49115 DECEMBER 1984 $2.25 U.S.

RCM radio control MODELER

THE WORLDS LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

VOLUME 21 NUMBER 12 USPS 509190 ISSN 0033-6866 DECEMBER 1984

RCM MODELER

FEATURE ARTICLES

DEPARTMENTS

PRODUCT TESTS

MERCHANDISING SERVICES

This Month's Cover features Cox Sky Rally built and flown by Mike and Charlie Fitzpatrick. The lovely model is Heidi Banks of Judith Fontaine Model Agency of Hollywood, California. Transparency by Fitzpatrick Brothers.

R/C MODELER is published monthly by R/C Modeler Corporation, Don Dewey, President. Editorial and Advertising offices at 144 West Sierra Madre Boulevard, Sierra Madre, California 91024. Telephone: (818) 355-1476. Office hours: Mon.-Thurs. 7:00-5:00. Second Class U.S. postage paid at Sierra Madre, California and additional mailing offices. All prices appearing in this magazine are subject to change without notice. All subscriptions will be taken at the prevailing rate. Postmaster: send address changes to R/C Modeler, P.O. Box 487, Sierra Madre, CA 91024

EDITORIAL CONTRIBUTIONS are welcomed by R/C Modeler, but cannot be considered unless guaranteed exclusive. Manuscript must be accompanied by return postage and any material accepted for publication is subject to such editorial revision as is necessary, in our discretion, to meet the requirements of this magazine. Editorial material is selected on the basis of general interest to the radio control enthusiast and the publisher assumes no responsibility for accuracy of content. The opinions stated in published material are those of the individual author and do not necessarily reflect those of the publisher. R/C Modeler Corporation assumes no responsibility for loss or damage of editorial contributions. Upon acceptance, payment will be made after publication at our existing current rate, which covers all authors rights, title to, and interest in, the material mailed including, but not limited to photos, drawings and art work which shall be considered as text. Submission of the manuscript to R/C Modeler expresses a warranty, by the author, that the material is in no way an infringement upon the rights of others. Note: The review or discussion of any product by RCM does not constitute an endorsement of that product nor any assurance as to its safety or performance by RCM.

SUBSCRIPTION RATES: The United States $24.00 per year, $47.00 two years. Foreign subscription including Canada and Mexico $32.00 for one year (no two year foreign). For further information, see subscription ad. Change of address notices, undelivered copies and orders for subscriptions are to be sent to P.O. Box 487, Sierra Madre, California 91024. Allow 6 weeks for new subscriptions and changes of address. Back issues available: $2.75 U.S., $3.50 Foreign.

ADVERTISING: Send advertising copy and complete instructions to Advertising Department, R/C Modeler, P.O. Box 487, Sierra Madre, California 91024. Telephone: (818) 355-1476.

FROM THE SHOP

RCM Staff

There has to be among us a good many modelers from the pre-R/C years who have fond nostalgic memories of the free flight experiences. Finding an uncultivated field from which we could fly our models was really not a big deal in most parts of the country. Usually these fields were covered with tall grass and/or weeds that prevented a take-off from the ground (R.O.G. for us old timers) but so what, we simply hand launched our flying machines.

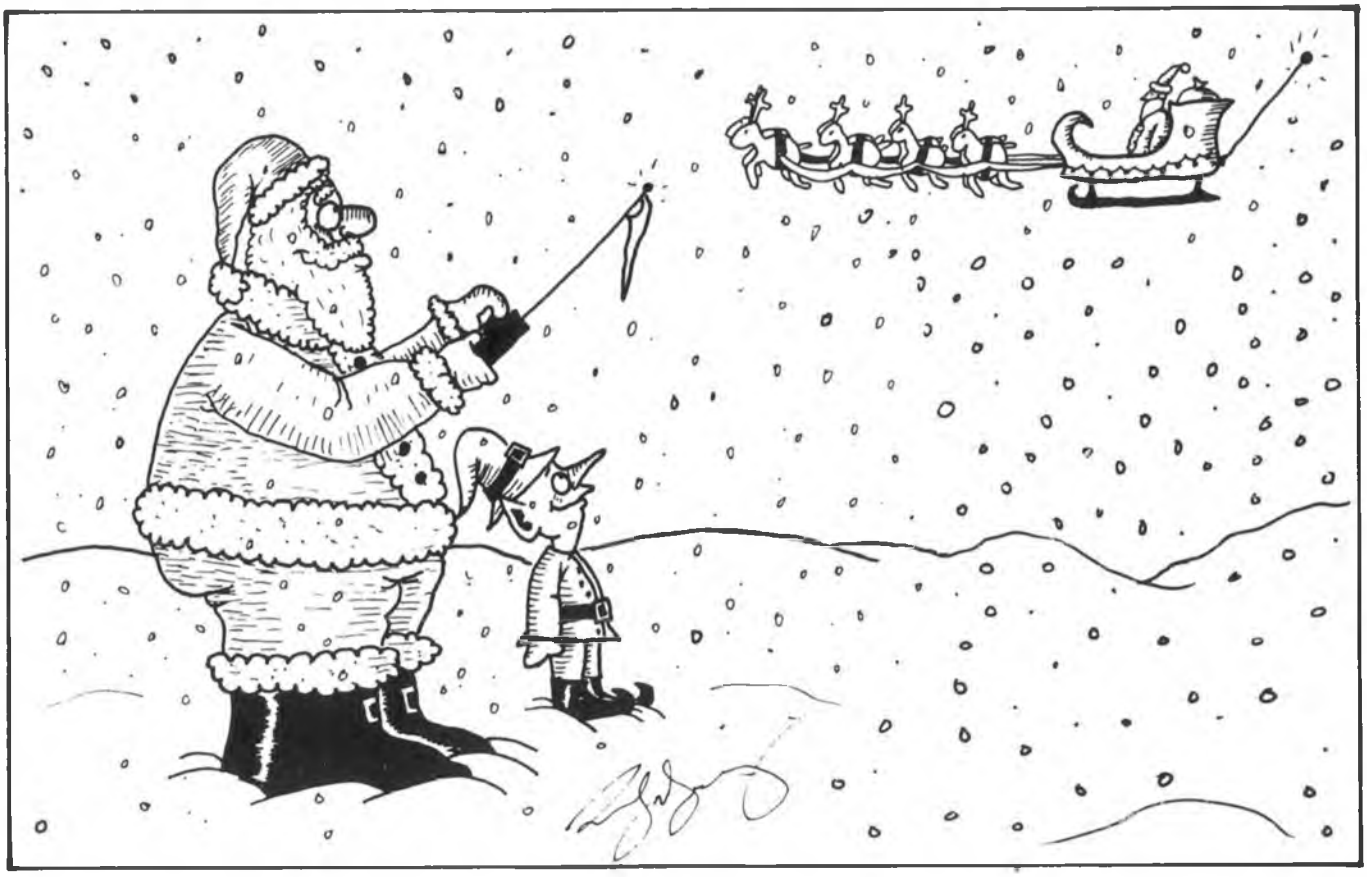
Along with the weeds were vines and berry bushes along the surrounding fence rows that were a minor annoyance when chasing models. However, this vegetation was the habitat of a creature that most us us would rather forget, particularly anyone who lived outside of the large metropolitan areas.

Our memories of this less exciting aspect of flying model airplanes was reviewed upon reading the following article in The Super Glitch, newsletter of the Tulsa Glue Dobbers, Tom Egbert, Editor, who reprinted it from the Pryor Creek RC Club newsletter, Mike Wheat, Editor.

"We all read about the problems of maintaining safety while flying and handling model airplanes, even unto the hazards of super glue and epoxy fumes and such. But little attention has been given to other hazards often encountered at the ol' flying field. The basic Oklahoma chigger ain't no fun. If you are bitten by a snake, you'll know it right away. But the chigger, that insiduous little eight-legger that inhabits much of the tall grass surrounding the flying field, only makes his presence known about four hours after he's had supper. And once you've got them, you've got them. Take insect repellent with you to the field. Spray everything that either sticks out or hangs down and hope it works. I've heard "Cutters" is good. There are other brands on the market, but doing field research on chigger repellent is a miss and scratch proposition. Once infested with these little buggers, there's little hope. The only real cure is waiting (and scratching) about five days. I've tried Absorbine Junior (worth about an hour of non-itch). Epsom salts in a scalding hot bathtub works a couple of hours. Solarcaine isn't bad, it stops the itching for an hour or two. My father believes in Anbusol a pain reliever for toothache. For the really horrible case of chiggers, try massive gobs of Icy Hot. It burns like the devil, especially in those hard-to-reach places that chiggers love so well. It burns, but it doesn't itch. Probably other brands of balm work just as well. If you get a good dose, you'll probably try just about anything. The best idea is not to get chiggers in the first place. (And we all know the first place they get.) But if your plane goes down in the tall grass, don't go after it until you've at least applied some kind of repellent. Be especially careful up at the old shed. Last time I was there, the chiggers were having a class reunion. It only takes a moment to get an infestation that will make your eyes water, keep you awake all night and make you wish you were dead. You just ain't never itched until you've had a good gob of chigger bites!"

★

The entire staff of R/C Modeler Magazine wishes each and every one of our readers a Merry Christmas and a joyous holiday season. May the fat guy with the white beard and red suit be good to you. □



RCM PRODUCT REVIEW

Top Flite Models
ANTARES

SPECIFICATIONS

Name	ANTARES
Aircraft Type	Multi-Task Sailplane
Manufactured By	Top Flite Models, Inc. 1901 N. Narragansett Ave. Chicago, Illinois 60639
Mfg. Suggested Retail Price	$99.95
Available From	Retail Outlets
Wingspan	99¾ Inches
Wing Chord	8½ Inches
Total Wing Area	867 Square Inches
Fuselage Length	47½ Inches
Stabilizer Span	23 Inches
Total Stab Area	76 Sq. In.
Mfg. Rec. Engine Range	NA
Recommended Fuel Tank Size	NA
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Flaps, Coupled Ailerons/Rudder
Basic Materials Used In Construction:	
Fuselage:	Balsa & Ply
Wing:	Balsa
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (19 pages)
Construction Photos	Yes

RCM PROTOTYPE

Radio Used	Ace Silver Seven
Engine Make & Displacement	NA
Tank Size Used	NA
Weight, Ready to Fly	54 Oz.
Wing Loading	8.97 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:
Flight performance, appearance and well-thought out design, exceptionally good instructions, and wood quality.

WE DIDN'T LIKE THE:
Die-cut parts, although the cut quality was good.

Sometimes it's kind of interesting to try and guess why a name was picked for a new model. This one doesn't take too much guesswork; it's obvious that Top Flite Models was pretty proud of their number RC-31 multi-task sailplane. The Antares is named for one of the brightest stars in our part of the Universe. When you take a look at the features, they have a good start. It's a standard class flat wing sailplane with a combined Eppler 193 and 205 airfoil with flaps that run about half span and ailerons on the outboard section. Add the sleek profile and full flying stabilator and you've got a bird with a lot of potential.

The Antares is shipped in a 49" x 7" x 3" box with a large photo of a completed plane to catch your attention. All the sheet wood is banded with paper strips to keep it from getting damaged in shipment and the stick wood is protected by the rolled plan sheets. This is a complete kit, all the hardware is provided including all needed nuts, bolts, connectors, and pushrods. All you need to provide is covering, glue, work, and the radio. Speaking of radios, one item that isn't mentioned in the information on the box, but is covered in the instructions, is the radio requirements. The Antares is designed for coupled aileron/rudder so you need at least three channels and preferably one with a mixer that allows adjustments of the amount of mixed throw.

Construction:

One thing that really deserves praise is the 19 page instruction book, very detailed and full of drawings to help with tricky parts. The plans are full size and on two 55" x 31" sheets. Wood quality is excellent but we were a little disappointed by the fact that almost all the parts are die-cut rather than machine sanded. Guess we've been spoiled over the years. But at least the cutting was very good and we had no trouble getting the parts out of the sheets. The instructions start with the fuselage and so did we.

Fuselage:

The fuselage is typical box construction but radio installation is planned as you go along (saves time later but sure adds to the building time at this point), all of the servos are pre-positioned on the side and the stabilator pushrod is

..... glued in at this stage. When it comes to the aileron and flap servo positions the instructions are very detailed but be sure to pay close attention, everything has to be just right. Just to show that we aren't kidding about detail, the fuselage building instructions cover 6 pages and thirty steps. The forward fuselage formers, F-3 and F-4 can be adjusted a little to suit your receiver and battery pack. We were using Ace Bantam servos that are about the same size as most standard servos and had to remove part of the forward hatch floor in order to get enough depth to clear the servo arms. None of this creates any real difficulty, just things to keep in mind while setting up. You have a few other decisions to make like what type of tow hook you want, since this determines where other formers are placed. All of the options are covered in the instructions along with information on advantages of each. A standard bent wire hook is supplied with the kit, we used it and have been happy with the results.

Some psychology was used when they decided on the building sequence; after the fuselage, the rudder and stabilator make a nice breather. Both are simple built-up structures that go quickly with Super Jet. We used Goldberg's Super Jet everywhere except where epoxy was specifically called out.

Wings:

By the time you get to the wings, you should be pretty used to detailed directions. In this section, you even get a lesson in ballast. It would be a good idea to go ahead with the ballast tube option even if you don't think you will want to use ballast. It's easy

continued on page 214

Pietenpol 'Four'

RCM's Pietenpol (#613) has been updated with ailerons and a .40 four-stroke engine. It's a whole new airplane and well worth building and flying.
By Gene Wallock

PIETENPOL 'FOUR'
Designed By:
Gene Wallock
TYPE AIRCRAFT
Sport/Stand-Off Scale
Aileron Trainer
WINGSPAN
63¾ Inches
WING CHORD
11 Inches
TOTAL WING AREA
701 Sq. In.
WING LOCATION
High Wing Parasol
AIRFOIL
Semi-Symmetrical
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
2½ Inch
O.A. FUSELAGE LENGTH
39 Inches
RADIO COMPARTMENT SIZE
(L) 5" x (W) 3½" x (H) 4¼"
STABILIZER SPAN
18 Inches
STABILIZER CHORD (incl. elev.)
6 Inches
STABILIZER AREA
103 Sq. In.
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top Of Fuselage
VERTICAL FIN HEIGHT
6⅞ Inches
VERTICAL FIN WIDTH (Inc. rud.)
5¼" Avg.
REC. ENGINE SIZE
.40 (4-Cycle)
FUEL TANK SIZE
8 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail., Throt.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Plywood
Wing ..... Balsa & Ply
Empennage ..... Balsa, Ply
Wt. Ready To Fly ..... 72-88 Oz.
Wing Loading ..... 14.8-18.1 Oz./Sq. Ft.

The 4-cycle craze is sweeping the civilized modeling world and why not; they're quiet and economical to operate. Several years ago, when the first Saito 30 4-cycle became available it was installed in a House of Balsa Pietenpol (RCM Plan #613) and was a real fun machine on rudder, elevator and throttle only. I decided to update the Pietenpol design to incorporate ailerons for a more realistic looking appearance and incorporate a built-up tail to simplify balancing and add to appearance. By now you must have guessed if I don't like the model's looks, I won't build it. Besides, I think it's refreshing to have an aileron trainer type model that doesn't have "ugly," "box," "lil" and "stik" in its name.

Before you start building, you'll look twice at the wing location above the fuselage and swear it has negative incidence. Well, it does, to neutralize the positive mean camber of the airfoil. In other words, the model won't balloon on you at level flight.

CONSTRUCTION

Fuselage:

The fuselage forward end is lite ply for handling durability and the aft end is built-up balsa for lightness. Pretty straightforward stuff except the built-up aft section underlaps the forward section. Now that I've got your attention, let's proceed:

1. Cut out one each left and right fuselage forward sides from lite ply. Mark the insides with an "L" (left) and "R" (right) in dark pencil or ink. No one will see it and the model will fly funny with left thrust and a tractor propeller (I don't mean a John Deere tractor).

2. Mark the tank floor location using the dotted lines on the pattern as a guide.

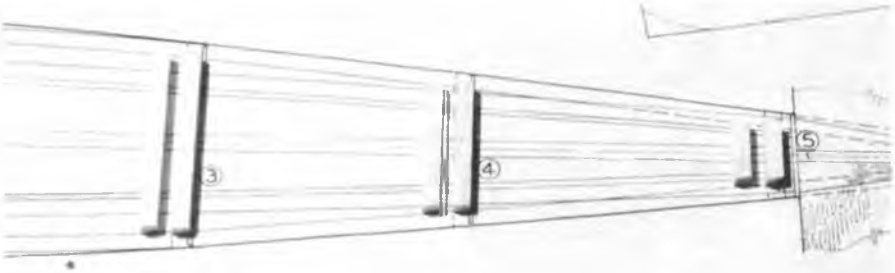
3. Place the sides on the fuselage plan with the "L" and "R" up, and mark the cabane locations. If you line up the rear edges of the sides, you'll stand a good chance of building the forward fuselage correctly. If, by some gross error, you line up the front bevel when marking the cabane locations, your wing mounting will be something to behold --- none of which is a joy!

4. Cut two cockpit floors, two former #9s, two strut attach plates and two servo mounts. I know the word "two" was repeated too many times — too bad! Hopefully you have a Dremel #580 table saw or access to one because all the aforementioned parts have a common dimension: the inside spacing of the forward fuselage. If all the parts are cut on the same set-up, it's very easy to build a true forward fuselage.

5. Well, it's time to assemble the forward fuselage. Use the top view as a guide to properly align the cockpit floors and strut attach plates. I use waxpaper over the plans to prevent the Zap from bonding to the paper and I suggest you do the same. I glue all parts with Zap CA and go over completed assemblies with Zap CA+. In the old days I double glued with Comet cement and never got out of the habit. Tape the cockpit floors and strut attach plates to the fuselage sides in

Place the forward fuselage sides on the print with the aft ends even and mark the cabane locations.

Place waxpaper over print. Glue landing gear mounts and cockpit floors to the fuselage sides using the fuselage top view as a reference.



Cut aft fuselage cross-pieces using the plan as the reference.

their correct position; the forward edge of the floors are in line with the aft end of the cabane locations and the aft edge of the strut attach plates are in line with the aft edge of the cabane locations. Use a #9 former as a 90° triangle to insure squareness. Zap the floors and plates to the sides. Try not to make the tape a permanent part of the fuselage due to overzealous gluing (that's a bottle of Zap, not a water pistol).

6. It's all down hill from here. Build two identical aft fuselage sides out of 1/4" square balsa. You know they're identical, because you don't have to mark them "L" and "R."

7. Place the forward fuselage section back on the fuselage top view. I assume you've removed the tape. Pin the assembly to the plan through the cockpit floors. Again, line up the aft edges on the reference line. Pre-cut the 1/4" balsa cross pieces per the top view. Plan to use a former #9 as a 1/8" shim to maintain parallelism between the top lite ply edges and the 1/4" balsa top longerons.

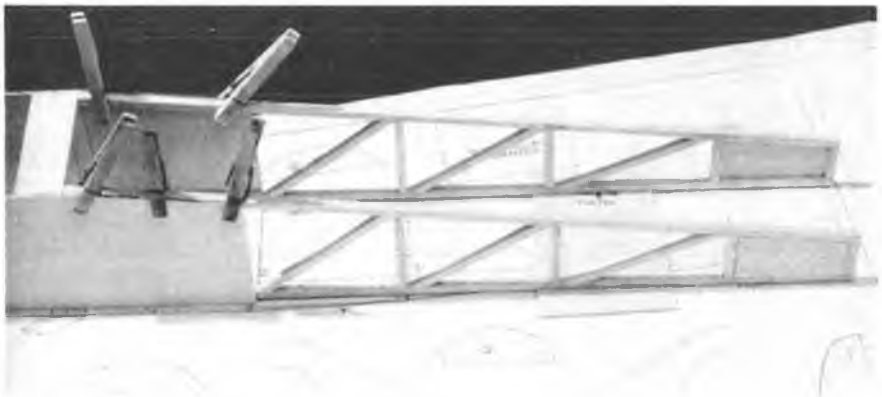
8. Glue the built-up frames to the forward lite ply section. The 1/4" top longerons end at the aft cabane rear edges and the bottom longerons butt up against the rear strut attach plate.

9. Pull the built-up frames together at the rear. Don't glue the rear post yet! Insert and Zap the upper and lower cross pieces you cut in step #7. Now glue the rear posts together.

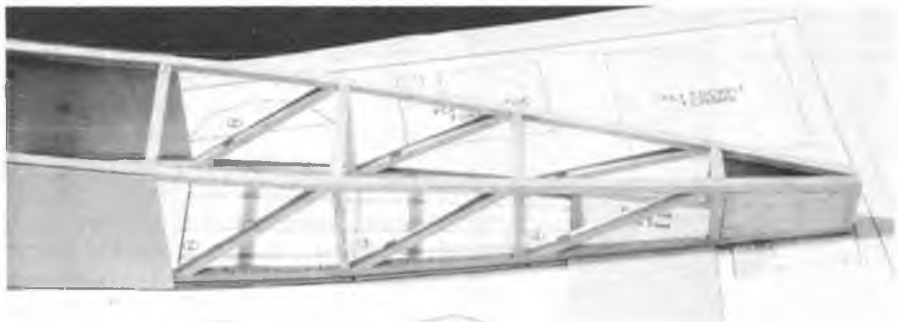
10. Before you go any further, verify the straightness of the fuselage. If you've built it crooked, twisted or angled, straighten it out now.

11. Fabricate all the remaining parts for the fuselage; tank floor, firewall, chin plate, radio hatch, nose block and ring, cowl sides, tank access cover and cleats and the landing gear components. In addition, make four equal length cabane struts.

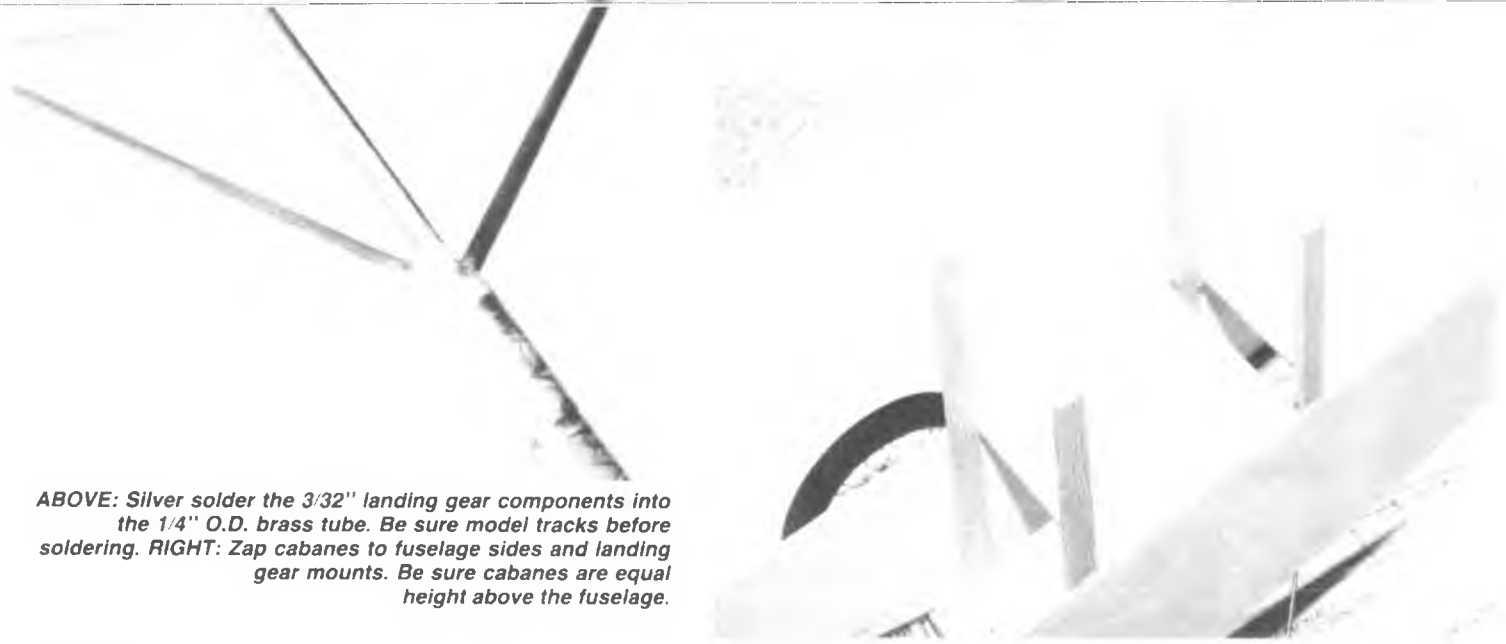
12. Clamp the forward and aft landing gear wires to the fuselage as shown using standard landing gear clips and #4 x 3/8" sheet metal screws. Bundle with the 3/32" diameter spreader axle and slide each end into a 1/4" O.D. brass tube. Tack together with Zap. Slip on the wheels and tail wheel and do some preliminary taxi testing on your driveway or garage floor. If the model veers left or right, twist the wire bundle (a little at a time) within the brass tubes which will effectively turn



Using the tank floor as a shim, Zap the aft and forward fuselage sections together.



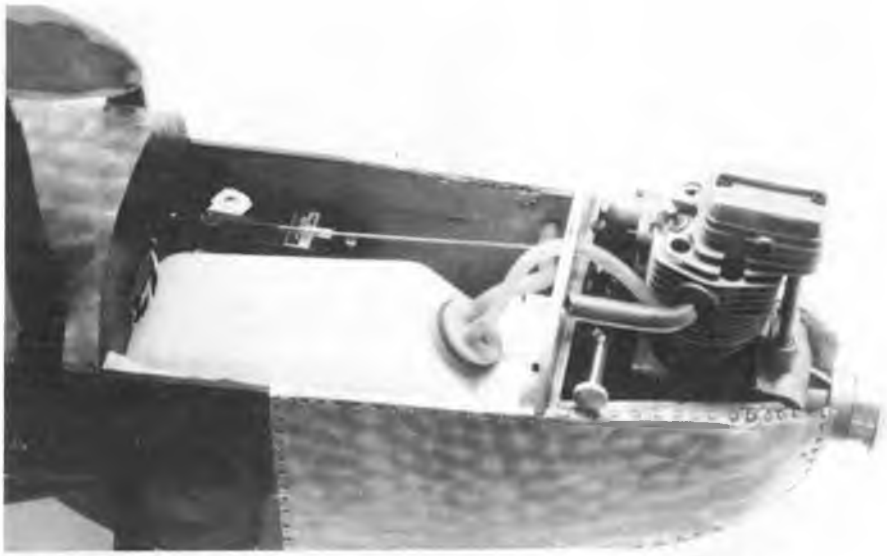
Zap the bottom cross-pieces in. Lift assembly and Zap in the top cross-pieces.



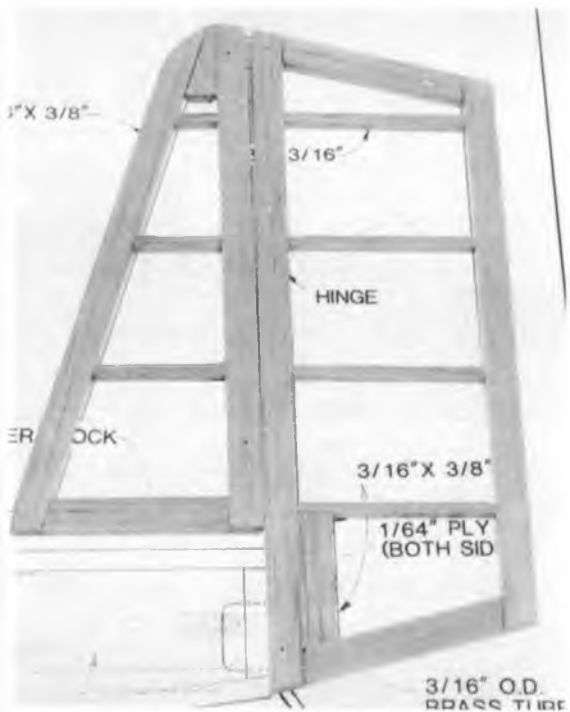
ABOVE: Silver solder the 3/32" landing gear components into the 1/4" O.D. brass tube. Be sure model tracks before soldering. RIGHT: Zap cabanes to fuselage sides and landing gear mounts. Be sure cabanes are equal height above the fuselage.

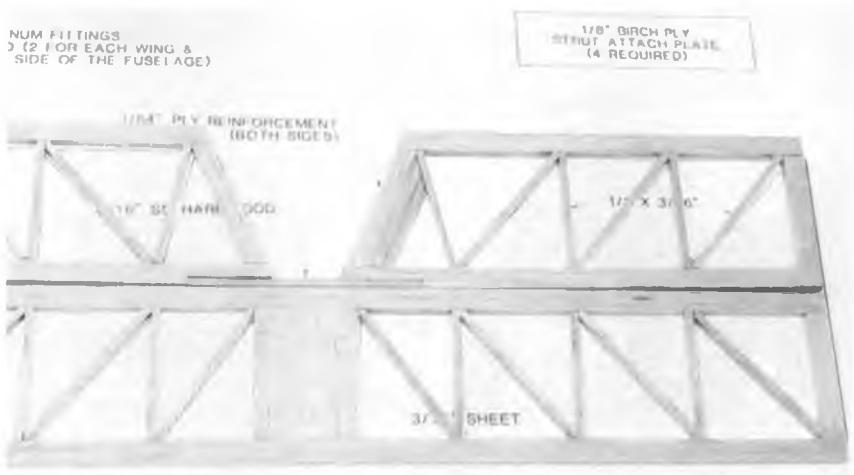
the wheels left or right. Be sure to Zap the wire bundle each time you twist or you will be running taxi tests for weeks. When the model rolls straight, silver solder the wires into the tubes. Silver solder a 1/4" I.D. washer on the inboard end of each tube for a wheel stop. Slip the wheels back on the tubes with another 1/4" I.D. washer on the outside edge of the wheels. Drill a 1/16" hole through the tube for a cotter pin. Locate the hole so that if you're off location, the wheels will have a little side-play. If the holes are too close to the wheel you'll have a non-turning wheel when you install the cotter pin. In the event you really don't like cotter pins, buy a big wheel collar and stick it on the end of the tube. This of course will look like a wart on the end of a witch's nose, but I don't like to comment on people's taste.

13. Shape the balsa cockpit blocks and notch for the cabane struts. Don't glue the blocks in yet; it's just a lot easier to shape them without the cabanes in place. Now Zap the cabanes to the inside of the lite ply forward fuselage sides, using the guidelines you put in at step #3. If you made the cabanes at different lengths, equalize the lengths right now or your wing

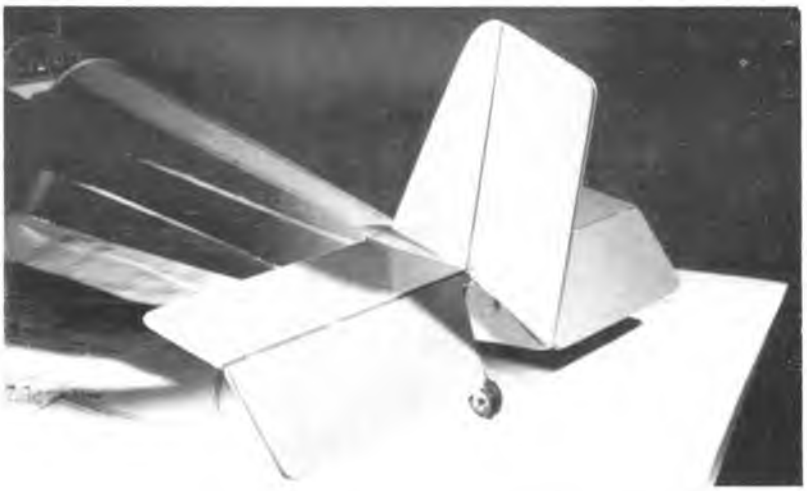


Fuselage front end showing the tank and throttle servo installation.

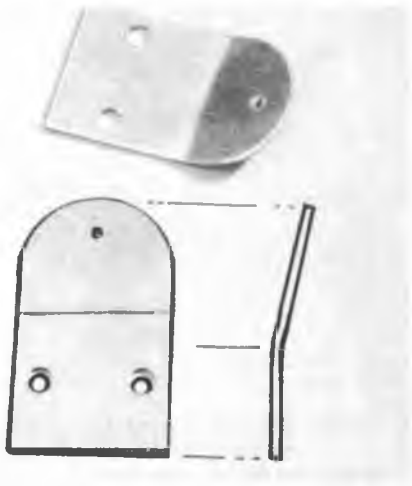




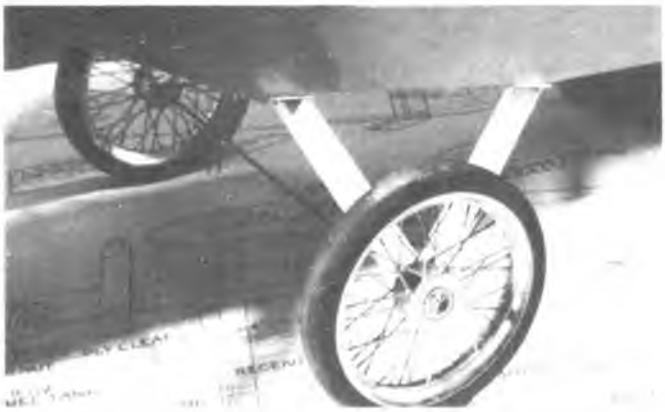
Built-up fin/rudder and stab/elev.



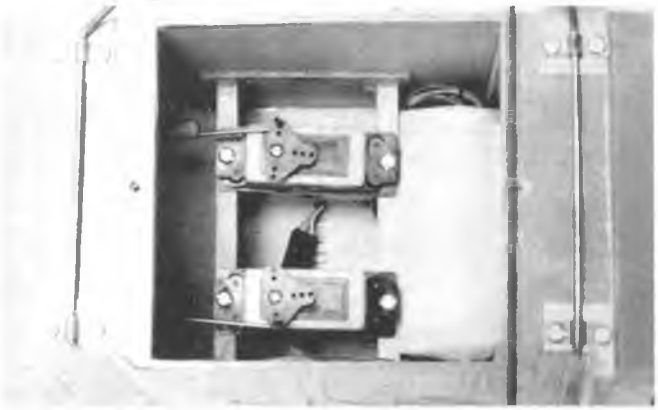
Tail group in place. Would look clunky without the filler blocks!



Fabricate eight strut attach clips. Bend the angles on a table edge (not your mother's or wife's) to agree with the strut installed position.



A set of House of Balsa wire wheels dresses up the model. Be sure the cotter pin retainer is bent over or your wheels will go trucking on their own.



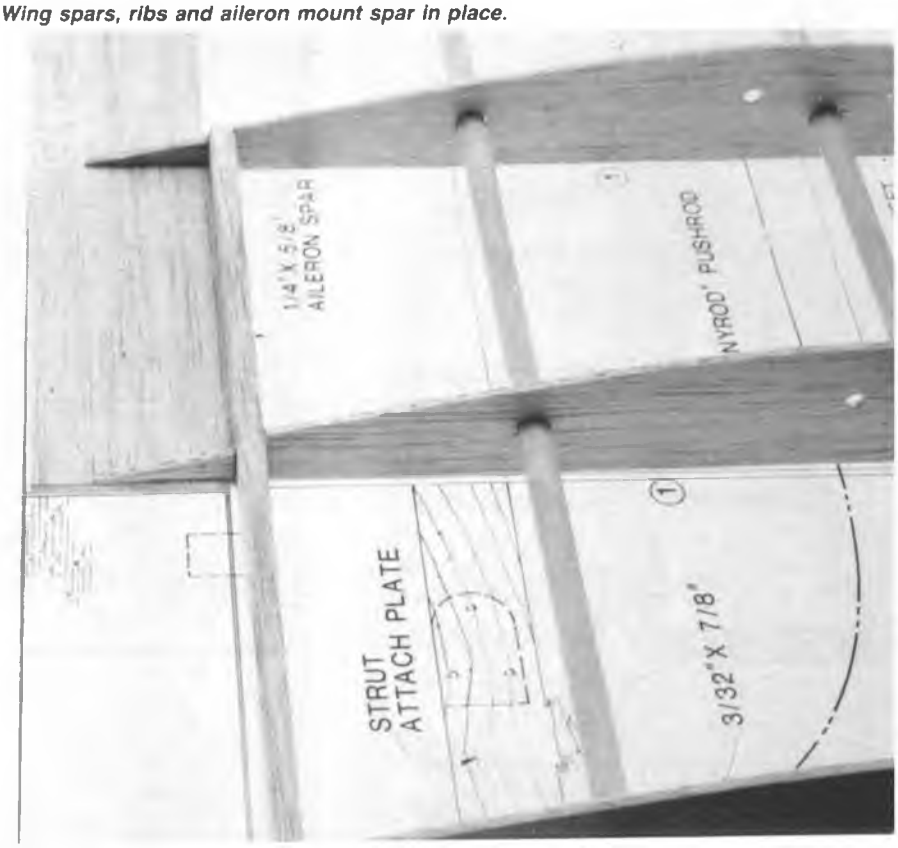
Typical radio installation. You'll notice I never throw anything away, even old radios.

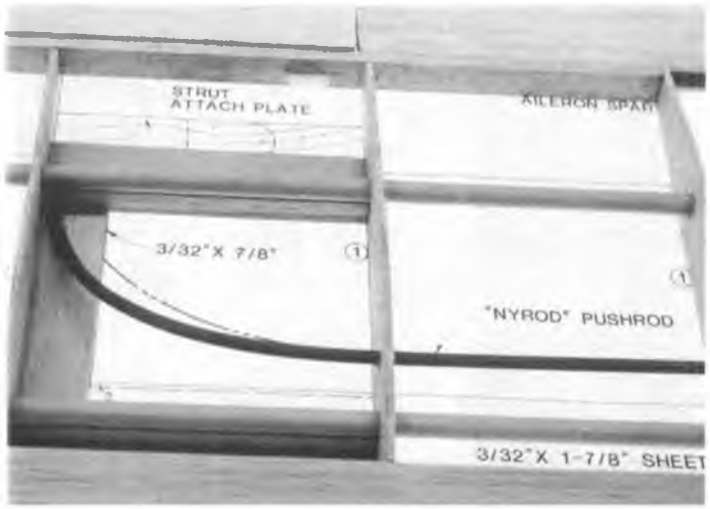
installation will be tilted. Remember the guy who tried to level a four legged table by cutting a little off each leg at a time; the Pietenpol is a parasol not a shoulder wing airplane.

14. Glue in the former #9s and the tank floor. Remember the floor guidelines from step #2. The floor is cut for right thrust so you'll know very quickly if you're installing the floor upside down. You'll notice the front end pulls in slightly; its supposed to or the front end width will look huge compared to the prop diameter. The notch in former #9 is to clear the

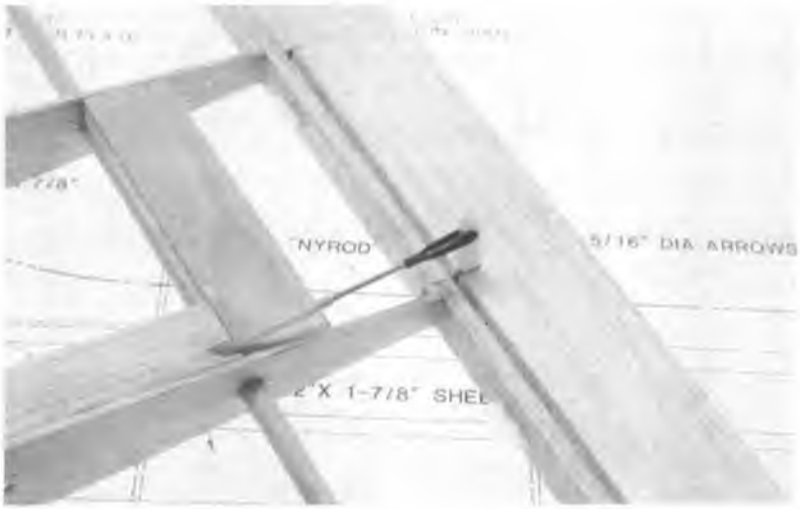
Bottom planking layed out and end ribs Zapped in place. Dihedral angle gussets and a House of Balsa "upright" make the job a lot easier.

Wing spars, ribs and aileron mount spar in place.





Aileron pushrod guide. Note smooth, natural curve.



Check the aileron linkage for smooth action and correct throw capability before covering.

throttle linkage, so verify your linkage orientation before Zaping in #9.

15. Obviously, you've selected an engine for your model. Hopefully it's not a Quadra but something that will fit in the engine space envelope. If you were thinking, you also bought the engine mount you'll need. I do not recommend Zaping in the engine. The side thrust is built into the fuselage as well as the down thrust; therefore, center the mount on the firewall between the sides and position the thrust line of the mount to match the plan. Most .40 4-cycles are about the same physical size, but verify the drive washer face location to the plan before you drill any mounting holes in the engine mount. Now, drill the mounting holes in the firewall to match the location and **size** of the mount holes. Undersize mounting hardware loosens up very fast and you'll look ridiculous trying to catch an engine that fell out at 500 feet. Install blind nuts on the backside of the firewall and Zap them in.

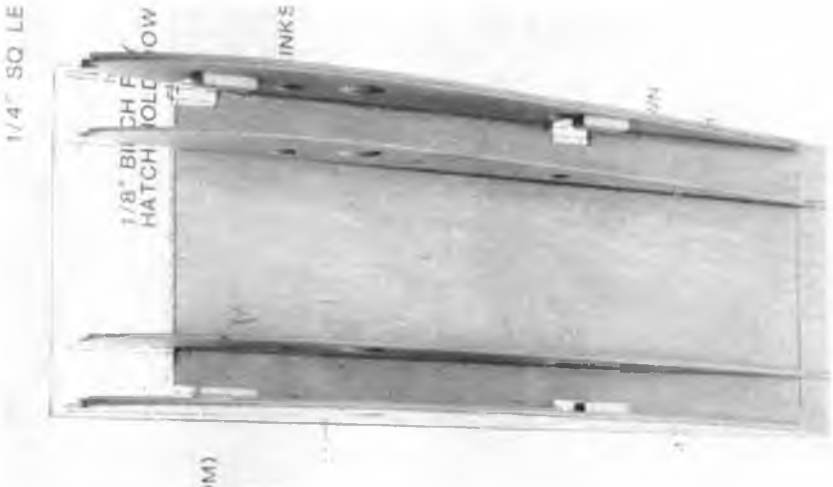
16. Glue the firewall in place. I usually Slo Zap them in but if you need your epoxy security blanket, use the 4-hour type not 5-minute. The glue must soak into the wood for a strong joint. The Slo Zap soaks in very fast while epoxy takes a lot longer.

17. Temporarily install the engine mount using all the hardware (size and length) that will be used on final installation. The back of the firewall will look like a four quilled porcupine. If the mounting screws don't come through, you haven't got enough thread engagement in the blind nut. If they're exactly flush with the nut, drop everything and head for Las Vegas; you're on a roll. Plan on using a foam cushion between the tank and firewall just in case. Plot your fuel and filler line holes through the firewall, as well as your throttle linkage. I didn't say drill them yet. Make sure the tank is replaceable with the installation you've planned. You destroy the structural integrity of the mount if you had to drill holes in it to clear fuel lines and linkage; that's why we're going through this exercize. When the path is established, drill the holes and remove the mount.

18. Zap the formers and aft stringers on, as well as the cockpit blocks you shaped in step #13. Zap the 1/8" x 1/2" ply tank access cover cleats in place. Tape the 1/32" ply access cover in place and pilot drill the 4-40 screw holes. Remove the cover and install 4-40 blind nuts in the cleats. Remember, we're in the tank compartment so plan on a foam bumper on the tank sides. Zap on the cowl sides, chin plate, nose block, nose ring and the 1/4" x 1/4" balsa spacers in the cockpit openings. Install the radio hatch and blind nuts. Fill in the rear side fuselage bays with 3/32" sheet for control rod guide exit mounting. Big long slots are nice if you're digging a wall footing, but are really tacky for pushrod exits. Trial fit the radio and install the pushrod guides. The tail group control horn locations are shown on the plan (that's what that 1/32" plywood is for), so exit locations shouldn't be a problem.

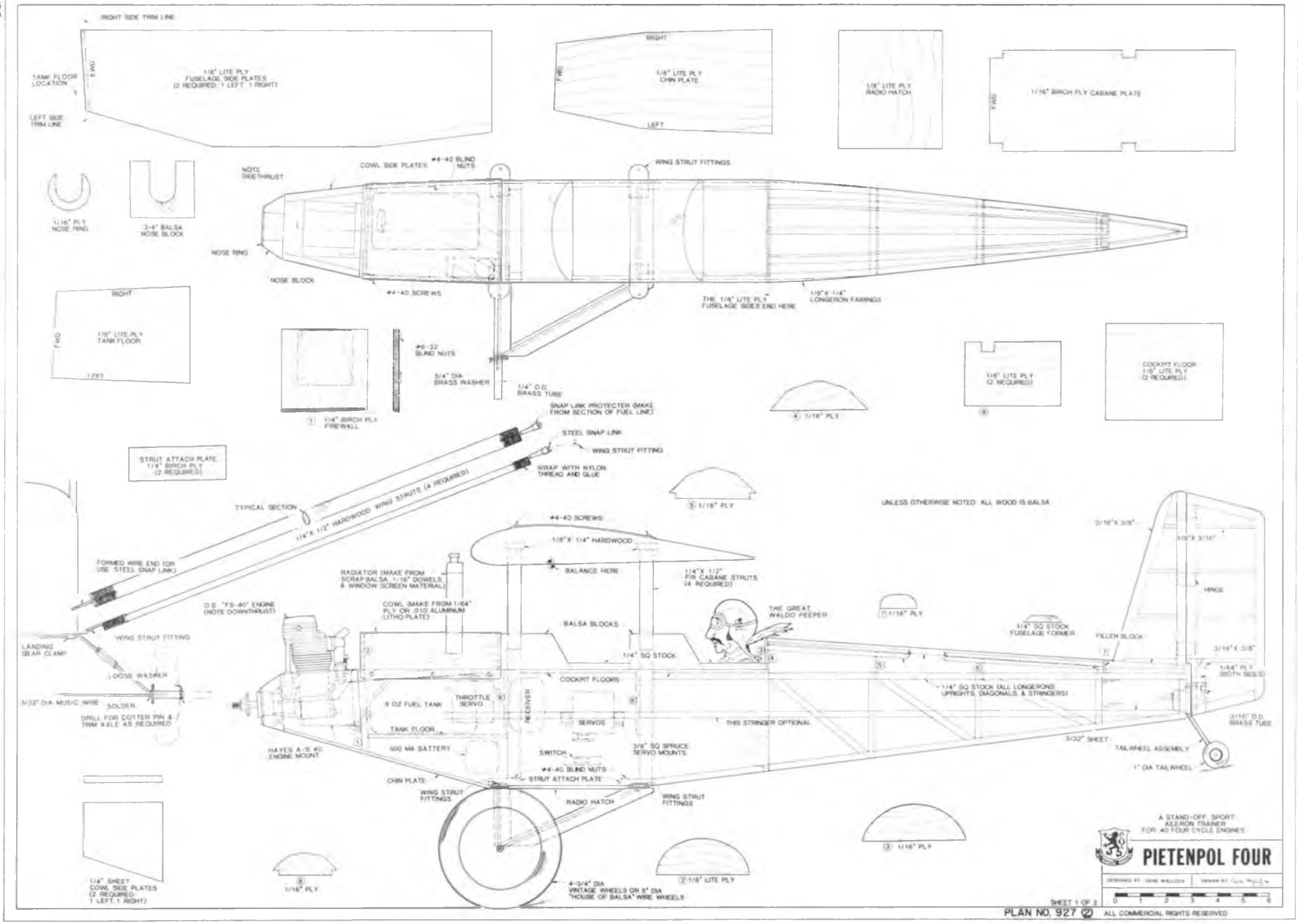
19. Remove the landing gear, radio, hatch covers and anything else that isn't part of the fuselage permanent structure. We are about to venture into the 4th dimension; it's called sanding! I sand initially with 120 grit garnet paper. Anything coarser than that and you put in gouges that require a trowel and pallet of spackle to fill. I finish with 400 grit dry. I also cover everything with MonoKote. I found it to be the lightest way to finish a model, and the fastest. I don't have to prepare the structure like I did for silk or paper covering. The only real work

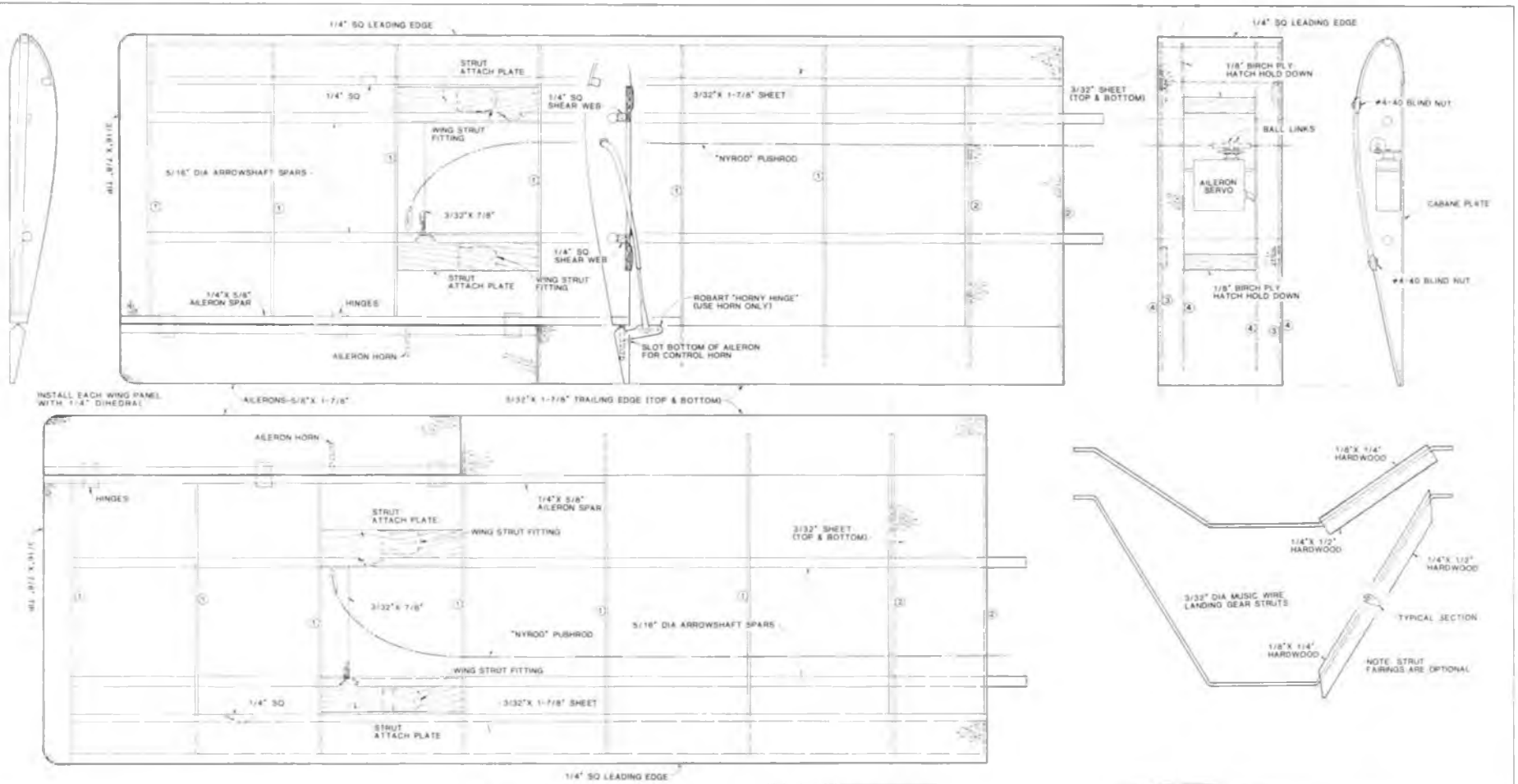
text continued on page 26



Center section initial assembly. Straightness counts for wing alignment and uniform dihedral.

FULL SIZE PLANS AVAILABLE — SEE PAGE 122




1/4" SQ LEADING EDGE
STRUT ATTACH PLATE
1/4" SQ
1/4" SQ SHEAR WEB
3/32"X 1-7/8" SHEET
3/32" SHEET (TOP & BOTTOM)
WING STRUT FITTING
5/16" DIA ARROWSHAFT SPARS
"NYROD" PUSHROD
3/32"X 7/8"
1/4" SQ SHEAR WEB
STRUT ATTACH PLATE
WING STRUT FITTING
1/4"X 5/8" AILERON SPAR
HINGES
ROBART "HORNY HINGE" (USE HORN ONLY)
AILERON HORN
SLOT BOTTOM OF AILERON FOR CONTROL HORN
INSTALL EACH WING PANEL WITH 1/4" DIHEDRAL
AILERONS-5/8"X 1-7/8"
3/32"X 1-7/8" TRAILING EDGE (TOP & BOTTOM)
1/4" SQ LEADING EDGE
1/8" BIRCH PLY HATCH HOLD DOWN
BALL LINKS
AILERON SERVO
#4-40 BLIND NUT
CABANE PLATE
#4-40 BLIND NUT
1/8" BIRCH PLY HATCH HOLD DOWN
AILERON HORN
HINGES
1/4"X 5/8" AILERON SPAR
STRUT ATTACH PLATE
WING STRUT FITTING
3/32" SHEET (TOP & BOTTOM)
3/32"X 7/8"
5/16" DIA ARROWSHAFT SPARS
"NYROD" PUSHROD
WING STRUT FITTING
1/4" SQ
3/32"X 1-7/8" SHEET
STRUT ATTACH PLATE
1/4" SQ LEADING EDGE
1/8"X 1/4" HARDWOOD
1/4"X 1/2" HARDWOOD
1/4"X 1/2" HARDWOOD
3/32" DIA MUSIC WIRE LANDING GEAR STRUTS
TYPICAL SECTION
1/8"X 1/4" HARDWOOD
NOTE STRUT FAIRINGS ARE OPTIONAL
#4 SHEET METAL SCREWS
.032 ALUMINUM FITTINGS (6 REQUIRED 12 FOR EACH WING & 2 ON EACH SIDE OF THE FUSELAGE)
7/8" BIRCH PLY STRUT ATTACH PLATE (4 REQUIRED)
1/16" PLY AILERON SERVO HATCH
2 3/32" SHEET 4 RIBS
CUT OFF FOUR RIBS (PER WING PANEL) AS SHOWN TO ACCOMODATE AILERON SPAR
1/64" PLY REINFORCEMENT (BOTH SIDES)
3/16" SQ HARDWOOD
1/8"X 3/16"
HINGES
3/16" SHEET
3/16"X 3/8"
1/8"X 1/4" HARDWOOD
1/8"X 1/4" HARDWOOD
3 1/16" PLY 2 RIBS
5 3/32" SHEET 12 RIBS
4 1/16" PLY 4 RIBS
PIETENPOL FOUR
SHEET 2 OF 2
PLAN NO. 927 (2)

you have to do is sanding the cowl from a rectangle at the firewall to a circle at the nose ring. An X-Acto carving blade makes short work of the roughing cuts. The transition from the lite ply front to the 1/4" aft framework leaves a 1/8" step. Four pieces of 1/8" x 1/4" balsa Zapped to the 1/4" x 1/4" longerons between formers #5 and #6 and sanded to the natural contour of the aft fuselage will make you look like a pro. If you leave the 1/8" step the whole world will know you're a hacker! When you've finished sanding the fuselage, gently rub it with your hand. You're not getting involved with it, you're just checking for lumps and bumps you may have missed. Get rid of them now or you'll be looking at them in the covering.

Tail Group:

20. The tail group is so simple it's really a waste of paper to go into great depth on how to cut sticks. Two items, however, are worth considering:

A. Be sure all the 3/16" stock is the same thickness or you'll end up sanding the tail 5/32" thick. That will make it pretty weak.

B. Be sure the hinges are in the same plane (straight line) or you'll have an oil-can effect at 0° throw. The servo will need steroids to hold a surface at 0° and the flight battery will think it's lighting Pasadena. Obviously flight time per charge will suffer greatly if you allow this condition.

Wing:

21. Fabricate all parts required to build the wing center section and outer panels. A brass tube, sharpened on the inside makes a dandy hole cutter for the spar and pushrod guide holes.

22. Build the center section first by pinning down the lite ply cabane plate. Make a left and right hand rib #3 and #4 assembly and Zap to the cabane plate edge. A House of Balsa upright comes in handy about now to insure the ribs are perpendicular to the plate. Zap the remaining #4 ribs onto the plate. Use the lineup marks on the plan for side spacing and the arrowshafts for temporary fore and aft locating tooling. Add the hatch hold-downs and set the assembly aside. The notches in rib #3 establish the incidence so cut them accurately. When you Zap in the 1/8" x 1/4" fir stops on top of the notch, line them up carefully.

23. Both wing halves are shown so there shouldn't be any problem building two left hand panels. As a precaution, cross the plan off when the panel is done. Construction is straightforward sheet trailing edge and sheeted top leading edge. Ribs #2 are planked completely top and bottom, so either pre-glue the 3/32" sheet or raise the ribs during construction. The wing spars are 5/16" diameter **arrow shafts,** not birch dowels. The arrow shafts have no grain runout while birch dowels have never heard the term "straight grain."

24. After the three basic wing sections have been built, it's time for the one critical operation on the wing. The outer panels are held to the center section with 1/16" dowels that go through the arrow shafts. To perform the drilling operation, slide the outer panels into the center section. Block up the end ribs 1/4" to eliminate a flat wing drooped look. Now, let's think for a minute. The arrow shaft isn't a steel rod so it's not going to offer too much resistance to drilling. An electric drill is cumbersome and makes holes fast — not necessarily where you want them. I use a pin-vise which X-Acto, among others, sells. Locate the hole position and start the hole with a

pinpoint dent. This keeps the drill from leaping off the shaft as you begin drilling. The inner rib #4s provide vertical reference for the drill. The only visual requirement on my part is to drill through the shaft centerline which is 5/32" from either edge of the shaft. If you're still a little unsure about this operation, practice on the spar just inside the tip rib. Be sure to Zap the practice holes shut when you're done.

25. Make the ailerons from light 5/8" x 1⅞" sheet. It's more important that they weigh the same than lightness. Remember the servo still has to move them so keep the hinges lined up or the oil-can effect will raise its ugly head again. It's now time to trial check the aileron servo direction. Place the servo in the center section and actuate. Set the trim at 0° so that you don't have a clocking problem later on. Feed in right aileron and watch the servo output wheel. The right ball link should move towards the right tip. If the direction is reversed your servo may be left-handed, your transmitter servo reverse switch in the wrong position, or the ball links are mounted on the wrong side of the wheel (rotate the wheel 180°). In any case, fix it now; you are building a crash!

26. Install the nyrod pushrods and guides and check for smoothness of operation. Drag cuts down battery flight life.

27. Remove the pushrods and Plasti-Zap the guides in. Finish planking the wing, add the tips, sand and check for lumps and bumps. Make them go away!

28. The wing struts are functional so we better build some to hold the outer wing panels up. They're made from straight grained fir or spruce. A simple 1/16" Z-bent wire will do nicely at the fuselage fitting while an adjustable steel snap link is used at the wing panel fitting. If you don't need to adjust the strut lengths your building is superb and you probably lie like a rug. I've alluded to fittings; you'll need eight for the model. Fabricate them from .032 aluminum sheet per the pattern on the plan. The mounting holes are on standard 1/2" centers to match the landing gear clamps. A 1/16" diameter hole will accept the wire and snap link.

Trial Assembly:

30. You have a golden opportunity to shine & impress your buddies with your building prowess. Trial fit the entire model. Check dihedral, incidence, servo direction, the antenna wrapped around the receiver. Wait a minute! You plan on letting the antenna hang out the bottom through a notch in the radio hatch — right? Is it okay if I watch you give the engine full throttle while you're standing on the antenna? Your act is classier than that. You prefer the WW II installation where the antenna magically rises out of a top hole or mast and heads directly for the fin where it's terminated with a rubber band and a bent pin! How about a plastic tube inside the fuselage that the antenna slides through? It makes a much cleaner installation and nobody asks you what that string is for. Make the tail filler blocks while you've got it assembled. One item we haven't taken care of is the strut fitting attachment to the outer panels. Turn the model upside down on the floor and slip a 1/4" shim under the center section. This will duplicate the incidence you built in — in step #24. Center the steel snap links on the threaded strut rods, attach the mounting clips and install the clips to

text continued on page 214

SUNDAY FLIER

Ken Willard

Photo 1

Photo 2

Photo 3

Sunday Flier Goes To Reno

I hadn't planned to go to the Nats at Reno this year. The air fare has gone sky high, and the last time I was in Reno was a very unpleasant experience. Besides, there had been a lot of local flying activities --- racing, scale, sailplane races, pattern, the whole schmeer. The only real reason to go, since I didn't plan to compete, would be to see old friends.

Then I received a letter from Tony Italiano, telling me that I had been elected to the National Free Flight Society's Hall of Fame, and the presentation was to be made at the Nats during the NFFS' Annual Symposium. That swung everything the other way. Of course I'd go. To put icing on the cake, I got a call from Frank Milo, honcho of Firecat Technology, asking me if I'd drive to Reno with him. And I did. We had a ball, and as you will see as this story unfolds, there was an unusual added attraction that made this trip one of the most enjoyable I've ever had. Let's get on with the tale.

Have you ever driven to Reno from the San Francisco area, taking Interstate 80 through the mountains, past Lake Tahoe, Donner Lake, and Donner Pass? It is a beautiful drive, and the scenery is outstanding. One thing; you do go up about 7200 feet altitude, and on the way up, if it's warm, you better have a good cooling system --- particularly if you use the

Photo 4

"Gee thanks pal, that's really bringing it in for me!"

air conditioning. As we ascended, the car did start to warm up --- not dangerously so, but we wondered about what might happen if you did have radiator problems.

Well, we got over the top and were on the downgrade when we saw a sign which would have solved the problem, had it arisen. An enterprising businessman, aware of the potential problems with radiators, had posted a sign alongside the road telling you what to do if the problem came up. Photo #1 shows the sign, and I'll bet he gets a steady stream of business.

As far as the actual Nats events were concerned, you'll be getting detailed reports from other writers who attended. As for me, I witnessed some action in pylon, pattern, scale, U-control, free flight, indoor, and soaring, so I got the overall flavor; the only event I missed was the old timers' free flight radio assist with the SAM group.

The competition spirit was very evident, and there were the usual number of protests --- maybe more than usual, but all in all, I got the general impression that the events were reasonably well-run --- especially when you consider that the help was all volunteers.

Funny how things work out. The radio control and control line events were held at Stead Air Force Base, and that happens to be where the LearFan Ltd. research and development and flight test operations are located. As we drove into the site, we had to go right past their facility. It was an opportunity I couldn't resist. I was with John Valentine and Wilson King of Velectro, the company that makes the Great American Foam Machine. John built the DC-9 that's on the cover of September RCM. His mouth was watering as he looked at the LearFan sitting outside the hangar.

"Would you like to stop in and see if we can get some info on that job?" I asked him.

"I sure would," he replied.

So we stopped and inquired from one of the technicians as to who we might get permission. He gave us the name of Glenn Goza, Personnel Manager, and showed us where Glen's office was located.

We went over to the building, went in, and were directed to his office. It was just before quitting time, but Glenn spent some time with us, and then invited us back the next day for a tour of the whole facility. You can be sure we took him up on it.

The next day we returned, and Glenn got us all properly badged and cleared for the tour. The very first thing we did was to go to the model shop, where we met and talked with Don Landrus, one of the toolmakers, who had built one of the most beautiful scale models I have ever seen. Photos #2 and #3 show Don with the model. Sure --- it's a windtunnel model, not an R/C job, but we could envision a flying model just like it, made by using the same technique which John used on the DC-9. No problem; Don took us over to the data library, and provided us with a full set of drawings from which to make a flying scale job.

We took in the rest of the areas, where they fabricated the various components, saw the test set-up where they were testing the landing gear to withstand some three to four times the normal landing stresses, and then went over to flight operations. The test plane was being prepared for a series of tests, and was sitting outside the flight ops hangar, as shown in Photo #4.

As luck would have it, technical delays --- a routine occurrence in flight testing --- postponed the flight until

the next morning. Don't worry --- we got up early and hustled out there to be sure and see it. And that's when I met Vaughn Roberts, one of the most interesting R/C enthusiasts I have ever had the pleasure of talking with. That's Vaughn in Photo #5. He's a retired Air Force pilot who has flown just about any airplane you can think up --- even crop dusters. He doesn't fly full scale power any more, but he does fly full scale gliders, and more than that, he has an R/C job that, as he says, "I've been flying and repairing for the last ten years!"

I don't know what Vaughn's title is, but he certainly was busy doing things to get the LearFan ready for flight, and I noted that the entire crew,

Photo 5

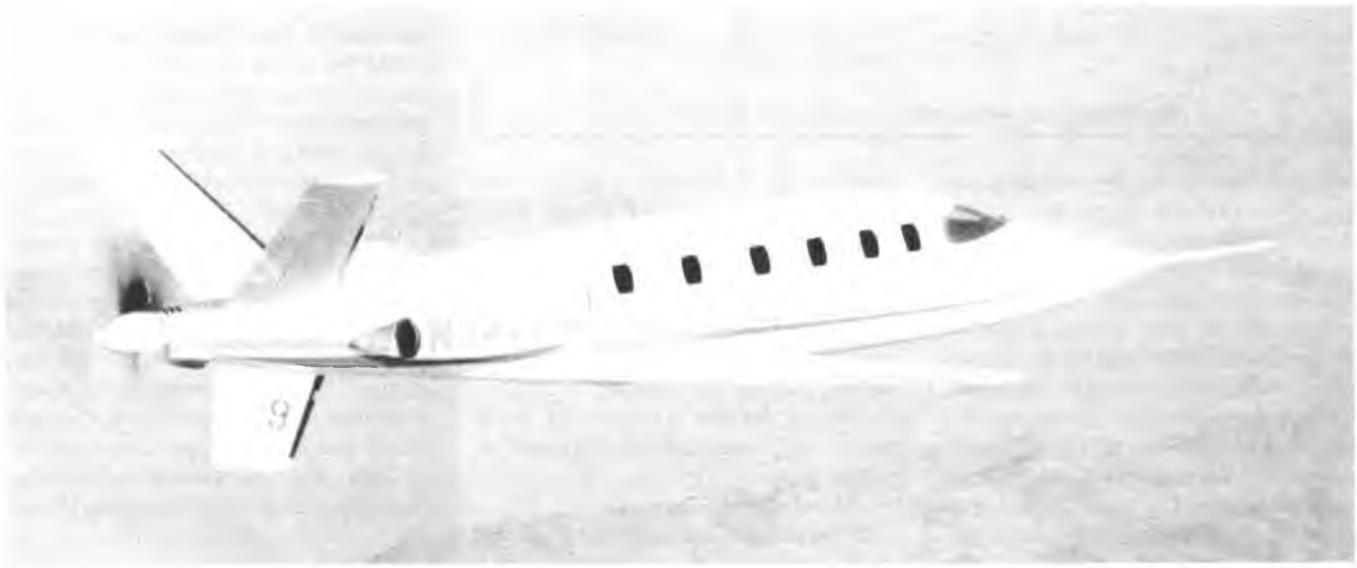


Photo 6

including Don Madonna, the pilot, kept coming to him whenever a problem came up.

Just before the test flight, Vaughn arranged with Don to make a flyby so we could get some pictures. We also alerted the AMA folks at the control line site, so they could get some shots as well.

The flyby turned out to be a check of the landing gear, since the indicator light on the instrument panel had conked out. No problem; everybody got photos --- except me. My camera jammed! Blast! To make up for it, they gave me a couple of beautiful air shots --- reproduced here in black and white, as seen in Photo #6.

Photo 7

During all this activity, I carefully taped a lot of information about the LearFan. For example, during test flights, they use a Lockheed T-33 as a chase plane. During a test the T-33, a two place jet trainer, uses up four times as much fuel as the eight place LearFan! I had a lot of other interesting stuff, but wouldn't you know it? Mr. Chief Dum-dum did it again; set the tape recorder down somewhere along the line while taking photos, couldn't remember where, in all the excitement, and never saw it again. Talk about dumb --- didn't have my name on it, and didn't identify myself at the start of the tape! Maybe the guy who found it might play the tape, recognize it's about the LearFan, and send it to them. A faint hope, at best.

Suffice it to say that our visit with the LearFan folks was one of the real

continued on page 36

highlights of the trip to Reno.

Another highlight for me was when I had the chance to fly Mark Smith's sixteen foot scale model of the ASW-20. What a beauty! Fast, majestic, graceful, impressive --- there aren't enough adjectives. That's Mark retrieving the model after the landing in Photo #7.

The final highlight was the best. Thursday night, at the Reno Colliseum, the NFFS held their Annual Symposium, during which Ed Lidgard, Paul Plecan and I were inducted into the NFFS Hall of Fame. It was particularly moving for me, because I've been away from free flight for some time. I told them about setting an indoor seaplane record 'way back in 1929. Yep, indoor seaplane. They don't even have that category any more! The flight was made in Evanston, Illinois, in the old Patten Gymnasium at Northwestern University --- and it doesn't exist any more either. Take-off was from an automobile drip pan in which about a half inch of water had been poured. The model had to float for at least 30 seconds, then you could wind it up and fly it. Take-off run was about a half an inch! The model sat on three floats, two in front on long, spindly legs, and one at the tail, very short, so the model angled up at about forty five degrees. Talk about an STOL (short take-off and landing) design! Flew for a little over three minutes.

I also told them about the time I was working with American Airlines as a meteorologist at Midway Airport in Chicago. I had the night shift, from midnight to eight a.m. About five in the morning, one summer day, I called the tower.

"Frank, have you got any traffic besides our flight from Detroit?"

"Nope."

"Would it be okay if I took my gas model airplane out to the runway intersection and put in a couple of flights? I've got a timer so the engine will only run about a half a minute, and glide will be about the same length of time. Okay?"

"You've got a **what**?"

I repeated the information.

"I gotta see that," said Frank. "Go ahead. If I get any unscheduled traffic, I'll give you the red light."

So I went out on the field with my old CAVU model with the inverted Elf ignition engine, fired it up and made three flights. It was dead calm, and the model landed each time about fifty feet from the take-off point, after circling up to the left under power, and gliding down gently in a right turn when the engine quit. It was fun.

The next morning, shortly after dawn, the phone rang in the operations office. It was for me.

"Ken? Frank here, in the tower. You got that model airplane with you?"

"Nope. Left it at home."

"Dammit, why didn't you bring it? I told the guys on the day shift about it, and they came out two hours early just to watch!"

Needless to say, the next morning I did bring it, and made some more flights just for the guys in the tower.

To the best of my knowledge, the CAVU free flight sport gas model is the only one that ever made flights in the middle of a major commercial airline airport during an operational time. To be sure, the year was 1936, and the airliners were DC-3s --- and most of the guys who were in the audience at the NFFS Symposium hadn't yet been born!

It was a fun evening, bringing back many memories --- and I'm very proud to be a member of the National Free Flight Society's Hall of Fame.

Thank you, free flighters.

□

ENGINE CLINIC

Clarence Lee

I have been receiving a considerable number of favorable comments in regards to the engine reviews we have been running this past year. We have been trying to feature the new and different engines appearing on the model market. With the large number of new engines being announced it has been a little rough getting the reviews into print as quickly after release of the engines as possible. We will be presenting these reviews as space allows.

To help speed things along, I have decided to run a shorter less technical review of the new Royal 40 two stroke engine here in the Engine Clinic column this month to bring this new engine to your attention as close to its release date as possible. After all, it is the engine's performance that most of you are mainly interested in.

The Royal 40 is reviewed in this month's column.

Although Royal Products has been advertising the engine for several months now, it has just been released shortly before the time of this writing (late June). I have received quite a few inquiries regarding this new engine as is typical of any new engine that appears on the market and was curious myself as to how well the engine was made and designed, how well it might perform, etc. Dave Anderson, who is Marketing Manager for Royal Products, sent us a pre-release engine for evaluation last month and I was quite impressed with the overall quality and performance of the engine.

Royal Products is headed by Ron Murray and they should be a familiar name to most modelers who have been involved in R/C for any length of time. For many years Royal Products imported the Merco line of engines from England until they discontinued production. Having once been involved with the engine business, Royal Products decided they would like to continue offering an engine(s) as part of their product line. The new Royal 40 is the first engine in a line of engines of various displacement sizes that Royal Products will be marketing in the near future. The Royal 40 is actually being built in Taiwan to Royal Products' design specifications.

The Royal 40 is of Schnuerle ported ABC type design. Actually ABN would be more accurate here in that the sleeve or liner is nickle plated brass rather than chrome plated. Several other manufacturers of ABC type engines have gone to nickle plating rather than chrome — most notable being O.S. with the ABC type engines in their line.

The Royal 40 has a bore of .835" and stroke of .725" for an actual displacement of .3970 cu. in. These were actual measurements of the engine tested as no literature accompanied the engine listing the manufacturer's specifications. This

continued on page 40

The disassembled Royal 40.

This photo shows the massive crankshaft and larger than usual ball bearings used in the Royal 40.

bore/stroke ratio results in an engine of what would be considered "overbore" design.

The engine is of one piece crankcase design with a removable front housing and backplate. All castings are of pressure die-cast aluminum and given a glass bead blast finish. The machine work is of very high quality and would appear to have been performed on the latest CNC (computer controlled) equipment. This can usually be recognized by the high quality surface finishes.

The massive one piece crankshaft has been hardened and finish ground on the bearing surfaces and runs in two ball bearings. The .60 size rear bearing has an o.d. of 28mm (1.102") and i.d. of 15mm (.590"). The single shielded front bearing has an o.d. of 22.2mm (.875") and i.d. of 7mm (.275").

The high silicon aluminum piston appears to have been machined from a permanent mold casting. The con rod is machined from bar stock aluminum and has bronze bushings at both the crankpin and wristpin ends. The tubular steel wrist pin is retained in the piston by wire cir-clips. The sleeve, as mentioned previously, is machined from brass and nickle plated on both the i.d. and o.d. surfaces. Porting is standard Schnuerle with a single boost port opposite the twin exhaust ports.

Latest offering from O.S. — the O.S. Max 21 VF-B for R/C dune buggy and off-road type cars. Note large size air filter and heat sink head. Should prove to be a very popular engine for this type of activity.

The carburetor is of the two needle, rotating barrel type and, except for the external appearance, is identical to

the proven O.S. two needle type carburetor.

The combustion chamber shape is the typical bowl type surrounded by a wide squish band with a measured volume of .72cc's which computes to a compression ratio of 10-1. This is somewhat on the high side but the manufacturer has designed the engine to run on 5% nitro which, in turn, necessitates the higher compression ratio.

As per the manufacturer's recommendation we tested the engine using a 5% nitromethane, 22% synthetic oil, and balance methanol alcohol fuel mix. The engine was given our standard thirty minute break-in period prior to testing. The temperature the day of testing was 88°F., the relative humidity 12%, and the barometric pressure 30.15 inches of mercury. A real hot, dry, California day. The engine was run with the muffler that comes as standard equipment on the engine. The following rpm figures were recorded.

9/6 Top Flite Super M — 14,800; 10/6 Top Flite Super M — 13,200; 11/6 Top Flite Super M — 10,900; 9/6 Power Prop — 14,600; 12/6 Power Prop — 9,700.

Next the engine was run with the 9/6 Top Flite propeller without the muffler and 15,800 rpm recorded. The muffler accounts for a 1,000 rpm loss in the 15,000 rpm range. This is, obviously, in an effort to hold the noise to an acceptable level. The muffler has a very small exhaust exit but heavy enough wall thickness to allow for enlargement of the opening if a higher noise level is acceptable and less power loss desired.

The power figures achieved were exceptionally good, especially considering the short break-in period given the engine. With additional running when fully broken-in, the engine could be expected to pick up 500-800 rpm. 15,800 with the 9/6 Top Flite propeller and open exhaust is very good and would make this engine a contender for the Formula 500 racing event — especially those requiring side exhaust engines but allowing Schnuerle ported engines. This is an event pretty well dominated by the Super Tigre S-40 and Como 40 at present. The Royal 40 looks like it may be a real contender although not having been designed specifically for the racing events.

A real surprise was the idle characteristics of the engine. The engine would hold a 2,200 rpm idle with the 10/6 propeller and 2,000 rpm with the 11/6. It could be idled as low as 1,800 but was on the verge of dying. Standard idle speed for a two stroke engine is in the 2,500 rpm range with many engines not being able to idle much below 2,750. To hold a smooth and steady 2,200 rpm with instant acceleration after a long idle period was quite exceptional. You could not ask for an engine to idle, accelerate, and decelerate better than the Royal 40.

Overall handling qualities were excellent. The engine was easily hand started hot or cold with only one or two flip restarts after stopping the engine for prop changes. The needle valve adjustment range was quite broad and there was no indication of detonation or pre-ignition when running the engine lean even with the larger size propellers. Many engines will have a tendency to pre-ignite (that frying egg sound) when set up to be run on low nitro fuel and the larger prop sizes are used due to the higher compression ratios. The engine was also run with 15% nitro fuel and experienced no pre-ignition problems. The engine picked up 200-300 rpm with the higher nitro fuel.

Only one minor problem was encountered during the testing that was brought to Ron Murray's attention and should have been corrected by the time this article appears in print. With the smaller propeller sizes at high rpm, there was a tendency for the engine to surge. This was caused by the carburetor barrel moving back and forth sideways under the high rpm vibration, in turn, varying the fuel mixture. As the carburetor barrel is spring loaded, the spring tension was increased by stretching the spring and the problem eliminated.

The Royal 40 was designed to be a good performing, reasonably priced engine. It has fulfilled these requirements very well. The suggested retail price of the engine is only $84.95. As the engine will be marketed through normal distributor and hobby outlets, you can expect to find it selling for somewhat less.

I was quite impressed with the handling and performance of the Royal 40 and should imagine that those purchasing the engine will be also --- especially when the selling price is taken into consideration.

★

Hello Clarence,

This is something I wasn't sure of . . . can you run 1/4 scale chain saw engines on alcohol? How about the oil content?

Drag racers around this area who street drag, cruise the highways looking for a race, switch their fuel to

alcohol by a separate tank up front under the hood. They have a by-pass in the fuel line.

They say it's hard to start an engine on alcohol. Once you start it on regular gasoline, it's easy to switch to the alcohol fuel.

While on the alcohol fuels, how about in a 4-cycle Saito? Again how much oil and how hard would it be to start?

Thanks,
Paul Maharis
Kew Gardens, New York

Any of the chain saw/leaf blower type motors can be run on alcohol and will show a considerable increase in power. However, you might run into trouble with the carburetor not supplying sufficient fuel; that is, you cannot get the motor to richen up enough at high speed. This is due to twice as much alcohol passing through the engine per revolution than with gasoline. Gasoline burns with an air fuel ratio of 13 or 14 parts air to one part of gasoline (14.7 the ideal mixture for best power versus fuel consumption) and alcohol with a ratio of 6 or 7 parts air to one of alcohol. If you cannot get the engine to run rich enough the high speed metering passage will have to be enlarged. This is the hole where the high speed needle valve seats on the Walbro and Tillotson carburetors used on most of the chain saw/leaf blower type engines. A #60 drill (.040") will usually do the job. You do have to be careful not to enlarge the hole too much as it will be too large in relation to the diameter of the needle valve and the needle valve will, in turn, have little effect. The answer then is a larger diameter needle point.

I would sure question this bit about drag racers switching back and forth

between gasoline and alcohol. I have had quite a bit of experience along this line having been involved in drag racing, street racing, and other forms of racing over the years. An automobile carburetor set up properly for gasoline would not pass enough alcohol — the engine would run lean, and the result would be a loss of power. A carburetor set up for alcohol would run excessively rich on gasoline if at all — much the same as trying to drive with a stuck choke. Again, a loss of power would result.

As far as oil content, the chain saw/leaf blower type motors can be run on a minimum of oil due to having ball bearing crankshafts and needle bearing rods. With a broken-in engine you can run about a 32-1 mix which is about 3%. 16-1 (6%) would be better for a new engine. This pertains to either gasoline or alcohol. The four strokers do not have needle bearing rods and require more oil. Although many fellows are using less oil, I would go with 15%-18% in a new engine and 12%-15% in a broken-in engine. The actual amount depends on the particular engine and the prop size being used. If the engine is being really lugged down with a big propeller, then more oil should be used. If the engine is cowled and running on the hot side more oil should be used. You should use more oil with 15% nitro fuel than you would need with 5%. A lot of variables affect the actual oil content required.

Gasoline is more volatile than alcohol and might be a little easier starting than alcohol but if the engine has a hot spark there is no problem with alcohol. If so, the addition of 3%-5% nitromethane will make starting easier.

Dear Sir:

I have a Saito FA-90T Mark II that I thought I was going to have to send back for warranty repairs! The left cylinder had fabulous compression, the right one almost no compression! I ran it for about an hour (off and on) using Sheldon's R/C 12½% fuel, 20% oil I guess! I had added "HP Corrosion Inhibitor" to this fuel!

Same thing, right cylinder almost no compression. Then I ran it for half an hour, ten minutes at a time using BK's Blue Flame 15% fuel cut 50/50 with alcohol. Then I brought the oil content up to 12% with Castor oil! After using this fuel the right cylinder is equal in compression to the left one!

Would the lower oil content be the

cause for the right cylinder seating in and having good compression now! That cylinder was flaming out during idle and on the last ten minute run the idle was perfect! She turns a 14/6 Zinger at around 8500 rpm using a Heath Thumb Tach to check rpms!

I noticed it turned the same on the 7½% nitro fuel! Why? Because of the lower oil content of the fuel? My Saito 30 and 40 turn the same rpm on 20% oil or my 12% oil fuel (same nitro content 15%). I'm sure glad that cylinder came in! It is one sweet engine! The sound of it at idle sounds like a high performance engine at idle in a fuel dragster! Of course not quite as loud! Thank you.

Best regards,
Wm. G. Mitch
Hebron, Indiana

I doubt if changing the fuel had anything to do with the cylinder finally gaining compression. It was probably just the running time that did it. I would guess that possibly a valve was not fully seating when new and with running and break-in wear enough valve clearance was gained to seat the valve(s). Any time a four stroke engine does not have good compression, or in the case of a twin cylinder four stroke, one cylinder is stronger than the other — suspect a sticking valve or valve with insufficient clearance. Naturally there can be other causes such as a ring with a burr that is keeping it from seating. Running eventually allows it to seat.

It is normal for a twin cylinder ringed engine whether it is a four stroke or two stroke to have better compression on one cylinder than the other. This is due to the position of the ring end gaps. If the ring end gap is on the left side of the cylinder when viewed from the front, the engine will have better compression in the running direction than in the backwards direction. If the ring end gap is on the right side, the cylinder will have better compression when the engine is rotated backwards. With both end gaps on the same side, the engine would have equal compression on both cylinders. If one cylinder has the gap on the right and the other on the left you can expect a difference in compression feel. This in no way affects the engine when running. The solution is to place both ring end gaps straightforward or backwards. Eventually they will rotate to different positions, however.

Power-wise, four stroke engines do not show much improvement with increases in nitro content. The difference between 7½% and 15% is probably 100 rpm at the most. Nitro does help the idle and acceleration considerably, however. As far as lower oil content increasing power — theoretically, it should. You are replacing a non-combustible (oil) with a combustible (alcohol). In actual application it does not seem to work out that way. I have taken 22% oil content fuel and reduced it to 6%-8% keeping the nitro content the same and haven't seen enough power gain to talk about. This probably has a lot to do with a change in the fuel viscosity. The high oil content fuel requires the needle valve to be backed out farther allowing more fuel to pass through the engine in a given time period. The lower oil content fuel allows the needle valve to be leaned in reducing the amount of fuel passing through the engine. The end result being little change in power but a fuel with lower lubricating qualities. In the case of the chain saw/leaf blower type engines or any spark ignition engine, a low oil content fuel is desirable in order to prevent spark plug fouling.

Dear Mr. Lee:

I have been flying an Enya 90 4-cycle in Cunningham's Lazy Ace.

In the process of starting (both by hand and by starter), it has spun the prop nut and propeller off several times. After having a couple of welding-rod lugs installed in the prop hub, the thing ***kicked in the air*** *on two occasions to the extent of splitting the propeller and* ***bending the lugs*** *which protrude about 3/16" out of the hub.*

I really like the 4-cycle bit but am beginning to get the feeling that the whole thing is a disaster waiting to happen.

The engine has been run as rich as seems possible. I have been using Zinger 15/6 props and have tried a 15/6 Dyna Thrust 15/6 plastic prop in hopes that the heavier weight would contribute some flywheel action.

I know you have covered this problem in your column but I am writing in hopes you might have further suggestions.

Very truly yours,
David L. Ott
Williston, North Dakota

As you have found out the hard way, using studs to keep the propeller from slipping is not always a good idea. If you are going to use studs they should not be vertically with the wood grain. This is asking to have the prop split every time. The studs should be 90° to the grain. On some makes of engines that come from the factory with prop studs, this can place the starting position of the propeller in the wrong position. Actually, the studs are not really necessary with a .90 size engine. The use of a secondary nut (jam nut) on the prop shaft will keep the prop nut from coming loose and throwing a prop.

The cause of prop throwing is an engine with too high a compression ratio, too much oil in the fuel which effectively raises the compression ratio, or running the engine too lean.

The Enya four stroke engines do have a tendency to detonate if set too lean. The addition of a .015" head gasket will help considerably. After installation, the valves will have to be readjusted. If you are using more than 18% oil this can also be causing your problem. And be sure you are actually running the engine on the rich side. The engine is going to lean out as the fuel level in the tank drops towards the end of the flight. This is when most fellows experience the prop throwing. Be sure to set the engine rich enough at the beginning of the flight to compensate.

Dear Mr. Lee,

I read your column in RCM every month and find it very enjoyable and informative. I hope you can give me a little advice on a problem I am having.

I am running an O.S. Max 30 R/C engine in a Bridi T-20. I am using a Master Airscrew 9/6 prop, Sheldon's 10% fuel, and stock muffler with muffler pressure to the tank. This combination was turning 10,200 rpms. I decided that it seemed to have too much back pressure so I bored out the muffler outlet to 3/16" and picked up 1,000 rpm!

There was only a modest increase in noise level but now it seems to run overly rich at idle and mid-range even with the air-bleed screw backed out all the way. The tank level is okay. Would changing to a Perry carburetor help? Or what?

Thanks in advance for any help.

Bill Sturgeon

By opening up the muffler and reducing the back pressure, the engine is now able to pump more fuel through accounting for the richer idle and acceleration. The engine is probably running a lot cooler which also can cause a richer idle. If your air bleed is full open it would indicate your tank position is too high. The centerline of the tank should be 1/4"-3/8" below the needle valve. If your tank position is okay then you will have to drill out the air-bleed hole to a slightly larger size. An alternative is to notch the top edge of the carburetor barrel about .015" with a jeweler's file. This will lean the idle mixture. Air-bleed carburetors do leave a lot to be desired because as you open the air bleed to lean the mixture you are doing so by reducing the fuel draw. A Perry carburetor would be a better way to go as the mixture can be leaned without reducing fuel draw at idle. □

Flying Near Airports? Be Careful!

Free Flight or Radio Control flying near airports, or in any situation which might involve the possibility of models being in the vicinity of full-scale aircraft operations, must be avoided—or conducted so as to eliminate any dangerous situations. Models should not be flown in the proximity of full-scale aircraft operations unless the flyer has someone else with him for the sole purpose of watching for full-scale aircraft and supervising the flying so as to prevent accident possibilities.

PROTECT YOUR RIGHT TO FLY!

Safe Flying Is No Accident!

When writing to an advertiser, be sure to let them know that you saw their ad in RCM.

ATTENTION
R C MODELER
SUBSCRIBERS

If you're moving, want to write us about your subscription, or have missed an issue, fill out this form, attach your old mailing label and mail to RCM.

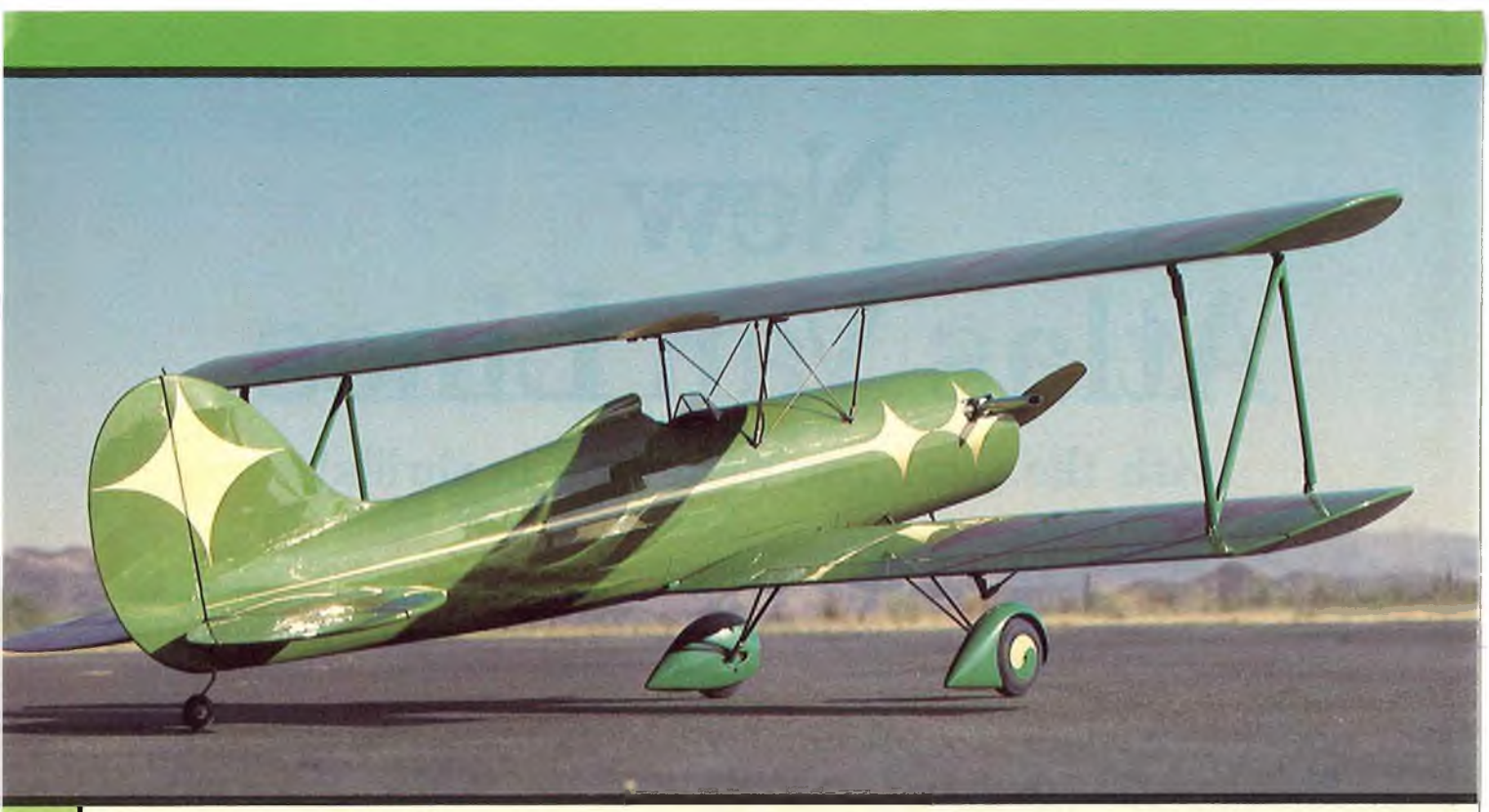
ATTACH YOUR MAILING LABEL OR PRINT YOUR OLD ADDRESS HERE

Name
Street
City
State Zip

PRINT YOUR NEW ADDRESS HERE

Name
Street
City
State Zip

R C MODELER MAGAZINE
P.O. Box 487, Sierra Madre, Calif. 91024



GREEN HORNET

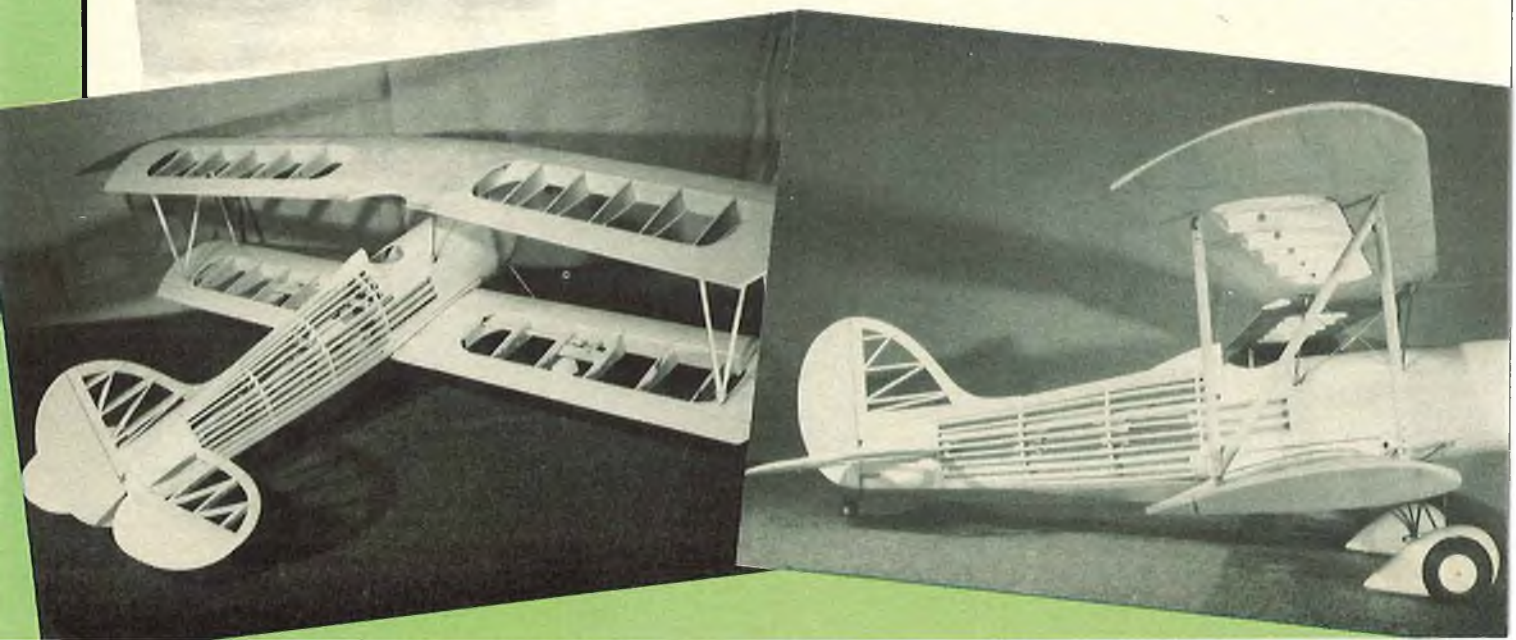
By Martin A. Fallandy

It's late August here in the west end of the San Fernando Valley. Hot and dry, as I sit here by the side of the moat surrounding my shop, idly tossing slightly spoiled apples at the crocs. The sound of those snapping jaws gives a person a real sense of security. I had two very weighty world problems on my mind. The first, what color MonoKote to cover my latest biplane with and, second, does a fly make a half a loop or half a slow roll to land upside down on the ceiling. Then my everloving wife came up and offered me a bottle of my favorite vitamins.

"No thanks dear, I'm waiting for Sweeny and Goertzen (my two flying buddies) to go flying," I said.

"Oh, that's right," she came back, "you and the airline pilots, no alcohol 24 hours before flying."

"That's right dear, except they have it easy, autopilots, copilots, computers and heaven knows what, and besides their equipment is built in a factory by



folks who know what they're doing," I returned. But there was something deeper on her mind, a sensitive person like myself can tell, and sure enough she lowered it on me.

"Dear," she started, "do you suppose you could do something about the backyard?"

"What's wrong with the yard?" I asked. "The weeds are a good six feet high, they give us privacy from Felix (RCM Aug. '83), our water drinking neighbor."

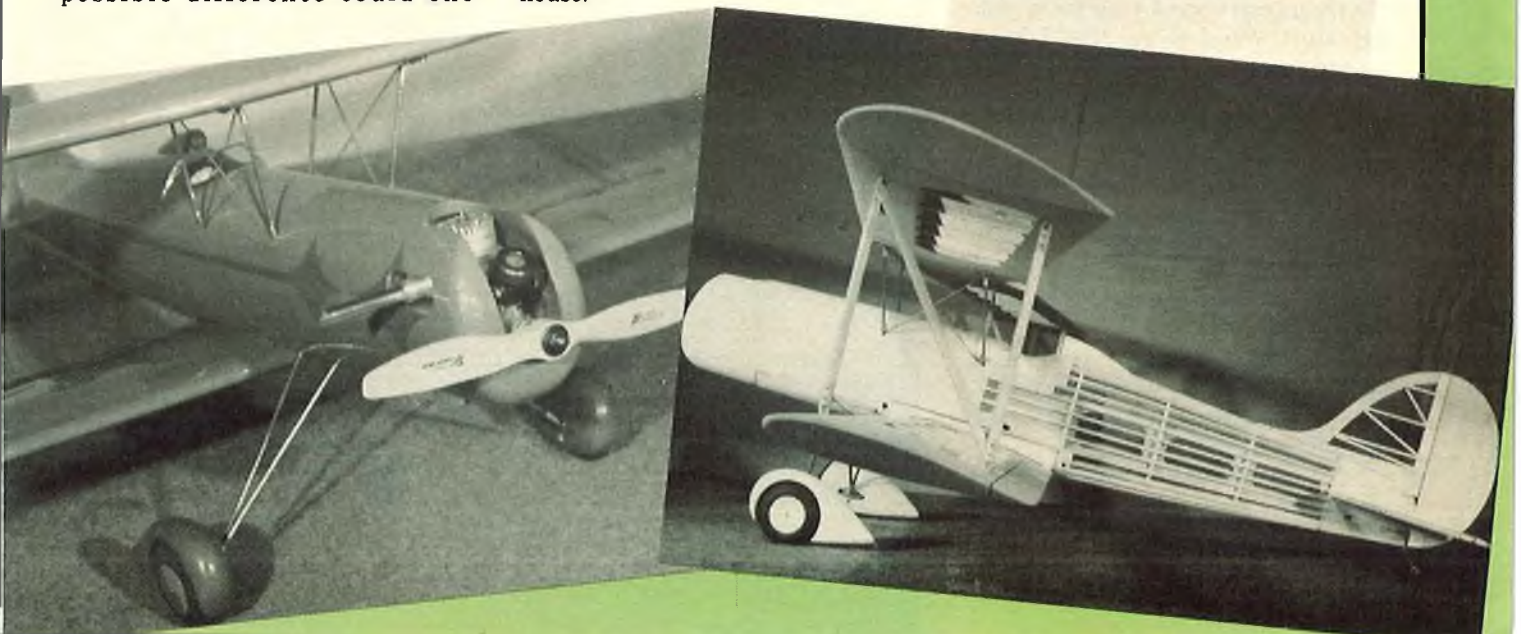
"I know, but Henry disappeared in there for three days last week," she came back. Henry is what she calls one of the midgets we have hanging around the house; she refers to them as "our" children. I haven't figured out this phenomenon yet, and besides there has to be five or six of them, what possible difference could one wandering aimlessly around in the weeds make. But they do seem to make her happy, and I've always felt everyone should have a hobby, besides a girl like mine is one in a million. Then she pretty well closed the conversation by saying:

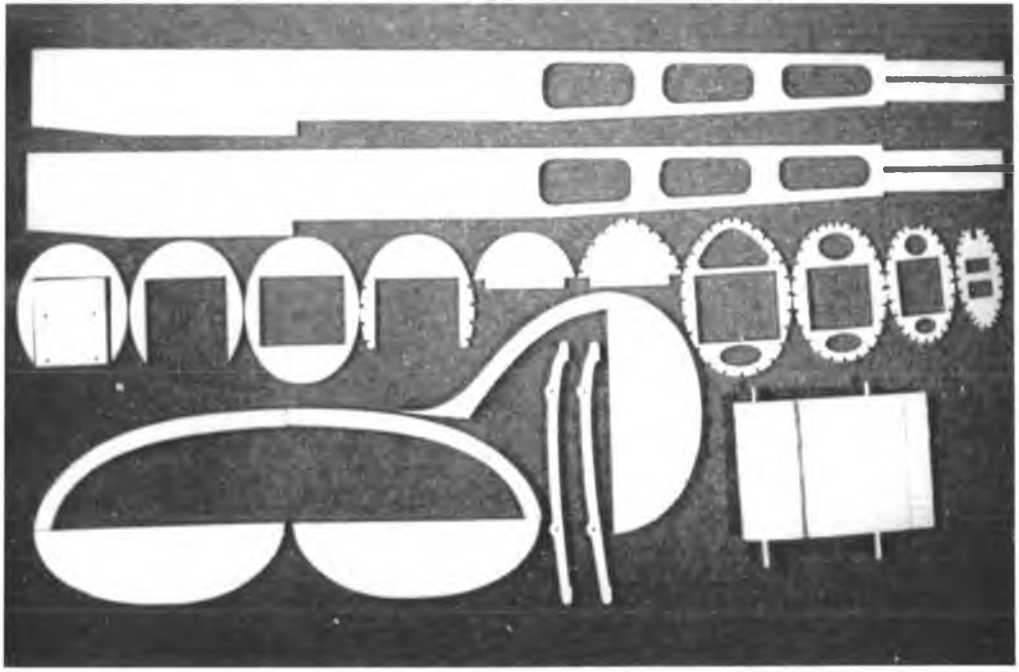
"Well dear, if something doesn't happen to those weeds pretty soon the **sweet** is going to drop out of 'Home Sweet Home'." Well any fool could figure out what that meant; I figured it out right away. "And further," she said, "I want to see something green out there."

"About this time Sweeny and Goertzen were honking and it was time to load up. "Okay dear," I said, "I'll get right on it — are the midgets all accounted for?"

"Yes," she said, "they're all in the house."

Give this fun biplane a try and you'll enjoy it as much as the designer does.





Step 1: Cut a complete parts kit. This will save building time later.

"Good," I said, lighting my pipe. I threw the burning match into the bone dry weeds, picked up my plane and gear and started for Sweeny's van, with the warm feeling that the back yard weeds were being taken care of. Walking along the driveway, I met my good neighbor Felix. As usual he was excited.

"Water, water, get some water Marty," he yelled.

"No you don't Felix, you're not going to fool me with that water trick again," I returned. As we rounded the corner we all waved to the two fire trucks roaring up.

"Nice to see our tax dollar at work, wonder who's having a problem," I said to my buddies.

We had one of those perfect flying days. Goertzen brought his Antic, powered by a four cycle mill; it floated around majestically. Sweeny terrorized the skies with his trusty Stearman and I bored a few holes with my Gull Wing Bipe. But I kept wondering what my everloving wife meant by wanting something green in the backyard. Well on the way home it hit me,

"Sweeny, swing by Smith Brothers Hobby Shop in Reseda, I need a few things," I fairly shouted.

"Good idea," he came back. "Perfect way to wind up the day," Goertzen chimed in.

On asking Chuck Smith for a roll of green MonoKote, his comment was, "Some green trim on a yellow model should look good, Marty."

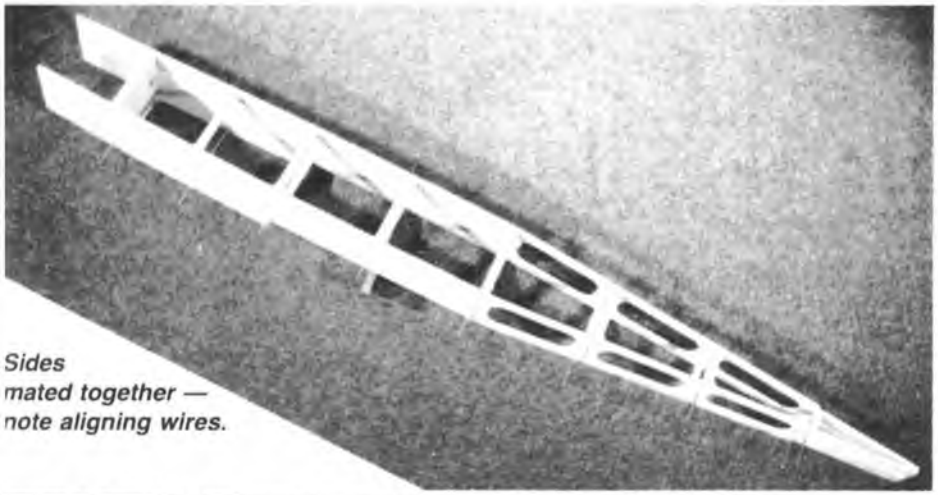
"No Chuck, the whole model is going to be green," I said.

"Marty, you're further out of your gourd then I thought, the first time you go in the corn (corn is grown commercially around our field in the Sepulveda Basin where we fly) you'll never find it," he said in a concerned way. (You can talk to your customers this way when you run a first class hobby shop). But I took it in the spirit it was given and said, "It's a chance I have to take, Chuck."

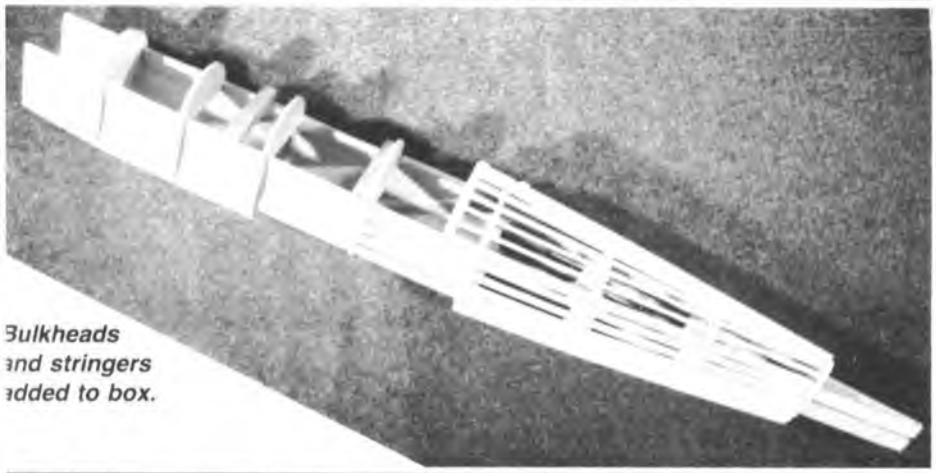
So the "Green Hornet" was born. I took a lot of care covering this model; I wanted it to look just right. When complete I placed it in the center of the backyard, the gold trim contrasting nicely with the now level, charred backyard, and waited for the pleasant comments I knew would be coming from my everloving wife. I didn't have long to wait.

"Nice looking biplane, dear," she said, offering me a bottle of my favorite vitamins.

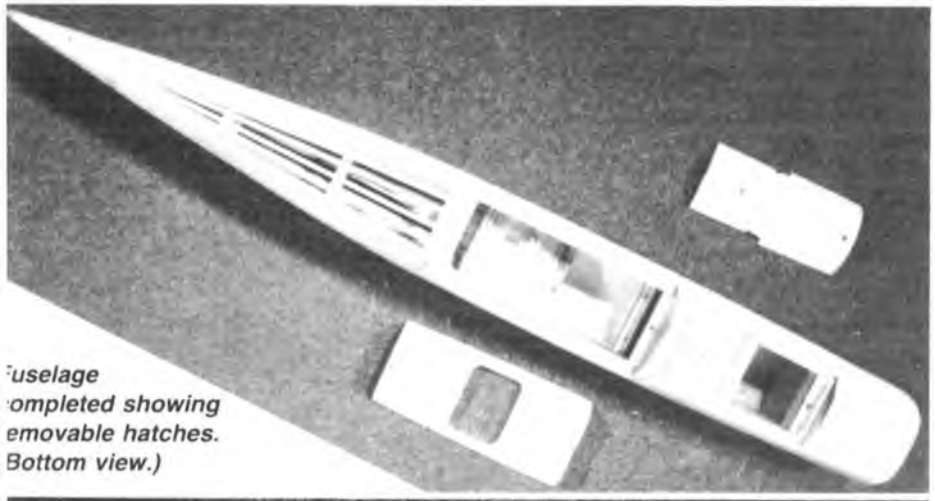
GREEN HORNET
Designed By:
Martin A. Fallandy
TYPE AIRCRAFT
Sport Biplane
WINGSPAN
Top: 53¾"
Bottom: 48½"
WING CHORD
7½ Inches
TOTAL WING AREA
767 Sq. In.
WING LOCATION
Biplane
AIRFOIL
Symmetrical
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
Upper: None
Lower: 1/2 Inch
O.A. FUSELAGE LENGTH
34 Inches
RADIO COMPARTMENT SIZE
(L) 7½" X (W) 2⅝" X (H) 2⅜"
STABILIZER SPAN
17 Inches
STABILIZER CHORD (Incl. elev.)
6¼ Inches
STABILIZER AREA
72 Sq. In.
STAB AIRFOIL SECTION
Flat Bottom
STABILIZER LOCATION
Mid Fuselage
VERTICAL FIN WIDTH (Incl. rud.)
7½ Inches
REC. ENGINE SIZE
.40 Cu. In.
FUEL TANK SIZE
8 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail., Throt.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage..... Balsa & Ply
Wing ..... Balsa, Ply, Fiberglass
Empennage ..... Balsa
Wt. Ready To Fly ..... 86 Oz.
Wing Loading ..... 16.16 Oz./Sq. Ft



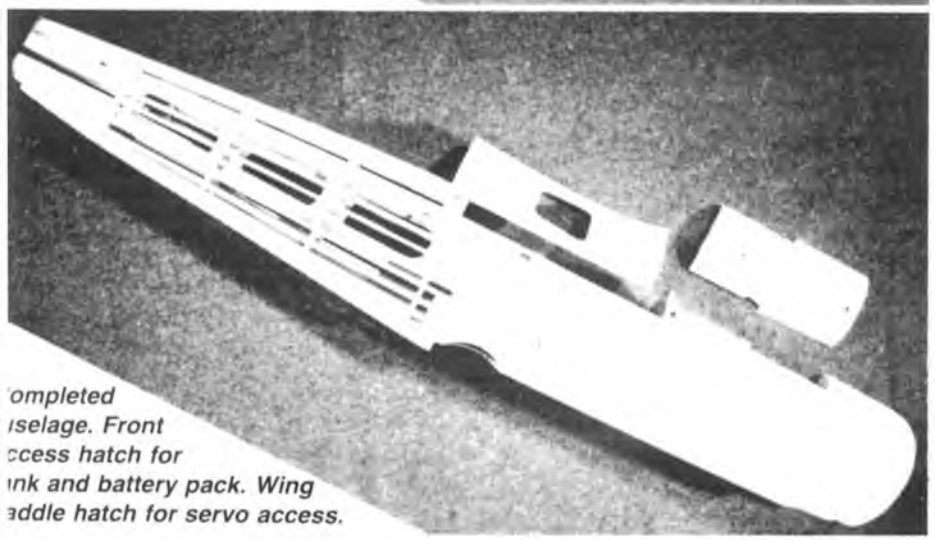
Sides mated together — note aligning wires.



Bulkheads and stringers added to box.



Fuselage completed showing removable hatches. Bottom view.)



Completed fuselage. Front access hatch for tank and battery pack. Wing saddle hatch for servo access.

"Notice the color," I prompted.

"Yes, it is green," she said.

"You did say something green," I reminded her, "of course I'll have it out flying once in a while, but it will be right there most of the time."

"You're so thoughtful, dear," she sighed.

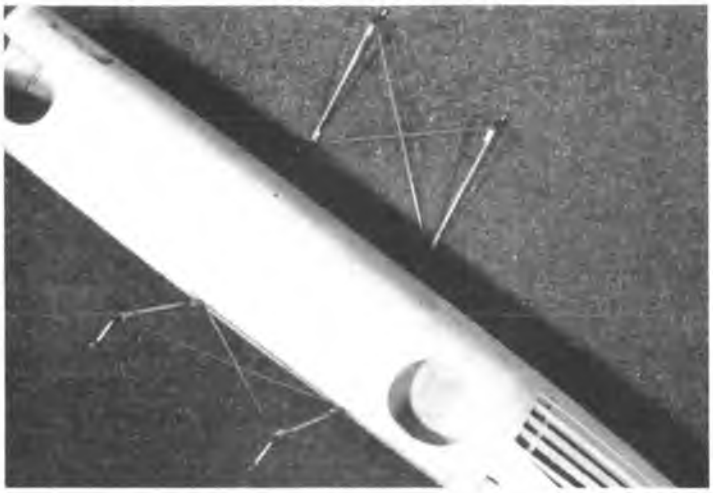
CONSTRUCTION

If you are considering building the Green Hornet, you have probably built a number of kits or maybe scratch-built from some of the many fine prints offered by RCM. Either way, look the plan over very carefully and you will find it's merely a box with a few round formers added, the wings and tail are quite conventional. There is an extra wing to build, but there is no thrill like a biplane floating in for a landing. Cut out the various parts very carefully, assemble with some thought and I know you will be successful. Most scratch-builders are designers at heart, so feel free to change things to suit yourself; but maintain the basic parameters as they are critical to successful flight. Bear in mind that biplanes are notoriously tail heavy, so don't hesitate to add lumber to the front end. Much better to add weight in construction to add strength, than in a dead lead weight.

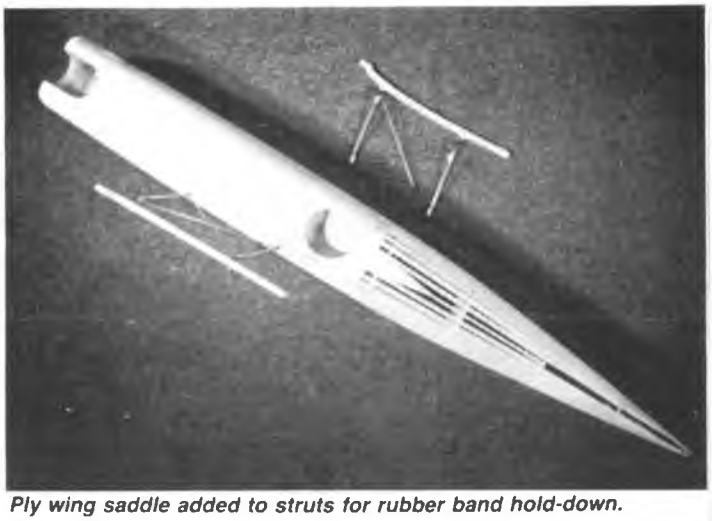
Fuselage:

Start by making the sides of the "box." Each side is made from a sheet of 3/32" balsa with a sheet of 1/64" ply contact cemented to both sides. I like to rubber cement the plans to the sheet of wood. (By the way, plans are not all that expensive, when scratch-building I usually send for two, one to cut up and one to build by.) Anyway, glue the two sides together in spots that will fall out when you cut out the lightening holes. Now cut the two sides together, add the 1/16" ply doublers to the inside front end of each side, and drill the 1/16" diameter holes in front of all bulkheads as indicated. When the two sides are cut out as one, they will separate when you remove the lightening hole areas.

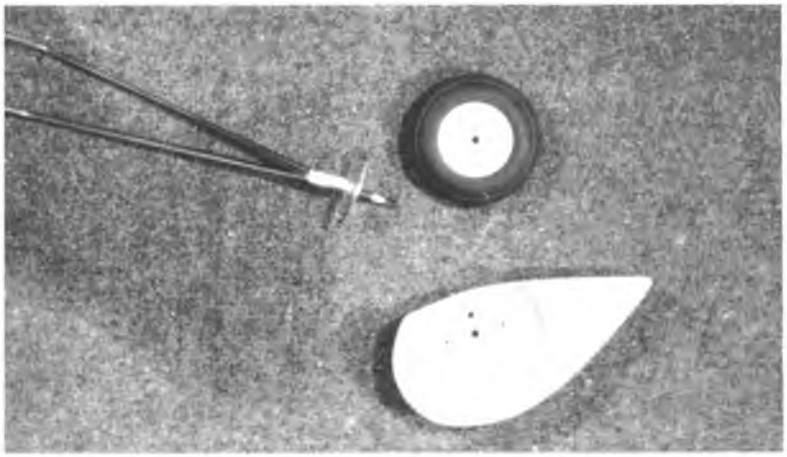
I like to use the RCM Fuselage Jig (RCM Feb. '72), but whatever method you use, place the sides over the top view. Make certain the two sides are parallel and at right angles to the building surface. Thread short lengths of 1/16" diameter music wire through mating holes from one side to the other; this will help line up the two sides. Glue 1/4" sq. balsa separators in place along with the 1/4" ply firewall and the triangular braces, right behind the firewall. Before you



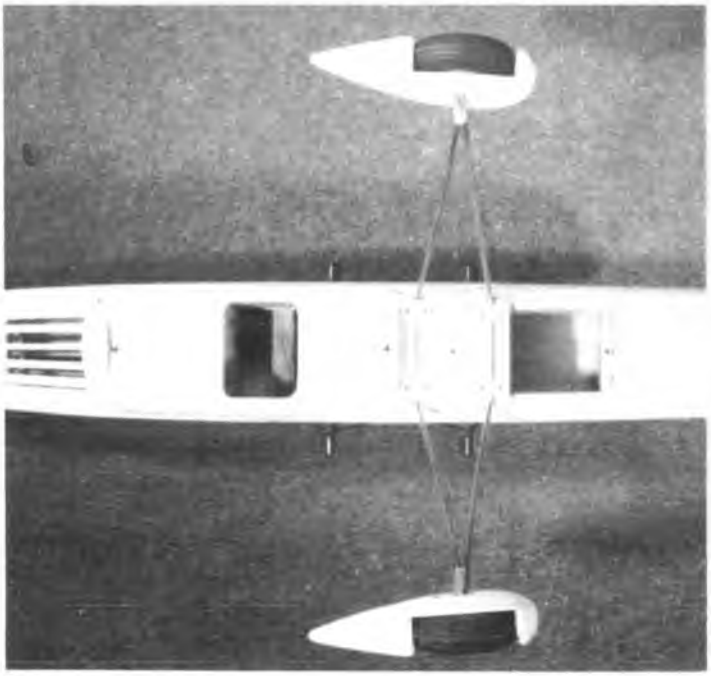
Cabane struts are removable in both bolt-on and rubber band versions. (Bolt-on version shown here.)



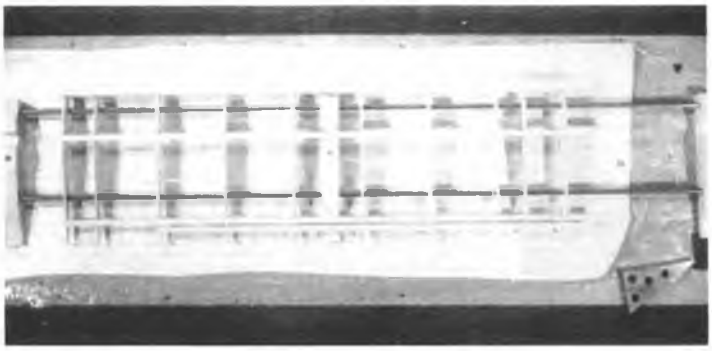
Ply wing saddle added to struts for rubber band hold-down.



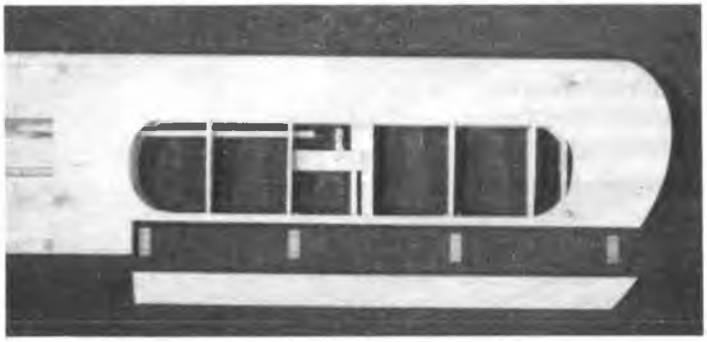
Landing gear with flange soldered to attach wheel pant.



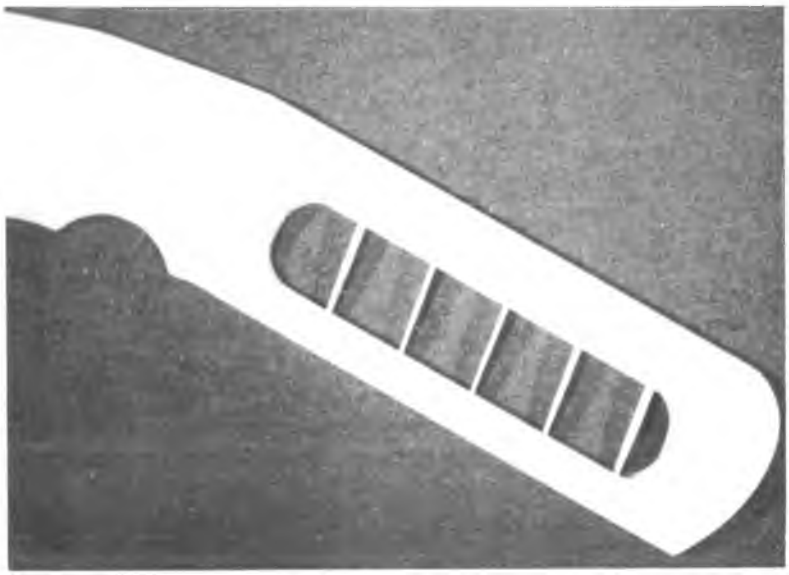
Access hatch removed showing landing gear attached with Goldberg straps.



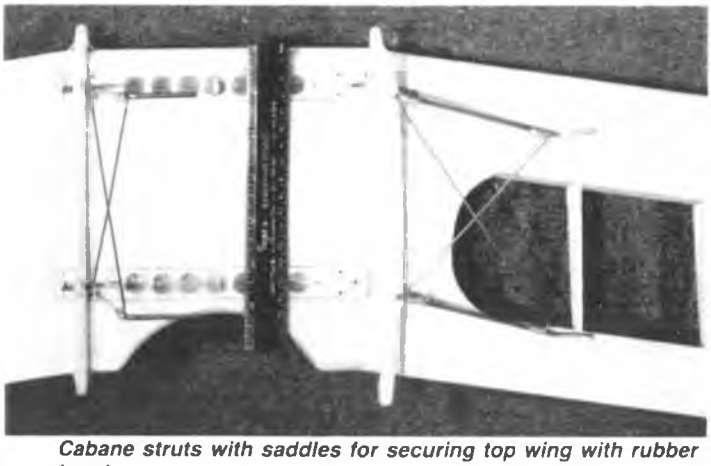
Wing set-up on wing jig using 1/4" drill rod.



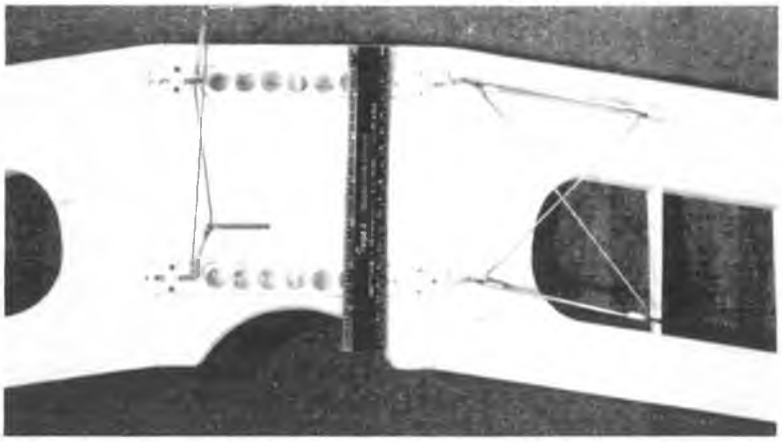
Lower wing showing aileron installation. Uses a fiberglass pushrod.



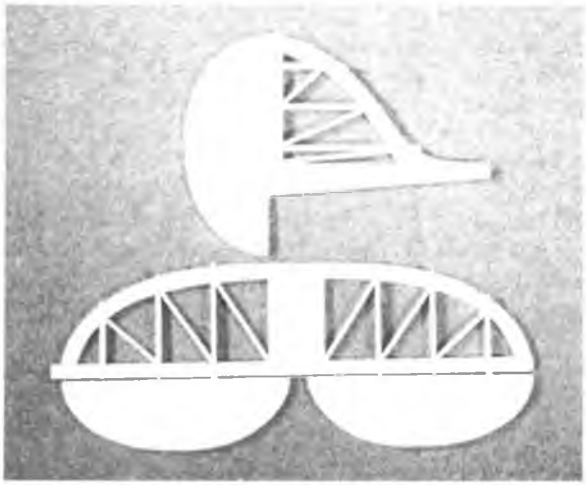
Upper wing has sweep back and no dihedral.



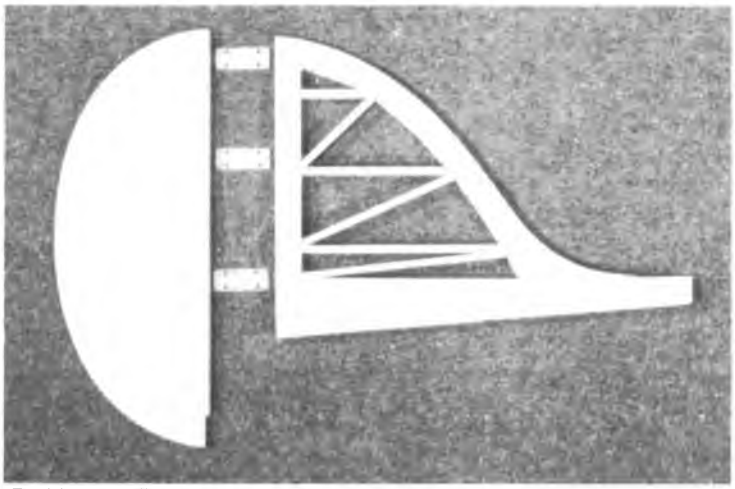
Cabane struts with saddles for securing top wing with rubber bands.



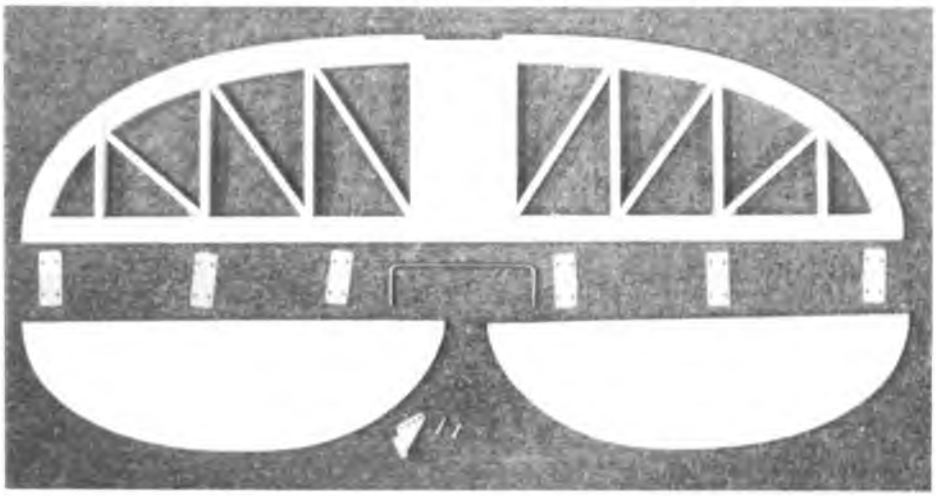
Cabane struts for securing top wing with 2-56 socket head cap screws.



Tail assembly rough framed ready for sanding to shape.



Rudder and fin completed.



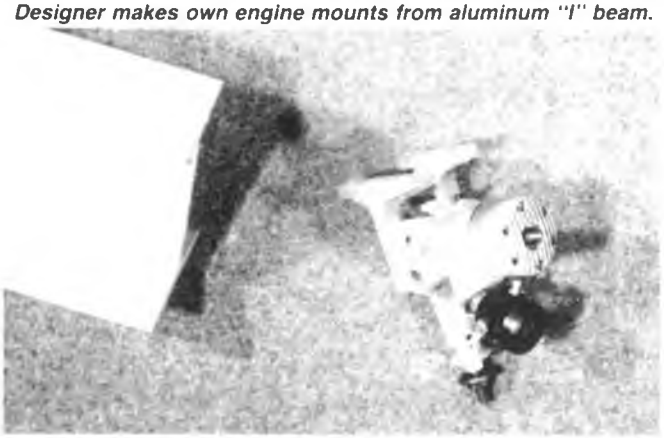
Designer makes own engine mounts from aluminum "I" beam.

put in the firewall make sure you have the holes drilled and T-nuts in place for your motor mount.

While this box section is drying, cut out the fuselage formers. Notice that F9 does not have stringer slots. The end of each stringer is notched 1/8" x 1/8". This notch fits up against and over this last former. Remove the box section from your jig, bevel the sides where indicated and remove all of the 1/6" diameter wires except the first pair.

Stab and elevators completed. Wire joiner fits into ply inset.

Exhaust header machined from aluminum bar stock.



The first bulkhead (1/4" ply) may now be placed in position by sliding it over the tail end of the box. With the first bulkhead in place, thread through the next two wires and add the corresponding bulkhead. Continue this process until all bulkheads are in place. Before adding the stringers and sheeting make sure the fuel tank support, landing gear platform, servo rails, switch and charging harness and pushrods are in place. Also add the 1/2" sq. hardwood blocks that support the cabin struts. Now is also a good time to temporarily mount your engine and thread through the throttle control cable.

Rudder and Elevator:

Both the rudder and elevator build flat on the plans. Construction is straightforward, just try to keep it light, but strong. Also remember to add the 1/8" sq. balsa strips to the top of the stabilizers and sand to a gentle airfoil as indicated. A little lift in the caboose sure is nice on those long slow, cocked-up approches.

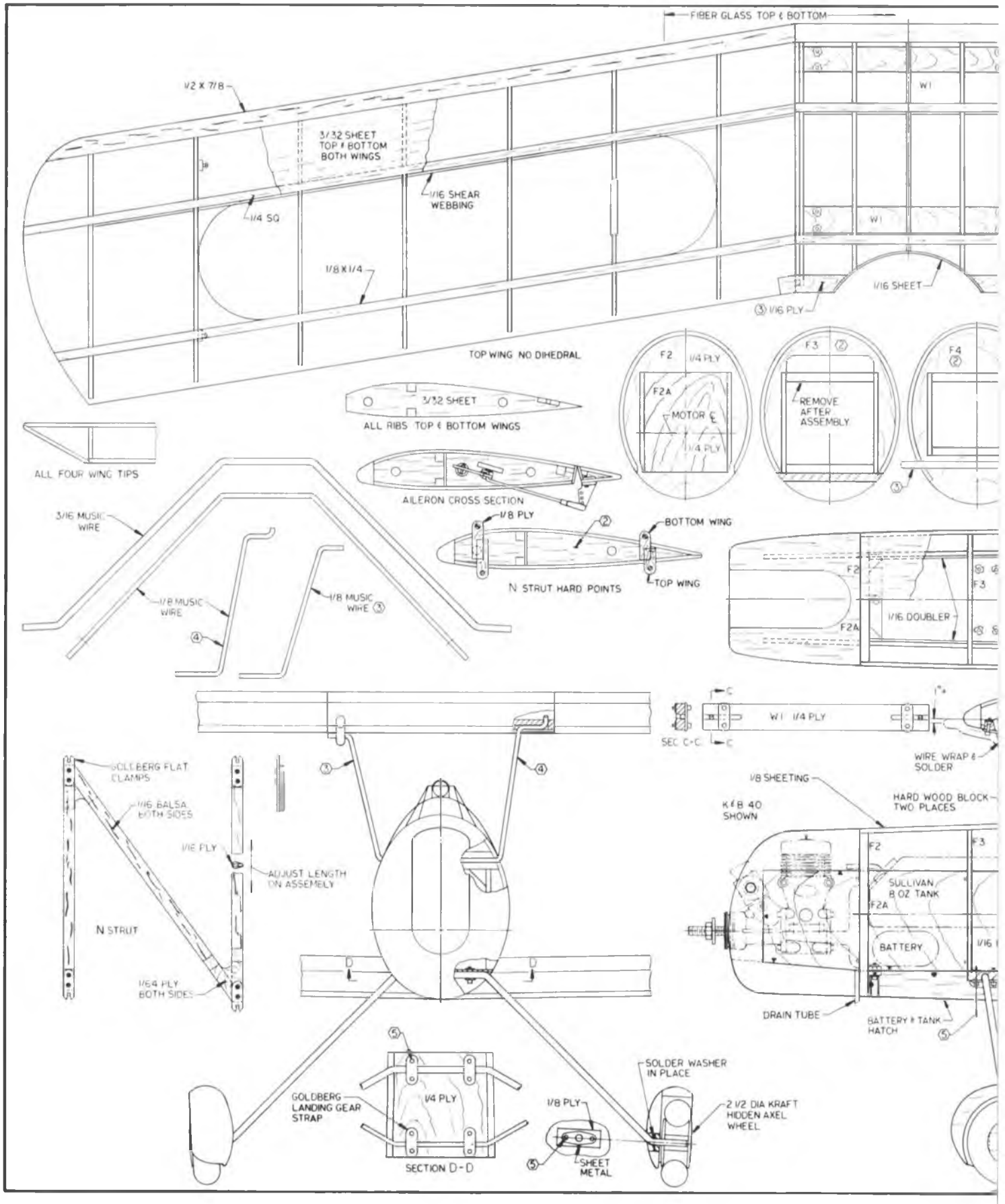
With the rudder and elevator complete, fit them to the fuselage, locate and cut slots through the tail end of the fuselage for the pushrods. Arrow shafts were used on the original. The fuselage may now be sheeted and the stringers added. Also the wing saddle and the fuel tank hatch may now be added. The fuel tank and battery hatch is a matter of choice, but I always like to have access to the tank in the event there is a fuel flow problem. It's always nice to be able to get in there and have a look. Use a heavy grade of balsa for the nose section, comes in handy on the occasional runway kiss. Add small pieces of 1/8" sheet balsa between the stringers where the stringers meet the half bulkhead under the headrest and where they meet the wing saddle. Sand these pieces slightly concave between stringers. This will give you something to stick to with whatever covering material you choose. With the fuselage complete, block sand to shape. All sheeting is 1/8" and the 1/8" x 1/4" stringers allow plenty of material for sanding.

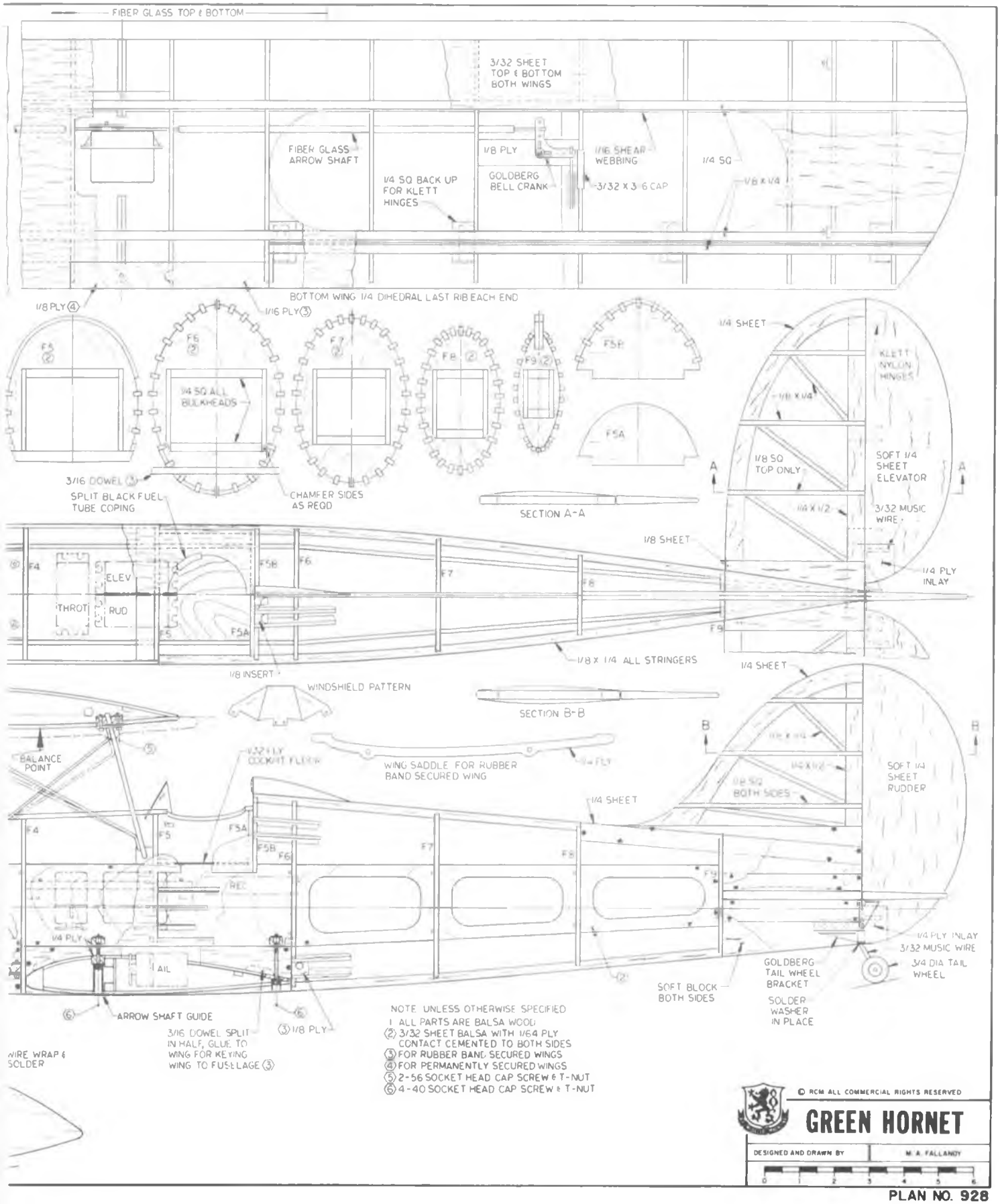
Wings:

There is nothing tricky about the wings. However, a couple of tips. Because the airfoil is semi-symmetrical, they do not lend themselves to flat building. I like to thread the wing ribs on a couple of 1/4" diameter drill rods and support the rods slightly above my building board at three stations. The supports can be of any type of wood, but the hole spacing must be identical to those in the wing ribs. One support is threaded on the drill rods with an equal number of ribs on either side. The remaining two supports are threaded on outboard of the ribs. With everything properly spaced, secure the center support and the support on the fuselage end of the wing to the building board with wood screws. Then place a 1/8" shim under the back edge of the support nearest the wing tip. This will give a little negative incidence to the last third of the wing and again avoid a stall on those long slow approaches.

With the wings held in this manner add the spars. Note that there are two 1/8" x 1/4" spars on the trailing edge of the bottom wing. These two spars form the ailerons. Before gluing them in place, space them with scraps of 1/8" sheet placed between ribs where they will not become permanently glued in place. Continue to add the leading edge and sheeting. When dry, the two

text continued on page 60


FIBER GLASS TOP & BOTTOM
1/2 X 7/8
3/32 SHEET TOP & BOTTOM BOTH WINGS
1/16 SHEAR WEBBING
1/4 SQ
1/8 X 1/4
W1
W1
1/16 SHEET
3 1/16 PLY
TOP WING NO DIHEDRAL
F2
1/4 PLY
F2A
MOTOR ℄
1/4 PLY
F3
2
REMOVE AFTER ASSEMBLY
F4
2
3
3/32 SHEET
ALL RIBS TOP & BOTTOM WINGS
ALL FOUR WING TIPS
AILERON CROSS SECTION
3/16 MUSIC WIRE
1/8 PLY
2
BOTTOM WING
TOP WING
N STRUT HARD POINTS
1/8 MUSIC WIRE
1/8 MUSIC WIRE 3
4
F2
F3
F2A
1/16 DOUBLER
C
W1 1/4 PLY
SEC C-C
C
WIRE WRAP & SOLDER
GOLDBERG FLAT CLAMPS
1/16 BALSA BOTH SIDES
1/16 PLY
ADJUST LENGTH ON ASSEMELY
N STRUT
1/64 PLY BOTH SIDES
3
4
1/8 SHEETING
HARD WOOD BLOCK TWO PLACES
K & B 40 SHOWN
F2
F3
SULLIVAN 8 OZ TANK
F2A
BATTERY
1/16
DRAIN TUBE
BATTERY & TANK HATCH
5
5
GOLDBERG LANDING GEAR STRAP
1/4 PLY
SECTION D-D
1/8 PLY
5
SHEET METAL
SOLDER WASHER IN PLACE
2 1/2 DIA KRAFT HIDDEN AXEL WHEEL



GREEN HORNET

DESIGNED AND DRAWN BY M. A. FALLANDY

0 1 2 3 4 5 6

PLAN NO. 928

1/4" diameter drill rods may be carefully removed, freeing the wing section from the building board. Carefully cut the ailerons from the bottom wing panels. Line the front of the aileron and back of the wing with 1/16" sheet. The two bottom wing panels are joined together with a 1/4" block under each outer wing rib to give the proper dihedral. The two top wing panels are joined to the center section, flat with no dihedral. If you are building the version with permanently secured wings, remember to add the hardwood blocks that form the anchors for the cabane struts. If all four main cabane struts are identical and their anchor points are as shown, the proper top wing incidence will be achieved. Wrap the cabane cross bracing with light, bare copper wire, but do not solder in place.

Assembly:

Assemble the completed components except the landing gear and set it up on a flat surface a little larger than the model; I like the dining room table. Hold the model together with rubber bands, with the main thrust line of the fuselage parallel to the table. Now make sure everything is symmetrical. Adjust the cabane struts for the proper top wing location. Measure to make sure each wing tip is equal distance from the end of the fuselage; the wing tips are equal distance from the fuselage; the tips of the elevators are equal distance from the nose and from the fuselage. When all is level, vertical, and symmetrical, permanently secure all components by gluing the tail section in place, drilling the bottom wing bolts in place or gluing the 3/16" half dowels to center the bottom wing if you are building the rubber band secured wing version. Whichever version you build, carefully remove the cabane assembly and solder all cross braces together.

Before covering, be sure to fiberglass and resin the upper and lower surface of each wing. There are no main wing spars, all wing strength is obtained from the fiberglass. A much greater strength to weight ratio is gained from the wing skin than from spars. Also heavily resin the entire nose section inside and out back to the landing gear. A word on the landing gear. Keep the wheel location where it is and give the wheels a little slant-in and a little toe-in. Also, don't use a smaller diameter music wire for the main gear or the tail wheel. More good

take-off runs are ruined by a weak landing gear system. Cover your model with your favorite material, but try to keep it light, I don't advise glassing the entire model, too much weight in the caboose.

When covering is complete, wrap all removable components with one layer of Saran Wrap, Handiwrap, or the like. Place a light bead of clear silicone on the mating surfaces and reassemble the model to its finished configuration. Quickly remove excess silicone, as it is hard to remove from most covering materials when dry. This will give you a fuel tight model. When complete, take your jewel out in the boondocks and run a few tanks through the engine at all power levels. Check to make sure everything is where it should be. Also don't forget to range check the model in the area you intend to fly.

Sweeny's test flights of the Green Hornet went well. This is a fun biplane to fly and I know you will enjoy yours as much as I am enjoying mine. It has no vicious tendencies, will not snap over on those slow cocked-up approaches, yet will do all the good maneuvers. Mine hums pretty well on a regular K & B 40. I suppose if you put a Hot Schnuerle ported 40 up front it will terrorize the skies, but, believe me, a stock 40 is more than enough.

Well, I was at peace with the world, smoking my pipe and reading the latest issue of RCM, when my everloving wife walked up --- she doesn't really walk, she flows --- and commented, "Your green biplane is a real beauty dear, but what I really had in mind was something **green** and **growing."**

"Okay dear," I came right back; when you have a good thing going, you don't fool with it. But this did pose a problem. Dedicated modelers are very resourceful, and I'm no exception, I have a lot of faith in myself. And sure enough, after ten seconds of carefully concentrated thought on one subject, it came to me. So I am now busy mixing a large vat of green dye, into which I will individually dip each midget. After all, they do seem to grow and they spend a lot of time in the backyard. I am sure this will please my everloving wife, and any girl as pretty as mine deserves the very best.

Happy landings. □

Full size plans listing for this aircraft and many others on page 122

RADIO SPECTRUM

Jim Oddino

1984 Nationals

This year's Nats probably won't be remembered as the greatest in history but I suspect they won't soon be forgotten by those who competed. This was the first major contest to include the FAI "turnaround" category and many were anxious to see what it would take to win. I'm sure many were surprised to see young Chip Hyde (and we must give credit to his teammate and father Merle) show the more mature (notice I didn't say old) fliers how it should be done. To tell the truth I was a little disappointed in the quality of flying in this class. I was hoping to see more fliers bring the pattern in close where you can see it as opposed to moving out in order to stay in the box. To me moving out is defeating the whole purpose, which I am told is to use less real estate and therefore keep the noise in a smaller "footprint" on the ground. I would like to think that Chip won because he attempted to meet that objective. However, even he seemed to be flying out further at the Nats than he had been in earlier contests in California. For those of you who are not aware of the equipment Chip uses, let me say up front in this article that he won with a Kraft single stick with lots of exponential. Based on that you may not want to read everything that will be discussed on which is the best stick mode.

As I mentioned in an earlier column, my plan to make my comeback at the Nats (my first since 1977) in the turnaround class fell through when I didn't get a new plane together in time. About a month before the contest I decided to fly in the Masters class with a Phoenix 8 which has become known as the stealth because it is so difficult to see. The net result was a very unsuccessful comeback. You can't change airplanes and patterns and expect to be competitive in thirty flights even if you have great equipment. And I sure couldn't complain about mine with the possible exception of the difficulty of seeing an almost all white airplane. The high altitude did not prove to be a problem. Engine performance was totally adequate after increasing the nitro content from 5% to 12% and shortening the pipe slightly. The elevator felt a little mushy so most guys increased the elevator throw a little.

I watched most of the Masters' fliers on my line which included Pete Callas and Steve McCann who finished first and second, and was very impressed with their flying. There is no question that the high performance Tipos and Phoenixes have reached a degree of precision that is difficult to improve on. Perhaps the turnaround is needed to provide a kind of handicap. I believe that the loops and 4 points, etc., I was seeing in turnaround would get 5's and 6's if they were judged by the same standards as used in Masters.

"For the third and final time . . . dinner is ready!!!"

However, I'm sure as things develop, the level of perfection will improve in turnaround, too.

I'm not sure I ever did get my Phoenix set up right because I noticed I had much more throw on the elevator than Steve McCann had on his. I'm sure this has to do with weight and C.G. position but there was no question that I needed the extra throw. The net result was that one "click" of elevator trim on my Futaba PCM then took me from climb to dive. After a couple of nights of searching for the right resistor in the elevator trim circuit, I found it and changed it so that one click of trim moves one increment (2.5 μsecs) instead of two.

This took care of my trim problem and once again shows how critical a high performance pattern airplane is. Therefore, you've got to have a high performance radio to go with it. If your system will only center to five or six µsec, you will never be in trim.

I got a few "inputs" while at the Nats. Apparently a lot of people took my comments on "animals" wrong. As I pointed out before, the guys known as pattern animals are proud of it as demonstrated by all of the red T-shirts and caps with the pattern animal logo seen at the Nats.

Steve Helms had a couple of inputs. First, he said he wished I would quit showing guys how to modify their equipment. Apparently he gets quite a bit of it to fix when the modeler screws it up by using "number 14 wire," etc. I can see his point and recommend you stay out of your equipment unless you think you can do a better job than the manufacturer. That ought to eliminate almost everyone. Steve's second comment was that he agreed with the idea that separating the roll and pitch control on the two sticks was probably the right way to go and he intended to try to learn to fly with

continued on page 70

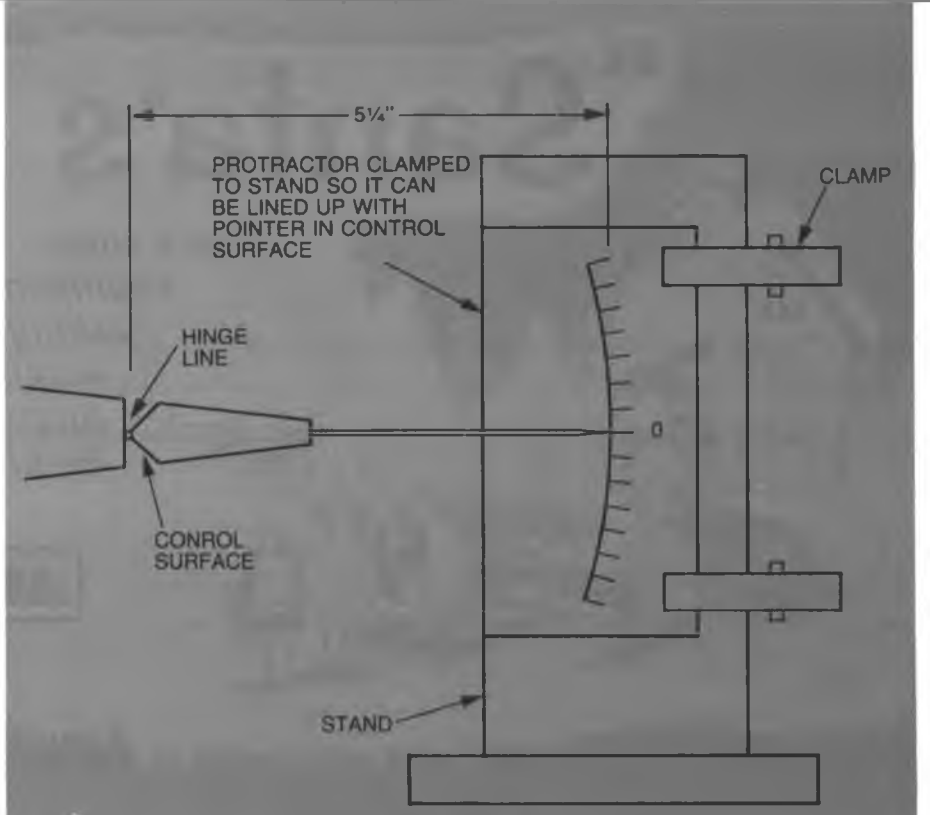


FIGURE 1

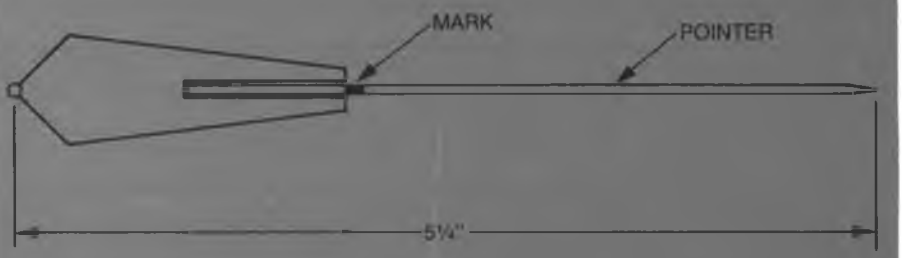


FIGURE 2

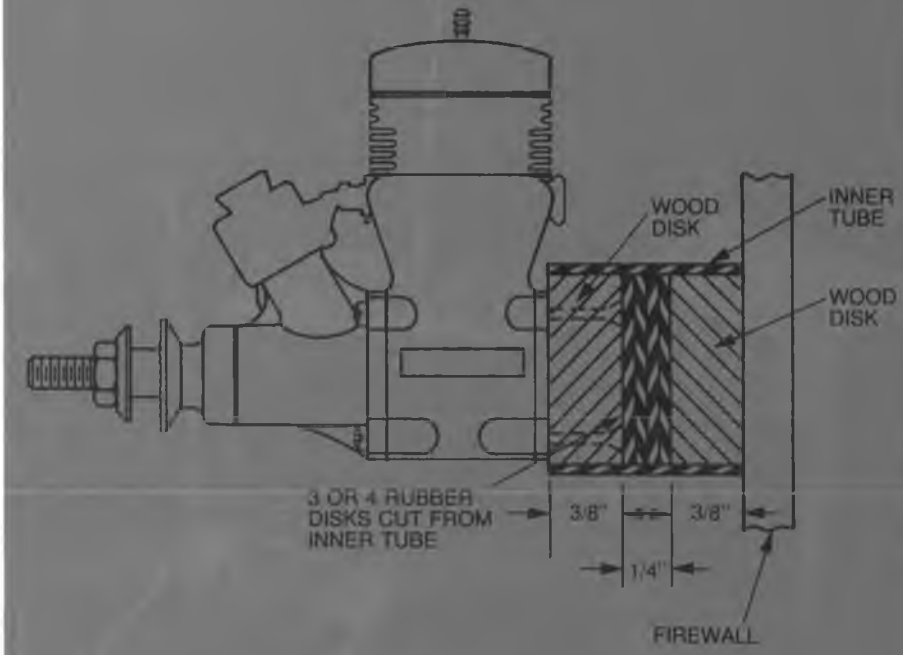


FIGURE 3

aileron on the left stick.

The next day at the practice field, Ivan Kristensen said he had been meaning to write me on that subject. He has been flying that way for years and he calls it Mode III. I intend to give it a try but I suspect I'd be better off practicing with what I'm accustomed to. It's like switching airplanes just before the Nats. I probably would have done better with my old crooked Curare even though the straight Phoenix is no doubt a better airplane.

Ivan did say he would write and give us the background on his Mode III. He did say that a fellow Canadian flew in a contest one week after switching from Mode II to Mode III. More on stick modes later.

While at the Nats we made good use of the digital pulse meter (DPM). When you are making adjustments it is important to know where you were before and after adjusting in order to zero in on the right amount of control. I used the unit called Ack-U-Tach/pulse built by H & N Electronics, 10937 Rome Beauty Dr., California City, California 93505. I mentioned in an earlier column that I was going to review this unit which is both a tachometer and digital pulse meter but ran into a slight problem. The tach function wasn't working but I didn't want to send the unit back because I was so dependent on it for the DPM function. I believe this is the only unit available that provides three decimal places which yields one microsecond resolution. Maybe now that the Nats are over I'll send it back and get the tach portion fixed. But I'm going to miss it.

Ivan Kristensen had a different approach and one I like very much. He made himself a big protractor and an adjustable stand. (See Figure 1.)

He then puts a pointer into his control surface, adjusts the protractor to line up with the pointer and at the proper distance from the hinge line. His protractor was designed with 5¼" radius so he had three different pointers, one for aileron, elevator, and rudder, that were cut to the right length and marked so they would be inserted in the control surface at the proper distance. (See Figure 2.)

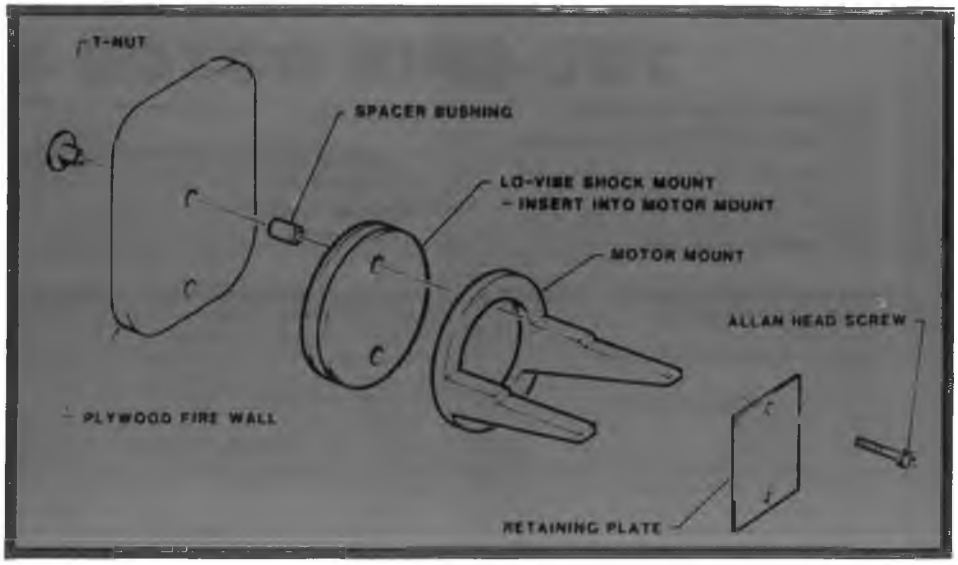
The nice thing about this technique is that you are calibrating your system all the way to the final output not just to the input of the servo as you are doing with the digital pulse meter. That way you can get back to the same place even if you change servos and

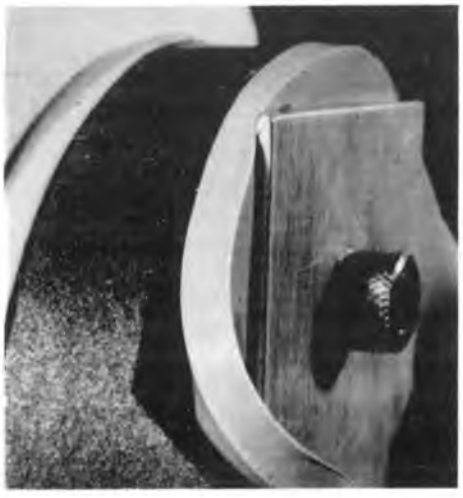
the throw isn't exactly the same. (I'm assuming you have all the adjustments available in the transmitter.) The only shortcoming I can see is that you don't have the same resolution you have with the DPM. Let's say that your elevator moves plus and minus 10 degrees. With a PCM system you should be able to set the control surface to .05 degrees. You'd need a pretty long pointer and big protractor to get that kind of resolution. Anyone out there got an idea how to make a control surface angle readout device with a digital display?

By the way, Steve Helms and Ivan and Russ Nakamura were flying new Atlantas with YS engines. All flew very well in spite of a limited time with the airplane. Steve used a variable pitch prop which is probably a valuable asset in turnaround.

Before leaving the subject of the Nats, I ought to mention Chip Hyde's engine mount. The engine (a Rossi) is attached to the firewall via a motorcycle innertube as shown in Figure 3.

Hose clamps are used to attach the innertube to disks which are attached to the engine and firewall. The engine really flops around at idle but smooths right out at full throttle. So what is this story doing in a radio column? Well, Merle claims that he had vibration measurements made and they found that the vibration level in the plane was cut by a factor of ten. That translates to longer radio life, especially the servos, which have to be relatively hard mounted to the airframe. Roy Speights is selling an engine mount isolator designed to do the same task. (Lo-Vibe Engine Mount Cushion @ $12.00 from D & R Products, 318 Decker St., Santa Rosa, California 95401.) It is significantly firmer than Chips but probably would still provide adequate vibration isolation. I wish I had picked one up at the Nats. I did have an elevator servo (an old JR 2001) get ratty during practice and had to change it.





So much for the Nats. Congratulations to the winners and to everyone who competed. My advice is to start working right now towards the 1985 Nats because there are a bunch of pattern animals who have already begun.

Mode I vs. Mode II

The subject comes up periodically and I have a feeling will never be put to bed. Recently Hanno Prettner took a very strong stand that Mode I was better because it separated the pitch and roll functions. It's hard to argue with his success. Here is another input which backs up that position.

Hi Jim,

Enjoy your column in RCM.

Mode I vs. Mode II . . . years back, I have asked many top fliers the answer to this question . . . and I always walked away wondering who was right. My only conclusion was to devote that flying season to flying all modes available and make my own decision.

I flew each mode approximately 20 hours a week for a month. (This makes me a damn good flier in all modes.) The winner — Mode I — by far.

The secret to Mode I flying is the separation of pitch and roll functions. Pitch and roll functions on one stick is easier in the beginning of R/C flying but limits you as your flying progresses up the learning curve. I'm a lefty so my set-up is a little different.

Left Stick — throttle and aileron.

Right Stick — elevator and rudder.

Forget what fliers say about full scale aircraft and their control set-ups. They're sitting in an actual flying situation; we're not. Believe me, it's harder to fly R/C than full scale aircraft.

This is not to make fun of other mode fliers but I believe if they put the effort into Mode I, they would become better fliers. But this depends on how well you want to fly.

If you really want to challenge your R/C flying, try Mode I. In time, you will notice better take-offs, loops, rolls, inverted flight and beautiful flared landings . . . like the real ones.

Paul Maharis
Kew Gardens, New York

Sounds like Paul was flying Mode III some time ago too. I would think Mode I (elevator and rudder on left stick) would be better for a left hander and that is why I decided to try Mode III (elevator and rudder on right stick) being right handed.

Well, now I can talk with some authority. Yesterday I did it. The first flight was real exciting, I had the co-pilots standing by to help. First I almost crashed on take-off, the old Curare was way out of roll trim and wanted to do a slow roll. Somehow I avoided disaster and got the airplane in the air. It seemed like it took half the flight to get it trimmed, and everyone was advising me not to go dead stick. After doing some inside loops and many left hand turns and a couple of rolls I ran out of gas. However, the landing was fairly decent. My feeling after one flight was that this was going to be very difficult. On the second flight I made a very nice take-off and a nice powered landing. Everything in-between seemed

impossible. I tried a Top Hat and scared myself half to death. I did notice that I could roll left or right equally well (but not very good). During and after this flight I kept telling myself I was wasting my time. Maybe it would be easy to learn from scratch but I have so many instinctive reactions built in I'm not sure I could ever change. I was debating whether to switch the servos back where they belong or to go home at this point. Then I decided to try one more. I flew with the engine rich to slow down the plane and lo and behold it started feeling comfortable. I could make right and left turns. I tried a square loop and it was pretty good. Maybe that Curare isn't as crooked as I thought. I flew until I was out of gas again, only this time I was in a bad position. Normally I would have bent the plane around in a tight spiral dive but I couldn't bring myself to do it with this set-up. I ended up rolling off the end of the runway into a mud puddle so I went home.

My conclusion after three flights is that it is very difficult to change. However, I could see some potential benefits. At this point I think I may try again but I'm not sure it is worth it.

I would advise that you start with a slow flying stable airplane like an RCM Trainer until things are fairly instinctive. I had the feeling I had too much aileron control when actually I didn't have enough. The problem was I would feed in some roll and then hold it instead of neutralizing like you normally would with a pattern airplane. By the third flight I was getting better but I have a long way to go. I'm not sure I'll live long enough.

Speed Trial Problem.

Doug Fitzpatrick of Tulsa, Oklahoma, points out that if the contest management would calculate your upwind speed and downwind speed independently and then average them you would find the true airspeed. In our example they would have come up with 78.3 mph into the wind and 138.3 mph going downwind. Then:

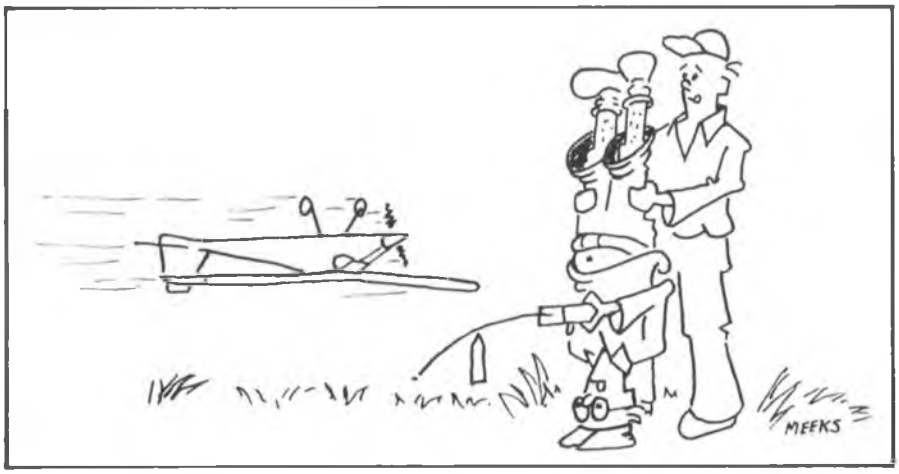
Airspeed = 1/2 (138.3 + 78.3) = 108.3 mph.

That's probably what they do at speed trials. I've never been to one. Guess I'll quit giving dumb problems.

Stay tuned for the continuing saga — can an old Mode II flier switch to Mode III and live happily ever after.□

FLYING LOWE

Don Lowe

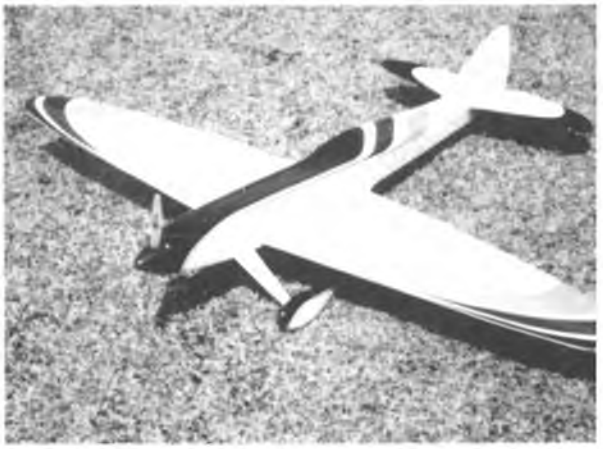


Those ailerons are important! Have you ever had a model that you couldn't trim out — even if everything looked straight with no wing warps, etc.? It can drive you to distraction. One of the straightest pattern ships I ever owned required lots of offset aileron to correct a roll problem until I found the problem — unsealed ailerons — and the ailerons to return to neutral trim or the ship is likely to be very bad under maneuvering conditions. To check for a bad wing, first of all trim for level upright flight, then perform inside and outside loops of roughly equal diameter.

If the ship turns in opposite directions on inside and outside loops, then the problem is a lift anomoly in the wings. If it turns or yaws off in the same direction on insides and outsides, then it's rudder trim, offset engine or a heavy wing on one side.

Lift asymmetry can be caused by lots of things — unequal areas (uncentered on fuselage), not square with fuselage, thicknesses and airfoils not the same at each station on both panels, warps, unsealed ailerons and ailerons not properly centered on the trailing edge. In regard to the latter, friend Lee Painter has a CAP 21 that was driving him nuts until he cut off the ailerons and rehinged **very carefully centered.** His problem was a right roll which required lots of left trim. The left trim handled the problem at high speed but really took over into a hard left roll when slowed down. His problem turned out to be ailerons that protruded above the wing on the right and below the wing on the left like so:

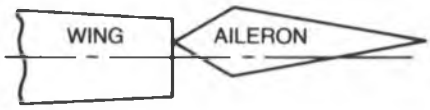
"Turnaround" design by friend, Dan Kowallek, of Kokomo, Indiana. 880 sq. in wing, 19% thick, 7½ lb. w/O.S. 1.2 four stroke. Dan reports it flies well. Had to add stall strips to make it snap — must use lots of rudder.



"Turnaround" design by "U.S. Eagle Inc." of P.O. Box 1902, Greenville, Texas 75401 — now available. Interesting in use of very thick wing to keep speed down — uses 2-cycle or 4-cycle engine.

this is only one of the possible culprits. In order that the ship properly trims, the wing panels **must** be aerodynamically identical in **every** respect. This means that they must produce identical lift under all conditions; if not, a roll is generated which must be accommodated by offset trim. Unfortunately, offset trim will handle the problem under one set of conditions of airspeed and angle of attack — as you change airspeed and angle of attack bad things happen. You **must** find the problem and allow

"4-Stroke Rally" — entries at RCACF Club Fly-In at Orlando, Florida. Lots of fun and quiet! Lots of specialty "uncontests" these days.



RIGHT WING

NOTE: AILERONS MUST BE CENTERED AND SEALED ON TRAILING EDGE OF WING.

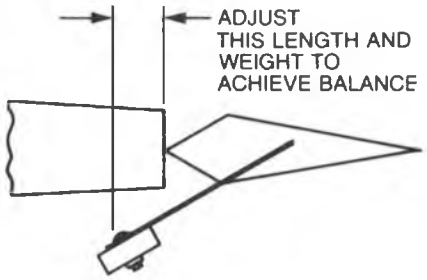
LEFT WING

While on the subject of ailerons let's talk briefly about another common aileron problem — flutter. This is usually caused by softness of some kind in the aileron/linkage set-up. I have had flutter on several ships — it is not easy to predict its occurrence. If it does happen, however, it can be very destructive — you can strip the servo gears or even have an aileron depart the aircraft — I have encountered both. If you have flutter, immediately slow the airplane down — this is the **only** thing that will stop the flutter — and land the ship. Flutter is allowed by slop in the linkages, poor mechanical advantage in linkage set-ups, torque rods that are not stiff enough and ailerons that twist easily. Modelers have tried many remedies — sealing aileron gaps, setting the aileron in from the wing tip, and adding mass to the aileron. The only truly positive cure that I know of is either to (1) stiffen up the whole aileron/linkage system or (2) **counterbalance** the aileron near the outboard end of the aileron.

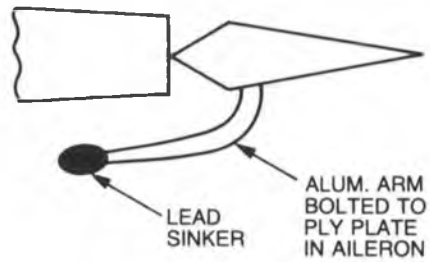
To cite one experience: I have **very bad** flutter on two of my large Lasers. I even lost an aileron on one before it stopped. On the other, I stripped the splines on the output arms of the servos and landed using rudder and elevator. On both Lasers I cured the problem by improving and stiffening the linkage system. Basically I moved the link **out** on the aileron arm and increased the servo travel in order to get the required roll rate. Even if you have to accept reduced roll rate it's better than flutter — which can easily lead to a crash. I might add that one of the first things I check for on a new ship is flutter. I do this by slowly increasing airspeed at a decent altitude so that I can slow down quickly to save the ship.

continued on page 82

I have two ships that had flutter at high speeds which I resolved by counterbalancing the aileron. My very lightweight Phoenix had aileron flutter — probably due to the use of softer than desirable aileron stock which was covered with heat shrink material. If you seal the surface with any kind of finish this adds some torsional rigidity to the aileron. On both ships I added counterbalances at the tip. Essentially what you do is disconnect the aileron link, then add an arm and weight **ahead** of the pivot to **at least** balance the weight of the aileron. It's best to add too much than not enough. On the Phoenix, I simply bent a piece of 1/16" wire double and pushed it (glued) into the aileron as shown, and bolted on lead weight until it balanced:



We recently had aileron flutter on Bob Godfrey's new 1/4 Scale Skybolt biplane. This turned out to be softness in the set-up which drove the top wing ailerons from the lower wing. It was cured by counterbalancing the top ailerons only like so:



We played with reducing the lead weight to an irreducible minimum to stop flutter. I might add that the lower wing ailerons didn't flutter at all when the ship was flown with top wing ailerons disconnected and mechanically restrained. The lower wing ailerons are directly driven by servos in each panel.

Bob has corrected this problem on his second Skybolt by going to narrower ailerons and using a servo on **each** aileron (4) — $200 worth of servos! The problem also could probably have been solved by significantly stiffening the interplane strut system between the wings, thus precluding any relative motion between the wings. Years ago Wayne Ulery and I resolved this problem on a biplane he had designed by putting the interwing aileron link inboard near the fuselage.

T.O.C. Biplane Development

Over the past several months I have been working with friend Bob Godfrey developing a biplane for the Las Vegas Tournament of Champions event. The challenge was taken because of the 10% bonus to be awarded at the T.O.C. for biplane entries.

To this date two ships have been built and extensively tested. Both ships have about 1700 sq. in. total wing area. We have played with tail moments and areas, incidences of wing and tail, aileron design, two different engines, etc. The first ship weighs about 18 pounds and has been flown with both a Webra "Bully" (2.1 cu. in.) and a "King 60" (3.6 cu. in.). The second ship has many changes derived from the first and weighs **15** lbs. and is powered by a Webra "Bully." Both ships will climb vertically (sustained) from take-off. The lighter ship is definitely superior all-around since it is more nimble and **damps** much better — especially in snap maneuvers. Bob worked very hard to get the weight down especially in the wings — and it has really paid off.

Generally I find the ships to not be as good as my 1/3 Scale Laser, primarily in damping — which was expected from a ship with much shorter wingspan and roughly the same weight as my Laser. They do fly extremely well, however, and it will be most interesting to see if there is 10% scoring difference at Vegas. I know that several competitors will be flying bipes at Vegas so it will be very interesting to see the results. □

RCM PRODUCT REVIEW

Carl Goldberg Models
JR. TIGER

SPECIFICATIONS

Name	JR. TIGER
Aircraft Type	Sport
Manufactured By	Carl Goldberg Models, Inc. 4734 W. Chicago Ave. Chicago, Illinois 60651
Mfg. Suggested Retail Price	$49.95
Available From	Both Mfg. and Retail
Wingspan	50 Inches
Wing Chord	9 Inches
Total Wing Area	450 Sq. In.
Fuselage Length	40 Inches
Stabilizer Span	18½ Inches
Total Stab Area	102 Sq. In.
Mfg. Rec. Engine Range	.15-.30 (.21 to .40 4-cycle)
Recommended Fuel Tank Size	6 Oz.
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Lite-Ply
Wing	Balsa, Hardwood, Ply (plastic tips)
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (32 pages)
Construction Photos	Yes

RCM PROTOTYPE

Radio Used	Futaba FP-4JN
Engine Make & Displacement	Thunder Tiger .25 FSR ABC
Tank Size Used	Sullivan SS-6
Weight, Ready to Fly:	56 Oz.
Wing Loading	18 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:
Complete instruction book.
WE DIDN'T LIKE THE:
No problems.

Carl Goldberg does it again! The "Jr. Tiger" is the latest in a long line of free-flight, control line and R/C models noted for their excellent flying characteristics, as well as quality of materials and ease of construction. The "Jr. Tiger" is a low wing, sport model and an excellent choice for the modeler who is comfortable flying high wing trainers. It is a smaller version of the .40 size "Sky Tiger."

The colorful 4" x 8" x 42" box has photos of the three different versions described in the instructions. A cardboard support holds the ABS plastic wing tips and dummy pilot securely in place. All small wood parts, as well as hardware, are bagged in plastic. The hardware is complete, even down to the nylon hatch hold-down and all wheel collars. All wood parts can be easily identified by referring to pages 4 and 5 of the instruction book.

Construction:

The 35" x 45" plan sheet is complete and easy to understand. The 32 page instruction booklet is almost worthy of a product review itself! Photographs accompany each step of construction, and four pages are devoted to covering and finishing as well as four more for radio installation. A pre-flight checklist, as well as descriptions of basic aerobatics, are also included.

The quality of wood, die-cutting, plastic parts, etc., was good. Following the construction steps in the book, aided by the excellent fit of all parts, results in an easy to build model. The fuselage is a sturdy box construction of lite ply with interlocking tabs and notches to insure correct alignment. Lightening holes in sides and top and bottom help to reduce weight.

The wing is very strong with 5/16" sq. bass wood spars, 1/4" dowel leading edge and center section planking. Plastic wing tips add a neat finishing touch and may be painted if desired.

The fin and stabilizer are 3/16" thick built-up structure with sheet balsa rudder and elevator.

The entire model may be assembled using Goldberg Super Jet as this builder did.

continued on page 213

SOARING

Al Doig

Launch area. Chris Bovais, Ft. Bragg, N.C., on near winch.

August 6th, 150 Cobbers and Illywhackers took the annual walkabout to Bullamakanka — the United States Nats. Standing at the soaring site in Reno, Nevada, one was tempted to forget the immediate surroundings and enjoy the beauty of the area — the clear air and towering mountains on all sides.

It seems that at every Nats I hear, "Boy! If we could have just gotten the original site!; a 250 acre sod farm, with trees and running water — and all air conditioned. However, all we could get you was this cow pasture at the end of the mile of dirt road — but you'll get used to the dust and heat."

There was a series of glitches that upset a number of entrants. First of all was the incredible 4 hour wait, in line, to check in and have your transmitter checked. Then, a significant number of transmitters were rejected to standards not understood by the contestant. After traveling a long way, he could not fly. It was felt that even though Soaring was the largest single group (305 event fees and 150 entry fees paid to the tune of around $8000) the AMA gave Soaring less than adequate support. The porta-potties were located at the Utah border (the last day they were moved within range). The winch retrieval systems quit halfway through the first round and the fliers were required to shag lines: fliers launching on the retriever-equipped winches protested for reflights. The computer broke down after 2nd round scores were posted and was never seen again. There were no landing judges for the first day. Fliers were seen standing at one landing circle and landing at another. And on and on ad infinitum.

To answer some of this flak: most is true, not hearsay. However, let's call a spade a spade. Most people do not realize how the AMA views its responsibilities at the Nats. The AMA provides the organization and facilities so that each discipline can successfully run its event. But, I think that many times, AMA officials, trying to be all things to all people, promise more than they are prepared to deliver.

It is clearly the responsibility of the AMA to see that transmitter processing, if the rules require it, is done efficiently and to known standards; the AMA did not do its job.

continued on page 104

Rod Smith (Mark's Dad), San Diego, Calif., Nats winner, Standard class in 1971 flew same Windfree!

John Brown, Anaheim, Calif., previous Nats winner.

The AMA provides (sponsors) computer scoring, but not on site. If Soaring wants on-site scoring they must provide it, or get in line at headquarters, and the line is long. Tacoma-based Mike Freeman worked his tail off at the headquarters computer installation — he didn't have much fun!

The AMA bought $4800 worth of winches and retrieval systems, on advice of the Soaring group, but does not have the responsibility to test them. When the retrieval system went down, the AMA provided 3 wheel bikes, but could not deliver them until 8:30 a.m. next morning, instead of the requested 7:30. I don't think this is

C.D. Rich Hansen, Modesto, Calif., and Winchmaster Greg Nikola, Pasadena, Calif.

Tom Neilson, Milwaukie, Oregon, and his K-Minnow, 2nd 2-Meter Open.

Results: The following listings are unofficial and were obtained from the event director's listings. The official listing was not available at press time and there may be errors.

2 Meter, Junior

1st Bobby Gerbin	Anaheim, Calif.
2nd Rand Sheldon	Wheatridge, Col.

Standard, Junior

1st Bobby Gerbin	Anaheim, Calif.
2nd Craig Avery	Pleasanton, Calif.
3rd Rand Shelton	Wheatridge, Col.

Unlimited, Junior

1st Bobby Gerbin	Anaheim, Calif.
2nd Craig Avery	Pleasanton, Calif.

2 Meter, Senior

1st David Pugh	Kent, Wash.
2nd Mike Garton	Muscatine, Iowa
3rd Ron Collins	Fresno, Calif.
4th Alex Bereczky	Anaheim, Calif.
5th Chris Bovais	Ft. Bragg, N.C.

Standard, Senior

1st David Pugh	Kent, Wash.
2nd Alex Bereczky	Anaheim, Calif.
3rd Charlie Stahlheber	San Marcos, Calif.
4th Shawn Lenci	Escalon, Calif.
5th Ted Nickson	

Unlimited, Senior

1st Brian Richard	Lancaster, Calif.
2nd David Pugh	Kent, Wash.
3rd Ken Becker	Pleasanton, Calif.

2 Meter, Open

1st Keith Kendrick	San Gabriel, Calif.
2nd Tom Neilson	Milwaukie, Ore.
3rd Carl Raichle	Land O' Lakes, Fla.
4th Terry Edmonds	Iowa City, Iowa
5th Dave Johnson	Portland, Ore.
6th John Root	Sylvania, Ohio
7th Scott Christensen	Buffalo Grove, Ill.
8th Tom Williams	Oklahoma City, Okla.
9th Larry Nelson	Walla Walla, Wash.

Standard, Open

1st Craig Foxgord	Pasadena, Calif.
2nd Larry Jolly	Santa Ana, Calif.
3rd Scott Christensen	Buffalo Grove, Ill.
4th Steve Manganelli	San Diego, Calif.
5th Tom Neilson	Milwaukie, Ore.
5th Dan Fink	Santa Ana, Calif.
6th Tom Brightbill	Portland, Ore.
7th George Boss	Rancho Palos Verdes, Calif.
8th Bob McGowan	Napa, Calif.
9th Ron Brown	Torrance, Calif.
10th Tom Williams	Oklahoma City, Okla.
11th Kevin Martin	Beaverton, Ore.

Unlimited, Open

1st Noel Milovic	Pasadena, Calif.
2nd Terry Edmonds	Iowa City, Iowa
3rd Larry Jolly	Santa Ana, Calif.
4th Louis Glaab	Rocky Point, N.Y.
5th Carl Raichle	Land O'Lakes, Fla.
6th Keith Kendrick	San Gabriel, Calif.
7th Mark Smith	Valley Center, Calif.
8th Craig Foxgord	Pasadena, Calif.
9th Bob McGowan	Napa, Calif.
10th Tom Brightbill	Portland, Ore.
11th Ray McGowan	Napa, Calif.
12th Dave Johnson	Portland, Ore.
13th Steve Manganelli	San Diego, Calif.

Scale

1st Mark Smith	ASW 20
2nd Ed Whyte	TG3
3rd Bob Elliott	Glasflugel 604

Special Awards

Hi Johnson	Craig Foxgord
Sid Axelrod	Chris Bovais

Dave Johnson, Portland, Oregon, and his Camano, 5th 2-Meter Open, 12th Unlimited Open.

unreasonable performance. Contest Director Rich Hansen worked his tail off the whole way, but he was hampered by the lack of a local soaring group to provide needed manpower. Never having run a Nats, I think he expected too much from the AMA. When you realize exactly what to expect, you can plan for contingencies.

continued on page 116

Tom Brightbill, Portland, Oregon, Camano, 3rd Standard Open, 9th Unlimited Open.

Bobby Gerbin, Anaheim, Calif., won all three classes in Junior! That's his proud dad (who didn't win three classes).

Larry Jolly, Santa Ana, Calif., and his Meteor, 2nd Standard Open.

When retrievers were needed, the fliers pitched right in. Dave Darling (Mr. Zero) from Modesto, California, took over as landing judge and Gregg Nikola of Pasadena, California, after arriving too late to register, took over and did a fantastic job for three days as winchmaster.

Anyway — we found that Soaring is not big in Nevada. There were 5 times as many entered from Mexico City as there were from Nevada. By State: Alaska, 1; Arizona, 1; Arkansas, 2; California, 76; Colorado, 12; Florida, 2; Illinois, 2; Iowa, 3; Kansas, 1; Michigan, 1; Missouri, 1; Montana, 4; Nevada, 1; New York, 2; North Carolina, 1; North Dakota, 1; Ohio, 2; Oklahoma, 2; Oregon, 9; Texas, 3; Utah, 4; Washington, 13; British Columbia, Canada, 4; Alberta, Canada, 1; Mexico, 5, for a total of 154 fliers. As most fliers entered more than one event, there were 305 airplanes to be launched, each headed (hopefully) for a 7 minute flight.

No one got all maxes. Those who launched at 7:30 a.m. were lucky to get 3:30. From there, about 20 seconds per round was the increase. There was a constant cycle from down to up. Even the biggies fell out in two minutes, or

Craig Foxgord, Pasadena, Calif., 1st Standard Open, 8th Unlimited Open.

Geo Boss, Rancho Palos Verdes, Calif. Only flying wing entered, 7th Standard Open.

Helen Olsen, formerly of St. Louis, now Anaheim, Calif. One of two women fliers.

Bob Dodgson, Camano Isl., Wash., with his new K-Minnow replacement called Pixie.

John Menard, San Deigo, Calif., Pres. Torrey Pines Gulls and original Sisquoc, 2-Meter 650 sq. with flaps.

Terry Edmonds, Iowa City, Iowa, with new "10" 2-Meter, 293 airfoil, 4th 2-Meter Open, 2nd Unlimited Open.

Al Kindrick, San Gabriel, Calif., Past Editor of this column.

Byron Blakeslee, Sedalia, Colorado, with Windsong. Editor of "Thermals" newsletter.

less, occasionally. Tom Neilson called it the Reno Crapshoot. Sometimes you were lucky, sometimes not. The beaut was that the weather (spelled wind) was perfect. On Saturday and Sunday before the contest there was a literal hurricane through the area. Local residents said this was normal; starting about noon. On all days of Soaring, the wind was very mild. The temperature, however, rose to 98° F. each afternoon.

I could not believe that at the initial pace, 900 flights per day could be achieved; but achieved they were. Things were kept moving quite well for the most part and flying was over

Texas Tom Williams, now of Oklahoma City, Okla. Most points in all three classes.

Ricardo Huerta, Mexico City, Mexico, is 16 years old.

Craig Avery, age 14, Pleasanton, Calif., 2nd in Junior Standard and Unlimited.

Charlie Stahlheber, San Marcos, Calif., 3rd Standard Senior, Sagitta 900.

by about 6 p.m. each day. In the three days, nine rounds were flown. The Davey winches performed flawlessly all day each day. An innovative process was used. Batteries were dual units. All batteries were connected to a buss and a central gasoline powered generator provided a continuous charge of 40 amperes. The failure of

Chris Bovais, Ft. Bragg, N.C., 5th 2-Meter Senior with original design. Winner of Sid Axelrod Award.

the Davey retrieval systems was a blow to the manufacturer, Ted Davey, who was present. The symptom was big globs of line coming off the spinning reel, tangling and being pulled up by the sailplane. The next in sequence, was a crew trying to untangle the mess whilst all hands stood by. I've seen many retrieval launches with the Davey system and I've never seen even one instance of this type tangle. The basic problem was that the launch/retriever system was never tested at this site before the first launch of the contest. There was apparently a problem with the grass

Third Place Scale, Glasflugel 604, Bob Elliott, Texas.

always fielded all aileron ships. This year all other areas of the country sported wiggle-wings. All the way from 2-Meter to Unlimited, there were ailerons. It would have been difficult to count the number of aileron ships due to the number of entries and the spread-out nature of the site. I would venture, however, to guess that at least 20% were aileron controlled. There were a couple of ships with winglets and one flying wing, flown by George Boss of Southern California's SULA Club.

My experience with computer in front of the retriever, and inexperience of the retriever operators didn't help, but in any event it did not result in favorable publicity for the manufacturer.

Two incidents of a glitch in frequency control occurred when the wrong pin was given to a contestant, resulting in a crash. But, on the whole, frequency control was handled in a very professional manner.

From an aircraft standpoint, the big news was the number of aileron controlled ships. The Pacific Northwest, led by Bob Dodgson has

scoring has been universally bad. I think that if the CD depends on an on-site computer to do his scoring he is living in the same dream world as the guy who expects to reconcile his checkbook with a computer. There are some jobs that are so uncomplicated they don't lend themselves to computerization. It's nice to have one on board as a back-up, and if it works, fine. Once you get latched onto computer scoring, without a backup, any glitch will throw a monkey wrench into the works. In the case of Reno, the computer operator was unfamiliar with the machine and the power source was not adequate, so the whole thing fell over on its side, without any backup. I say — forget the exotic computer for on-site scoring and mechanize hand scoring so that the contestants can see the scoring as the meet progresses. I reckon this is a poor attitude after 26 years in the computer industry.

Scale continues to attract only a small number of contestants. Ten ships reached static judging. Mark Smith of Mark's Models, San Marcos, California, overpowered the field with his 16 foot ASW 20. Mark not only received 99 static points but put on a flying demonstration that set off his flying ability. The ASW 20 looks realistic in the air and appears to be flying at scale speed. Mark had no trouble making his 3½ minute flights, and treated the crowd to low passes on landing with a stall turn, topped with a perfect landing on both of his flights.

I didn't stay for Electric nor F3B; four days in 98 degree temperature is enough punishment. My general impression was that the AMA did a reasonable job; the CD did a reasonable job; and I didn't, finishing 15th in 2-meter.

For anyone contemplating advocating legalized gambling in their state, go to Reno and look around at the wonderful benefits reaped by the residents. Particularly observe the sidewalks and curbs in the South section. They are completely erroded due to some contractor using too little cement in the concrete. It seems that little cement is used in the political system all the way to the top. But how can I complain, I live in the same cementless society.

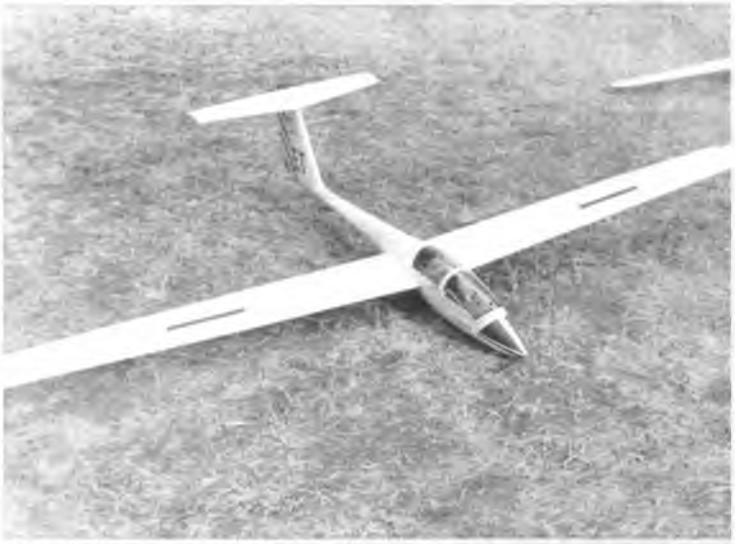
Catch you all next month, all being well, Howzat! □

photo coverage continued

K1B Scale, Ray Marvin, Denver, Colorado.

Winning Scale ASW 20, Mark Smith, Valley Center, Calif.

Scale Minimoa, John Read.



Twin Astir Scale by Rich Burnoski.

Cockpit winning Scale ASW 20 by Mark Smith.

Second Place Scale TG3 by Ed Whyte, Alto, Michigan.

CUNNINGHAM ON R/C

Chuck Cunningham

The Seventh Annual Southwest Jumbo Fly-In was a terrific success. It far surpassed the previous six editions on all accounts. More fliers, more models, beautiful weather (hot, naturally) lots of spectators, no problems and, as far as I know, no complaints. The only actual problem that we heard was the motel rooms were hard to find as a large church organization picked this same weekend to have a convention in Fort Worth. Didn't they know that they were treading on a really hallowed weekend?

We're going to talk about the Fly-In a bit more after a time, but before we get to that let's talk about modeling in general, as we usually do in this spot each month. Yesterday several of us were spending a Saturday afternoon at Thunderbird Field. Bill Slater, Don Winfield and I were all getting stick time on Bill's Balsa USA J3 Cub. This aircraft is pulled around the sky nicely by a rather elderly O.S. .80. We were each just kinda messing around,

Woody Frantz, Tulsa, Oklahoma. Beautiful Kinner Sportwing, 102" span, 21 lbs., 2.3 Kloritz, scratch built, own plans.

Kerry T. Hurt, Jackson, Texas. F4U-4 Corsair, 94" span, 32 lbs., Quadra prop drive.

Donald Meek, Houston, Texas. Best Scale Award — AT-6, 102" span, 25 lbs.

Bud Kincaid, Tulsa, Oklahoma. Most Impressive Award — JN-4 Jenny, 11' span, 22 lbs., Quadra power, full flying wires and cable controls.

Mike Cook, Houston, Texas. F4U-4, 96", 27 lbs.

Fred Marshal, Lubbock, Texas. Carting all these models leaves little room for the driver. Fleet Bipe, Eindecker, Gere Sport, J-3 Cub.

shooting touch and goes (more like "bounce and wents") when we decided to see just how perfect a landing each could make. By perfect, I mean good approach, gentle touch down (with no bounce) and straight roll out. There was almost no wind, a great rarity at T-bird Field. We each made three passes at landing, then passed off the transmitter to the next guy for his three passes. We spent several flights doing this, each time making better and better landings from approach to touch down. The wind pushed up as a thunderstorm neared, making it a bit harder to set up for landings as this aircraft wants to land right into the wind, not exactly where you want it to go. You had to slip the Cub to get her just where you wanted her. We had a great time . . . and each of us made much better landings than we had when we were just fooling around.

The point is that if you're a bunch of old timers, like us, who have gotten into somewhat sloppy habits, or you're a group of relative newcomers, it's not a bad idea to get in a little friendly competitive practice now and then. Pattern pilots know this, they practice each flight. Olympic gymnasts know this, they practice all of the time. Formula I racers work on getting a bit more speed from an engine, and we sport fliers just go out, bore a bunch of holes in the sky, and don't really work at making our flying more precise. Next time that you're out with your flying buddies, get in a bit of practice. If you don't want to trust your bird to old Ralph, let each of you fly your own aircraft, but try making a really good take-off, traffic pattern and landing, then watch old Ralph do the same thing. Chances are that with each

Donald Burnett, Houston, Texas. Farman Moustique, 80" span, 10 lbs., Gemini Twin.

Joe Smith and Dave Drumm's Pober Pixies. 90" span, 12 lbs., .90 4-cycle engines. Very scale like flying.

other's help, you will become a much better pilot. Even the airlines stick a check pilot up in the cockpit every so often.

After we got through going round and round making landings, we were approached by a young man who asked us if we would help him get in his first flight. Since the weather was changing I told him that flying wouldn't be a good idea but we would look over his aircraft and give it a pre-flight check to be sure that the first flight would be a successful one when the time came.

He and his dad had done a very fine job of building and finishing their first radio controlled model, but a few things kept it from being in flying condition. We checked over the entire aircraft and made a list for him to check out and make corrections. Minor problems that were easy to correct, yet several of them could have cost him an aircraft. Such as unbraced nylon pushrods that did move the control surface with no load upon it, but with air loads on the elevator, simply would have bowed and not moved the surface. A throttle servo that had too short of a control arm, thus allowing the engine to move only through about one half of the throttle range. And a few more really minor problems. The surfaces all moved in the correct direction, and the nose gear moved to turn the aircraft in the same direction as the rudder. All in all, a darn good job, but not quite ready for flight. An engine setting with a bunch of up thrust was also added to the list.

Just a couple of weeks ago I went through the same type of inspection on Tom Bartzen's newly finished Lazy Ace. Tom, who is approaching nineteen, has been out chasing girls for the past year rather than paying attention to R/C modeling, and had forgotten a few of the lessons that he had learned earlier. We spent some time going over the Lazy Ace, making a list of things to correct, and just a couple of days later made perfect first test flights. I expect that when we next see the young man who was at the field yesterday, he will have an aircraft that is capable of helping him learn to fly.

It's hard for a beginner, or a returnee, to get everything right when he has to rely on just himself to get the job done. If you're at the flying field and a beginner asks you to help him fly, take the time to really inspect the model before you ever let it try and

Steve Fenton, Odessa, Texas. All aluminum, 7' span, 28 lbs., Horner Twin engine, whip antenna. Excellent flying aircraft with smoke system.

Curly Rucker, Ft. Worth, Texas. PBY, 9' span, 20 lbs., twin O.S. .60 engines.

Carl Orbison, Tyler, Texas. Best Non-Scale Award — Texas Coyote, 89" span, 23 lbs.

Steve Fenton, Odessa, Texas. All aluminum, 7' span, Horner Twin engine, 30 lbs. and smoke systems.

take to the air. Don't forget to run a range check on the radio while you're at it. If you're a beginner, seek out all of the advice that you can get. After all, it's your money and work that's going up into the air. I feel that if more local hobby shops tried to give pre-flight service, and to really get down to helping their customers, the inroads of the mail order houses might not make such a large impact on the local store owner.

☆

Now, let's get to a run down on the Seventh Annual Southwest Jumbo Fly-In. As I said earlier, it was tremendous. There were 66 entrants, and we counted over 120 aircraft at the field on Saturday, at 10 a.m.! As is always the case, a number of guys did not enter, just brought their aircraft to show and tell, and not to fly. This always seems kinda silly to me, because the nominal entry fee also buys a couple of chances on the radios that we gave away. This year, as last, Millers Distributers of Fort Worth provided two fine Futaba radios to be given away to the entrants. It is a real pleasure to have sponsors of the status of Millers beer join in sponsoring the Jumbo Fly-In. Our thanks go to Pat Craine for this participation. It's really amazing when you toss something like the Fun Fly. You plan everything out, then sit back, pray that the weather will be good, and wait to see what happens. Each of the Jumbos has been really outstanding, but you begin to wonder, "Is this the year that everyone has gone to too many big model fly-ins?" When I arrived at Thunderbird Field at about 7:30 a.m., a large bunch of tents had already been set up in the pit area. Year after year, regulars make sure they get there early enough to grab favorite places. At the height of activity, about 1:30 p.m. on Saturday, the tents stretched for hundreds of yards. Thunderbird Field is a large flying field, with acres of clear space. It was amazing to see just how much of the field was taken up by pit area. The pits this year were at least a hundred yards longer than in past years.

As you know, we do no local advertising other than send information to the local hobby shops in Fort Worth and Dallas. Most of the spectators congregate from information received from this column in the spring. This year the cars were parked all over the roads leading to the field, and stretching away for over three quarters of a mile. If we had advertised locally, the crowds would have been unmanageable. As it was, since the spectators for the most part were knowledgeable modelers, everything was very orderly.

The aircraft were, once again, of very superior workmanship. Flying

Jerry Rhodes, Eagle Pass, Texas. Bristol Scout, 6' span, 21 lbs., Quadra. Has logged 380 flights and 102 hours. Also, Chuck's Lazy Ace, 76" span, 11.5 lbs., Webra 91.

for the most part was excellent. Over the years, modelers have adapted to giant aircraft very well. The days were hot and dry, and no one had any problem plucking a model off of the runway at less than flying speed. One of the main changes that I have noticed is that the aircraft are actually tending to be smaller than in the past, with much more available power. Early in the big model movement, everyone seemed to be trying to build the largest model. Now size has become less of a factor, and engine power has taken over. As an example, Al Willaert's 38 lb. Nosen P-51 with a Sachs-Dohlmer 5.2 cu. in. engine in the nose really honks along just as the full scale aircraft does. Much more "scale like" than earlier P-51s with 2 cu. in. Quadras up front.

This year we were not covered up with Byron Pitts, Lasers, and CAP 20's. It seemed to be a sprinkling of many different kinds of models, and more seemed to be scratch-built, or plan built rather than some of the prefab kits that have been prevalent in the past several years. At this Fly-In, as I have heard has been the case at many other fly-ins, the large four stroke engine has been making inroads for the larger models. Not major at the Jumbo, but certainly making their presence felt.

One of the most interesting models, actually two models, exactly alike except that the second aircraft tipped the scale at 28 lbs. versus the first built at 30 lbs., were brought to the Jumbo by Steve Fenton. These aircraft were both pulled by Horner Twin engines. They were relatively small, span about 7', but the unique thing about them were that they were of all aluminum construction. The only wood used was in the firewall and the front of the cockpit headrest. All else was of foam and aluminum sheet, with the aluminum fastened together with rivets and pop rivets. They both used a wire whip antenna, and were equipped with very good working smoke systems. They flew great, and Steve did an outstanding job flying them. I hope that I can prevail upon Steve to give me some more information on the construction of these birds that I can bring to you later.

Another absolutely fantastic model was Bud Kincaid's Curtiss JN4-D "Jenny." This aircraft was scratch-built from Bud's own plans. It has an 11' wingspan, weighs 22 lbs., is powered by a Quadra, and controlled

by a Kraft radio. It had all flying wires, complete cable control just like the real Jenny, and all silk and doped surfaces. It really looked the part; beautiful scale-like flight. All that it needed was a blonde wing walker clinging to the flying wires to look just like the old barnstorming days. By the way, did you know that the government destroyed hundreds of Jennys in crated condition during the twenties. It seems that too many barnstormers were buying these crated Jennys for 150 bucks, putting them together, and going out into the country taking people for rides, and then getting into flying circuses. In the circuses they were wiping themselves out with great regularity, and giving flying a bad name. The government decided that the only way to limit this facet of aviation was to crunch the crates, so they did. Wouldn't you like to find a crated Jenny today?

Curly Rucker brought his fabulous PBY flying boat with 9' wingspan, tipping the scales at 20 lbs. This aircraft is pulled along by two O.S. .61 engines. Just the week before the Jumbo we all wandered down to a small lake at Midlothian, Texas, to make the test flights on this aircraft. Tom Blakney did the test flying and the PBY was off of the water in about thirty feet. Really a great model.

There were the usual Balsa USA Fly Babys, Sky Master Lazy Aces, Byron Pitts, and numerous other models. Unfortunately, many were not registered so it was almost impossible for me to figure out what all was as the field since I usually spend most of my time manning the front desk and PA system. Once again, it wouldn't be possible to put on the Fly-In without the help of my loyal friends in the Fort Worth Thunderbirds and Al Willaert and Ron Ables from the North Dallas R/C Club. All of the registering and ticket selling chores were handled for the seventh year by my wife Jan and my daughter Cindy. Couldn't do it without them.

Prior to the 1984 Jumbo, I had decided that this would be the last one that I would put on. It isn't an easy task, takes lots of time and effort both before and during the two days, as well as a lot of clean up details after. Last year we seemed to have a number of hassles, mostly from the Corps of Engineers (one park ranger especially

continued on page 212

SCALE VIEWS

Col. Art Johnson

Did you ever fly a scale model that had a little bind in the aileron or elevator controls or hinging? It does not take much friction to keep the control surface from returning to an exact neutral when the controls are released. The symptom is easy to see when checking the controls. If the aileron remains a little up when the stick is released from one direction and a little down when released from the other, you may be in for some fun flying. The model can drive you nuts in flight as you can never get a hands-off trim position. You wind up constantly rocking the wings back and forth as the neutral position of the control surface changes each time you move the stick.

If you are having trouble with a bellcrank or control rod aileron installation, try putting a servo out in the wing where you can have a straight shot to each aileron control horn. With today's lightweight servos, a two servo aileron set-up may actually weigh less than a bellcrank and steel wire in nylon tube installation commonly used with a single servo. I found this to be the case when I pulled out the bellcrank linkage in my F-82E and substituted a servo in each wing. The model came out just a little lighter and the tighter aileron control eliminated an intermittent flutter problem.

The nylon type hinges used in most models today are not likely to cause binding unless you get too much glue around the hinge pin. They do flex around any part of the hinge that is not imbedded in a stiff surface and most are not readily used when you want the point of rotation set back from the leading edge of the control surface. If you want a rock solid hinge that can position the axis of rotation anywhere that is desired, then a ball bearing hinge may be just the ticket. Until you try a control surface set in ball bearings, you may not believe how absolutely smooth and precise such a control can be. I first tried this type of hinge bearing when I was looking for a way to eliminate all slop in a full flying stabilator. It worked so well that I have since used it on ailerons and even flaps. The bearings are not difficult to install and a wide variety of types and sizes will work. The bearings will weigh a little more than nylon hinges but the weight penalty is not significant as compared to the benefits. If it were, I would not have used them in my F-100D ducted fan model.

Finding suitable bearings may be the toughest part of the installation. I found that the easiest hinge was formed by setting a 1/4" diameter aluminum rod in the control surface and fitting a 1/4" inside diameter sealed precision ball bearing over the rod. The bearing is held in place by crimping tubing over the outside diameter or by gluing it into a plywood or plastic standoff. Bearings of this type are available from bearing

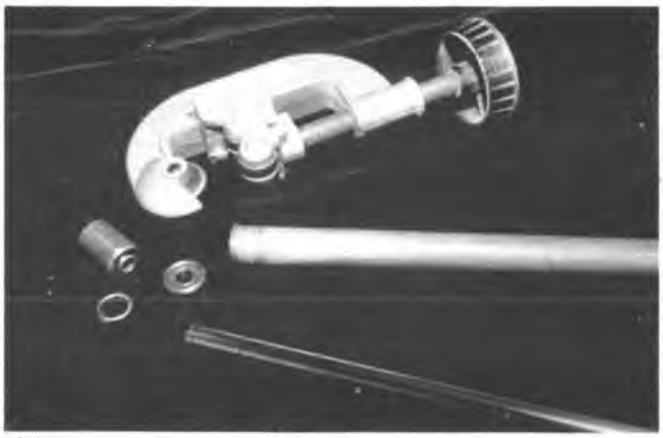
supply houses in most cities (look in the Yellow Pages). A less expensive source is a surplus or salvage outlet. Suitable bearings are used in all kinds of office machines that are routinely junked for salvage and this is where a friend of mine located some that I have used. Less expensive needle bearings are also usable but just a bit more bulky. I have used both types in my latest model with equal satisfaction and both types are shown in the photos with this column.

Small ball bearings with almost any inside diameter can be used to fix the wing tip end of an aileron. A bolt through the bearing into a rod or dowel set in the aileron will hold the bearing to the aileron. To provide a gluing surface to set the bearing into the wing, a piece of brass tubing that just fits over the bearing is crimped to the bearing. A tubing cutter makes a good tool for this purpose. Crimp down hard enough on each side of the bearing to hold it in place but not hard enough to cut through the tubing. A half inch long piece of tubing should provide enough surface to epoxy the bearing into the wing. Actually, the same system can be used for both ends of the aileron if there is no flap butting against the inboard edge. If there is a movable flap, then the inboard bearing must be mounted in a plywood hanger recessed into the flap edge. The plywood hanger is glued into the wing when the aileron is installed.

Control surfaces of a model are not the only moving parts that can benefit from the reduced friction of ball or needle bearings. Wheels are also a good candidate for the easy movement treatment on models where the take-off roll is critical or where fast spin up helps on landing. Wheel drag has not been much of a problem on most of our overpowered prop engined models. The prop will usually haul these models off the ground in a lot less than a scale take-off distance even when the tires are a little square and the axle is through an out of round hole in the plastic wheel. In fact, a little drag in the wheels on some models may not be all bad. It can make the take-off roll look more realistic and reduce the need for brakes on landing. That is, if the drag does not nose you up before the wheels can get up to landing speed in case of a tail dragger.

Models of jet aircraft are much more difficult to get off the ground in a hurry and this is where anything we

continued on page 134



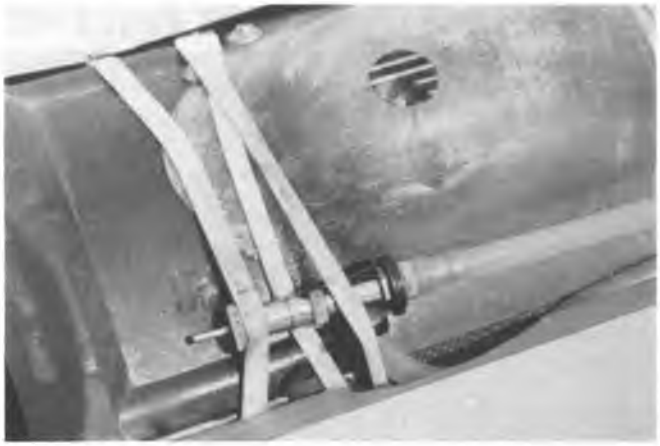
Crimp with tubing cutter holds ball or needle bearings in brass tubing for easy gluing into wheels or aircraft structure. Two bearing installation for wheels is just below cutter.

1/4" diameter aluminum rod makes solid shaft for bearing rotation in aileron, flap, or elevator. Top shows bearing mounted in ply hanger for inboard aileron installation. Center shows bearing in brass tubing for outboard aileron.

Either ball or needle bearings will greatly reduce friction of wheels used on models. Photo shows sealed ball bearings on left, needle bearings on right. Wheel must have hub that can be drilled large enough for bearing mount.

Art's F-100D breaks ground from short runway. Ball bearings on wheels shortened take-off roll to make use of these fields possible. Model also uses ball and needle bearings on control surfaces. (F-100D is an upcoming construction article.)

Bob Walter's Mirage was new to the "King Orange" contest. Australian two seat version modified from the Jet Hangar Hobbies kit and powered by O.S. 46 fan engine.



An idea carried over from Bob's control line speed days, remote needle valve to the O.S. 46 makes needle adjustment easy in the Mirage.

Ramon Torres' model of a turbo prop powered T-34 military trainer won 1st place in Giant Scale at the "King Orange," Southeastern Regional Scalemaster Qualifier. The T-34 is an exceptionally smooth flier.

Art's veteran model of Col. Cy Wilson's F-82E Twin Mustang won Expert Sportscale event at "King Orange." Model was modified to use a servo on each aileron replacing bellcrank installation which had previously given flutter problems.

continued on page 210

POWER BOATING

Howard Power

A few months ago we were contacted by Richard McCann, the owner of Richlen Inc., R/C Boats (23 Colfax Rd., Edison, New Jersey 08817). He wondered if we had time to help him test his newest release, the Bounty Hunter 40 deep vee hull. Trying different hulls has always been a learning experience. Every boat design has its unique characteristics. To achieve the best performance each design has to have its hardware tuned to take advantage of these characteristics. Deep vee hulls are relatively easy to get to run and handle at low speeds (below 40 mph).

Bounty Hunter 40 deep vee by Richlen Inc. R/C.

You take the same hull to speeds approaching 50 mph, however, and you have a very different trimming situation. At these higher speeds the hull is riding on a single patch of water that is very small. On top of that, the vee bottom of the hull is not the most desirable shape for stability. It's very much like balancing an inverted cone on the palm of your hand. The thrust line depth and angle, propeller type, propeller fore and aft position, and rudder geometry greatly affect the performance capabilities of any hull. What works on one hull will not necessarily work successfully on another design.

The first photo shows the Bounty Hunter 40 hull. The boat in the photo was constructed by Dean Ellis of Salinas. The hull is large enough for high powered 7.5cc or 11cc racing motors. The overall length is 42" and the beam is 12". The hull shape bears a strong resemblance to the Sightler hulls that are so popular in the Southeast. The Bounty Hunter has a pair of normal looking ride strakes that are 26" in length and bisect the hull bottoms. It also uses chine strakes that have anhedral. Anhedral implies that the outside edge of these strakes is closer to the water than the inside edge when viewed from the transom. This strake design develops large side forces that help keep the hull from sliding sideways in a turn. They also can induce chine tripping (and spin outs) under hard cornering conditions if the bow comes down too much. The balance of the wetted lateral (side)

Engine and radio installation.

Hardware set-up.

Bounty Hunter on plane.

area around the boat's Center of Gravity is very important to a hull's ability to corner or to take on rough water without instability. The chine line and strakes are used to control this important factor in deep vee hull design.

The size and position of the turn fin, spin fin and rudder blade also contribute to this balance of lateral area. The turn fin is usually a thin flat surface that is positioned on the hull centerline close to the boat's Center of Gravity. If you move this fin forward of the Center of Gravity it develops forces in a turn that destabilize the hull in yaw and, in effect, makes the boat easier to turn. If you make this fin too large or if it is positioned too far in front of the Center of Gravity the boat will hook. Hooking implies that the hull will turn in a continually decreasing radius when the rudder is held at a constant angle. This is instability in the boat yaw axis and must be avoided. The spin fin is another thin flat surface that is mounted on the right side of the boat at the transom. This fin increases the aft lateral area to keep the boat's stern from sliding out when the hull is rolled over to the right in a sharp right hand turn. The proper balance of all these factors is necessary if your boat is to have excellent high speed turning performance.

The Bounty Hunter hull is a hand layup consisting of four layers of cloth. Our boat had a nice white gelcoat finish for easy paint preparation. The boat comes with the deck joined to the hull. Not shown is the super trick hatch cover that also is included. Unfortunately, the photos were taken before the hatch was mounted. The hatch has a very eye pleasing design that allows the pipe to be completely enclosed within the hull-hatch combination. The heavy 3/8" thick plywood engine mounting rails are installed at the factory. The motor mount position and integral radio box geometry are designed so that the tuned pipe lays down inside the hull. The rails are fitted with 8-32 large head T nuts and an Octura Swift Switch motor mount is recommended. The boat also comes with a 1/4" full width plywood transom plate that is factory installed. This boat has a good looking top design that uses its shape to greatly increase deck strength. With the hatch on, the boat looks like it's going 50 mph on the beach.

The second photo shows the engine and radio installation. The radio box is built into the hull with its front bulkhead bonded to the hull bottom and to the engine rails. A smoked acrylic radio box cover, mounting hardware, and rubber gasket are included in the kit. I prefer a separate radio box that is removable because a built-in radio box sometimes leads to hull bottom concavity between the bulkhead and the transom plate. As yet this hull has not developed any bad bottom contours. Dean used a Kraft whip antenna mount, a Du-Bro waterproof switch mount and Power Products water tight pushrod seals in his radio installation.

The boat is powered by a highly modified OPS 60 marine engine using an M & H variable venturi carb. The carb linkage is easily seen in the photo. Two 12 ounce Pylon plastic fuel tanks were mounted in front of the engine. The engine runners were reinforced in the area of the motor mount by four 1/4" plywood bulkheads. These greatly stiffen the motor mounting. This keeps the rails from eventually cracking free from the hull due to vibration. It is our habit to recommend this on all of our 60 powered fiberglass hulls. This area takes a real beating and, therefore, should be strengthened. The bulkheads are bonded to the hull by 1" wide fiberglass strips and resin.

Photo 3 shows the hardware set-up. Dean used Pipeline (39624 Lahana Way, Fremont, California 94538) cavitation plates made by Bill Prigley. These aluminum plates were described in the June, 1982 Power Boating column. The remainder of the hardware is mostly Power Products (766 Broadway, Seaside, California 93955). Their adjustable strut assembly was mounted on the hull centerline with the centerline of the

propeller shaft 1/2" below the level of the vee bottom and parallel to the keel. An Octura (7351 N. Hamlin, Skokie, Illinois 60076) stub shaft, drive dog, streamlined prop nut, and ferrule are used to restrain the propeller in the strut. A Power Products square end 3/16" diameter flex cable transmits the engine power to the ferrule. The cable is soft silver soldered to the ferrule and two set screws hold the stub shaft to the ferrule. A 1/4" O.D. brass tube houses the flex cable and is cut off so that 1/2" of the cable is exposed to the water. This allows the cable to be withdrawn for lubrication. If the cable breaks, the propeller and stub shaft remain with the hull. The square drive cable floats in the cable nut so that no thrust is transmitted to the engine. No water is drawn into the hull brass tube since it is facing aft and acts as a siphon when the boat is moving. This drive system has proven to be reliable and very free in operation. A Power Products adjustable rudder assembly is mounted 1½" to the right of the hull centerline. The 1¼" wide rudder blade has its leading edge 4" aft of the transom. Various propellers were tested. Best performance was achieved with Octura X450 and X452 propellers. The boat runs fast and has excellent handling charcteristics when turning. It should prove to be a very competitive hull.

★

Murphy's Laws are well-known to those of us in the R/C boating hobby. There are many rules of thumb that may be followed to be successful in the sport. Many of these gems are known to but a few select gurus and their followers. In an effort to spread the gospel, the teachings of my favorite boating personality, Sergeant Speed, can now be told. Sergeant Speed is an avid partner of that racing superhero, Captain Hydro. Captain Hydro has his doctorate from the School of What's Happening Fast and is presently teaching a class in Hydrotherapy at a leading California trade school. We are, therefore, presenting (in unabridged form) Sergeant Speed's Speed Tips as told to Captain Hydro.

1. Engine horsepower is equivalent to its displacement multiplied by its price.
2. The depth of a boater's frustration is directly proportional to the pitch of his propeller.
3. Water is not solid until you crash.
4. A boater is not measured only by the length of his pipe.
5. The best hulls are made from nobendium and noweightium unless you can find unobtainium.
6. If your boat isn't as fast as everyone elses, throw more money at it.
7. Disregard all previous speed tips.

We know that many of you readers have your own speed tips. Drop me a line and we will continue to print these kernels of wisdom.

★

Dear Mr. Power:

I am a relative newcomer to model boating and I have learned a lot by reading your informative column. I have a number of questions that I hope you can answer. (1) What are the engine displacement ranges of the different classes? I was confused by the 1983 IMPBA Internats having Classes B, D, E, and F, and the 1983 NAMBA Internationals having classes A, B, C, and X. What is the difference? (2) What are the advantages and disadvantages of a carbureted engine (ex. OPS) as compared to a throttle exhausted engine (ex. K & B)? Is one better than the other? (3) My local hobby shop sells mostly R/C aircraft engines that need to be converted to marine use with an Octura Kool-Clamp. Aside from the flywheel and water-cooled head, are there any differences between the aircraft and marine engines (i.e., internal make-up, running characteristics, etc.)?

Thank you for your help.
Kenneth J. Daigle
New Orleans, Louisiana

The two national model boat sanctioning organizations have essentially the same displacement classes. They just label them with different letters to confuse the innocent. NAMBA (North American Model Boat Association International, Inc., 6073 Sunrise Dr., Lower Lake, California 95457) has the following displacement ranges for each class:

A — 0 to 3.509cc
(0 to 0.214 cu. in.)
B — 3.51 to 7.509cc
(0.241 to .458 cu. in.)
C — 7.51 to 11.009cc
(.4581 to .6715 cu. in.)
X — 11.01 to 22.009cc
(.6716 to 1.3425 cu. in.)

IMPBA (International Model Power Boat Association, 38355 Hidden Lane, Mt. Clemens, Michigan 48043) has the following displacement classes.

A — 0 to 1.8032cc
(0 to .110 cu. in.)
B — 1.8196 to 3.5901cc
(.111 to .219 cu. in.)
C — 3.6065 to 4.918cc
(.220 to .300 cu. in.)
D — 4.9344 to 7.5081cc
(.301 to .458 cu. in.)
E — 7.5245 to 10.9836cc
(.459 to .670 cu. in.)
F — 11.000 to 30.013cc
(.671 to 1.8308 cu. in.

As far as heat racing goes IMPBA usually runs two classes together. The small engine class involves classes A and B, the middle engine class involves classes C and D, and the large engine class involves classes E and F, the largest engine class involves class X. As a result, these combined classes are directly comparable with NAMBA's classes A, B, C and X.

A carburetor controls engine speed by controlling the amount of fuel and air in the intake tract. The exhaust throttle equipped engine controls the engine's speed by exhaust tract flow control. **Any** engine can be controlled by either device or by a combination of the two. An exhaust throttle must reliably seal off all the exhaust gases. If it does not, the engine will not shut off and you will lose some of the efficiency of your tuned pipe. Any leakage results in poor low speed control and in the worst case of over-revving on the beach.

If you wish to use an exhaust throttle I recommend one that has a rotating cylindrical barrel, is water cooled, and has high temperature O rings to seal the barrel to the body. The throttle barrel should be either brass or anodized aluminum. These materials keep the barrel from sticking in the aluminum body when the throttle gets up to operating temperature. Sticking is common because the hot exhaust gas heats up the rotating barrel more than the throttle body. The barrel expands and since you need a good fit between these parts to keep leakage to a minimum, binding can be a problem. The exhaust throttle is used in conjunction with a simple venturi intake system. The fuel to air mixture is adjusted by a single needle valve. This intake system is trouble-free and easy to operate. The disadvantages of using an exhaust throttle are in two areas when the highest performance is desired. The fixed intake system limits the motor's ability to run at low

speeds. The idle speed with an exhaust throttle will therefore be higher than if a carburetor is used. The carbureted motor will also be able to use a slightly bigger propeller since its better fuel and air mixture control can be more closely matched to a tuned pipe racing motor's fuel requirements on and off the pipe.

If you want to use a carburetor on your motor I recommend those with two needle valves. A simple rotating barrel carb with a single needle valve will work but this type carb has a bad tendency to load up at low speeds. This causes poor acceleration characteristics and a high idle speed. In my opinion, the exhaust throttle system is better for racing than the use of the single needle carburetor. To solve this low speed richness problem, manufacturers have gone to double needle carbs that allow leaning the low speed mixture. These carbs have idle and acceleration characteristics that are superior to exhaust throttles. O.S., Rossi, and K & B make carburetors of this type that can be used on our racing motors. These twin needle carbs are more difficult to adjust but offer a performance edge over exhaust throttled engines.

If you are interested in racing, you should buy a marine engine. Kool Clamps are fine for converting an aircraft engine for use in slow speed sport boats (cabin cruisers or scale boats). Most good aircraft 7.5cc engines develop about .75 horsepower and 11cc aircraft motors are rated at about 1.25 horsepower. Racing marine engines easily develop three times the horsepower of the aircraft motors of the same size. The internal parts are made of better and stronger materials. These motors are more expensive but their higher operating rpm gives them a tremendous power advantage. Even if you are a sport boater you will find that the ruggedness of construction of marine engines will give you more reliability. These quality marine motors will outlast and outperform aircraft motor conversions in the same applications.

Well, that about does it for another month. Send your questions, comments, etc., to the address at the end of this column. If you desire an answer before magazine publication, enclose a stamped self addressed envelope. Howard Power, Hobbies Unlimited, 766 Broadway, Seaside, California 93955. (408) 394-1200.

□

SILENT POWER

Jim Zarembski

In June 1984 Bob Boucher, President of Astro Flight, scheduled a business trip to Cincinnati, Ohio, to present a paper on solar powered, manned flight to the American Institute of Aeronautics and Astronomics. He graciously offered to present excerpts from this paper to the Toledo Weak Signals Club at their June club meeting. As many of you already know, Astro Flight supplied the electric motors and propulsion system for the Gossamer Challenger solar powered aircraft that first crossed the English Channel.

Bob's presence in Ohio led to a series of impromptu flying sessions. One of the most notable included Keith Shaw, Bob, and myself. We started the morning off with the R/C field to ourselves. Ten electric powered R/C models, four chargers, and three pilots. On that morning, nearly two dozen flights were flown. Bob Boucher flew an Astro Flight Porterfield, and

(L to R): Keith Shaw, Jim Zarembski, and Bob Boucher near Toledo, Ohio, June 1984.

Keith Shaw with Cobalt 40-geared Spitfire.

helped debug my new Electroglide II sailplane.

Keith flew the Zombie Old Timer, the Flying Wing, and his Coloumbia. However, the most striking flights were made by Keith with his geared Astro 25 powered Spitfire.

I showed a few pictures of this ship in the August 1984 Silent Power column. To refresh your memory, the Spitfire weighs in at 80 oz. and has 670 sq. in. of area. Construction resembles a rubber model, but is strong and light when covered. I had reported that the Spitfire was powered by 16 cells. Actually 12 cells (Sanyo 1200 mah) were originally used. This has been increased to 18 cells with a geared Astro Cobalt 40 to give a little more speed. How does the Spitfire fly? With the Jomar SC-2 speed control, Keith taxies to the end of the strip, gives it 3/4 throttle, and away she rolls! After a few feet the tail comes up, and after about 30 feet the Spit takes to the air. On his first flight here, Keith circled back over the runway and retracted the landing gear. It just looked fantastic! Keith had installed the small Pilot retracts, which work very well. In the air there is nothing like the Spitfire. The elliptical wings and stab in its olive drab and gray

Shaw's Spitfire (uncovered).

camouflage paint scheme looks like 1939 all over again. There's something about a victory roll at 20 feet that makes this a very special and crowd pleasing model.

I hope that other modelers follow in Keith Shaw's footsteps and build more scale ships powered by electric motors. They're clean, quiet, and perform quite well.

In July I visited Los Angeles and had the opportunity to visit several flying sites and get a glimpse of some of the new projects underway at Astro Flight.

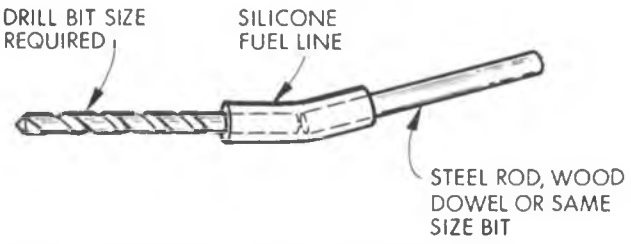
Bob Boucher has designed a new sailplane — the Astro Challenger. It has been designed for 05 systems using six or seven cells of 900 mah capacity (Sanyo cut-off cells), direct or gear driven. The prototype seen in the photograph was powered by an Astro Cobalt 05 with the Astro Flight 2½ to 1 gear drive. This is not the belt drive that has been available for several

continued on page 158

FOR WHAT IT'S WORTH

From RCM Readers
Edited By Jerry Smith

Faced with the dilemma of trying to drill holes through the already installed firewall of his new airplane, Ron Thompson, Prescott Valley, Arizona, found his standard size drill bits were too short and his electric drill was too **big.** Twisting the bit with his fingers seemed all but futile. The very hole he was trying to drill was the solution and answer to his problem. Simply couple two drill bits together with a piece of silicone fuel tubing, attach to the electric drill which will now reach through the nose ring of the fuselage and, presto, a neat clean hole in the firewall. Make sure the drill bits are the same size and butted together inside the tubing to exert pressure needed, otherwise tubing will twist. See sketch.



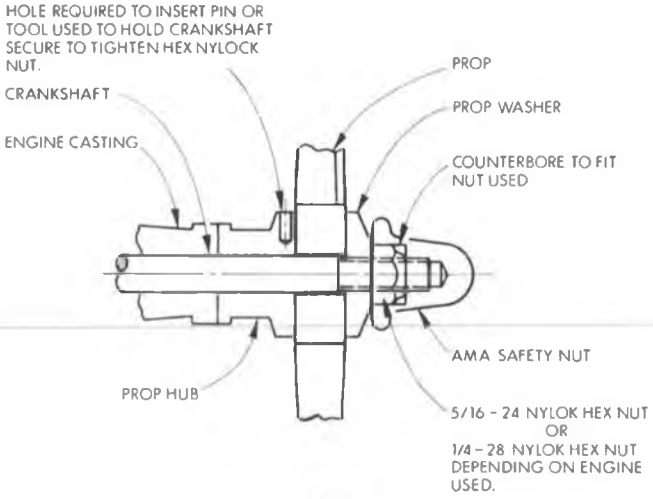
NOTE: MAKE SURE DRILL BIT AND ROD ARE BUTTED TOGETHER INSIDE TUBING TO EXERT NEEDED PRESSURE, OTHERWISE TUBING WILL TWIST.

★

Bob Petro, Post Falls, Idaho, monitors and records the battery and history of his Ace Digipace in a most positive way. He places stickers, purchased from a stationery store, right on the transmitter and airborne battery pack, indicating date and capacity time and assures you that the record will not get lost --- instead of intending to do it as soon as you find that book you keep misplacing. Bob hasn't had a failure yet since adopting this recording system. A simple idea yet it may save your airplane which is a costly item nowadays.

★

Bill Hoffmeister, Indianapolis, Indiana, had been working with a fellow flier who had a 120 four stroker. Several times it backfired causing the prop to come off and hit him. Two nuts were used to retain the prop but this wasn't the answer. Using the four bolts supplied with the engine came next. At one time the engine backfired, the prop split in two and Bill had two pieces coming at him instead of one. Finally the problem was solved by using a hex Nylok nut. Now, when the engine backfires, the prop slips a little on the crankshaft, but all components remain in place. The nut only has to be retightened before starting again. The AMA safety nut, as shown in the sketch, needs to be drilled or counter bored just a little less than the thickness of the hex Nylok nut. This helps to keep the AMA nut locked in place. For details, see sketch.



★

If you over-sand those plywood bulkheads to be installed in a fiberglass fuselage, you will wind up with gaps too large for the resin to act as an adhesive. Why not make some fiberglass porridge. Mix up some resin, add wing joining glass cloth cut up into small portions, say 1/4" square, and mix in a container. Then position bulkhead in fuselage and pack gaps with the porridge. Allow to cure.

Do you get those thin brass tubes kinked when you bend them for vents in fuel tanks? Place a Du-Bro Flex-Cable in the tube before bending. After bending withdraw the Flex-Cable and --- no kink.

Have you ever had the annoying problem of fuel lines coming off an inaccessible fuel tank? Guard against this snag by applying Super Glue to those fuel lines as you install them on the tank outlets. Thanks to RCM reader, John Firth, Rikka, Kuwait.

★

The long Aluminum T-Bar sanding blocks are really great, but many people have trouble finding sandpaper long enough for a seamless installation. The solution is to go to your local hardware store and buy some sanding belts used on belt sanders. They are available in many grits and lengths, so you should be able to find one that will let you cut several strips for your sander with minimal waste. The best part is they last forever in our uses. They are the cloth backed type. Sears sells several belts and also has a good adhesive for the aluminum blocks called "Sanding Disk Cement." It allows peel-off removal and replacement with ease. Thanks to John Van Hassel, Clancy, Montana. □

Bob Boucher with the 62" Cleveland Viking (will be an Astro Flight kit).

years, but a machined aluminum housing with precision gears mounted on a ball bearing supported prop shaft. I was really surprised at the very low noise level of these drives. Bob used the small Geist folding prop, which is approximately a 13/6, and all that could be heard was the propeller noise and the whine of the motor. The Challenger climbs at about a 30° angle with this motor/prop combination. I flew it in a local high school soccer field on Sunset Boulevard at dusk. We actually picked up thermals at 8:00 p.m. This ship flies like a dream. It'll be a welcome addition to the few electric powered sailplanes available today.

Astro Flight is also experimenting with old timers. The Cleveland Viking was originally a 48" wingspan, free-flight model back in the late

Astro Challenger, the Nats winner on a test flight on Sunset Boulevard.

Jerry Holcomb's Laminaire at Boeing Hawk's Electric Fly-In, June 30, 1984.

Laminaire on take-off roll (Astro 05 geared).

Leonard Bedford's Leisure Playboy.

Mitch Poling's Monarch powered by a geared LT-50 at the Boeing Hawks.

thirties. It has been blown up to 62" for a total of 500 sq. in. of wing area. The construction technique is typical for an old Cleveland kit. The fuselage is built up with 5/32" sq. balsa sticks. It appears that 1/8" sq. in an R/C Old Timer just isn't enough to give the strength required and to hold the covering, and 3/16" sq. is a bit too heavy. The model appears to frame up quite easily. Bob built the prototype in about five nights.

The wing features an undercambered airfoil and is very similar to the Playboy. The Viking was covered in red transparent MonoKote and weighs in at 35 oz. with an Astro 05 gear system, and a Futaba FP4 radio system with two S-33 servos and an Astro electric motor control.

Bob flew the Viking at "Test Base Alpha," which is actually a small park two blocks from his plant in Marina Del Rey. Although it was gusting quite heavily (10-15 mph), the Viking ROG'd off the grass easily and climbed up to soaring height in no time at all. The Viking is responsive to the controls and has a tremendous glide. Our flights were about 12 minutes in duration in less than ideal conditions.

What else is new at Astro Flight? The Rapid Chargers have been redesigned with diodes mounted in the alligator clip so that if it's hooked up to the wrong terminal on a car battery, it won't damage the unit or the flight pack. (It appears that some of the Japanese cars have reversed the red and black wires.)

How do you mount a Cobalt motor? Typically, a tube can be used, but Bob Boucher has stumbled onto the fact that a MonoKote cardboard tube is perfect for the Cobalt 05 and 15 motors. In addition, the MonoKote tube segment can be mounted in an Astro 05 motor mount. This is how the 05 gear motor was mounted in the Viking.

Bob Sliff and Ross Thomas flew several electric models at Mile Square during my visit to L.A. Bob flew a Leisure Playboy Cabin and a Jabberwock and a glider he calls the Cloud Cruiser. However, the most interesting ship I saw was as of yet uncovered. It's a direct drive version of the R/C Hand Launched glider, the Gnome. More on this later.

I must thank Mitch Poling along with Bernard Cawley, CD of the 1984 Boeing Hawks Electric Fly-In, for photos and reports on the event held June 30. Here is Bernie's report:

continued on page 162

Bob Boucher with his new Cleveland Viking. Model has 62" span and is powered by an Astro 05-geared Cobalt motor and seven Sanyo 800 MAHR cells. Model weighs 36 oz. ready to fly. Placed second at Reno.

2nd Annual Boeing Hawks Electric Fly-In, June 30, 1984

The second attempt for an Electric Fly-In at our field met with much greater success than the first time (which was rained out). The day was sunny with light, variable winds. The radar range people even took mercy on us, and didn't even show up. All in all, an almost perfect day.

It was clear that there is some strong interest in electric power around here, as almost all of the eight official entrants had at least two planes with them, and we had many spectators — some curious about electric power and others who were building something, but were not yet ready to fly. We had several people from Canada, and some from the Portland area (and I got a call on Sunday from someone from Bend, Oregon, who, unfortunately, had the wrong date and was trying to find us).

There was a rather large assortment of planes, from various powered sailplanes to old timers, sport planes, a scale model of a to-be-built homebuilt, and Dave Katagiri's pattern plane and pylon racer. So, the curious got to see a good cross section of what kinds of electric planes there are. About the only thing missing was a twin — or four motored plane (next year!).

Mitch Poling was kept busy answering questions and flew a couple of planes for people as well — and he managed to take some pictures for his Model Builder column.

The format was open fly-in except for the speed runs — any time anyone wanted to be timed for duration, someone had a watch on him, and most everyone flew whenever they wanted.

The prizes were provided by the Hawks, SR Batteries, Leisure Electronics, and Astro Flight. The awards were as follows:

Most Impressive — 1st place to Jerry Holcomb's Laminaire — a model of a two-place pusher homebuilt, rather like a short wide Lear. Cobalt 05 on eight cells and a 6/6 pusher prop looked **great** in the air (Jerry's from Vancouver, Washington). **2nd place** to Jay Olson's Geist "Hot River" F3E FAI Electroflight Sailplane — powered by Geist 60/20 with 3:1 gearing and up to 20 cells. We all wished we had seen this one fly!

Longest Flight — 1st place to Leonard Bedford and his Leisure Playboy, powered by an Astro Cobalt 05 on Astro belt reduction and seven cells — 15:05. **2nd place** to Harold Hatley of Astoria, Oregon, and his Electricus, powered with a direct drive Leisure 05 on 6 cells — 13:20.

Most Aerobatic — 1st place to Dave Katagiri's Electro-Bat, powered with a Keller/Leisure 25/12 on 12 cells, which was very smooth in the air and looked very adequately powered. **2nd place** to Jerry Holcomb's Kraft Chipmunk foamie — powered by an Astro 05XL on six or seven cells. I don't quite know what he did to it, but it went **very** well for a heavy 05 plane.

Steve Roselle took sixth place with this neat looking low wing Panther powered by a Leisure LT-50 geared motor. Steve used a 12/8 Top Flight prop.

Highest Speed to Dave Katagiri's Uno racer, powered by an Astro Cobalt 05 on seven Sanyo 900 mah cells — 68.1 mph.

Smallest Plane (by size) to Bernard Cawley's 020 Schoolboy (four SR 900 cells).

Smallest Plane (by weight) to Len Bedford's free flight Brooklyn Dodger, also Astro 020 powered on five Sanyo 100 mah cells (9 ounces!).

Largest Plane to Jay Olson's Hot River sailplane.

Best Crash — no award — none needed (the worst mishap was when my Showmaster blew off the table and managed to damage the Schoolboy, too, as it went — thank goodness for Super-T!).

Many thanks to our sponsors and, based on the response, we hope to have a much bigger event next year.

Bernard Cawley, Jr., CD

Here's a report on the 1984 Reno Nats from Bob Boucher.

We had a great time at the AMA '84 Nats in Reno. There were nine electric events at the Nats this year. They were: Seven-cell Sailplane, Open Sailplane, Seven-cell Old Timer, Class A Free Flight, Class B Free Flight, Indoor R/C Duration, Indoor R/C Scale, Indoor Control Line Scale, and SR Free Flight.

The AMA provided booths and seminar rooms for the EAA and for Astro Flight. The seminars were well-attended. Cal Ettel talked about the FAI electric activities, Bob Sliff about the EAA, and I answered questions about our equipment.

Bob Sliff, Bruce McAvinew and I visited the Lear hangar at Stead AFB to inspect the Lear fan. I met the Chief Engineer for Lear who is also a modeler and is getting interested in electric flight.

The weather was absolutely beautiful, but it got a bit hot in the afternoon --- about 100°F. The altitude is about 6000 feet and, at that temperature, the pressure altitude is over 10,000 feet. This had quite an effect on our models. They needed more prop pitch to climb, and the sink was noticeably higher. Bob Sliff tested an 8/8 Rev-Up on his Cobalt 05, and found that at this altitude it drew only 28 amps. He flew with an 8/6, and gave his 8/8 to Bruce McAvinew for his Cobalt 05 Electrolite. Both props were a definite improvement over the tried and true 8/4 that we use at sea level.

Ray Vanderwalker with his neat Corbin. Ray used an 11/7 prop on his first flight, and noticed that we were outclimbing him. Ray tried a 13/5 prop in the hope of improving the climb, but this pitch was way too low for this altitude, and he stalled on take-off in his second round.

Bob Sliff used a cut-down 16/8 prop in the Old Timer event, where there was a 12" prop limit. The Astro Cobalt 05 geared seemed to like that combo; it took first place in the Old Timer event. I had a new Old Timer model, the Cleveland Viking, blown up to 62" span. My model weighs 36 oz. with the Astro Cobalt 05, gear box, and a seven-cell 800 MAHR battery. Radio was a Futaba 4L with two S-33 servos and a 275 MAHR battery. I am using the Astro relay on/off motor control. At sea level, the Viking maxed every time. At Reno it was 30 seconds short and took second place behind Sliff. I used the biggest prop I had (a 12/8 Top Flite). August Fabian took third place with an Astro Cobalt-powered Leisure Playboy.

In the Indoor R/C events, Tony Nacarrato did 28 minutes --- about the same time as he did at the IMS Show in Pasadena, which is at sea level. I guess this means that his model is optimized for altitude already, and probably could benefit from a geared prop at sea level.

The Electric Sailplane event was hotly contested. There were about 13 entries and most people entered both Open and Seven-cell classes. I flew the Challenger, and entered it in both events. My Challenger is powered by a geared Astro Cobalt 05 and used the 13/6 small Geist folding prop. I had maxes or close to maxes on the first five rounds, and at that point had won Open and was top man in Seven-cell. But my landings are kind of hard (got to practice landing more) and I must have busted something on the fifth round because on the sixth round I lost my wing in the climb. Still, I got a sixth in Seven-cell with one zero. Bob Sliff took second in the Open class with his Astro 15-powered Sensoar, and John Brown took third with his Astro 05-powered Electricus. In the Seven-cell class, John Brown took first with his Cobalt 05-powered Electricus, John VanHassels took second place, and Bruce McAvinew took third with his Jolly Electralite. Bruce used a Rev-Up 8/8 on his Astro Cobalt 05. It drew only 28 amps in the thin air at Reno.

In summary, let me say that we now

continued on page 166

PIT STOP

Gene Husting

A record 127 entries made this the biggest McCoy race ever! This yearly race shows the great amount of admiration the racers have for Dick McCoy. Hosted by the PROCAR Club, and held at the popular Ranch Pit Shop track in Pomona, California, this race is always one of the three best races of the year. The McCoy race, the Nationals and the Winternationals in Florida, are the most attended races by the racers. And the McCoy race generally has a larger entry than any other race.

Besides entries from all over the U.S.A. we were also honored to have entries from Canada and Mexico. The Delta team was here in force with half of the Midwest with them. One of the reasons everyone likes to race here is that Gil Losi keeps the track in such great shape. A newly completed, large driver's stand and timers area is a welcome improvement. The track is open evey day so the racers can come as early as they want and get all the practice they want. Another great thing about this track is that it doesn't hurt cars. You can virtually do a week's practicing with the same body. That means a lot to the racers.

Arturo Carbonell was there a week early to test a new front end on his Eagle. He had made a double ball link upper "A" arm set-up for the front end. This would cut down on the amount of camber change and give the car more steering, which was something he wanted. Rick Davis had come in on Tuesday to test his new 4 wheel drive RC500, which he had just finished a couple days earlier. Rick said it ran every bit as good as his stock RC500 on Tuesday, but later in the week, when the traction got higher, he went back to his stock RC500.

Another racer from the far northwest, who came down for a week's vacation, was Gary Kyes with an RC500 car. Gary had a few little problems the first couple days getting it all tuned in, but as soon as he got it working right, I figured he was sure to be one of the drivers who was going to break the track record. He was just flying around the track. Gary never stops experimenting or working to improve his car.

There were so many drivers going very fast, you knew there wasn't enough room in the "A" Main for all of them. Both the Gil Losi's, Sr. and Jr., were fast every time they were on the track. Paul Dionne and Tom Wong were running faster with their Eagles than ever before. Arturo, Rich Lee, Dana Smeltzer and Rick Davis had "A" Main written all over their practice times. And someone who deserves a great amount of thanks from all the racers he continually helps is Ron Paris. Every time I see Ron he's helping someone else with their car or motor. I don't know how he has the time to go as fast with his own car as he does. Bill Jianas was running one of Ron's Paris Stage III motors, and he looked like he was one of the guys who was going to break the track record. Ralph Burch didn't get in until Thursday and immediately was going faster than anyone. Jianas nicknamed Ralph, "Ralphie the Robot," because he never seems to make any mistakes on the track. Jianas was also trying to find some way to short circuit the Robot, possibly by finding Ralphie a girl. Lots of fun!

The 12th Annual McCoy Championships was the biggest ever with 127 entries. Racers filled the Ranch Pit Shop Raceway in Pomona, Calif., for this event.

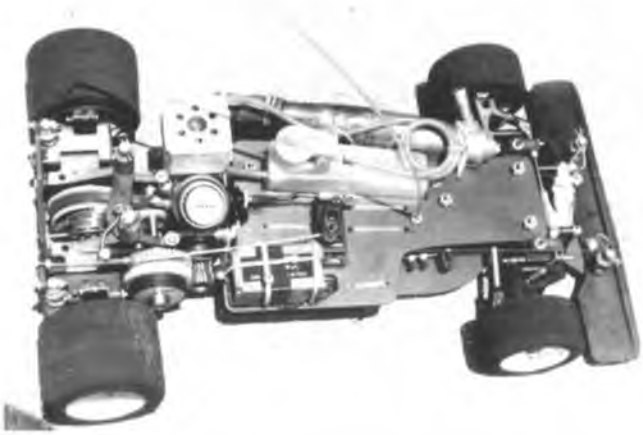
Bob Stanclift flags off one of the 19 qualifying heats. Every driver got 6 rounds of qualifying.

It's almost impossible for everyone to get through the first two turns without some contact, as the start of the "D" Main shows.

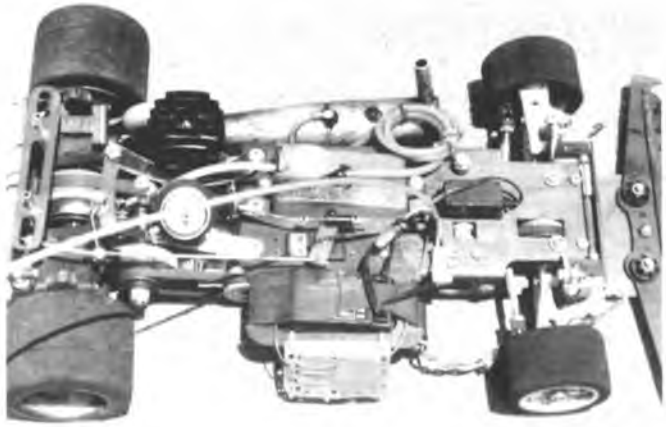
Mike Tobey of CRP teched the cars, including fuel tanks, as Jerry Snow and Gil Losi Jr. look on.

Master mechanic Ralph Burch Sr. does all the super pit work for his son Ralph Jr.

A good car and a super driver like Ralph Burch Jr. are the right combination to break track records. Ralph has been Top Qualifier in every race he's been in, in the last year.



Burch's RC500 car features a Rich Lee-K & B engine with one of McCoy's new torque mufflers, and Airtronics radios. Car is built from all stock over the counter parts including graphite chassis and radio tray, belt drive, 2 speed gear box and OPS carb.



Notice anything different about Rick Davis' RC500 car? This OPS powered beauty is a 4-wheel drive! Notice the belt by the clutch and at the front end?

"A" MAIN RESULTS

RACER	QUAL.	LAPS	CAR	ENGINE
1. Dana Smeltzer	13-4:03.4	128	Associated	McCoy
2. Bill Jianas	13-4:01.0	128	Associated	Paris-McCoy
3. Art Carbonell	13-4:02.7	126	Delta	Picco
4. Rich Lee	13-4:04.1	124	Associated	Lee-K & B
5. Tom Wong	13-4:07.7	124	Delta	Picco
6. Paul Dionne	13-4:04.7	123	Delta	Picco
7. Gil Losi Sr.	13-4:06.0	121	Associated	Paris-McCoy
8. Ralph Burch Jr.	14-4:10.7	115	Associated	Lee-K & B
9. Ron Paris	13-4:07.9	98	Associated	Paris-McCoy
10. Gil Losi Jr.	13-4:04.9	92	Associated	Paris-McCoy

"C" MAIN RESULTS

Racer	Laps
1. Benny Bullock	88
2. Gary Buriani	87
3. Rick James	86
4. Louis Przybyla	85
5. Tom Douglas	83
6. Rick Templin	79
7. Jerry Snow	78
8. Robert Chuhran	78
9. Bob Leckron	41
10. Mike Fox	5

"B" MAIN RESULTS

Racer	Laps
1. Rick Davis	110
2. Bob Block	107
3. Lee Hall	104
4. Gary Kyes	101
5. Chuck Wiggins	99
6. Robert Cavazos	99
7. Jeff Hollfelder	68
8. Ruben Serrano	37
9. Barry Grossenbacher	DNS
10. Gene Husting	DNS

There would be 6 rounds of qualifying, 3 on Friday, 3 on Saturday and then the Mains on Sunday. The weather was ideal for Friday, in the 80's. The big question was who was going to be the first to break the 14 lap barrier. I thought there could be about 6 drivers with a chance to do it. But who would be first? Normally the qualifying heats are set up so that all the experts qualify together in 2 or 3 heats. But for this race they mixed everyone up, so there was only one or two experts in each heat. This way everyone had a chance to race with the experts.

There were 19 qualifying heats. Through the first 16 heats Jianas' track record of 13 laps in 4:00.1 was still safe. In the 17th heat was Gil Losi Jr., Dana Smeltzer and Ralph Burch. But the batteries must have been low on the Robot as he only turned 13-4:03.7. I make it sound slow, but I just wish I could go that fast. Nobody else broke 14 laps either, so in the next round Ralph turned 14-4:14! It could be done after all! To give you an idea just how fast he is, he also turned 14-4:13.2, 14-4:13.9 and then the new record 14-4:10.7. This was almost half a lap faster than the next best time, which belonged to Bill Jianas who turned 13-4:01.0. Next was Arturo with 13-4:02.7, then Dana Smeltzer with 13-4:03.4. Six seconds separated 2nd through 10th place. That's close!

"C" Main

Lou Przybyla led the start of the 30 minute "C" Main with Gary Buriani close behind. Gary took over the lead after the first pit stops, with Rich

Dana Smeltzer drove his McCoy powered RC500 car to one of the most exciting finishes ever, to win the 12th Annual McCoy race.

James coming up fast to take over 2nd. Rick passed Gary and took the lead and looked like a sure winner, but with 2 minutes to go he ran out of fuel and Benny Bullock won with Gary Buriani 2nd and Rick James 3rd.

"B" Main

There were 2 or 3 of these guys in the "B" Main that just missed making the "A" Main by one second, so this promised to be a very good race. However, somebody forgot to tell Rick Davis. Rick took off in the lead and was long gone. Nobody ever saw him again. So everybody else was racing for 2nd place with Bob Block beating out Lee Hall for the honors. It looked like Rick's time in the 35 minute "B" Main would have had him fighting it out for 3rd place in the "A" Main.

"A" Main

Larry Stanclift, who did a super announcing job, called all the "A" Main drivers together for their introduction to the crowd before the start of the "A" Main. The drivers were given a 30 minute practice session, because they hadn't been on the track since yesterday. Then 5 minutes before the start was announced, the cars were all lined up awaiting the green flag.

Ralph shot ahead in the lead with Arturo following. Jianas finally got clear of the pack and was closing in on Art. Ralph was pulling away from Art and Bill. At the first pit stop at 5 minutes, Ralph had enough of a lead that he was in and out of the pits and still had the lead. By the 10 minute mark, Ralph had lapped everyone except Art and Bill and he was right behind them.

Ralph's motor had started to richen up as it was getting broken in, so on his next pit stop, Ralph Sr. fueled the car, leaned the carb and adjusted in more brakes. This almost used up Ralph's lead, but he was still in the lead leaving the pits. Then disaster struck. Ralph spun out leaving the pits. Jianas went by to take the lead, with Arturo following in 2nd. Ralph spun out 5 more times before finally making it to the straightaway, then the engine died! What happened was the tank cap didn't get shut all the way, so fuel dumped out on the brakes and tires, and then the engine leaned out because there was no tank pressure. Ralph Sr. thought the carb was too lean so he richened it up, but now it was too rich. By the time they got the car working right, he was 15 laps down. He was really flying, but that was too many laps for even Ralphie to make up.

Jianas now had the lead and was pulling away from Art. At the 20 minute mark, he had pulled up behind

continued on page 178

Bill Jianas, on the right, receives his 2nd place trophy from Dick McCoy, with Dick's grandaughter, Tammie, helping with the award's presentation.

Arturo Carbonell drove his Picco powered Eagle to a well-deserved 3rd place finish.

Art to lap him. But he didn't make an effort to pass Art. He just stayed about 5 feet behind Art. This seemed like a perfectly logical thing to do. If 2nd place is right in front of you, it means you have a lap lead, so you're okay. However, there was somebody in the back of the pack that was now moving very fast. Dana Smeltzer, who had way too much steering in the beginning of the race, now had his steering rate set correctly, and he passed Bill Jianas to un-lap himself. I think this woke Bill up, because when Art went a little high in the sweeper, Bill tucked inside and passed him cleanly. Bill made the turn at the end of the straightaway, but Art overshot the turn a little and tapped Bill, rolling Bill over. It was an accident, and to show it was accidental, Art waited until a marshall turned Bill over and then started running behind Bill again. This is just something you don't see enough of in racing, and Arturo is to be highly commended for this showing of sportsmanship.

As Jianas was pulling away from Art, Dana was getting closer and closer to Bill. At the 35 minute mark Dana was right behind Bill as they both pulled in for their last fuel stop. Steve Lilley gave Jianas the fastest pit stop I have ever seen. The car never came to a complete stop. I just knew the tank could not have been filled and Bill was going to run out of fuel! But the super fast pit stop gave Bill over a straightaway lead over Dana. Dana was closing that gap again, but now he was trying a little too hard and spinning out, enabling Bill to stay about 50 feet ahead.

Then the announcer said — 5 seconds to go. Bill was 2 turns away from the finish. He got right before the finish line and almost came to a complete stop, but Dana closed right back up on him and he decided he better take off. I think he must have been waiting for the finish horn, but that was not the correct thing to do. By the time he realized it, he had Dana on his rear bumper and it was the last lap.

Bill went a little high in the sweeper and Dana tucked inside. They were side by side heading towards the straightaway, when they accidentally bumped. Bill spun out, and Dana found himself slowing down waiting for Bill to get turned around. Then he realized what was happening and took off with Bill right behind. Dana crossed the finish line first for the win with Bill close behind in 2nd and Arturo following in 3rd. A very exciting finish to a super race. □

"Sorry I woke you folks, but I couldn't resis trying her out!"

GIVE IT A WHIRL

John Gorham

The Awesome 1984 AMA Nats

Awesome was the word for many aspects of the 1984 Nationals. First, and somewhat unexpectedly, champions from all over the world turned up to do battle with our own American fliers. The Nats virtually turned into a mini world's championship. That was awesome. Next, the pre-organization of this year's Nationals was so poor that the majority of all the fliers present very nearly resolved to leave the Nationals unflown on the first day and return to their homes. This was also awesome in a different way! The main complaint was the nonexistence of any judges. After very belated pleas by one or two of the AMA senior staff the night before the helicopter events were to be held, a couple of notables from the industry reluctantly agreed to judge. However, they changed their minds for various reasons and we turned up on the morning of the first day of our helicopter Nationals facing a situation of no judges at all!

We had the alternative of scratching the whole Nationals for this year or continuing on the basis of "contestant" judging. As you will probably agree, contestant judging is a very poor way to conduct an event as serious as the National Championships, for all sorts of reasons. Not only could bias come into it because of the fliers attachments to their own favorite machines, but, more important perhaps, the level of knowledge of the judges will vary tremendously. For instance, you might have a person judging expert fliers who has very little awareness of the fine points of aerobatic maneuvers.

When all the irritation and frustration calmed down, we all voted to go ahead and have our Nats. A lot of credit is due to the C.D., Chuck

Bill Curtis (B.C.) hovers his GMP Competitor with Robert Gorham as caller.

Fran De Proft flies his .60 powered Schluter Superior aided by Cliff Hiatt.

Scale entry line-up.

Line-up of some of the entrants' machines.

Interior of Jose Picazo's beautiful Hirob Iroquois.

Yoshi Nagatsuka does an "auto" with his Kalt Baron 60. Taya Shigetada does the calling.

Winter, and everybody present for pitching in and making this year's Nats a success when it was on the brink of failure. A lot of talk went around about making our helicopter Nationals a special interest event, such as is done in the case of other types of aircraft. Maybe this is the way to go or maybe we'll give the AMA one more chance. In any event, I'm sure I speak for all of us present. We don't want another occurrence of what the AMA presented to us in 1984. Now to the event itself.

The Nats were held in Reno, Nevada, and the flying was conducted at an altitude of around 5,000 feet. Temperatures were also very high and, as we all know, the combination of high altitude and high temperature gives us an air density effect equivalent to perhaps 7,000 or 8,000 feet. The performance of any

continued on page 184

Askok Shevde receiving his 1st place award in Novice.

Franz Fletcher wins 1st place Scale with his Robinson RB22.

helicopter falls off sharply at these altitudes so there was a lot of "scurrying" around for extra potency of fuel and the last tweek of adjustments to engines as well as weight saving and the use of special rotor blades.

The attendance at the Nats this year was down from last year, maybe because of the lower population density of the West Coast as compared to the East. The total number of actual flying entries was 49 in the three major AMA events with an extra five in scale and nine in FAI, although the fliers in FAI were the same people who flew in AMA Expert so cannot be counted as additional entries. So far as machines were concerned, everybody's product turned up in varying numbers and shapes. American RC had an "Eagle" helicopter there which was entered in the Novice event. GMP had a variety of "Crickets," "Cobras," "Competitors" and "Hirobo" scale. Schluter had a complement of "Superior" and "Heli-Star" helicopters as well as "Air Wolf" and a couple of other scale entries. There were two KKK machines entered, one the Robinson "RB 22" and a hybrid KKK design put together by Dave Robinson of CMI. Another newcomer to the Nats this year was a scale "Jet Ranger" fuselage especially designed for the GMP "Cobra." I flew this particular version in Intermediate mainly to show that a scale helicopter could do well in an aerobatic competition. Despite the fact this was my first competitive effort since 1978 I managed to place 2nd. Incidentally, I got beaten out of 1st place by a "Competitor!" Grrr! So far as the Expert class was concerned we were honored by the presence of top fliers from two other countries. From Japan was Yoshi Nagatsuka and Taya Shigetada. Taya is the 1983 National Champion of Japan although Yoshi is better known to us since he attended last year's Nationals in Massachusetts. Both are world ranking R/C helicopter fliers. From Europe came Francis De Proft who always places in the top two or three places in European championships and he is also considered as one of the world's top fliers. The result of this "foreign invasion" was twofold.

Cliff Hiatt is the 1984 National Champion.

The old man receives his first award since 1978. Chuck Winter, C.D. offers congratulations.

TABLE 2
EQUIPMENT USED BY NATS ENTRANTS

ENGINES	HELICOPTERS	RADIOS	FUEL
25 — O.S.	1 — American RC	3 — Futaba	39 — K & B
2 — HP	24 — GMP	36 — JR	2 — Coolpower
5 — Enya	2 — Horizon	2 — Ace	2 — Smith's
1 — Rossi	3 — KKK		1 — Pylon
3 — Webra	3 — Kalt		1 — Sheldon's
1 — YS	13 — Schluter		

First, it showed our own fliers, for the first time, how they rated with respect to world class flying and second, it gave all of the rest of us there present a chance to see the giants battling it out in almost perfect weather conditions (leaving out the altitude effect). It was soon obvious that there were predominantly six people involved in this battle, the two Japanese fliers, Francis De Proft, our own Bill Curtis, Robert Gorham and Cliff Hyatt of the USA. Robert was 1983 national champion of Expert class and this year had his title taken from him by another American flier, Cliff Hyatt. I'm sure everybody there who watched will agree, however, that Taya, Yoshi, De Proft, Hyatt, Curtis and Gorham were flying very close in ability. This made all the Americans there very happy that our fliers were now world class and we are all looking forward with a lot of anticipation to the FAI World's Championships in 1985. The elimination to pick the American team will take place in New Jersey at the end of September this year.

During these 1984 Nationals we had an opportunity, also, to compare our AMA aerobatic maneuvers in Expert class with the FAI maneuvers and I believe there was general consequences that the FAI aerobatic pattern does provide a better means of judging a flier's ability than the AMA one does. I, for one, am convinced that we should change to, and fly only, the FAI aerobatic maneuvers as fast as possible. One of the main reasons for this opinion is that it is disturbing and can lower the level of performance by our fliers to keep moving from one type of aerobatic performance to another. Even the type of machine needed to win is slightly different in some of its characteristics. Let's just have one standard now for the world, shall we AMA? We're the only country left which flies a different aerobatic schedule to the rest.

Table 1 shows the positions, points and types of machines flown. Table 2 shows the helicopters, engines, radios and fuels used by the contestants.

Despite the lower attendance this year the overall standard of flying was extremely high, as we have already reported. The standard of performance of the top fliers in the Expert class was really "inspiring" and gave us all a great deal of pleasure to see such a very high standard which now, after a few short years, exists in our own section of our hobby. This is not only true in the Expert class, but the Novice and Intermediate flying also reflected, I believe, much improvement on last year.

So far as Scale was concerned it was a surprise, I think, to most people that there were only five entries. "Air Wolf" and Schluter's "A Star" were there, the KKK Robinson "RB 22" entered by Franz Fletcher, and Hirobo's "Giant Iroquois" with fantastic interior detail by Jose Picazo. Sam Newhouse entered his Sikorsky "Skycrane." The static judging was taken very seriously and provided us with an interesting spectacle of the many judges viewing the models from all angles to arrive at their marking. The final result of scale was that Franz Fletcher took 1st place with his "RB 22." The Hirobo "Giant Iroquois" might well have given Franz plenty of competition except that its gas engine could not be coaxed to produce enough power at that altitude to fly the machine. A great pity because whether it won or not it would have given all of us there a lot of pleasure to see this large scale Iroquois flying. Trophies were awarded down to 3rd place in most classes and the prize giving ceremony was duly made at 4 p.m. on the third day.

In many ways the 1984 Helicopter Nationals were notable. Notable for the foreign entries, notable for the fine standard of flying by what were obviously several of the world's best fliers, notable for the obvious lack of attention which AMA gave the helicopter event, notable for the tremendous commradarie of everyone present who made sure that the Nationals actually took place and were successful, notable for the efforts of Chuck Winter who had to run the whole event without an assistant C.D., promised to him by AMA, notable because of the difficulty of flying in the rarified air at Reno, notable because of the quite serious sunburns which many of us encountered at that altitude and in that heat (100 degrees) and perhaps, ironically, notable because many of us who normally just fly and then sit and watch, found out what is was like to sit out in the hot sun for hours on end judging and doing many of the other menial tasks which are normally handled by local club people and personnel provided by AMA. I wouldn't want to go to another Nats like the one this year from an organizational point of view but I doubt whether I'll attend another which was so dramatically different from those held prior to this one. I thoroughly enjoyed being there, meeting all my fellow fliers, and actually being both a contestant and a judge all at the same contest.

'Til next month — break a blade (but not with metal in it!) □

(Editor's Note: The lead photo on page 160 of the October '84 issue had the wrong caption. It should have read, "Pennsylvania fly-in was very well-attended." Second photo down R/H column should have read, "Charlie Sjoback was the lucky drawing winner of a Kalt 20 Baron from Circus Hobbies at the Pennsylvania Fly-In." Our apologies for the errors.)

LET'S TALK ABOUT LANDING

Or, Taking a Different Approach to the Old Approach

By Don Sobbe

Landings have been variously described on the one hand as a controlled crash and, on the other, as a precise maneuver in which airspeed and altitude are exhausted at the exact instant the wheels contact the end of the runway. The former can be seen at any flying site, any time. The latter is a little more uncommon, usually accompanied by oh's and ah's and the pronouncement that the flier is an expert. Well, not quite. The guy who can land on a dead fly every time and not break its wings is no different than you or I. (An expert is someone who can land on a live fly, not hurt it and not have it fly away.) The only difference between a good and bad landing is everything you do **before** you land.

Believe it or not, it's easier to land a full size airplane than a model. That's because you have an airspeed indicator, altimeter, vertical speed indicator, and tachometer to tell you how things are progressing. And, as an extra special bonus, you can look out of the window to see if the spinner is pointed in the general direction of the county in which the airport is situated. How convenient! Us poor balsa pilots have to rely on visual cues alone to get down the glide slope and arrive at the end of the runway with the **right airspeed** that will **allow** us to land. In order to do this consistently, we also need to know our airspeed, altitude, rate of descent and distance to the runway. And, we need to know how to **control** these factors. If you have normal vision, normal depth perception and a transmitter with a rachet on the throttle, you have all the instruments you need to make good landings.

Let's start with airspeed and altitude. To accurately control a model that is on an approach to landing you must clearly understand what controls airspeed and what controls altitude. "Power, when available, controls altitude and elevator controls airspeed." I say when available, because a twelve pound model with a thirty-five engine may not have enough power available to climb.

Now, there is a direct and interactive relationship between power, elevator, airspeed and altitude that can best be expressed; "Attitude (pitch) plus power equals performance." But for our purpose the foregoing statement is a good rule of thumb, in that power **primarily** controls altitude and elevator **primarily** controls airspeed. An airplane can only be trimmed for a given airspeed. Let's say that we are in an airplane and we have the elevator trimmed for level flight with the throttle set at 50% power. The airspeed indicator reads 70 knots. Now we'll increase the throttle to 80% power and see what happens. Initially the airspeed increases and this might lead you to believe that power controls airspeed but, stick around, that's

going to change. As the aircraft accelerates, the wing generates more lift and we start to climb. As we climb, gravity starts to work on the available power. Since the airplane is trimmed to fly at 70 knots, the airspeed will drop back to 70 knots but, because we are using more power, the aircraft remains in a climb. The only thing we have changed is the power setting and the result is an increase in altitude. Everything else is the same. If we reduced power below the original 50%, the aircraft would descend at 70 knots. "Power controls altitude."

Now let's change the elevator trim and see what happens. Remember, we are climbing with 80% power and an airspeed of 70 knots. As we put in down trim on the elevator, the aircraft levels off and accelerates. We end up trimmed for level flight at 80% power with a new airspeed of 100 knots. We have stopped the climb **and** increased the airspeed by changing the elevator. This might lead you to believe that the elevator controls both airspeed and altitude. This is an example of the interaction of power and elevator and is a little deceptive. If the elevator controlled altitude, then any time we pulled up elevator the airplane would climb. In fact, if we did just that, the airplane would initially climb, but the airspeed would go down. If we kept increasing the climb by using more elevator alone, we would eventually lose all of our airspeed and the airplane would go down. Now we would be holding up elevator but going down. Remember? "Attitude (pitch) **plus power** equals performance." The elevator **alone** will not control altitude. It will control airspeed. In fact, it will control it so well that we can stall the aircraft. "Elevator (primarily) controls airspeed." I know this concept is a little hard to get used to but it will become clear later on when we talk about approaches to landing.

Now let's talk about airspeed and rate of descent. Usually when a model is on final approach it is coming almost directly at you and it's not possible to judge its speed. We must have a way of presetting an approach airspeed that will (1) keep the model safely above stall speed, and (2) allow a controllable and predictable rate of descent. In order to find this airspeed, fly your model past so that you can view it from the side while you reduce power. You will soon find a point where you are holding a slight amount

continued on page 194

of up elevator and the airspeed and rate of descent are stable and controllable. At this point, slowly close the throttle and count the number of clicks on the throttle rachet to get it closed all the way. Let's say it's three clicks. This is your approach power setting. Now when you are on downwind or base leg you can close the throttle all the way, wait for the model to slow down, add your three clicks of throttle and begin your descent for landing. By doing this you will get the same airspeed and rate of descent every time.

Whether you choose to retrim the model for the approach is a personal matter. I don't, because if the wind is gusting or I have to add power for a go-around the model will have a tendency to pitch up. The airspeed, amount of back pressure on the elevator, amount of power and rate of descent will vary considerably from airplane to airplane. I have two click up to six click models. Some glide well and fly a flat approach with no power and others fly better with a steep approach and more power. The key elements to remember are: (1) Find the number of clicks that will give you the right power setting for an approach airspeed, and (2) don't start the approach until the model has reached that airspeed.

Now that we can reliably set our airspeed and rate of descent, the only variables left are the altitude and distance from the runway at which to start the approach. This will take a little practice. You will have to develop a method of visualizing a point in space at which your approach will begin. Some people like to imagine a window or box and then fly their model through it. Others line up with a tree on the horizon and eyeball the altitude. I use what I call visual inches. When the model is on downwind and appears to have a wingspan of about one inch, from my view point, I turn base and keep it about six visual inches above the horizon. Then I imagine a line from the runway out to the horizon. When the model gets to that point, I turn it toward the runway and start the approach. By using visual inches a large model will automatically be flown in a larger pattern than a small model. Use any method that works for you, but use something.

Another factor to consider is the

wind. If it's windy you will want to turn to the base leg closer to the runway than if it's calm. This is because your power setting (clicks) will give you a constant rate of descent but your ground speed will be reduced. (See Figure 1.) Wind gusts must be given serious consideration since they could cause a stall at reduced airspeed. If your model normally approaches the runway into the wind at 20 mph, and the wind is blowing at 10 mph, your model will have a ground speed of 10 mph. Now let's say your model is approaching into a 10 mph wind with gusts to 20 mph. When a gust hits your model, its speed over the ground could drop to zero. As often happens with wind gusts, as soon as one hits, the wind drops momentarily to zero. There you are, down low with reduced power and zero airspeed. Guess what happens next? ("Hey Morrie, get a baggie and bring the shovel!") Whenever there are wind gusts present, add the gust factor to your approach speed and you'll be okay. If the wind is 10 mph gusting to 20 mph, you would add 10 mph, several more clicks, to your approach speed. This means that you will have to carry a fair amount of power and fly the model right onto the runway. That's all right. Big airplanes do the same thing. Use a little steeper approach than normal to keep the nose of the model down. This will prevent wind gusts from getting under the wing and ballooning the model up. It's best to practice approaches on a calm day so you can get an idea of how far out to start an approach with a given power setting (clicks). One other point is the air temperature. On cold days, air is dense, will support more lift and engines develop their rated power. On hot days, air is thin, will support less lift and engines get tired real fast. So, a cold day three click approach could become a hot day six click approach with the same model.

Now let's talk about flying the approach. The first rule in flying an approach to landing is: "Never try to save a bad approach." As long as there is fuel in the tank and the engine is running, there is no excuse for not going around and trying again. I've aborted approaches at pattern contests rather than risk a crash for which I would have gotten a zero anyway. If the airplane isn't on fire (or

continued on page 198

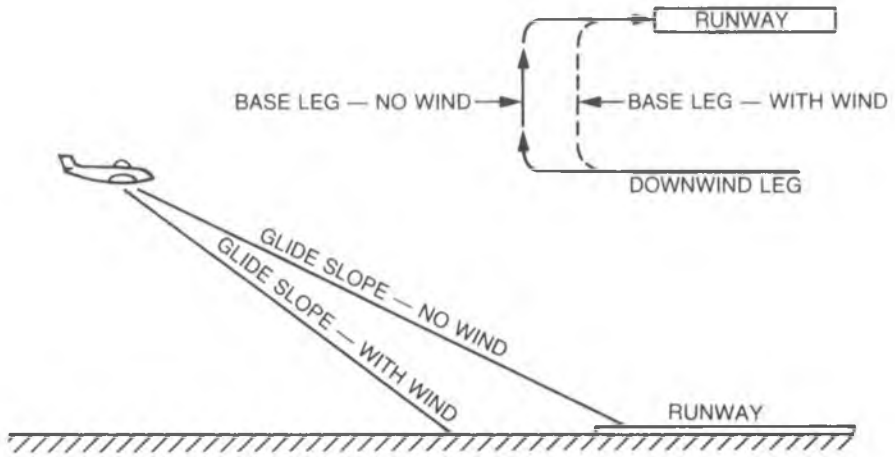


FIGURE 1

your pants), go around! If you're too slow, too fast or not lined up with the runway --- you got it --- go around! 'Nuff said? Rule two in making an approach is: If you suddenly see propeller blades on the front of your airplane and they are not turning, you have three problems: (1) You're going to land. (2) Right now. (3) Wherever you're at. Forget all about making the runway. That only happens in Hollywood. The big thing to remember is: "Maintain your airspeed." If you let that disappear, control and lift then disappear and your airplane will disappear. Permanently!

Now that you know the rules, let's see how that throttle and elevator work on an approach. While your airplane is on its downwind leg, pick a spot on the field or runway where you want to land. You won't be able to look at it while flying but it will help you to visualize an imaginary line, or glide slope, to the runway. You've turned final, your airspeed is good, you've got your three (or whatever) clicks of throttle set and you start the descent. From this point on you will use elevator **or** throttle to keep the airplane on the glide slope but, **never** use both at the same time. Here's why. (See Figure 2.) Figure 2 shows an airplane that is below its desired glide slope. Notice that in order to get back on the glide slope it isn't necessary to climb, but merely fly level. If we add a little bit of power the descent will be stopped and the airspeed will increase slightly. But, the primary effect will be to stop the descent. "Power controls altitude."

Once back on the glide slope power can be reduced back to three clicks. We haven't moved the elevator at all. Or, we could leave the throttle alone and feed in a little up elevator, but only if the model is slightly below the glide slope; otherwise, too much airspeed will be lost.

By increasing the angle of attack with the elevator, lift will be increased and the descent stopped. Since the model doesn't have to fight gravity by climbing, the increase in drag due to the increase in angle of attack will not slow the model enough to be of concern. If we used both elevator and throttle together we would get an increase in airspeed and altitude, end up above the glide slope too fast, and then have the same problem but in reverse. If we were above the glide slope and reduced power (power controls altitude) the sink rate would increase but the airspeed would remain under control. Too often we see fliers high on an approach using down elevator. They end up diving at the runway and crossing the field at mach one. Remember? "Elevator controls airspeed." If reducing power won't get the model down to the intended glide slope before reaching the runway then it's time to go around and do it again. If your model keeps coming in low, start the approach from a higher altitude or closer in. If it keeps coming in high, start the approach from a lower altitude or farther out --- but leave the power setting (clicks) alone.

In actual practice it is generally easier to leave the power alone and fly the elevator to maintain the desired glide slope. However, models with high wing loadings can be stalled easily when too much elevator is used at a reduced airspeed and, in this case, setting the descent rate (speed) with the elevator and then using the throttle to maintain the desired glide slope is a much safer procedure. This is exactly what jet fighters do.

Thermal and gusts tend to bounce models around near the ground. Don't be in too big a hurry to correct these wanderings, unless they are extreme, as they tend to cancel each other out. And when you do change power or elevator, give it a few seconds to act on the airplane before changing those settings again. Make small changes. Think of putting pressure on the stick instead of actually moving it. You'll get smoother and more precise control that way.

Now let's assume that you've made a beautiful approach and your model is a foot over the end of the runway. This is the payoff. If you've done everything right, you can slowly close the throttle and start feeding in up elevator. You only want to use enough elevator to stop the model's descent. As the airspeed bleeds off, the wheels will slowly settle to the runway. (If you are flying a model with a high wing loading it is sometimes necessary to keep the power on until the wheels are on the ground. A sudden power reduction could result in a stall.) Of course, if you haven't done everything right and the model is too slow, it will fall out of the air like a homesick manhole cover. If it's too fast, it will just fly down the runway and land a block away. This is what I meant earlier by the **right airspeed** that will **allow** us to land. And if it's really fast it will end up standing on its tail eight feet in the air with the throttle closed. This is an ideal time to hand the transmitter to someone else or scream, "I'm hit! I was glitched! Your check is in the mail!" □

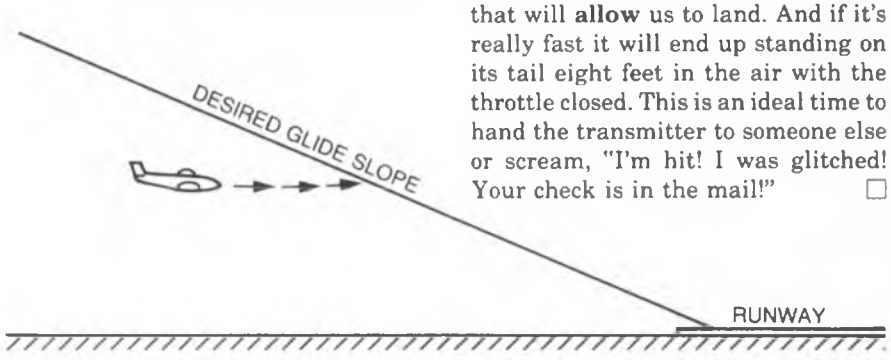


FIGURE 2

SCALE VIEWS
continued from page 132/131

can do to reduce friction during take-off will help. If you suspect that you have a wheel drag problem, do not just check by spinning the wheels when there is no weight on the model. Set the model on the wheels and see how much force it takes to push it. It is surprising how the drag builds up with weight on the axle. Sealed ball bearings are again the best bet to solve this problem although needle bearings can also be used. The bearings are easy to install in those model wheels that have solid or non-spoked plastic hubs. Just crimp the bearings into a piece of tubing and epoxy them into a hole drilled through the hub. If you cannot find bearings to fit the desired axle size, get a larger inside diameter and sleeve the bearing with brass tubing. Make the sleeve a tight fit in the inner bearing race and on the axle. You want the bearings to rotate, not the tubing. Is it worth the trouble to get your model rolling on ball bearings? You bet! They cut the take-off roll of my latest jet model project enough to permit flying from short local runways when I originally had to travel hundreds of miles to find a runway long enough to get the model airborne.

King Orange R/C Scale Contest

The King Orange, sponsored by the West Pasco MPA at their flying site north of Tampa, Florida, is also the Southeastern Regional Scalemaster's Qualifier. In just a few years this contest has become the largest scale only contest held each year in the Southeast. The meet is held in June when the Florida weather is warm and a good test for models that may later fly at the AMA National Championships or at the Scale-master's Championships, both of which are held in the warm summer or fall months. Contestant turnout was good this year with just a couple more models in the Giant Scale event than in Expert Sportscale, the second most popular event.

There were not many new models at the King Orange this year with most contestants relying on proven top scorers from past competition. What has changed in recent years is the mix of models entering the contest. This year, two thirds of the models were of civilian light aircraft with more models of a single type, the Laser 200, than of all the prop fighters combined. In fact, Laser 200s were entered in three of the four events with four alone in the Giant Scale class. Not long ago I recall commenting that there was not a single model of the Laser 200 in the huge turnout of scale models at the Westover AFB Nationals. Perhaps the popularity of the Laser at the T.O.C. has influenced modelers and certainly Don Lowe's T.O.C. Laser flew well at the contest, although the changes made for improved flight leave the model in a configuration that does not static well.

Models of military fighters did predominate in the Expert Sportscale event where most of the ducted fan models were entered and where the multi engined models flew. Models of jet aircraft were all from the Jet Hangar Hobbies kits and all of different aircraft. In fact, except for the Lasers and Cubs (12 total), there were not two of any other aircraft type entered in the contest. Variety still gives scale top billing with the

continued on page 212

SCALE VIEWS

continued from page 210/131

spectators and I see no evidence that this is going to change.

After four rounds of flying, no one was surprised to see Ramon Torres' well-known turbo prop version of the T-34 military trainer come out on top in AMA Giant Scale. The 90 powered model is very smooth and realistic in the air. The T-34 was followed by Dave Platt's Zero fighter and Mario Yederlinic's big PT-19 military trainer. My old reliable F-82E made it through four flights for the lead in the Expert Sportscale class followed by newcomer to the Expert class, Curtis Yeagle and his nicely done Beech Baron twin from the Royal kit. Bill McCallie's old F8F Bearcat was also flying in fine form for a third place at the King Orange.

By the time you read this, the big summer events will all be over. Co-columinst, Col. John deVries will have filled you in on the FAI Championships in Paris, I am going to have to miss the National Championships at Reno in August (that is a long way from Southern Florida) but hope to make the Scalemaster Championships at Kansas City in September. As of right now, I would not even hazard a guess as to the types of new models that will surface at these events and please the judges. We will just have to wait and see. One thing that I will predict is that scale modeling will not take any steps backward. Scale builders constantly amaze me with their ability to make that impossible subject into a routine flying model that we all can handle. □

CUNNINGHAM ON R/C

continued from page 130/124

who seemed to really be out for a promotion). We also had several paging systems come on the air right in the middle of the Fly-In, Sunday morning to be exact. They hadn't been on the air prior to this, but Sunday morning in 1983 they came on and removed several aircraft from the air rather quickly. This year the Corps kept hands off, and we would not let any aircraft register on Red/White and Green/White, the suspect frequencies. Also, in 1983 someone

stole a JR eight channel transmitter from the impound area. This theft was not noticed until the transmitters has been reissued. Naturally, this had never happened before, and we simply were unprepared for theft of this nature. This year, we were prepared and checked the transmitters out by tag. Several other problems made me feel that "what the heck," why go to all of the trouble and effort to bring modelers together from all over the southwest if all it was going to produce is trouble. But, this year was such a success that Jan and I have caucused and decided that we'll do it again in 1985. We hope to get more people involved in the early planning and in the operation so that the show can go on again in 1985. Mark your calendars now for the third weekend in July, you know, the hot weekend. Plan to come to Fort Worth, Texas, for the 1985 Eighth Annual Southwest Jumbo Fly-In. □

JR. TIGER
continued from page 84

Covering:

Any of the plastic films or fabric materials are suitable for covering. We used orange and white Solartex already on hand. The canopy was approximately 3/4" longer than necessary, but after trimming with scissors it fit perfectly. The decals included in the kit and a tiger in the cockpit complete the "tiger" theme. A coat of satin polyurethane was used to protect the decals.

Engine:

A new Thunder Tiger .25 FSR ABC engine with muffler was installed. The engine is very powerful and runs smoothly (available from Hobby Shack). A Sullivan SS-6 6 oz. tank fits easily in the tank compartment. The engine is mounted on a "break away" plywood plate and an extra plate is even included just in case. This would also allow a change of engine makes or sizes with no modifications to the nose of the airplane.

Radio:

A Futaba FP-4JN radio was used for control. The servos fit easily three across behind the cabin and a 2 plus 1 arrangement is also described in the instructions.

Flying:

The C.G. came out exactly as shown on the plans; skill of course. With the

control throws set per the instructions, you can expect gentle initial flights, and basic aerobatics are easy with the more responsive settings shown. Take-offs and landings are smooth and stable even when it's a little breezy.

Conclusion:

A flier who is comfortable flying trainers will certainly enjoy the sporty look of a low wing airplane as well as its stable ground handling. The flying characteristics are even very similar to other trainer type airplanes. The instruction booklet is by far the most complete this reviewer has seen, which makes the "Jr. Tiger" an excellent choice as a .15 to .30 size sport model for even an inexperienced builder. The quality of this kit makes it an excellent buy. □

PIETENPOL 'FOUR'
continued from page 27/16

the outer panels using #4 sheet metal screws.

Finish:

31. Fuelproof the tank and engine compartments. If the cabanes and cockpit floors aren't going to be covered, fuelproof them too.

32. Select your favorite covering material and prepare the framework as required for that specific material. I cover in the following sequence:

A. Fuselage
B. Tail Group
C. Wing Center Section
D. Wing Outer Panels
E. Tail Filler Blocks

Assembly:

33. Install the landing gear assembly, strut clips, wheels, engine, tank, radio and pushrods into and onto the fuselage. The trial fit at step #30 now pays off because there's no surprises. Zap on the tail group and tail wheel assembly. It goes on straight because you insured that at step #30!

34. Zap in the filler blocks by the fin and stabilizer. The fillers are only for aesthetics, but why have the model look like the box your motor oil came in?

35. Mount the wing center section to the cabanes using Zap CA –. If epoxy still blows your skirts up, use 4-hour curing time. Make sure it doesn't run down the cabanes while it's drying.

36. Install the strut clips in the outer wing panels. Insert the outer panels into the center section and hook up the struts. Connect the aileron pushrods to the servo ball links and the aileron horns.

37. Before you install the aileron servo hatch and radio hatch, check the following:

A. The 1/16" dowels are through the 5/16" arrow shafts so that the wing panels won't fall off in flight.

B. The aileron servo does have servo mounting tape holding it down to keep it from moving instead of the ailerons.

C. The pushrod connections are solid and all steel snaplinks have keepers.

D. The antenna is not wrapped around the receiver; it's in its tube.

E. The wheel cotter pins are in and bent over.

Control Throw, Balance and Flying:

38. The control throws are as follows:

Rudder: 3/4" left and right.
Elevator: 1/2" up and down.
Aileron: 1/2" up; 1/2" down.

39. Balance where shown on the plan — no exceptions.

40. Before you attempt flying, check your fuel consumption, so that you'll know your approximate flying time. Then back off two minutes for safety. The model will dead stick in but it's a little tricky trying to taxi back to your pit area.

41. If you're an experienced pilot this aileron Pietenpol is a pussycat to fly. It has no bad habits unless you've washed in the wing tips. They should be straight or you'll tip stall. Actually, this applies to any model. A Robart Incidence Meter is a must tool for checking surface trueness. If you're a novice pilot, I can't tell you on paper how to fly. Beg, borrow or steal the services of a competent instructor to help you solo. □

ANTARES
continued from page 8/6

enough to do at this point and who knows. One tool is an absolute must for the wing. If you don't already own a 48" metal straight-edge, make the investment now. You're going to need one in order to build the wing. The

structure is not especially difficult but it does require a little extra care to make certain things fit. It would be very easy to lose much of the potential of the airfoil if you get carried away with a sanding block or settle for a poor fit of the parts. We do suggest one change in the sequence. The shear web is pre-cut but since this is a tapered wing each piece has to be sanded to the final size. We installed the webbing at the same time as the ribs in order to insure a tight fit, much of the spar strength depends on a good fit of the webbing.

Covering:

Another Top Flite product, MonoKote, was a natural for covering the Antares especially since the flaps and ailerons are hinged using the MonoKote system. The hinge method is fully detailed in the instructions and if you haven't already tried this system, it works very well. The result is a sealed hinge line and effective controls. The MonoKote goes on easily and about the only part that requires extra care is the wing. It is fully sheeted so you can't just seal around the edges and shrink it. With a little care you can start at one end and work your way up without trapping any bubbles.

Radio:

By the time you've made it through the construction stage almost all of the radio installation is done. The servo positions were decided while setting up the fuselage and there aren't too many choices where you put the receiver and battery. With a state of the art sailplane, batteries become a factor, the Antares is designed for long flights. We decided to go first cabin and acquired one of the SR Batteries 900 series packs. The square pack fits perfectly in the nose of the Antares and after several comparisons on a battery cycler with standard packs we're convinced! SR has definitely figured out how to stuff more electricity into the same size --- must be magic!

When it came to the radio, our Ace Silver Seven gave all the needed options. As we mentioned earlier, the Antares is designed for coupled rudder and aileron. With a three channel system this can be done with a "Y" connector, it's not the best method but it will work. The major drawback is difficulty in adjusting the amount of throw on each function. We equipped the Silver Seven with the mixer option and this makes for a much better control system. On radios without mixer you can educate the left thumb and fly coordinated discrete functions. We used both of the latter methods depending on how well the left hand knew what it was doing that day.

The flaps are set up on the throttle stick so that full go (for you power types) and low trim give 0 degrees of flap and high trim results in about 10 degrees of reflex.

Flying:

Precise recommended control throws are given in the instructions and so far we haven't had any urge to change them. One nice thing about sailplanes is that you can try out the trim and balance before committing them to the air. A few healthy flings over the tall grass is a real confidence builder. Try that with a pattern plane sometime! Once we were happy with the trim, we grabbed the end of the high start and wandered back a ways. We'll have to admit that we didn't stretch it all the way. Flaps down about 15 degrees, hook up, and off we go! Not bad for the first launch, the Antares goes up quickly and didn't have any tendency to get squirrelly. Most of the first couple flights were spent playing with the flaps; they are the most unusual feature. At full down flap the Antares almost comes to a halt (kind of like spoilers but not really). On the other hand going to reflex flap results in a little loss of altitude and increased speed. This kind of speed control is a great advantage when it comes to playing in thermals. It took awhile to get used to the Antares but the more we fly it the more fun it is.

Conclusion:

Building the Antares took quite a bit more time than we've been used to on most sailplanes but then this one isn't most sailplanes. We wouldn't recommend this one for the beginner; nothing was all that difficult but it does require attention to detail. The instructions are very well-done so anyone with some prior building experience shouldn't run into any problems. The real test of the Antares was in flying, and in that department it really performs. The designer, Scott Christensen, is a co-founder of the League of Silent Flight and it is obvious that he put a lot of his experience into the Antares. At a price of $99.95 for a very complete kit, the Antares is quite a bird. □