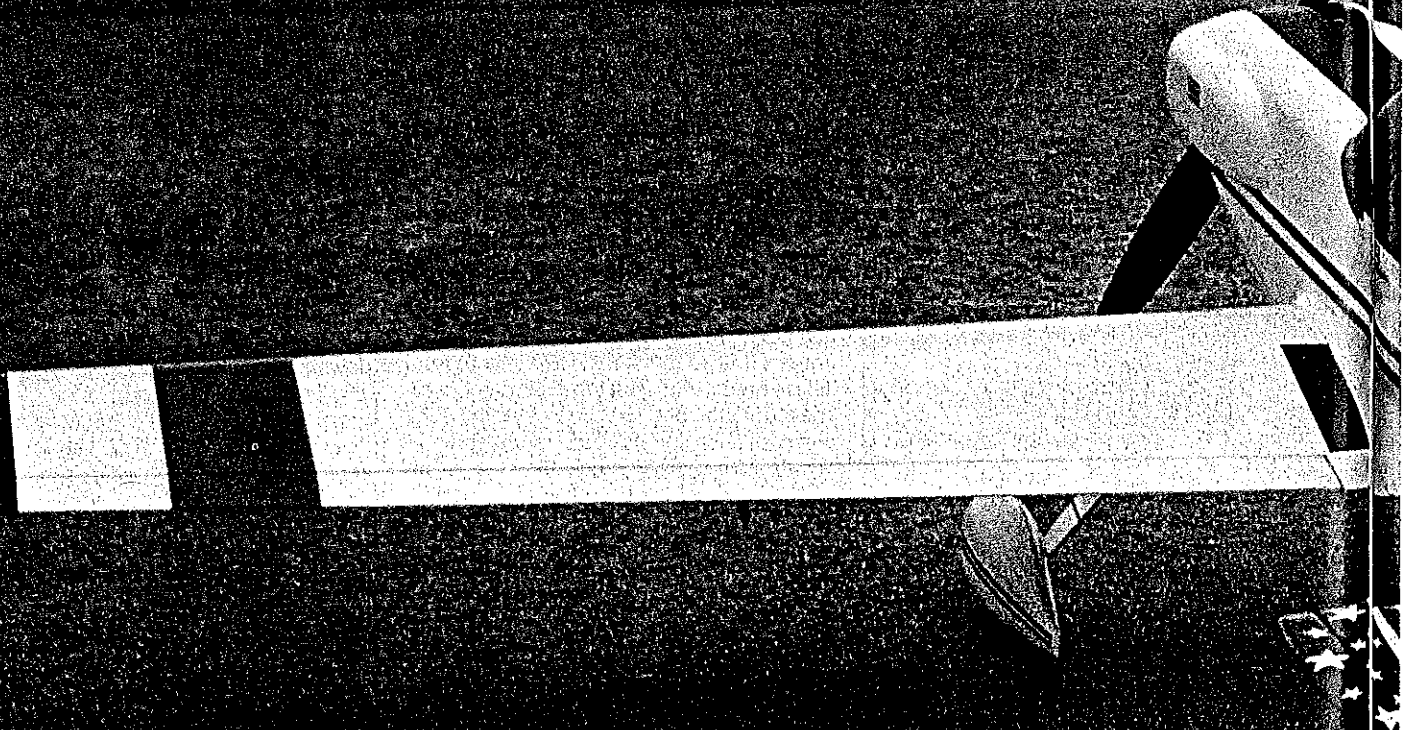


CAP #487

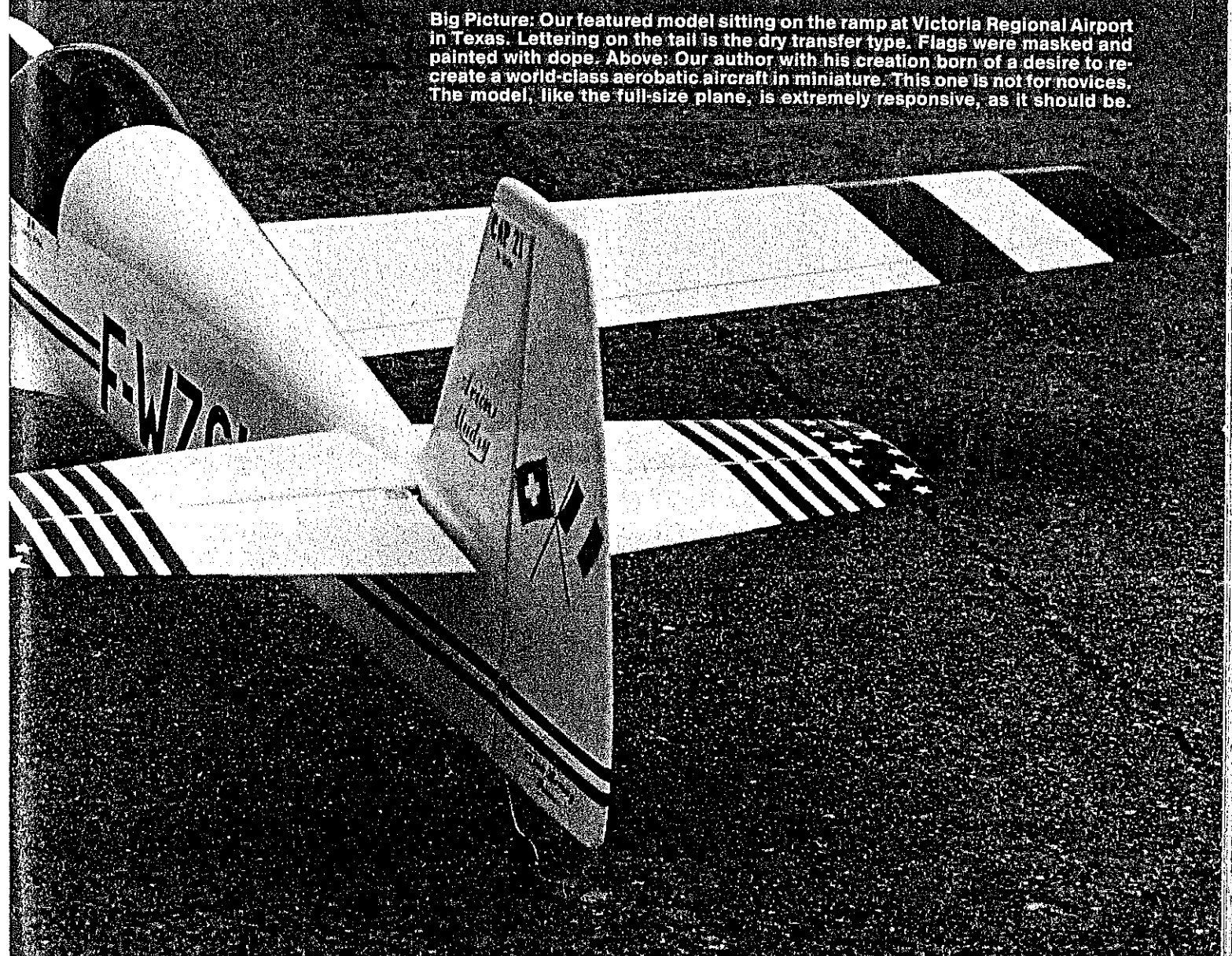
Scaled after the prototype of the French aerobatic mount, this .40-size Sport Scale model for a five-channel setup performs just as spectacularly as the full-size plane. In the hands of a capable pilot it'll put trails in the sky, with the smoker going, that will truly amaze you. ■ Brad Shepherd



P1



Big Picture: Our featured model sitting on the ramp at Victoria Regional Airport in Texas. Lettering on the tail is the dry transfer type. Flags were masked and painted with dope. Above: Our author with his creation born of a desire to re-create a world-class aerobatic aircraft in miniature. This one is not for novices. The model, like the full-size plane, is extremely responsive, as it should be.



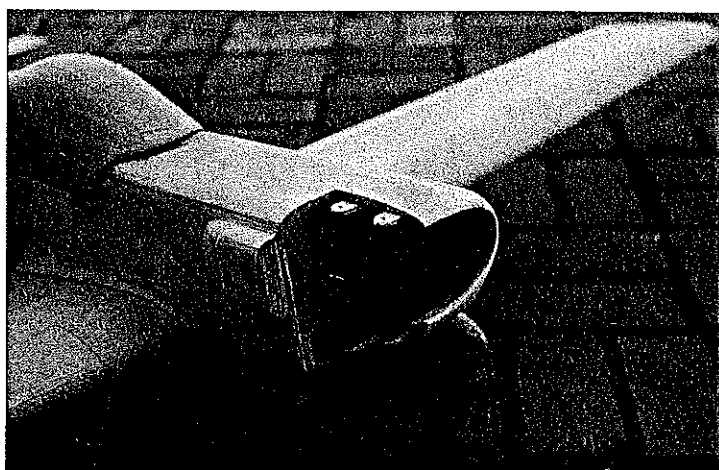
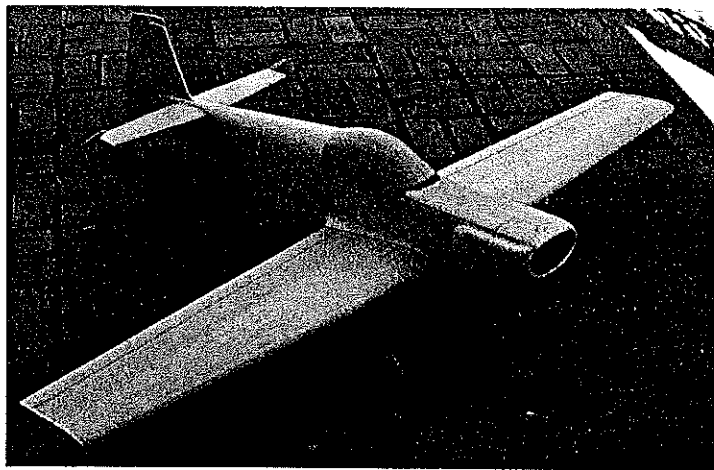
IT IS PROBABLY safe to say that our French friends across the sea are nonconformists. Not to be outdone by the Pitts, Stephens, Lasers, Zlins, etc., that seem to be dominating full-size World Aerobatic Championships, they have designed an aircraft that appears ready to put them in a position to attain the coveted WC gold. Giving up on the CAP 20 series of aero-

batic mounts due to its shortcomings in snap maneuvers, an entirely different approach was used in designing the CAP 21.

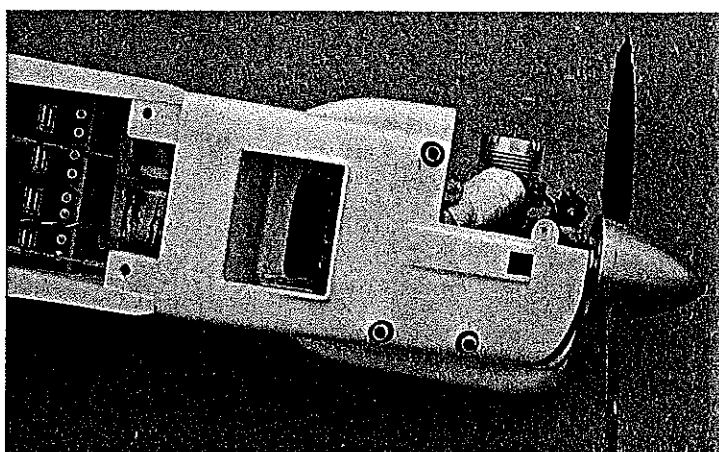
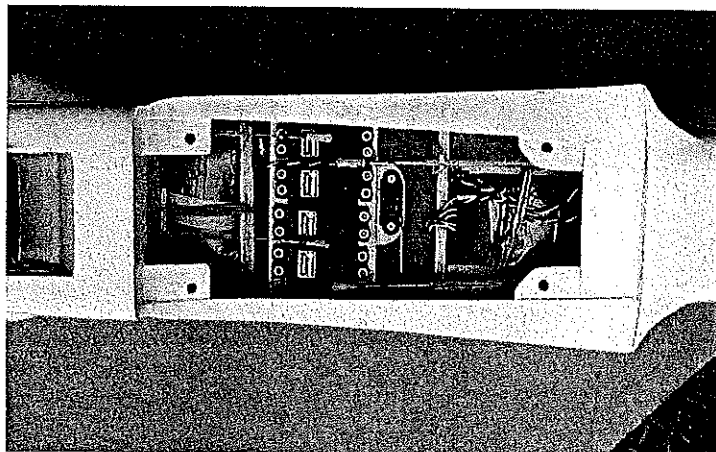
The wing, with its highly unorthodox airfoil, has the highest aspect ratio of world class mounts, and that's unusual when one considers some of the maneuvers in the Aresti pattern that call for fast roll rates. What they have done, though, is come up

with an aircraft that rolls almost as fast at low speeds as it does at high speeds, no doubt due to the combination of airfoil, aspect ratio, and long ailerons.

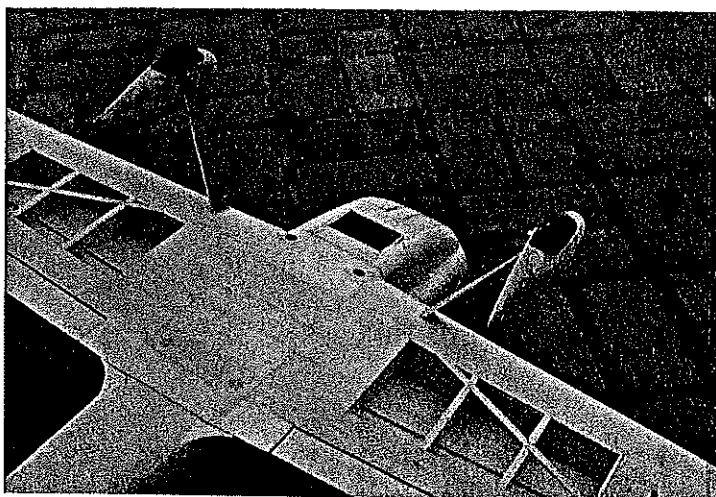
Coming in at over 1,000 pounds, it is about 200 pounds heavier than the Pitts and Lasers, but apparently that does not hurt its vertical capability in competition maneuvers. Go out of sight doing vertical



Left: There's a certain beauty in uncovered balsa on a model. Keep the sheeting on the wing and tail in the medium-to-light category. The model has a long tail moment, and it's easy to wind up tail-heavy if you aren't careful. Right: The right half of the cowl comes off for easy access to the engine and smoke system. Ply tabs and blind nuts keep it in place. Careful sanding results in the nice contours seen here.



Left: With the battery up forward and everything packed in foam, there is plenty of room for a neat, reliable installation. Note the four maple hold-down blocks for the wing. Right: We see the sweepback angle of the exhaust/smoker and ply tab cowl hold-down. The lip around the bottom opening is clearly visible as is the tin chute inside. Text has more details about the smoker and tin chute construction.



Left: Wheel pants are constructed using foam, glass cloth, and epoxy (more details in the text). The landing gear is fitted after the wing is removed from the jig. Right: Lip on edges of the air exit add to the realism. Exhaust stacks are aluminum tubes sunk into balsa and held with epoxy glue. Black dope around the tubes simulates openings in the cowl. Photos of the model by the author and Leon Folsie.

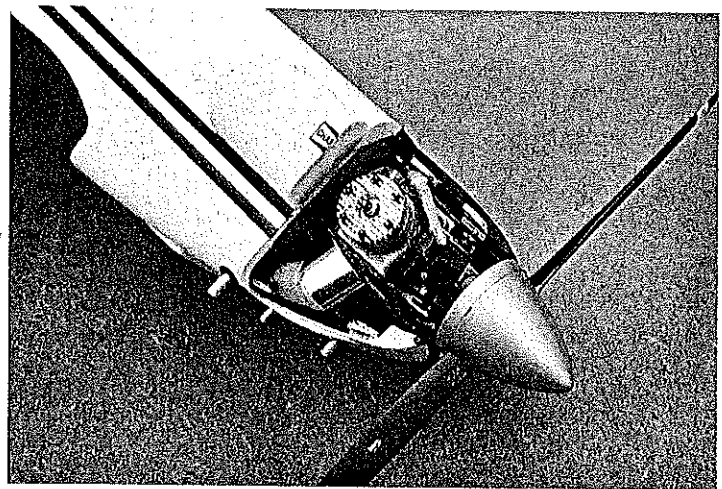
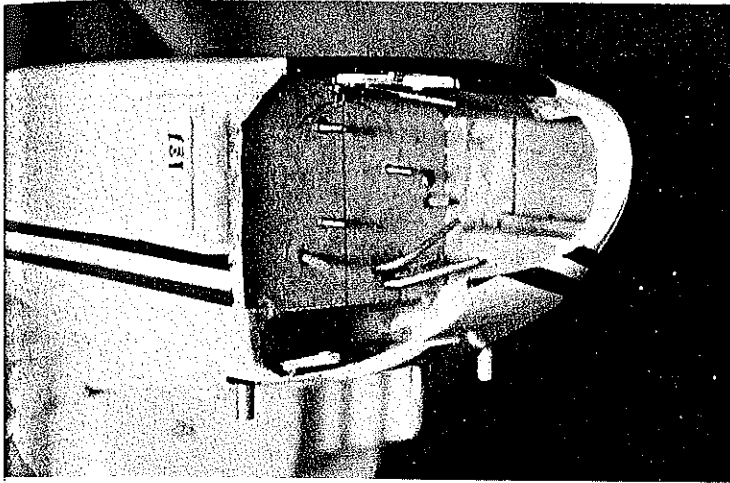
rolls like a Kermit Weeks' Special, it will not, but that is not required for "in the box flying."

The prototype F-WZCH showed up at the 1980 World Championships, and it has since been joined by at least two others, F-GAUP and F-GAUK, which competed in the 1982 World Champs. The latter two aircraft have shorter ailerons, no wheel

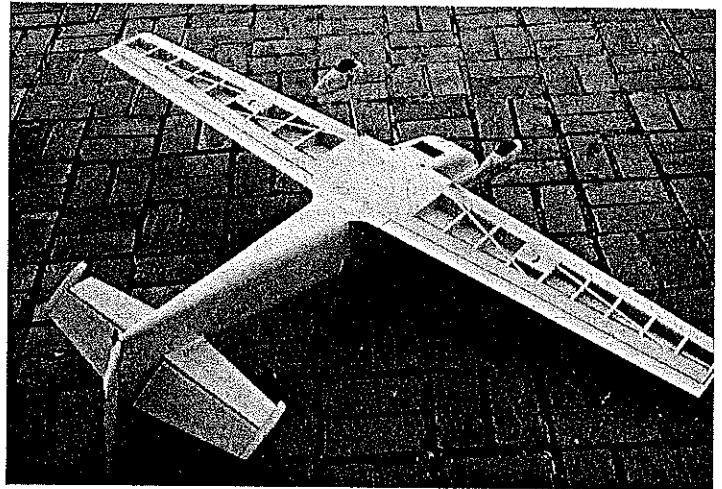
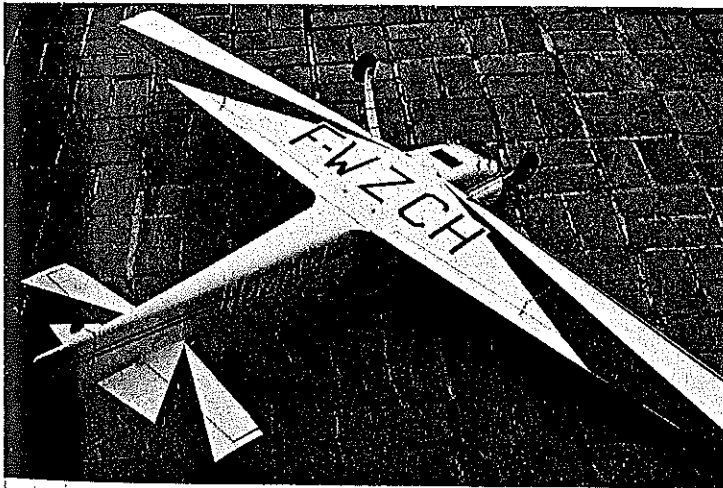
pants, slightly different canopies, and the basic color is turquoise blue (which strengthens the idea that Frenchmen are nonconformists, as we don't know of any other acro mounts that are turquoise). I had originally intended to build a model based upon the F-GAUP, but not having any turquoise heat-shrink covering, I decided to build a model of the F-WZCH prototype.

If we can find one word to describe this airplane, it probably is simplicity. That same attribute was used in designing this model of the CAP 21 by using balsa and plywood sizes that can be readily obtained.

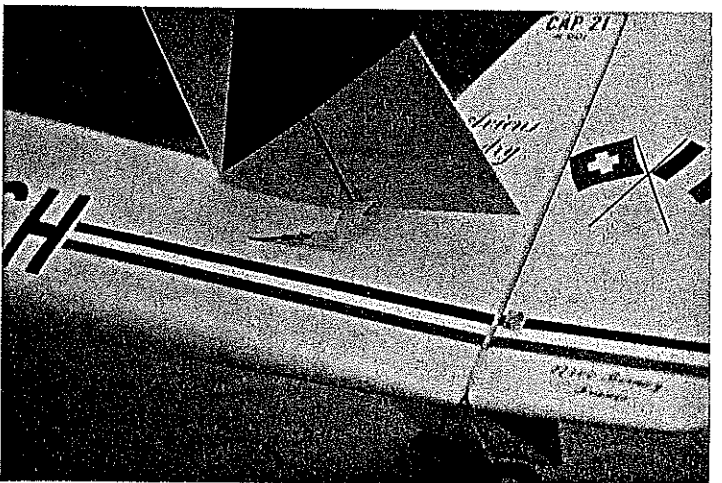
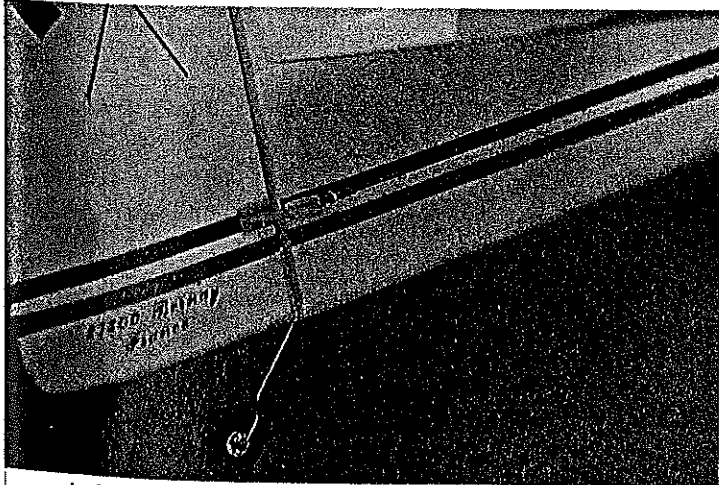
It is always nice to be able to say that a model flew right off the board without a



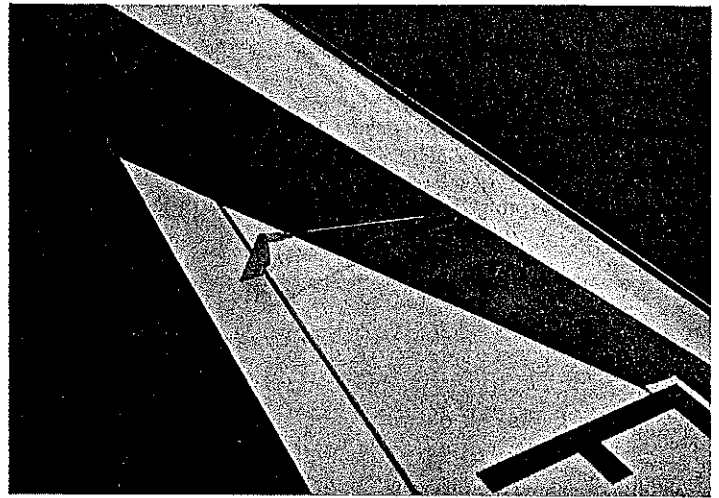
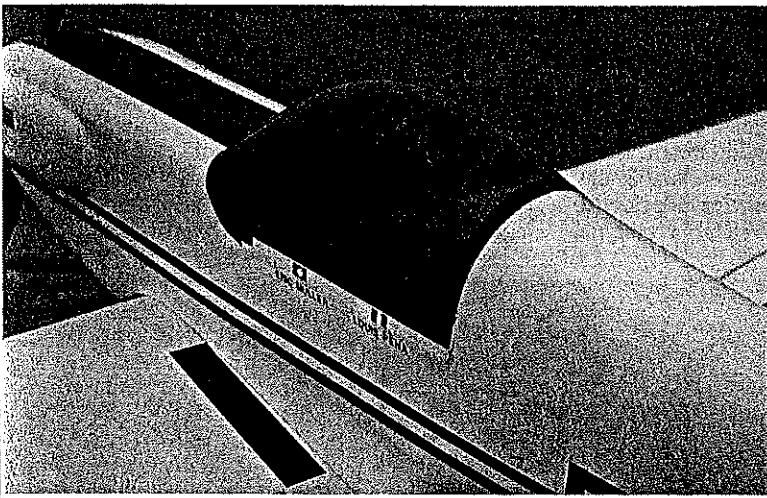
Left: Ready to install the engine, engine mount, and all the hookups. Note the large air exit hole at the firewall bottom. Apply slow-curing epoxy to the inside of the compartment for fuel proofing. Right: The engine installed and ready to go. The angle on the exhaust/smoker is a little tricky; author used the cut-and-try method to get it just right before silver soldering the joint. Note the fiberglass wrapping.



Left: Registration letters on the wing bottom were cut from MonoKote and ironed-on with low heat. Fuselage letters were cut from a black Sig decal sheet. Right: Fillets fair nicely into the trailing edge. Angled balsa strips on the wing are where the MonoKote joints occur.



Left: The simple wire tail wheel assembly mounted in a strip aileron horn is reliable and sturdy. The Sullivan cable pushrod used resulted in a neat installation. Right: Sullivan pushrod on the elevator horn. Keep length of the cable outside the fuselage as short as possible to minimize cable flexing under flight loads. The jam nut on the snap link keeps the cable from turning (and changing the trim) in the air.



Left: The pilot is seated and ready to go. Earphones and chute straps add to the realism. Black trim around the canopy is Sig Skybrite; don't use ordinary dope, as it will shrink the canopy out of shape. Names are from dry transfer lettering; flags were hand-painted. Right: Ailerons have long horns with the flanges cut off, buried in the ailerons and secured with CyA. Aileron pushrod links installed after covering.

single negative thing showing up. Such was not the case that spring morning of the first test hop. (Our club is now flying from a grass strip that the City Parks Department has allotted us in the Community Center Complex. Still in the developing stages, it is not like a golf course green. In fact, it is a little bumpy, which causes us to hold some extra up-elevator when accelerating with a tail-dragger.)

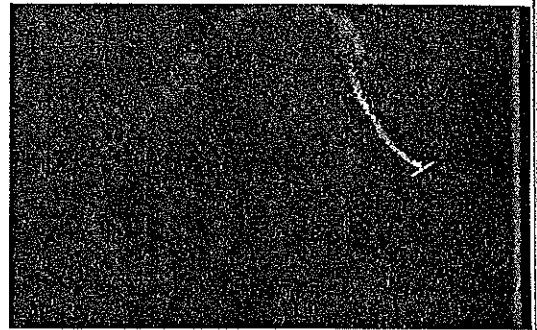
We bolted on the wing, checked the clevises, range-checked the radio, filled the tanks, and fired-up the engine. After checking-out the throttle and making sure the engine sounded right, the plane was lined-up on the strip, the throttle was opened, and a little right-rudder and up-elevator were fed in. About the time it broke ground, the engine went rich; to make matters more interesting, the model had too much aileron and elevator throw. Visions of going back to the workbench flashed through my mind as the model floundered around.

With the hair on the back of my neck

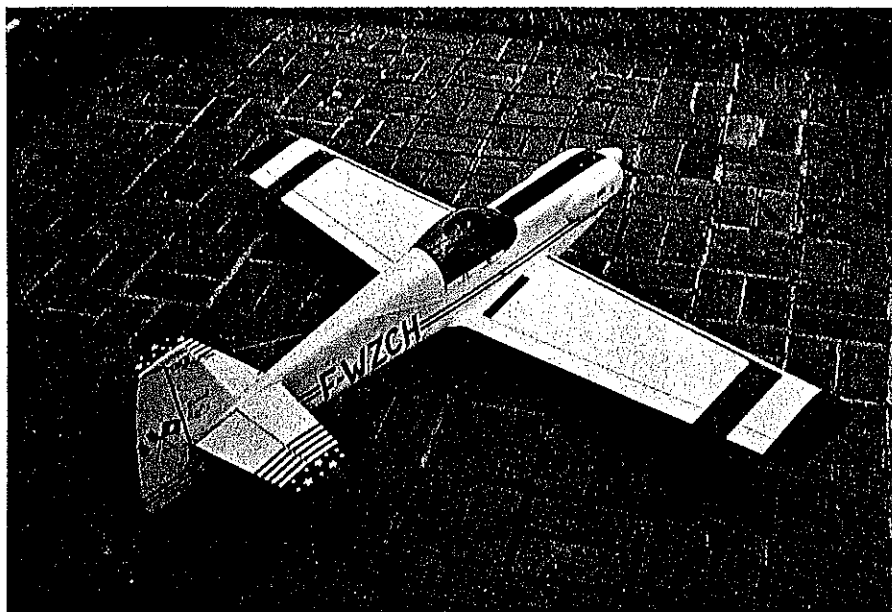
standing straight out, and my heart just beginning to pump again after returning to its proper place, I managed to get the model settled down and made a slow-climbing 180° turn. The engine picked-up a little, so I decided to make a few more turns and then landed the model OK. I turned the radios off, walked around for a few minutes to settle down, then refilled the tanks. The aileron pushrods were moved to the outer holes in the horns, but I could not adjust the elevator any more, as the clevis was already in the outside hole.

With the recent education still fresh in my mind, I fired-up the engine, leaned it a little, then headed down the strip not holding as much up-elevator. In the air it went as any self-respecting flying machine is supposed to do. Ah, the sweet smell of success.

The force setup on this model is typical of any of the low-wing Pattern and sport machines now flying, but for anyone who has been flying mid-wing airplanes for a



Author's pioneering efforts to develop a smoke system for small two-stroke engines is beginning to pay off. He's continuing with experiments to get the smoke more dense.



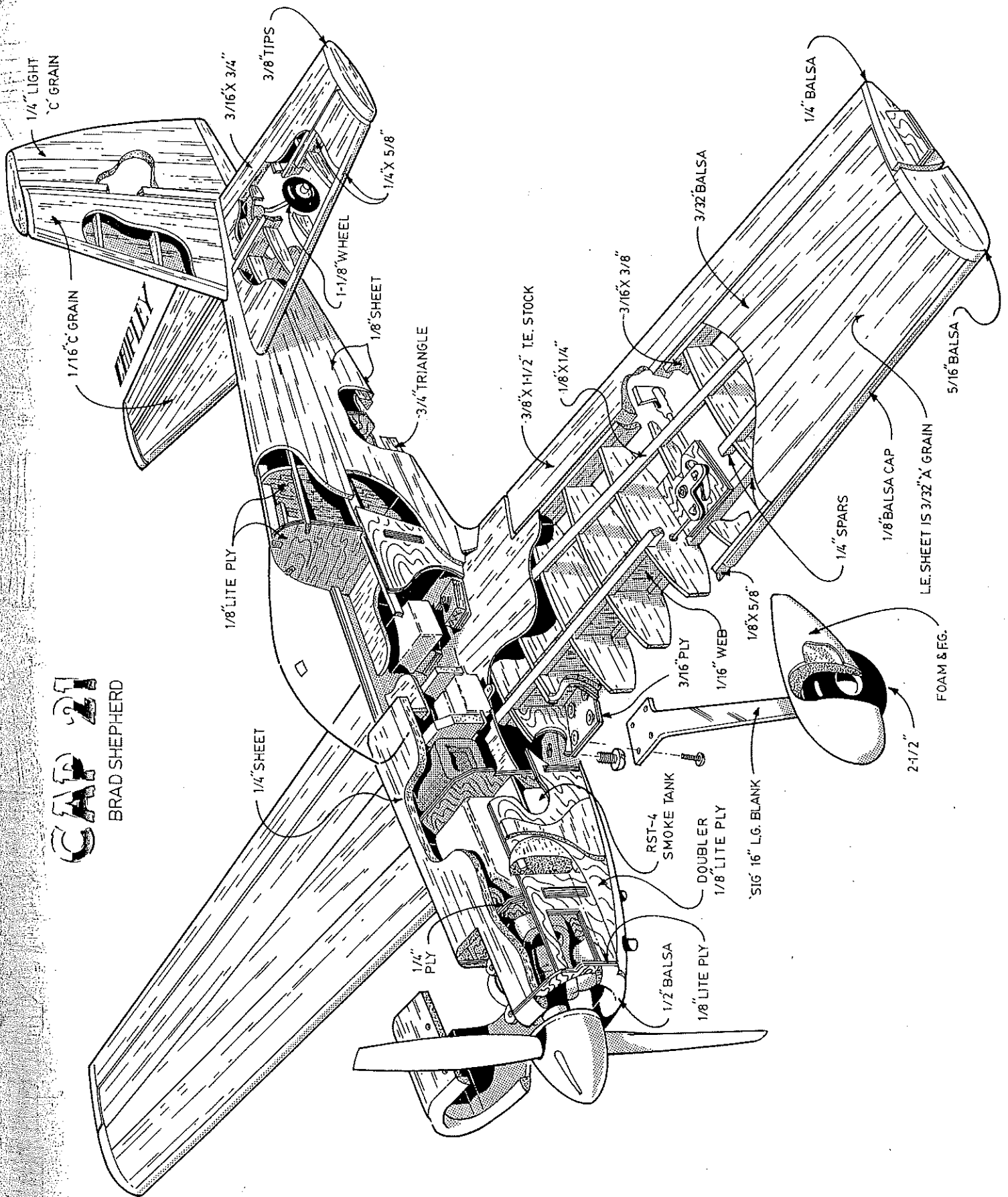
Wing walks are MonoKote that has been roughened with sandpaper and applied with a low heat setting. The canopy is tinted with black RIT dye according to instructions in the text.

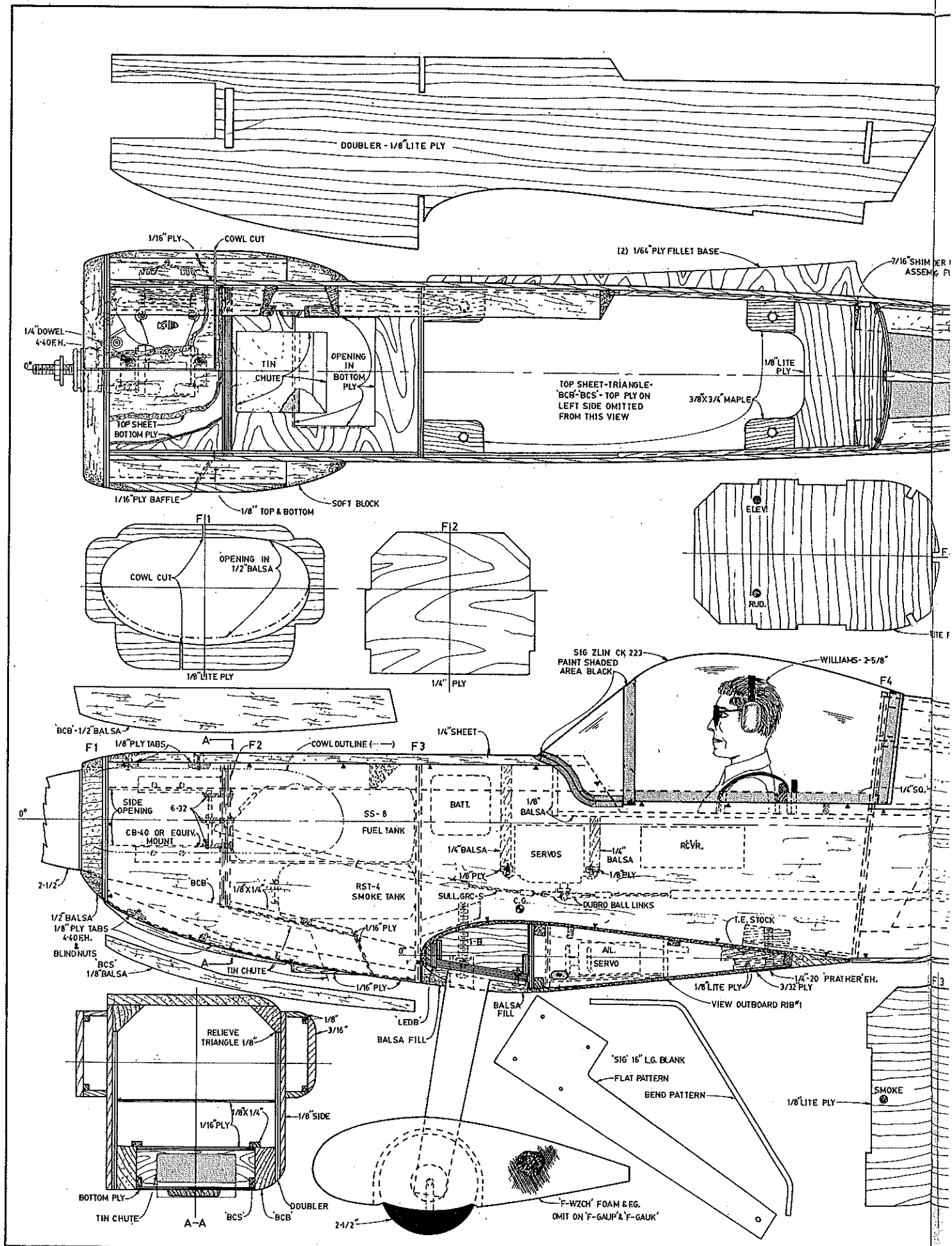


With the smoker pumping away, it looks like the full-size airplane taking off from a grass strip in the heart of France. Author relates, sadly, that his club lost this beautiful flying site to tennis players who had more influence with the city fathers than the modelers.

CAP 21

BRAD SHEPHERD





27300 Bernay
France



CAP21
N001

FWZCH

*Avions
Mudry*
LOUIS PĚNA ERIC MÜLLER

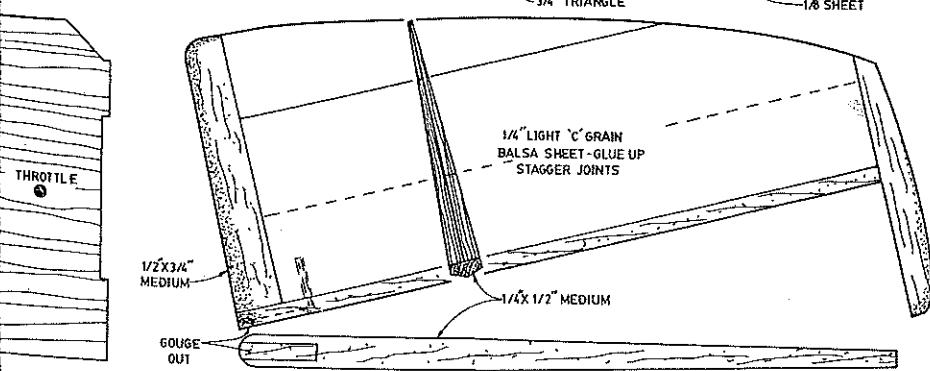
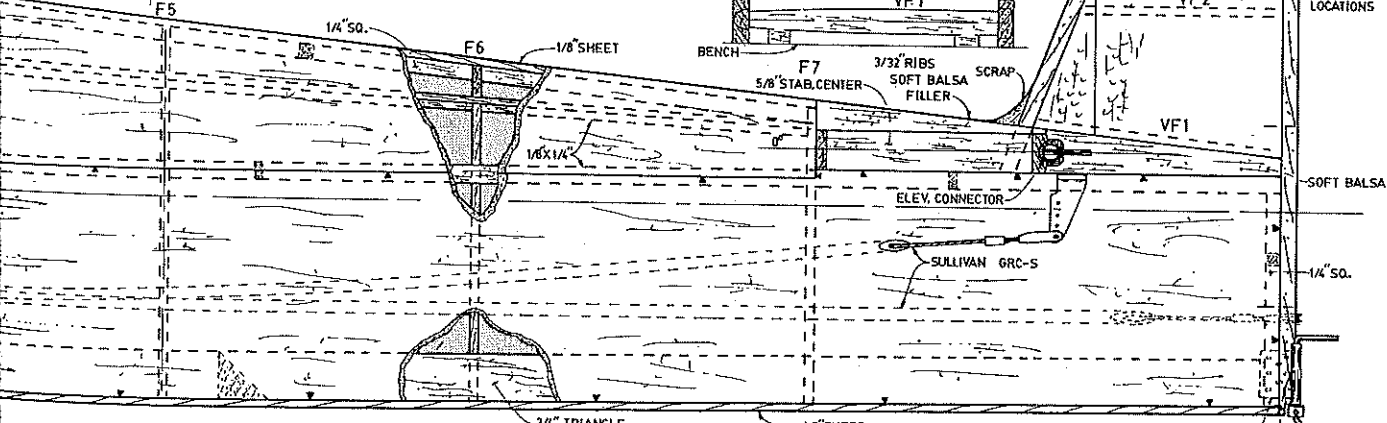
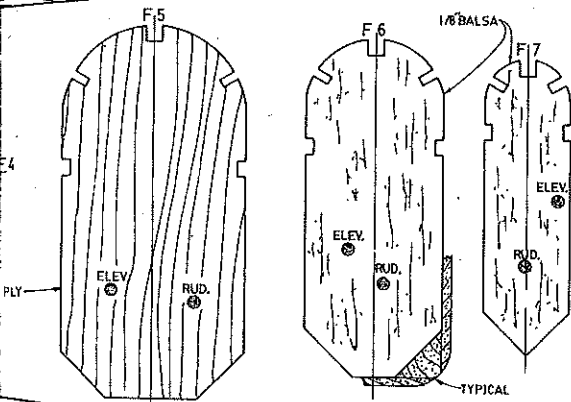


FUSELAGE DECORATIONS
SHOWN ACTUAL SIZE

NOTE
KEEP THE TAIL LIGHT!

NOTE
ALL MATERIAL Balsa
UNLESS SPECIFIED

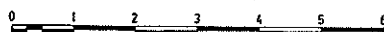
NOTE
FIN IS JIG BUILT -
MAKE SURE LE & TE.
PIECES ARE ACCURATE



NOTE
AS DENOTE BASIC
1/8 SIDE

AIL. BEARING
3/32 BRASS BUSH
1/16 MW.
1-1/8 WHEEL

CAP21
FRENCH WORLD CLASS
AEROBATIC AIRCRAFT
SPORT SCALE FOR 40
DESIGNED-DRAWN-BRAD SHEPHERD



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long time, it is going to take a little getting used to. Some up-elevator has to be fed in when doing knife-edge flight (which the mid-wings do not require), snap rolls are very scalelike, spin entry and exit is positive, and outside loops with snaps when the smoker is going are something to behold.

To find out how the model behaved at low speeds, I took it up to about 200 ft., cut back the throttle, and watched it slow to a speed I thought would be impossible (with this airfoil) without it stalling. I wouldn't recommend slowing too much on the landing approach, though; instead, keep some power on until it is a few feet off the deck, then cut the throttle and let it settle in.

Don't be surprised at the flight qualities of the CAP 21 design. Naturally, it was conceived to be a challenger in world class competition by flying maneuvers in a way more-ordinary flying machines can't. Hence, it is super-responsive to any changes in the control surfaces. The same holds true for the model, and I would not recommend it to someone who hasn't had much experience in flying all-out aerobatics. This model will do anything in the book, and although this is not meant to scare anyone off, forewarned is forearmed.

The model. A "lead sled" will not perform aerobatics well. Although this model is a little larger than average for a .40, careful selection of wood should result in a plane that will do a full schedule.

I can't begin to give angles or dimensions on the exhaust stack/smoke chamber due to a lack of education in geometry. It was strictly a cut-and-try eyeball thing that was

silver-soldered together and exits through a tin chute made from a gallon can. To you pipe fitters out there, it is a rolling offset. An old modeling friend, Eldon Wilson, gave me some good ideas on the smoker which I have incorporated to produce much denser smoke. Instead of steel wool, use copper wool made from a car battery ground cable or welding cable; unravel the copper wire, and bunch it up like steel wool. Thin-walled 1/8-in. copper tubing with four holes punched in it was used for the smoker fluid inlet.

The wheel pants were shaped from open-cell foam (not beaded) and covered with glass cloth and slow-curing epoxy. When cured, the foam was dug out of the wheel wells, and a coat of resin was applied to the inside.

The canopy was tinted using black RIT dye and hot (not boiling) water in a large pan. (This was a tip from Claude McCullough.) Dip the canopy in the solution for about 2 min., then take it out and rinse in cold water. If the canopy needs to be darker, repeat until the correct shade is obtained.

(While on the subject of the canopy, if you are going to enter AMA Sport Scale contests, there's a potential problem. A pilot has to be glued-in before the canopy is glued-on in order to satisfy RC Sport Scale model requirement rule 53.A.3, which specifies that a pilot must be visible in flight. But the next sentence effectively says the judges are to put on "blinders" and disregard the pilot when static judging. You can build a sliding canopy if you care to go to the trouble so that you will be able to

remove the pilot figure for static judging and take care of the apparent contradiction, also present in rule para. 53.A.5.3. Me? I glued-in the seat, parachute, straps, and pilot figure before gluing-on the canopy. Hopefully, the judges can figure out what to do.)

I won't go into step-by-step details of constructing this model, but I will cover the high points. Most everything in building this model is straightforward and conventional, and all the dimensions are on the plans.

Wing. There are three ways to make a set of ribs: cut them out individually using the patterns on the plans, make ply root and tip ribs and then carve a stack of blanks around these, or cut a wing panel from foam (using the tip and root ribs), then cut the foam at each rib station and trace around the shape of the foam at each station. The last method is probably the most accurate of the three if care is taken when cutting the foam.

Wing panels are built right-side-up, pinning the aft flat portion of the ribs to the bench and bottom spar. The top is sheeted while in this position. Panels are glued together upside-down in the jigs after establishing a long straight line on the workbench. The center-section sheeting on the bottom is glued-in after the dihedral braces, ply sub-ribs, and wing mounting plate are epoxied in place.

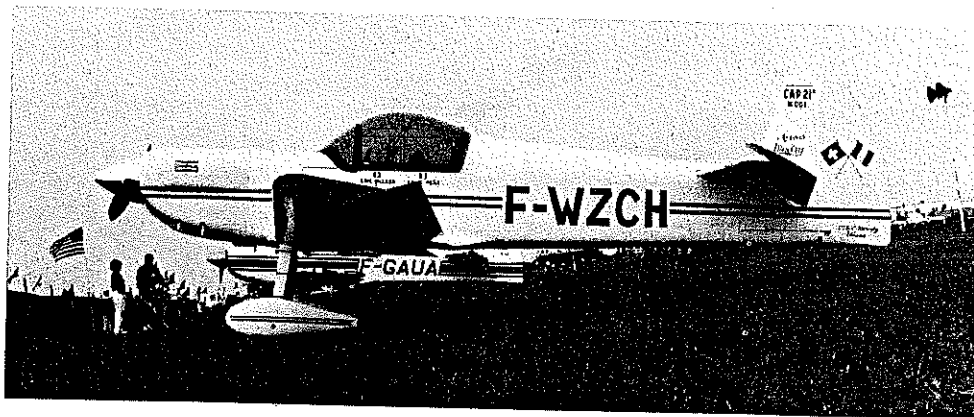
The landing gear assembly is fitted after the wing is removed from the jigs, then the rear ply plates and top center-section sheeting can be glued in place.

The stabilizer is built using the leading and trailing edges as jigs, applying sheeting while it is pinned down. The elevators are built flat on the board. After pinning the leading and trailing edges down, 1/16 sheet balsa is glued in place, and the ribs and 1/4-in. scrap are then glued on the top sheet.

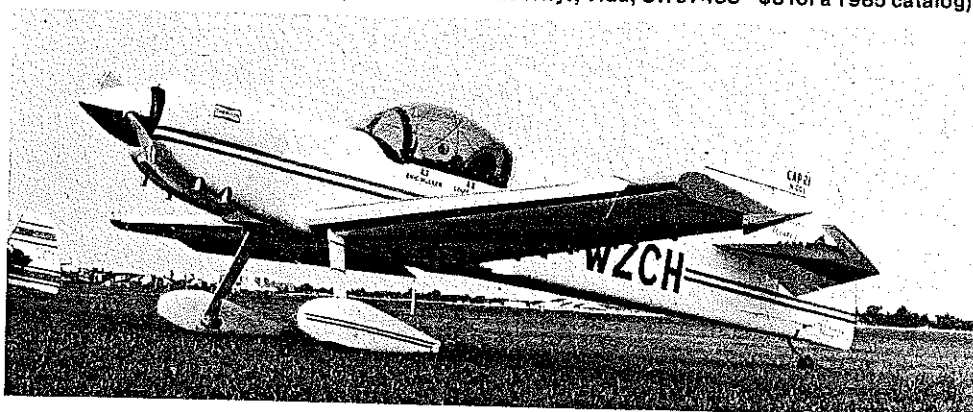
The fuselage is assembled over the top view on the plans. Remember to shim under Former F4. The turtledeck sheeting was soaked in water, wrapped around a Turtle Wax bottle (the tapered one), and allowed to dry overnight. It comes out to be almost exactly the right curve for the turtledeck formers (nice how that worked out, huh?). Leave the 3/8-in. center section of the stab flat, as this allows the stab to be glued-in without getting unwanted incidence.

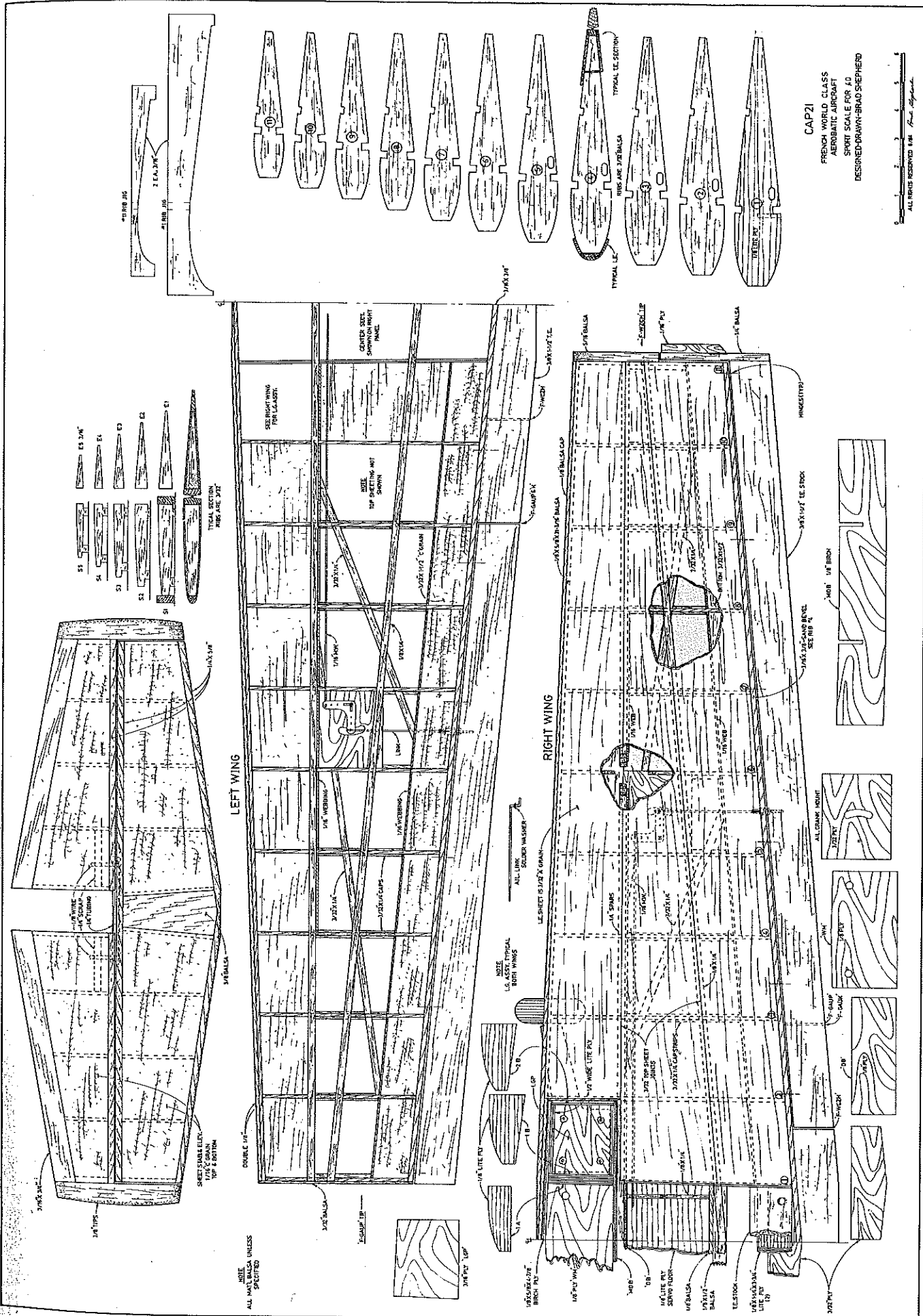
Covering. Super MonoKote was used on the wing. If you don't use heat-shrink material, the 3/32 x 1/4-in. angle strips can be omitted on the bottom. The fuselage was covered with light silkspan with a dope finish applied over it. The registration lettering is from a dry-transfer sheet, and the flags were painted with colored dope. The Champion logo was cut from the side of a spark plug box and glued on (just about the correct scale size).

Enjoy the CAP 21. It's a blast! But remember—it will do everything in the book (and some things that aren't)!



The full-size inspiration for this model, pictures courtesy of Repla-Tech International. Three-view drawings and photographs for documentation/detailing can be obtained from the company (Repla-Tech, 48500 McKenzie Hwy., Vida, OR 97488—\$3 for a 1985 catalog).





CAP21
 FRENCH WORLD CLASS
 AEROBATIC AIRCRAFT
 SPORT SCALE FOR 10
 DESIGNED-DRAWN-BRAD SHEPHERD



NOTE:
 ALL MATERIALS UNLESS
 SPECIFIED