohio FF Meet. A rundown of winning designs at the OT's shows: Zippers, Sailplane, Ram Rod, a Sandy Hogan and a lone Banshee. Rubber ships included a Foo-2-U, a '41 Hall, and Lanzo designs. Winners at the NOFA Meet included: Murphy, Chuck Jones, Gil Morris, Bill Hale and Larry Willis. Guy Scott took Towline; Mike Richardson, P-30.

- The 5th annual Tri-County Control Line Meet in Lebanon, Conn., was plagued by gusty winds. Nonetheless, Dave Cook took Expert Stunt; Matt Dube, Advanced. Leon Bowen took Beginner; Dick Carville, Intermediate. Steve Sacco made it a clean sweep in Combat by taking Slow, Fast and 1/2A. Glenn Simpson took Class I, II, and Profile Carrier with scores of 311.8, 325.6, and 286.1 respectively. The last event was flown to CLAN .40 rules. Brian Silversmith took AMA Profile Carrier. Mike Nassise pulled seconds in both Profile classes, plus a third in Class I. Several Carrier ships were totaled in the wind, and Stunt ships were badly damaged.



PHOTOGRAPHY: BOB ABERLE

New Kraft KP3KW R/C system intended expressly for use by boaters and car drivers. Pistol grip transmitter is new innovation. Nice.

An FM Product Review:

Kraft System's K-Line, KP-3KW

By Bob Aberle

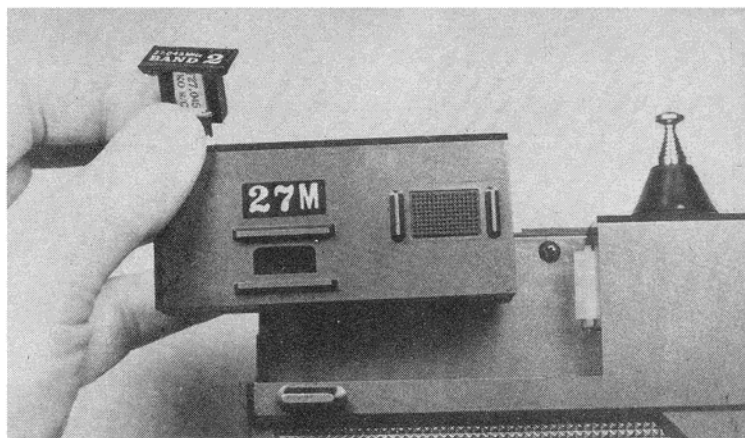
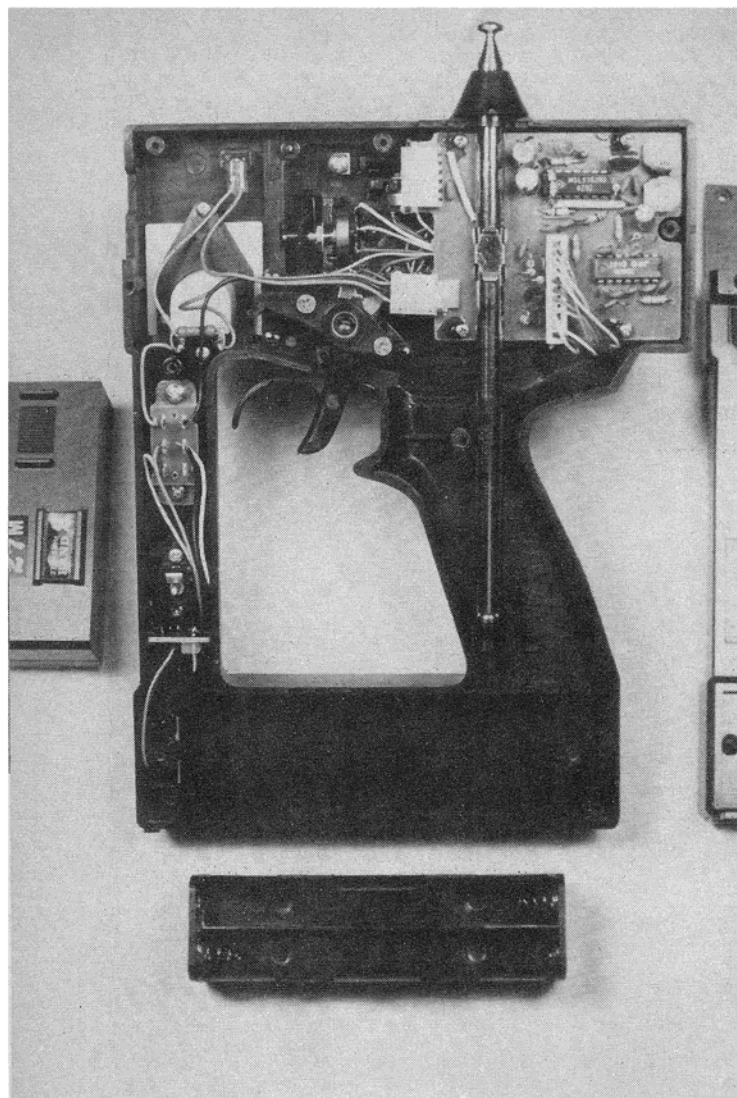
Kraft takes aim at the R/C car and boat racers
with this new feature packed import.

As pointed out recently in another product review, the R/C car and boat operators are finally getting some individual recognition by the radio control system manufacturers. Up until recently these special interest groups had to resort to standard aircraft type R/C transmitters with control sticks or a "hybrid" type unit employing a steering wheel along with a spring return throttle lever. At the beginning of 1981 several new concepts in special purpose radio systems were introduced expressly for the car and boat enthusiasts. The system previously reviewed consisted of a two piece transmitter featuring a separate control head (containing the steering and throttle control functions). The system to be described here is another new concept: a self contained, pistol grip transmitter with integral steering wheel and special trigger grip throttle.

The specific radio system to be reviewed is

the new Kraft Systems "K-Line", Model KP-3KW. This new Kraft series is imported from Japan. It has a list price of \$219.95. The basic system consists of a three channel transmitter and receiver, dry battery holder with integral switch harness, two servos; an assortment of servo output wheels and arms and mounting hardware, an adjustment tool for use with the special controls, frequency flag and an instruction manual. This particular "K-Line" model radio system is presently only available on the 27 MHz band. Kraft has indicated that 72-75 MHz frequencies will be available in the near future. The 27 MHz band is still very popular with R/C car and boat enthusiasts because it is legal to change channels by substituting crystals in both the receiver and transmitter (Note: It is still illegal to change transmitter crystals on the 72-75 MHz R/C frequencies). Keep in mind that the price quoted for this system *does not* include

R/C racing cars



Inside the special new transmitter (left). Removable battery box at bottom. Trigger control is ball bearing supported. Removable RF module at far left. Close up of RF module (top). In addition, the crystal can also be changed on the 27 mHz frequencies. That is legal on that band. Special controls (above). Rudder is actually steering. Dual rate and servo reversing.

any batteries. You will have a choice when it comes to selecting the battery power for this system. These options will be discussed later.

KPT-3KW Transmitter

This new transmitter is, of course, the key item to this system. As you can see in the photos, the transmitter is a single, self-contained (not a two piece), unit. It is meant to be held by the left hand using a pistol type grip. Your left index finger operates the throttle lever which resembles the trigger of a pistol. This leaves the right hand free to grip the steering wheel. The idea here is to combine the feel of a slot car trigger throttle, along with a steering wheel for turn control, into a single transmitter package. The one problem, as you might guess, is that a left handed person would be out of luck attempting to use this unit. In all fairness, that same comment would apply to all of the new special purpose R/C car/boat transmitters being offered.

The KPT-3KW transmitter measures roughly 8 inches in height, 6 inches wide and 4 inches thick (including the steering wheel projection). It is quite light, weighing only 23 ounces when fully loaded with batteries. The eight section whip antenna extends to 41 inches in height. It can also be fully collapsed for storage purposes which is a convenience on this type of unit. The quoted list price *does not* include any batteries. As such, you must purchase a set of eight alkaline type (A-A size) cells for insertion into the transmitter battery box. The batteries are located at the bottom of the transmitter. This was a good design choice

since the weight of the batteries tends to balance the transmitter when the antenna is fully extended. The eight alkaline cells provide 12.6 volts (nominal) at no load. Total transmitter current drain was measured at 115 MA. Transmitter power output was noted at 750-800 MW (milliwatts) (5 watts is legal on the 27MHz frequencies). You could also purchase an optional nickel-cadmium rechargeable battery pack from Kraft Systems (Model KB-8KW which lists for \$29.95). It's just a matter of substituting battery boxes. A charging jack is already provided for your convenience should you choose this option at a later time. You can not use your existing Kraft battery charger with the new "K-Line" series because the connectors are different. It will, therefore, be necessary to purchase a new model KBC-KW charger (list price \$16.95).

The steering wheel is ball bearing supported. It measures 2 1/2 inches in diameter and has a rubber covering to prevent your hand from slipping off the wheel. As received this steering wheel can be rotated plus or minus 35 degrees (total movement of 70 degrees). You can, however, reduce this amount of steering wheel travel by inserting a small plastic spacer which is supplied with the system. The procedure is easy to follow and takes little time. Steering trim is accomplished with a small lever which is located just above and actually behind the steering wheel. As such it is difficult to operate this trim lever since your fingers can easily get caught between the lever and the wheel.

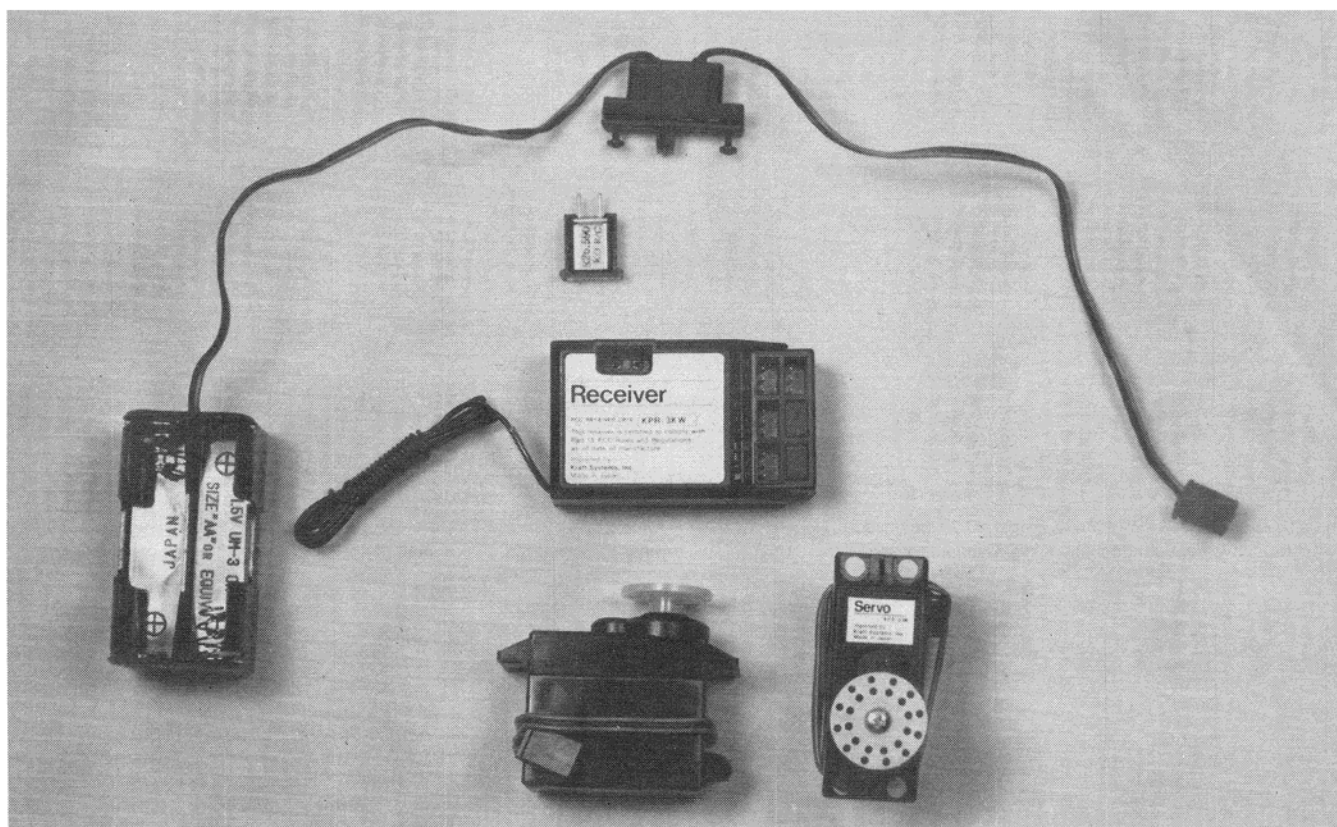
A relative power output meter is provided

with a large face for easy reading. In addition, a red pilot light, located above the meter, glows while the power is on. The power on/off switch is recessed into the right side "handle".

The trigger type throttle lever employed here is quite interesting. First of all, it is supported by a ball bearing which is important for both good control resolution and minimized wear. Best of all, the trigger can be operated in both directions. If you pull on the trigger, as you would with a pistol, the car will accelerate (throttle servo advances on one side of neutral). There is also a second trigger lever that lets you "kick" the throttle control in the opposite direction. This feature can be used for either the application of brakes or possibly for motor reversal in the case of the electric powered cars. The throttle channel also has a separate trim lever which is located in a vertical position, just to the right of the steering wheel. It also has a ratchet device to prevent accidental movement of the control.

A third proportional channel is also available on this transmitter. It is another lever, mounted in the vertical position to the left of the steering wheel. Again this lever has a ratchet device. Separate trim is not available on this auxiliary channel. This third channel would be most likely of interest to the R/C boat operator for pitch trim or needle valve adjustment purposes. Keep in mind that you must purchase, separately, a third servo since the system only comes with two.

If you haven't already guessed, the KP3KW transmitter comes with a set of spe-



The components that go into your car or boat. System comes with battery box which holds four A-A alkaline non-rechargeable batteries.

cial controls. These controls are located behind a removable plastic plate which can be found in the top left corner of the case (behind the KP3KW model marking). Behind this plate you will find dual rate control for the steering channel, steering balance and servo reversal switches. Let's talk about these special controls and specifically how they worked on my evaluation radio. Normal steering control (dual rate switch at "normal") will produce servo travel of $+45^\circ$ to -48° (total of 93°). Steering trim travel (channel 1) amounted to $+9^\circ$ to -9° (total trim travel of 18°). Right steering (or rudder as it was marked on my set) balance control reduced the servo full travel from 45° down to 22° . Left rudder balance reduced the servo travel from 48° down to 25° . These controls did tend to interact somewhat. For example: when moving the left steering balance control, the right channel travel would also move to a degree. You will have to get use to this fact. The rudder or steering balance are therefore end point adjustments that let you set more right than left or vice versa.

A rudder or steering "kick down" control is also provided. "Kick down" is another name for dual rate control. In this case you get a choice of two separate kick down levels or positions. Beside the "normal" position you can set the steering channel to a kick down "A" or "B" position. Each position has its own individual pot adjustment. In either position I was able to reduce the steering servo travel all the way down to 17° . Remember, this is like a span control, it reduces both extremes of

servo travel at the same time. To adjust these control pots you will need a small screwdriver (Kraft provides one with the system). You could set up position "A" for mild control reduction and position "B" for drastic steering control reduction (possibly for very fast track conditions). The big problem here is that the dual rate switch (three position type) is very small and hard to find, let alone operate, especially under running (track) conditions. Likewise, you can't, in a practical sense, adjust the control reduction pots while the car is in motion. A big pot control knob on top of the transmitter case would have been more helpful. By the way, switching the dual rate controls in and out, *does not* affect the servo neutral position (an important point!).

The final special controls are for servo reversing (both the steering and throttle channels). The throttle channel adjustment has two reversal switches (one small slide switch and the other about twice the size for identification purposes). This gets a little complicated, but what it does is the following: you can have throttle trim effective at low speed only; throttle trim effective at high speed only; servo reversed-throttle trim effective at low speed only and servo reversed-throttle trim effective at high speed only. This is a part of the two way throttle trigger motion which was described earlier. Race car operators are especially going to like this feature.

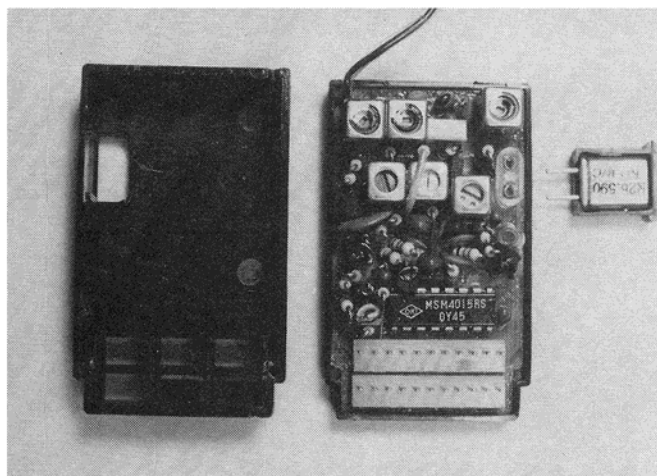
One final point on the transmitter. It contains an externally mounted and quickly removable R-F module. In addition, the crystal can be changed within the module so that you

can easily switch channels before a race (again remember, this is only legal on the 27 MHz band).

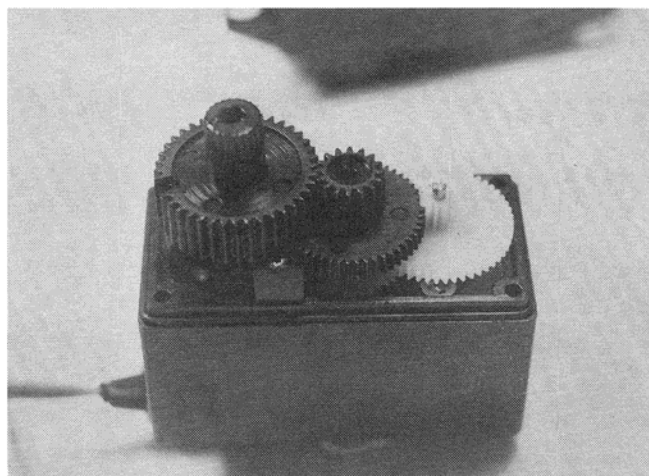
Other Components (briefly)

The KPR-3KW receiver measures $2\frac{3}{8}$ inches long \times $1\frac{1}{16}$ inches wide \times $\frac{13}{16}$ inch thick and weighs 1.5 ounces. It employs plated Molex type connectors as seen on many of the Japanese imported systems. These connectors will not interface with the regular Kraft Multicon connectors. The receiver crystal can be easily removed for frequency changing purposes from the outside of the case.

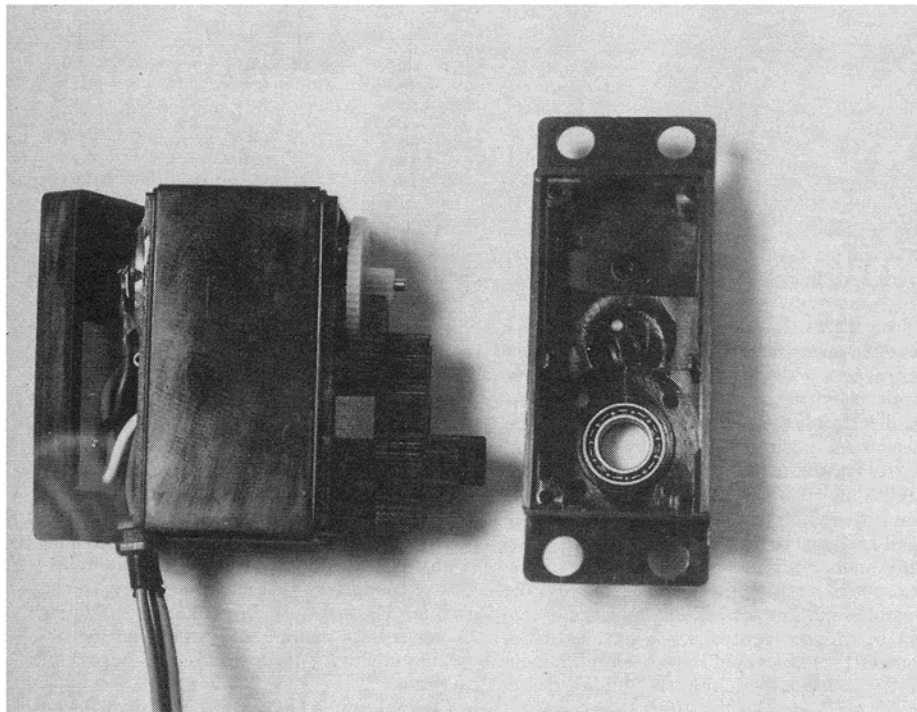
Servos supplied with this system are designated as model KPS-23K. They are also imported. Keep in mind that these servos have coreless motors. Each servo measures $1\frac{1}{8}$ inches long \times $1\frac{1}{8}$ inches high \times $\frac{13}{16}$ inch thick (less output arm and mounting flanges) and weighs 1.6 ounces. The output shaft is supported by a dual ball bearing and has a spline gear on the hub for easy servo neutral positioning. Each servo comes with a $\frac{7}{8}$ inch diameter and a $1\frac{1}{2}$ inch diameter output wheel, plus three types of "star" output arms. Servo gears, as can be seen in the photos, are very heavy duty (much thicker than you are normally used to seeing). A waterproof gasket keeps the servo dry (good for boat and off-track car racing). Another interesting feature is the fact that the feedback pot is *not* directly coupled to the output shaft. Kraft specifications indicate that the servo output is 3.2 kg/cm (which is equivalent to 44 in./oz. of torque)



Inside the Kraft KPR-3KW receiver. Single I.C. in the decoder. Note removable crystal for convenient channel changing. Connectors are Molex.



Close up of the workings of the Kraft imported KPS-23K servo. Double ball bearing supported output shaft. Very thick servo gears are used. Hefty.



Another shot of the insides of the KPS-23K servo. Note the ball bearing and beefy gear train used here.

and that the transit time is 0.3 seconds for 60 degree rotation (not 90 degree but still very fast). Neutral spacing is 1.4 milliseconds as it is on most other Kraft R/C systems (the exception being the Kraft Sport Series Models KP-2A, 4A and 6A which has a 1.9 M.S. neutral spacing). In actual testing the servos were quite fast. Neutral centering after returning from full control throw was within $\frac{1}{2}$ degree or less on the steering channel and within 1 degree or less on the throttle channel. The $\frac{1}{2}$ degree centering is generally found only on the very best (aircraft intended) R/C systems.

Receiver power is normally provided from a pack consisting of four alkaline (A-A size) cells which you must provide. The battery holder

for these cells measures $1\frac{1}{4}$ inches square \times $2\frac{1}{4}$ inches long. It has an integral switch harness. Weight of this pack, with the batteries installed, is $3\frac{1}{2}$ ounces. You could easily substitute a nickel-cadmium, rechargeable battery pack if you like. Kraft offers a special *five cell pack* designated as their model KB-5KW which lists for \$21.95. The extra nickel-cadmium cell will produce roughly the same servo speed as can be obtained with the higher voltage alkaline pack. For electric powered cars and boats you can easily hook up the receiver and servos directly to the main power source. This receiver has a built in voltage regulator circuit that permits safe operation from 4, 5 or 6 cell nickel-cadmium motor system battery

packs. As a convenience Kraft will offer a complete nickel-cadmium battery conversion set for the KP3KW radio. This special set is designated as their P/N 350-024KW and will list for \$64.95. The set will consist of the KB-8KW transmitter battery pack; the five cell KB-5KW car or boat pack; a switch harness that contains a charging jack and the KBC-KW dual output charger.

Just a brief note on power consumption. The receiver idles at 8.5 MA. (on four alkaline cells — 6.0 volts nominal). Adding two servos, the total idle current was only 18 MA. Pulsing one servo in continuous motion I measured the current drain at 300 MA. With both servos in motion the drain was 500 MA which is a little high. It is the price you pay for high output, highly accurate servos.

Warranty and Service

The now standard Kraft warranty applies in this case as well. It initially covers a period of 90 days. It is further extended for a total period of six months from the date of purchase provided in the judgment of Kraft that the components or system show only reasonable wear and tear. All service on the new Kraft (imported) K-Line will only be performed initially at the factory facility in Vista, California. However, Kraft is planning to authorize select Kraft Service Stations throughout the country to service the K-Line series in the near future.

Summary

I found the Kraft KP3KW radio system a refreshing new addition to the R/C car and boating sections of our hobby. I liked the basic transmitter concept and especially the trigger throttle. I didn't like the fact that the steering "kick down" or dual rate level couldn't be adjusted while the car or boat was in motion. All in all, it still is a fine working radio system which should prove quite interesting on the competition trail this coming year. For more details about the other new Kraft K-Line models I suggest you write for a detailed brochure (Kraft Systems Inc., 450 W. California Ave., Vista, California 92083).

Starting Line

By Jack Russell

Hot weather, late nights, early mornings, heated racing, endless thrashing, unbearable humidity, heated racing, tons of junk food, Buckaroos, rain delays, instant rule changes, heated racing, brain fade, sunburn and exhaustion... the 1981 Sanyo/ROAR Nationals featured all these things and much more.

This year it was the east coast's turn to host the Nationals and the site selected for the annual event was Rattey's Raceway in North Attleboro, Massachusetts. The last week in July and first week in August were set aside for the Nats, with the $\frac{1}{8}$ gas cars doing their thing the first week and the $\frac{1}{12}$ electrics closing out the racing the second week.

Since last month's Starting Line column described who won what race with what equipment, this report will take a look at how those results will influence the hobby, as well as some of the other events and the people who were involved in this year's Nationals.

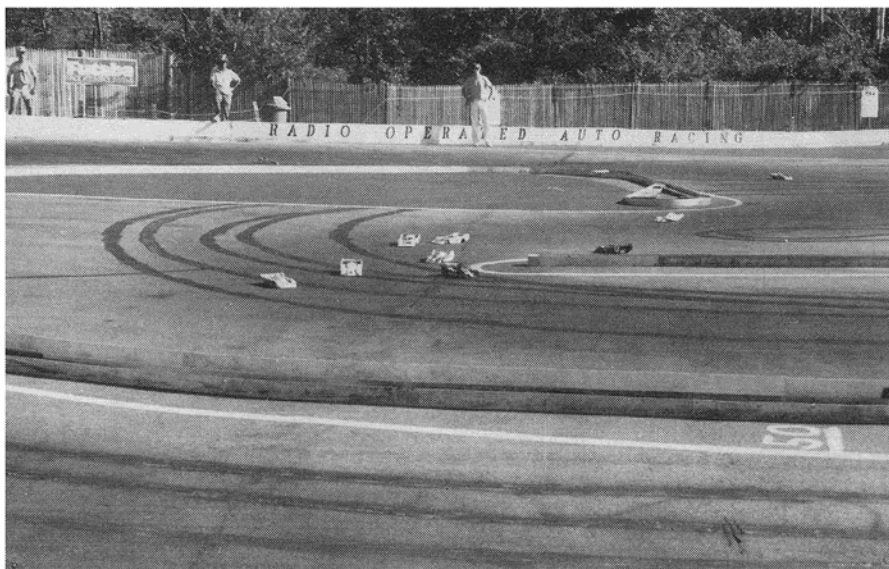
Trends

There is no doubt that chassis suspension is the one area which has received the most attention from designers and manufacturers. That goes for both $\frac{1}{8}$ and $\frac{1}{12}$ cars.

Rick Davis won the $\frac{1}{8}$ Can-Am A-main with a prototype of the Associated suspension car. Other Associated prototypes were in the A-main. Gary Kyes, of MRP, was running strong with his Alpha car, also independent suspension, until a blown engine put him out of the A-main. There were other drivers using suspension cars in the lower $\frac{1}{8}$ gas mains. Since the track at Rattey's was rough (due to swells and cracks in the blacktop), the suspension cars seemed to have the performance edge over the more standard non-suspension cars.

Following the Can-Am finale, Rick Davis and Bill Jianis, both Associated drivers, were singing the praises of the suspension cars. They did mention that the increased cost of the suspension cars might force some of the independent competitors, who do not have factory backing, out of racing. That is a fact to be considered. The suspension cars are more expensive than the solid chassis cars which have been winning up to this point. (It should be pointed out that the solid suspension cars do not necessarily have to take a back seat to the independent suspension machines. Art Carbonell won the World Championship in July with a Delta Super J, which does not employ independent suspension. He was competing against some very sophisticated suspension cars.)

Associated kept the wraps on a new prototype $\frac{1}{12}$ car until the second week of competition when the electrics took over the track at Rattey's. Dubbed the "wonder car", the new Associated prototype employed a wedge shaped chassis with the rear blocks mounted to a separate fiberglass plate. The rear assembly and the chassis were bolted together, with



PHOTOGRAPHY: JACK RUSSELL

Mike Lavacot leads the field through the infield in the 6-cell Stock A main. The electrics had a little more trouble with the rough track surface than did the gas cars. Track was large for $\frac{1}{12}$ scale cars.

some nylon blocks and a second shaker plate, to form a type of suspension for the entire rear portion of the car. Although the additional parts may have increased the weight of the car, as compared to a comparable production RC12E, the extra weight may have been an advantage on the rough track. In talking with Roger Curtis of Associated, he seemed very pleased with the performance of the new prototype.

The MRP team, which took three of the five electric events at the Nats, was, for the most part, running stock, out-of-the-box GP-12's. One team member did run a modified GP-12 which employed a sprung rear axle. This was done by taking the stock rear blocks, elongating the hole for the nylon bearing blocks, and allowing the bearing blocks to ride up and down in the elongated hole with a spring providing tension against the axle bearing blocks. If you were active in slot racing a few years ago you might recall the Dynamic suspension cars. The MRP "floating" rear axle is quite a bit like the Dynamic slot car suspension.

So, it looks like suspension is the way R/C race cars are headed. Both of Associated's prototypes, $\frac{1}{8}$ and $\frac{1}{12}$, will eventually be put into production. You can look for MRP to offer the sprung rear blocks for the GP-12 as an option.

Admittedly, I did not get to see much $\frac{1}{12}$ racing at the Nats. It does seem to me, after watching the Can-Am finals, that the suspension cars did have an edge on a rough track like Rattey's.

I attended all the $\frac{1}{12}$ races and competed in all the outdoor events, so I got a good look at what went on in the electric events. In all hon-

esty, the stock MRP GP-12 cars were the most impressive on this track. (MRP also took away three National titles with the GP-12, as they won Production, 4-cell Stock and 6-cell Stock.)

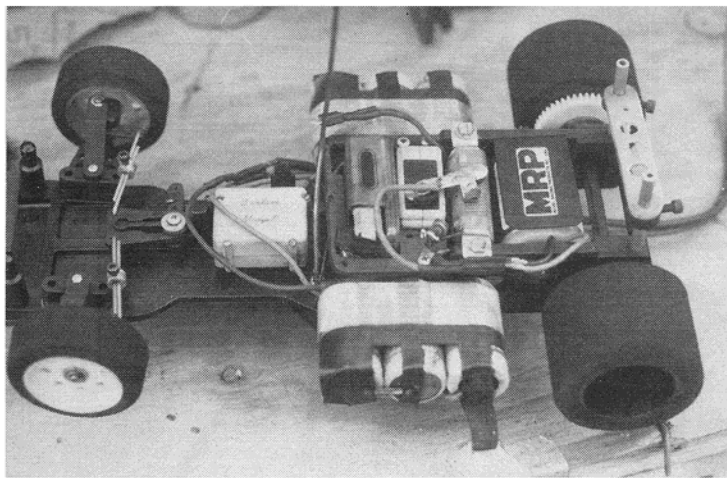
The JoMac Lightning 2000, which won the 6-cell Modified A-main with Ralph Burch, Jr. at the controls, and the Parma Panther, both use front suspension with each front wheel independently sprung. These cars performed well both indoors and outdoors.

Happenings

In what must be a Nats first (at least according to many of the old timers I talked to), a procedural rule regarding $\frac{1}{12}$ stock motors was changed on the spot at the conclusion of the 6 cell Production A-main. Drivers select their stock motors from a "grab bag" when their cars are teched-in. If the first motor picked is a slug, the drivers get two more chances to select (read as buy) a better motor. Those were the rules outlined in the Nats registration package.

After the Production A-main was completed, one of the motors used in the A-main was the subject of a protest. ROAR president Mike Reedy and the race committee were faced with a touchy situation. If the protested motor was torn down and found to be illegal because of a manufacturing error which might have caused the winds to be wrong, he would be forced to disqualify a competitor who had nothing to do with the "flaw" in the motor.

In an effort to handle this problem, and any others like it which might arise, Mike Reedy decided that all A-main drivers in stock class events at the Nats would turn in their motor



Joel Johnson's MRP GP-12 brought him A main wins in both 4 and 6 cell stock. Car is virtually stock. Note full-on wiper arm contact. Different.



Jim Aguirre's graphite rail Associated experiential car. Radio tray has no front post mount. Steering servo on chassis. Note narrowness of rails.

and be issued new ones for the next event. That would take the "freak" motor out of the competition and make the racing more even, while not penalizing a driver for having selected a motor which would be found to be illegal because of a manufacturing defect.

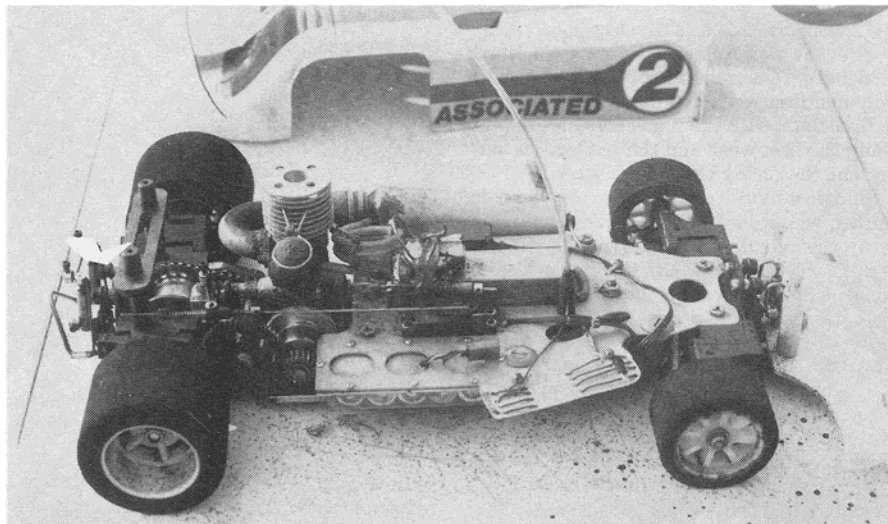
The decision was at that time good and bad. Since the motor was provided by ROAR, the driver who picked a "freak" motor could argue that he or she be allowed to keep that motor. Depending on how much of a "freak" such a motor would be (how much the winds differed from a stocker), the majority of the drivers would have to race against a hotter motor. There are other arguments to be made on both sides of the coin.

ROAR's Nats rules are marginal at best. With something as important as a national championship hanging in the balance, it would be nice to see detailed rules incorporated for the running of all future Nationals.

Current ROAR president Mike Reedy realizes that the rules need improving and has already made an effort to see the problem areas cleared up. Another problem facing ROAR is an upgrading of the actual running of the Nats. As evidenced by the 1981 Nationals, ROAR must make sure that the person, or club, running the Nats has enough people to help put on the two week race. Bill Rattey put on the Nats almost single handed and I think the event suffered because of the lack of lap counters, timers and marshalls.

The general ROAR meeting took place after the banquet at the conclusion of the 1/8 racing. No major rule changes were voted on at this meeting. Gene Husting, of Associated, suggested that a manufacturer's or Pro class be set up for the Super Stock 1/8 gas class of racing. Currently, Super Stock rules forbid factory sponsored drivers from competing. This was done in the hope that the club level racer could compete against others like him in a national event. In addition, Super Stock rules currently limit the equipment being run so that exotic, prototype cars are not allowed to compete.

This Nats report would not be complete, or truthful, if I did not mention the tactic of blocking (also known as taking-out) which seems to have cropped up in the mains which feature team against team. Some folks obviously feel that blocking or taking out a front running member of another team is a perfectly acceptable way to drive. Maybe I'm a die-hard, but if I had the ability to make an A-main at the Nats I would certainly not jeopardize my chances of a good finish by taking



Rick Davis' Can-Am winner is an Associated prototype independent suspension car. Version of car seen at Nats used "O" rings for springing. Rick ran an OPS engine. He called it "a victory for the fat guys."

out another driver so that some other member of my own team could win. Blocking and take-outs are an unnecessary part of this hobby. If a driver doesn't think enough of himself to give it his all in any race he or she is in, then maybe they should drop out and take up a less competitive activity... like collecting aluminum foil. If victory must be won through the use of blocking and take outs that victory is worthless.

People

One of the nicest parts of attending a Nationals is meeting people. Since this was my first ROAR Nats, I had a lot of catching up to do as far as meeting folks.

It was nice to finally catch up with Gene Husting of Associated. I have known of Gene since the early slot racing years of the early 1960's. Gene was particularly active in 1/25 scale drag racing. He wrote a number of magazine articles back then and I can remember using a number of his tips and construction practices on my own dragsters. I also got to meet Gene's lovely wife Midge and renew my acquaintance with Roger Curtis.

After our numerous telephone conversations concerning such diverse topics as R/C cars and bass fishing, I finally met Rick Jordan of Bolink. Rick and Tim Morton headed the Bolink factory effort. Tim and I seem to get together at the trade shows and finally we

both made it to a major race.

Bob Novak, of Novak electronics, gets my nod for the Nats good guy award. After stripping a servo gear (Novak Bantam Midget, naturally) in a bout with the boards, Bob rebuilt the servo before my first qualifying heat of the day. I was not the only one who benefited from Bob's helpfulness. Thanks Bob.

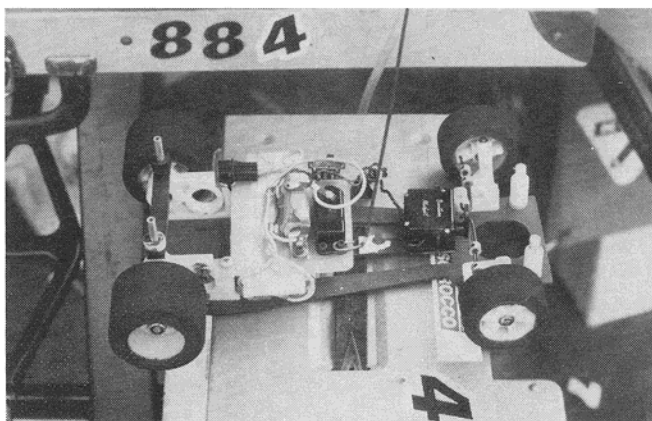
As you may know, Sanyo was the sponsor of this year's Nats. Pat Takeda, of Sanyo's national accounts sales department, was in attendance for most of the 1/12 racing program. Pat began the week with an elementary knowledge of R/C racing, but at the end of her stay was well on her way to becoming a knowledgeable race fan and supporter. As a matter of fact, Pat tells me she's looking forward to getting her own car and competing in races in the New York area. It was a pleasure to meet Pat. With her enthusiasm, Pat will be one of the hobby's great supporters. That should be a real plus for racing in general.

Gary Kyes, of MRP, also deserves a pat on the back for his assistance in running the 4-cell indoor events. Gary took time out of his own busy racing schedule to help out. Don McKay of Jomac did the same and also deserves kudos for his helping hand... especially as a flagman.

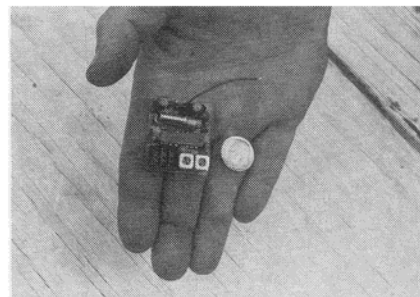
Despite the problems, a good time was had by almost everyone. If you get a chance to attend the Nationals, don't miss it. (C)



Top three drivers in 6 cell Stock A main. Joel Johnson (center) was the winner. Mike Lavacot (left) third, Butch Berney was runner-up to Joel.



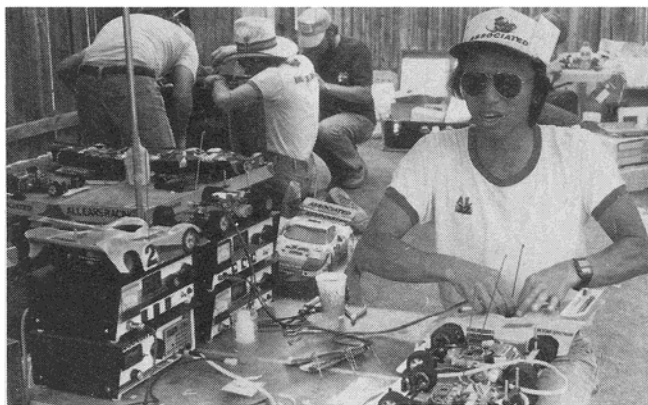
Mike Lavacot's graphite wedge experimental Associated car. This is not an exact duplicate of fiberglass pan. Note radio tray and steering servo.



Action in the MRP pits just before Stock A main (left). Joel Johnson in front, Jim Welch partially hidden, Gary Kyes and Ed Janis. Ernie Provetti (left rear) tries to sell them all Trinity motors. Prototype Novak 2 receiver (above). Note size compared to dime. Receiver not in production. Hand courtesy Gary Kyes. We arm wrestled for dime after photo was taken. Gary is now rich.



Can-Am A main winners (above). From left, Rick Davis winner, Ralph Burch 2nd, Bill Jianis 3rd, Curtis and Gene Husting, 4th and 5th. Driver's stand at Rattey's indoor track (below). Note narrow lanes. Driver's track.

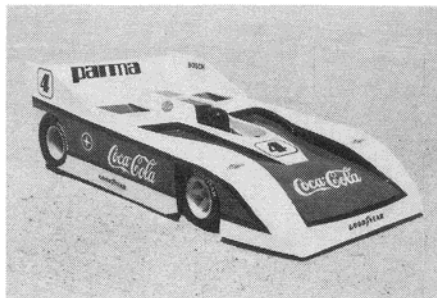


Al Chuck of the Factory (above) prepares for 6 cell race. Al makes custom accessories including hand painted drivers. Associated pits (below). Mike Lavacot (left), Randy Tentschert (foreground), Kent Clausen prep cars.

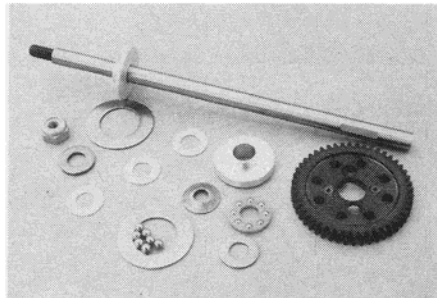


Pit report

DELTA MANUFACTURING, INC., 27 Racecar Court, Lorimer, IA 50149, brings its extensive experience with $\frac{1}{8}$ gas racing to $\frac{1}{12}$ electric racing with the introduction of the CMK120 Phaser Chassis modification kit. This chassis kit features a fiberglass chassis plate and radio tray. The completed car has an extremely low center of gravity which gives improved steering response and overall handling. The chassis has adjustable front suspension caster to control throttle steering. The motor mount is machined from aluminum and provides rugged construction as well as acting as a heatsink. The chassis uses Associated wheels, axles and differential to complete the assembly. For more information write to the above address.

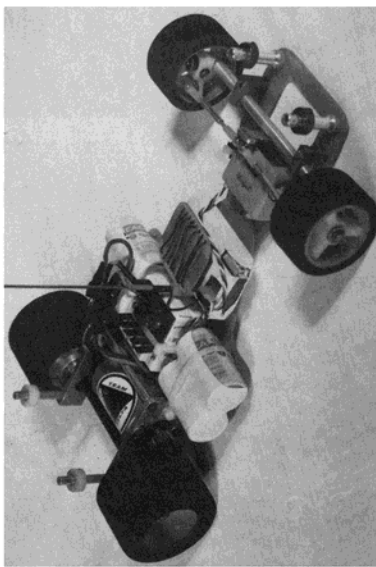


PARMA INTERNATIONAL, INC., 13927 Progress Parkway, North Royalton, OH 44133, has expanded its line of $\frac{1}{8}$ scale bodies with the introduction of the Holbert CAC. This body is made of lexan. For more information write to the above address.



PARMA INTERNATIONAL, INC., 13927 Progress Parkway, North Royalton, OH 44133, announces the availability of the Parma Associated differential. This world famous differential is now being used in the Parma Panther car. Parma Tiger quick-change wheels are designed to fit this differential. For more information write to the above address.

JOMAC PRODUCTS, INC., 12702 N.E. 124th Street, Kirkland, WA, 98033, has a new Lexan chassis designed to be used with their Lightning 2000 car. The use of Lexan as a chassis material is a departure from the more common G-10 fiberglass and graphite chassis plates currently in use. JoMac claims that the Lexan chassis is less susceptible to stress and bending than either fiberglass or graphite. Unlike the G-10 glass or graphite chassis, the Lexan chassis will not take a temporary set when the car strikes the boards. The Lexan chassis does not require any time to settle out from a crash. In addition, the Lexan chassis



can be used from 0-150 degrees Fahrenheit without warping. For more information write to the above address.

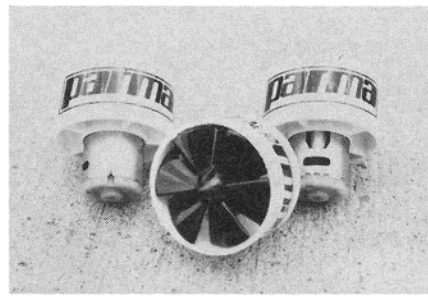
K-TOOL, Division of Kalee, 2041 Winnetka Ave., No., Minneapolis, MN 55427. The K-Tool Division of Kalee Products, Inc. has released a new universal airbrush filter—universal in that it will fit all brands of hobby airbrushes. Kalee is no stranger to the hobby industry.

This filter will undoubtedly receive wide attention, in time to come, for it is not a gimmick or a jimcrack. Even experienced airbrush users often do not realize the amount of dried or lumped pigment particles in even the best bottles of modelers' paint.

In the April 16, 1981 issue of the Con-Cor newsletter, the editors commented on this filter. It seems that their Manufacturing Division masks and airbrushes their more complicated paint schemes—especially those using three or more colors.

The newsletter went on to express surprise about the amount of gunk filtered out when they tried the new K-Tool filter. The paint finish was so dramatically improved that the filter is now required equipment for all airbrushes in this division of Con-Cor.

The filter requires the purchaser to cement his paint feed tube to the filter cap with Super-T Hot Stuff cyanoacrylate adhesive. Owners of a Binks airbrush will want to either switch over to a Floquil-type bottle, or shorten the filter to fit the Binks bottle. Full instructions for this are included in the filter's package.



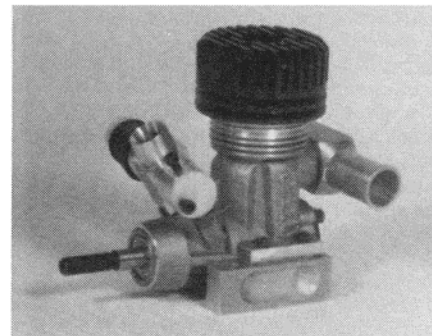
PARMA INTERNATIONAL, INC., 13927 Progress Parkway, North Royalton, OH 44133. Keep your batteries cool while charging them with the Parma #4555 Battery Cooling Fan. This fan can also be used to cool motors and resistors. For more information write to the above address.

BEV SMITH/CARRERA, P.O. Box 225, Old Bridge, NJ 08857, has a two motor, front wheel drive version of the Porsche 936 available in a $\frac{1}{10}$ scale electric racer. The Porsche, #90343, uses a pair of RS380S motors for power. It features a painted Lexan body with pressure sensitive decals. The Porsche is a ready built kit which requires a 2 channel radio and hook-up of the steering assembly to get going. For more information write to the above address.

BEV SMITH/CARRERA, P.O. Box 225, Old Bridge, NJ 08857, is offering a $\frac{1}{10}$ scale electric R/C version of the Ferrari Formula One racer. The Ferrari, #90342, has a differential and rear wheel drive. It features a painted Lexan body and decals. For more information write to the above address.

BEV SMITH/CARRERA, P.O. Box 225, Old Bridge, NJ 08857, has a $\frac{1}{12}$ scale R/C version of the Porsche 935 available. The Porsche kit, #90328, has a differential rear axle with single motor drive. The electric motor used in this ready built kit is the RS540S. The car requires a 2 channel radio and minimal steering linkage hook-up. For more information write to the above address.

ASSOCIATED ELECTRICS, INC., 1928 East Edinger, Santa Ana, CA 92705, makes things a little easier for $\frac{1}{8}$ gas racers with the introduction of the new Ball Differential for the Associated RC300 car. This diff is strong, lightweight, easily and quickly adjustable. The Ball Differential is available complete with rear wheels and tires, or minus the wheels and tires. The wheels and tires are available separately, as is the right hand rear wheel which is required for this differential. For more information write to the above address.



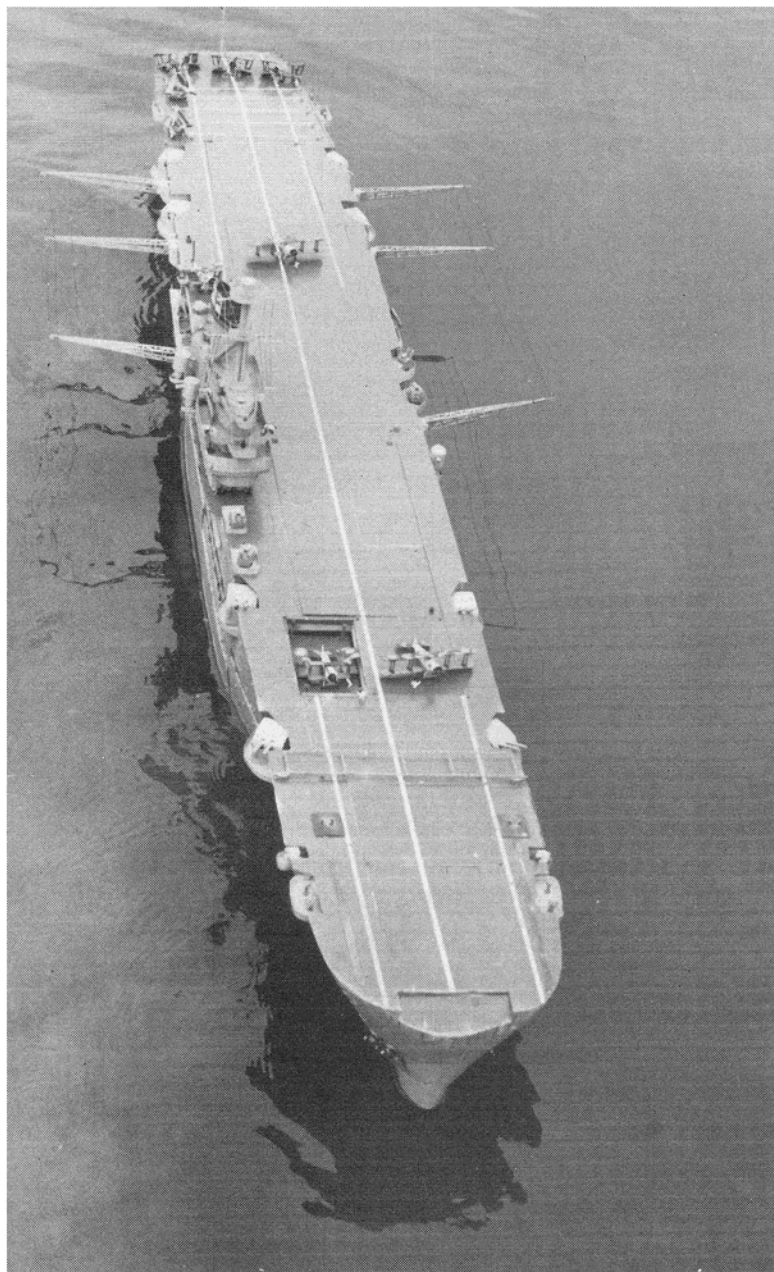
DELTA MANUFACTURING, INC., 27 Racecar Court, Lorimer, IA 50149, is producing a truly state of the art charger with the new model BC804PD Peak Detector Charger. This battery charger incorporates adjustable constant current charging with a detection circuit which senses peak battery voltage during the quick charge cycle. When the battery voltage peaks, the charger automatically shuts off. The charge current is adjustable and this charger can be used to fast charge battery packs from 250 to 1200 mah capacity. Three expanded voltage scales are available on the built in meter. The meter is also sensitive down to 2 millivolts per division so that slight changes in voltage as the battery reaches peak charge can be detected. Once the battery pack is attached and the current level adjusted, no further attention is necessary during the charging process. For more information write to the above address.

H.M.S. Ark Royal

By Bud Lederer

An in depth look at the development
of a super scale ship.

PHOTOGRAPHY: BOB HUNT



Bud Lederer's 1/150 scale Ark Royal as seen from above bow. Real Ark Royal was 22,000 ton carrier of WWII fame. It sunk off Gibraltar in 1941. Bud's model has operational flight deck elevator and radio towers. Realistic.

The legendary career of the H.M.S. Ark Royal spanned only two years in the "dark days" of World War II (dark as far as the British Empire was concerned). But, in the 1939-41 period the "Ark," as she was affectionately referred to by her crew, was perhaps the most celebrated carrier of her time.

Completed in 1938, as the ominous clouds of war were rapidly encompassing Europe, the Ark Royal was the first of the modern carriers and incorporated a number of revolutionary features which future generations of ships of her type would emulate in design.

The Ark Royal's most distinguishable feature was a massive stern overhang which gave her an enlarged flight deck. This enabled her aircraft to be simultaneously launched and recovered.

Unlike American carriers of that period, the British had placed much faith in a steel armored deck as opposed to a wooden one to withstand bomb damage better. Ironically, it was a single torpedo from a U-boat that sent her to the bottom, rather than a bomb blast.

The Ark Royal's operational career, though short, was most eventful. On a number of occasions German propaganda sources claimed to have sunk her, only to be refuted when the carrier made an unscheduled reappearance.

Her biggest moment arrived in the classic Bismark episode of May, 1941. After the notorious battleship had shocked the world in her sinking of the Hood, pride of the English fleet, and badly damaged the Prince of Wales in the Denmark Strait, the Bismark and her consort, Prince Eugen made for safety towards occupied France. With a formidable head start, that no doubt would have eluded a large British naval force bent on retribution, the only remaining margin of hope was to slow up the German's escape via an air strike.

The Ark Royal, which was in the Mediterranean at the time as part of Force H, received an urgent dispatch, instructing her to divert for the Bay of Biscay. Would she arrive on time to be a determining factor?

Exceeding her designed speed of 30 knots, the 22,000 ton carrier, the triple shafts turning at full capacity, enabled her to reach the operational area, there to play-out a decisive role in the dramatic episode.

Two air strikes were launched from her flight deck on May 26th. The first squadron of Swordfish failed in the initial attempt. With chances of success lessened by the approach of dusk, a desperation attempt, perhaps the final, was carried out.

As the fortunes of war would will it, the second sortie managed to achieve the hoped for result. Two torpedo hits were recorded from near point blank range. The Swordfish torpedos immobilized the Bismark's rudder plant, thus impeding forward progress and setting her up for the kill, which came early the next day. Without the Ark Royal's contribution, the hunters would not have been able to close the gap on their quarry.

The Ark was returned to the Mediterranean and saw considerable action in that vital theatre of operations. On a plane ferrying mission to a besieged Gibraltar, her destroyer escort screen was penetrated by the U-81. A single torpedo found its mark on the forward star-

R/C model boating

board side. The hit caused an increasing list and in spite of counterflooding attempts to right her, the list became more acute.

At 01000 hours on November 14, she descended like "a sleeping child" some 50 miles off the coast of Gibraltar. Her crew of 1,625 was safely evacuated, all but for one seaman, who perished in the initial explosion. The loss of the Ark Royal came at a nadir for English sea power. Within two months three other capital ships were to go down. These blows, when coupled with Pearl Harbor on December 7, 1941, were to prove near fatal for allied hopes until the tide of war started to change the following year.

What undoubtedly attracted me to building a scale model version of the Ark Royal was a cover article which appeared in the February 1975 issue of the English publication, *Model Boats*. It was an appealing model by C.M. Voss, and his version in 1/192 scale, featured two standard radio control functions.

A second motive which influenced a decision to proceed ahead at full speed was that the majority of my other ship model inventory of some 10 ships was of the Kriegsmarine variety. To allay the impression that I had pro-German leanings in that direction, a ship of His Majesty's Navy would afford a counter-balance; or at least a start towards that direction.

A number of considerations had to be taken into account before actual construction on the Ark Royal could commence, paramount being reasonable accurate and functional plans. Size was also a consideration. To this end, Model Maker Plan Service, a reputable English institution, has in its vast inventory a building plan for the Ark Royal (reference #MM1212). The only drawback to the print was that it called for the vessel to be built in a 1/1200 scale, which would bring the overall length of the hull to just under 50 inches. That sort of size gets lost quickly in the water (no offense intended for builders of that scale).

Since most of my other surface models range in the 1/100 or 1/150 scale, something along those lines would be more in keeping with an overall consistency. Therefore, the plan was taken to a photo-offset shop and "blown up" by 150%. This step, though moderately expensive, produced several dividends. Namely, the size of the ship was substantially increased to an overall spread of 74 1/4 inches in the popular scale of 1/150. Another advantage in working with full scale plans is that all hull bulkheads could be directly traced off the blue print. Also, superstructure contours, radio masts, armament, and so forth, are all readily visible. A huge time saver over the long haul, the enlargement of the plans was well worth the extra investment.

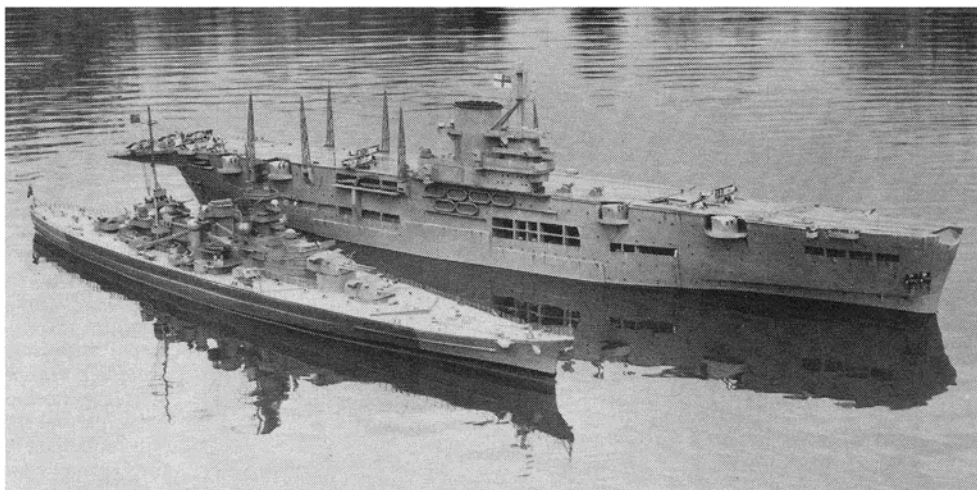
Aside from plans, an extensive number of secondary sources were used as references. The *Encyclopedia of the World's Warships*, and Anthony Preston's *Aircraft Carriers*, contain sufficient photographs and data on the Ark Royal. Air Fix, the English plastic model firm, also made a kit of that carrier in 1/700 scale, which proved a useful orientation point along the way.

Hull

Utilizing the plank-on-frame method, con-



Bud Lederer carefully takes Ark Royal from storage rack as he prepares to launch ship (above). When fully ballasted model weighs 42 pounds. All that weight makes launching a process which calls for much care. In the company of 1/150 scale German battle cruiser Scharnhorst you get idea of size of real Ark Royal (below). Although the two models were posed here for size comparison, real ships never crossed paths.



struction on the hull began. Bulkheads, 14 in all, were traced off the plan contours. 1/8" plywood was used. After they were cut off with a jigsaw, they were notched to accommodate support stringers, and notched again at the bottom to be fitted on the keel. All but the first and last bulkhead centers were then cut out to accommodate the inner workings.

The keel was laid by joining a pair of 1/4" pine strips, and notched to receive the appropriate bulkheads. In this manner, an "egg-crating" effect would be achieved when the bulkheads were placed. Care must be taken that the alignment is consistent throughout. A carpenter's wood type glue was used for the cementing agent.

Initially, pine strips were going to be used as the primary planking source. However, since the hull has a number of interesting double curves, and a complex skeg arrangement, 1/16 x 1/4 inch balsa stripwood, along with other varying sizes was found to be more flexible. The planks were tacked with Hot Stuff, popular with airplane modelers.

A 50-50 mix of Ambroid cement and baking soda was used to fill in seams and imperfections. If you plank the way I do, plan to mix up an abundant amount. It does the job of filling quite well, and sands off rather nicely.

After the initial planking process is com-

pleted and rough sanded, the bow and stern were put on with balsa block. Once again, the curvature of the bow and stern had to be carved, sanded and re-sanded to the called for contour shape.

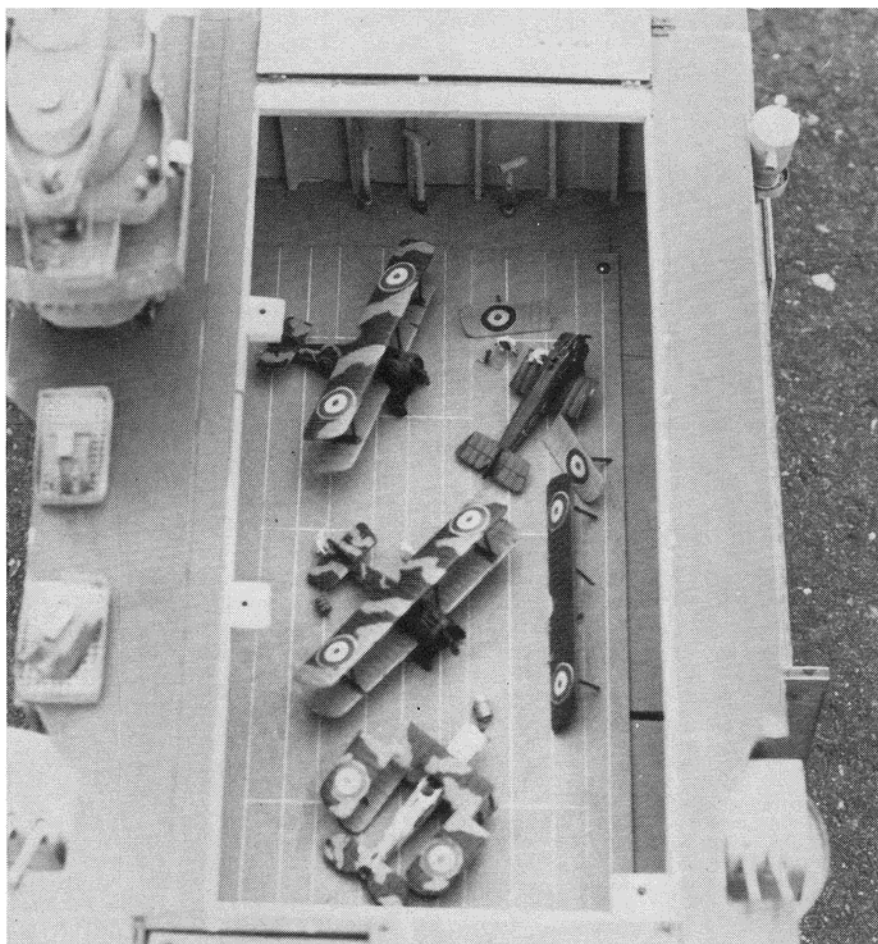
The entire hull was next resined on both sides and then wet sanded. A layer of heavy duty fiberglass cloth was then applied to the outer portion of the hull. Cloth strips of 1-1/4" wide starting from the keel up were laid. A number of cut-outs in the hull, to accommodate the propeller shafts, rudder post, and side openings were all made before (you guessed it) more wet sanding was resumed.

The hull was now ready for painting, well almost. To produce a realistic appearance, rather than the usually sterile look which glassed hulls invariably give, the Ark Royal's hull was next given a "skinning" to represent the outer plate sections.

Aluminum plating

Aluminum sheet, the type readily obtained in print shops (offset printing plates) was strip cut and fitted on to the hull in a staggered arrangement and butted. 3-M Pliobond contact cement was used to hold the plating. After extensive pre-testing, this adhesive was found to be most water resistant.

This extra step is well worth the extra ef-



Close up of forward service deck which features a diorama. Real Ark Royal service deck was used to store planes and housed a machine shop. Tape recorder is below the service deck. Wired for sound.

fort. Not only does the plating greatly add to the realism of the ship, but it also serves to reinforce the hull, which had taken on rock-like strength proportions. The armor belt along the midsection was also fabricated in this fashion. I was determined not to have one single torpedo to do in my Ark!

Next, over 550 port holes were drilled and filed into the hull. Exact-Miniatures of Oxford, Maryland, fashioned the ports from brass stock, which included an outer lip. (They also make excellent propellers to specification.) The ports then were sealed from the inside by a layer of resin.

Painting

A primer coat of Dupont Laquer was sprayed on as the base layer. The upper portion of the hull received a mix of Scalecoat greys, the lower half was sprayed with Duco Oxide Red. Between coats, the hull was wet sanded again, this time with extra fine 600 production paper. In all, six coats were applied. A wash of thinner and a touch of white was oversprayed and steel woolled with a very fine grade. A super light coat of Floquil Rust was hand applied to represent a most realistic weathered look. One must take care not to overdo this last step, or else face the prospect of compromising an otherwise well done fin-

ish. In the case of the Ark Royal, which was almost constantly at a duty station, and had little time for dockyard maintenance, a heavily weathered appearance of chip and rust marks is evident in most photographs.

The propeller shaft wings and the rudder post arrangement were installed prior to the painting sequence. All outer shafts are from brass rod, and supports soldered together with Stay-Brite Silver Solder. Oiling cups were placed near the motor coupling ends to facilitate shaft lubrication. The inner shafts are of $\frac{1}{32}$ monel rod.

Flight deck

The flight deck was next on the agenda. The Ark Royal's deck was unique in the sense that the stern had a sizeable overhang. This section had to be first constructed and faired to the proper alignment with the rest of the deck.

In order to keep the weight factor as light as possible, so as to preserve operational stability with the ship in the water, $\frac{1}{16}$ " ply was used and was resined for added strength. A number of access openings were cut into the deck to afford an easy entrance into the hull. Over the plywood came a plating of aluminum sheet of the type previously described. This step resulted in the armored deck effect which was called for. A rectangular opening was left

for the forward elevator, which will be later described.

As to the color scheme of the deck, conflicting information was encountered from the numerous sources at my disposal. Most photographs indicate that the color was a slate to dark grey, almost black. The Air-Fix version employed a dark green color. So, taking some liberties on this matter, I followed the latter version (partly for appearance sake) and applied Floquil Green-gray. An over spray of light gloss, and a few touches of Rub and Buff silver produced an elegant deck with just a trace of wear and tire skid marks.

Superstructure

Next came the Island. Once again consideration had to be given to keeping weight to a minimum. A combination of balsa block covered by card stock made up most of the superstructure assembly. Templates were traced off the blue print. Compared to the hull, this part was easier, by far, to build. A coat of resin was applied for added strength.

Deck detailing, such as numerous catwalks, ladders, and so forth, employed the utilization of model train parts, as well as fittings from Model Shipways. Box car brass grating sections, which have the proper perforations, afford a realistic effect for a variety of walkways. Flat hole stanchion posts were soldered onto each section and joined by a fine wire for railings.

Along the two sides of the hull are a number of alcove like openings. A "picture box" with a backing was fashioned for each alcove. Each section represents a cameo diorama with water tight doors, bollards, railing posts, junction boxes, and overhead pipes. Tweezer work comes in handy at this stage.

The superstructure was then painted with several coats of Floquil Lettering grey. A judicious flecking of rust was applied in the funnel area, followed by a light wash of white.

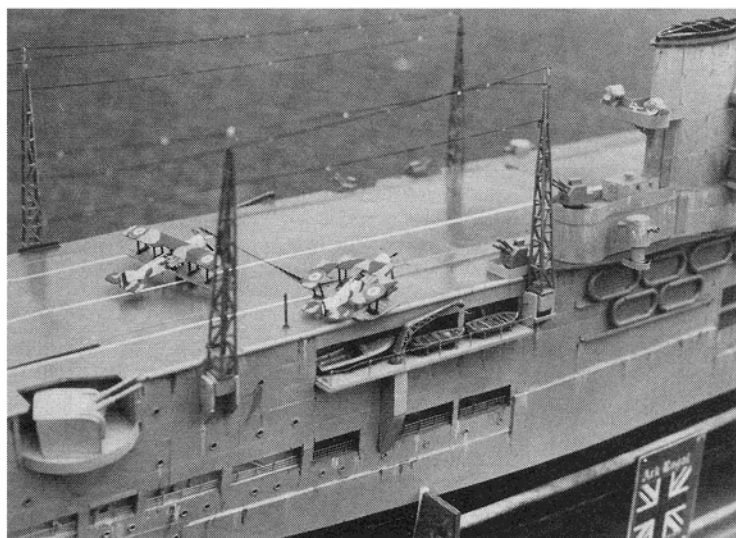
The primary weapon system of the Ark Royal featured eight dual purpose 4.5" twin mount turrets. The turrets were constructed from balsa sheet and received an outer layer of aluminum plating. Brass stock made up the barrel portions. Secondary mounts were made in a similar manner, with brass tubing silver soldered together for the barrel effect. "Pompoms" constituted most of the secondary guns.

Detailing

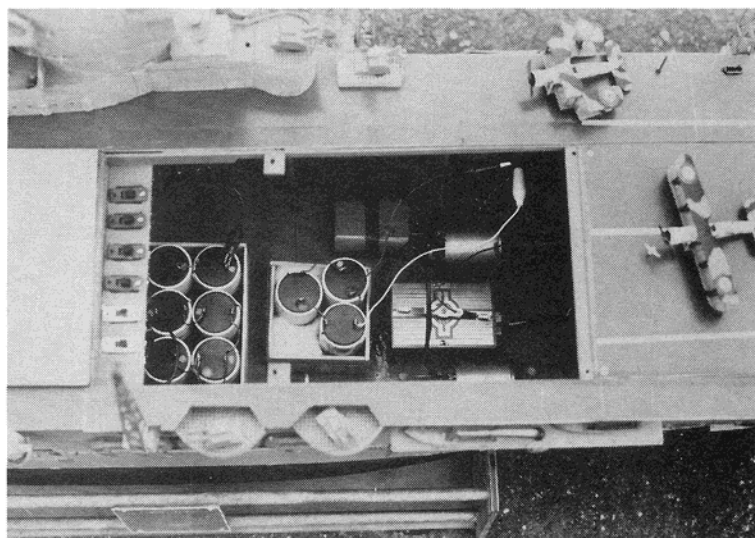
The ship carried a number of large Carley floats that were hung on the sides. To achieve a consistent floats, a mold was prepared of epoxy putty for the upper portion, and then was seated on a flooring of small grooved perf board. The entire assembly was then vacuum formed in a Mattel Vacu-Form unit. The result of this process being a dozen appealing life rafts.

Motor launches and life boats were from Model Shipways castings and were re-worked before they were duplicated by the vacuum form method as described above.

The eight radio masts (4 on each side), which fold out during flight operations, were individually constructed from thin hardwood strip and resined for reinforcement. The only draw back to having these masts in position is



Looking down on superstructure from starboard side (**above**). Bevy of gun turrets and alcoves which open to hull are faithful to detail on real ship. Underway on lake at New Jersey's Woodale Park (**below**). Ship has excellent turning and handling characteristics. Tricky in wind, though.



Access to radio compartment is through fold-back hatch on main deck (**above**). Spacious deck made access to radio gear quite generous. Note the ni-cad batteries for both the motors and receiver. Also visible is P-C board speed control for motors. Switches are for ship's lighting system.



that one accidental brush of the hand can dismember them from their moorings.

A hangar deck located in the forward section, which features a working elevator to the flight deck was also installed. This sub-assembly features N-sized ground crew (figures by Preiser) performing various stages of maintenance on the aircraft. For viewing this area, a portion of the flight deck can be lifted back on mini hinges. The hangar is also lighted and can be seen from the side openings.

Aircraft proved to be another problem. The Ark Royal carried 60 planes, mostly of the Swordfish, Fulmar, Skua, and Seafire variety. After numerous unsuccessful attempts were made to reproduce the torpedo bomber from wood parts, the trusty Mattel method was tried. It too failed to produce a satisfactory

aircraft. A mild sense of frustration started to set in. After all, what's a carrier without the proper aircraft to complement it?

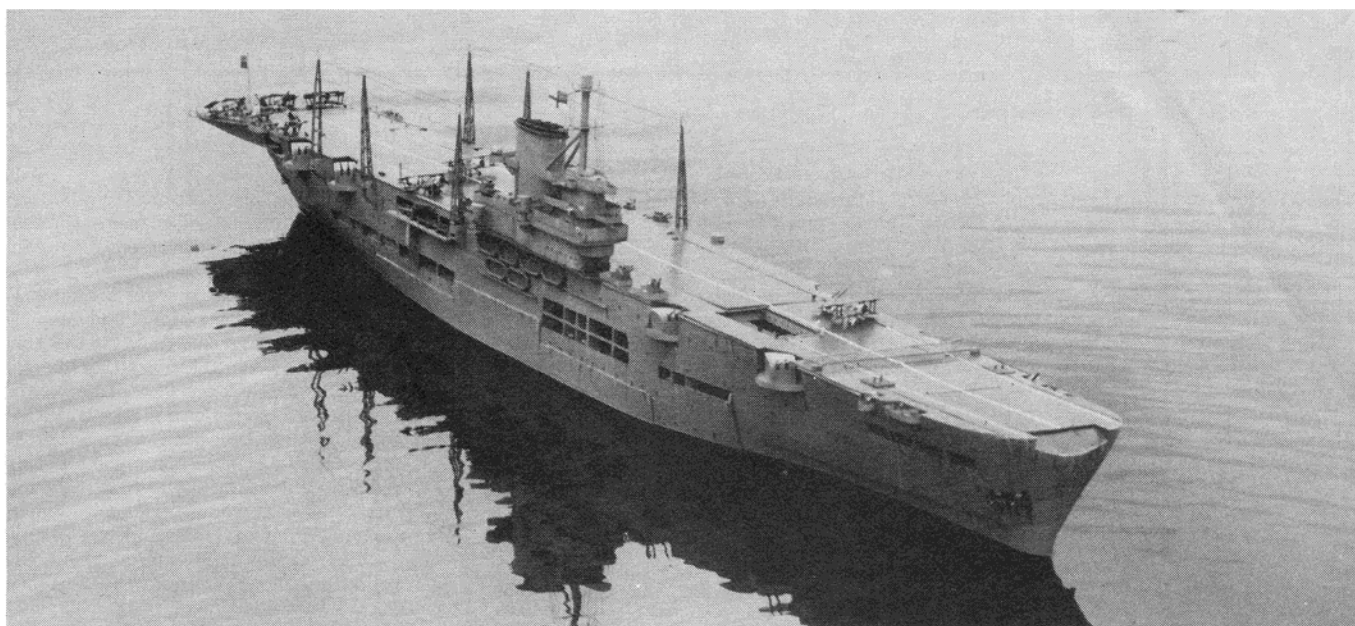
A solution was afforded when I ran across the Backmann mini-plane series. The only problem was that Backmann did not have (you guessed it) the Swordfish. The closest resemblance to the famed "Stringbag" was a World War I fighter, the Bristol F-2B. With a touch of ingenuity, a dozen Bristol's were reworked and a brass ring was added to represent the radial engine cowl. Voila! "Instant Swordfish". With wings in the folded position, a close look-alike effect was achieved. The final touch of skull duggery was done on a pair of P-40's which were taken apart, and reworked to represent Seafires. In the folded wing position there is a marked resemblance.

Radio

The working features of the model incorporate a number of operational details. A five channel Kraft R/C system is employed.

Speed control is achieved by an English made Vari-Speed control board which fits easily over a servo and performs in a most satisfactory manner. For the time being, a pair of Dumas 12 volt motors operate the outer wing shafts on direct drive. A six volt Gates sealed lead acid battery unit provides sufficient power to maintain a scale speed effect. A conversion to a 3-1 reduced gearing arrangement will be made at a future dry-dock refit. At that time, the center shaft will also be activated. Propellers are 1 3/4" three blade brass.

The single rudder (slightly enlarged above scale) was made from brass sheet. In trials,



Radio antennas erect and fighter on deck as the Ark Royal cruises by. The antenna towers folded out over side during carrier landings.

the turning effect proved to be better than expected, especially considering the size of the hull. For added maneuverability, a thruster pump arrangement was fitted in the bow section below the waterline. A reversible 12 volt Trico windshield wiper pump affords a measure of a water jet push effect. The pump is activated by a micro-switch on a servo.

An alarm bell, which gives a call to "action stations" (British capital ships employed bells for this purpose) was installed below the forward section and a micro-switch turns it on.

The elevator from the forward service deck to the flight area is an interesting feature which offers an added dimension. A worm gear fitted to a geared down motor, which is in turn attached to a slot-car gear, provides the turning action. A discarded Dumas speed control unit, connected to a servo provides full reversing. The elevator is steadied by brass tubing which serve as guide tracks. What the viewer sees when "up" position of the elevator signal is given, is a folded Swordfish coming slowly out of the bowels of the ship. The Ark Royal had three such elevators. One does nicely for an effect on the model.

A final servo is reserved for the catapult platform. Two planes, using the smallest Estes Rocket for propulsion may be simultaneously launched via the attached "hot wires". This in itself is a simple but effective action that is guaranteed to catch the attention of shore watchers, although the trajectory of the flights is most unpredictable.

To complement the above described servo actions, a number of other features have been incorporated, which are set off manually.

A grain of wheat lighting system is on board for "night running". A toggle series of switches sets off the illumination for the navigation and interior lights.

The funnel gives off two types of smoke. For indoors, a "hot wire" coil unit (like those

in railroads) provides ample billows of smoke which is sustained by a kerosene mixture. The only problem with the unit is that it does not sustain itself well under wind conditions. Therefore, a second unit aptly named "Chemical smoke" (a capsule vial) takes over in an outdoor situation. The net effect when this vial is punctured is to give off an abundant amount of smoke for about 10-15 minutes.

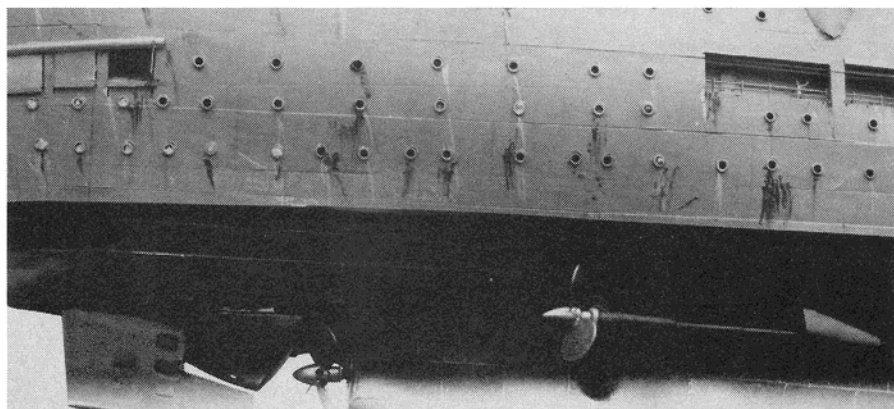
A tape deck, located in the center section, with twin speakers placed in the bow and stern, plays stirring British marches, contains excerpts from Winston Churchill's renditions of "Blood, Sweat and Tears", and airplane taxiing and taking off sounds. When the half hour tape is activated (via a push rod to the cassette unit) the Ark Royal becomes "alive" with the sound of music and prose.

Testing

Initial water tests of the model at a nearby pond, showed that it required some 16 pounds

of buck shot for added ballast. The pellets were cemented between the false deck and keel. With the added weight to bring her down to the boot mark, overall weight of the ship was increased to 42 pounds. A tolerable, but somewhat cumbersome, displacement to tote around and to lift without running the risk of getting a hernia.

Further trials in frigid March weather conditions quickly ascertained that an aircraft carrier with its high protruding hull sides and upper superstructure can be somewhat of a problem, especially when the wind kicks up. To this date, the Ark Royal has been able to sustain a brisk gust of wind and right herself without, seemingly, much danger of toppling over. This is not to suggest that the famed carrier will become only a "fair weather" ship. An eye towards discretion may serve as the better part of valor, if she is to enjoy a lengthy period of service . . . longer than her unfortunate real life counterpart of bygone days. ☞



Stern section from beneath hull shows single rudder plant and starboard shaft. In operation, the model is powered by the wing shafts. The center shaft is dormant. Note hull detailing. Nice workmanship.

R/C Sport Boats

By Vic Macaluso

Performance. This word simply means the execution of an action. All very simple, right? Wrong! We model boaters, as well as people in practically all areas of endeavor, constantly get caught up in one very time consuming, expensive and very often frustrating aspect of this word. That is, getting optimum performance from our machines.

Many of us are quite happy to just build our boats, properly rig them and occasionally change a prop or thrust angle just to see what happens. On the other hand, you have two other types of boaters: The Perfectionist and the Competition Boater. Both have been described as neurotic, unaware of the value of money, given to being very secretive or just plain crazy. Some of us fit very neatly into the

above categories, but most of us who seek optimum performance do so because of the challenge and satisfaction we get from getting the most from what we do.

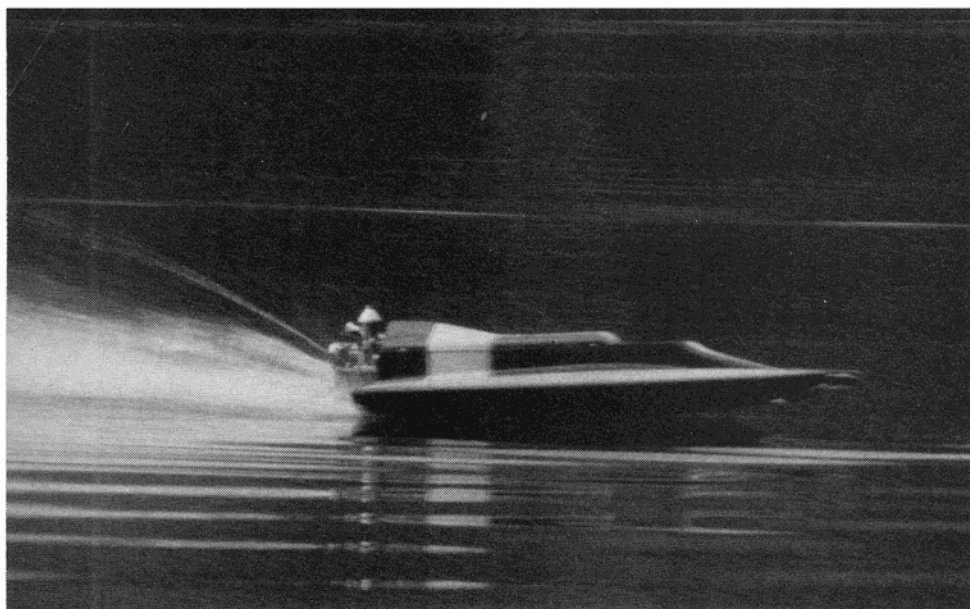
This month I'd like to cover some of the techniques used to trim tunnel and deep-vee hulls for maximum performance. By this time you should have most, if not all, of the mechanical bugs worked out of your boat (your tuned pipe no longer falls off in hard turns and you've learned that plastic gas tanks next to exhaust manifolds create problems!). Now you can concentrate on some of the more subtle activities that come under the general heading of trimming. Different types of hulls sometimes require vastly different techniques for proper trimming, so let's cover two major hull types, one at a time.

Tunnel hulls

Tunnel hulls and hydros are very similar in design, with the major difference being the sponsons on the tunnel hull run the entire length of the hull with the forward portion of the sponsons very often extending beyond the actual bow of the hull in a "pickel fork" manner. The sponsons on a hydro usually stop somewhere amidships (back from the bow) with air pressure and propeller lift being used to attain a proper running attitude and lift at the back of the boat at high speed!

The first consideration in a tunnel hull is proper balance. Without your center of gravity properly located you will never realize optimum performance. On most tunnels I've run I found the best C.G. location to be approximately $\frac{1}{3}$ the length of the boat forward from the transom. The boat may feel a little tail heavy at first, but later on you will see why I prefer that location. While we are balancing our boat in the fore and aft plane let's not forget about our side to side balance. Every tunnel hull I've seen eliminates this problem by locating all of the goodies in a very narrow pod on the centerline of the hull. But, you may be wondering, what about the flotation we put in the sponsons? I know styrofoam weighs practically nothing, but at high speed, when a tunnel hull is literally flying, a slight side to side imbalance could mean the difference between tracking like an arrow and having a boat that's all over the water. On most tunnel hulls the balance problem is fairly easy to solve just by putting your battery pack up forward and moving it fore and aft as needed. By the way, this balancing act is done with the gas tank empty. The reason is that as the gas burns off while running, the boat will go faster. As the boat goes faster, the less gas you have, the further forward your C. G. will move. The farther forward your C. G. is at high speed, the more stable your hull will be. Of course, all of the above has its limits and the secret is to find them and run the boat right at those limits. (Remember, we are looking for optimum performance this time.)

Another factor in trimming a tunnel hull,



Absolute perfection (above). Dumas Hot Shot 21 by Gerry Mauro displays perfect running attitude for a tunnel hull. Gerry's boat from another angle (**below**). Entire hull is flying except for running strakes and prop. In both photos the boat is riding on only half the prop. Only inboard strakes of sponsons in water.

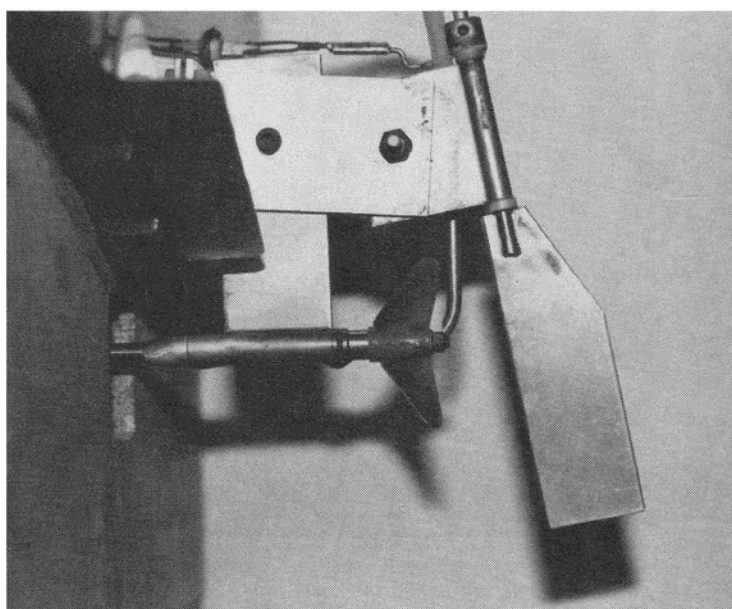
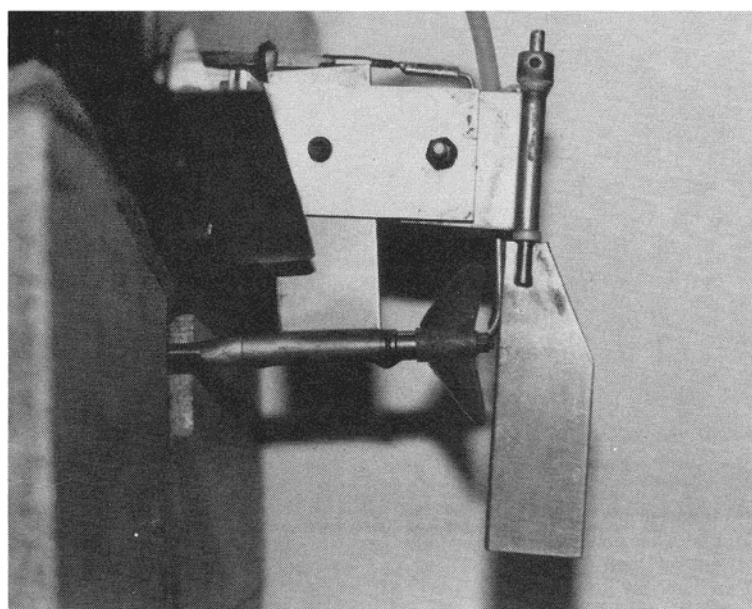




An example of a Deep Vee at straightaway speed (above). Tracking straight and minimum hull in water. Rudder angled in **(below)**. Lifts bow in water.

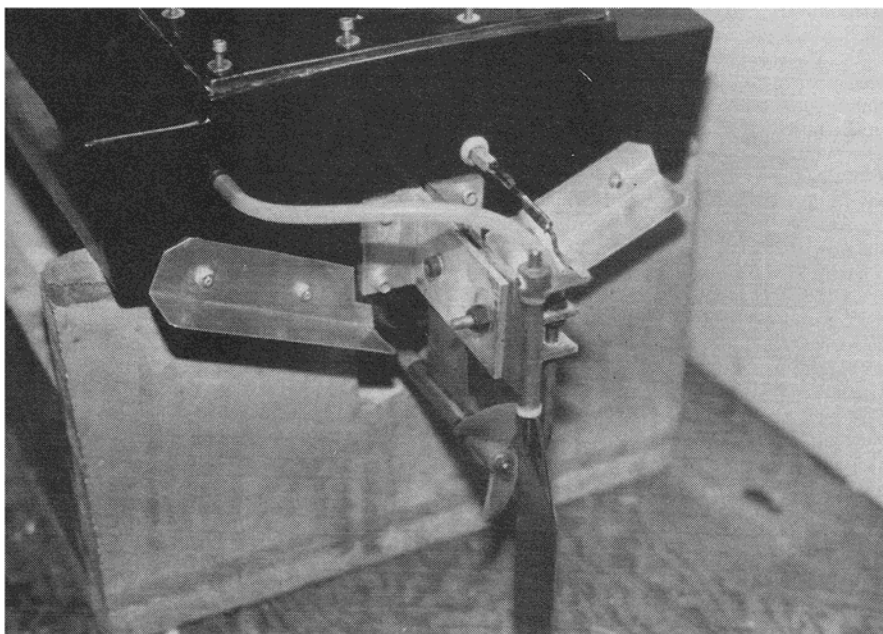


Classic Deep Vee turn (above). Bow level or slightly up, hull tracks like it's on rails. Rudder angled out **(below)**. Will lower bow in turns.



and a *very critical* one at that, is the thrust angle of the propeller. This is the angle, from parallel to the water's surface, at which the prop is providing thrust. In outboard applications this is governed by the angle at which the motor is attached to the transom of the boat. This angle can be changed and adjusted by adding thin metal shim stock either on top of or below the engine mounting plate. Add shims to the top of the mount to angle the prop down and below the mount to angle the prop up. Angling the prop up (lower unit out) will tend to lift the bow of the boat. This could be helpful if your boat tends to bury the bow in a turn. Angling the prop down (lower unit in) will help keep the bow down at high speed and prevent the boat from blowing off the water. The idea of using motor trim is to find a running angle for your boat that will handle a reasonable range of water conditions. In anything over a slight chop, leave your tunnel hull home and haul out the deep-vee.

A third consideration in trimming for optimum performance is the height at which the prop is set in relationship to the bottom of the sponsons. A good starting point is to set the centerline of the prop shaft even with the bottom of the sponsons and work from there. Depending on the type of prop you are using (surface riding of course), and the weight of your



Business end of Deep Vee. All components are adjustable, including trim tabs. The tabs are absolutely essential to cope with the various water conditions these boats run in. As always, trimming is an art.



boat, raising the engine $\frac{1}{16}$ of an inch at a time should increase your performance somewhat. You will know when you went too far. Either your engine will scream and your boat will be going nowhere (ventilation), or you will have limited control in the turns (not enough skeg in the water). The idea, again is to find a blend that makes you and the boat happy.

One last consideration is, do I or don't I need a turn fin? Well, my friend, sometimes you do and sometimes you don't! Depending on the hull (and manufacturers recommendations) you generally do need one. Dumas' Hot Shot 21 Glass hulls run very happily without one, and, yet, I found my Steve Muck Lil Lightening practically uncontrollable without one.

An important factor in mounting your turn fin is that the farther forward you mount it the tighter the boat will turn, to a point. Too far forward and you will have spinout and flip problems. Too far back and you will need Lake Michigan to turn. Again, experiment!

Properly blended, these four factors can be quite effective in getting all you can from a particular hull.

Remember! Try everything and make all your adjustments very slight.

Deep-Vee hulls

Trimming deep-vee's is not much different from trimming tunnel hulls. In fact, all the previous considerations for tunnels, with the possible exception of the turn fins, can also be applied to these hulls.

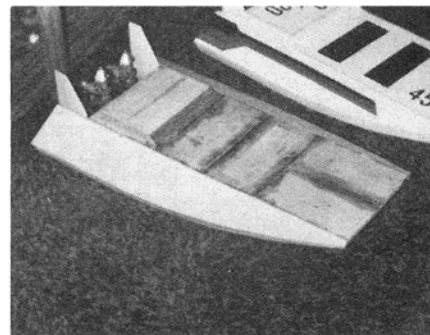
Changing balance, prop angle, and prop

depths on these monsters has essentially the same effect on deep-vee hulls as it has on tunnels, although the affect is not as great. Because you are dealing with a basically larger and much heavier model, and one that slices through the water rather than flying over it, your trim inputs to a deep-vee will generally not have as gross an effect as on the lighter tunnels.

One really critical factor in trimming deep-vees is the side to side balance. Because of the hull design, the higher the boat rides on the Vee the more effect an imbalance will have. This, coupled with other factors involving hull designs, can set up a condition known as chine walking at high speed. This is a progressive condition (the faster the boat goes the worse it gets), and will almost certainly lead to a flip unless you back off the throttle. One last consideration on balance of a deep-vee, don't be afraid to move the CG too far back. With these hulls you want as much boat out of the water as possible. It is much easier to bring the bow of a deep-vee down with trim tabs than it is to bring the bow up with prop angle or "lifting" props.

Again, go slow in your adjustments and you will probably have a faster boat.

I'd like to thank many of the readers of this column for their positive reaction to it. The letters and photos sent to me so far have really been great and those that can, will appear in this column from time to time. Keep 'em comin'! Vic Macaluso, Contrib. Editor—Flying Models, 34 Campo Ave., Selden, New York 11784.



What's this (top)? Take one Dumas 40-60 size Swamp Buggy Tunnel Hull, remove the engine tower, cut off the last transom bulkhead, beef up the radio hatch, bolt on a pair of K&B 3.5cc engines and presto . . . you have one mean "Thunderboat". Here's a finished boat and one under construction (above). The builder, Andy Mahan, of Fairfield, Ohio, claims that the Thunderboat will do 47-49 mph! Not bad for a Swamp Buggy. Actually, it just shows what can be done with available boat designs if you want to try your hand at modifying or improving them. Just because it hasn't been done before doesn't mean it won't work. The most successful racers, be it boats, planes or cars, are the ones who are not afraid to break with tradition and experiment. So, go ahead and try something different. Who knows, you might just win with your own creation or modified boat. Sounds like fun.

letter rip

Heart of Dixie Classic

The Heart of Dixie Classic race was held at Birmingham, Alabama, on May 9 and 10 and was an exciting and well-attended race. The Birmingham Model Boat Association (BMBA) was the hosting club and with the efforts of Ed Lackey, C.D., a well-run yearly race was established.

The BMBA Club is approximately two and a half years old and has now featured two races. This year's race provided excellent competition with the awarding of the largest trophy I have seen and with other outstanding prizes also given away.

The race featured open outboard, open mono and open hydro with a special F class event. Approximately fifty people attended and about seventy-five boats participated in the race. The competition was fierce and was supplied by a contingency from Indy, headed by Martin Davis, Greg Huey and Bob Finley. The northern competition was met head-on by the New Orleans folks, consisting of Louis Duran, Sherry and Art Matthews and their son, Roger Moran and Charlie Chauvin. Also, the BMBA Club served as a mixer in the hydro class. Bud Beard provided stiff competition. The mono portion of the race was exciting and new to some of the off-shore folks who experienced heat racing for the first time. The Atlanta Club and Memphis Club provided fast and closely run races.

The outboard division was dominated by Bob Finley and his Eldiablo. Tommy Lee, the designer of the Lee Craft tunnel hull and world record holder in the full size tunnels, did not get an opportunity to match his tunnel against the outboard rigger which would have been an exciting and excellent race. Maybe this can be arranged next year since Bob Finley won one of Tommy Lee's hulls at the race.



PHOTOGRAPHY: DR. GARY TURNER

Bob Finley shows off his new Mantis Canard hydro.

Who knows, Bob may be running a tunnel next year.

Since the Heart of Dixie Classic was held in early May, it represented one of the initial races east of the Mississippi and was therefore the site of the unveiling of new equipment. From what was unveiled, the Innernats

at Indianapolis ought to be an outstanding race. On Friday, the Indy group arrived at the gate waiting to get in at about eight o'clock in the morning to start running and testing equipment. Apparently the spring thaw had not yet occurred in the north. From every indication, this will be the year of the Canard. We have all seen glimpses of the Canard last year. At the BMBA race, about six Canards participated in the competition. It certainly appears to be a very viable concept for heat racing. At the BMBA race, a considerable amount of attention was directed towards the position of the adjustable strut on the Canard. Some very slight adjustments converted many of the Canards from a not so competitive boat to a very competitive boat. It certainly offers the concept of easy maneuverability and the ability to run a very "tight" course.

A probable one of a kind heat was established consisting of most of the major manufacturers of hydro boats. The heat consisted of Don Pinkard, Martin Davis, Louis Duran and for further excitement, Bud Beard and Charlie Chauvin were added to the heat. Apparently Don Pinkard caught a glimpse of the "heat" and did not come to race. The heat was won by Louis Duran of Spider Boats. If you like exciting competition and a well-run race, be sure and put the Heart of Dixie Classic, hosted by the Birmingham Model Boat Association, on your calendar.—DR. GARY TURNER

Results

Mono

First—Charlie Chauvin 1800
Second—William Golightly 1725
Third—Tony Psalmonds 1525

Outboard

First—Bob Finley 2000
Second—Gary Turner 1800
Third—Tommy Lee 1575

Hydro

First—Cherry Matthews 1950
Second—Louis Duran 1575
Third—Bob Finley 1425

F-Hydro

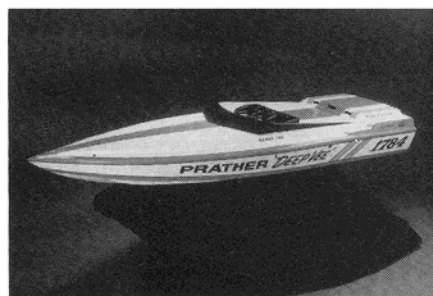
First—Gary Turner 1725
Second—Charlie Chauvin 1625
Third—Bud Beard 1450

Excellence of Performance

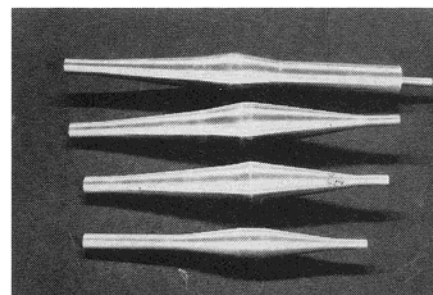
Bob Finley

PRATHER PRODUCTS, 1660 Ravenna Avenue, Wilmington, CA 90744, announces the availability of new 19 inch Starting Belts. Prather now has 15, 17 and 19 inch belts for use with electric starters. The Prather Starting Belts all feature gripping teeth to prevent slipping. For more information write to the above address.

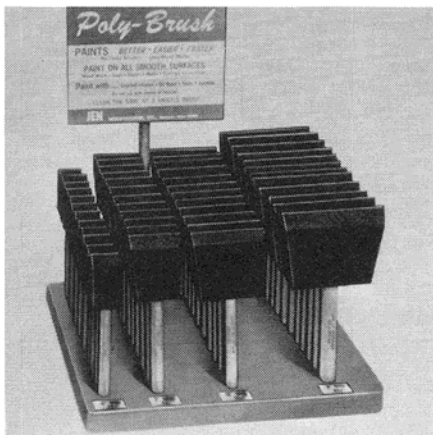
PRATHER PRODUCTS, 1660 Ravenna Avenue, Wilmington, CA 90744, announces the release of the Prather 46 inch Deep-Vee Boat kit. This boat is designed for .60 to .90 size engines. The 46 inch Deep-Vee won X-Class




Deep-Vee at the 1981 NAMBA Nationals using an OPS .90. The kit features a joined epoxy fiberglass hull, which provides strength and warp resistance. For more information write to the above address.



PRATHER PRODUCTS, 1660 Ravenna Avenue, Wilmington, CA 90744, has developed a series of maximum performance Prather Marine Tuned Pipes. Prather pipes on Prather Enterprise 67 inch Deep-Vee at speeds up to 40 mph on regular gas and oil mix. The Kioritz can run for an hour on 16 ounces of gas. The Marine Kioritz comes complete with water cooled head, recoil starter and drive shaft adaptor. For more information write to the above address.



JEN MANUFACTURING, INC., P.O. Box 128, West Side, Worcester, MA 01602, has a line of low cost, polyurethane foam brushes which apply paints and varnishes evenly and never spread more than their width. Jen's Poly Brushes are foam disposables and come in 1, 2, 3, and 4 inch widths. These brushes are designed for use with enamel, latex, stain, oil paints and varnish. They will not work with shellac or lacquer. For more information write to the above address. 

IMPBA Roostertail

The 1981 Internats were held August 8-15 along with the World Championships by the Indy Club at Indianapolis. The names of the first place winners and Champions are as follows:

Outboard - John Shannon

Scale - Steve Ball

1/2 Hour Enduro under 30 C.I.D. -

Robert Berson

1/2 Hour Enduro over 30 C.I.D. -

Vittorio Gobetti

Team Marathon - Mauro Braghieri, Driver
Vittorio Gobetti, Driver

Oval

B Mono - David Preusse

D Mono - George Grossman

E Mono - Scott McGuffin

F Mono - None (must have 3 boats)

B Hydro - Ed Hughey

D Hydro - Bob Finn

E Hydro - Steve O'Donnel

F Hydro - Charlie Chauvin

Straight

B Mono - John Shannon

D Mono - Ed German

E Mono - George Harris

F Mono - None (must have 3 boats)

B Hydro - Karen Hughey

D Hydro - Jay McGuire

E Hydro - John Shannon

F Hydro - Fred McBroom

Multi

B Mono - Bill Schafer

D Mono - George Grossman

E Mono - Scott McGuffin

F Mono - Vernon Barnes
B Hydro - Ed Hughey
D Hydro - Jay McGuire
E Hydro - John Ackerman
F Hydro - Roger Moran

National Champions

B Mono - David Preusse

D Mono - George Grossman

E Mono - Scott McGuffin

F Mono - None

B Hydro - Ed Hughey

D Hydro - Jay McGuire

E Hydro - Bud Beaird

F Hydro - Tom Pretzfeld

National High Point Champion

Jay McGuire

President's Cup - Ed Hughey

The Board meeting was held August 12 and 13 and the Quarterly Report is already out.

The big news is that the 1982 Internats will be held in Orlando, Florida. I personally am looking forward to visiting Florida again and know that the Florida boaters will do everything possible to see that we have an enjoyable stay.

The site is near many motels and campgrounds as well as Disney World, Sea World, Circus World and many other attractions, so plan to make it a family affair.

In our 3rd Quarterly Report we are trying something new, in that we are sending a ballot to everyone on the matters up for consideration, to see what kind of response we get.

Have you voted for your District Director? If not, do so at once.

FRED McBROOM, IMPBA President. 



