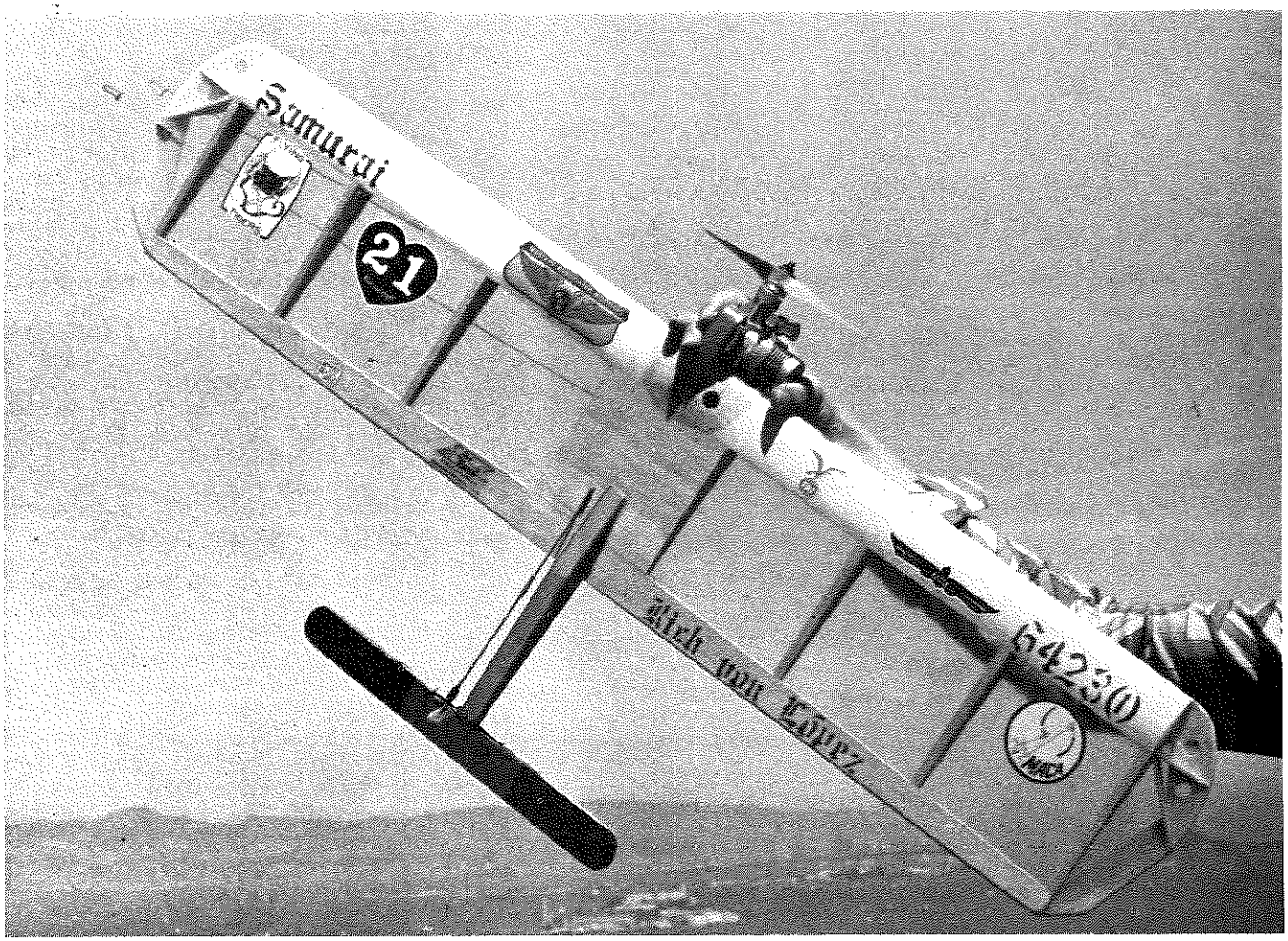


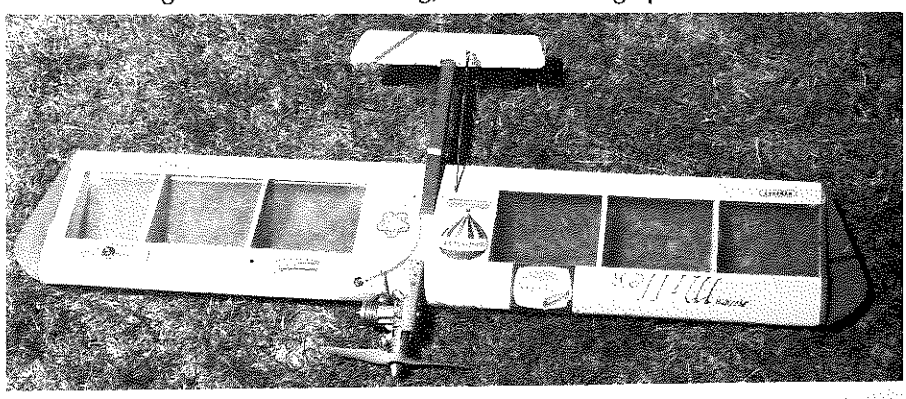
* SAMURAI * FAI COMBAT

PHOTOS BY AUTHOR

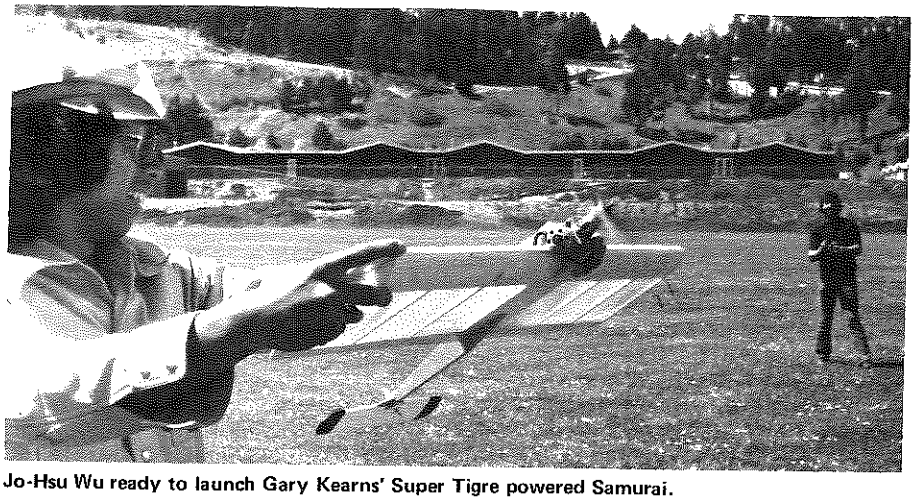
By RICH "von" LOPEZ . . . FAI Combat has reached World Championship status, and as such, will receive more attention on the local "battle fields". Be prepared, with a design that only needs you . . to win.

are strengthened by means of two 3/32 plywood doublers and two 3/16 dowels. The whole motor mount area gets a coating of Petit Formula II Hobbypoxy, both for structural integrity and fuel- proofing. I decided to use a mono-boom tail section rather than the familiar twin or tri-boom sections. My first prototype Samurai used a mono-boom made of 1/2 inch balsa with 1/16 plywood laminated on both sides. Prototypes No. 4 and 5 used 1/4 inch balsa laminated on both sides with 1/4 inch basswood. The latter units give more strength and a little more tailweight for a more responsive aircraft.

Flying Tiger members Gary Kearns, Paul Klahn, Glenn Williams and Jo-Hsu Wu all built several prototypes each, some with twin-boom tail sections, different wingtips, and some with upright motor mounts for use with the Cox Conquest 15. I found that a piece of aluminum from a beverage can about 1 to 1-1/2 inch square in size, mounted against the leading edge, is enough to protect the leading edge from burning due to the heat of the rear exhaust. The models fly better with the motor mounted sidewinder style. The upright versions tended to come in on the lines during the launch, and again during the landings. There is also the possibility that you could damage the motor during an inverted landing, especially on a poor landing surface such as the 1977 Nats combat field. For Western Associated Modelers (WAM) competition, Gary Kearns and Glenn Williams built Samurai with exhaust manifolds running through the wing. It works, but it takes time to build the aircraft in this fashion. Paul Klahn built his first two Samurai with twin-booms and different wingtips. Paul found the



Grant Miller's Rossi 15 powered Samurai. Grant is from Fresno, California.



Jo-Hsu Wu ready to launch Gary Kearns' Super Tigre powered Samurai.

mono-booms to be lighter than the twin-booms.

The first Samurai was built and flown by Jo-Hsu Wu. Jo used a twin-boom set-up and slightly different wingtips. At first, Jo ran a Super Tigre G15, and he was impressed with the overall performance. Then we put a G15-19 on it. I flew it and immediately liked it; I had never experienced such a stable and tight-turning model. During this same flight, the booms and tail flew off the model, the cyanoacrylate glue did not keep them firmly secured to the wing's Fascal covering. The Samurai went straight down and impaled itself in the earth. To my surprise, the wing was entirely intact, suffering no structural damage. Naturally, the motor was full of dirt and the prop broken, but the soundness of the design had been proven. I would expect that crashes where the wing does not come straight in, that is at 90 degrees to the ground, the wing will probably suffer some structural damage, as would be the case with all designs. The ground was also reasonably soft where we were test flying.

As an added incentive to build Samurai, take note of its successes in competition. The first ones were flown at an FAI contest in San Jose, California, where it placed first. The Samurai captured the WAM Class A championship in 1977, a series of ten contests. I flew the winning models to the championship. Paul Klahn, my teammate, flew another Samurai to a second place finish in the Class A final standings. Samurai also picked up another FAI win at Redwood City, California, on August 20, 1977. That's not a bad record in competition for a new design. Hopefully you can enjoy some success with Samurai also.

CONSTRUCTION

There are always certain items that one needs when building any aircraft model. Make sure that you have these items prior to the actual construction of Samurai. Here are some lists of items that one should have on hand when one starts the project, the lists are divided up into four categories: Tools, Glues, Woods, and Hardware.

TOOLS: A modeling knife with spare blades, single edge razor blades, a razor blade plane, X-Acto hole punchers No. 31/32, X-Acto balsa stripper No. 48, a razor saw, paper hole puncher, a center punch, a scratch awl, scissors, pins of various sizes and gauges, sandpaper of various grits, sanding blocks, fingernail emery boards, various sizes and shapes of files, a set of drill bits, safety glasses, screwdrivers, wire cutters, long nose pliers, 1/4 and 5/16 inch nut drivers or wrenches of that size, a soldering iron or gun with solder and flux, a metal yard or meter ruler, a felt tip pen, a sealing iron, a heat gun, glue brushes, dope brushes, a glue gun, a couple of 4 inch spring clamps, a flat building board, and access to a drill press and a Dremel Moto-Shop.

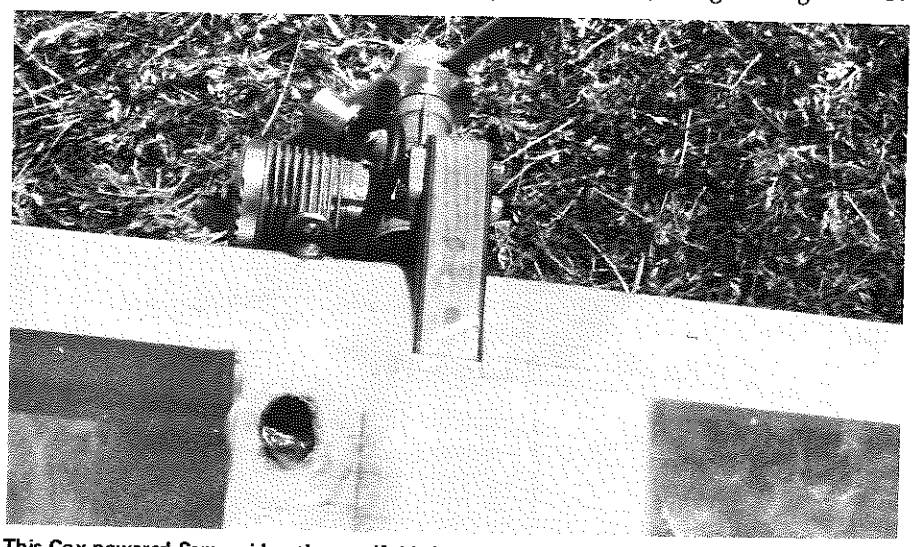
GLUE: Regular cement, such as Testors or Ambroid, 5-minute epoxy, slow-cure epoxy, cyanoacrylate glue, aliphatic resin glue, and contact cement.

WOOD: Two 3/16 square x 36 inch spruce spars, 3/32 plywood for motor mount doublers and the bellcrank mount; 1/16 plywood for the tail boom doublers and the templates; 3/8 x 1/2 hardwood for the motor mounts; a 3/16 dowel; 3/8 square x 36 inch balsa for the leading edge; 1/2 inch balsa sheet for the motor mount filler block and the tail boom; 3/16 balsa sheet for the stabiliator; 1/8 hard balsa sheet for the two center ribs; 3/32 hard balsa sheet for the two outside center ribs, wingtips and wingtip supports; 1/16 hard balsa sheet for the wing ribs, trailing edge, vertical webbing and cap strips; 1/16 soft balsa sheet for the leading edge sheeting; 1/16 medium balsa sheet for center section sheeting.

HARDWARE: Length of 1/16 music wire for the pushrod and the stabiliator hinge pin; 1/32 music wire for the leadouts; 3/32 brass tubing for the leadout eyelets and the stabilator hinge bushing; a 2 inch Fox or Perfect bellcrank; a Du-Bro No. KL49 Kwick link; a long nylon control horn; a large fuel filter; neopreme fuel tubing; 5/32 bore x 3/64 wall bladder tank tubing or pen bladders, such as Tatone type; a 4-40 bolt set; covering material such as Fascal, Monokote, or Solarfilm; a transparent lettering stencil; and carbon paper for making templates.

TEMPLATES

One needs to make templates for the wing ribs, mono-boom, bellcrank platform, wingtips, wingtip supports, and the engine mount outline. Remember, all the parts you cut out will only be as good as your templates, so take your time and do not rush the templates. To make the templates, you will need some 1/16



This Cox powered Samurai has the manifold through the wing. Author has another, and simpler arrangement for the Cox exhaust explained in the text.

plywood, carbon paper, a pencil, regular typing paper, and the Samurai plans.

1. Place the carbon paper under the item in the plans for which you wish to make a template, with the typing paper under the carbon paper.

2. With your pencil, trace over the part you want to reproduce, using a straightedge whenever you can.

3. Cut out the carbon copy, leaving plenty of margin, and glue it onto the 1/16 plywood.

4. Cut out the parts on a jig saw, being careful and accurate.

5. Carefully sand and fit these templates to the plans with fine sandpaper and small files or fingernail emery boards. Make sure these templates are exact.

MOTOR MOUNTS

It would be advisable to build enough motor mounts to last a season of competition, since they do take a bit of time to make.

1. Cut out the 1-3/4 x 1-5/32 inch (this dimension will vary depending on the width of the engine you choose to run) x 1/2 inch motor mount balsa filler block. Make certain you have the wood grain running vertically.

2. Cut two lengths of 3/8 x 1/2 maple, 3-1/4 inches long.

3. Glue the maple engine bearers to the balsa filler block. Use aliphatic resin glue, or 5-minute epoxy if you are pressed for time.

4. Cut two pieces of 3/32 plywood 3-1/2 x 1-7/8 inches (this dimension will vary depending on the width of the engine you choose to run).

5. Laminate the two pieces of plywood to the motor mounts. Use aliphatic resin glue and weigh down the assembly overnight. You can hasten this procedure by using 5-minute epoxy.

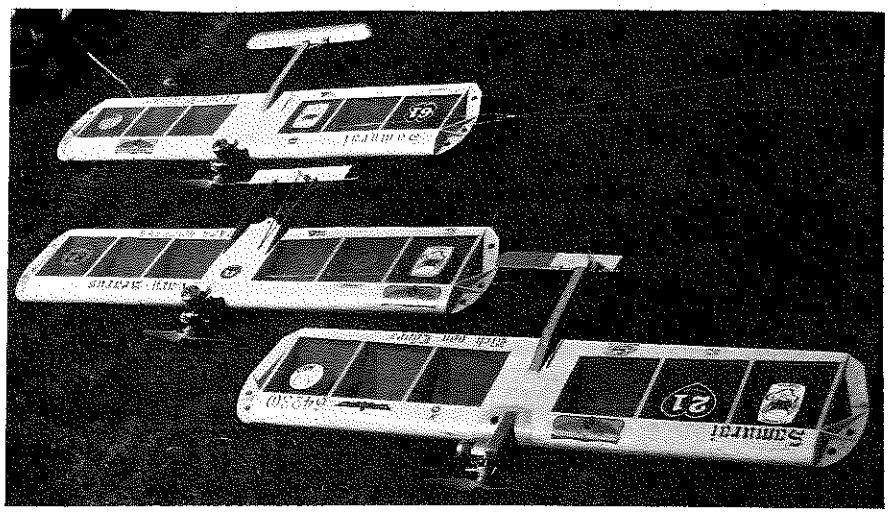
6. When dry, cut out the portion of plywood that is occupying the engine space on a jig saw (a Dremel Moto-Shop saw works well). Be sure to wear safety glasses whenever using power tools. The pieces of scrap plywood cut out will be just the right size for the bellcrank mount.

7. Mark the location of the engine mount bolts and the dowels, using an awl and then a center punch.

8. Drill out these holes. Use a drill press if you have access to one. Look around and see if one of your neighbors will let you use theirs, or check with your local school's woodshop teacher.

9. Glue the dowels in place.

10. Use the template of the engine mount outline to draw the outline on the rough engine mounts.



Samurai belonging to Glenn Williams, Gary Kearns, and Rich "von" Lopez. Note tail variations and engine installations.

11. Cut the notch for the 3/8 square leading edge and notches for the 3/16 square spars. Note that the lower spar notch is cut 3/32 deeper than the top spar notch to allow for the interlocking of the bellcrank mount. Cut the slopes on the front and rear of the mounts as outlined.

12. Sand to a smooth finish. You can use the disc sander on your Dremel Moto-Shop or use a sanding block with rough, medium, then fine sandpaper.

MONO-BOOM AND STABILATOR

1. Cut a piece of 3 x 1/2 inch balsa to a length of 8-1/2 inches, and two pieces of 3 x 1/16 plywood to lengths of 8-1/2 inches.

2. Laminate the pieces of 1/16 plywood on each side of the 1/2 inch balsa, using contact cement.

3. Using the boom template, draw the outline of the boom on the sheet you just laminated. Fit as many outlines as you can on the sheet.

4. Cut out the mono-booms on your jig saw.

5. Drill a 3/32 hole for the brass tube bushing, refer to the plans for the exact location. You can also drill a hole through your template at this time for easier marking in the future.

6. Epoxy the 2 inch long brass tube bushing in place as shown on the plans.

7. Cut out a stabilator that is 1-1/2 inches wide by 3/16 thick by 12 inches long.

8. Sand the stabilator, rounding the leading edge, trailing edge and tips. Slightly airfoil the stabilator, first using a razor blade plane and then sandpaper.

9. Cut out the notch on the stabilator for the mono-boom as shown on the plans.

10. Cut a piece of 1/16 music wire to a length of 7-1/4 inches. Slip it through the bushing in the mono-boom. Slip one piece of 3/32 x 1 inch long brass tube over each side of the hinge pin as shown on the plans. Bend the hinge pin 90 degrees, 1/2 inch from each end. Make sure the bends are parallel.

11. Mark the location where the hinge pin will go into the stabilator and drill it out with a 1/16 drill bit.

12. This assembly can be tack-glued with cyanoacrylate glue and permanently glued with 5-minute epoxy. Make sure you don't glue the mono-boom bushing to the stabilator, but that you do glue both of the other 1 inch bushings to the stabilator.

WINGTIPS AND
WINGTIP SUPPORTS

1. Using the wingtip and wingtip support templates, draw as many part outlines as you need on a sheet of 3/32 hard balsa. If you wish to make more than one set of parts at a time, stack up additional sheets of 3/32 balsa and pin them together and cut them out at the same time on a jig saw.

2. Glue the two wingtip parts together at the joint shown on the plans.

3. Using an X-Acto hole puncher, punch out the lightening holes as shown on the plans.

RIBS

1. Using the wing rib template and a felt tip pen, start drawing the outline of the ribs on a sheet of 1/16 x 3 balsa. Fit as many outlines as you can into a given space so there are no large areas of wasted space.

2. Cut five more sheets of 1/16, two sheets of 3/32, and two sheets of 1/8 balsa to the same length as the sheet with the rib outline drawings. Stack these sheets up and pin them together with No. 20 T-pins, about three pins through each rib stack will do the job nicely.

3. Cut out the rib stacks on a jig saw, try and cut right down the center of the line made by the felt

tip pen. It can be done with a little practice.

4. All the ribs can be sanded while pinned together. Lay a piece of 100 or 150 grit sandpaper flat on a board, using thumbtacks to hold it down. Pass the rib stacks over the sandpaper until they are sanded to your liking, but be careful as it does not take too much pressure to take them down. Make certain you sand them evenly.

5. Take pieces of scrap 3/8 and 3/16 square balsa or spruce and use them to fit the leading edge and spar notches in the rib stacks. You can use small files or fingernail emery boards to get perfect fits.

6. Mark the ribs across the top or bottom with a felt tip pen to let you know which side is up and/or down when building the wing.

7. Take the pins out and separate the ribs. The four inboard ribs that pass the leadouts will have to be punched out for the leadouts. Mark the location of the leadout holes on the ribs by placing the ribs over their position on the plans and marking it with a pen. You can use an X-Acto hole puncher or a paper hole puncher to make the holes.

8. The front part of the 3/32 outboard rib will have to be cut off at the spar to make room for the bladder compartment.

9. The inboard 1/8 center rib will have to be cut out for the bellcrank mount. Check the dawing on the plans for the shape and location of the cut out. Set the ribs aside until you are ready to assemble the wing.

WING

1. Cut two 34 x 1-1/4 x 1/16 inch hard balsa halves of the trailing edge. The taper to 3/4 inch at the wingtips begins at the edge of the center section. Cut this taper to both halves, using a metal yard or meter ruler and a modeling knife. Slightly chamfer the edge of the trailing edge halves where they will be glued together, with a sanding block. Check the note on the plans.

2. Cut both of the 3/16 square spruce spars and the 3/8 square balsa leading edge to a length of 34 inches.

3. With the plans on a straight building board covered with waxed paper (one can make a more permanent set of plans by covering them with Fascal), locate the lower spar and lower half of the trailing edge and pin them to the building board. Note that the spar should be shimmed up with 1/16 scraps so that the ribs will lay perfectly flat.

4. Locate all the ribs, except for the two center ribs, on the spar and trailing edge. Make sure that the ribs that have been punched out for the leadouts are in their proper location.

5. Glue these ribs to the lower spar and to the lower half of the trailing edge with cyanoacrylate glue.

6. Cut a bellcrank mount to shape from the scraps left over in Motor Mount Step No. 6.

7. Locate and drill out the hole for the bellcrank bolt.

8. Slip the bellcrank mount through the inboard center ribs and 5-minute epoxy these two parts to the lower spar and lower half of the trailing edge. This rib has to be perfectly square with the spar and trailing edge as it will determine whether the motor mounts come out square or not, so take extra care in lining up this rib.

9. Place the motor mounts upside down exactly over the side-view drawing of the model on the plans. Spread some 5-minute epoxy over the front part of the 1/8 center rib. Glue this rib to the mounts and line it up exactly with the plans. Let it dry thoroughly without moving it.

10. Remove the wing from the building board. The motor mounts and center rib can now be glued to the other center rib, bellcrank mount, spar and lower half of the trailing edge. Use 5-minute epoxy and clamp together with a 4 inch

spring clamp.

11. Glue the 3/8 square leading edge to the wing. Use 5-minute epoxy at the engine mount and cyanoacrylate glue at all the rib joints.

12. Glue and pin on the top half of the trailing edge, using regular cement or aliphatic resin glue.

13. Glue the top spar in place with cyanoacrylate glue.

14. The spars will have to be sanded at the bladder compartment section so the vertical webbing will lay flush. The back of the leading edge at the bladder compartment section should also be sanded slightly to knock off the sharp edge. A sanding block with 100 grit paper will take care of this task quickly.

15. Glue the vertical webbing in place as shown on the plans, make sure that the grain of the wood is running vertically. Use cyanoacrylate glue.

16. Attach the 1/32 music wire leadouts to the bellcrank by bending and wrapping the wire, using your long-nose pliers, and trim the excess with wire cutters. Add the pushrod to the bellcrank. Guide the leadouts through the ribs and slip the bellcrank in place, bolt it to the bellcrank mount. W.A.M. pilots, now is the time to add a safety cable. Cut the excess length off the bellcrank bolt. Dab a little 5-minute epoxy on the bellcrank bolt nut so that it will not work its way loose.

17. Cut four pieces of 1/16 soft balsa to 16-3/4 x 2 inches for sheeting. The grain of the sheeting should run lengthwise.

18. Sheet the lower half of the wing first. Use contact cement at the leading edge and at the spars. Use aliphatic resin on the ribs.

19. Cut the triangular drain vent hole through the sheeting at the outboard rear corner of the bladder compartment. See the plans for the exact location.

20. Mix enough slow-cure epoxy to coat the inside of the bladder compartment, mono-boom and stabilator. Coat them and let them dry. Sand the dry coat of epoxy smooth.

21. Punch out the access hole on the top outboard sheeting panel and on the underside, draw a line where the bladder compartment ends.

22. Coat the underside of the top sheeting panels, spars and leading edge with contact cement as you did with the lower sheeting panels.

23. With slow-cure epoxy, coat the underside of the outboard sheeting panel to the line you drew on it. Do not get any epoxy on the contact cement portions. Use aliphatic resin glue on the ribs and proceed to put the sheeting panels on.

24. Glue the lower center section sheeting in place, using cyanoacrylate glue.

25. Glue the upper center section sheeting in place. Note that an exit hole for the pushrod must be cut prior to gluing.

26. Cut some small scraps of 1/16 balsa to fill in the gap over the spars behind the engine mounts, and glue it in place.

27. Cut some long strips of 1/16 balsa, 1/4 wide for cap strips, use an X-Acto balsa stripper. Glue the cap strips in place with cyanoacrylate glue or contact cement. Make sure that the fits are snug.

28. Glue the wingtips and wingtip supports in place with cyanoacrylate glue.

29. Tack glue with cyanoacrylate the 3/4 inch lengths of 3/32 brass tubing leadout eyelets to the wingtips and secure in place with 5-minute epoxy.

30. Make up the leadout ends.

31. Sand the entire wing smooth, beveling the edges on the wingtips and trailing edge. Round and blunt

up the leading edge while feathering in the leading edge sheeting.

32. With slow-curing epoxy, coat the engine mounts and the area around them both top and bottom so that the entire area will be fuel-proofed. The engine mounting holes may have to be redrilled to clear out the excess epoxy. Allow plenty of time for the epoxy to cure.

COVERING THE STRUCTURE

Prior to covering the model, it is advisable that you put your name and AMA or WAM number on the model. Note that this should only be done if you are going to use a transparent type of covering, such as Fascal. I use a transparent stencil and flow pens to put my name and number on my models. I also adhere any organization or product stickers or decals at this time. This is all very easy to do and makes the models very professional in appearance.

It is easiest to cover a model when you have the proper tools, and in this case, they are a sealing iron and a heat gun. The sealing iron is used first to adhere the edges of the covering to the structure. The heat gun is used to shrink the covering. If you use Monokote, the roll of covering will have instructions on how to use it properly. The fact that the wing is built flat on a board helps give you a warp-free structure. All of the Samurai I have built have come out warp-free, however, I have warped them while shrinking the covering.

After the wing is covered and dewarped, the mono-boom and stabilator can be glued on. I like to fit these on the structure, mark the location and then sand the area so that the glue will adhere better. Use 5-minute epoxy to glue the boom on. Locate the control horn and mark the location of the bolt holes with an awl. Drill the holes out and bolt the control horn in place. Attach the Du-Bro clevis to the control horn and thread the rod in about halfway. Match the rod up to the pushrod and cut any excess length off the pushrod. Add the split coupling sleeve and solder it to the pushrod and threaded rod. Adjust the clevis to give an equal amount of up and down control. I always put a piece of tubing over the clevis so that it won't separate or come loose from the control horn during flight.

FLYING THE SAMURAI

The first flight should be a cautious one. Fly the Samurai level for several laps, notice if either wing is high or low on the lines. If you do spot a warp, take it out before you really put it to a test. Only use 2 ounces of fuel during test/trim out flights. When the model is flying perfectly level, do some inside loops and take note of the diameter of the loops, then try some outside loops and check their diameter. Make adjustments to the linkages to give you the desired turning radius. When you have it sorted out, fly and enjoy Samurai. Know what it can do and use its capabilities to your advantage in a contest situation. ●

Mammoth . . . . *Continued from page 29*

biggy. Large aircraft usually involve a fair investment in time and money, and one tends to use the same procedures, preflight and after-flight maintenance that you would use on a full-sized aircraft. You will also pride yourself on doing a good landing, and each maneuver will be deliberate and thought out.

Large aircraft can afford the weight of a few repairs or design changes. You don't have to start from scratch after a crash. In the case of the Quadras, etc., which run on ignition using gas and oil, fuel soaking is no longer a problem as these engines don't spew out the oily gloop which limits the life-span of the aircraft. Those using standard glow engines and prop reduction units will have to spend more care fuel proofing, because they are building this aircraft to last, not as an expendable item.

Last year I was invited to go to Italy by a major industrialist who thought large RC models were sufficiently out of the 'toy' category to create a market for adults not able to fly full-sized aircraft. Just a month before my flight date my "Thunderbird" suffered major damage, with a totalled wing, stab, and cowling due to a faulty elevator clevis which let go in flight. On a normal sized model, I would have scrapped the whole aircraft and started from scratch. In this case, I built a new wing and stab, making improvements over the old one and rerigged the airplane to take care of some problems I adjusted previously with in-flight trim. The difference was tremendous! Had I not rebuilt the plane, I would have never realized its full potential. The point I'm trying to make is that large models are easier to repair and modify. A 10% increase in weight to a small model is very significant if the model is near its top efficient weight already, but a 10% increase on a 20 lb. aircraft is 2 lbs., and that is a lot of glue and patches!

The question most asked is, "Will an ignition engine bother my radio?" Our tests with the Quadra, which has a magneto-generated spark ignition system, and therefore a very low current across the points, and a coil which does not appear to 'ring' excessively (secondary oscillation which appears as arcing on breaker points), have shown that it does not affect the operation of a radio of recent vintage in good working condition. You will probably remember that the first digital radios could not even stomach a minor metal-to-metal joint without throwing a fit. Since about 1970, we have gotten away with murder. If your radio doesn't require bonding of metal-to-metal joints, and has been manufactured since 1970, it should be okay. We have yet to find a radio in this category which can't be used. "In good working condition" is also a key to the answer. A radio can have a large number of its components defective and still wiggle controls back and forth with apparent good range. However, items like automatic gain control, filtering circuits, voltage stabilizing circuits, etc., can affect your radio's ability to reject unwanted signals. Remember that a brand new, factory fresh radio does not always guarantee perfect performance. A number of manufacturers have had problems in the past year, and items like extended servo leads, larger batteries, more metal in the form of cabin struts and landing gears, long steel cable control rods, and interplane bracing, will not help an