

FLICK

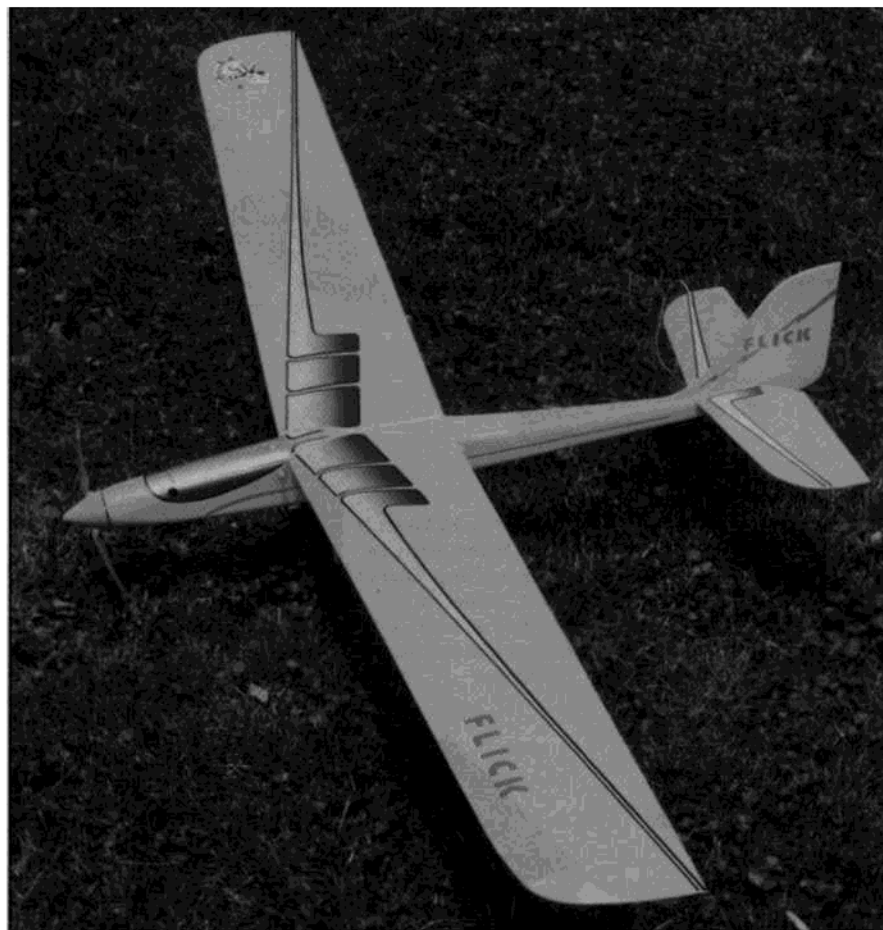
*Designed By
Theodore E. Daven*

A Simple 3-Channel Motor Glider For Some Clean, Quiet Fun

Slick which was a construction article in this magazine Oct. '95, Plan #1200. The Flick can be flown with any of the smaller motors available in the 035 class, with four to six cells. There are a number of motors with Mabuchi size designations of 360, 370, 380, and even 390 that are available from several suppliers. Johnson also has small motors this size available from Hobby Lobby; and one prototype has many hours on it with a Sagami motor that is sold by Kyosho as a LeMans AP 29.

The required controls are rudder, elevator, and motor. There are some in-line gear reduced motors on the market for the Mabuchi 380 motor that would readily fit into the nose if this is your choice. The flying weight of your finished Flick will vary depending upon the motor and subsequent pack choice. The Speed 300 with five cells was the lightest at 21 oz. and the AP 29 with six cells was the heaviest at 26 oz.

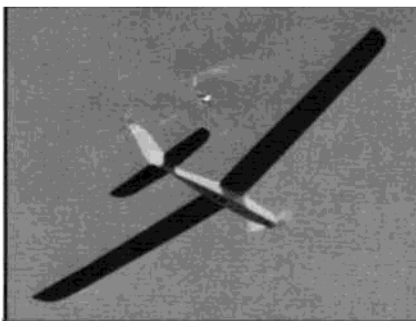
The easiest way to build the Flick is to spread out the plans and walk through the construction, while reading the instructions so that you become familiar with the design. Then, using the templates, cut the formers and ribs, then cut the fuselage sides by first making a tracing over the plans for the side template. Next, gather all of the other parts required that are listed in the parts list. The required lengths of the sticks are given, as are all of the other required dimensions for the small parts. All of the hardware listed is



The Flick has been designed for those modelers who want the performance of a larger electric powered glider in a smaller, more economical

package. The design is based on my experience with the S3021 airfoil in two kits for production, the Vengeance and the Skimmer, as well as the aileron equipped





FLICK

Designed by:
Ted Davey

TYPE AIRCRAFT

Motor Glider

WINGSPAN

59 Inches

WING CHORD

5-7/8" (Avg.)

TOTAL WING AREA

348 Sq. In.

WING LOCATION

Shoulder Wing

AIRFOIL

S 3021

WING PLANFORM

Tapered Leading Edge

DIHEDRAL, EACH TIP

3-1/2 inches

OVERALL FUSELAGE LENGTH

30 Inches

RADIO COMPARTMENT SIZE

(L) 12-1/2" x (W) 1-1/2" x (H) 1-1/2"

STABILIZER SPAN

15-1/2 Inches

STABILIZER CHORD (inc. elev.)

3-7/8" (Avg.)

STABILIZER AREA

54 Sq. In.

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

5-3/8 Inches

VERTICAL FIN WIDTH (inc. rud.)

4-1/2" (Avg.)

REC. MOTOR SIZE

035 (300-400)

BATTERY SIZE

6 cell (SR or Sanyo) 1100 mA and up

LANDING GEAR

NA

REC. NO. OF CHANNELS

3

CONTROL FUNCTIONS

Rud., Elev., Throt.

C.G. (from L.E.)

2-3/8 Inches

ELEVATOR THROWS

3/8" up — 3/8" down

AILERON THROWS

—

RUDDER THROWS

1" left — 1" right

SIDETHRUST

—

DOWNTHRUST/UPTHRUST

5°

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa, Lite Ply, & Ply

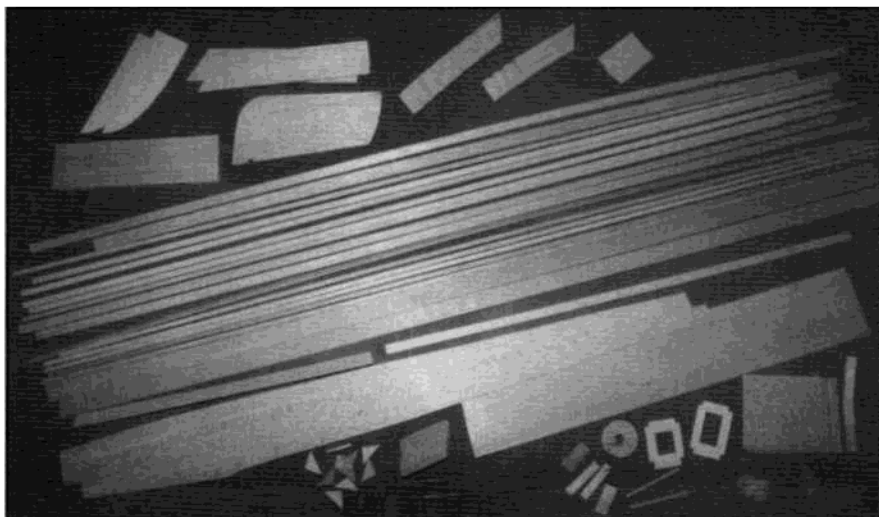
Wing Balsa & Ply

Empennage Balsa

Wt. Ready To Fly 21 to 26 Oz.

1 Lb. 5 Oz. to 1 Lb. 10 Oz.

Wing Loading 8-1/2-11 Oz./Sq. Ft.



Flick parts precut for construction.

of the usual modeling type and should not present any problems.

All of the prototypes have been built with cyanoacrylate adhesives using both the thin and thick viscosities with an accelerator. If you are not familiar with these types of glue, experiment with them in a well ventilated area on some scrap wood of the type you will use in assembly. This not only gives you an opportunity to see how they perform, it also will help determine if you are allergic to them. If you prefer other types of glues, you will have a very small weight increase and it will simply take you a little longer to build the model because of the longer drying time. Regardless of your choice, it will be easier to assemble a stronger, better flying model if you take the time to double glue, or preglue each joint that has a butted end. This pregluing seals the wood and allows the second coat to actually glue the pieces together more securely.

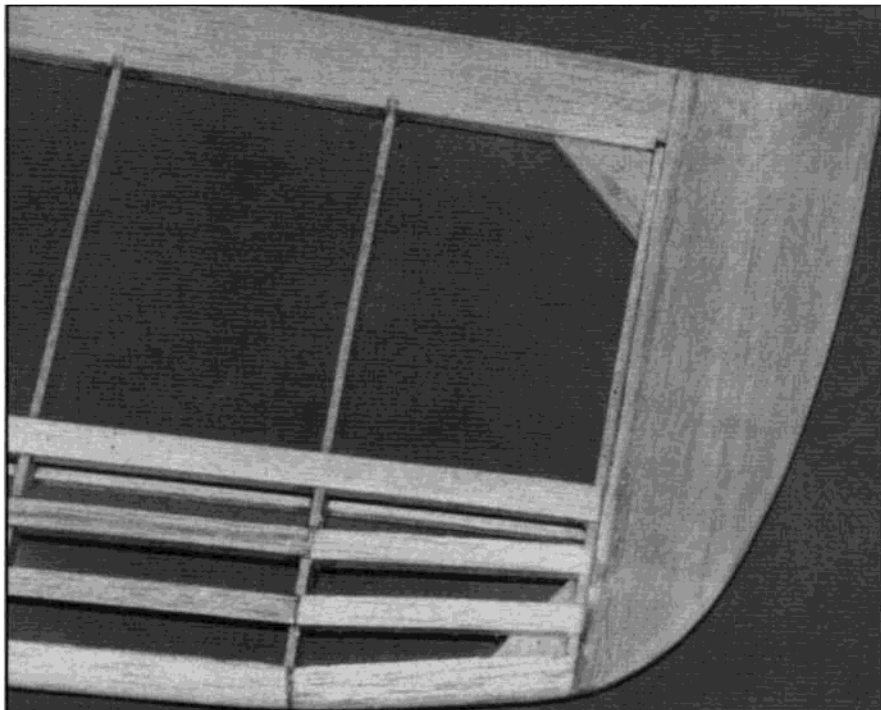
CONSTRUCTION

Wing:

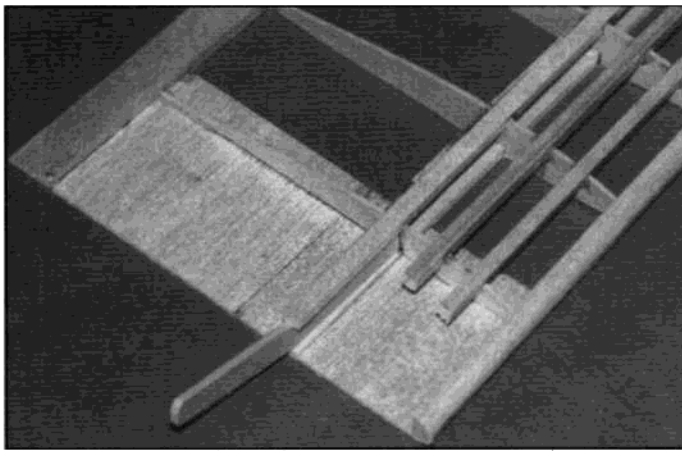
The wing is built first because you will need it when constructing the fuselage to be certain the spacing between formers F2 and F3 is accurate. The wing is flat bottomed from the spar to the rear edge; consequently, assembly will go quickly. The 1/8" x 1/4" spars and the shear webs are used, along with the larger than normal 3/16" square turbulator spars, to give maximum strength to a relatively light wing. Fit, and carefully glue all of the parts in place so that the wing is as strong as it should be. Before you start positioning and gluing, cover the plans with wax paper or the clear plastic sheet left over from your last model covering job.

(1) Pin one 1/8" x 1/4" wing spar in place over the plan, either pinning through it or by straddling it with enough pins to keep it in place.

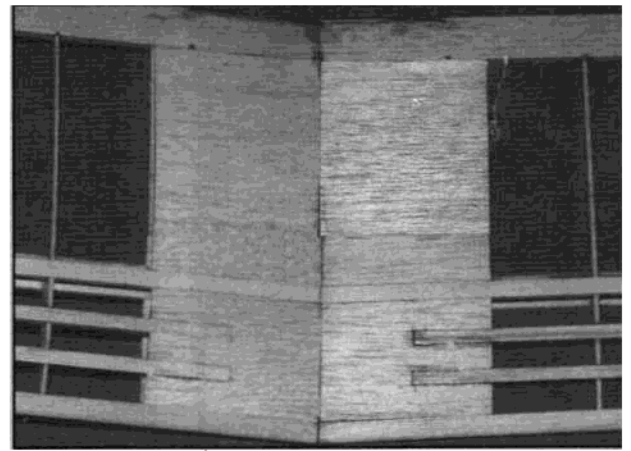
(2) Mark the position of the ribs onto both the 1/4" x 3/8" L.E., and the



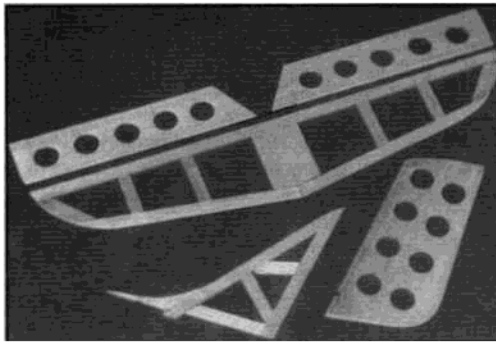
Completed wingtip.



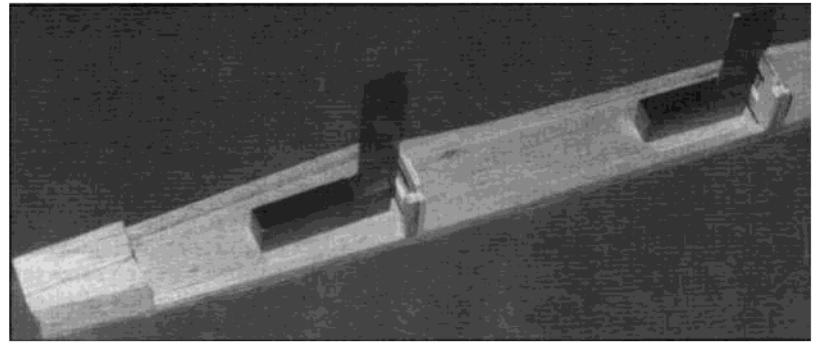
Wing center section with dihedral brace.



Completed wing center section.



Completed stabilizer, elevators, fin, and rudder.



Side with stringers, formers, and triangular stock.

3/16" x 3/4" trailing edges. Cut in grooves 1/16" wide and 1/16" deep into the trailing edge. You may find that an old hacksaw blade makes this operation easier.

(3) Cut two pieces of 1/16" sheet to 2-1/2" long, butt glue together, then glue to the rear of the spar at ribs one and two. Be certain that this piece is flush to the board and do not use much glue. Cut another sheet and glue it to the front of the spar.

(4) Position and pin the trailing edge in place. Check the fit of the ribs, and when you are satisfied, glue all of them in place except number one. For the moment, use as little glue as possible so that you won't have to sand off the excess once the wing is taken off of the board.

(5) Position the 1/4" x 3/8" leading edge

in place, shimming it up in several places with some scrap. Cut this piece at rib 14 as shown, making a smooth perpendicular cut. Glue the longest piece to ribs 2 through 14. Sand a butting angle into the piece that fits between ribs 14 and 15 and glue in place.

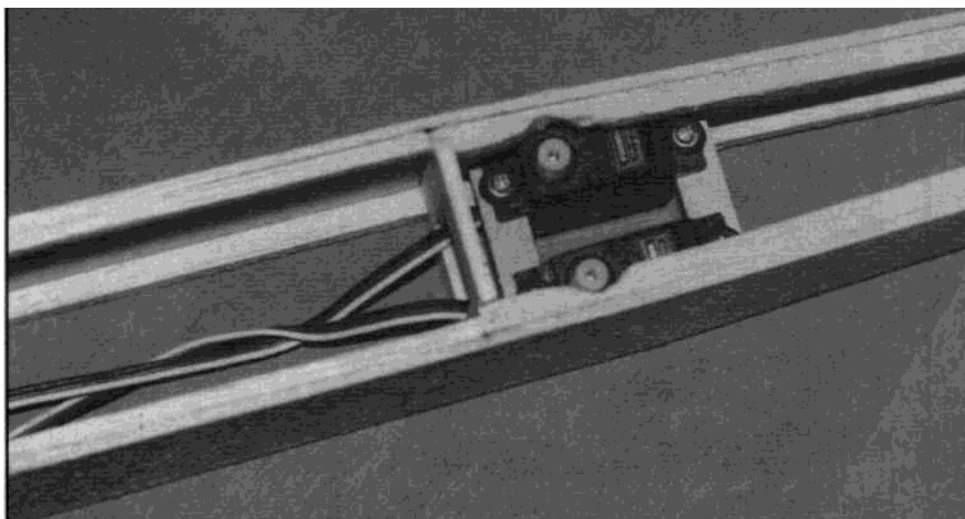
(6) Glue the top spar and the two 3/16" square turbulators in place. Note the small taper out at the tips and bend the spars down accordingly. Fit and trim in the shear webs and glue in place.

(7) Remove this wing panel from the board and repeat steps one through six for the other half of the wing.

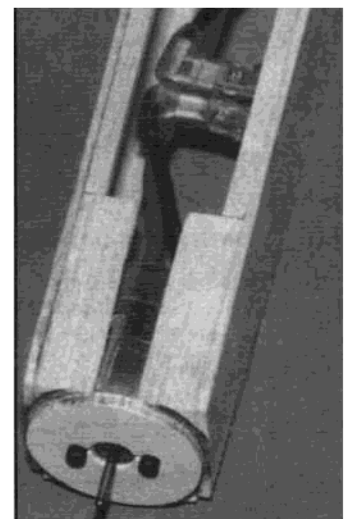
(8) Carefully preform the wingtips and glue in place as shown. Using a sanding board with 80 or 100 grit, carefully sand the wing to blend in the ribs with the leading and

trailing edge. Shape the leading edge as shown on the plans, using the template, working carefully to obtain the proper shape. Shape the tips, including some of the spar and leading edge material, to obtain a smooth taper. Hold the panel near the edge of the bench when shaping the leading edge and it will be easier to form the proper airfoil.

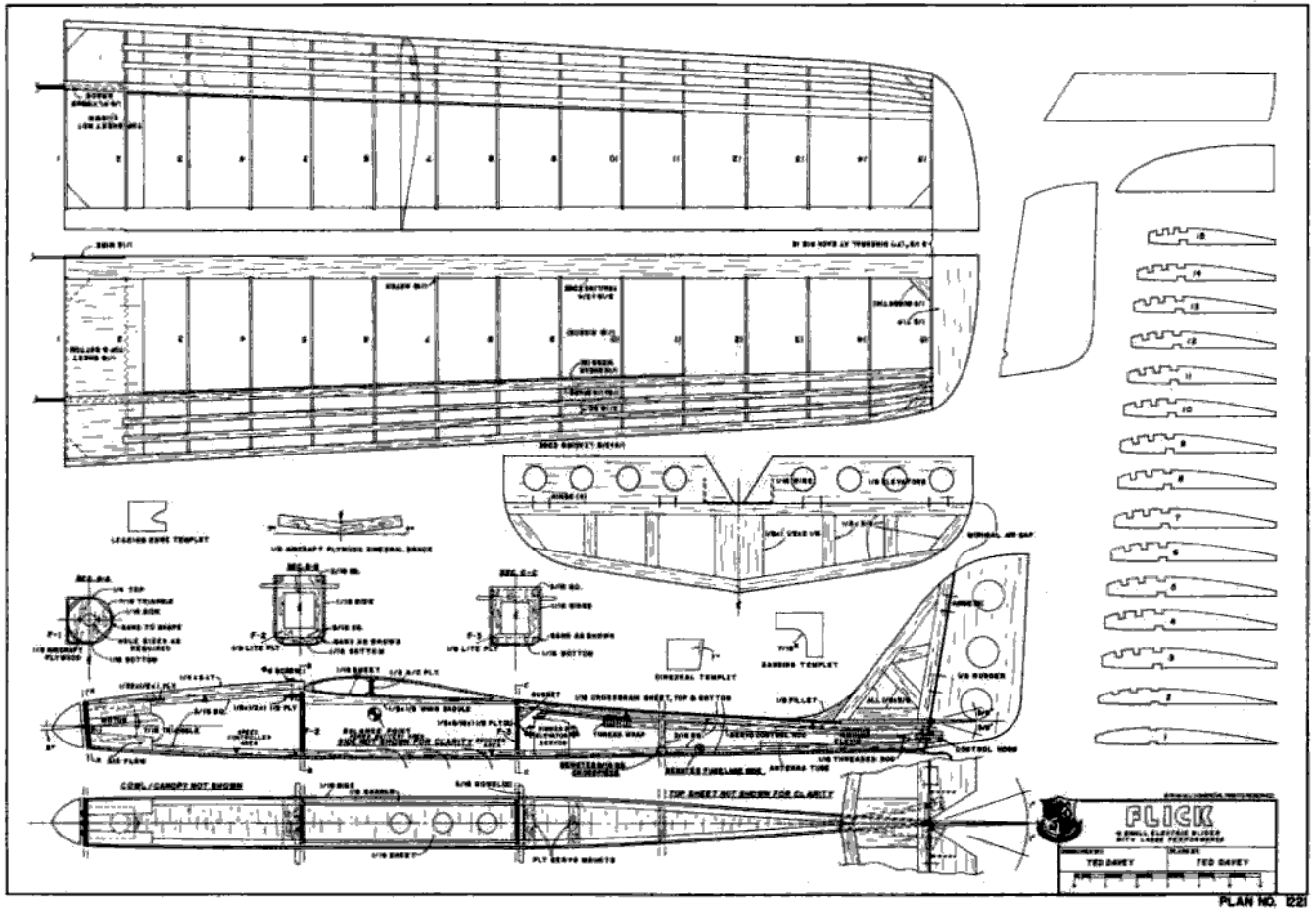
(9) Sand the sheeting and spars at the number one rib position of one wing panel to get a flush edge and pin it to the board. Fit, and glue the 1/8" ply dihedral brace in place. Shim up the other wing panel 7" and sand the spars, leading edge, and trailing edge to properly butt against the first panel. Cut the slot in both number one ribs for the dihedral brace and glue them together, and glue the front and rear pairs together.



Mounted servos before planking.



Nose with F1 and mounted motor.



(10) While maintaining the 7" total (3-1/2" each tip) dihedral, fit it all together. When you are satisfied, glue the wings together on the bottom sheeting, brace, and spars. Take the time to test fit very carefully to prevent gluing in any tip wash-in or wash-out. Then fit and glue the center ribs and top spars in place. Again, use just enough glue to obtain good joint strength. If need be, you can add more later.

(11) Once the glue is dry, remove the wing from the board. Cut the gussets from 1/8" x 1/2" material and glue in place as shown. Cut away enough wood on the trailing edge to fit and glue the 1/16" wire protector in place which will have to be bent to shape.

(12) Cut to fit and add in the top 1/16"

sheeting behind the main spars and around the 3/16" turbulators. Finish sanding the wing and spread some thin glue on the leading edge to protect the wood from the wing mounting rubber bands. Go over the entire wing and add in more glue fillets where you feel more strength is required.

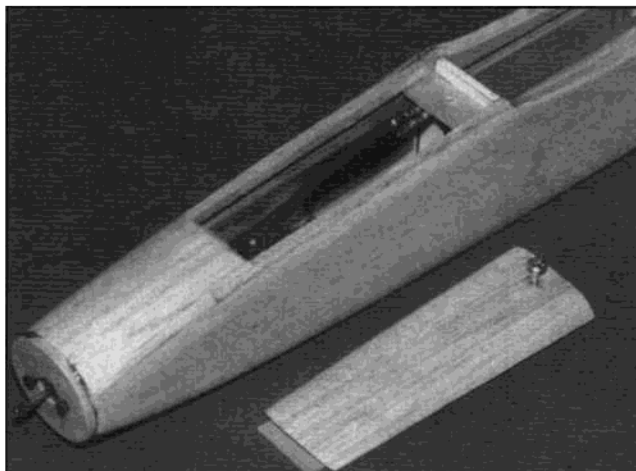
Stabilizer, Elevator, Fin, And Rudder

The stabilizer and fin are made from 1/8" x 3/8" light balsa, with a 1/8" center section on the stab. The elevators and the rudder are made from 1/8" light balsa sheet with optional lightening holes if you wish. Extra patterns are on the drawing to simplify cutting out these three parts. The fin and stab are simple to make and will be quite strong if the pieces are cut out with perfect

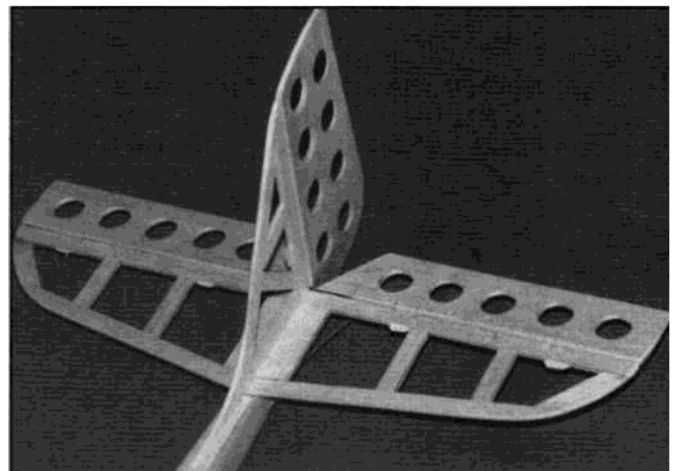
90° angles for proper butting and gluing.

(1) Cover the stabilizer plans to protect them as you did with the wing. Cut the front and rear pieces first and pin them on the plans. Cut, fit, and glue the shorter pieces in place, being careful to get a good fit. Double gluing is helpful here because of the open grain on the shorter pieces, but don't let the glue seep through and cover the bottom surface.

(2) Form the rudder over the plans as shown, first pinning the front and rear pieces. Again, glue very lightly when you butt the pieces or you will have to do a lot of sanding. Remember, some coverings adhere differently to the glue on the wood instead of the wood itself when the heat of the iron is applied, and you could end up with a strange



Completed nose with motor and canopy.



Tail feathers glued in place before covering.

finish if too much glue is left on the wood.

(3) Remove both pieces from the plan when the glue has set. Sand both sides with a sanding board to obtain a smooth surface and round off the edges. Don't round off the area on the fin where the fillet will be attached.

(4) Cut the hinge slots into both pieces and temporarily mount the hinges. Sand the taper shown into the rudder and the elevators with a sanding board. Carefully drill the 1/16" holes into the elevators for the 1/16" wire joiner and test fit the joiner. Glue in the joiner once the fit is perfect. Finish sanding everything with 220 grit paper and set it aside.

Fuselage:

The sides that you have precut, along with the formers as shown, are large enough to accommodate any of the smaller size motors available for which this model was designed. The Astro Flight 020 and 035 motors would be a difficult fit because of the brush assemblies protruding on these motors. As shown, the fuselage is large

enough for 6-cell packs in the 1000 mA size range, particularly if the servos are mounted behind former F3. Even if you have no plans to use this many cells, it is a good idea to put the servos there because you will then have much more available room to mount the rest of the equipment or move it around to facilitate balancing.

The Flick features a canopy hatch for easy access to both the motor and the speed controller. There is no hatch on the bottom for quick pack removal because this would add additional weight. You may find it convenient to make a smaller hatch on top of the servos in the event you want to service one of them. One of the prototypes has such a hatch that is held in place by the ironed-on covering. If need be, the covering can be slit and the hatch opened.

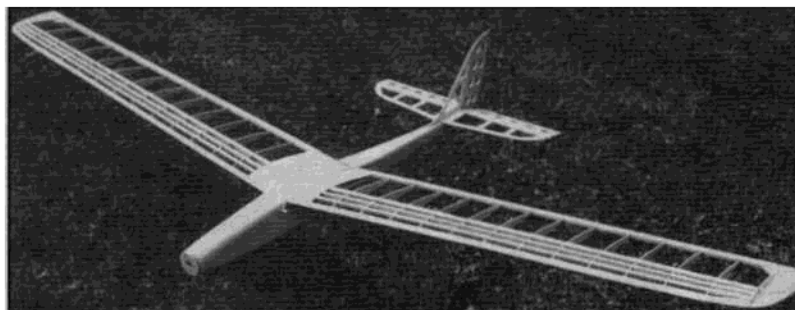
(1) Pin one precut side to the board and pin and glue the 3/16" stringers in place as shown. Be certain that the longer stringers butt the side edges. Glue formers F2 and F3

in place, using a square to obtain the required 90° angles. Glue the two 7/16" triangle pieces and the gusset behind F3 in place.

(2) Pin down the other side, and pin and glue the 3/16" square stringers, 7/16" triangles, and the gusset in place.

(3) Lay the second side flat on the board and stand the first side on the two formers to butt the sides together. Rubber band or tape the assembly together and check the fit very carefully. Pull in the tail together to be certain that the alignment will be accurate and that you will not be building in a crooked fuselage. When you are satisfied, glue just the formers to the second side.

(4) Sand the taper into the 3/16" stringers at the rear as shown in the top view. Cut, fit, and glue in place the top and bottom 3/16" square crosspieces at the bottom of F2 and F3. Pull the tail together, again checking the alignment, then glue together. Cut, fit, and glue in place the two 3/16" crosspieces 4-1/2" behind F3.



Flick framed out ready to cover.



Finished nose with Futaba receiver, controller, and pack.

(5) Fit and glue the 1/8" x 5/16" ply crosspieces for both servo mounts, using your servos to properly space the mounts. Sheet the fuselage bottom with 1/16" balsa cross-grain.

(6) Position F1 former in place in the nose and pull in the fuselage sides to meet the former. Clamp, rubber band, or tape the sides into this position and very carefully check your fit to be sure that there is no side thrust, and that there is 5° of down thrust. Once you are satisfied, seep in enough thin glue to hold the formers in place. Mount the motor for a final check.

(7) Once the glue has set, remove the clamps, etc., and check the fit. If the alignment is not perfect, now is the time to cut it apart and repeat Step 6 above. When satisfied, add a fillet of glue. Fit and glue the 1/8" plywood canopy mounting plate in front of F2.

(8) Glue the 1/4" thick top nose/canopy plate in place. Temporarily insert a sheet of plastic behind the 1/32" ply hatch latch plate position so the top will not be glued back further than required. Drill through the 1/8" ply plate with a 1/16" bit from the bottom so that the sheet metal mounting screw will be centered. Install the screw from the top to hold the hatch in place.

(9) Sheet the bottom of the nose area with 1/16" balsa cross-grain as shown. Fit and glue the 1/8" x 1/2" doublers in place for the wing mount area, and trim to fit to the wing cut-outs' shape already formed into the precut sides. Sand the nose area to shape. Cut the canopy block as shown, and glue on

the small 1/32" ply latch plate which keeps it in position at the front end.

(10) Fabricate the two servo pushrods from hard 3/16" square balsa. Use the threaded end for the clevis at the control horns and a shorter piece for "Z" bends at the servos. Cut the slot in the fuselage side for the rudder control rod. Check for proper distances for the hook-up of both the elevator and the rudder later. Temporarily plug in the servos and check for centering and the proper throws.

(11) The antenna tube should be installed so that it protrudes out the bottom as shown. This will protect the rudder, and the rudder servo, on a hard skidding landing. Drill the holes for the two 3/16" wing hold-down dowels, but do not glue them in place. Sheet the top of the fuselage with 1/16" sheet cross-grain. If you prefer to use a servo hatch, it must be constructed at this time.

(12) Sand the fuselage to the shape shown on the section views. Use the template for most of the fuselage except back near the tail. Do most of the rough shaping with a sanding block with 60 grit paper and the final shaping with 120 grit.

Final Assembly And Finishing:

(1) Place the fuselage on a flat surface and secure it so it will not move. Mount the fin to the stabilizer, making sure the fin is straight and square to the stabilizer. Position this assembly in place on the fuselage rear to check the fit. Place a flat ruler across the wing saddle and align the stab so that it is perfectly parallel to the wing saddle. When

the alignment is perfect, glue the stab to the fuselage. Once you check the fit, add a fillet of glue to the stab/fin and the fuselage/stab. If you prefer, you can add in a fillet of 1/8" balsa triangular stock in both places.

Flick Parts List

- 2 — 1/16" x 3" x 28", fuselage sides
- 1 — 1/16" x 3" x 28", fuselage top & bottom
- 2 — 1/16" x 3" x 24", wing ribs
- 1 — 1/16" x 3" x 20", wing center
- 1 — 1/16" x 2" x 13", shear webs
- 4 — 1/8" x 1/4" x 28-1/2", wing spars
- 1 — 1/8" x 3" x 24", wings, elevators, fin, & stab
- 1 — 1/8" x 3/8" x 36", stab
- 1 — 1/8" x 3/8" x 18", fin
- 1 — 1/8" x 1/2" x 20", fuselage wing doubler & gussets
- 1 — 3/16" x 3/16" x 36", fuselage
- 6 — 3/16" x 3/16" x 27", fuselage and wing
- 2 — 3/16" x 3/4" x 28-1/2", wing trailing edge
- 2 — 1/4" x 3/8" x 29", wing leading edge
- 1 — 1/4" x 2" x 7", nose block/canopy
- 1 — 3/16" x 5" dowel, wing mount
- 1 — 7/16" x 5" triangle, fuselage
- 1 — 1/8" x 1/2" x 1", plywood canopy mount
- 2 — 1/8" x 5/16" x 1-1/2", plywood servo mounts
- 1 — 1/8" x 1-3/4", A/C plywood, F1 former
- 1 — 1/8" x 2" x 6", lite plywood, F2 & F3 formers
- 1 — 1/32" x 1/2" x 1", plywood canopy mount plate
- 1 — 1/8" x 5/8" x 4", A/C plywood, dihedral brace
- 2 — small control horn
- 2 — small clevis
- 2 — 1/16" x 12" threaded rod
- 4 — #2 x 1/2", sheet metal screws
- 1 — 1/16" x 3-1/2" wire, elevator joiner
- 1 — 1/16" x 4" wire, wing edge protector
- 1 — #6 x 3/4" sheet metal screw, canopy mount
- 7 — hinges
- 1 — antenna tube

(2) Final sand the whole model using 220 grit paper and then 320. Take the time to look carefully, and even use some filler if required, to be certain that the finish will be as nice as you want it to be. Add additional layers of thin CA glue where the control horns will be mounted to stiffen the wood and minimize compression.

(3) Cover everything with your choice of material. The prototypes were covered with Coverite's 21st Century. Cut through the covering material on the fin/rudder and the stab/elevators and glue the hinges in place. Keep the air gap to an absolute minimum and avoid excessive gluing, as it can affect the movement of the hinges. This is a relatively small model, so to help identify or find it when high up, the very bright Neon coverings were used. All three prototypes have yellow on the top of the wing and on the fuselage along with the fin and rudder. The three bottoms were covered with pink, orange, or green, with the green being the easiest to see.

Equipment Installation And Flying:

(1) Keep in mind the balance point when installing the equipment. The receiver, its batteries, the controller, and the power pack can all be mounted with Velcro-type material. The material will adhere better to the balsa if you first spread a thin layer of glue to form a hard skin. You can also glue some 1/32" ply to hold the Velcro and to hold the switches as well.

(2) I strongly suggest that you use some kind of motor control, either an electronic throttle or an on-off type. Flying is much more enjoyable, and certainly a lot safer, if the speed can be controlled. Simply turning on the motor and letting the model fly until the batteries run down, heats up the batteries and the motor which can cause premature wear, failure, or both.

(3) Prior to powered flight, check that the servos are operating in the proper direction and try some test glides. Test by throwing it straight out, not up, and do not throw it too hard so it won't balloon and stall. Reposition the equipment as required to get a long flat glide.

(4) To obtain optimum results from your motor, be certain that the pack is fully charged before you fly. Many chargers advertise a 15-minute charge cycle and, in fact, have a 15-minute timer. In reality, you will

find that a discharged pack is rarely fully charged in 15 minutes, particularly one that is rated at 1500 mAh or more. The easiest way to be assured of a peak charge is to use a Peak Detection Charger which automatically fully charges the pack and then shuts off. If one is not available, monitor the voltage charge rate with a digital meter, and stop the charge when the voltage peaks and starts to drop. At that point, the pack is fully charged and will give you the best performance.

(5) If you are a newcomer to flying, it would be a good idea to get some experienced help for the first flights. Having someone else do the launching will give you a little more time to react. Either way, be certain to launch it straight out as was done with the test glides. When in doubt, a good rule of thumb is to launch it at the horizon. When the time has come, launch the Flick under full power directly into the wind. Let it continue to climb straight out at a shallow angle with very easy turns until it reaches a few hundred feet of altitude. At that point, you can try some mild aerobatics and different speeds until you feel out the controls.

(6) When you set up for the landing, don't let it slow down too much and lift the nose or it might stall, lift a wingtip, and drop in. The Flick likes to fly, so keep it moving until you flare it for landing just as it is ready to touch down. Good luck with your new bird, I am sure that you will like it!



Aug. 1996