

Fancy Cut ... Plus!

By Dick Sarpolus

The original design was easily built and a popular Giant sport design for smaller gas engines. This enlarged version mounts the bigger Zenoah G-62 or Sachs 4.2.

My *Fancy Cut* design was published in the January 1994 issue of *FLYING MODELS*. It was designed for power by such engines as the Quadra Q-42, Zenoah G-38, SuperTigre S-3000, Sachs 3.2, etc. Two good friends of mine had a couple of larger, more powerful engines (a Zenoah G-62 and a Sachs 4.2) that needed planes behind them, and asked what I thought about using those engines in the *Fancy Cut*.

Obviously, the larger Zenoah G-62 would provide a good deal more power with its 50% displacement increase—but it would also bring along close to two pounds of additional weight. That weight, added to a Quadra Q-42 powered *Fancy Cut*, would increase the wing loading from 30 ounces/square foot to about 34 ounces/square foot. Still not too bad, but I felt a larger airframe would be better suited to the larger, more powerful G-62. And the Sachs 4.2, while lighter, could certainly handle a larger aircraft.

Just how would you take an existing design and enlarge it a bit for a bigger engine? You could blow up the plans by a percentage—say 5% or 10%—increasing every dimension of the original design; that would be pretty easy. But some of the design features shouldn't be enlarged; there's no reason to make the fuselage wider, or higher, or

go to a different cowl and plastic canopy.

I enlarged certain portions of the design by the "eyeball" and experience method; if it looks good, it'll probably fly good. The wing span was increased by 2 inches, or 2%. The wing root chord was increased by almost 2 inches, or 12%. The tip chord was also increased, by 15%. The aspect ratio was lowered, to keep the wingspan down. This all resulted in a new wing with a span of 92 inches and an area of 1540 square inches, compared to the original's 1300 square inches.

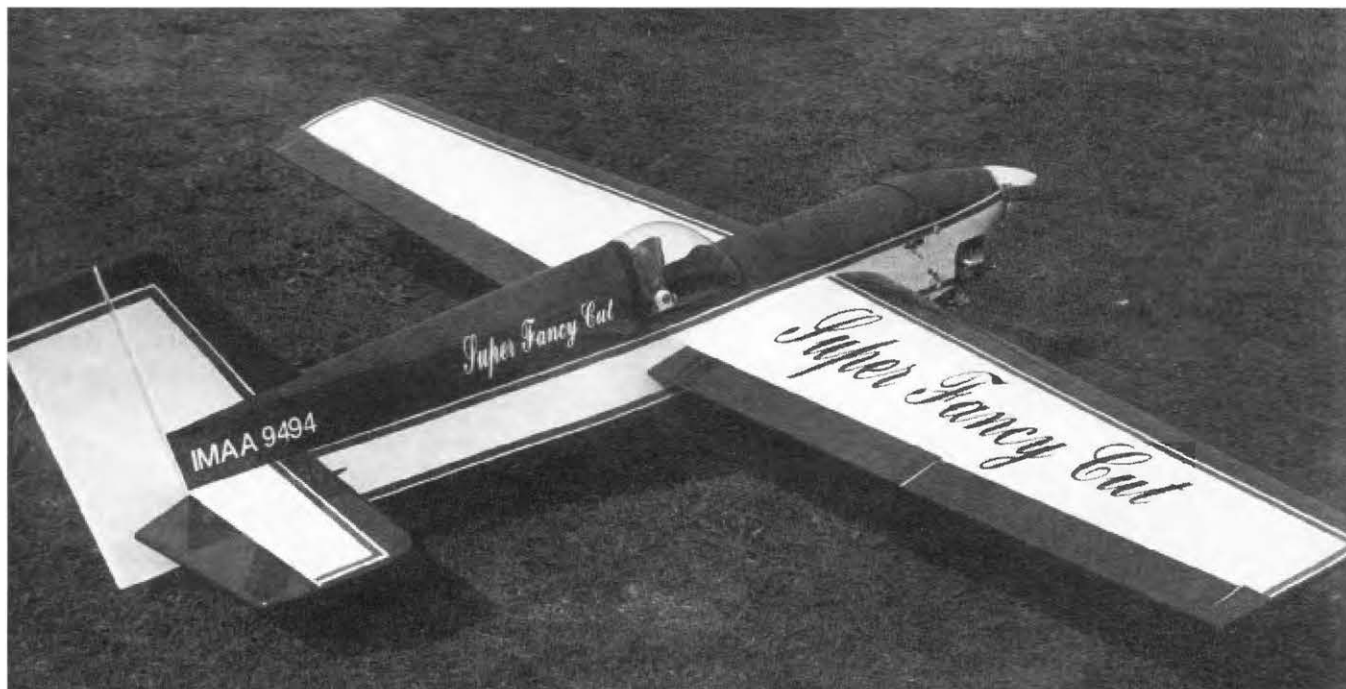
The larger wing area would easily handle the increased engine weight and keep the wing loading down. Now, with a larger wing, a larger horizontal stab area was needed to keep the stab/wing relationship the same, so it was blown up with a size increase. The vertical fin and rudder area was also increased. The fuselage, while it didn't have to be widened, was lengthened overall a few inches, about 3%. The nose length was actually shortened a little, for balance with the heavier engine.

Even if the overall weight was increased by three pounds with the heavier engine and more structure, the wing loading would remain the same. The same plastic canopy and fiberglass cowl was drawn in, although a different cowl was actually used on one of the prototype aircraft for a change in appear-

ance. With all these changes, a new set of plans was drawn up incorporating new foam core templates, etc. It's still the same design, just a little larger in areas and moments. So the name change; now it's a *Fancy Cut Plus*.

It worked. The larger aircraft flies well with the bigger engine and handles as easily as the original plane does. Two aircraft have been built to the new *Plus* layout, one powered by the Zenoah G-62 and the other with a Sachs 4.2. Both fly well; the Zenoah powered version did end up with a heavier wing loading due to a fiberglass covering and a paint job, while the Sachs powered machine (lighter engine) came out lighter with a plastic film finish. That one weighs 18 pounds, which works out to a wing loading of only 27 ounces/square foot. So if you've got or prefer a larger, more powerful, and probably a heavier powerplant, for a quick building, easy handling sport/aerobatic project, consider the *Fancy Cut Plus*.

The plug-in wing panels make for easier transportation and enable the mid-wing design without having to cut deeply into the fuselage. The swept back vertical fin, turtledeck, and large canopy give a bit different appearance. With the thick, fully symmetrical airfoil, the plane is aerobically capable for sport use. This isn't a contest machine;



Dave Hollander's *Fancy Cut Plus* sports the original name, *Super Fancy Cut*, in computer cut vinyl script lettering. It certainly adds to the visual appeal!



Dave's model is powered by a Sachs 4.2 engine, fitted with a Davis remote muffler. This yields a very quiet, yet powerful set-up. Neat pilot, Dave!

it's an easy flying fun job. Foam core wing panels, fuselage top blocks, and tail surfaces for easy building.

The fiberglass cowl, plastic canopy, and fiberglass wheel pants are available from Fiberglass Specialties (38624 Mt. Kisco Dr., Sterling Heights, MI 48310). The aluminum landing gear is by ACE R/C. One of the prototypes used Byron's large Sukhoi aluminum landing gear for a different appearance and more prop clearance; it worked well. Rather than the cowl shown on the plans, Fiberglass Specialties' TR-260 cowl was used on the Zenoah powered aircraft, again for that different appearance. It also worked out well; builder's choice.

The aluminum tube wing joiner system is becoming more common as more mid-wing aircraft designs are being modeled. The plug-in wing panels for a plane this large are convenient to transport and the fuselage is easier to build without a deep cutout for a one piece wing. The aluminum and phenolic tubing is available in sets from Gator R/C Products. You do have to make a removable bottom section on the fuselage for access to the interior, but that's an easy task.

As mentioned earlier, fiberglass cowls and wheel pants are available from Fiberglass Specialties and the aluminum landing gear is a product of ACE R/C. Other cowls and landing gears could be utilized. Get the plans from FLYING MODELS, have the foam cores cut by someone in your club or a commercial supplier, and there's not too much more work to build up this design.

With this basic construction, you might just cut out the parts and begin building in your usual manner. I'll go over the procedure and techniques that I use. Starting with the fuselage, select firm to hard balsa for the two sides, edge gluing and splicing as needed to get the size required. Glue the 1/16-inch plywood doublers, 1/4-inch plywood

landing gear block doublers, stab saddle doublers, and balsa lower edge strips to the two fuselage sides. I like a 3/8-inch plywood firewall for the large engines, and usually laminate a piece of 1/8-inch and a piece of 1/4-inch plywood together.

With one fuselage side flat on the workbench, add the firewall and the next three bulkheads to that side, installing them perpendicular to the side. Glue the second fuselage side to these bulkheads; the sides are parallel from the firewall to the wing trailing edge position. Add triangle stock and

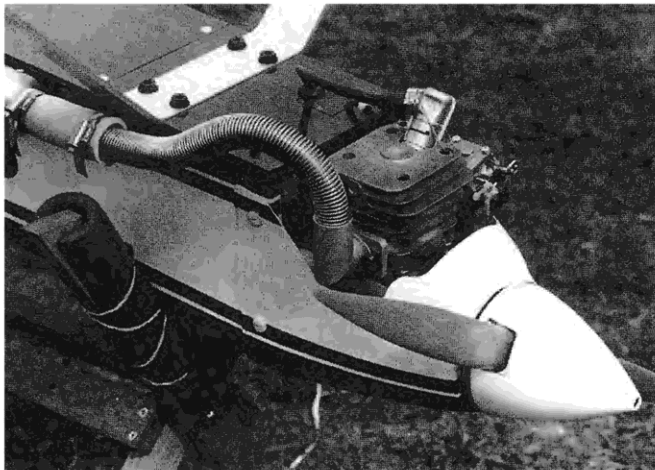
heavy fiberglass cloth behind the firewall to reinforce its joint with the sides. I also put several small screws into the firewall through the fuselage sides for extra reinforcement.

Pull the tail end together, installing the rear bulkheads. As this is done, be sure the fuselage sides taper in a straight line to the rear so the straight-cut foam top block will fit correctly. I trial-fit the foam rear top block as I install the rear bulkheads so I can trim or move those bulkheads if needed for the foam core to fit.

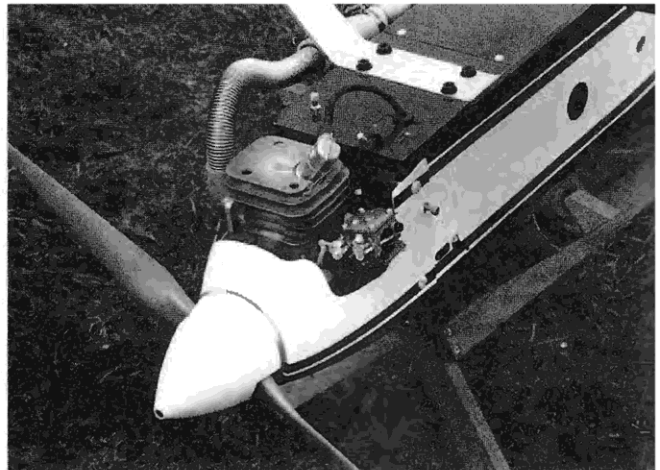


With Dave holding onto it, you can easily see the relative size of this great looking bird. It has a wingspan of 92 inches, and a very generous 1540 square inches of wing area. Build it light, and it will perform well.

Fancy Cut ... Plus!



Here's a close-up of the Sachs 4.2 in the nose of the *Fancy Cut Plus* (above left). It's neat and clean, and, above all, simple. Note the thin prop tips. Use ex-



trema caution when starting and setting the mixture! The other side of the fuselage reveals the carburetor (above right). Note the landing gear mount.

Before sheeting the foam fuselage top blocks, check to see that when sheeted they will line up flush with the lower fuselage assembly; the foam can be sanded if necessary for proper alignment. Sheet the foam blocks; I recommend Dave Brown's Southern Sorghum contact cement. Other adhesives would be thinly spread epoxy or any other contact cement you prefer.

Before gluing the fuselage top blocks in place, I fit the 1½-inch I.D. phenolic tube through the fuselage sides to accept the aluminum spar, but don't glue it in. When the wing panels are later fitted to the fuselage,

the tube can be glued in place after checking to be sure everything lines up correctly. A slot must be cut through the rear of the top fuselage block for the vertical fin installation; do this before gluing the block in place. Add the plywood landing gear mount to the fuselage. I wait until the engine is mounted to the firewall, then add the plywood forward bottom piece to the fuselage. Before sheeting the fuselage bottom, cut holes in the rear bulkheads and fit the elevator and rudder pushrods.

Before sheeting the foam wing cores, decide if you want to carve shaped wing tips

from balsa blocks, leave the tips squared off, or cut the cores off at an angle. I cut the core tips at an angle with a hot wire and a plywood jig. Doing the tips like this is easy and saves the weight of wing tip blocks plus the work of carving tip blocks to shape.

Further work is necessary on the cores before sheeting. A ⅛-inch plywood rib is fitted to the root of the core, and the core is then cut 12 inches out from the root for the installation of a second ⅛-inch plywood rib. Before gluing the plywood ribs to the foam, sand them, if necessary, to get a good fit flush with the core. Also sand the root end



Two-piece plug-in wings make the *Fancy Cut Plus* very easy to transport and maintain. The pieces are easier to finish this way, too!

of the foam core so it will fit flush to the fuselage side with the top wing surface at a right angle to the fuselage; this isn't critical as it can be shimmed with balsa and sanded to fit later. Be sure the second plywood rib is in place correctly; the hole in it for the spar tube establishes the dihedral. We want the aluminum spar to be parallel to the top wing surface, making it flat. All the dihedral angle is in the bottom surface of the wing. Mark the top of the plywood rib so it is installed toward the upper wing surface.

The foam can be removed for the spar's tube by first using a heated metal rod to put a hole through the core and then inserting the cutting wire, hooking it up to its bow, and cutting the hole with the plywood ribs as the templates. It could also be done by using a large, round file. The spar tube is epoxied into the foam core, through the plywood ribs.

Another hole is needed through the foam core from the root to the location of the aileron servo. I heat the end of a metal rod with a torch, and push the hot end through the foam, melting a hole for the aileron servo cable. A 3/8-inch dowel locating pin is glued into the wing panel, through the root plywood rib and a short plywood rib further out in the core.

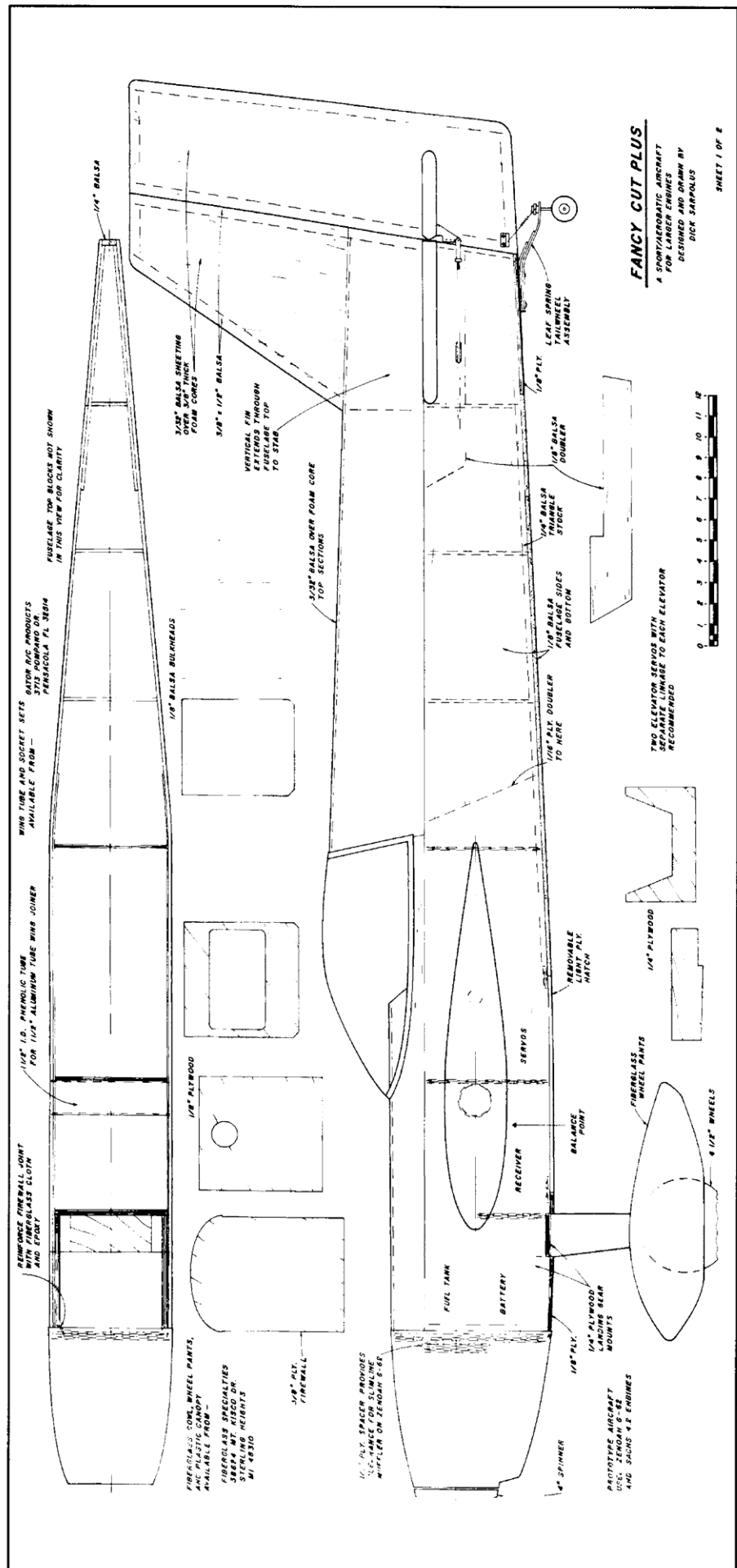
The cores are sheeted with 3/32-inch medium weight balsa, edge glued as necessary for the needed width. Edge glue the sheeting by taping the joints together with masking tape to make up the size needed, then flip the wood over, open the taped joints over the edge of the work bench, and apply the glue to the edges of the wood. With the sheeting flat on the bench, scrape the excess glue off the joint with a putty knife and weight the wood down until the glue dries. Peel off the masking tape, and use the taped side as the outer surface of the sheeting. I sand the inside surface of the sheeting with rougher paper to speed up the work, and use finer sandpaper to finish off the outer surface.

The toughest part of edge gluing the sheeting is getting a tight fit between the individual sheets; most cut balsa doesn't have good straight edges. I used to use a long sanding straightedge made from a piece of aluminum right angle stock. Now I use the Balsa Edge Sander made by Precision Model Products, a great item for the shop. I use the aliphatic resin type glues for this work, finding them easier to sand for a smooth joint.

With the core sheeted top and bottom, trim off the leading edge and block sand it square. Add an oversized leading edge strip, and plane and sand it to shape. Cut and sand the sheeting to match the trimmed tip angle, and add the sheeting there.

The ailerons are cut from the sheeted wing, trimmed down to allow for the balsa edging which is glued in place, and sanded to shape. Hinge the ailerons along the center line, using large, sturdy, freely moving hinges, whatever type you prefer. Recesses are cut into the lower wing surface for the aileron servo mounting; epoxy plywood mounting pieces in position to suit your servos, having them protrude from the wing surface just enough to hook up the aileron pushrods.

For extra reinforcement, I suggest fiberglass cloth and epoxy be applied around the inboard ends of the wing panels, extending

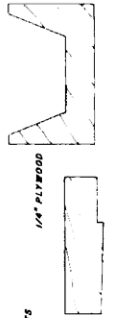


FANCY CUT PLUS
A SPORT/AEROBATIC AIRCRAFT
FOR LARGER ENGINES
DESIGNED AND DRAWN BY
DICK SHARPOLES

SHEET 1 OF 2



TWO ELEVATOR SERVOS WITH SEPARATE LINKAGE TO EACH ELEVATOR RECOMMENDED



Fancy Cut ... Plus!



The Davis muffler and the APC prop combine to keep this big bird extremely quiet and neighbor friendly! This photo also shows to good effect the very robust aluminum gear. Wheelpants would help dress it up.

about 10 inches out from the wing panel roots.

With the phenolic tube section in the fuselage but not yet glued in, slide the aluminum tube spar in place and add both wing panels. Check to see that the dihedral angle is the same on both sides; the top surface of the wings are straight, all dihedral is in the bottom surface. Also check to see that the wing panels fit closely to the fuselage on both sides.

To get a good fit, you might want to add a

layer of balsa to the wing root surface and sand that; it's easier than trying to sand the plywood root rib. Elongate or shim the holes in the fuselage sides if required. With the wing panels lined up properly, leave everything in place and epoxy the phenolic tube into the fuselage, working through the open fuselage bottom area. Be sure both wing panels are at the same zero angle of incidence; the panels are lined up by the $\frac{3}{8}$ -inch dowel stub in the wing roots protruding into their mating fuselage holes. Move and/or

shim those holes to align the wing panels.

To retain the wing panels on the spar, use a hardwood block glued into the wing, flush with the wing surface, and drill and tap the hardwood for a 10-32 steel retaining bolt. The bolt will extend down into the aluminum tube spar. Do one wing first, and with the bolt in place, drill the other wing panel. For easy alignment, I leave the tube spar in place in one wing panel when the plane is disassembled. The access hatch on the bottom of the fuselage can be removed for the aileron cable hookup when the wing panels are mounted.

The tail surfaces are built flat on a work bench surface. The $\frac{3}{8}$ -inch thick hot-wire cut foam sheets are cut to shape, with $\frac{3}{8}$ -by $\frac{1}{2}$ -inch balsa edging added, then sheathed with $\frac{3}{32}$ -inch balsa as was done with the wing cores. Tip blocks are added, and all edges shaped. With the wing mounted on the fuselage, I add the horizontal stab, aligning it with the wing. The vertical fin is added, aligned perpendicular to the stab. A plywood section on the bottom rear of the fuselage is used to mount a leaf spring tail wheel assembly.

Whatever type of hinges you use—either the various molded nylon flat hinges or the hinge point style—cut the slots or drill the holes into the surfaces and notch the control surfaces as appropriate to permit a close fit of the surfaces for a small hinge line gap, still allowing proper movement. I use $\frac{1}{4}$ -inch plywood for control horn mounts, recessing and epoxying the plywood into the tail surfaces. The horns are mounted with self tapping screws.

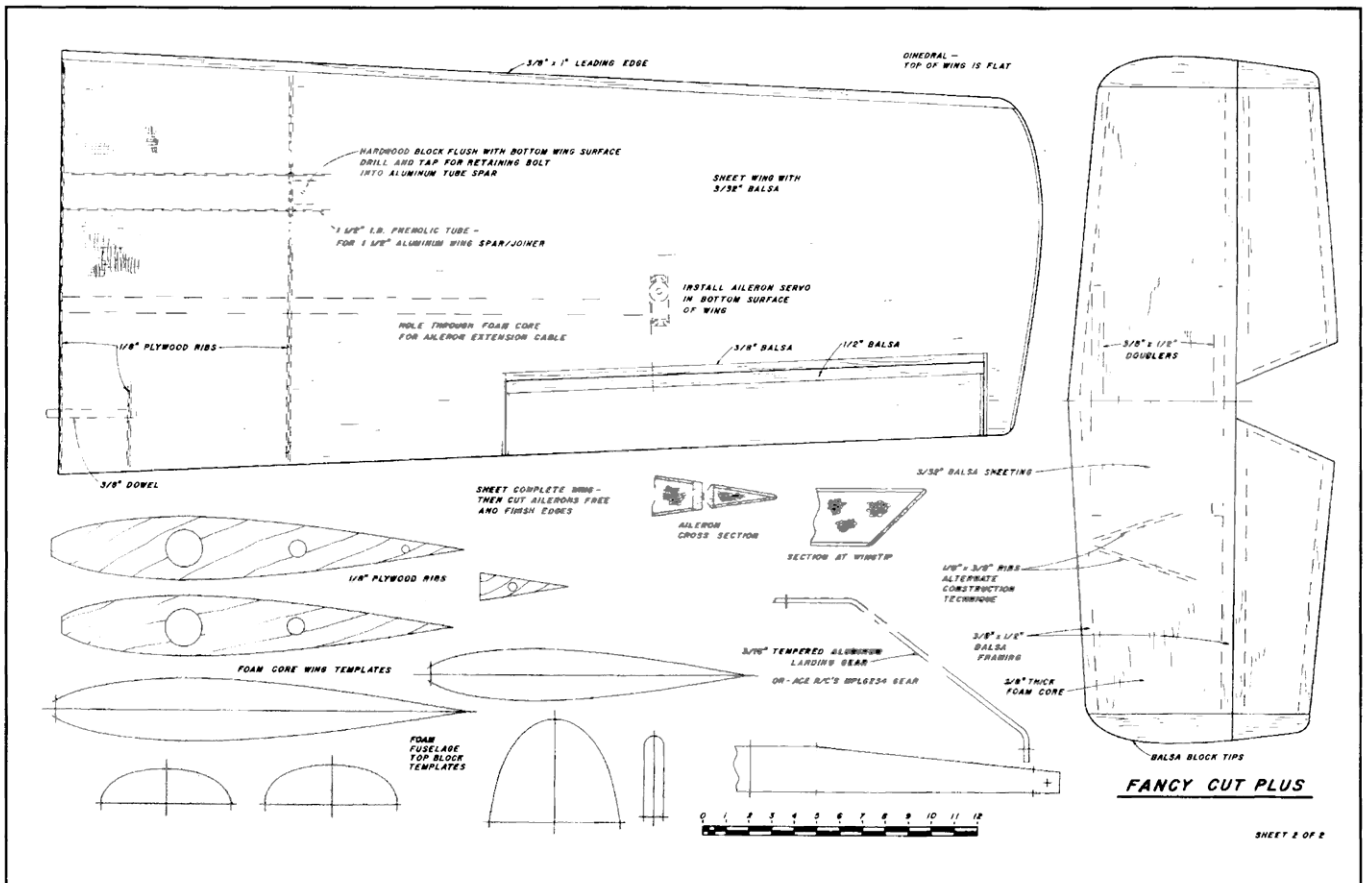
I use $\frac{1}{4}$ -inch plywood for the servo mounts in the fuselage, and recommend only the larger 4-40 threaded rods and clevises for



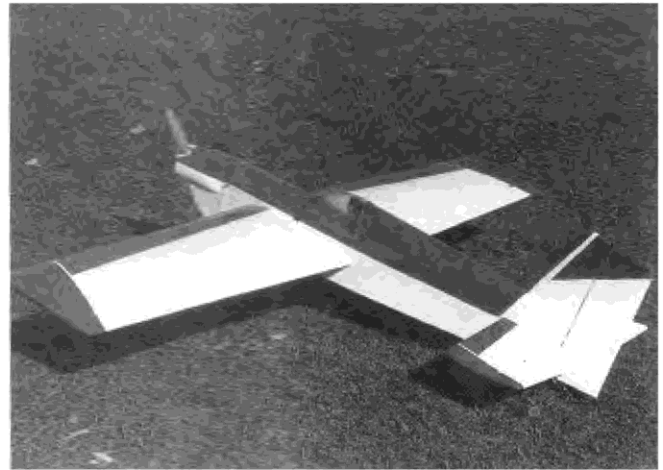
Large planes require more robust control linkages and servos. Don't skimp at this point, or the results could be a very large hole in the old flying field...or worse



Dave Hollander (L) and Lou McGuire show off their respective *Fancy Cut Plus* models. Lou's featured a Zenoh G-62 for power.



Fancy Cut ... Plus!



Here are two more views of Lou McGuire's *Fancy Cut Plus* (above left and right). Lou glassed and painted the surface of the model. He prefers wooden

Zinger props, and a more Sukohi-like landing gear arrangement. This is a model that you can customize to suit yourself. Just don't change the aerodynamics.

all linkages. Fiberglass tube pushrods are used for the elevator linkages. Using separate servos for each elevator, each with its own pushrod, allows the pushrods to be perfectly straight from the servo arm to the control horn. Since the pushrods cross over within the fuselage, one of the elevator servos is mounted slightly higher than the other to keep the two pushrods from rubbing together. The tail wheel steering is tied to the rudder with small springs; the actual linkage from the servo to the rudder can be done with a pushrod or a twin cable pull-pull setup if you prefer.

A long Y-harness is needed for the two aileron servos mounted in the wing panels. A 1200 mAh battery pack is used, wrapped in foam rubber and positioned beneath the fuel tank. If necessary, for proper balance, the battery pack can be relocated, even behind the wing if needed.

The exact engine mounting must be done to suit the engine used. The Zenoah G-62 needed a 1/2-inch thick plywood spacer be-

hind its mount to provide clearance for a Slimline muffler. The Sachs 4.2 was mounted with a plywood spacer block, and an exhaust tube connected the engine to a remotely mounted very quiet muffler arrangement by Davis Model Products. Quite a bit of the fiberglass cowl was trimmed away for the Sachs carburetor and exhaust connector. The cowl used on the G-62 powered plane was a TR-260 type, and with its wider shape, more of the engine was enclosed.

Either cowl will probably be long enough to overlap the fuselage, and can be held in place with four nylon bolts; drill and tap the fuselage sides for the cowl mounting bolts. If the cowl must be butted to the front end of the fuselage, hardwood blocks are glued to the firewall for the cowl mounting bolts. The plywood landing gear block is drilled and tapped for the nylon bolts which hold the gear in place. I like to mount the ignition switch on the front of the firewall, and cut a slot in the cowl for the switch handle. A 4-

inch spinner is required. The fiberglass wheel pants are mounted to the axles on the aluminum landing gear with brackets by B&B Specialties or Sig.

For the covering and trimming, you'll probably use one of the iron-on plastic films. They're easier and faster than painting, and save a lot of weight. If you prefer a glassed airplane with paint, go for it. One of the two prototype aircraft was painted and although heavier, it flies just fine.

We didn't expect any excitement when test flying the first *Fancy Cut Plus*, and we had no trouble at all. I did want to be sure the plug-in wing mounting system was secure, and did plenty of snap rolls, right, left, inverted, spins and full throttle flight and the wings stayed right where they belonged. This thing is large, but the two-piece wing does make it easier to transport.

If you're thinking of a larger aircraft to use that larger engine, for some sport and aerobic flying fun, consider the *Fancy Cut Plus*. **C**



Giant Sport flying is becoming one of the most popular pastimes in the hobby. Planes like the *Fancy Cut Plus* are perhaps the reason why. Try one and find