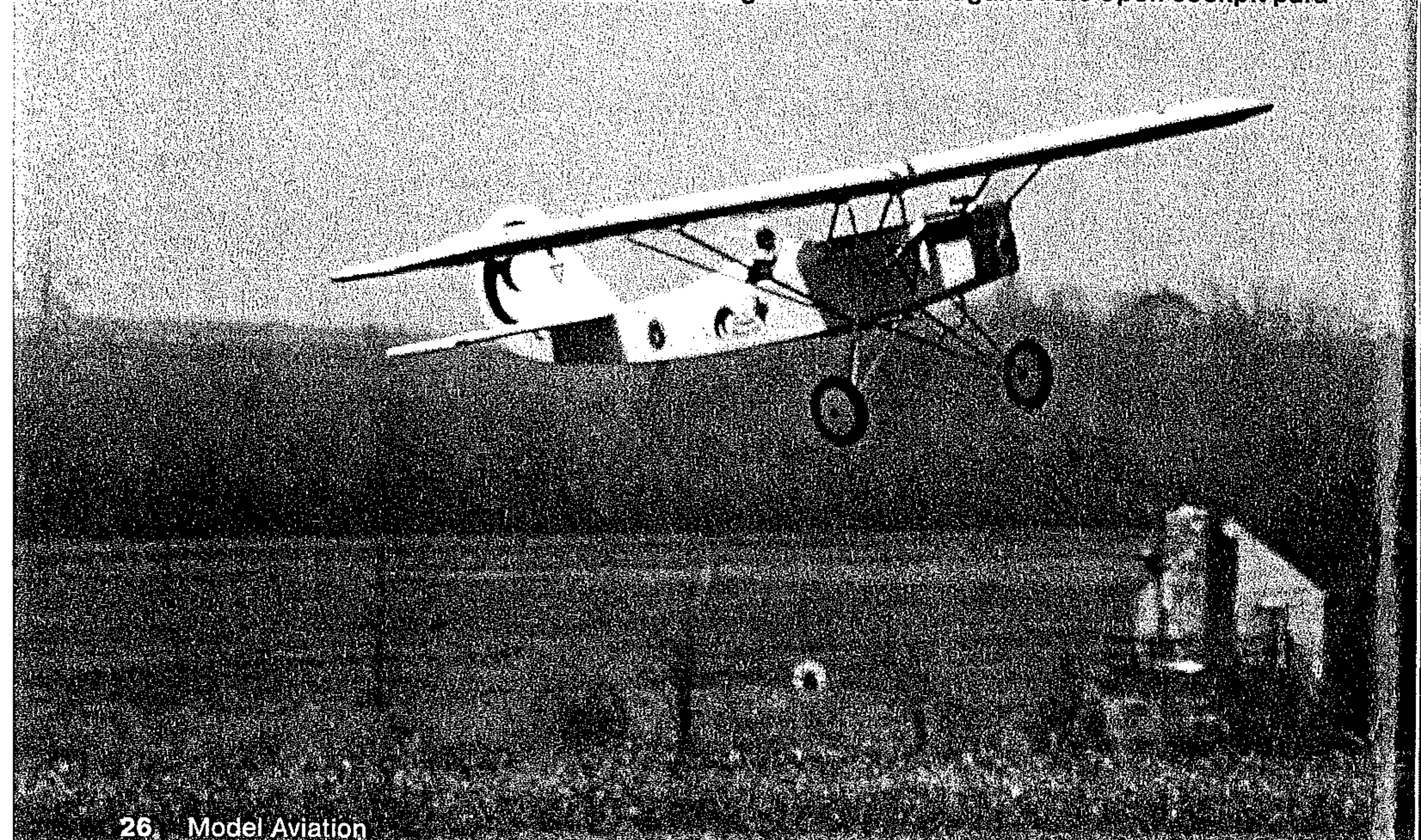
474

four-strok

This is one rooster that won't mind if you ruffle its tail feathers. In fact, this RC airplane has been designed to make it easy to change the tail configuration and the wing type so that you can experiment to find the best combination for your style of flying. Before you make any changes, though, try it as per the plans. You may be surprised to find a 'vintage' plane with a parasol wing that can perform smooth axial rolls and lazy outside loops. It's for a .90 four-stroke engine and four-channel controls. ■Bill Dickey

IN ABOUT 1941, my first and last job for a one-legged bootlegger was to deliver a Rearwin parasol from Roanoke, VA to a CAA (Civil Aeronautics Administration—forerunner of the FAA) emergency landing strip near Chilhowie, VA. Morning fog, rain, and low clouds began to threaten my route along the Blue Ridge Mountains. Brushing the foothills in formation with farmyard fowl had me "pinching leather" for higher altitude, and the cable-stressed Szekely up front wasn't helping out much.

With blissful ignorance and a few light spots in the overcast, I broke out on top of a sunlit "world above a world." Appalachian peaks penetrated the cloud tops, indicating the southwest course of the Shenandoah Valley. The damp chill in the clouds, the rain against the open cockpit para-



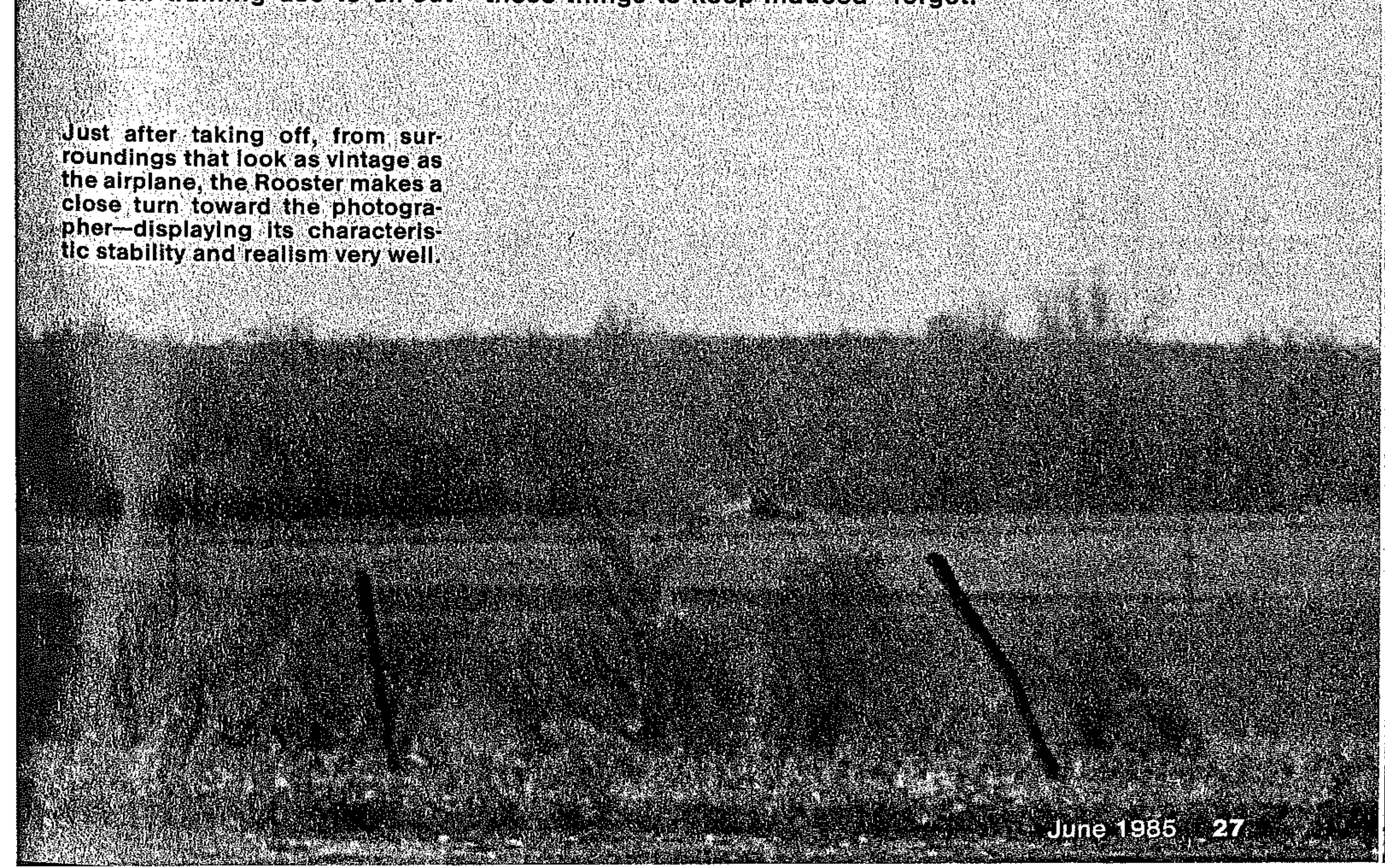
ke rooster

sol, and the lonely beauty above the clouds made an impression on a teenage dodo that thousands of military and civilian flying hours afterwards did not erase.

In addition to its other virtues, the RC parasol is a memory thing. If you like models with vintage character that fly scalelike, sound scalelike, and look scalelike (without the restrictions of a true-scale model) and can accommodate almost any "creative" flying, the Four-Stroke Rooster will appeal to you, too. The design lends itself to easy trim changes and modifications to the wing and tail surfaces for different flying characteristics—from training use to all-out freestyle four-stroke aerobatics. With the setup shown on the plans, it will fly at one-third throttle so slowly that you can walk along with it (and with outstanding control and stability). At full bore, it will fly the vertical patterns, as the all-up weight of 8¼ lb. closely matches the static thrust of the Enya .90. It features super-fast and easy field assembly and disassembly.

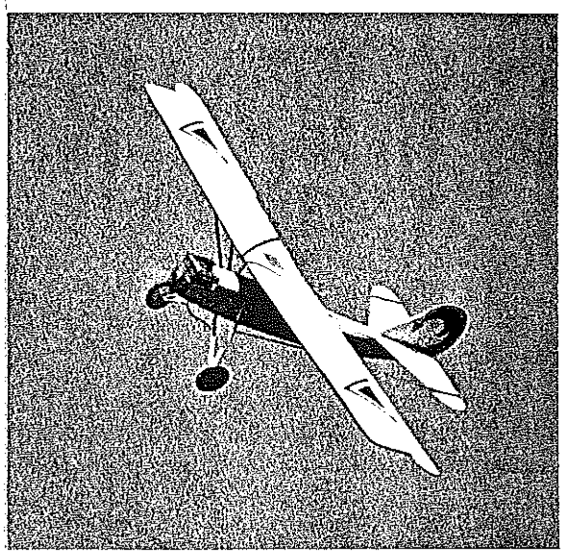
Begrudgingly, we must make compromises in most all designs. The cabane struts would look more vintage if they were taller above the fuselage, and the engine would be hidden better if mounted lower in the fuselage. I had to compromise these things to keep induced drag forces of the wing and the engine thrust line as close together as possible so that trim and aerobatic stability would not suffer too much.

The fuselage could be lighter with built-up construction, but I wanted sheeting and nylon (or silk) covering for its durability. The landing gear at 14½ oz. is a bit heavier than I would like, but I wanted a durable, wide-stanced gear with functional shock struts for rough, tall grass fields to protect those 15-in. props that cost five bucks apiece. The tail skid could be a simple wheel under the rudder, but I wanted a functional and durable system that I could install and forget.



Just after taking off, from surroundings that look as vintage as the airplane, the Rooster makes a close turn toward the photographer—displaying its characteristic stability and realism very well.

Sitting on the tarmac of the local airport affords us a good view of the struts and landing gear assemblies. Wing construction is a mixture of foam and open framework. Otherwise, the structure is built from balsa and plywood. The four-stroke engine produces a pleasing sound.



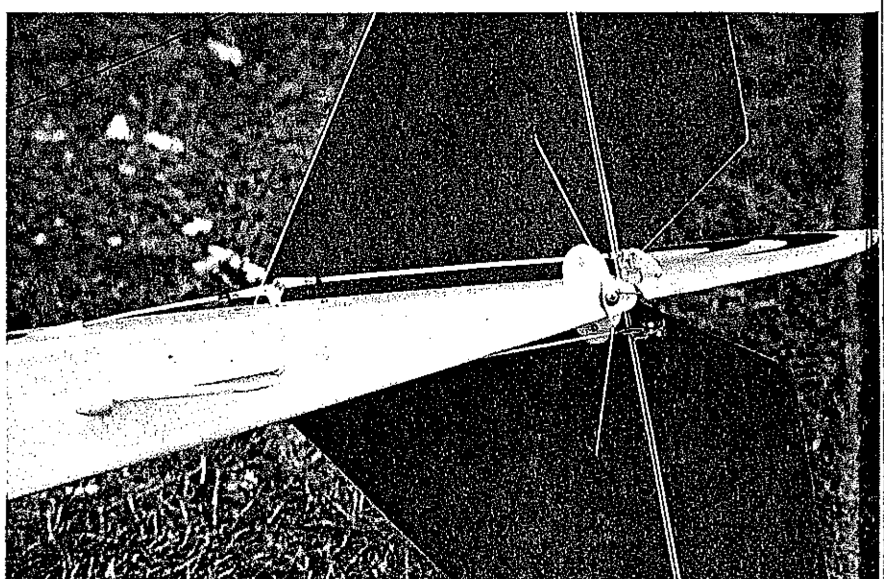
Turning into the final approach for landing. The model is comfortable in winds up to 15 knots with the wing shown on the plans—and up to 20-knot winds with a smaller wing.

This model is not a prototype. It has evolved from six other parasols over the past five years. It has been thoroughly tested, and there are no "surprises." Metal work is hard for most of us, but practice brings success (I sure have wasted a lot of 5/32 music wire!). Cabanes have been kept simple by letting the lift struts do some of the work. This system has been tested on other parasols and biplanes with great success. It also contributes to the great flexibility of the parasol configuration.

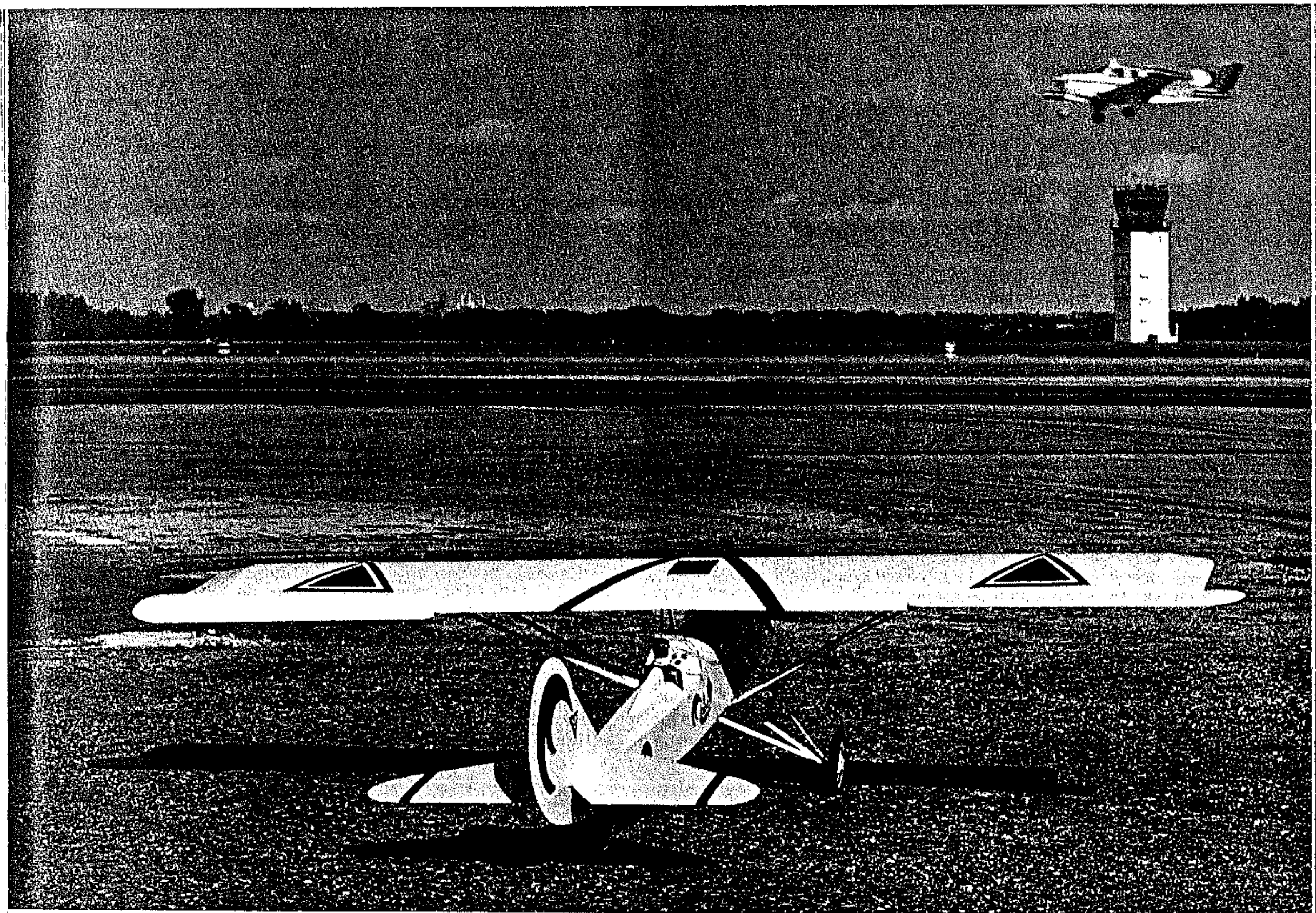
If you are a flier and fly just for the fun of flying, I guarantee the Four-Stroke Rooster will be a rewarding project. If you like show work, you might consider this: when you see a Cap-21, you expect precision, but when a vintage-looking model flies true axial rolls and slow, graceful outside loops close to the ground, you surely get everyone's attention.

Fuselage. The basic sides are ⅛ soft balsa sheet with doublers of ⅛ medium balsa sheet and ⅛ Lite Ply. Lay out the basic sides, and cut them to shape. Build-up the doublers, and cut them to shape. Cut lightening holes in the doublers before gluing them to the sides. *Be sure to make a right and left side (not two identical ones)!*

Fit and glue in the top and bottom longerons and doublers for the formers aft of the cockpit. Tape or pin the sides together, and true-up the edges to the shape shown on the plans. Cut out Bulkheads B through F, and attach the triangular balsa



Left: This is the setup the author uses for streamer dropping. Note the cabane fitting and its screw locking tab. Suggestions are made for aerial "tricks," though your imagination is the only limit. Right: Close-up of the tail group. Balsa guard at the skid front keeps out grass.



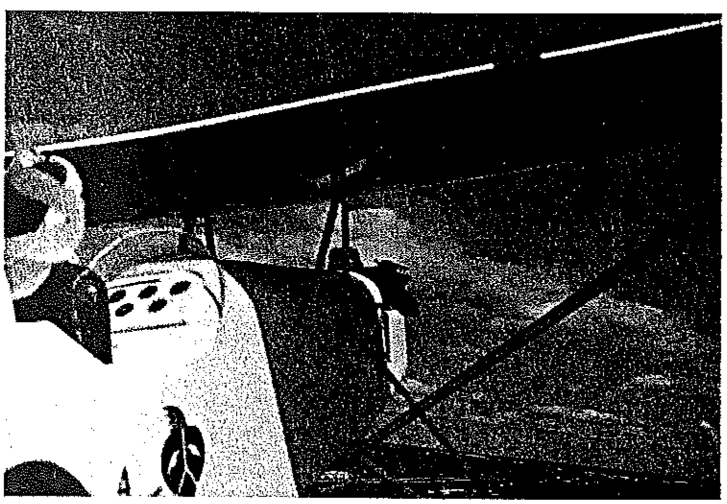
The model is poised as if ready to taxi out as soon as one of the newer generation of airplanes gets out of the way. Notice the "elephant ear" aileron tips; the author cautions builders not to remove them, as they provide aerodynamic balance and permit use of a small servo.

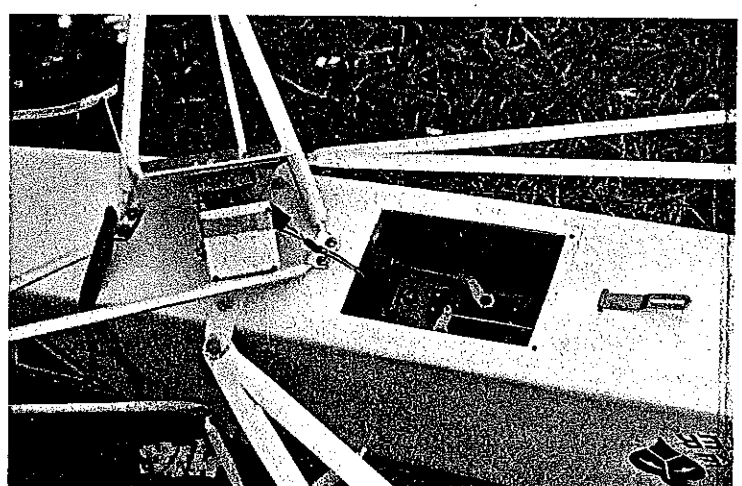
strips. Cut out the maple cabane mount blocks, and glue them to D and E; fit and glue the battery compartment floor to Bulkhead E. Cut out the maple landing gear blocks, and glue to C and E, observing the angle to match the belly sheeting.

I mounted the servos three-abreast under the battery compartment, with access through the utility hatch in the belly. If you like it this way, this is a good point to attach servo tray mounts to E and F. True-up all bulkhead edges to 3¾ in. on a table saw, if possible. It is important to have square edges, as no building jig is used (the square edges help in achieving good alignment).

To build the "box," lay one side, with the inner surface upward, on a level, flat surface. For glue penetration, prick the sides at the bulkhead positions with a pin or such (I use an old needle valve). Attach B through F, and temporarily lay on the other side (with weights on it) until the bottom joints have cured. Don't rush this, especially if the sides tend to curl. Glue on the top side next; before the glue sets, square the top and bottom sides with one another.

Lay the "box" belly-up over a centerline, and bring the ends together at the rear; glue in the tail block. Be sure to keep the sides vertical. Still over the centerline, build-up and fit G and H to the natural curve of the sides. Cut out Bulkhead I, and temporarily fit it in position. Make the maple stabilizer





Left: This is the view that an imaginary pilot might see as he climbs aboard (but obviously the "pilot" already is in the cockpit!). Right: There are several things to see in this picture—especially the 180° accessory servo (and secondary release clasp) and lift strut mounting.

Enya .90 being given a test run in the backyard, the prop just ticking over. Pilot was constructed from open-cell blue foam, clothes made from paper towel material that was later finished with enamel and Hobbypoxy. Featured model evolved from six prototypes before it.

mount block and the pine steerable skid block, then glue them to Bulkhead I. Glue on the ⅛ Lite Ply bottom plate, and drill for the aluminum tube bearing (slightly flare the tubing ends with a short taper punch). Glue Bulkhead I into the fuselage, and true-up the edges by sanding.

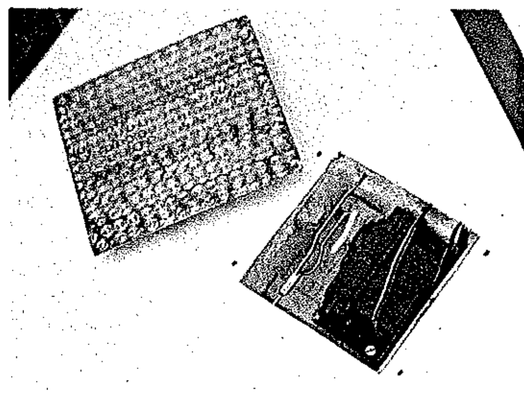
The engine mounts are made of lumberyard maple; together with the firewall and Nose Block A, a strong cradle for the engine is formed. Don't build this any lighter, as the larger four-strokers need a lot of dampening. About 1° of downthrust is used, another area of compromise. If we want to keep the radio trim for inverted flight reasonable, the off-angles must be kept to a minimum. Put in 2° down and 2° right if you feel better with it.

While installing the engine mounts, you may want to consider the type of throttle control routing you will use. Engines with the carburetor near the firewall are more difficult in this respect. I have been running the cable under the beam mount to the front, then using a 180° bellcrank back to the carburetor. This method also allows easy adjustment in the linkage.

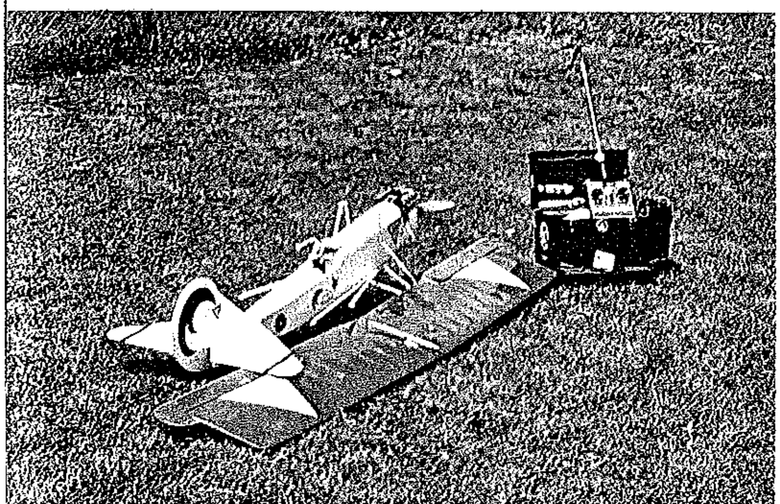
After the beams are in, fit and glue in the ¼ sheet balsa triplers under the beams; square up the front end, and fit the nose block, which is made of four laminations of ⅛ Lite Ply. I have better luck by making the nose block slightly oversize and, first, getting the required engine clearances, then gluing it in place and sanding off the excess. If you have a disk sander, use it to true-up the belly. Attach the ⅛ Lite Ply belly sheeting back to Bulkhead G. I like to cut lightening holes in everything, and I am able to save about 2½ oz. altogether in this way (I've known guys to spend $100 for lighter servos to save this much weight!). If you are a nitpicker, you may want to cut the holes in the belly sheeting before attaching.

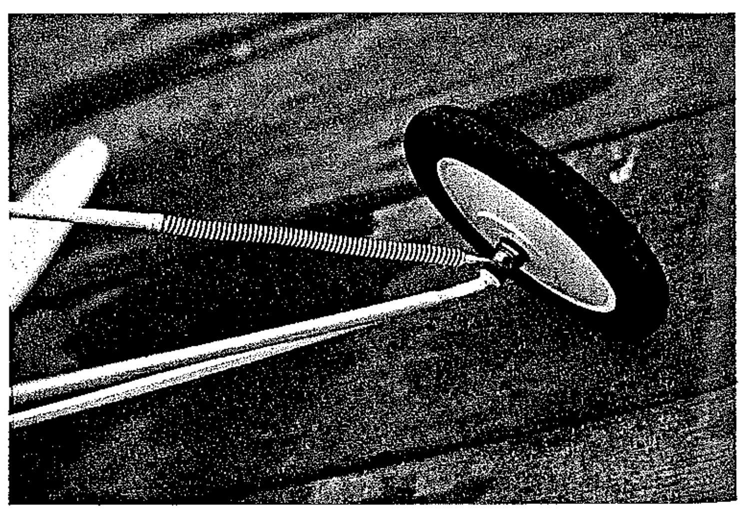
Run the controls for the rudder and elevator next. I use Nyrods. Sheet the rest of the belly with medium ⅛ sheet balsa applied cross-grained. While you have access, fuel-proof the inside of the fuselage from the front back to the cockpit area. Drill the cabane and shock strut mounting holes while the maple blocks are visible.

Fit the top formers from the cockpit forward, and sheet with ⅛ soft balsa. I like to mold this wet around something that is close to the fuselage shape, and then put it on dry (in this way, "valleys" will not form between the formers). Next, fit the formers and sheeting for the rear top deck. I left the

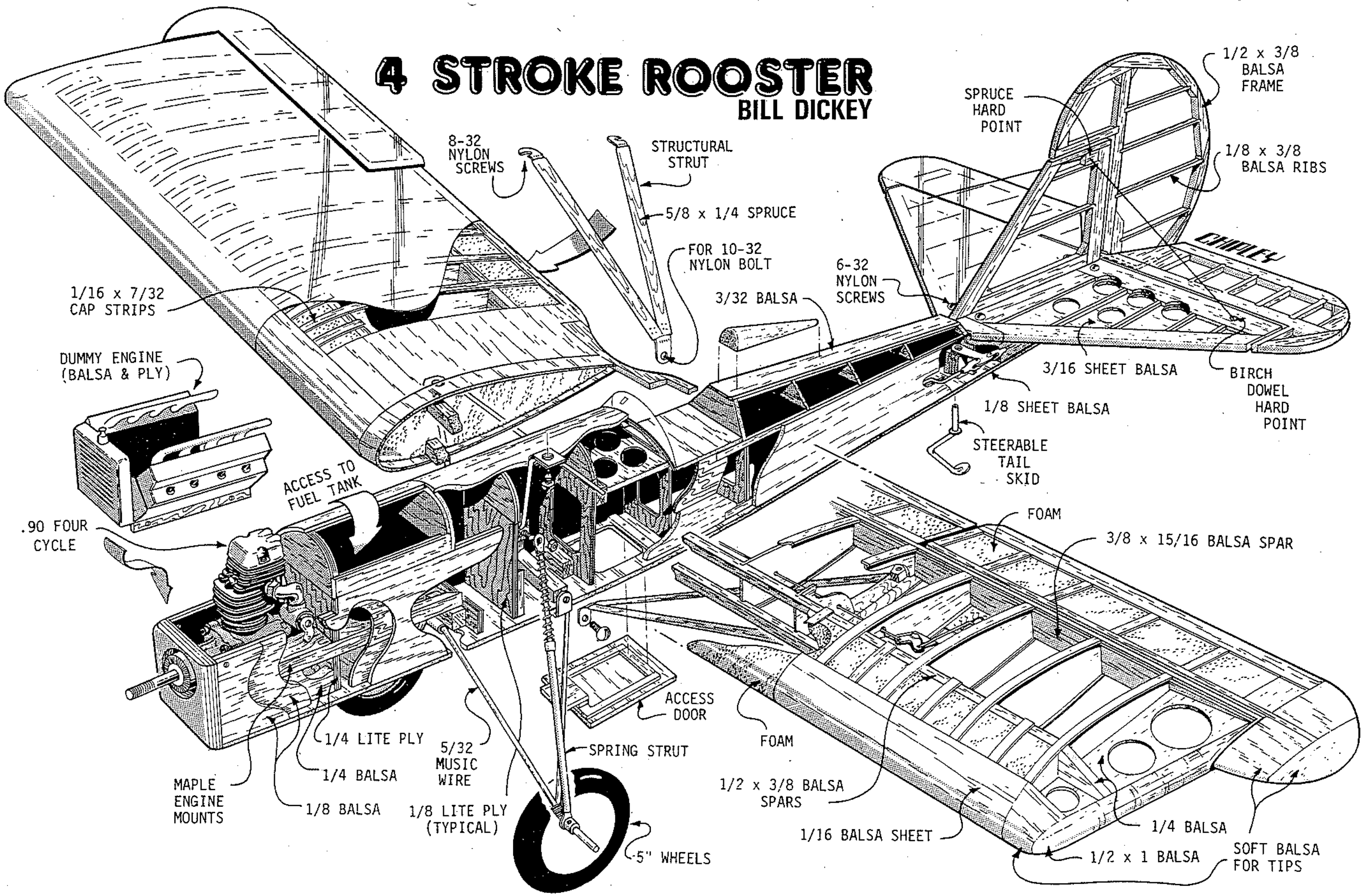


Aileron servo access in the top camber of the wing is well away from the engine's fuel residue. The cover, made from an old aluminum printing plate, simulates a gas tank.





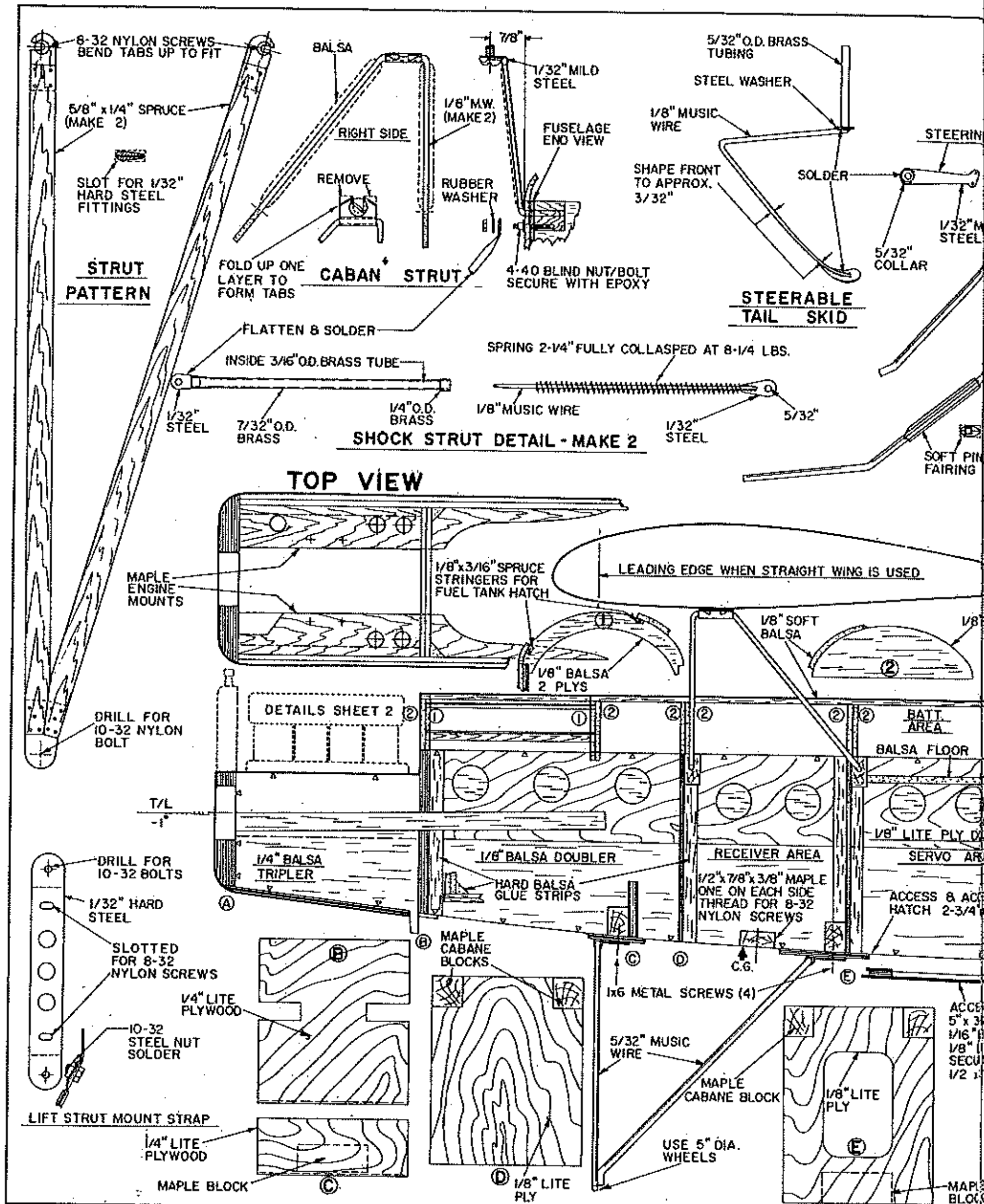
Left: Assembly from this point takes less than two minutes. Field equipment is kept simple thanks to the ingenuous way the wing is attached. A half-gallon of fuel will last all day with the miserly four-stroker, and the author has never considered using an electric starter. Right: Landing gear shock strut needs no extension limiter, as the music wire Vs do not recoil enough to let the strut exceed max extension.


4 STROKE ROOSTER
BILL DICKEY
8-32 NYLON SCREWS
STRUCTURAL STRUT
5/8 x 1/4 SPRUCE
FOR 10-32 NYLON BOLT
6-32 NYLON SCREWS
3/32 BALSA
SPRUCE HARD POINT
1/2 x 3/8 BALSA FRAME
1/8 x 3/8 BALSA RIBS
CHALEY
3/16 SHEET BALSA
BIRCH DOWEL HARD POINT
1/8 SHEET BALSA
STEERABLE TAIL SKID
1/16 x 7/32 CAP STRIPS
DUMMY ENGINE (BALSA & PLY)
ACCESS TO FUEL TANK
.90 FOUR CYCLE
FOAM
3/8 x 15/16 BALSA SPAR
ACCESS DOOR
FOAM
1/4 LITE PLY
5/32 MUSIC WIRE
SPRING STRUT
1/4 BALSA
MAPLE ENGINE MOUNTS
1/8 BALSA
1/8 LITE PLY (TYPICAL)
5" WHEELS
1/2 x 3/8 BALSA SPARS
1/16 BALSA SHEET
1/4 BALSA
1/2 x 1 BALSA
SOFT BALSA FOR TIPS

sides open on this model, as I was planning to cover the fuselage with nylon.

Fit the rear stabilizer mount block, and drill and thread the four mounting positions. Make a hard pattern of this section to use later for fitting the stabilizer. Cover the fuselage top in this area with 1/16 med. sheet balsa. Cut the access opening for the fuel tank, using the material that was cut out to make the door. The access hatch to the battery compartment is the instrument panel. I remove the battery after each flying session and keep it with the transmitter while charging. In this way, I can monitor and test the receiver battery better.

The fuselage is covered with nylon and clear dope, using pool-room powder as a filler. Wait about a week, and then paint with Hobbypoxy. (I try to build the tail surfaces or landing gear—or something—during the waiting time.) Apply trim, then paint with clear Hobbypoxy. The fuselage unit should weigh about 26 oz., and the cabane struts will add another 2¼ oz.



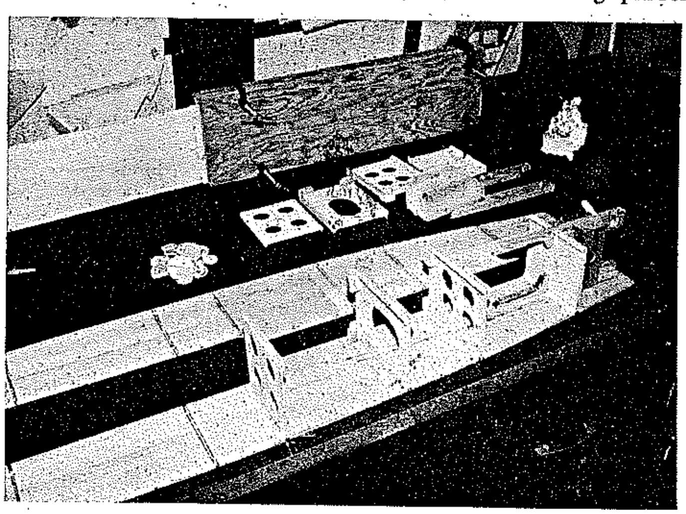
Tail Surfaces. These are designed to be removable so they can be used on other fuselages and for experimental options. (Also, for me, it seems easier to construct and repair them in this way.) Use lightweight balsa, and aim for a bare weight of 4½ oz. Vibration tends to "eat up" parts back there, so I recommend using Du-Bro ¼-scale hinges at the outboard positions. This is a fairly light model for a .90 four-stroke engine, so I suggest that the wing always be attached when running the engine to help absorb the power pulses.

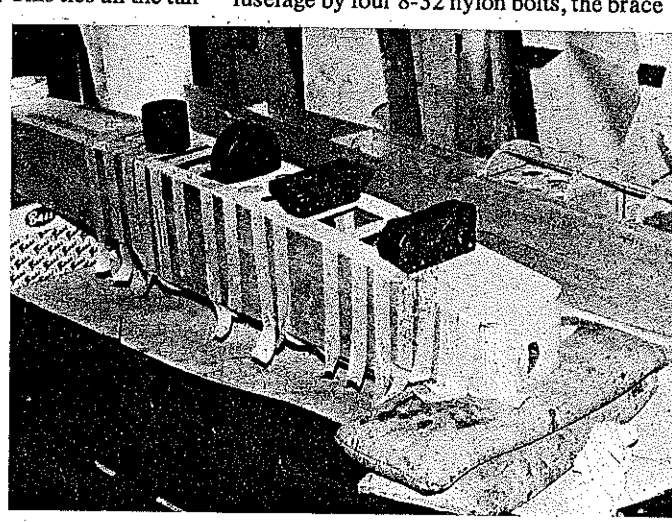
Build and cover the fin and horizontal stabilizer separately, and tie them together with ⅛-in. dowels and epoxy. Epoxying the torque wire in the leading edge of the elevator before removing the center section of the trailing edge will help ensure a true unit.

I covered the tail surfaces with Solartex, and they weighed 6½ oz. when complete. The lightest and most durable tail unit that I have built was covered with polyester cloth and finished with dope and Hobbypoxy; it outlasted (except for the hinge pins) two other fuselages.

The 1/32 music wire brace is in one continuous piece through the birch dowel hard points and anchored with the lower rudder hinge pin screw. This ties all the tail pieces together and helps absorb vibration. When the unit is removed, the tension is reduced as the unit slips off the rear.

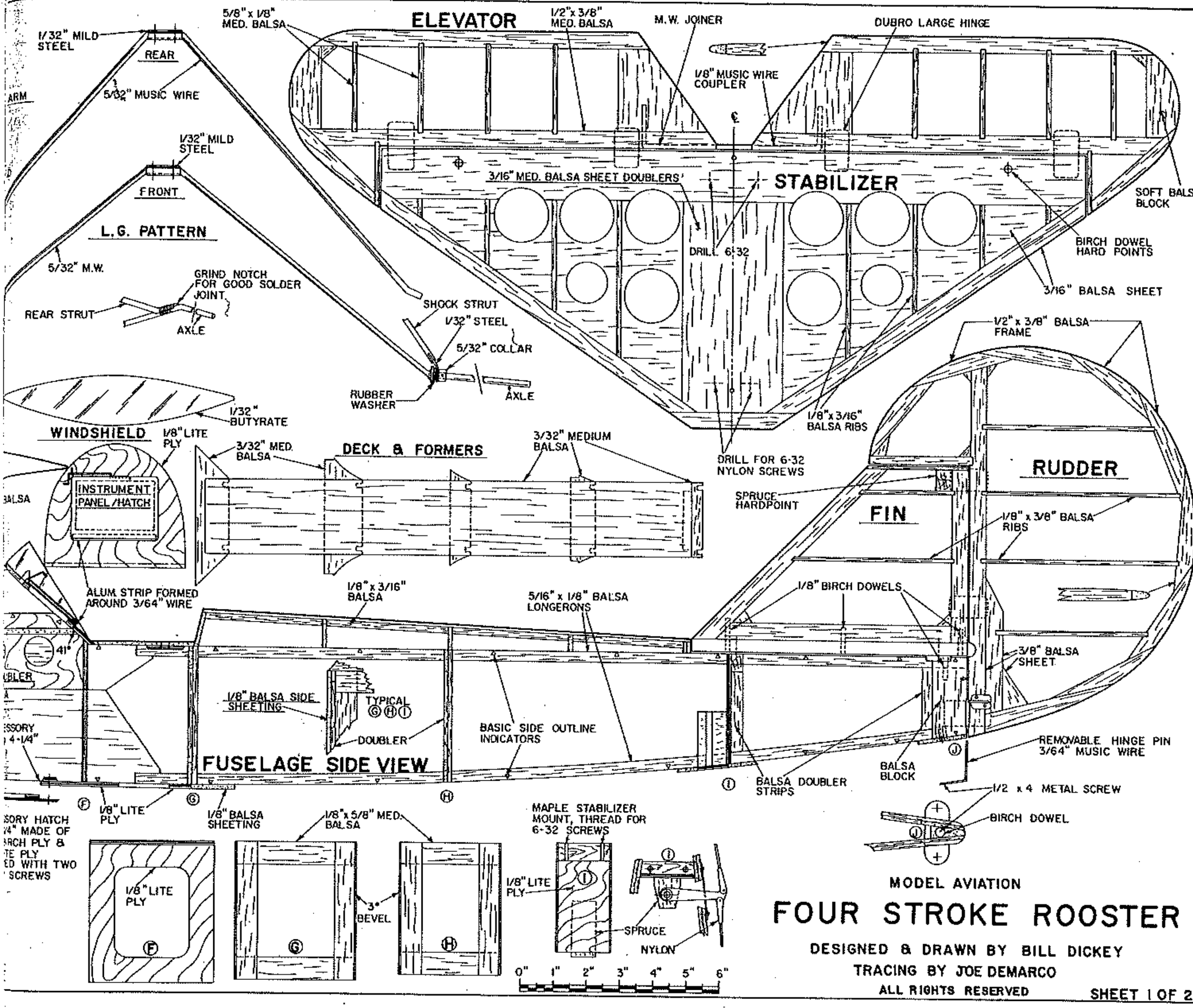
The tail surfaces are secured to the fuselage by four 8-32 nylon bolts, the brace





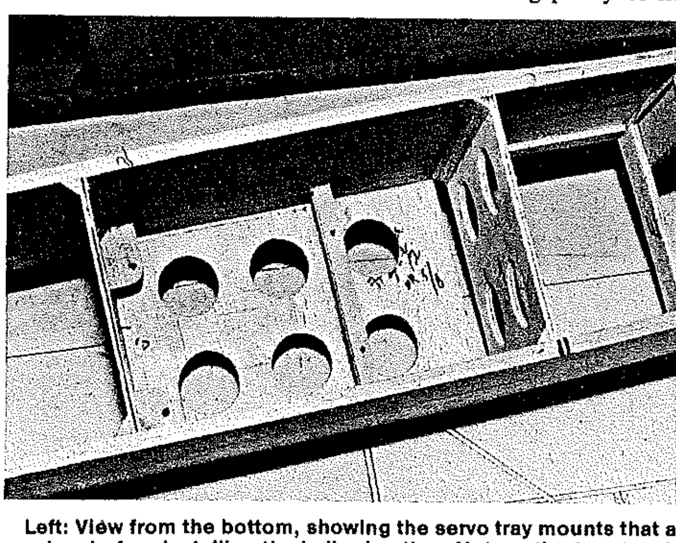
Left: Square-cut glue strips on the sides of the bulkheads make use of a jig unncessary. Two fuselages are under construction in the picture. Engine mounts will be installed later, but mockup shows the blocks used to keep the mounts parallel for gluing. Right: Lite Ply forward sheeting is held in place while the glue sets. Nose piece is already installed, to be sanded to shape along with the belly sheeting.

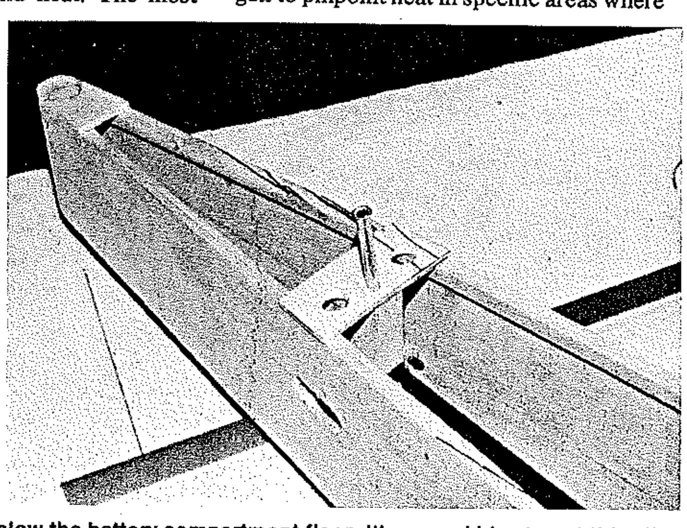
FULL-SIZE PLANS AVAILABLE . . . SEE PAGE 172



wires, and the lower ¼-scale rudder hinge. This is overkill for the stress of air loads, but for ground knocks and power pulse stresses, it seems reasonable. I tried using a keyed dowel at the front and two screws at the back, but this began to get loose after one heavy season of flying.

Undercarriage. Tin all joints to be mated, using plenty of flux and heat. The most common error is to use too little heat (but if using a butane torch, be careful not to apply too much heat). I use such a torch to supply general heat in conjunction with a soldering gun to pinpoint heat in specific areas where





Left: View from the bottom, showing the servo tray mounts that are below the battery compartment floor. It's a good idea to get this all set up before installing the belly sheeting. Note author's extensive use of cutouts for reducing weight. Right: Steerable tail skid mount and bearing with opening for the steering arm on the left side of the fuselage. A slotted 1/32-in. plywood plate will cover the opening.

I want solder to flow. This technique is especially useful when doing the wrapped joints and building-up the fillets between the joint and the wheel thrust washer.

The best way I have found to jig this is to drill a hole to fit the axle in a wood block and set it up vertically in a vise. The thrust washer should rest on the wood block. Flow solder in the windings and on the washer, then remove the general heat, and with the gun, build up the fillet. Too much general heat, and the solder will flow off the work. Watch for the difference in "flow" and "ball up and roll off." With the latter, usually the work is not fluxed properly, or there is too little general heat in the metal.

Use about 2° of toe-in and about 3° of camber if possible. With me, this is mostly eyeballed, but I can assure you it helps.

The shock struts are functional. They have been extensively tested, and they do work. I had trouble locating compression springs, so I had to modify Century Spring Corp. No. C-233 tension springs purchased from a local hardware store. I modified the spring by stretching it (as it comes from the package) to 30 in. at room temperature. Then I slipped it on a piece of 5/32 music wire and held it fully compressed for about 5 min. The resulting compression spring should be 13½ in. long—from which two strut springs can be cut.

Build the steerable tail skid as shown on the plans for realistic and stable ground handling with no servo strain. I have used this design on eight other aircraft without a minute's trouble. Substitute a wheel for the hard steel shoe for flying on pavement. Be sure not to bind the servo when setting up the steerable arm travel clearances.

Wing. This is a combination of foam and balsa using the foam nose section as the foundation for a lightweight and rigid structure. I have had excellent results with this method, and a lighter wing is produced than the all-foam types. With the balsa ribs, you also have more flexibility with the placement of equipment. Take care to cut true cores. I cut sections about 24 in. long and glue them together to make panels of whatever length I need.

Cut the nose sections from the cores, and then cut the slots for the ribs on a bench saw if at all possible. Each panel has 3½° of sweepback which should be considered when cutting the rib slots. Achieving a straight panel is easy with a true nose section, even slots for the ribs, and a true rear spar.

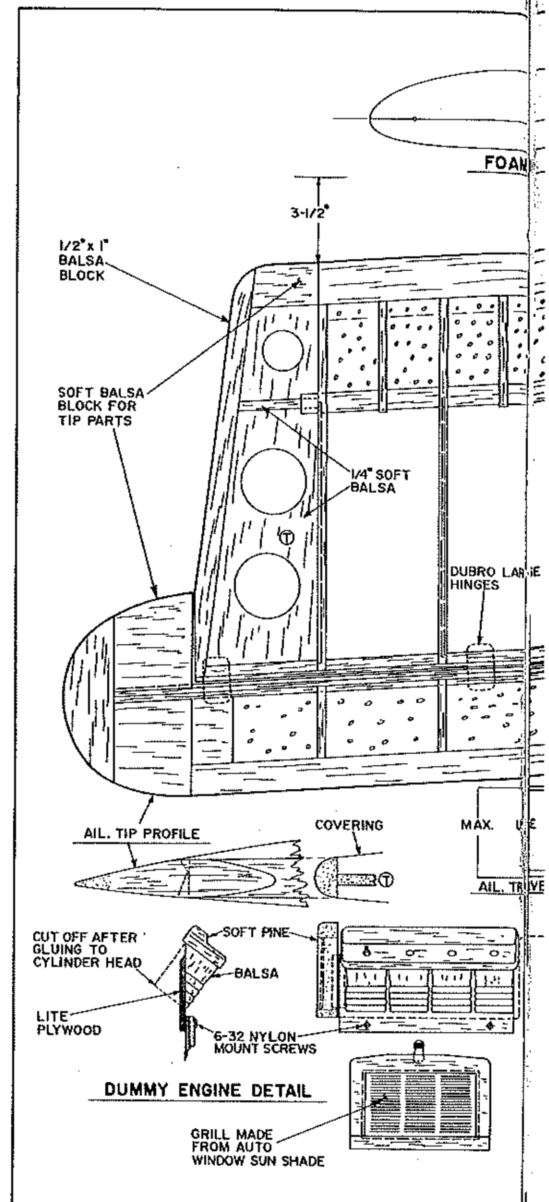
I use a metal template for cutting the ribs individually from soft 3/32 balsa. Rib caps are medium-hard balsa for strength (and the medium-hard sands better than soft). After the ribs are set in the nose section and the rear spar, jig the panels on a table saw, and cut slots for the upper and lower spars. Spars are medium balsa and set in the foam at the junction of the ribs.

The leading edge sheeting is soaked with Windex and fitted over the foam leading edge. Mark along the edge with a ball-point pen to help position the nylon cloth strips that join the sheeting and rib caps. Hold the sheeting around the leading edge with masking tape until completely dry, then remove and glue on the nylon strips along the pen line. These add strength spanwise to the wing, too.

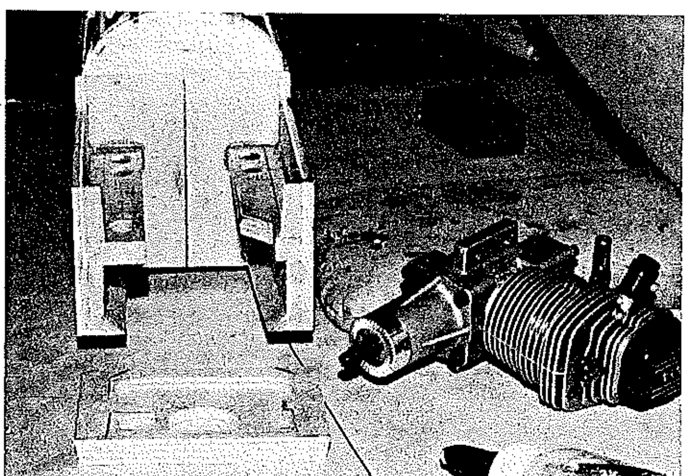
Ailerons are made from the trailing edge section of the foam cores as are the fixed trailing edge sections inboard of the ailerons. Don't compromise the "elephant ears" type of ailerons on this design. They provide aerodynamic balance that permits a small servo to do a big job—and they are super-responsive.

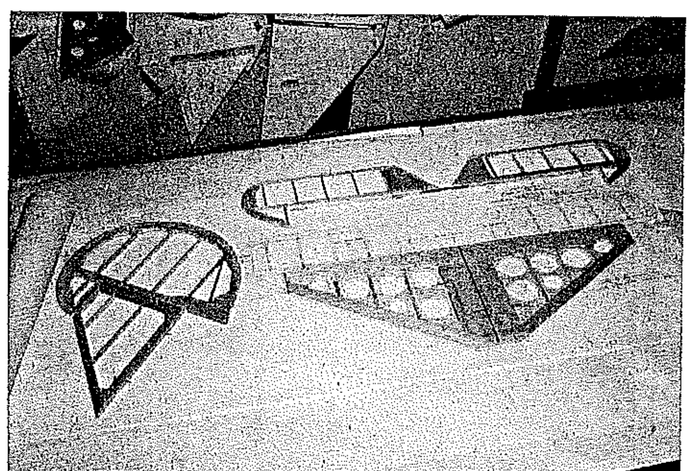
Provide differential aileron travel with 60° bellcranks. Setting the control horns back of the hinge line will provide this in most cases, but I wanted quite a bit of up-travel which couldn't be obtained by relocating the control horns, nor would it give me sufficient differential.

Make the wing and aileron tips from the softest sheet and block balsa you can find to help absorb the shocks they usually get. I cut ½° of dihedral angle into each wing panel butt. When joining the panels, be sure to get a good fit with the bias-cut spruce joiner blocks. It takes effort to get a good

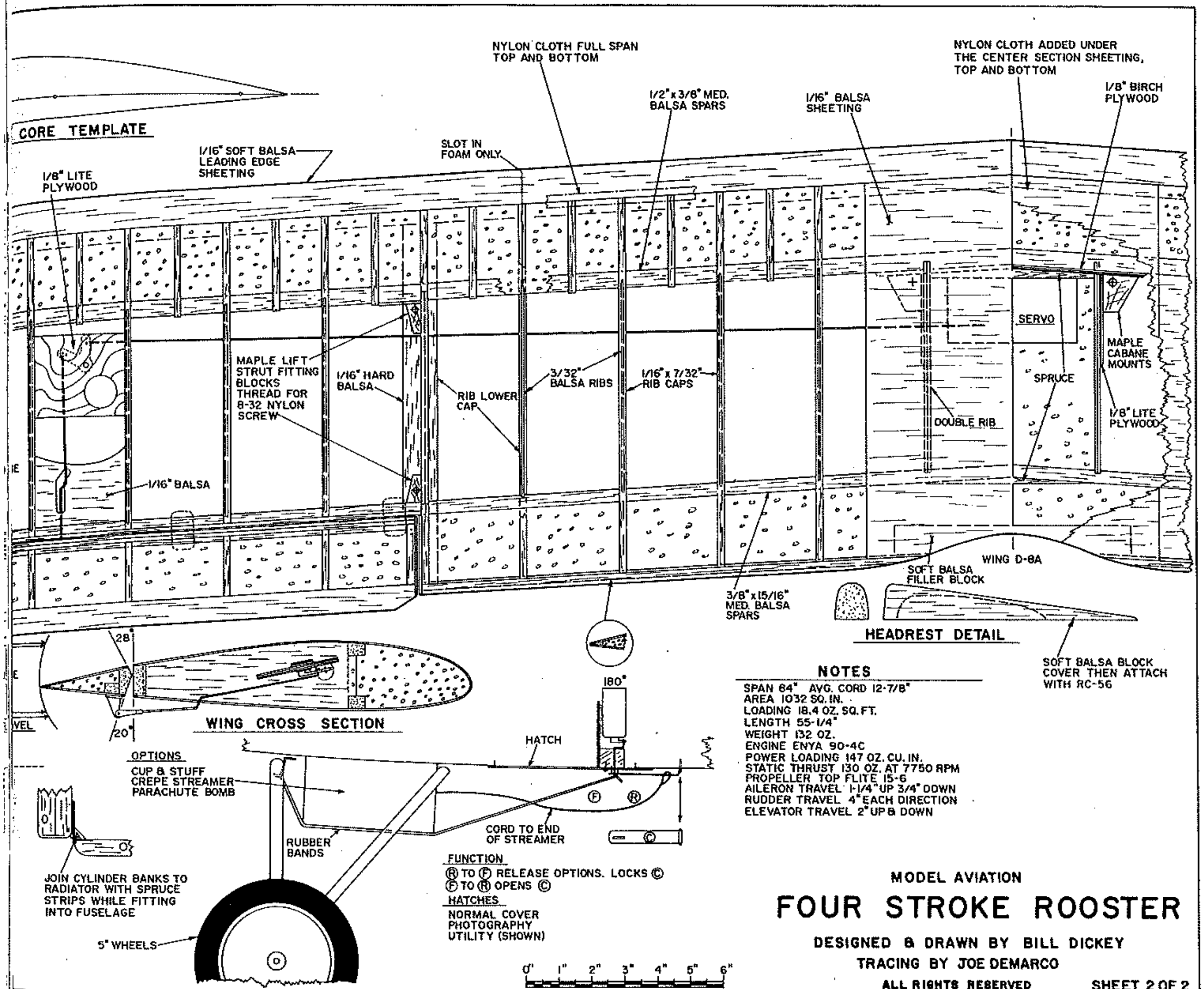


glue bond here, but it is very important to do so. I add more strength by gluing nylon cloth under the center section sheeting with thinned Titebond (or Elmers). With the functional lift struts, you don't need full





Left: The nose piece is Lite Ply. The left engine mount rail has been cut and drilled for the 180° bellcrank for throttle control. Right: All balsa for the tail surfaces is light and medium weight. Try to keep these surfaces at 6 oz. max weight for the C.G. point to be as per the plans.

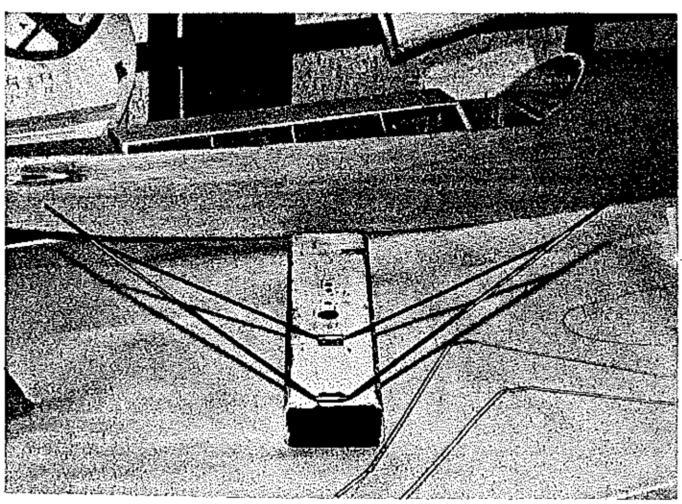


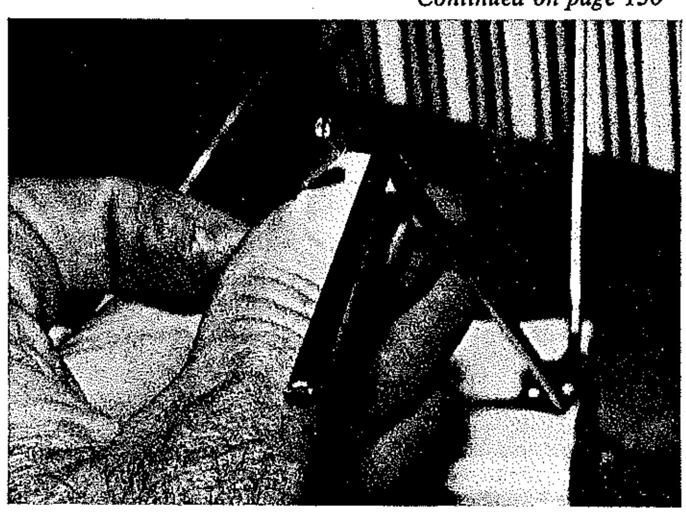
cantilever strength.

I like to provide access to the aileron servo through the top of the wing using a hatch that looks like a gas tank top. Completely covered with Super MonoKote, the wing weighs 30½ oz.

Rigging and flying. The wing is designed to fly at normal airspeeds with zero angle between the wing chord and the horizontal tail. Matching wing area and inherent lift of the modified NACA 2415 airfoil at zero incidence to the overall model weight allows the tail to "plane" and control the

Continued on page 130





Left: The fuselage rear deck has been installed, and the battery compartment floor can be seen ahead of the open cockpit. The landing gear (foreground) is about ready for fitting to the fuselage. A simple jig, as the gear is mounted on here, makes doing the job easier and more accurate. Right: Grinding the rear leg to mate with the front leg will make the joint neater and stronger. Text has useful soldering tips.

Safety/Preston

Continued from page 127

the parking area.

"Can you guess what was wrong? A postmortem discovered that *the ailerons had been hooked up backwards!* (Remember, *three* qualified inspectors had spent 30 minutes checking this model and had missed the builder's error.) Perhaps this is a case of 'too many cooks can spoil the broth.' It isn't sufficient to just check that the correct control surface wiggles when you wiggle the appropriate stick. It has to wiggle in the *right direction*, too!"

Human error as a source of problems is not confined to builders and fliers of models. Sometimes, a manufacturing error can cause you some grief. Just last week, I received the fourth recall notice on my 1978 automobile. I don't believe I've ever heard of a recall concerning a hobby product, but that doesn't mean that everything you purchase from the local hobby store is perfect! A few months ago, I received a letter from Paul Beretta, a modeler from Glen Cove, NY. The following are Paul's own words of his experience of a manufacturing error.

"I want to share with you an incident which I had the other day. Having purchased a new radio and charged the batteries, it was time to test it out in my airplane. The servos, receiver and switch harness had already been installed, so it was just a few moments' work to hook up the battery. Since my main purposes at this time were to be servo-travel setup and CG adjustment, I left the battery unwrapped.

"I flipped on the switch for the receiver and turned to pick up the transmitter. When I turned back to the airplane, smoke was billowing from the top of the fuselage! I managed to pull the battery loose from the switch harness with only minor burns and drop it, still smoking, on the floor. Investigation proved that the cause of the problem was a defective (shorted) switch. The result was the destruction of the switch harness, the receiver battery wiring, and the battery case and cells. I don't like to think of what could have happened if the battery had been foam-wrapped and stuffed deep inside the nose of the plane. Those wires were glowing red, like a big glow plug, and, although the materials of the wires and battery case merely melted and smoked, other materials inside the plane may have behaved differently.

"The manufacturer was most kind and cooperative about replacing the damaged components. So, aside from the loss of my 'new toy' for a week or so, I suffered no real loss. You can be sure, though, that in the future I will check out all electrical components, *outside the aircraft,* before installation! The important thing to be aware of is the tremendous heat-generating capacity of short circuited Ni-Cds. I know that, until this incident, I was not aware of this."

Paul's letter jogged my memory about a similar incident, a report which I read a number of years ago. In this one, a modeler had purchased a new radio at a hobby store and, during the journey home, it allegedly set fire to his station wagon. At the time, my reaction was "Ho-Hum, he's trying to get a new car out of the radio manufacturer's insurance company." Perhaps I was wrong and this was another case of a short somewhere in the radio's battery circuitry. Anyway, the moral of these stories is to do as Paul did. **Always bench check a new radio before installation in a model.** Nobody is perfect—not even hobby-equipment manufacturers.

Have a safe month.

John Preton, 12235 Tildenwood Dr., Rockville, MD 20852.

Rooster/Dickey

Continued from page 35

wing.

Balance the model carefully at the point shown on the plans, with the average lift centers aft of the center of gravity. After you have balanced the model, don't change the balance point trying to chase trim prob-

Continued on page 132

lems. Example: If you find that down-elevator is needed to hold level flight, it doesn't mean the tail is heavy (needing nose weight). The trouble is the wing is lifting the tail out of "plane," so decrease the lift by slightly raising the wing trailing edge (don't mistakenly feel you have reduced the overall lifting capability of the wing, because you haven't). The lift strut mount is provided with slots to adjust the wing for these problems, showing another example of the versatility of the parasol configuration.

At proper trim, the wing profile view will appear to have negative incidence if the aircraft is close to design weight. If overweight, you might actually have to add positive incidence to the wing to achieve tail trim (in which case, you *would* be reducing the overall lifting capability of the model). Also be sure to balance the model along the roll axis; nails pushed into the soft wing tips will usually correct for any imbalance.

Set the control throws for the amounts shown on the plans. This will produce quick responses, such as needed for "creative" maneuvers. Use elevator back pressure in turns and glides, forward elevator pressure for inverted flight, and right rudder on takeoffs and climbs. Use lots of rudder in slips, and hold track by varying degrees of opposite aileron. For nice knife-edge flight, use almost full top rudder.

Normal and outside snap rools are easy, and recovery is positive (as it also is with normal and inverted spins). Flat turns with the rudder are stable and look good (if you like 'em), but keep some power on.

It may sound like this model is set up just for flying aerobatics, but fly it at half-power for an outstanding trainer that is stable and just responsive enough to keep out of trouble. Work hard for a low engine idle, as the differential between top rpm and idle is relatively small in four-strokers. Low idle is required for realistic glides, safe taxiing, and maneuvers such as takeoff-loop-land, where the back-side airspeed must be kept low.

Use other wings for added pleasure with this versatile parasol. A heavier-loaded, low aspect ratio wing (about 24 oz. per sq. ft.) would be good for flying in high winds. Or try a STOL type with Clark-Y airfoil section with flaps and/or slots; it's a ball. Use accessory hatch(es) for all sorts of things—like bomb dropping, banner towing, tissue dropping, parachute dropping, photography, or whatever you can think of.

Field assembly and disassembly of the Rooster is easy to live with. By loosening six nylon bolts about three turns, unplugging the aileron servo, snapping the wing and struts out of their mounts, and folding the lift struts back against the fuselage, you are ready to load up. It takes less than two minutes, and there are no screws to lose or to thread in with cold, numb fingers! This system works very well, and the metalwork is not as difficult as it may appear. Just be sure the "tabs" match the screw heads.

I know you will like this versatile, functional, and durable vintage-type airplane.

Charge Timer/Marez

Continued from page 42

Testing. This is actually a dual step, as you will be learning how to program your charge timer and what each button does as you test your work. With the AC plug back in the wall and the display blinking, press the *Fast Set* button; the blinking should stop. Now, press both the *Fast* and *Slow* set buttons simultaneously and release; the display should indicate either 12:00 or 00:00.

If the former, the clock is set for 12-hour time; 24-hour time for the latter. Pressing the *24/12* button should change the display from one of those indications to the other. Leave it on 12:00; pressing the *Fast* button will advance the time at a rate of one hour, by minutes, a second. The *Slow* button advances the time at two minutes per second. Press the *Fast* button until the display is past 12:00; the p.m. indicator, a small dot in the upper left corner of the display, should now appear. Pressing the *24/12* button once will cause the dot to disappear and the display to change to the equivalent time on the 24-hour clock. For example, an indicated time of 2:35 p.m. will become 14:35.

Pressing the *Alarm Display* button will cause a change in the display to some arbitrary time; the desired alarm time can be set with the *Fast* and *Slow* set buttons in