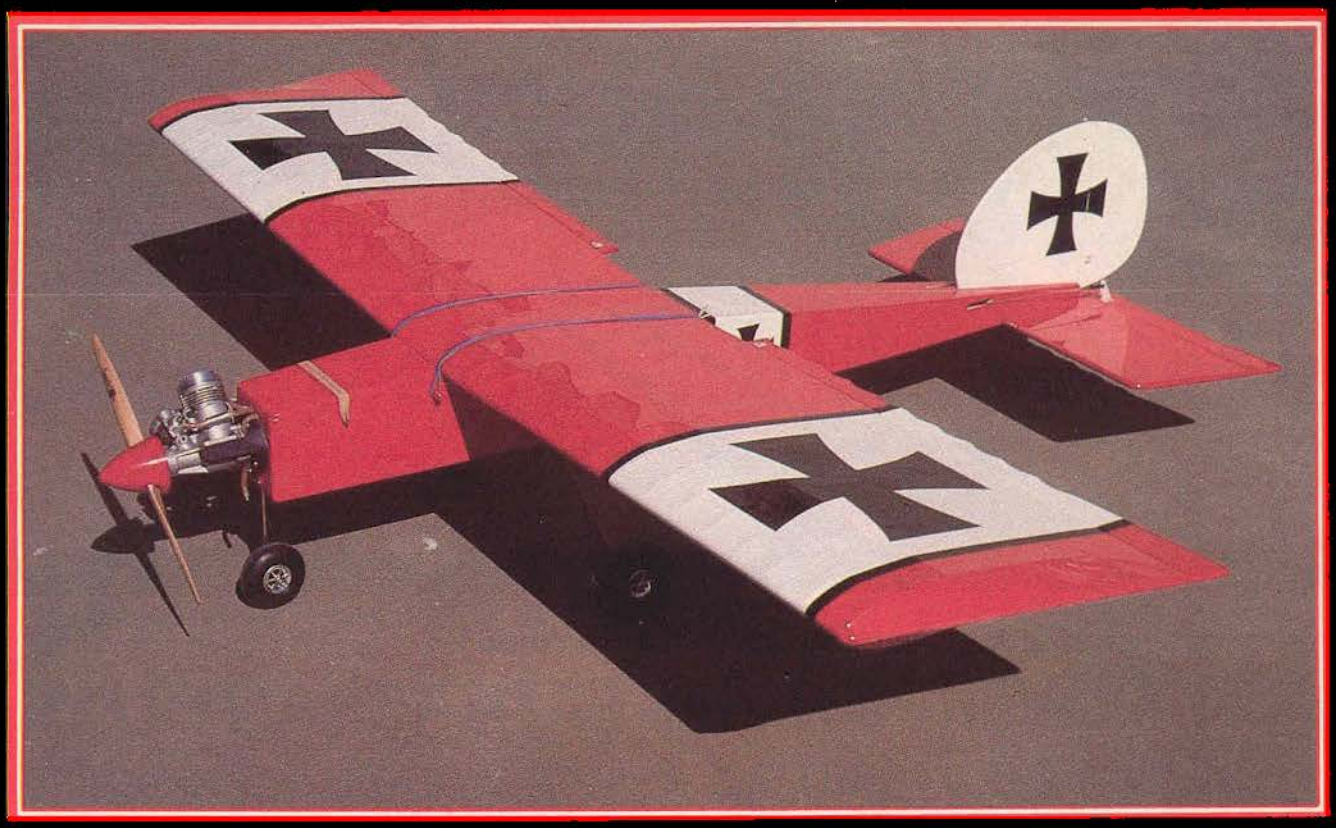
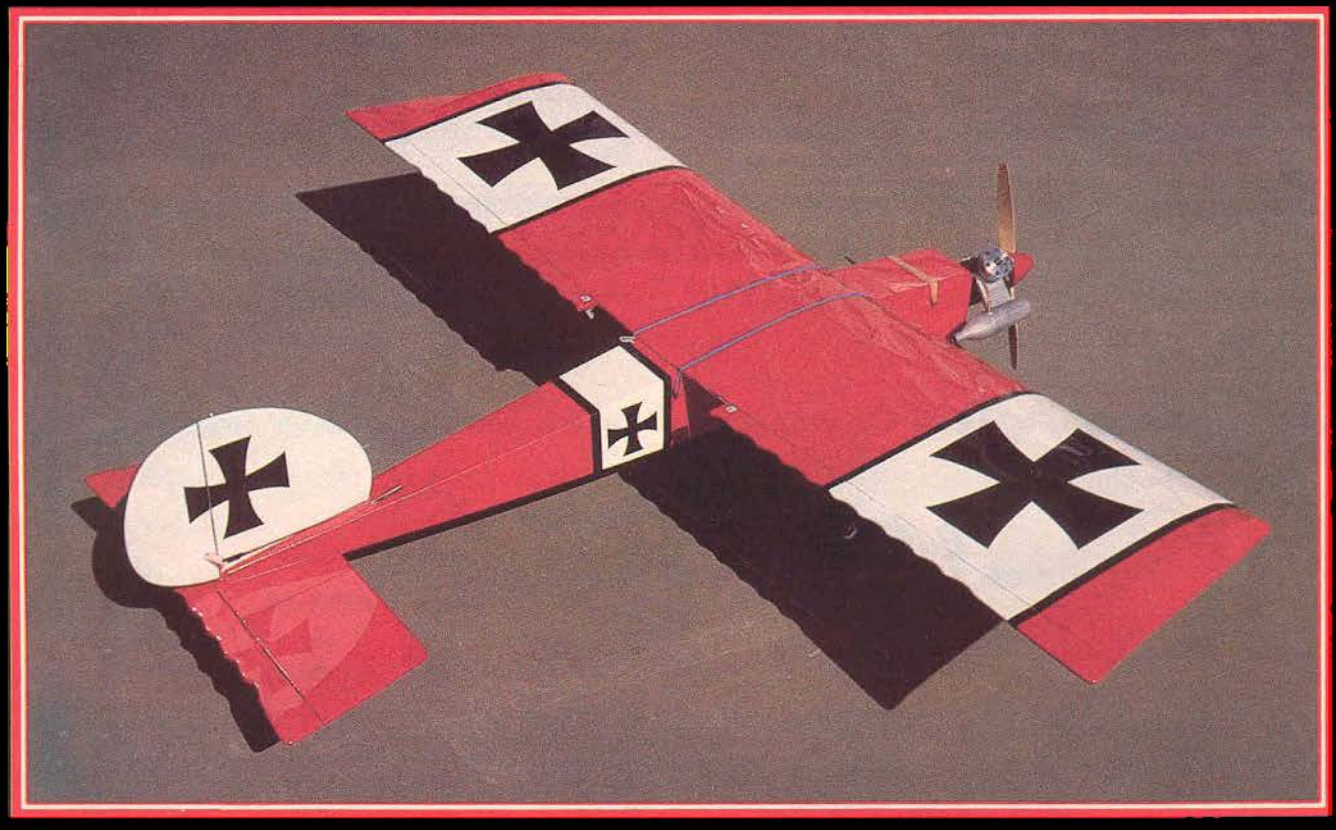


DAS UGLY STIK

A classic design that has survived for 10 years.

By RCM Staff



Part I

Das Ugly Stik, designed by Phil Kraft, has probably sired more Stik offsprings than any other R/C design. With the passing of time and the introduction of the various Stik designs, Phil's name seems to have gotten lost in the shuffle. Be it known to one and all, Phil Kraft was the designer of the original Ugly Stik!

In the May-June 1966 issue of Grid Leaks, Phil Kraft wrote the following:

The original concept of the Ugly Stik was to design a radio controlled aircraft which could be built in an absolute minimum of time. Its purpose was towards a flying test bed for new proportional control developments and an all around shop airplane which could be used as a loaner for visiting fliers testing repaired equipment, and any use which required an airplane which could be considered as expendable.

In the original form, the Ugly Stik was completely square. All surfaces were merely cut out of standard sizes of wood with no curves or frills whatsoever. The plans were finished on a Sunday afternoon some two years ago. A visit to our local hobby shop was made at approximately 4:30 to purchase the wood and other necessary materials. Taking time out for Sunday dinner, still the framework was completed by 10:00 o'clock that evening. Two more evenings were required for covering and doping, and on Thursday of that week, the ship was first flown.

Obviously not much time was taken in sanding or painting. This was to be an expendable, utility airplane. As with most straightforward functional designs, the Ugly Stik proved to be an excellent flier. It was extremely stable, very easy to fly, and quite capable of contest performance. I am not sure who first applied the name Ugly Stik to the design, but whoever it was certainly applied a descriptive name. Wherever it was flown, I was subjected to a great deal of kidding about finally having developed an airplane even uglier than the Kwik Fli. There were also a great many requests for plans, particularly among the newcomers to radio control who wished for an easy-to-fly, rugged expendable airplane to learn on — which this surely is.

There was in this early square design something suggestive of a World War I type aircraft. As a joke with assorted scribbling on the plans, we came up with a design vaguely reminiscent of the Fokker Eindecker. The results were perhaps no less ugly, but did tend to produce a design with a certain amount of charm and appeal. Certainly it never fails to create a great deal of attention among the spectators at the local flying field.

Performance-wise, it of course cannot be classed as an all-out competition Class III model. However, it is certainly capable of winning contests in the hands of a good flier. While the design has not been used a great deal for contest work, it has several wins to its credit in Class III. Its main virtue is as a trainer for the beginner in proportional control. I have always felt that is a waste of time for newcomers in our hobby to spend over a hundred hours on an elaborate Class III design to learn on. Inevitably, unless the beginner is of remarkably unusual talent, he's going to have minor or major accidents due to misjudgment in learning. Therefore, the Ugly Stik fits the requirements perfectly as a trainer. It is about as simple as possible to construct. As stated before, it is rugged and very easy to fly.

DAS UGLY STIK

Designed By:
Phil Kraft
TYPE AIRCRAFT
Sport
WINGSPAN
60 Inches
WING CHORD
12½ Inches
TOTAL WING AREA
720 Sq. In.
WING LOCATION
Shoulder
AIRFOIL
Semi-Symmetrical
WING PLANFORM
Straight Constant
DIHEDRAL EACH TIP
1½ Inches
O.A. FUSELAGE LENGTH
46 Inches
RADIO COMPARTMENT SIZE
(L) 11½" x (W) 3½" x (H) 3½"
STABILIZER SPAN
22 Inches
STABILIZER CHORD (incl. elev.)
7½ Inches
STABILIZER AREA
160 Sq. In. (approx.)
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Bottom Of Fuselage
VERTICAL FIN HEIGHT
8 Inches
VERTICAL FIN WIDTH (inc. rud.)
11½ Inches
REC. ENGINE SIZE
.40-.61 Cu. In.
FUEL TANK SIZE
12 Oz.
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Eng., Rud., Elev., Ail.
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Ply, Pine
Wing	Balsa & Spruce
Empennage	Balsa
Wt. Ready To Fly	**96 Oz.**
Wing Loading	**18½ Oz./Sq. Ft.**

We are presenting the version of the Ugly Stik that was originally kitted by Jim Jensen. We have incorporated a few updates such as using a plastic engine mount and a modern radio system. The Futaba FP-4L radio was selected because it is a reliable, economical system with servo reversing switch feature.

Also, in response to numerous reader requests, we are presenting a most comprehensive set of building instructions and photos. Due to the length of these instructions, this article must be presented in two parts with the second part appearing next month.

Now we can get on with building our very own Ugly Stik.

(See Photo 1)

(1) Cut fuselage sides from 1/4 sheet. Sides are spliced in aft end to allow the use of 36" long sheet stock. Various holes are drilled as shown at this time.

(2) Glue aft splice parts into position.

(See Photo 2)

(3) Cut out the remaining fuselage parts.

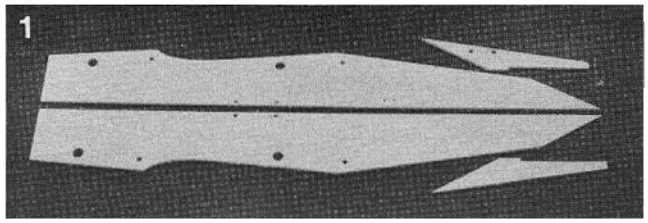
(4) Assemble forward ply bottom to aft bottom sheet using the 1/8" x 1" ply doubler on the top side.

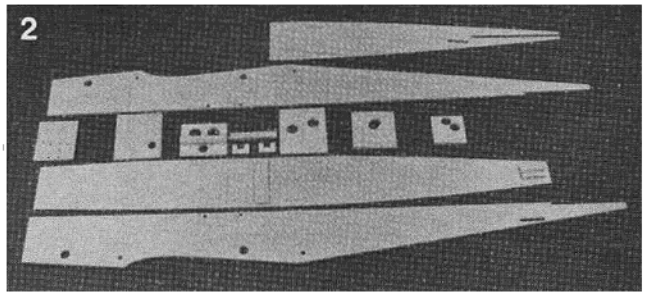
(5) Mark the top side of the bottom for bulkhead and 1/4" square rudder support locations.

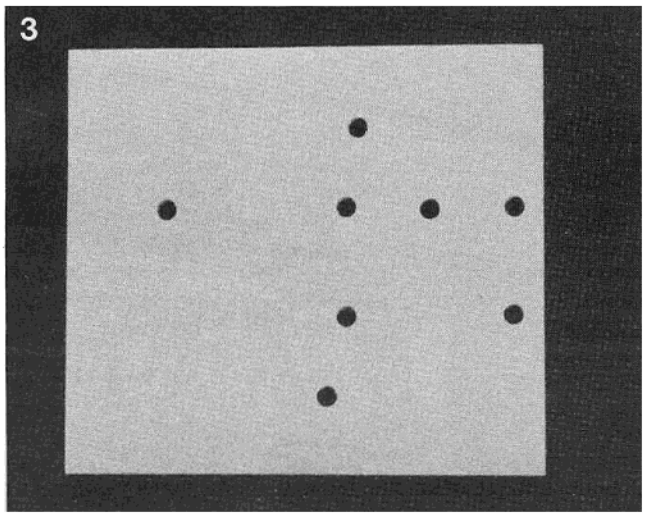
(6) Glue rudder supports to bottom as marked.

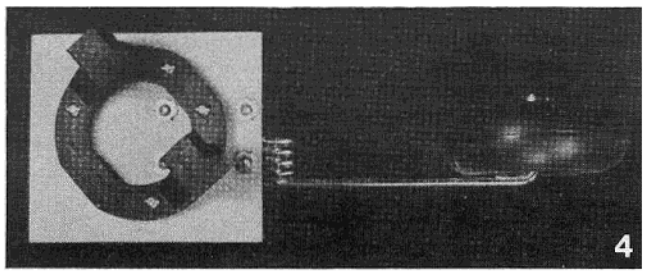
(See Photo 3)

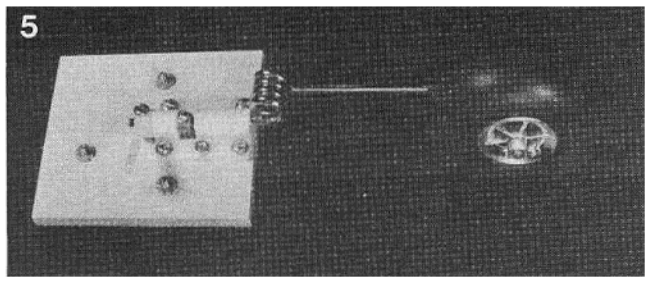
(7) Drill holes in 1/4" ply firewall for engine and nose wheel mounts. Our model used a Kraft engine mount and a Carl Goldberg 5/32" steerable nose gear set. If you use a different brand of these units you may have to drill the holes to fit your selection.









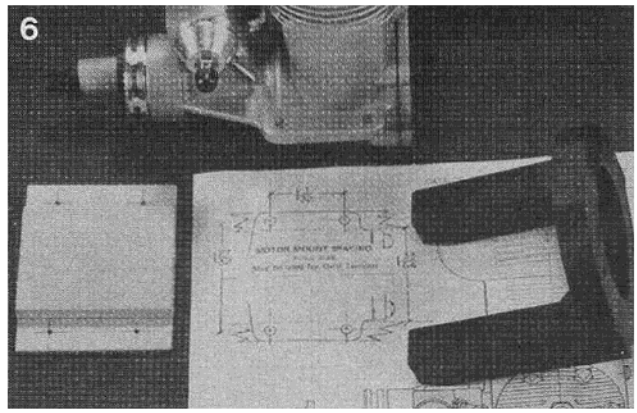


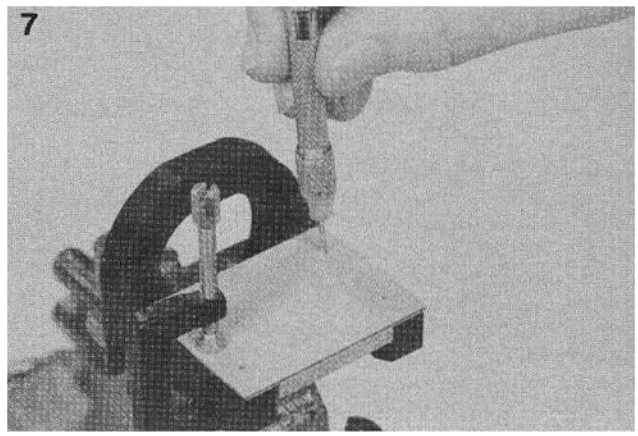
(See Photos 4 & 5)

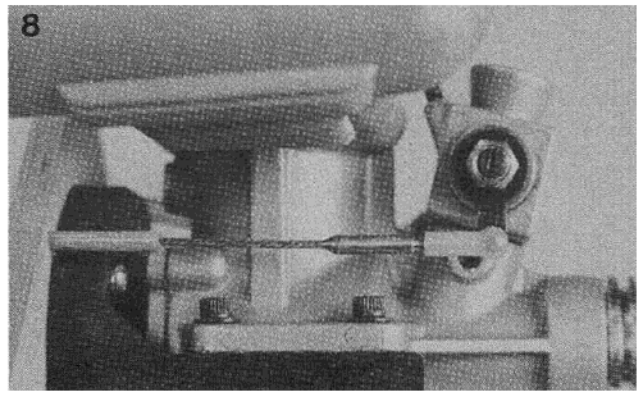
(8) Make a trial fit of the engine mount and nose gear onto the firewall.

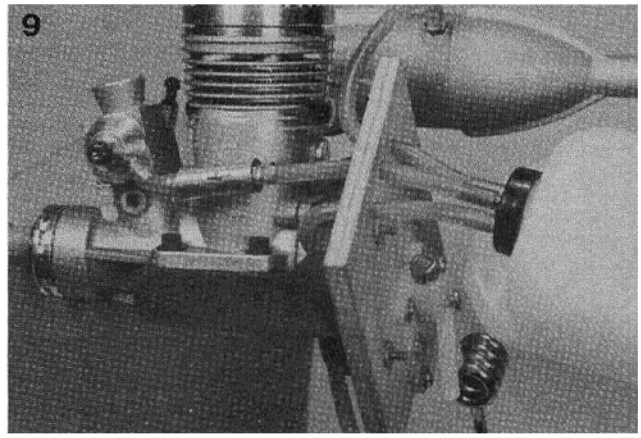
(See Photo 6)

(9) Remove the engine mount. Make a simple jig to locate the engine mounting holes. Use either the engine instruction sheet or measure your engine for the correct hole pattern.





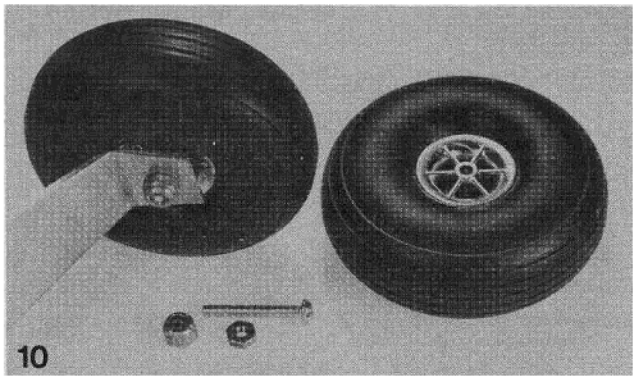




(See Photo 7)

(10) Clamp the drill jig to mount and mark the hole locations.

(11) Remove drill jig and drill holes as marked. We prefer to drill and tap the holes. It is acceptable to use self tapping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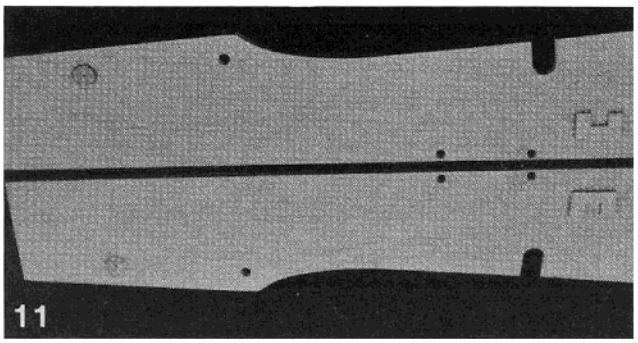
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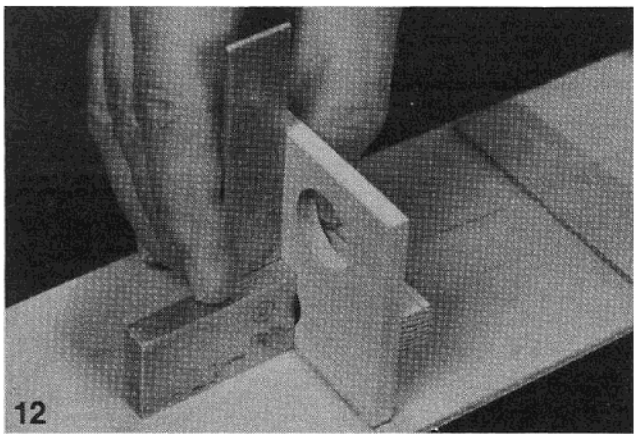
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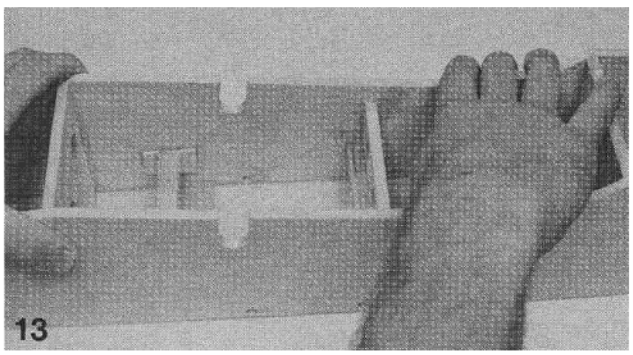
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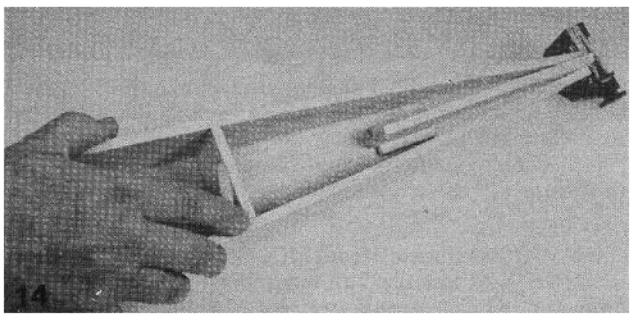
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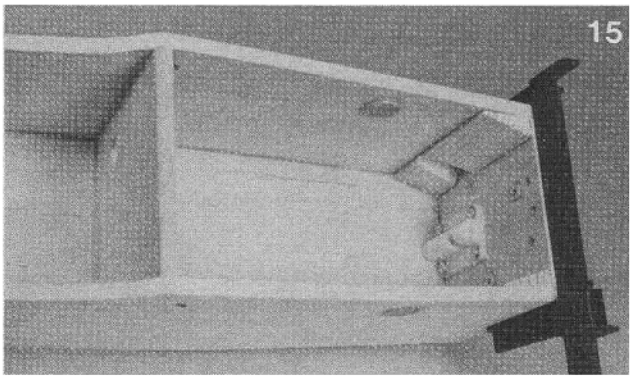
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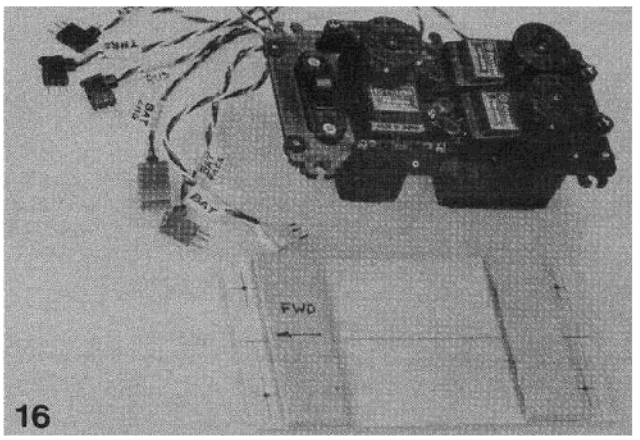

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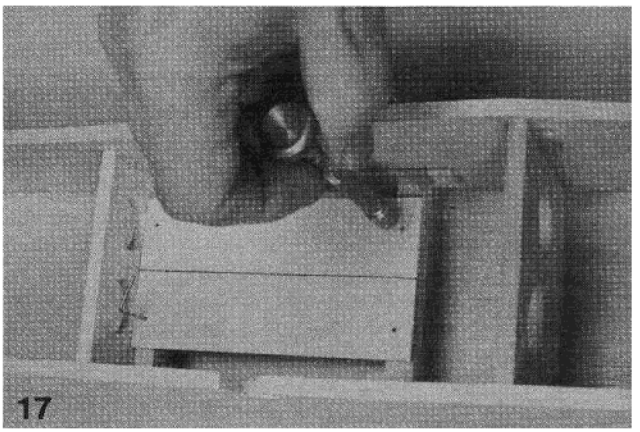
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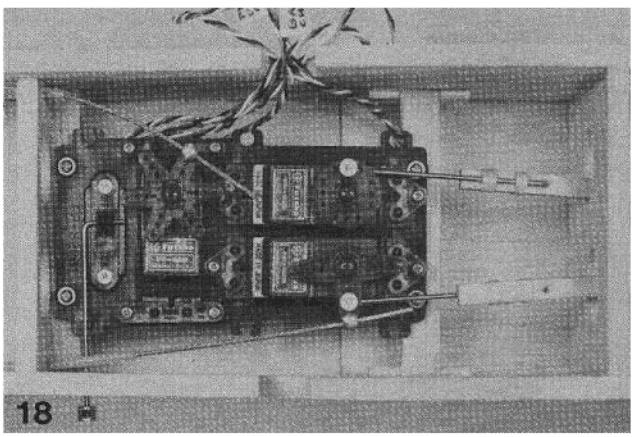
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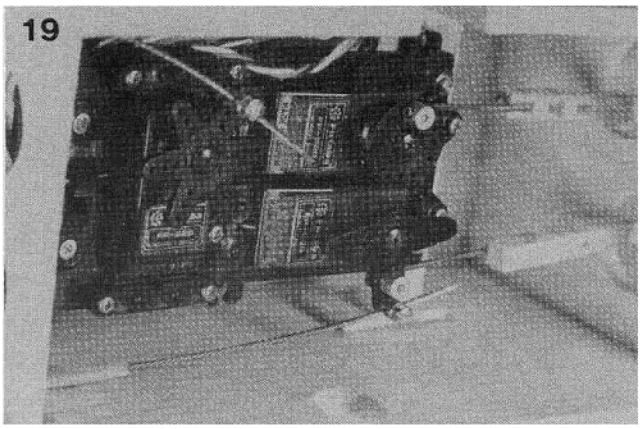
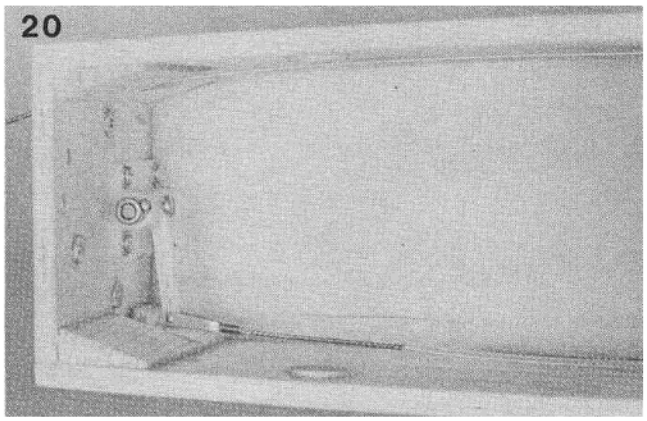
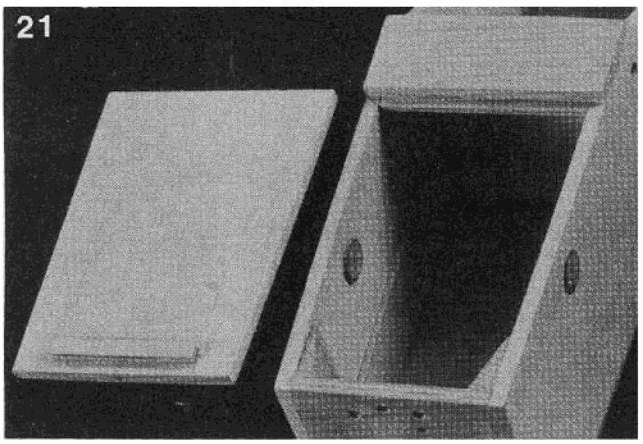
screws or to drill clearance for machine screws and use lock nuts on the bottom of the mount beams.

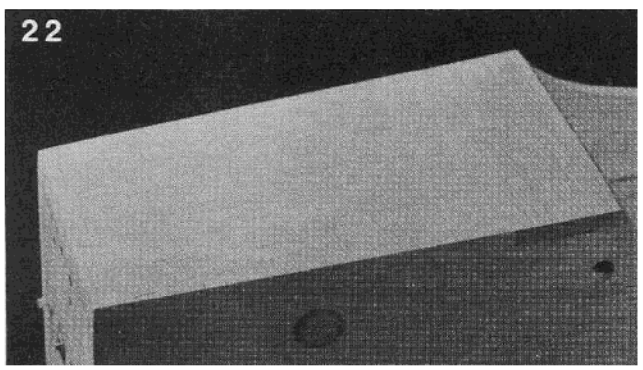
(See Photo 8)

(12) Secure engine to mount and reinstall on firewall.









(13) Locate and drill a hole in line with carburetor throttle arm for the pushrod. Photo shows the Du-Bro ball link, threaded pushrod coupler soldered to flexible cable and nylon tube pushrod guide.

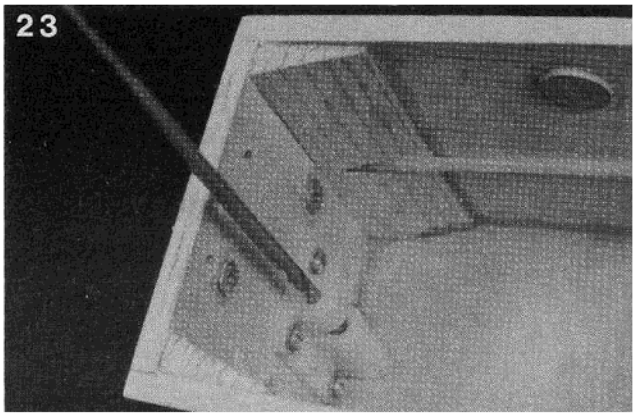
(See Photo 9)

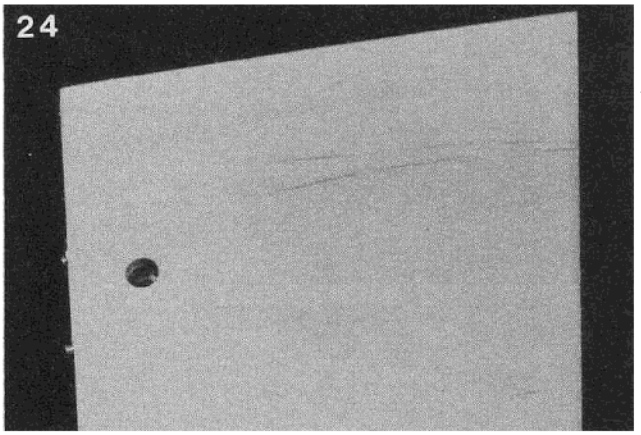
(14) This is an opportune time to locate and drill holes in the firewall for the fuel system. Shown are the 12 ounce Du-Bro tank, the three tube arrangement and a Du-Bro final filter.

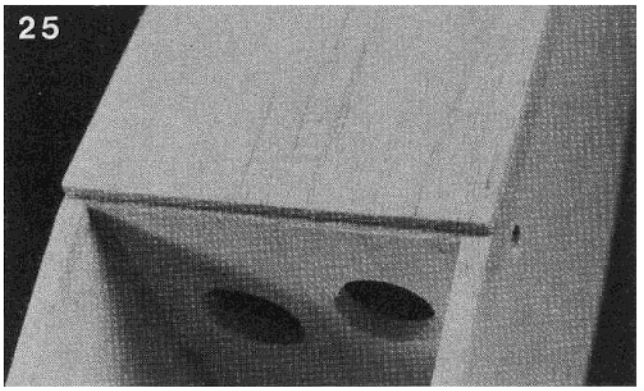
(15) The components may now be removed from the firewall.

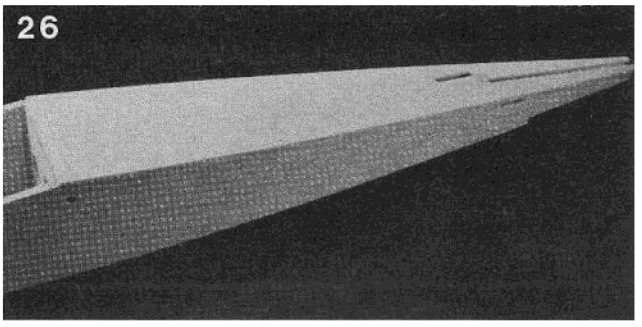
(See Photo 10)

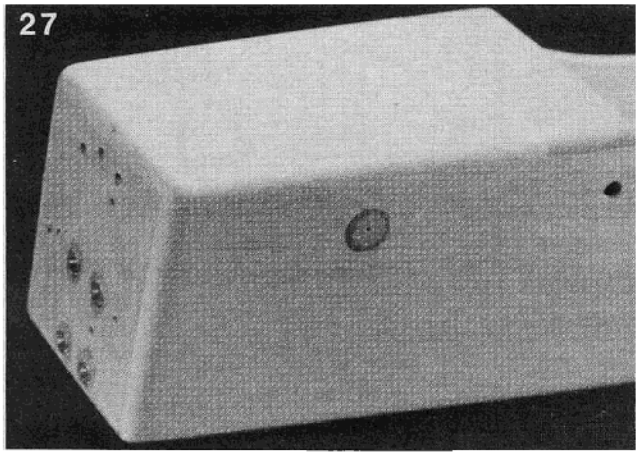
(16) A Great Planes Model Mfg. Co. dural landing gear (Part No. L-4) was used on our model. The Du-Bro 3½" diameter (3.50T) wheels are installed with 8-32 x 1½"

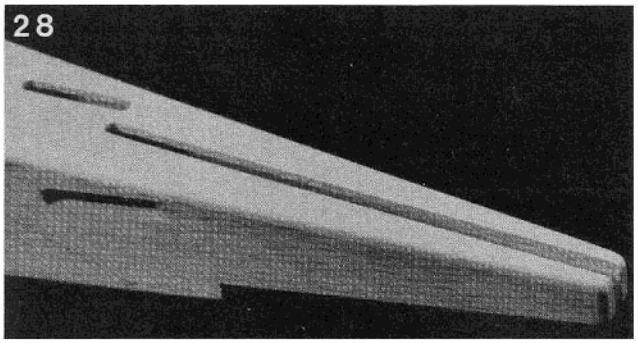


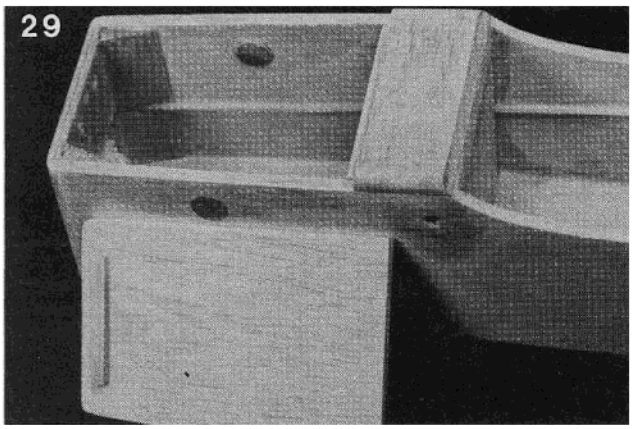


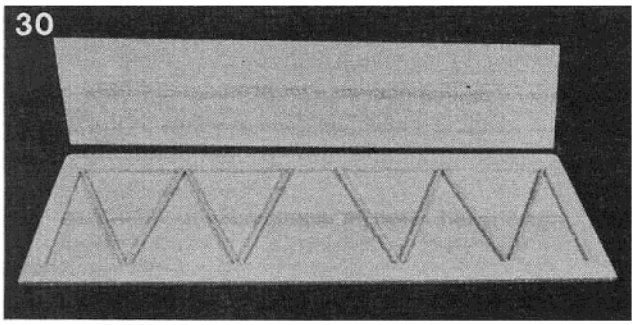












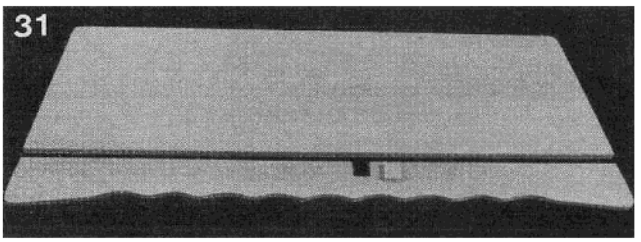
machine screws, plain nuts and self locking nuts.

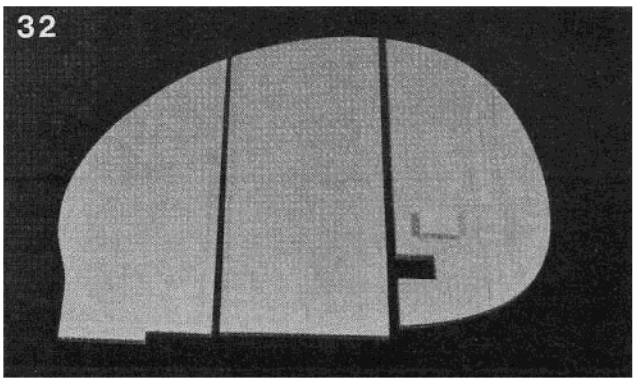
(See Photo 11)

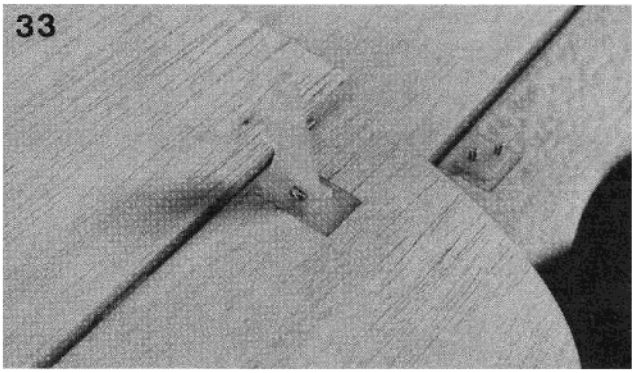
(17) Install the hardwood inserts in the front hatch position and retainers for the aft servo rails. Servo rails must be located to fit your radio servo tray. The radio installation shown on the plans is for the Futaba FP-4L system.

(See Photo 12)

(18) Assembly of the bulkheads to the fuselage bottom







may now be started. Proper alignment of the bulkheads to the location marks on the bottom is important as is the squareness. Bulkhead F-3 is shown in the photo with the forward servo mounting rail glued in place.

(19) It is best not to install the firewall F-1 at this time.

(See Photo 13)

(20) The fuselage side panels are now glued in place in the wing area. Side panels are attached to the bottom, bulkheads F-2, F-3, and F-4. The use of instant glue (Hot Stuff, Jet, and Zap) makes this step quick and easy.

(See Photo 14)

(21) The aft ends of the side panels are held together with a small clamp or pins while a piece of scrap 1/4" sheet inserted between the rudder supports and the fuselage sides help provide alignment. Instant glue will secure this assembly while it is being firmly held in place.

(See Photo 15)

(22) The firewall (F-1) is best glued to fuselage sides and bottom with epoxy. The triangle stock corner braces, with clearance cut for steering arm (L.H. only), are also installed with epoxy.

(See Photo 16)

(23) Make a simple fixture to match the mounting dimensions of your servo tray. This will simplify drilling the hole pattern for mounting screws.

(24) Install the engine, rudder, and elevator servos and battery switch in the servo tray per radio manufacturer's instructions.

(25) Take a few minutes to identify each of the connectors. A short piece of masking tape wrapped around the wire and labeled with a marking pen will save a lot of time when making subsequent control installations.

(See Photo 17)

(26) Using the drill fixture mentioned above, locate and drill pilot holes for the servo mounting screws.

(See Photo 18)

(27) Install servo tray.

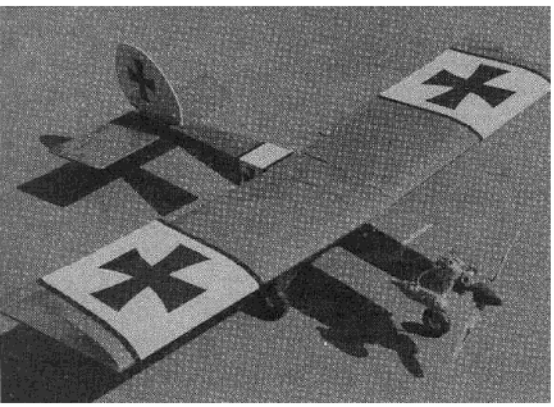
(28) Drill holes along fuselage sides for tubing to retain flex cable pushrods for throttle and nose wheel steering.

(29) Make flex cable pushrod for nose wheel steering.

(30) Make pushrods for rudder and elevator controls. Leave extra length on wire at aft end of these pushrods for final trim and fit later.

(See Photos 19 & 20)

(31) Use your favorite method of attaching pushrods to servo arms. Our method is to achieve both ease of installation and safe function. Make sure that the pushrods run freely through the clearance holes in the bulkheads.



(See Photo 21)

(32) Glue on top front fuselage piece.

(33) Glue plywood hatch support in place.

(34) Glue hatch stop to inside of hatch at front end.

(See Photo 22)

(35) With hatch in place, sand all edges even and smooth.

(See Photo 23)

(36) Using nose gear block as a guide, drill a hole through the fuselage bottom with a 5/32" diameter drill.

(See Photo 24)

(37) Turn fuselage bottom side up and enlarge the nose gear clearance hole to 1/4" diameter.

(See Photos 25 & 26)

(38) Glue on the top rear fuselage sheeting, making sure that the forward edge overlaps bulkhead F-4 by only 1/8".

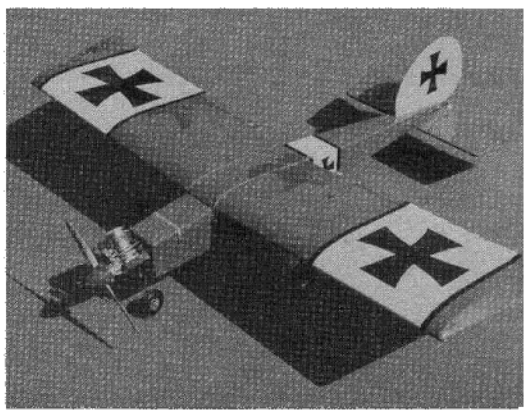
(See Photos 27 & 28)

(39) Sand all the fuselage sides smooth with a radius on all the outside corners.

(See Photo 29)

(40) Fuelproof the tank compartment with K & B polyester resin. Also coat the front of the firewall, bottom of the hatch cover, and any of the adjacent edges and surfaces that will be subjected to fuel or exhaust residue.

(41) Sand all of the resin coated exterior surfaces smooth.



(See Photo 30)

(42) The horizontal stabilizer construction starts by gluing the 1/16" sheet skins together and cutting to size per drawing.

(43) Cut the 3/16" x 3/4" edge pieces to length and glue to the bottom skin.

(44) Cut the 1/8" x 3/16" ribs to size and glue in place per drawing.

(See Photo 31)

(45) Glue the top skin to the stab structure.

(46) Cut the elevator from 1/4" sheet and make the control insert from 1/4" plywood.

(47) Glue the insert into the elevator.

(48) Sand the stab and the elevator smooth. Sand a radius on all edges.

(See Photo 32)

(49) Cut the fin and rudder from 1/4" sheet. Make the control insert from 1/4" plywood.

(50) Glue the fin pieces together and glue the insert into the rudder.

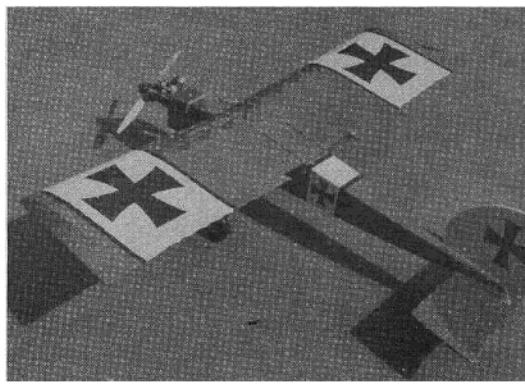
(51) Sand the fin and rudder smooth and sand a radius on all the edges except the bottom of the fin.

(See Photo 33)

(52) Install hinges and control horns as shown on plans.

Next month we will continue the construction and finish this Ugly Stik project.

□

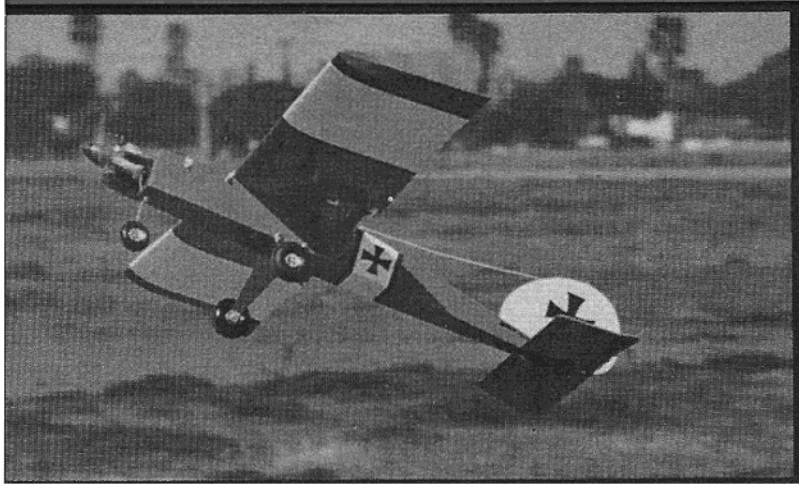


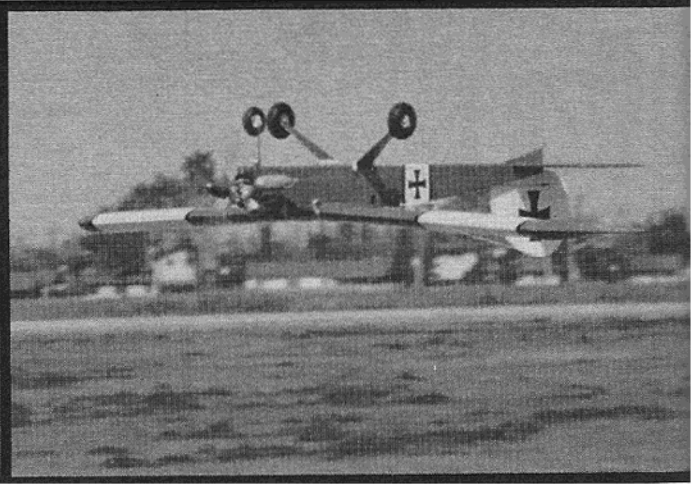
From RCModeler May 1985

DAS UGLY STIK

Part II

By RCM Staff



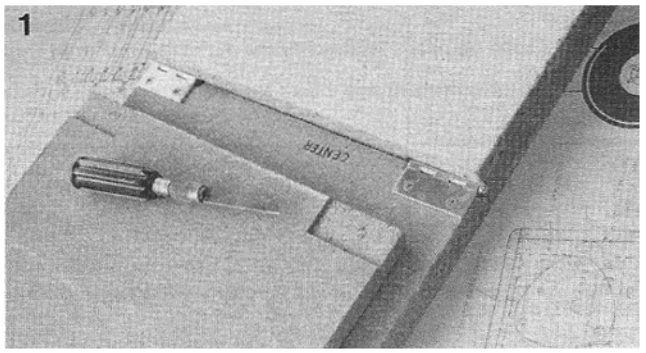


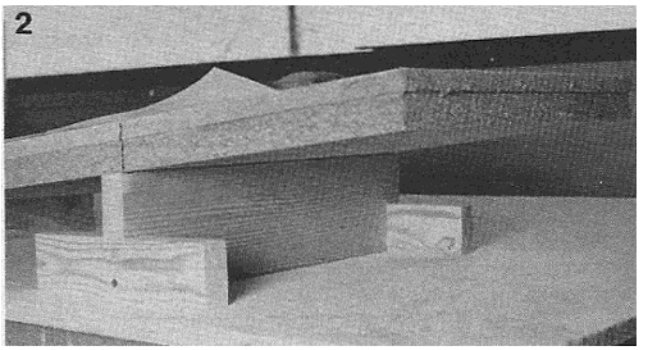
Conclusion Of Construction For This Classic R/C Design

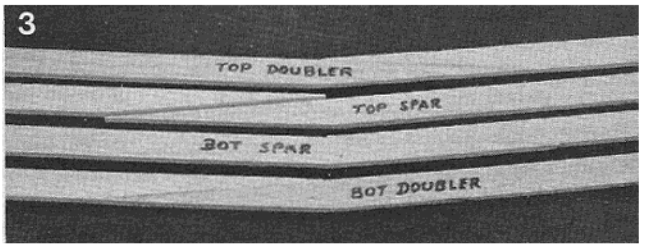
Last month we related the origin of Das Ugly Stik along with the construction instructions for the fuselage and tail surfaces. This month we shall conclude the project with the detailed instructions for building the wing and with the final assembly. Without further ado, let's get on with it.

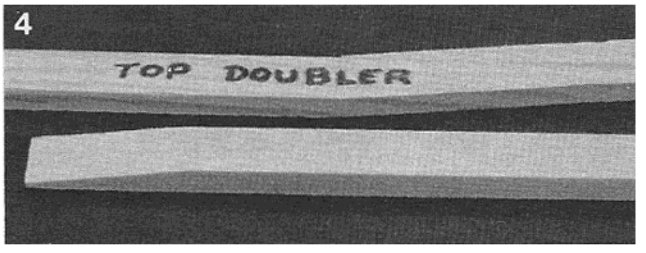
The wing structure for the Ugly Stik is a simple and basic design as can be seen on the plans. The building instructions are rather lengthy due to some of the subtleties of the design. We strongly recommend that the plans be thoroughly studied before starting construction.

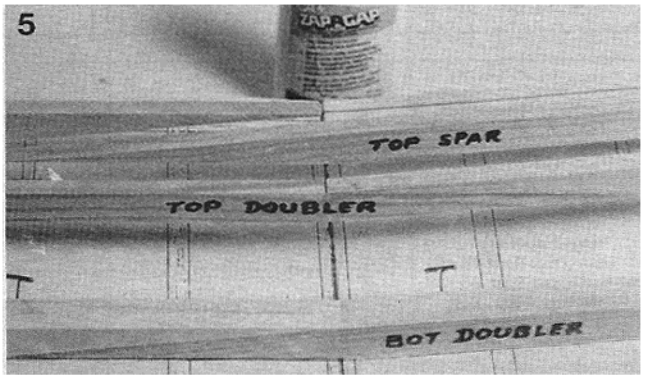
The Ugly Stik design does have a feature that was prevalent 20 years ago which requires the dihedral to be

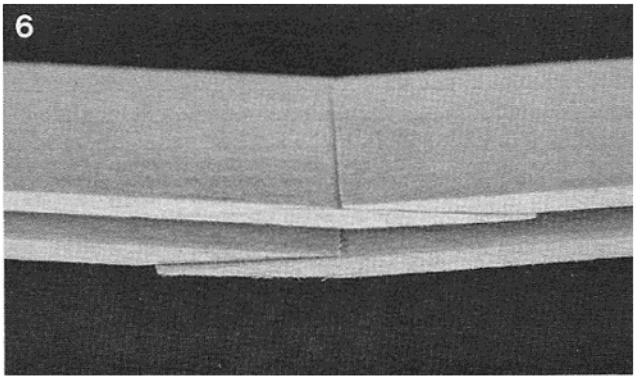












built in at the beginning of the assembly. The easiest way to accomplish this is to assemble a hinged wing building board.

(See Photo 1)

(1) Accumulate pieces of 3/4" x 12" (or wider) x 36" particle board (or flat plywood), two pieces of 1/2" soft cellotex (same size as the particle board) and a pair of 2" butt hinges with removable pins.

(2) Cut relief notches for hinge nodes and fasten the hinges to the particle board with screws. Be sure to face the hinge pin heads toward the outside for easy removal.

(3) Cut hinge clearance in the bottom corners of the cellotex.

(4) Glue the cellotex to the particle board.

(See Photo 2)

(5) Cut a piece of common board to raise one end of the wing building board to the proper dihedral angle. The distance under the Ugly Stik wing tip rib is 3" when the opposite tip is flat.

(See Photos 3 & 4)

(6) The first step on the wing assembly is the fabrication of the spars and spar doublers. Using the 1/4" x 1/2" x 36" spruce strips, cut the taper carefully to match the plans. Do not cut to length at this time.

(7) Trial fit the tapers and fit by placing the spars and doublers on the wing building board that has been blocked up to the proper dihedral distance.

(See Photo 5)

(8) Glue the splice joints together as shown on the plans.

(9) After splicing, identify top and bottom spars and doublers being sure to alternate the splice joints.

(10) Cut the doublers to finished length and bevel per plans.

(11) Glue the doublers to the spars.

(12) The spars may now be cut to finished length. Some of us prefer to leave approximately 1/4" extra length on spars and leading edge strips to trim and sand smooth after assembly.

(See Photo 6)

(13) The 1/8" x 1⅞" x 36" trailing edge sheets are beveled for alternate lap joints at the center section.

(14) Position the plans on the building board making sure that the centerline of the plans line up with the center joint of the building board. Cover the plans with plastic food wrap, Saran Wrap or equivalent.

(See Photo 7)

(15) Position and glue the lower trailing edge splice joint over the plans.

(See Photo 8)

(16) With the lower trailing edge sheets pinned to the building board, score the sheets at the outboard edge of the tip ribs about halfway through the thickness and block up the front outboard corners with pieces of 3/16" thick scrap wood. Keep the trailing edge flat.

(See Photo 9)

(17) Cut out the wing ribs. There are several precautions to be taken. Notice the different notch widths and that the bottom aft edge of the ribs is flat. Also the notch for the bottom secondary spar in the false rib is different from the top notch. It is wise to mark the bottom edge of all the ribs for future reference.

(See Photos 10 & 11)

(18) Start the wing assembly by placing the bottom spar in position. Place the ribs in their appropriate locations. Slip the top spar into its slot in the ribs. Place the top secondary spar into its notches. The 3/8" square leading edge is held in place with pins. We have a good snug fit between all the parts because we were very careful when we cut out the ribs weren't we?

(19) Check the alignment on all the parts and zap them securely with instant glue.

(See Photo 12)

(20) Position the bottom secondary spar into its notches and insert the false ribs.

(21) Check the alignment and apply the instant glue.

(See Photo 13)

(22) Hold the top 1/8" sheet trailing edge in place and zap it to the ribs and to the bottom sheet along the aft edge.

(23) Press the forward outboard corner of the top sheet down and glue it to the bottom sheet.

(24) Sand the leading edge and spars flush with the tip rib.

(25) Check the fit of the 1/4" wing tip to the tip rib and trailing edge.

(See Photos 14 & 15)

(26) Glue the wing tip in position.

(See Photo 16)

(27) Cut the notches for the servo mounting rails in the center rib deep enough for the rails to bridge straight across the 3 center ribs.

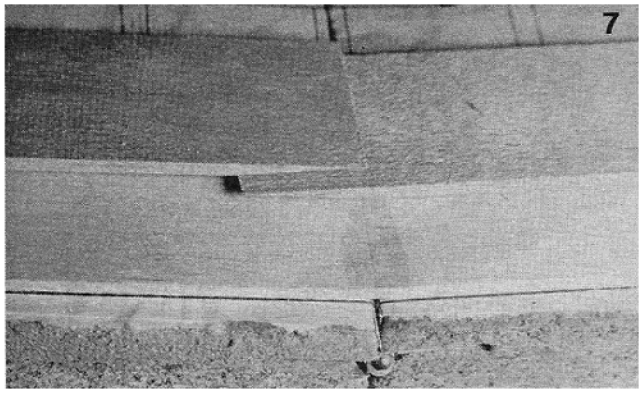
(See Photo 17)

(28) Glue in the servo rails.

(29) Trim the center rib down flush with the servo rails.

(30) Sand the aft edge of the bottom trailing edge sheet flat across 2" from center.

(31) Glue 1/4" x 1/2" x 1½" aileron bellcrank supports in position as shown on plans.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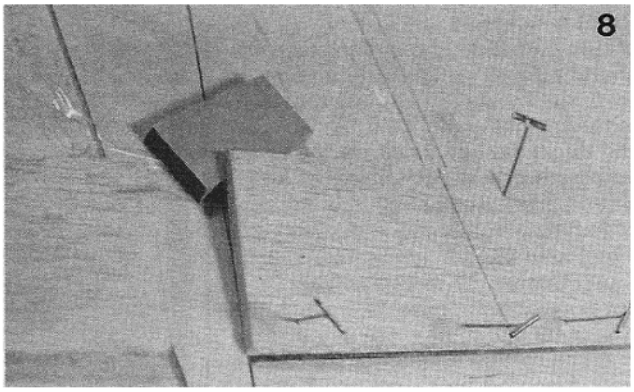
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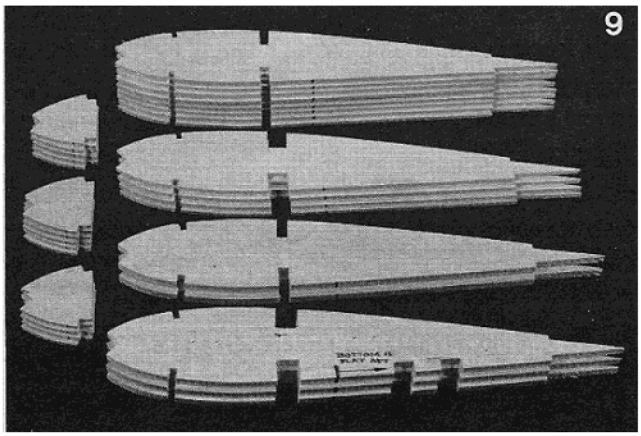
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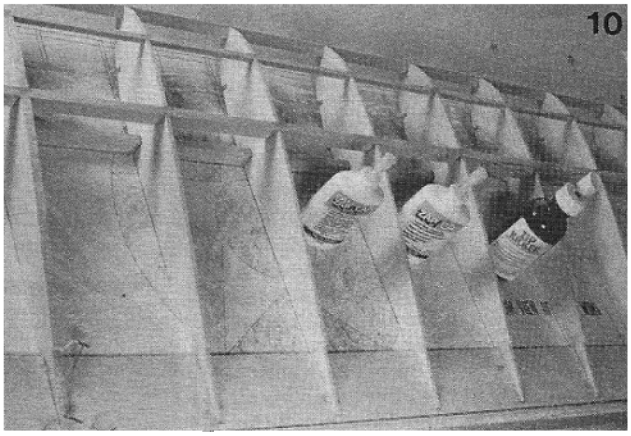
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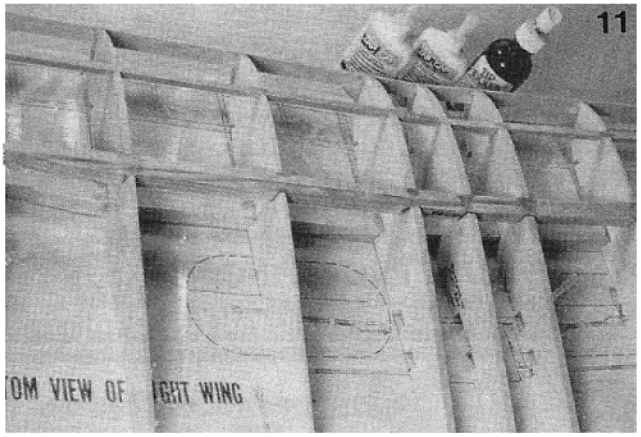
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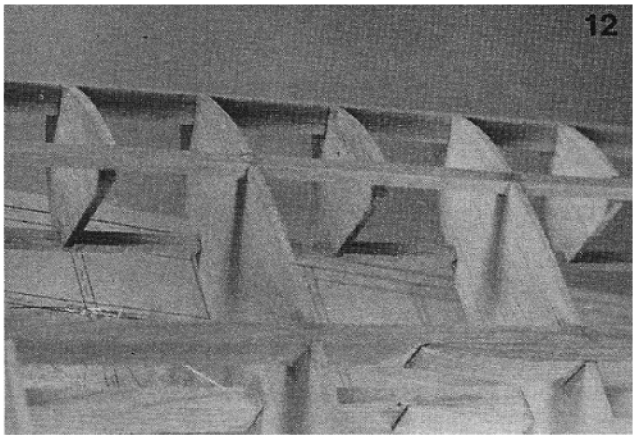
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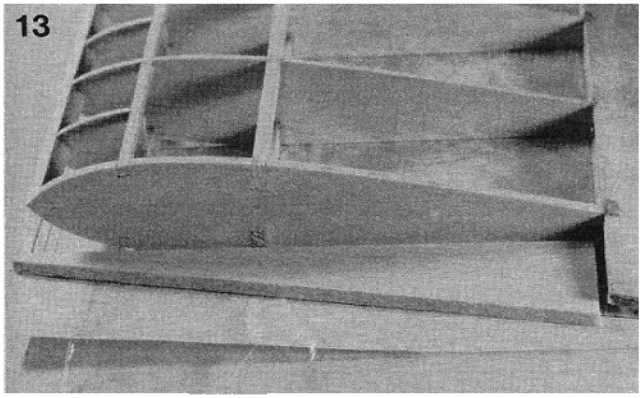
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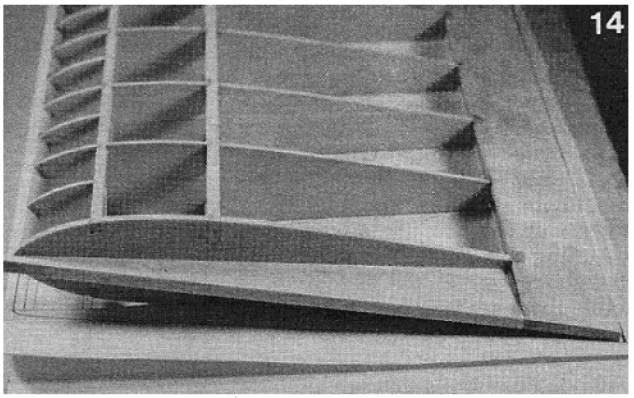
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(See Photo 18)

(32) Make slots and fit hinges per plans. Do not glue the hinges in place at this time.

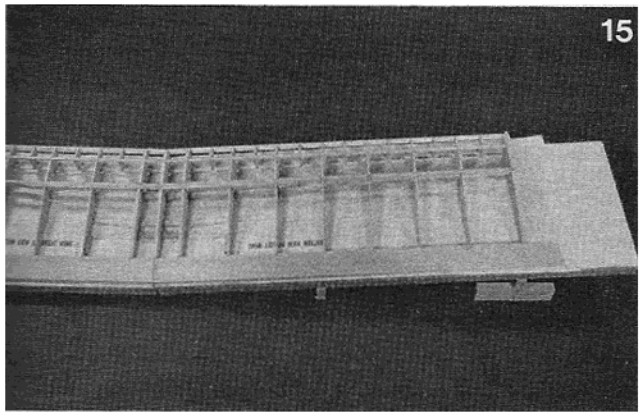
(33) Sand a radius on all the outside edges including the ailerons.

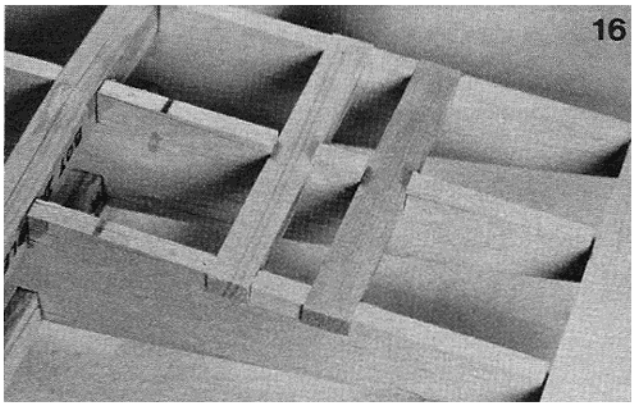
(See Photo 19)

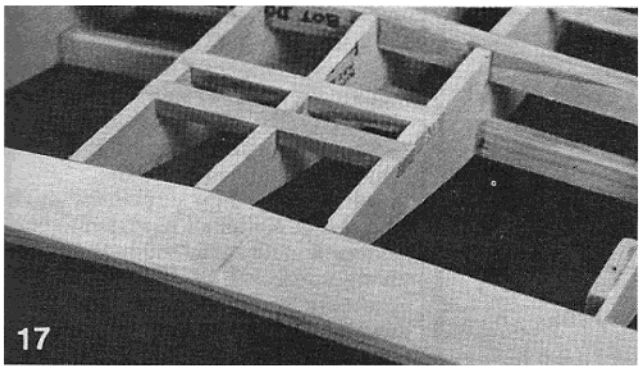
(34) A flat mount is required for the aileron servo. If your radio set includes a plastic flat mount, use it. We made ours from a piece of 1/8" lite ply and 2 pieces of 1/2" thick pine.

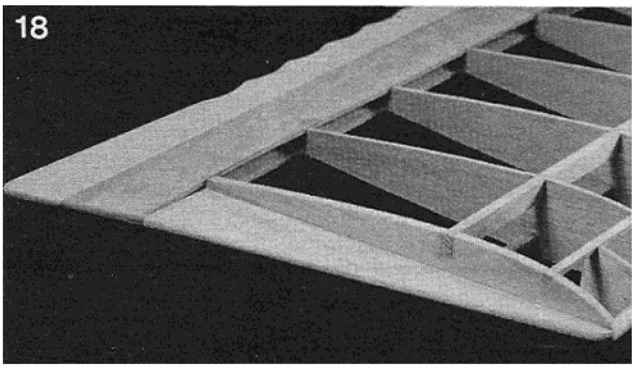
(See Photo 20)

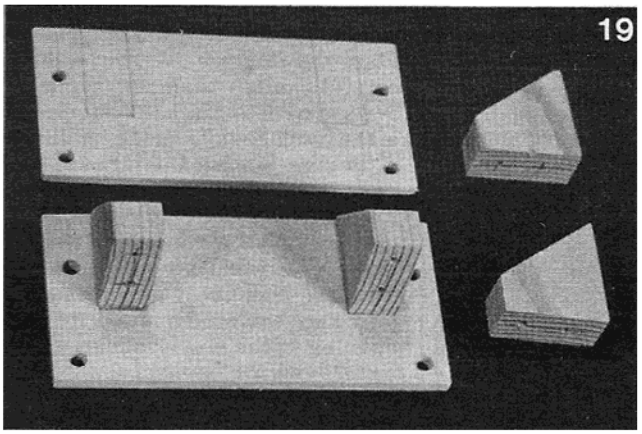
(35) Make a trial installation to fit the aileron controls as shown on the plans. The Williams Brothers 60° bellcranks provide aileron differential (more up than down travel). For future

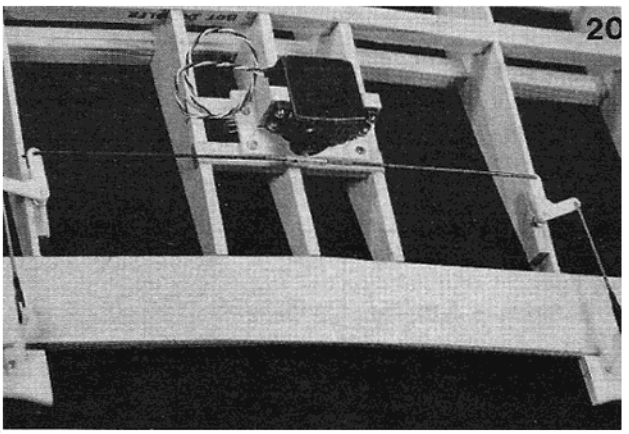








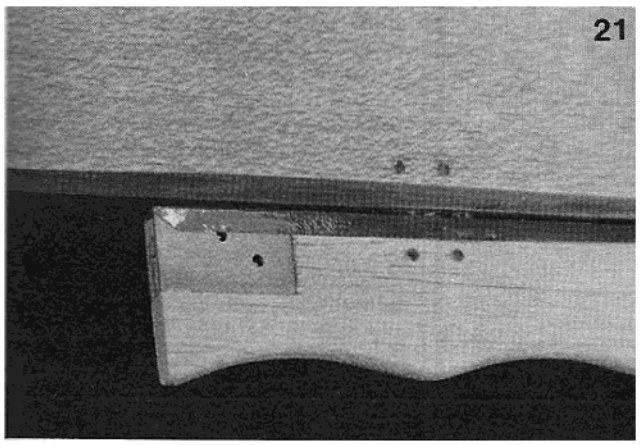


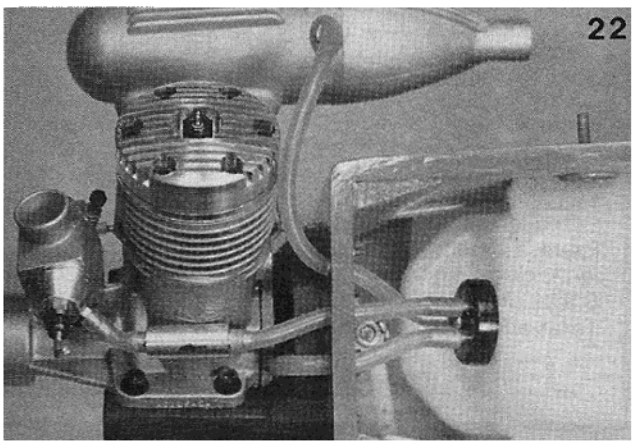


reference, the bellcrank pivot screws are installed after the bottom wing surface covering is applied and before the top side is covered. After aileron control linkage works smoothly and with no slop, remove all the components in preparation for covering.

(36) We covered our Ugly Stik with Super MonoKote and we suggest that you use the covering material of your choice. Our first instruction on covering is to read and follow the manufacturer's instructions that come with the material. RCM offers a comprehensive book on covering with heat shrinkable self-adhesive plastic films entitled Tom's Techniques by Tom Ingram and Harry Higley. This most informative book is listed in RCM's Anthology Library Series along with the price and ordering instructions.

(37) About now you should have





decided on the color scheme and trim for your model. Figure the amount of covering material required and procure same.

(See Photo 21)

(38) We started our covering procedure by applying a 3/4" wide strip of film to all of the matching edges between the control surfaces.

(39) Then we slit the film in the hinge locations and spread petroleum jelly (Vaseline) on the hinge nodes. (This is to prevent gluing the hinge together.) Epoxy was forced into the hinge slots and the hinges were inserted. Holes were drilled through the wood and hinges with a 3/32" diameter drill and round toothpicks were forced through the hinge locations. The toothpicks were secured with thin instant glue, trimmed off flush, and sanded smooth.

(40) Proceed to cover the entire airplane. Quicker said than done. Remember to cover the bottom of the wing and install the aileron bellcrank pivot screws before covering the top of wing.

(41) With the covering completed, lay the stabilizer and elevator assembly flat on your workbench. Place the fuselage over the stab and carefully align them for symmetry and squareness. Mark the intersection of the fuselage sides on the top surface of the stab. Remove fuselage and draw lines on the stab 1/16" inboard of the fuselage lines. Carefully cut through the film (do not cut into the wood) and remove the center portion of the covering. Now apply glue to fuselage and reposition on stab quickly aligning to the previous marks.

(42) With the fuselage and attached stab flat on the workbench, insert the fin and attached rudder. Make sure the bottom edge of the fin slips between the two 1/4" x 1/4" supports on the fuselage bottom. Check the alignment and mark the intersection of the fuselage top to the sides of the fin. In the same manner as described above, remove the fin from the fuselage and mark lines on both sides of the fin 1/16" below the fuselage lines. Remove the covering from the bottom portion of the fin. Squirt glue between the 1/4" x 1/4" supports and on the fin at the bottom edge of the covering. Quickly insert the fin into the fuselage and check for proper alignment.

(43) After the tail surfaces are attached, mark the location of the 1/8" x 1/2" plywood landing gear stop on the bottom. Cut and remove a strip of the covering 1/4" wide and glue the ply stop in its proper position. Apply covering to the stop.

(See Photo 22)

(44) Install the 1/8" and 1/4" dowels through the fuselage sides.

(45) Start making the final assembly installations. First install the nose wheel strut and secure the steering arm. Install the nose gear control cable and connect it to the steering arm.

(46) Bolt the engine and mount to the firewall tightly. Place the foam rubber pads in the front compartment and slide the fuel tank into position. The pads should be just slightly compressed, not tightly packed. Install the fuel lines and filter. Connect the throttle pushrods to the throttle arm.

(See Photo 23)

(47) Install the servo tray with the servos and the switch mounted. Connect the pushrods to the servos as previously fitted.

(See Photo 24)

(48) Plug all electrical connectors into their respective receptacles. Wrap the receiver and the battery pack loosely with foam rubber and insert each into a plastic bag. Slip the battery pack into the front of the compartment with the receiver behind it. Make sure the aileron cord and the antenna are available from the top side.

(See Photo 25)

(49) Install the control horns on the rudder and elevator. With the servos at a neutral position and the appropriate connectors attached to the horns, cut the pushrods to the proper length and solder in place. Be sure to use locknuts and keepers on the clevises.

(50) Install the aileron servo mount, with the servo in place, on the wing center section. Attach the previously made aileron control linkage.

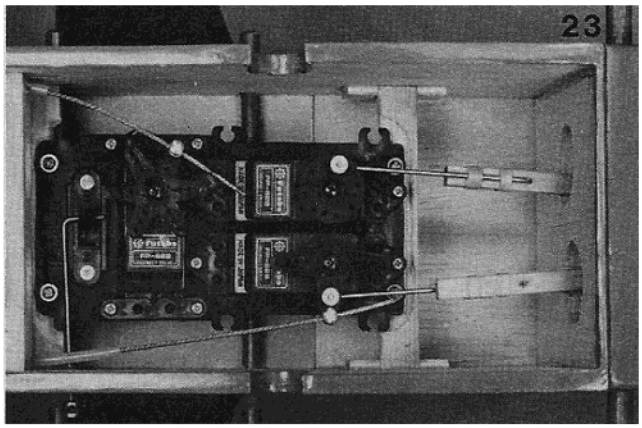
(51) A bit of explanation about final assembly. In the mid 1960s, the common practice was to hold the model together with rubber bands. For this purpose we suggest that you purchase a one pound box of number 64 rubber bands from your hobby shop or stationery supply store. As the Ugly Stik used this method of attachment you will need a good supply to last through the flying season.

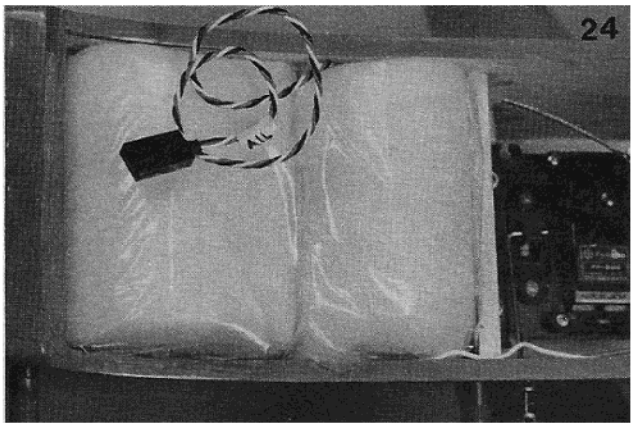
(52) Attach the landing gear and front hatch cover securely with rubber bands. The number of rubber bands required will vary depending upon the quality and type of rubber you have obtained. Just make sure the components are securely in place.

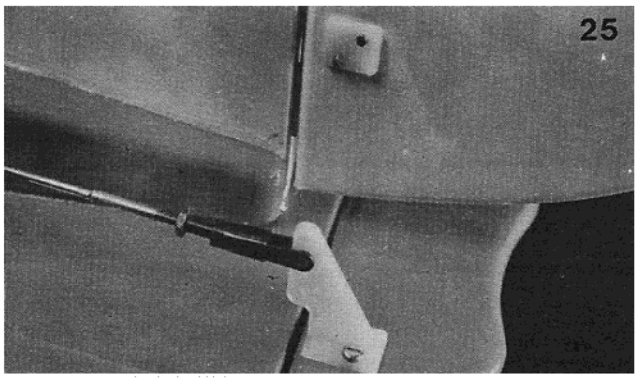
(53) Bring the antenna out of the fuselage and attach the end to a pin stuck in the top of fin.

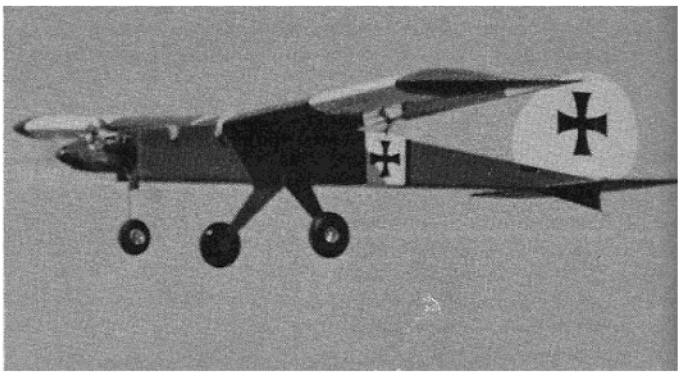
(54) Plug the aileron servo connectors together and rubber band the wing in place.

(55) Turn on your transmitter and









(57) Go out to the field and fly it! Our only comments on flying are to get an experienced pilot to assist you on the first few flights if you do not have much flying time. Of course you should have the radio batteries fully charged and fresh fuel. Adhere to common sense courtesy and safety rules and enjoy.

From RCModeler Part 2

Our model required a couple of corrections following the first test flight. First was to desensitize the nosewheel steering by moving the pushrod connector closer to center on the servo wheel. Then we cranked in a bit of up elevator with the clevis at the elevator horn. Those were easy but the other problem was embarrassing. About five minutes into that wring-it-out flight we suddenly had no aileron control. Sorta weird after four point and snap rolls.

Get it down fast, which was no big thing, and pull the wing. Somebody (me!) goofed. When rigging the aileron controls and using an aileron connector ball link, I didn't have a threaded ball so I used a rivet shaft ball to be replaced later with a threaded job. Somehow I forget and the connector had simply slipped out of the servo wheel. No harm was done but there is a moral, check and double check because the bird you can lose might be yours.

One more thing, don't let anyone kid you, a .60 powered Das Ugly Stik is **not** a beginner's trainer. It is one performing dude with lots of straight up capability. Also, it goes where you point it until you tell it differently, no hands off inherent stability like a J-3 Cub.

Thanks again to Phil Kraft and long live Das Ugly Stik.

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