

String hinges recommended by the author for the wing flaps and elevator can be seen in this view. Wing filets of 1/8 sq. balsa (before shaping) add a lot of strength to the otherwise vulnerable wing/fuselage joint. Braces of 1/8 plywood between the engine mount and wing help to absorb landing gear rearward loads.

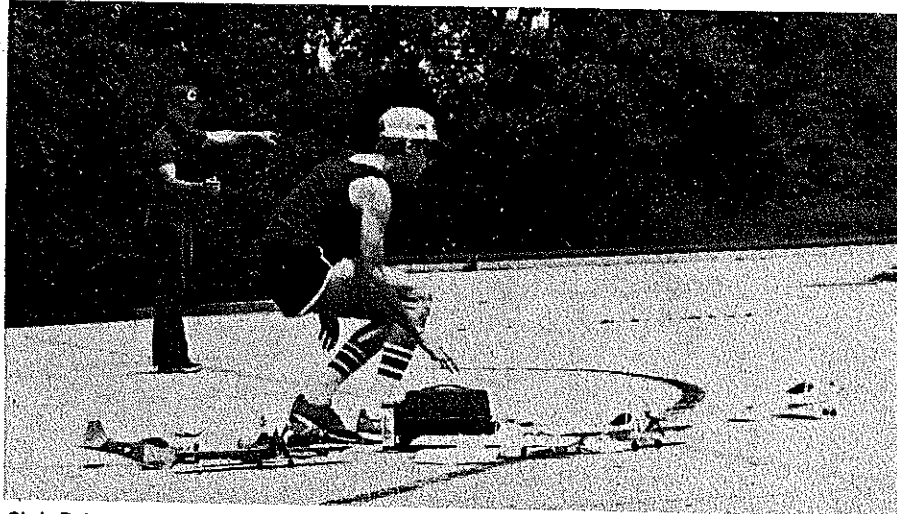
Wing Master

Classic profile 1/2A Control Line appearance, present-day construction methods, and a larger-than-normal flapped wing go together to make this simple model ideal for sport flying or getting started in CL modeling. ■ James M. Petro 377

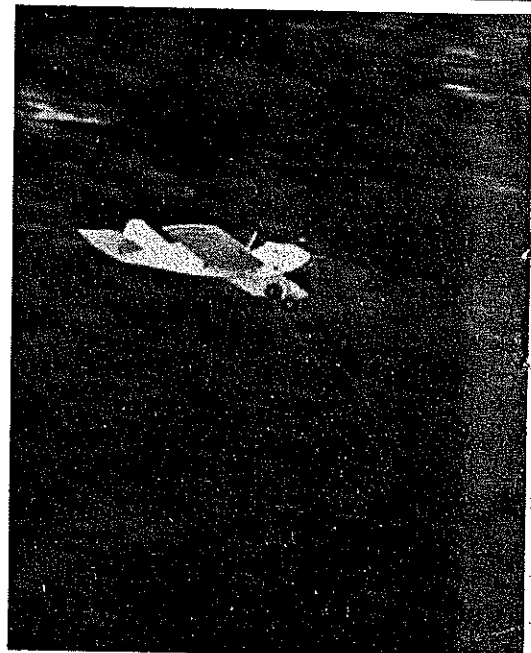
WINGS NEVER WERE intended to be panel-like structures that *only* support the airplane in the air. Wings must also lift it off the ground, provide control and stability while flying, and most important, allow it to settle back down to earth. That's what we need wings for—takeoff, flight, and landing.

How can flat slab wings on 1/2A Control Line airplanes be much good, especially when the pilots are young and eager to do more than turn around and get dizzy? From the way a slab-wing plane reacts (or stops reacting) when the engine slows or quits, you would almost suspect that power is 90% responsible for the takeoff and

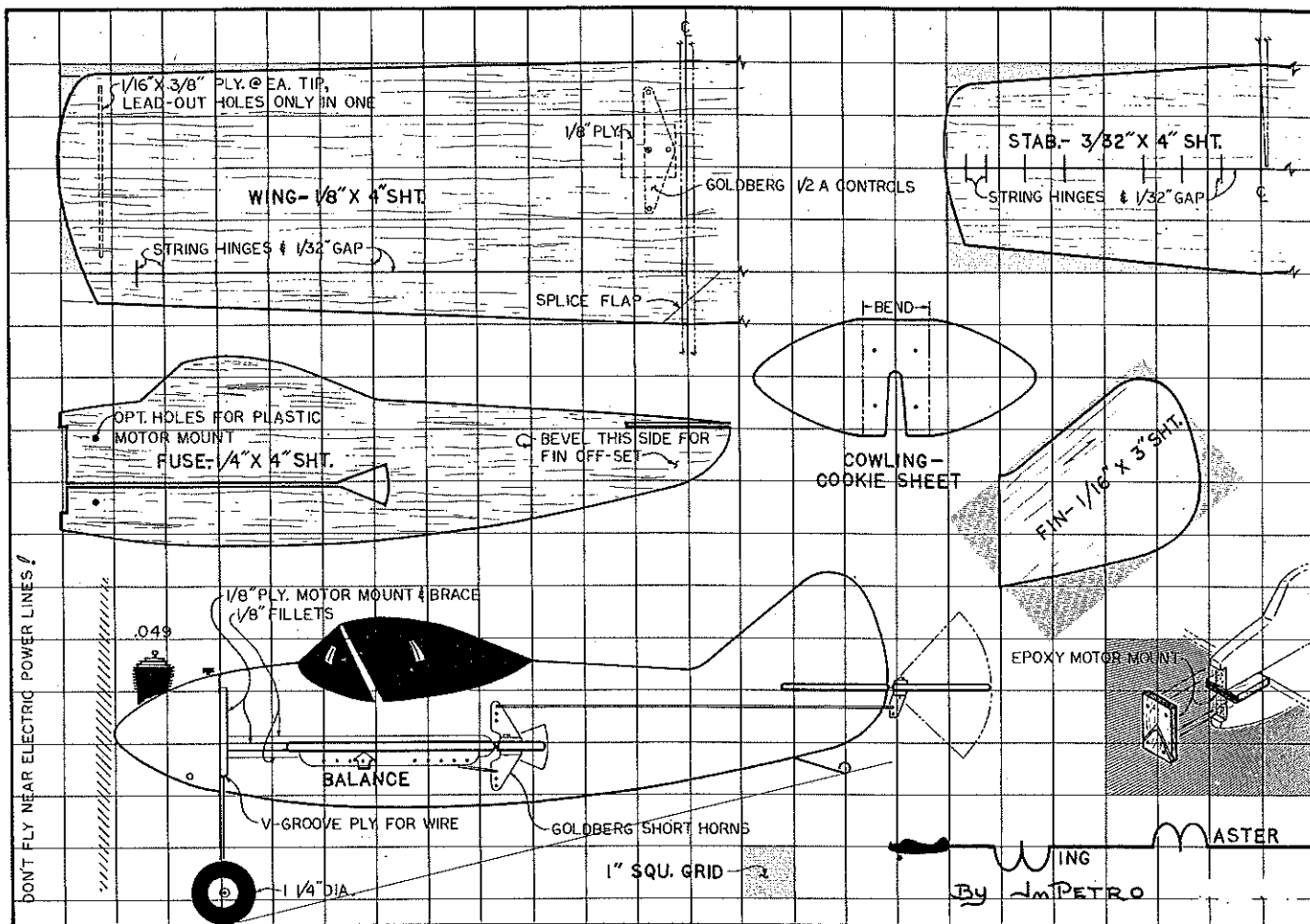
Photos by the author and Jim Petro, Jr.



Chris Petro, age 14, performs pit duties for the author at center-circle for a test hop. Judging by the number of planes, they must have had a full day of fun flying.



It's not easy to get a crisp flight shot like this. Author calls attention to flattened top of the fin due to three upside down dead-stick landings while having fuel-draw problems.



flight, and the remaining 10% shows up when the plane plummets to the ground, barely under control.

As my boys became interested in CL, I decided that there had to be a way to make a kid-simple airplane that was as controllable as my .35-powered Stunters with wing flaps. We experimented with various Midwest and Sterling 1/2 A kits modified with wing flaps as described in the June 1981 issue of *Model Aviation*. Wow! What a heck of a lot better fliers those planes became. Later, I wanted to put together a slab-wing 1/2 A CL with classic lines, wing flaps and durability. It was named Wing Master, the subject of this article.

When the original design of this model was laid out, I noticed that 1/2 A kits generally use smaller

pieces of wood than what we can buy in the hobby shop. All the better for Wing Master, because it could grow to fit a full 4-in.-wide wing sheet that is just enough bigger to show that it is the wing doing the flying, not just the power. The fuselage was also enlarged and rounded to have a pleasant appearance and durability.

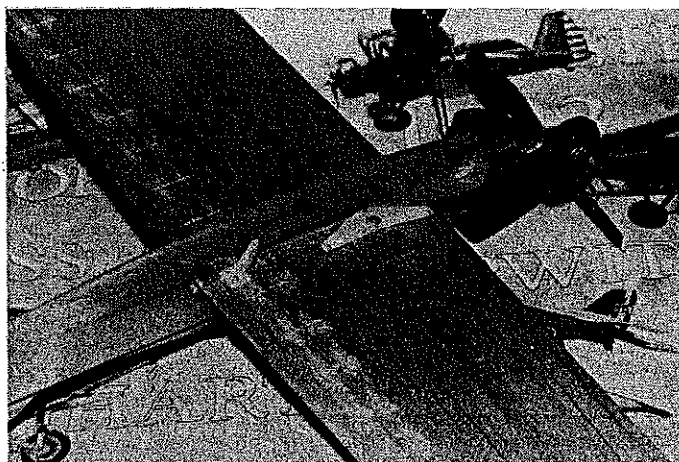
Four models were made, each with a different engine, and all flew better than expected. This model leaves the ground, maneuvers, and skims back to earth with smoothness and grace. Youngsters fly through a loop, and come out of the circle with a big grin. And yes, there were some crashes on the asphalt, but all the breaks were in convenient places and very easy to repair with Hot Stuff glue.

The plans are drawn on a 1-in. square grid, so

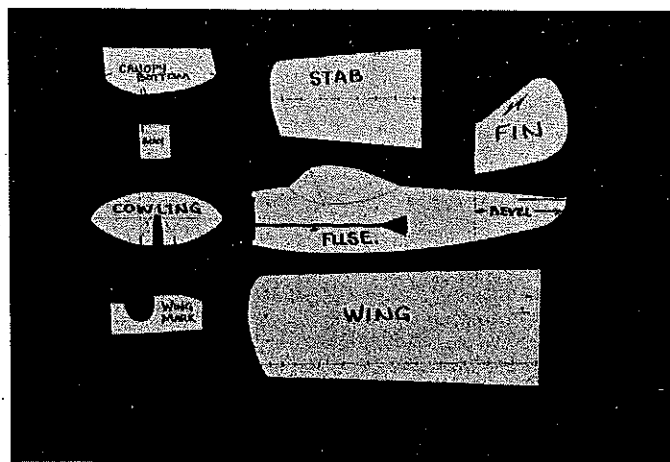
you can start immediately to lay out a Wing Master. If you make a set of cardboard templates of the parts, you'll be ready to make more Wing Masters. The following comments will help you make a better plane.

Fuselage. Start with a firm sheet of 1/4-in. balsa that is 13 in. long and 4 in. wide. Establish two parallel reference lines 1 in. apart for the wing and stab slots. The wing slot is 1/4 in. wide, and the stab slot is 3/32 in. wide (1/8 in. wide, optionally). If you will be using a plastic engine mount, drill the two bolt holes, and put some Hot Stuff in the holes for added strength. No bolt holes are needed if a plywood mount and brace are used.

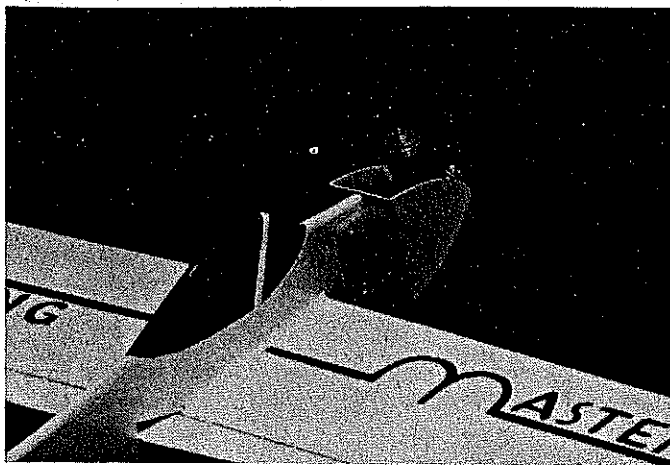
At the dotted line the fuselage is beveled to a point at the end of the fuselage so that the fin will



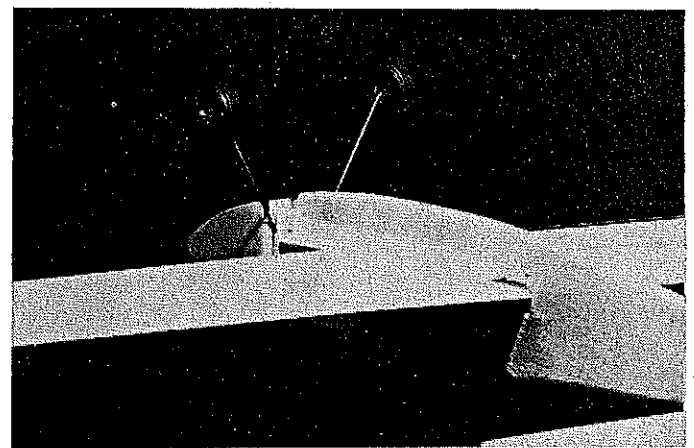
This view helps explain how the engine mount, bellcrank, and flap controls go together. White spots near rear of wing are the remains of spackling compound used to fill cuts made for string hinges.



If you intend to make more than one Wing Master, it would be good to make templates like these from a lightweight card material. Note the angle on the brace piece to point the engine mount outward.



A plastic Sterling or Midwest engine mount as shown here is of help if it is desired to switch a single engine between several models.



If a Cox .049 engine is dieselized with a Davis Diesel head, author recommends using 1/2-in. triangular fillets on both sides of fuselage and wing, extending from the flap hinge line to the engine mount.

have an offset and improve flight tension on the controls lines. When the fin is glued on, the resulting cross grain will make this section a lot stronger. Use a little extra effort to make a good bevel.

Fin. A hard piece of 1/16 x 3 x 5 balsa (or even 1/16 plywood)—shown as the shaded part—is used to make the single-piece fin. All glue joints for Hot Stuff should have baking soda rubbed in and dusted off before gluing. Glue the fin on the fuselage, then cut the slot for the stabilizer. Use a sanding block to make the fin flush with the body. By the way, ready-to-use spackling compound is a great ding and gap filler.

Wing. Try not to bug your hobby shop owner, but do get the best hard, flat piece of 1/2 x 4 x 36 balsa that he's got. Maybe you can make him feel a little better by buying two or three more pieces, because you'll probably want to start on more Wing Masters after you see how nice the first one is.

Read this part twice, because you're going to make a 5-in.-wide wing from 4-in.-wide wood. Cut out the 24-in.-span wing using a half-wing template. Mark the center line and one fuselage side line. The remainder of the wood is cut into two tapered strips. Overlap the strips and cut both together for a nice splice joint. Rub baking soda into the end grains, and carefully align the two pieces so the leading edge of the flap is straight; now apply Hot Stuff to the splice joint on both sides. Sand all the edges of the wing and flap to a round shape.

This is the time to attach the flap to the wing. I prefer the string-hinge system, with each string spaced 1-in. apart (1/2 in. apart at the tip). It is

easier to handle the hinge installation if the wing and flap are pinned to a board after marking and cutting the slots with a razor saw. A much neater job occurs if the cuts are made on the bottom surface.

Cut the slots half-way through so the string will be located in the center of the wing thickness. Snip each string about 4 in. long. Put a drop of Willhold-type glue on a few slots, and push the string down with a small screwdriver. Smooth the excess glue into the slot with your finger, and let dry. Trim off the string ends by cutting down into the wood where the string protrudes. A touch of spackling compound fills in the cut marks.

Sand everything smooth, and rub baking soda along the center line on both sides of the wing. Install the wing into the fuselage slot, and square it up before applying Hot Stuff to the joint on both sides.

Stabilizer. This is built and installed just like the wing, except with closer string spacing. A hard 3/32 balsa sheet or medium 1/8 is good for the stab. Find as flat a sheet as you can.

Engine. If you have a Midwest or Sterling plastic mount, you're all set. However, another simple and strong mount is made from 5-ply aircraft plywood. The exploded view shows how the two parts fit. Taper the brace piece so the engine mount has an outward offset. The brace piece carries the loads fully back to the wing and fuselage. An awl is used to make depressions in the plywood mating surfaces, which the epoxy fills in to make a strong joint.

Wood trim. All profile planes are apt to crack

along the wing/fuselage joint, so this should be reinforced. A 1/2 sq. balsa strip is glued on all four seams, and a large X-Acto gouge blade is used to shape the square to that of a fillet. Heavier fillets are suggested if you use a diesel engine.

Two 1/16 plywood pieces are baking-soda-powdered and Hot-Stuffed on the bottom of the wing. The outside wing stiffener is handy for attaching weights. The plywood also helps to keep the wing from splitting on any nose-first landings.

A 1/2 x 1 in. square of 5-ply plywood is used to mount the bellcrank.

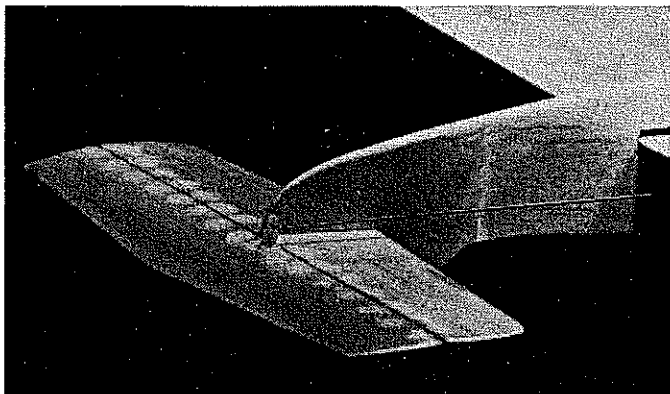
Cowling. Make a pattern, and then cut the cowling from a thin sheet of aluminum (check out an inexpensive cookie sheet). The slot is to allow more air to the engine intake. Besides making the front of the model much prettier, this cowling helps hold the landing gear in place.

All holes should be center-punched and drilled before the metal is bent to shape. Do not try for a sharp bend, because this grade of aluminum will crack if you do. A 1/16-in. inside radius bend is about as sharp as it will accept.

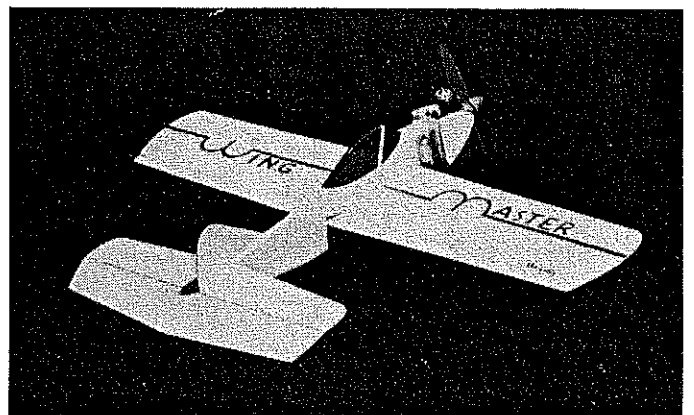
A Black Widow engine fits well in the cowling. If you use a short-tank engine, the cowling will need to be trimmed back and rounded for prop clearance.

Landing gear. Bend 1/16 piano wire to the proper shape, and trace the bend on the plywood mount. Cut a groove where you have traced, but *not* so deep that the wire fits flush. If the wire protrudes slightly, the mount will bend and keep the engine screws under tension, and they will resist working loose.

Continued on page 152



The ply effect of the fin when glued on makes the rear of the fuselage very strong. The tail skid wire is simply sharpened and pushed into the fuselage, with a drop of cyanoacrylate glue applied to keep it in.



The Wing Master is a good looker from any angle. The engine cowling makes the plane look better in side view, but isn't required.



NEW PRODUCTS

CARS, BOATS & AIRPLANES

STATIC DISPLAYS (20 Categories)

DEMONSTRATIONS

DELTA DART CONTEST

SWAP SHOP

**70th ANNUAL
GREATER CHICAGO RADIO CONTROLLED
MODEL SHOW**

**SATURDAY & SUNDAY
OCTOBER
16th & 17th
NEW LOCATION**

THE ODEUM
1033 North Villa Avenue
Villa Park, Illinois 60181

For More Information write:
A.G.C.R.C.C.
P.O. Box 221
Morton Grove IL 60053

**Super Savings
Fiberglass Materials**

Fiberglass Cloth 5 Sq yards \$15.00
your choice 3/4, 2, 4, or 6 oz. cloth

Laminating Epoxy Resin (6 hr cure) \$30.00 per gal.
Liquid Mold Release \$3.00 16 ozs.

Epoxy Primer (K&B) \$40.00 per gal.
Epoxy Paint Thinner (K&B) \$15.00 per gal.
Polyester Resin (K&B) \$20.00 per gal.

Send check or money order shipping collect COD okay.
Call or write **Bob Smith R/C Aircraft**, P.O. Box 33335,
Granada Hills, CA. 91344 (213) 366-6872

**1/20TH SCALE DOCUMENTATION DWG'S
OF NOTABLE FAIRCHILD'S**

FAIRCHILD FC-1

**GEORGE H. CLAPP
CENTRAL SQUARE,
N.Y. 13036**

INFO \$1.00 - REFUNDED WITH ORDER

Fairchild Republic Approved

larity of the 1/2A events.

But all things, both good and bad, must change—sometimes end! This month I will end my authorship of the CL Racing special interest column for *Model Aviation*. As it turns out, I found myself in the wrong place at the wrong time *again!* (Only this time it is not in the field of model airplanes that I am involved; rather, it is in local politics.) I recently ran for—and won—a position on the City Council of Missouri City, TX. In this position, I will be involved in a great many activities which will affect the future of my city. As you can imagine, these activities will take a certain amount of my time to perform. When I decided to try for this office, I recognized that some of my other interests, notably my activities in modeling, would have to be sacrificed to allow the time to be spent in city affairs, so now that my election has been a success, it is time to cut loose some of the other activities.

I have enjoyed writing this column over the years. The friendships that it has produced with all of you will not be forgotten. I will continue to be an active modeler and competitor, but no longer a writer on a regular basis. I'll be seeing you at all the contests in the future, just as I have in the past.

See you at the Nats!!

Bill Lee, 3522 Tamarisk Ln., Missouri City, TX 77459.

Wing Master/Petro

Continued from page 74

Select the wheels after the plane is finished so you can use their weight to get the correct balance point. The tail skid is made from extra

pushrod wire, and it is glued with Hot Stuff.

Painting. Apply at least one coat of fuel-proof clear finish as a sealer and a minimum of two coats of fuel-proof color paint. (I have been having very good results with foam brushes obtained from K-Mart. The best technique is to brush slowly, and the paint will flow evenly.) Templates for the canopy bottom outline and other decorations really help in making a neat model.

Try to avoid getting too much paint in the control surface gap or on the string hinges. The hinges can be loosened, but movement of the elevator could be too limited if there is too much paint.

Always put on your AMA number. People will ask about it, and they usually are impressed with our organization.

Controls. I used parts manufactured by Carl Goldberg Models: #BCH1-1/2A bellcrank and horn, and #CH-2 short control horns. Select the piano wire size with the best fit in the control linkage holes.

The lower horn on the wing flap needs two new holes to accept two screws from the upper horn. These two horns are on the flap with their bases facing each other; the nut plates are not used.

Very carefully make Z-bends on the pushrods so that the elevator and wing flap are each at level position when the bellcrank is parallel to the fuselage. The multiple holes in the lead-out plate will allow adjusting the line sweep-back for best flying with your setup.

Engine. I like the Cox Black Widow engine for this model, though I suspect that a good amount of fuel is lost from the fill and drain tubes early in the flight. What do you think would happen if the fill tube is capped with a short length of fuel line sealed with a screw, and if the overflow tube has a short length tubing brought from it sideways through a hole in the inner cowling? Would the capped fill tube and offset drain tube keep all the fuel in the tank?

Conclusion/comments. During flight testing, two problems came up which I wish someone could solve. First, we need a fuel gauge that can be seen by the pilot. One Wing Master was inverted when it ran out of fuel. Second, we need a really simple engine mount adapter that will permit switching engines between planes without having to take out the screws. Besides saving time, it saves you from losing the screws.

The standard Cox needle valve barely extends above the back edge of the cowling. You may want to consider some fix for better access.

Dacron flying line is used for the string hinges

**3-FUNCTION
ACCU-TACH 1**

- LCD Tachometer w/dual scale capability—10X or 100X
- Digital Voltmeter with or without load for checking/cycling all TX/RX battery combos
- Monitor quick charging operation

79⁹⁵ prepaid

Nor Cal AVIONICS

P.O. Box 70956 · Sunnyvale, CA 94086

Send check or money order, no C.O.D.'s
Calif. residents add 6% tax



**THE NELSON .15...
UNQUESTIONABLY
THE BEST!**

**QUARTER MIDGET,
AMA & FAI PLUS
THE "TEXAS 300"**

For complete information,
Write to:
Kustom Kraftsmanship
Brochure A
P.O. Box 2699
Laguna Hills, CA 92653
Call: (714) 830-5162
Dealer inquiries invited.

RUBBER STRIP

FAI RUBBER Made in U.S.A.
SIZES: 1/4", 3/16", 1/8", 3/32", 1/16"
by 1mm thick (042)
BOXED 16 ounces of rubber per box.
PRICE \$12.00 per box, postpaid in USA

NEW PIRELLI
SIZES 6mm, 3mm, only 1mm thick
PRICE \$18.00 per hank (approx. 1/2 kg.)

TIMERS KSB Fuel and DT \$11.50 ea.
plus 10% UPS

Sole US Distributors & World-wide Sales
Send .25 for 1981 catalog

F.A.I. Model Supply
PO Box 3957, Torrance, CA 90510

of the wing flap and elevator because it doesn't stretch, and the fibers glue well with the wood. The next improvement will be to find a transparent monofilament string that will also glue well. Then the connection between the control surfaces will be invisible.

For those who have wondered how long it takes to come up with a simple construction article like this 1/2A profile, the answer is six months! Think about that when someone complains that it takes a week to build the plane.

Finally, the warning about not flying near electric power lines should be heeded. Remember that under some conditions power lines can pose a threat from the model being near them without actual contact. Never fly near power lines.

Snapshot Twin/Hux

Continued from page 82

Sight down the two balsa strips, and align the wing tips regardless of how the center section aligns. Set the center on waxed paper while epoxy sets, and check alignment often. Fill any variations in center section with epoxy, but do not use any cloth on the top of the wing—only on the bottom. You may raise the dihedral angle to 1/4-in. per tip if you wish.

Install the wood for the aileron servo tray. Do not attach the L. E. bulkhead or wing dowels until later. Install complete aileron linkages in the boom area.

Fuselage. Check the wing saddle on the side template to see if any adjustments are necessary. Cut sides and bulkheads from specified stock. Note that the center bulkhead is of 1/8-in. hard birch plywood, but it could be cut from thicker stock.

Epoxy hardwood longerons to fuselage sides. Assemble the sides and first two bulkheads. The rear bulkhead is attached last. Note that it caps the fuselage and that it does not fit between the fuselage sides. Sheet the bottom. Install the hardwood wing hold-down blocks.

Fill in the corners with an assortment of triangular stock. Assemble balsa blocks and sheets for the nose section and cockpit hatch. Cut the top and side profiles with a band saw. Note that the front edge of the hatch must be angled so hatch can be raised and pulled forward when the rear plywood bulkhead is fitted on the wing dowels.

Tack-glue the nose and hatch in place for shaping. Cut and sand until it looks the way you want it. I used a belt sander. Don't worry about sanding a hole through the blocks. For every hole that appears, install another balsa block inside to

Columbia Model Crafts proudly introduces its expanded line of professionally finished aircraft for the quality conscious modeler.

TrainAir—40 powered high-wing airplane by Northeast Aerodynamics. 58" wingspan, all wood, covered in Monokote, 4-channel with wheels, motor mount, one piece hinged wing. Acrobatic yet stable.

Olympic 650—Airtronics superb 2-meter sailplane, plug-in wing panels, covered in Monokote with all surfaces hinged and pushrods installed.

EZ Fly—Cabin model, 51" wing, 25 through 35 engines, 4-channels with wheels, motor mount and one piece wing. Excellent sport plane. (See RC Modeler review January 1982.)

We feature OS engines and radios by Airtronics, World and Futaba.

Airplane	Completely Finished	With Engine Installed	With Radio Installed
TrainAir	\$129.95	\$209.95	\$309.95
Olympic 650	154.95	209.95	269.95
EZ Fly	129.95	199.95	299.95



Columbia Model Crafts
9366 Sharp Antler
Columbia, Maryland 21045
301 596-0134

JACK (1944) ARMSTRONG P-40 CARD KIT
FULL COLOR EXACT REPRODUCTION
NOW ONLY **\$5.00** REMEMBER HOW WELL THEY FLEW?
Special offer includes coupon for receiving balance of set at half price. Send To: Saf-File Models • P.O. Box 62 MA Roseville, MI 48066
UNIQUE NOSTALGIC GIFT

SCALE DOCUMENTATION
SCALE DRAWINGS PHOTOS - BOOKLETS MODEL PLANS
1982 AIRPLANE CATALOGS \$2.00
REPLA-TECH INTERNATIONAL
48500 MC KENZIE HWY. VIDA, OREGON 97488

fill it.

Be careful how much you sand the 1/8-in. sides and bottom. Too much sanding will leave only the triangular stock holding the nose gear bulkhead. When you are content with the shape, remove the blocks and rout out the inside to about 1/2-in. thickness.

For a cargo tube, use the cardboard tube from a roll of Christmas wrapping paper or the like. Line the inside of the tube with contact paper, and glue the tube in place. Install doors and release device. If no cargo tube is to be used, move the radio gear under the wings, cap the rear bulkhead with balsa, and sand to shape.

If you decide on a fuselage-mounted main landing gear (which is the strongest), mount the 1/4 plywood plate and the side doublers at the bottom of the fuselage. Drill and tap for two 1/4-20 nylon bolts to hold the aluminum landing gear.

Flatten the center leading edge of the wing to

match the width of the center bulkhead. Temporarily set the wing saddle foam in place. Set the wing in place on the fuselage with the W-1 bulkhead in place, matched with the center fuselage bulkhead.

Clamp or weight the wing in position. Double check to see if wing and saddle match (shim or cut any differences). Put epoxy between the W-1 bulkhead and the wing leading edge. Mark the dowel positions on the fuselage center bulkhead, and drill through bulkheads and wing up to the box spar tab. Then drill holes for the hold-down bolts at the rear of the wing. Use the drill that matches the threads of the hold-down bolts.

Remove the wing. Tap the 1/4-20 holes for the wing hold-down nylon bolts. Drill out the holes in the wing for the bolts to fit through, and coat lightly with epoxy. Install the 1/4-in. dowels in the wing leading edge. Place cockpit hatch in place, and drill 1/4-in. holes to match center bulkhead.

ATTENTION 1/4 SCALERS

EPOXY GLASS COWLS FOR:

NOSEN, PICA, SID MORGAN, Balsa USA, PLATT, CONCEPT FLEET, HOSTETLER, RCM T-CRAFT, SHEBER PITTS 1/8-B 1/4 SCALE, SUPER CUB, FOKKER D-7, BOEING P-12, P-26, F4B2, F4B4, SPARROW HAWK, GEE BEE MOD "Y", MACBRIEN'S TURBULENT, CHRISTEN EAGLE, BRISIGHELLA'S STARDUSTER II, 1/8 SCALE J3-B1 BABY, FLYBABY, AIRCAMPER, PILOT JUNGSMANN 1:3.5 SCALE, 1/4 SCALE DECATHALON, PIPER PA-18 & OTHERS

WHEEL PANTS FOR:

CITABRIA, STARDUSTER II, PITTS, SKYBOLT, LIBERTY SPORT, CHRISTEN EAGLE, P.S.E HAWK, STEARMAN, STINSON SR-9, MULLIGAN & OTHERS

BRAZED & HEAT-TREATED WIRE GEARS & CABANES
LARGE SCALE PLANS AVAILABLE

Send SASE for latest list

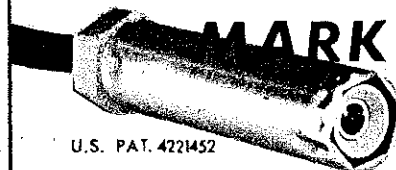
We supply Modelers with fiberglass parts for your plans—Write or call us:

T & D FIBERGLASS SPECIALTIES

30925 BLOCK, GARDEN CITY, MI 48135

PHONE (313) 421-6358

HEAD LOCK MARK III



U.S. PAT. 4221452

\$3.75

at your favorite
hobby dealer

If not available, write direct; add 50¢ (\$1 outside U.S.).

THE "NEW STANDARD" FOR GLOW PLUG CONNECTORS

CHECK THESE FEATURES

1. Push, twist, its locked on.
2. Push, twist, its off.
3. Will not come off, even under heavy engine vibration.
4. Will not short out.
5. Positive spring contact.
6. 30 inch lead wire.

MODEL PRODUCTS CORP. BOX 314 Pompton Plains, N.J. 07444