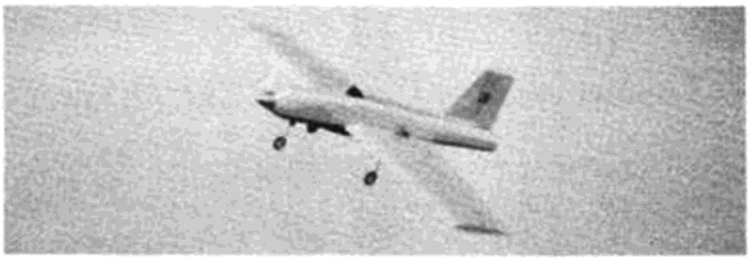
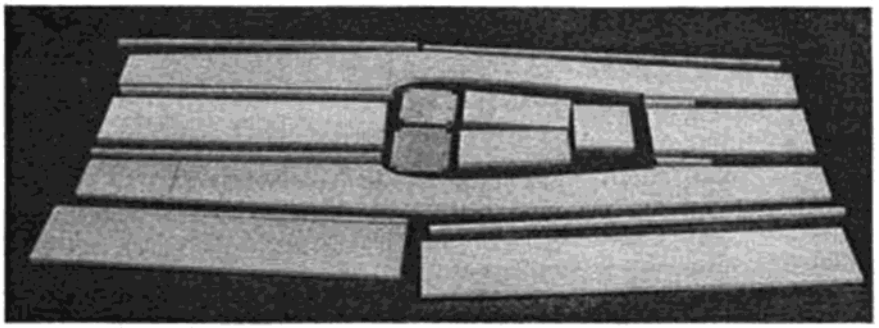
SKYWALKER

By Bill Evans

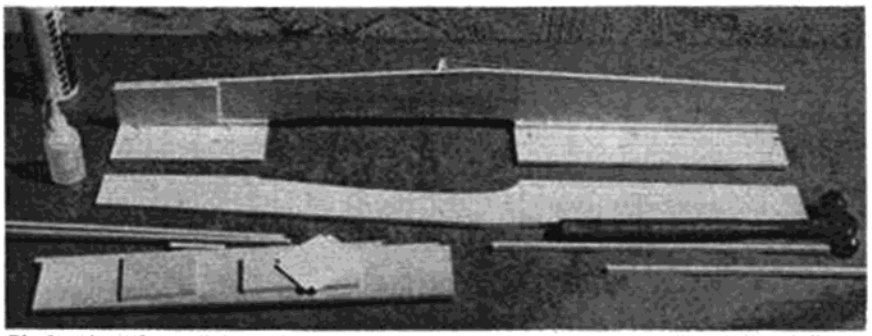
If you haven't tried the flying wing concept, this is a great opportunity. Presented in three different sizes by Bill Evans, so one should fill your needs.



Have you ever asked yourself why you fly R/C? What is the payoff for the countless hours spent and the endless drive that makes you probe deeper and deeper into model aviation. If you've never wondered about this, you're not alone. Though I built my first ten cent Comet kit more than forty years ago it was just recently that I realized why my obsession for the hobby is so strong. There are three reasons: The first is the challenge. The challenge of flight. To get the ship into the air and make it fly. Next is the satisfaction. No matter how many flights I make in a day, each time I grease it down on the centerline there is a great satisfaction. Finally, there is the unlimited potential. Today's "state of the art" radio systems, power combinations and building materials provide for open ended design configurations limited only by our imagination and willingness to work to produce!



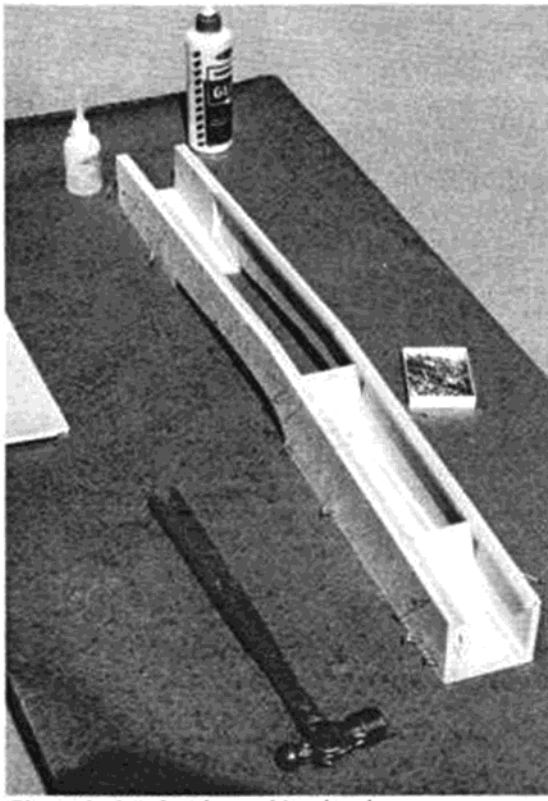
Fuselage pieces cut out and ready to assemble.



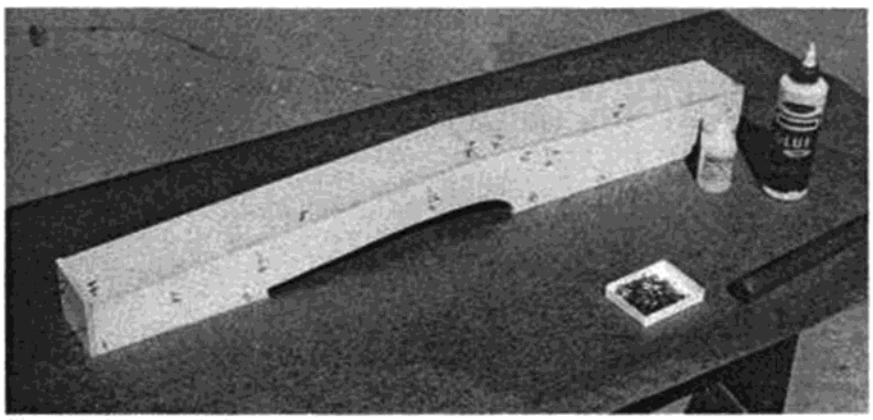
Pin fuselage front and rear bottom pieces down on a flat surface. Use sides to align.

Design groundwork for the Skywalker began early in 1974 with the design and test flight of the Saracen (a 72" flying wing glider, RCM April '76). The evolution between the Saracen and Skywalker included more than twenty designs such as the Similtars (RCM Dec. '78, MA Dec. '78), Astrons (RCM Nov. '79, MA Apr. '80), Desperado and Top Gun.

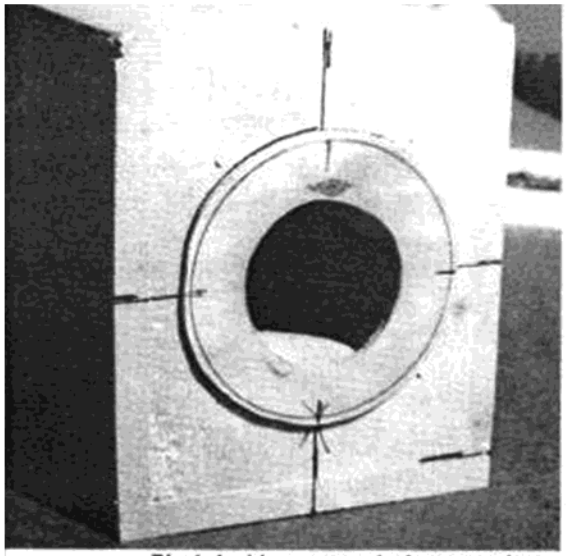
On September 26, 1980, the first Skywalker took shape and was test flown. Powered by a K & B 3.5, it was performance plus! Shortly after, a .40 powered by a K & B 6.5FR was in the air. A week later the T.D. .049 (using a pen bladder tank) version was flying. Amid phone calls for plans and cores for the first three sizes of the Skywalker, work began on the .61 size. Due to its size, I found the .61 version to be the smoothest and easiest to fly of the lot. It's super stable and goes through the air like it's on a set of tracks.



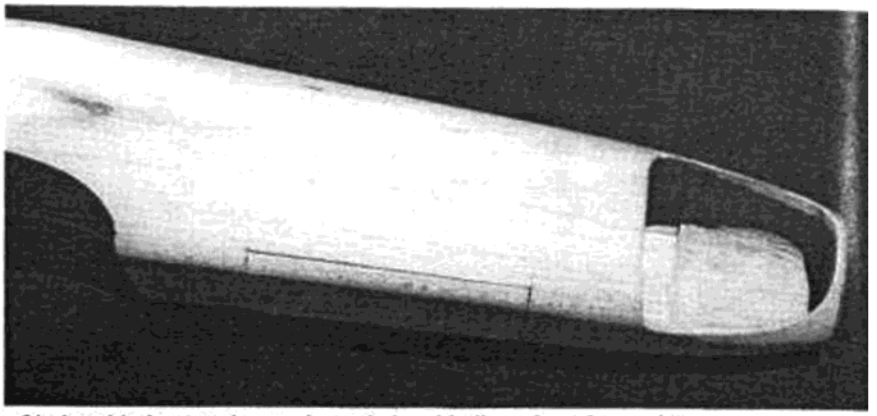
Pin and glue fuselage sides in place. (Note: pin from outside.) Glue and pin 1/4" balsa in corners. (1/2A size only.)



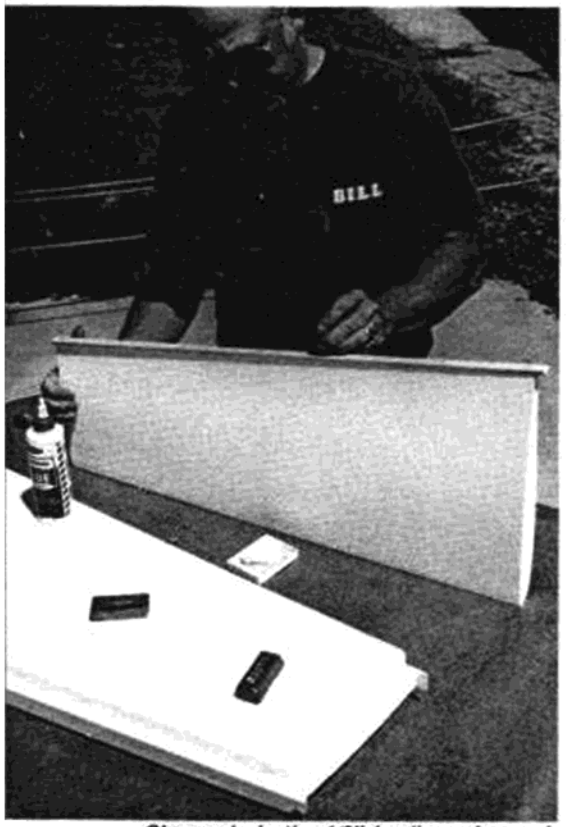
Pin and glue top sheeting in place.



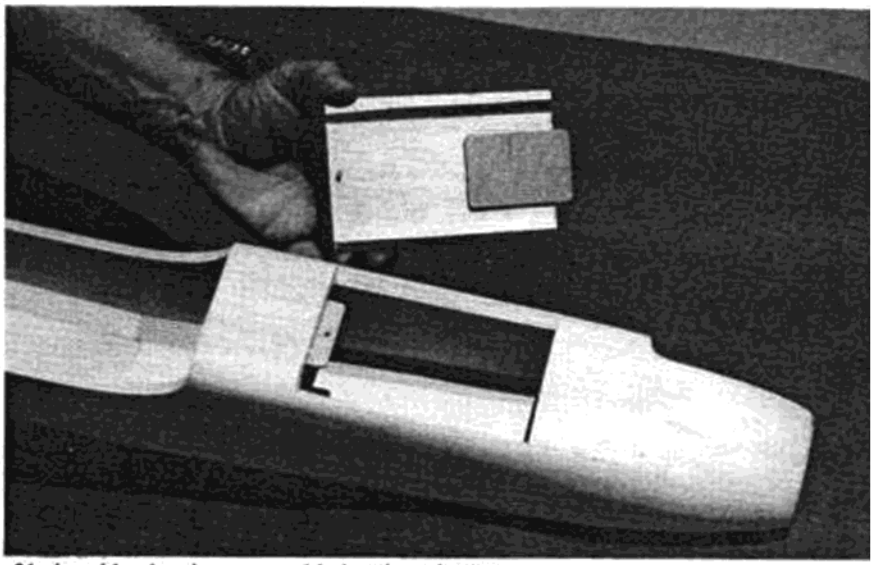
Block inside nose and glue on spinner plates.



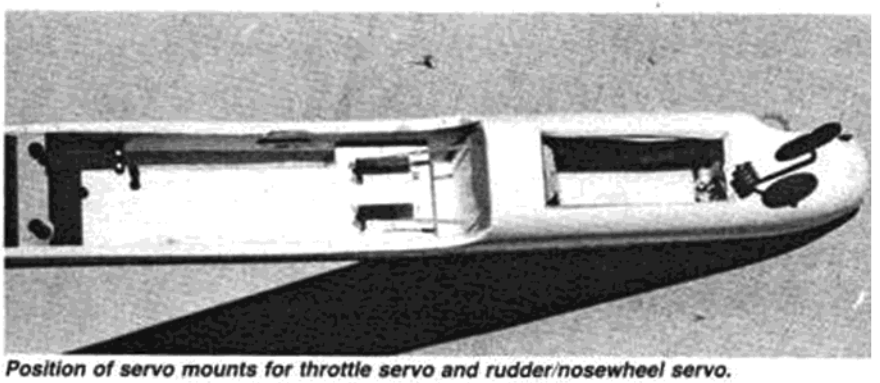
.61 size ship front end carved, sanded and hollowed out for engine.



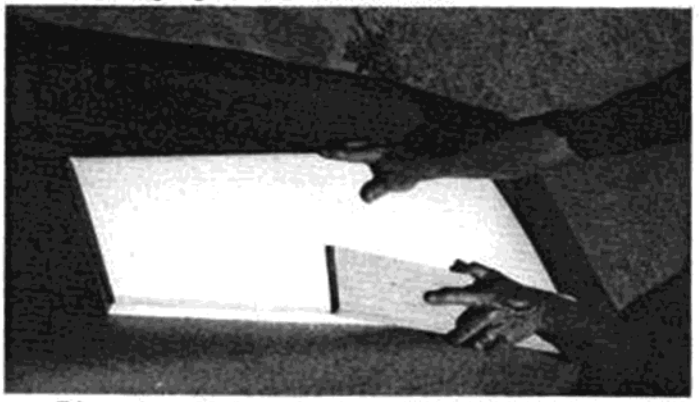
Glue and pin the 1/8" leading edge and 1/4" trailing edge balsa to the foam cores.



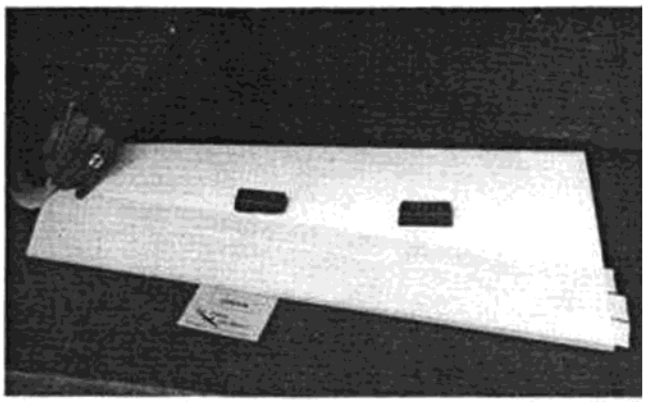
.61 size ship showing removable hatch on bottom.



Position of servo mounts for throttle servo and rudder/nosewheel servo.



Trim and sand balsa trailing and leading edge so skins will fit over them. Be sure to vacuum cores and sheeting material.



Apply adhesive (tape or contact cement) to core. Photo shows the use of Corefilm tape.

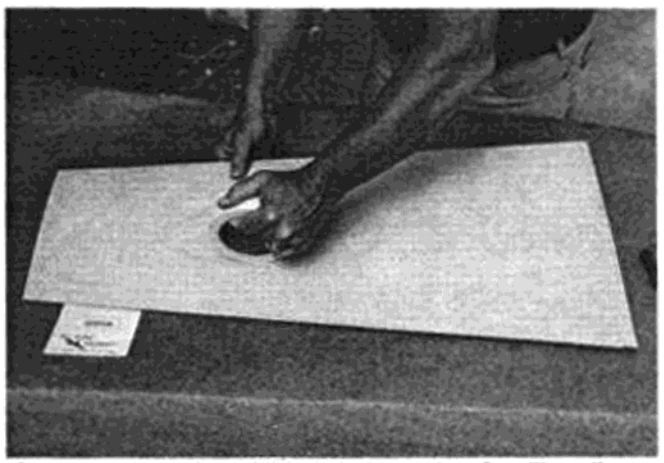
NAME OF AIRCRAFT
1/2A Skywalker, the .40 Skywalker, and the .61 Skywalker

Designed By:
Bill Evans

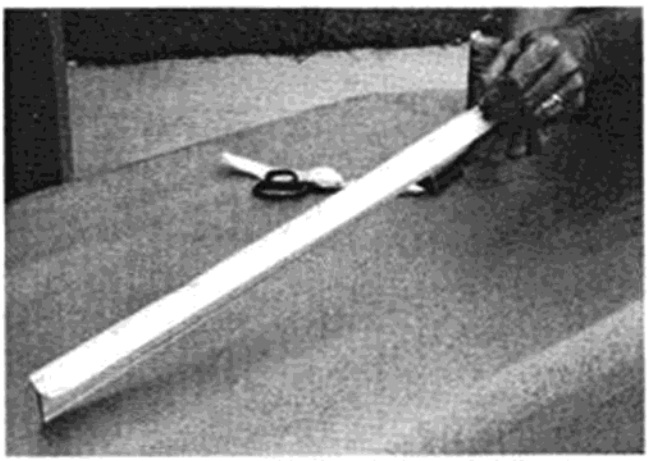
NAME OF AIRCRAFT
1/2A Skywalker
TYPE OF AIRCRAFT
Sport Flying Wing
WINGSPAN
40 Inches
WING CHORD
8¼ Inches (Avg.)
TOTAL WING AREA
330 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Symmetrical Reflexed
WING PLANFORM
Swept L/E
DIHEDRAL EACH TIP
1/4 Inch
O.A. FUSELAGE LENGTH
25 Inches
RADIO COMPARTMENT SIZE
(L) 13" x (W) 1¾" x (H) 1¾"
ELEVON AREA
46 Sq. In.
VERTICAL FIN HEIGHT
6½ Inches
VERTICAL FIN WIDTH (inc. rud.)
5¼ Inches (Avg.)
REC. ENGINE SIZE
TD .049
FUEL TANK SIZE
1 Oz. Bladder
LANDING GEAR
Wire Skids
REC. NO. OF CHANNELS
2
CONTROL FUNCTIONS
Elevons
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa and Ply
Wing ..... Balsa, Foam, and Ply
Empennage ..... Balsa
Wt. Ready To Fly ..... 23 Oz.
Wing Loading ..... 10 Oz./Sq. Ft.

NAME OF AIRCRAFT
.40 Skywalker
TYPE OF AIRCRAFT
Sport Flying Wing
WINGSPAN
50 Inches
WING CHORD
11¼ Inches (Avg.)
TOTAL WING AREA
562 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Symmetrical Reflexed
WING PLANFORM
Swept T/E
DIHEDRAL EACH TIP
3/4 Inch
O.A. FUSELAGE LENGTH
34 Inches
RADIO COMPARTMENT SIZE
(L) 15" x (W) 2¼" x (H) 2"
ELEVON AREA
78 Sq. In.
VERTICAL FIN HEIGHT
8½ Inches
VERTICAL FIN WIDTH (inc. rud.)
7 Inches (Avg.)
REC. ENGINE SIZE
.40
FUEL TANK SIZE
8 Oz.
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Elevons, Rudder & Throttle
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa and Ply
Wing ..... Balsa, Foam, and Ply
Empennage ..... Balsa
Wt. Ready To Fly ..... 68 Oz.
Wing Loading ..... 17.4 Oz./Sq. Ft.

NAME OF AIRCRAFT
.61 Skywalker
TYPE OF AIRCRAFT
Sport Flying Wing
WINGSPAN
60 Inches
WING CHORD
13⅞ Inches (Avg.)
TOTAL WING AREA
832 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Symmetrical Reflexed
WING PLANFORM
Swept T/E
DIHEDRAL EACH TIP
1 Inch
O.A. FUSELAGE LENGTH
43 Inches
RADIO COMPARTMENT SIZE
(L) 15" x (W) 3" x (H) 3"
ELEVON AREA
105 Sq. In.
VERTICAL FIN HEIGHT
8½ Inches
VERTICAL FIN WIDTH (inc. rud.)
8 Inches (Avg.)
REC. ENGINE SIZE
.61
FUEL TANK SIZE
13 Oz.
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Elevons, Rudder & Throttle
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa and Ply
Wing ..... Balsa, Foam, and Ply
Empennage ..... Balsa
Wt. Ready To Fly ..... 105 Oz.
Wing Loading ..... 18 Oz./Sq. Ft.



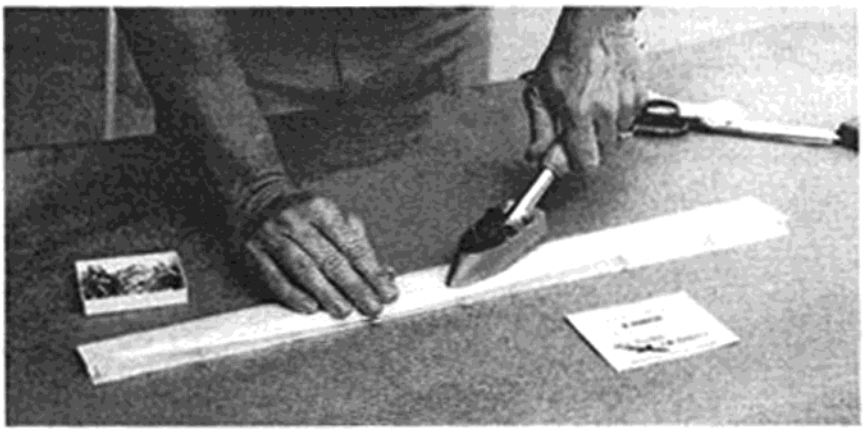
Set sheeting in place starting at trailing edge. Corefilm roll was used to smooth down sheeting.



Apply X-hinge as shown, using pins to hold stitch line to center edge of control surface.

Both the first two Skywalker 61's are now history due to elevon flutter which has been corrected. Due to the speed and control surface pressure, the original elevon torque rods fatigued and bent! This condition has been corrected by reshaping the elevons, changing the pushrods from soft 1/16" wire to 3/32" piano wire, 54 inch oz. servos, and balancing the control surfaces. Though the loss of the first two ships was unwelcome it is to your advantage for me to thoroughly test fly a design and correct any potential problem before plan release.

You will also notice that this construction article has two special features. First the Skywalker offers you the choice of .049, .40 or .61 size engines so you're really getting three articles in one. Also, to depart from, "here's one that I did, you can now try one," several Skywalkers have been built by a number of modelers from Reading, Pennsylvania, to the West Coast. The idea behind showing pictures of some of the modelers who got in on building the first Skywalkers was to include you, the readers, as an important part of the article. Marc, Vince, Dan, Wayne, John and Randy deserve a special thanks.

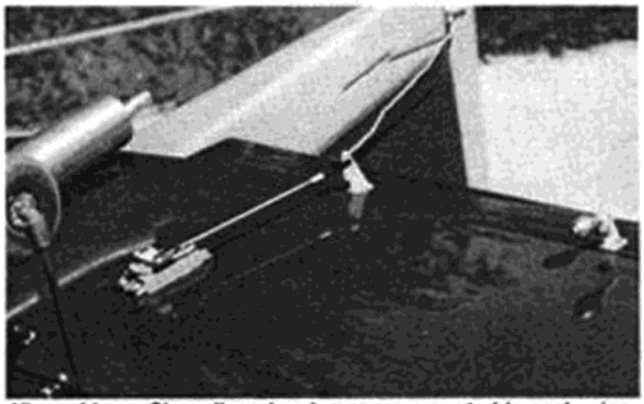


Iron down X-hinge on both sides.

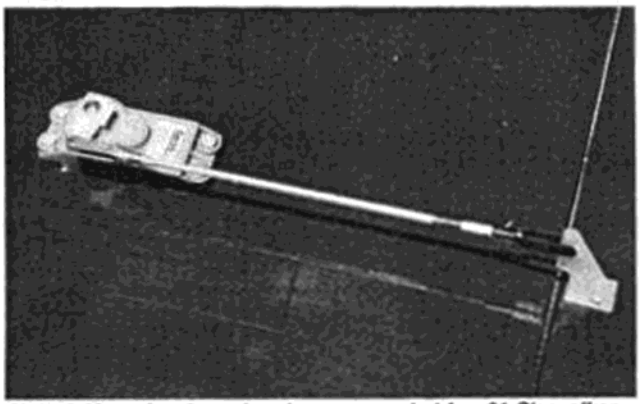
Pin control surface in place on wing, then iron down X-hinge on to wing.

Construction of either of the three Skywalkers shown is similar, so choose your size and begin your project Skywalker.

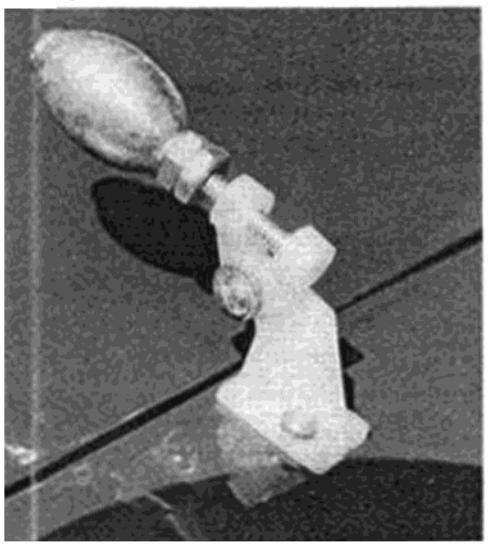
For your convenience, Skywalker foam wing cores and 1/64" plywood wing sheeting may be ordered from Soaring Research, 454 Wildrose Lane, Bishop, California 93514. **Cores** for the .61, $14.00; 1/64" **plywood wing sheeting,** $16.00; .40 size **Cores,** $12.00; **plywood wing sheeting,** $12.00; and .049 **Cores,** $8.00. Include 2.50 per order for shipping and handling. California residents add 6½% tax.



View of large Skywalker showing servo mounted in each wing panel. This is for those who have ail./elev. mixer on their radio.



Note 4-40 pushrod used and recommended for .61 Skywalker.

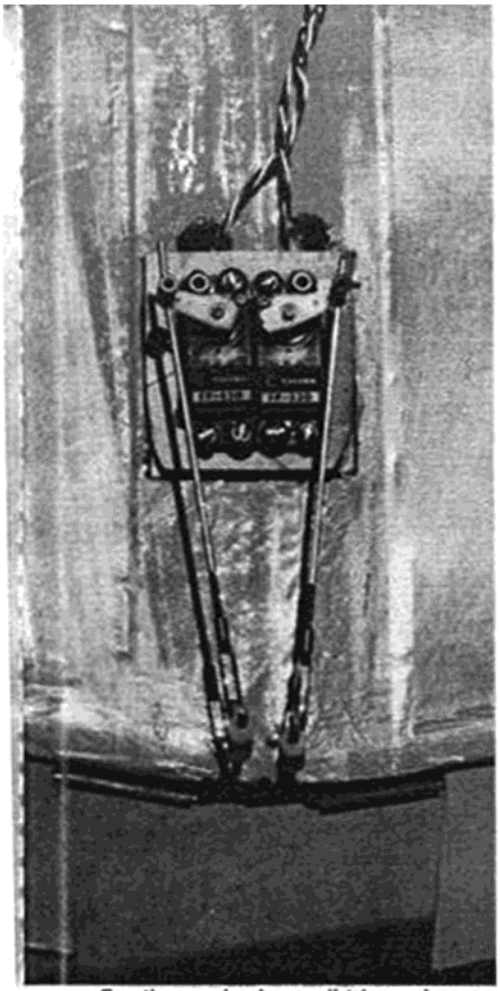


Close-up detail of elevon balance. A must for the .61 size. Made from Du-Bro control arm with Du-Bro aileron link.

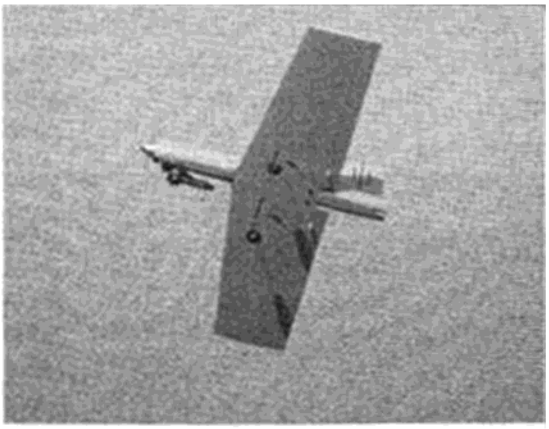
CONSTRUCTION

The best advice is to build the Skywalker per the plan. If you have a modification in mind, do it after you fly it as designed.

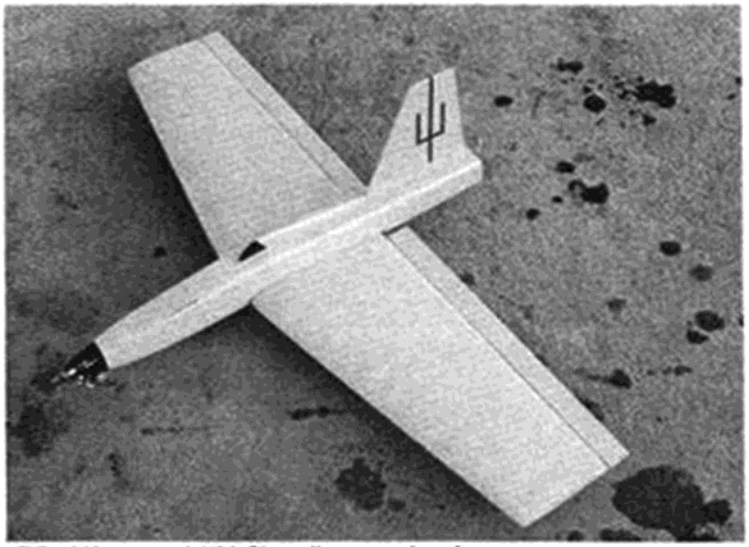
Skywalker construction is very quick and has been kept simple. The use of ply sheeted cores gives great strength. In a way, a sheeted foam wing is much like a piece of case hardened steel; that is, the outside skin provides a hard protective shield for the inner core which serves as a shock absorber.



For those who have ail./elev. mixer on your radios, just mount servos on underside of wing. Note 4-40 pushrods used for .61 size Skywalker.



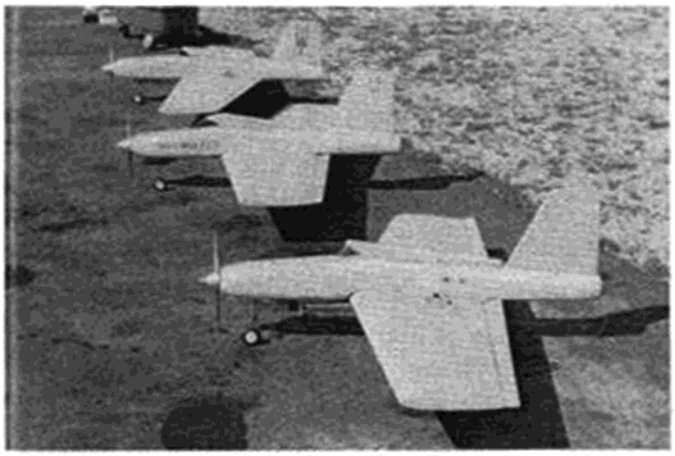
K & B .40 powered Skywalker makes a low pass. This was early version with swept leading edge.



T.D. .049 powered 1/2A Skywalker — real performer.

The fuselage built on a flat surface utilizes the technique of box construction with triangular stock in the corners, which produces rounded and streamline results.

- Glue (aliphatic does nicely) and pin the 1/8" balsa leading and 1/4" balsa trailing edges to the cores. Make sure to keep the cores free of curves or bends. Set these aside to dry.
- Cut out fuselage parts.
- Pin fuselage bottom front and rear pieces down on a flat surface using the sides as a guide. Glue and pin left and right sides to the fuselage bottom so that the sides rest on top and flush with the edge of the bottom pieces. (Push pins in through from the outside of the fuselage.)
- Glue and pin 1/2" balsa triangle stock in place at bottom inside edges of fuselage front and rear (push pins in through fuselage side to help in pin removal.)
- Glue and pin firewall and former in place.
- Glue and pin upper 1/2" balsa triangle stock in place flush with the top edge of the fuselage.
- Glue and pin fuselage top front and top rear in place.
- Glue and pin fuselage tail cover in place.
- Glue and pin inside cowl blocks to inside front of fuselage. Set aside to dry.



Three prototype .61 size Skywalkers. Two in front with swept leading edge and third one with final wing version of swept T/E.

.40 size is ready to roll down runway.

• Trim and sand wing leading and trailing edge stock so that the ply sheeting will fit nicely over them.
• Cut wing sheeting to shape, about 1/2" oversize.
• Clean cores and sheeting with vacuum and apply sheeting transfer tape to core (we used Corefilm).
• Remove tape backing and set sheeting in place.
• After sheeting both wing panels top and bottom, trim the edges and glue and pin 3/16" balsa leading edge in place.
• Cut out and shape fin and elevons.
• Sand wing panels to shape and join with 5-minute epoxy.
• Locate and mark hardwood gear blocks as shown on underside of wing; remember there is anhedral. (I say this because one builder put the gear blocks on the top side of the wing in error.)
• Epoxy gear blocks into wing.
• Trim and sand fuselage to shape and cut out for engine.
• Construct the sliding servo tray to fit your servos.
• Final sand all parts and use your favorite heat shrink covering or paint in your choice of colors.
• Install control linkage making sure that left aileron control on transmitter results in the left elevon going up and the right elevon going down.
• Neutral position of the elevons should be such that the elevons are raised 3/32" to 1/8" above what you would normally expect to be neutral. This will provide a slight reflex required on flying wings.
• There are two suggestions with regard to flying your Skywalker. First it may be to your advantage to make a couple of short flights to become oriented with the flight appearance. Remember that the Skywalker will go where you point it. When making turns, give aileron command to roll on edge then apply up elevator command to execute the turn. At the same time, give opposite aileron command to right the ship to prevent it from going inverted. I mention the above because I have seen some pilots neglect to give the opposite aileron command which may result in the ship going inverted without the pilot realizing it. This condition applies to conventional ships as well.

Built per plan and following the suggested construction sequence, your Skywalker will be a rewarding project. □

From RCModeler Mar. 1985