

FUN

If your R/C club is like most of the other clubs in America today, the most popular events of the flying year are the Fun-Flys or Fly-Ins or whatever you call them. Because of their popularity, these events bring out a great crowd of participants and a vast variety of airplanes of varying sizes, shapes, and capabilities. The order of the day is to meet friends, admire airplanes, drink a lot of soda pop, eat hot dogs, and have a lot of fun in the competitive events.

The competitive tasks are usually simple enough that everyone can get into the act. Because of this, they are easy to complete but hard to win. Having the right airplane for the task helps but the tasks are seldom announced before you arrive and who brings four or five airplanes anyway? For example, it's hard to win a timed event with a Quaker (as great an airplane as it is) or to risk your best scale or super pattern ship doing a limbo event.

Maybe what is needed is an airplane that is reasonably fast and maneuverable for the timed events. One that can get back to the finish line in a hurry after finishing the prescribed maneuvers but then slow way down for a spot landing for extra points. While on the subject of



By J.M. Mergen



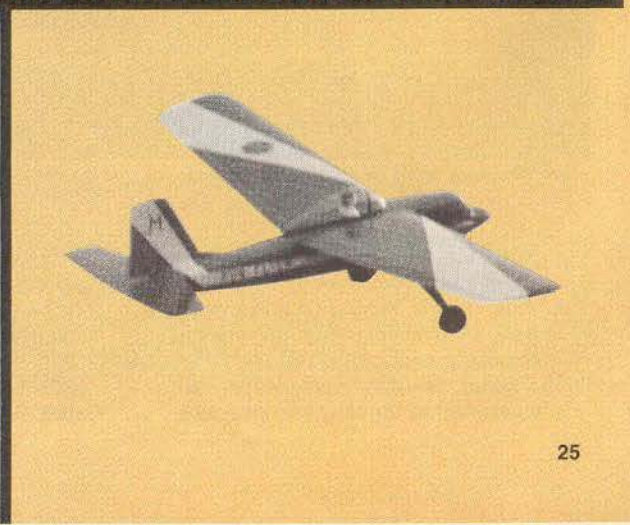
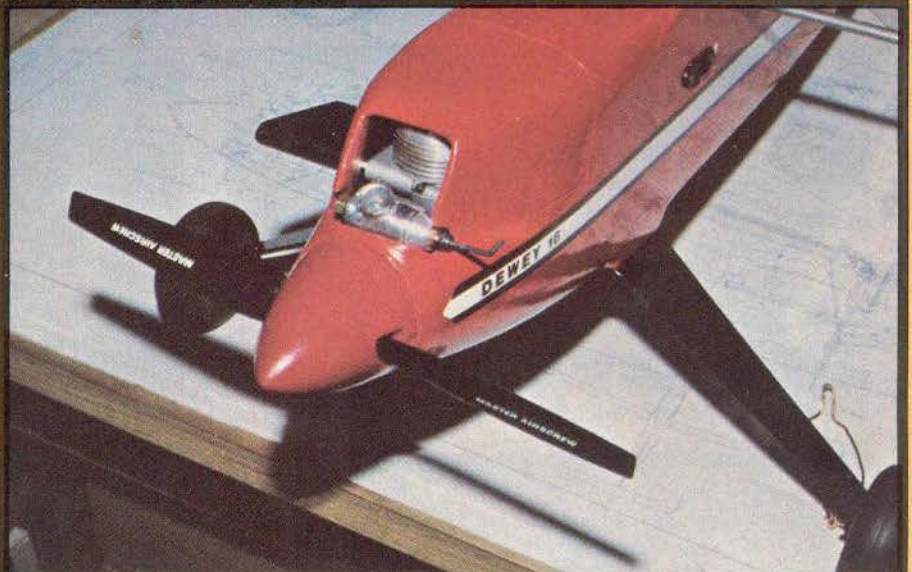
Designed for fun-fly events or just Sunday sport flying, this 40 powered "Fun Flyer" lives up to its name in just about every way.

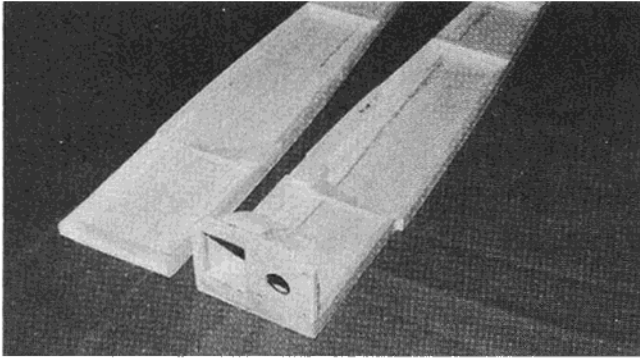
FLYER

landings, how about one that can make a landing before it wants to without leaving parts scattered around? It would be nice, too, to be able to keep the engine running after such a landing to avoid the necessity of walking a few hundred yards in front of the crowd to retrieve an airplane with a dead engine. The ability to do quick loops and rolls is an absolute necessity and predictability in every maneuver is essential. Inverted flight must be second nature to the design. In short, what we need is a fast but slow machine that is very quick but docile, flies inverted almost as casually as right side up, is always predictable, is rugged and one that we can be proud of during the "admire the airplanes" time of the Fun-Fly!

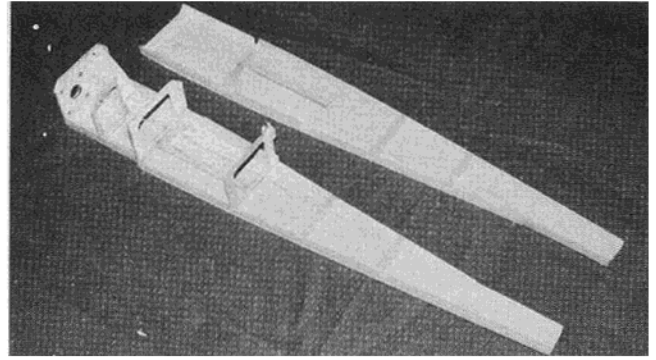
With these and a few other thoughts in mind, Fun Flyer was designed as follows:

- * A 60" wingspan model powered with a .40 size engine was picked as about the right size for a sport airplane.
- * The fuselage was held to 40" for transportability without sacrificing pitching or directional stability.
- * The wings were made in two panels for easy transport.
- * Ample control surface area was

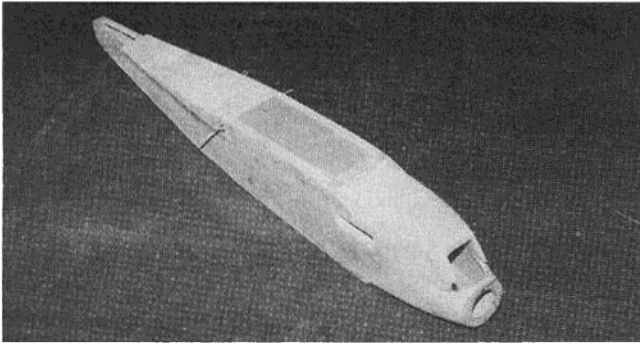




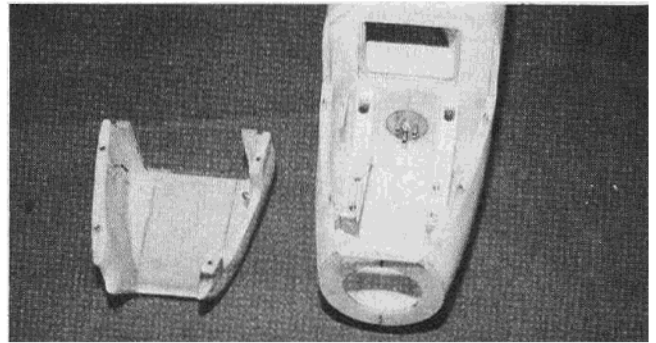
Start fuselage by assembling longerons, struts, FS1, FS2, and air exit assembly.



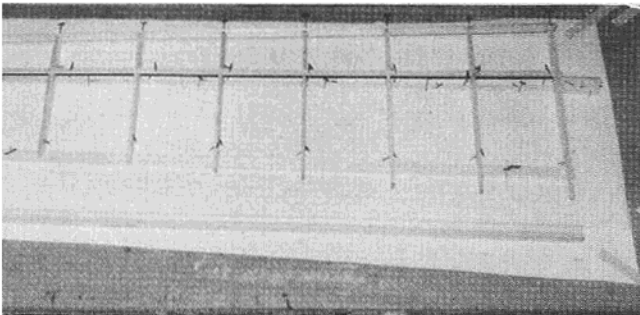
Add F3, F4, F5, servo rails and throttle cable before attaching left side.



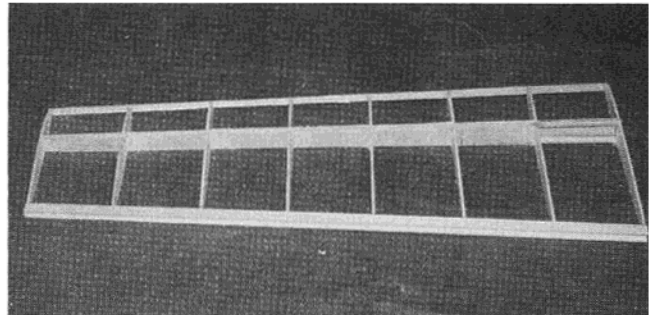
Fuselage planked and rough sanded back to leading edge.



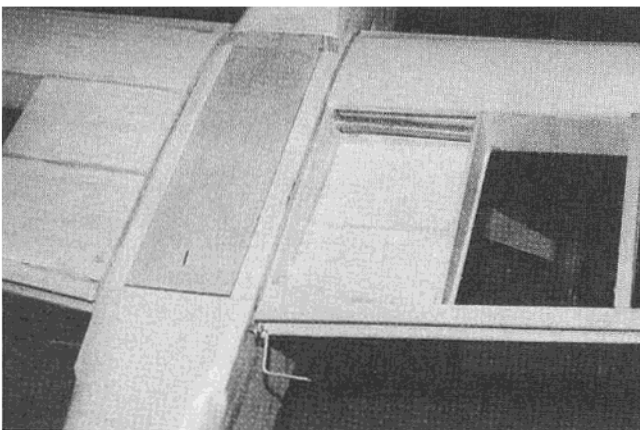
Detail of engine compartment and cowling.



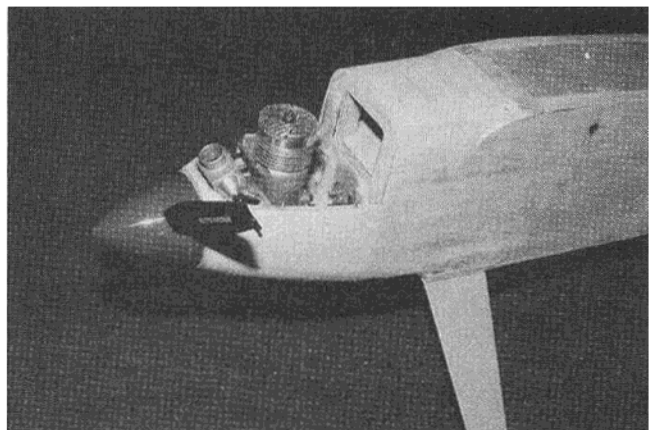
Start of left wing panel showing ribs shimmed up for alignment of trailing edge.



Wing panel removed from board for finishing — note first bay webbing left out.



View showing wing carry over tube epoxied in first bay.

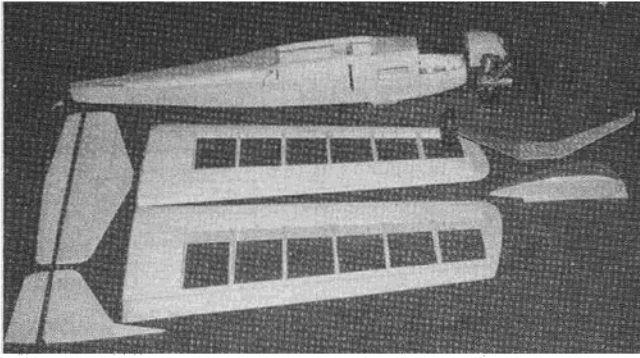


Final nose shape is shown.

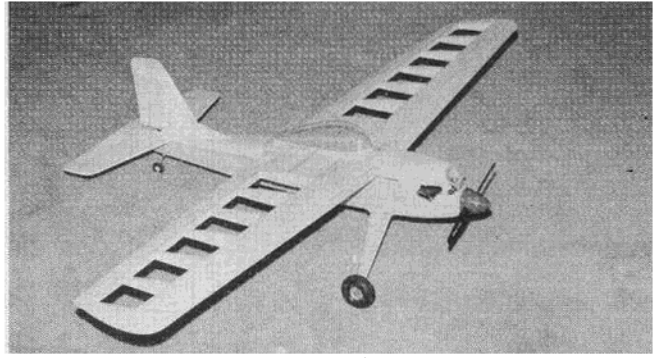
- provided for maneuverability about all three axes.
- * A wide stance, strong landing gear was used to provide for rough handling and rough fields.
- * The basic design's upright engine was selected for easy starting and

- no nonsense operation.
- * The engine was closely cowled to help streamline the plane for speed and for a better appearance. The close cowling and side air outlet also keeps most of the oil and exhaust concentrated. The

- result is that even the canopy stays clean and dry.
- * The wings were tapered for appearance but the taper probably adds some structural and aerodynamic efficiency.
- * The wings are quickly and easily



All parts ready for covering and assembly.



Finished airplane except for covering and trimming.

assembled or disassembled and locked in place by the canopy forks without tools. Ailerons are automatically plugged in when the wings were attached without disturbing any wiring.

- * Access to the engine is provided by the snap on and off cowling attaching system.
- * All structure is good for at least 15G's and has demonstrated its strength in numerous all-out aerobatic flights.
- * A relatively low wing loading was picked for good low speed operation but the aerodynamically clean lines and good power loading give the design high speed and maneuverability.

All the above good intentions have resulted in an airplane weighing in at five and a half pounds with eight ounces of fuel. This gives a wing loading of twenty one ounces per square foot and a power loading of about six pounds per horsepower --- just about right for the job.

Once you arrive at the field the airplane can be assembled and ready to fly in less than one minute and disassembled just as fast. With wings off it will fit across the back seat or in the trunk of the smallest car.

Flight testing has shown the airplane to be very fast at full throttle but that it will slow down to the speed and easy handling of a trainer at reduced power. It has shown it can do just about any maneuver in the book and do them with agility. Inverted flight is outstanding with the machine trimming out with just a touch of forward trim. It is very close to being perfectly balanced in normal or inverted flight with the C.G. as shown on the plans.

Thus Fun Flyer comes pretty close to the writer's dream as to what a Fun Fly airplane is all about.

The author has tried to keep the construction of Fun Flyer as simple as possible with only a few frills such as the enclosed engine cowling (you can select two simpler options as shown on the plans) and the wing attachment

and locking device. These, I think, pay off in ease of transporting the plane and assembly at the field.

Since most of the construction is conventional and the builder will have no need of step by step details, the discussion will cover the sequence of operations with an occasional explanation of a convenient way to accomplish a particular phase.

CONSTRUCTION

Fuselage:

Start the fuselage by building two identical sides. Mark the water-line and the location of the frames and struts with a soft pencil. Locating from the water-line, carefully bore the holes at F4 and F5 through both sides at once. Next cut out F1, F2, F3, F4, FS1 and FS2.

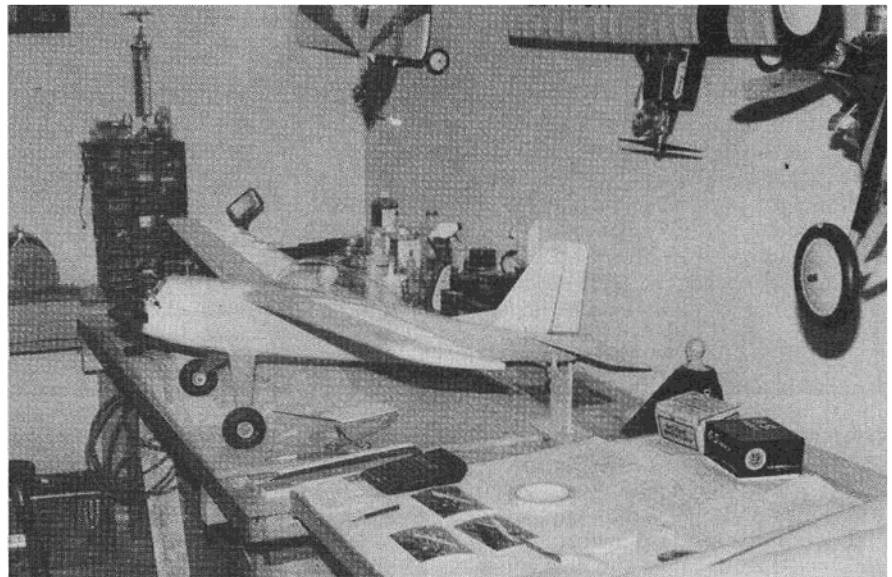
Install the 1/2" triangular longerons on both sides, being careful to make a right and left. Next assemble the F2 hardware and attach F2 to the right side of the fuselage. Build up the 1/8" sheet air exhaust and install the 7/8" triangular piece and the vertical 1/2" triangular piece. Cut and fair the exit hole and fair the 7/8" triangular piece as shown. This exhaust system is used only with the closed cowl. If you use either of the

options for the nose of your airplane, the rectangular hole in F2 and the whole exhaust system is omitted. The notch in F3 can also be left out.

Next, install FS1, FS2, and the 3/8" square stiffener struts on both sides. Now install F3, F4, F5, and the servo rails on the right side. Since the fuselage does not taper from F2 to F5, these frames are installed perpendicular to the side for good alignment of the fuselage. When installing FS1, FS2, F4 and F5 be sure that the edge of F5 and FS1 are tangent to the hole in the fuselage side and make sure F5 is tangent to the other hole. Install the servo rails on the left side. This is a good time to add the throttle cable tube.

Now the left side can be cemented to F2, F3, F4, and F5. Using the top view as a guide, draw the fuselage sides together at the tail, trimming the longerons to leave a 1/2" inside width to accommodate the elevator pushrod and horn.

Install the brass tube at F4 and the brass tube and block at F5. Install the blocks at F5. Make up the aileron cranks as shown and install through 1/8" holes in the sides. Cement to the blocks as shown. Next, add the servo



Here is where the Fun Flyer happened.

cross rails and FS3 and the 1/8" plywood gusset.

The fuselage can now be planked with balsa and plywood as shown.

To build the standard cowling which encloses the engine, the following procedure was used:

Mount the engine on its mounts to act as a reference for the cowl centerline. Secure F1 in place using the propeller shaft and thrust nut with the shaft going through a scrap piece of plywood tack cemented to F1. Fit the side and bottom sheets between F1 and F2. Then add the 3/8" triangular pieces and a block across F1 at the top. Install four metal dowel pins as shown. Sharpen the upper ends before installing. Remove the nut and the piece of scrap plywood and the engine. Rough shaping is desirable before building the top cowl.

To build the top cowl, first cut out F2A. Roughly cut out the sides and the wedge shaped pieces at the front. Cement the wedge shaped pieces to the sides and then build up on the lower cowl with F2A in place and using the pins to support the sides. Add the top planking and rough sand in place. Remove the upper cowl, open the dowel holes and install aluminum tubes to fit the dowels. The interior shape can be formed at this time and the muffler slot can be added. With the engine mounts (which have been drilled and tapped) in place, the cowl retaining clip can be added. After installing the spruce cross piece to the upper cowl, put the cowl back on and mark the spot for the cut-off screw which holds the cowl in place. If you miss the location, the washers shown can be used as shims. With the cowl in place, finish sanding back to the wing leading edge.

The fuel tank and all controls are easily added through the hatch. Drill a 7/16" hole in each side for the wing retaining screws.

The hatch and canopy are one assembly. Start by building the hatch and fitting to the fuselage holding it down with the hook and rubber band as shown. Then, with the hatch in place, fit a sheet of 1/4" balsa to the contour of the hatch. Shape the balsa to fit a Sig 11" canopy. Install the steel fork and cement the balsa sheet to the hatch with the hatch in place on the fuselage. Protect the rest of the structure from the cement with waxpaper. Now cement the canopy in place. You may want to cover or paint the balsa or add a pilot and instrument panel before cementing the canopy.

Alternate #1 and #2 nose sections are built in the same manner as the standard one by using the engine to line up the front ring F1 and proceeding from there to fit the sides and top or bottom.

FUN FLYER

Designed By:

J M Mergen

TYPE AIRCRAFT

Aerobatic Sport

WINGSPAN

60 Inches

WING CHORD

10 In. (Avg.)

TOTAL WING AREA

596 Sq. In.

WING LOCATION

Shoulder Wing

AIRFOIL

Symmetrical (NACA 0012)

WING PLANFORM

Double Taper

DIHEDRAL EACH TIP

1 1/2 Inches

O.A. FUSELAGE LENGTH

40 Inches

RADIO COMPARTMENT SIZE

(L) 7 1/2" X (W) 2 3/4" X (H) 3"

STABILIZER SPAN

20 Inches

STABILIZER CHORD (inc. elev.)

5 3/4 Inches (Avg.)

STABILIZER AREA

115 Sq. In.

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

7 1/4 Inches

VERTICAL FIN WIDTH (inc. rud.)

5 3/8 Inches

REC. ENGINE SIZE

40 Cu. In.

FUEL TANK SIZE

8 Ounce

LANDING GEAR

Conventional

REC. NO. CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Ail., Throt.

BASIC MATERIALS USED

Fuselage	Balsa, Ply, Spruce
Wing	Balsa, Ply, Spruce
Empennage	Balsa & Ply
Wt. Ready To Fly	88 Oz.
Wing Loading	21 Oz./Sq. Ft.

Wing:

As shown, the wing for Fun Flyer is built in two panels to facilitate transporting. They are joined at the fuselage by a 1/4" diameter carry through rod which is the only structural member. The 1/8" rod near the trailing edge simply maintains the wing incidence.

Start the wing by cutting out all the ribs. If you are building on a flat surface, pin down the spar cap and cement the ribs to it. Add the top spar cap and the inner leading edge and trailing edge while pinned down. The 3/32" balsa webbing, as well as the forward plywood webbing in the first bay, can also be installed. Also install the 5/8" x 5/8" incidence block. Upon removal from the work surface, the panel can be planked and the rib caps,

outer leading edge and tip added. This is a good time to fit the aileron. Do not attach the aileron permanently at this time. Construct the other panel in an identical manner. On both panels omit planking on the top inboard bay.

You will note that 5/16" O.D. brass tubing is called out as a bushing for the carry through rod in both the fuselage and wing. Since 5/16" O.D. x 1/4" I.D. tubing is hard to get, two thin walled tubes, one inside the other, and sweat soldered together at one end can be substituted as shown on the fuselage sheet. These can be procured at any hobby shop.

Assemble the wings to the fuselage by setting up the panels on the forward carry through rod and brass tube bushings, supporting the wing panels on suitable blocks. When satisfied that the fit along the fuselage and the dihedral are okay, tack cement the tubes to the plywood spar web. Remove the panels and finish by filling the cavities between the spar caps with a slurry of micro-balloons and epoxy; epoxy the remaining plywood web in place. Add W1 and check for fit with the fuselage. With one panel in place make sure of the incidence and drill a 1/8" hole as shown using the rear tube in the fuselage as a drill guide. Do the same for the other panel. Open the holes to 5/32" and epoxy in the rear tubes. After adding the 3/32" plywood back up, mark W1 through the hole in the fuselage and put in the #10 wing retaining screw. Finish planking. This completes the wing except for covering and permanently attaching the ailerons.

Empennage:

The fin and rudder assembly are conventional 1/4" sheet sanded to shape. In the interest of weight and balance, light balsa is used for the fin and a little heavier and stronger grade for the rudder. The same procedure is used in the case of the stabilizer and elevators. Note the fairings at the bottom of the fin. These should be added after the complete empennage is covered and in place. To install, cover the fairings leaving about 1/16" flap along the edges. Cement in place and, with the tip of the iron, seal the edges in place.

The stabilizer and elevators need little explanation except to make sure that there is adequate clearance for the horn and clevis. Note the plastic tubing on the elevator pushrod to avoid metal to metal rubbing.

Assembly and Finishing:

If an iron-on covering is used, cover the fuselage, wing panels, fin, rudder, stabilizer, and elevator separately.

Cut away covering for wood to wood joints between fuselage and stab and fuselage, stab and fin.

With the wings in place make sure the canopy fits easily and locks the wing. The #64 rubber band is doubled to get the right tension.

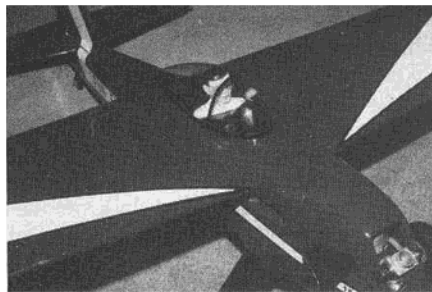
Drill and tap three #10 holes and attach the landing gear. Build up the tail wheel assembly and insert through the tail wheel bracket. Solder a formed 1/32" music wire tiller to a 3/32" wheel collar. Put the wheel collar on the tail wheel shaft and tighten. A small rubber band between the tiller and the nail in the rudder gives good shock absorption and protects the rudder servo.

All control and radio components are conventional. With the radio components as shown, balance is very good and no ballast was needed in the prototype.

Flying:

With the elevator, rudder and aileron deflections shown, Fun Flyer is a good sport flier with rather good aerobatic characteristics. A little more elevator and aileron throw and it becomes pretty snappy. Take-offs are smooth and comfortable. As mentioned before, inverted flight is outstanding and almost any stunt can be done. There is no worry about strength. The airplane seems to be able to take more than anyone can give it. Since it is very clean it glides very well, but, when slowed down, makes a very docile landing.

Why not build one and take it to the next fun-fly?



Bill of Materials

- (4) 3/16" x 3" x 36" balsa — fuselage sides, top & bottom.
 - (4) 1/4" x 3" x 36" balsa — stabilizer, elevator, fin, rudder, upper engine cowl, canopy base & outer leading edge.
 - (1) 3/8" x 3" x 16" balsa — lower engine cowl, fuselage struts, upper cowl doubler.
 - (3) 1/8" x 3" x 36" balsa — wing ribs, inner leading edge & air outlet.
 - (6) 3/32" x 3" x 36" balsa — wing planking, rib caps, forward fuselage top & spar webs.
 - (2) 1/2" x 5/8" x 36" balsa — trailing edge.
 - (2) 1/2" x 1 1/4" x 36" balsa — ailerons.
 - (1) 1" x 1 1/4" x 15" balsa — wing tips.
 - (1) 1/2" triangular x 36" balsa — forward longerons.
 - (3) 3/8" triangular x 36" balsa — longerons, fin fillets, & cowl longerons.
 - (1) 5/8" x 5/8" x 8" balsa — wing carry through blocks.
 - (1) 1/4" x 1/4" x 21" spruce — servo rails.
 - (1) 1/4" x 1/2" x 4" spruce — servo rail.
 - (4) 1/8" x 1/4" x 36" spruce — spar caps.
 - (1) 3/8" x 1/2" x 7" spruce — blocks at F5 as shown.
 - (1) 1/4" x 4" x 6" ply — F2, & tail wheel support.
 - (1) 3/16" x 6" x 10" ply — F4, landing gear supports, aileron roots, rudder root & tail wheel support.
 - (1) 1/8" x 6" x 12" ply — F5, W1, servo rail supports, fuselage doubler at F4.
 - (1) 3/32" x 6" x 12" ply — F1, F2A, F3, hatch & spar webs.
 - (1) 1/4" dia. x 10 3/4" M.W. — wing carry through rod.
 - (1) 1/8" dia. x 5 1/4" M.W. — wing carry through rod.
 - (1) 3/32" dia. x 6" M.W. — tail wheel strut & cowl dowels.
 - (1) 1/32" dia. x 2" M.W. — tail wheel tiller.
 - (2) 3/32" dia. x 5" threaded aileron cranks.
 - (2) 3/32" I.D. x 1/4" brass — grommet for aileron crank.
 - (10) 2" Robart hinge points — aileron hinges.
 - (1) 5/16" O.D. x 1/4" I.D. x 12"
- or**
- (1) 5/16" O.D. x 9/32" I.D. x 12" Brass tubing — wing carry through.
 - (1) 9/32" O.D. x 1/4" I.D. x 12" Brass tubing — wing carry through.
 - (1) 5/32" O.D. x 1/8" I.D. x 6" brass tubing — wing carry through.
 - (1) 1/8" O.D. x 3/32" I.D. x 4" brass tubing — aileron crank bushing & cowl pin bushings.
 - (1) 1/8" x 1" dia. nylon or equivalent — propeller spacer.
 - (1) Halco B 105-5 landing gear.
 - (2) 3" dia. standard wheels.
 - (1) 1 1/4" dia. tail wheel.
 - (1) Goldberg tail wheel bracket.
 - (1) 3/32" I.D. wheel collar.
 - (1) Sig 11" canopy.
 - (1) Sullivan 8 oz R.S.T. fuel tank.
 - (1) K & B 40 or equivalent engine.
 - (1) 2 1/4" dia. Goldberg spinner.
 - (2) 3" Sig engine mounts.
 - (3) #10 x 5/8" long nylon bolts — landing gear.
 - (1) .020" x 2" x 7" spring steel — cowl clip & wing fork.
 - (2) #8 x 1" long washer head screws — wing lock.
 - (6) #4 x 5/8" long bolts — engine mount & cowl clip.
 - (6) #4 lock washers.
 - (4) #6 x 5/8" long bolts — engine mount.
 - (4) #6 lock washers.
 - (2) #2 x 1/4" long bolts & nuts — wing fork.
 - (1) 4 channel radio.
 - (1.5) rolls MonoKote or equivalent.
- * Servo hardware, pushrods, clevises, ball ends, control horns, etc., as shown on the plans.
* Epoxy, cyanoacrylate, aliphatic cements, solder, foam wrap & fuel tubing as required.

**From
RCModeler
Nov. 1983**