GEE TEE I

Designed to meet the RCM 15-500 club racer rules, the Gee Tee I is also an excellent intermediate trainer and all around sport aircraft. Use a front rotor .40 for racing, a .20 to .40 for general sport flying.
By Graham T. Hall.

The first prototype of the Gee-Tee I was designed and built during August, 1973. Shortly thereafter, RCM proposed the 15-500 class pylon racer so the design was modified slightly to meet class requirements and a second prototype was built. Prototype number three, which is depicted in the photos and on the drawing, incorporates all the modifications that have been made to date. There is nothing extremely original or highly innovative about the Gee-Tee I, but it is a very straightforward approach to R/C aircraft construction.

The wing is in a shallow saddle and is mounted using the old standby, the rubber band mounting method, which, although not the best from an appearance standpoint, is simple and allows for positive separation with minimum damage should an unscheduled landing occur. The nose moment is slightly longer than usual which makes for easy balancing, as well as providing plenty of room for fuel tank and batteries. The combination dihedral brace and landing gear mount transmits the force of a hard landing to the fuselage rather than to the dihedral joint. Using laminated ply for this piece not only makes for a strong assembly, but also allows it to be made without the use of a table saw for slotting.

In the flying department, the Gee-Tee makes a snappy 15-500 pylon racer. It is stable yet quite aerobatic. There are no bad tendencies that I can find so it would also serve as an intermediate trainer as well as an exciting Sunday flyer. It builds in about 30 hours and should more than reward your investment in time and materials.

Okay, enough sales-pitch: Let's build!

CONSTRUCTION

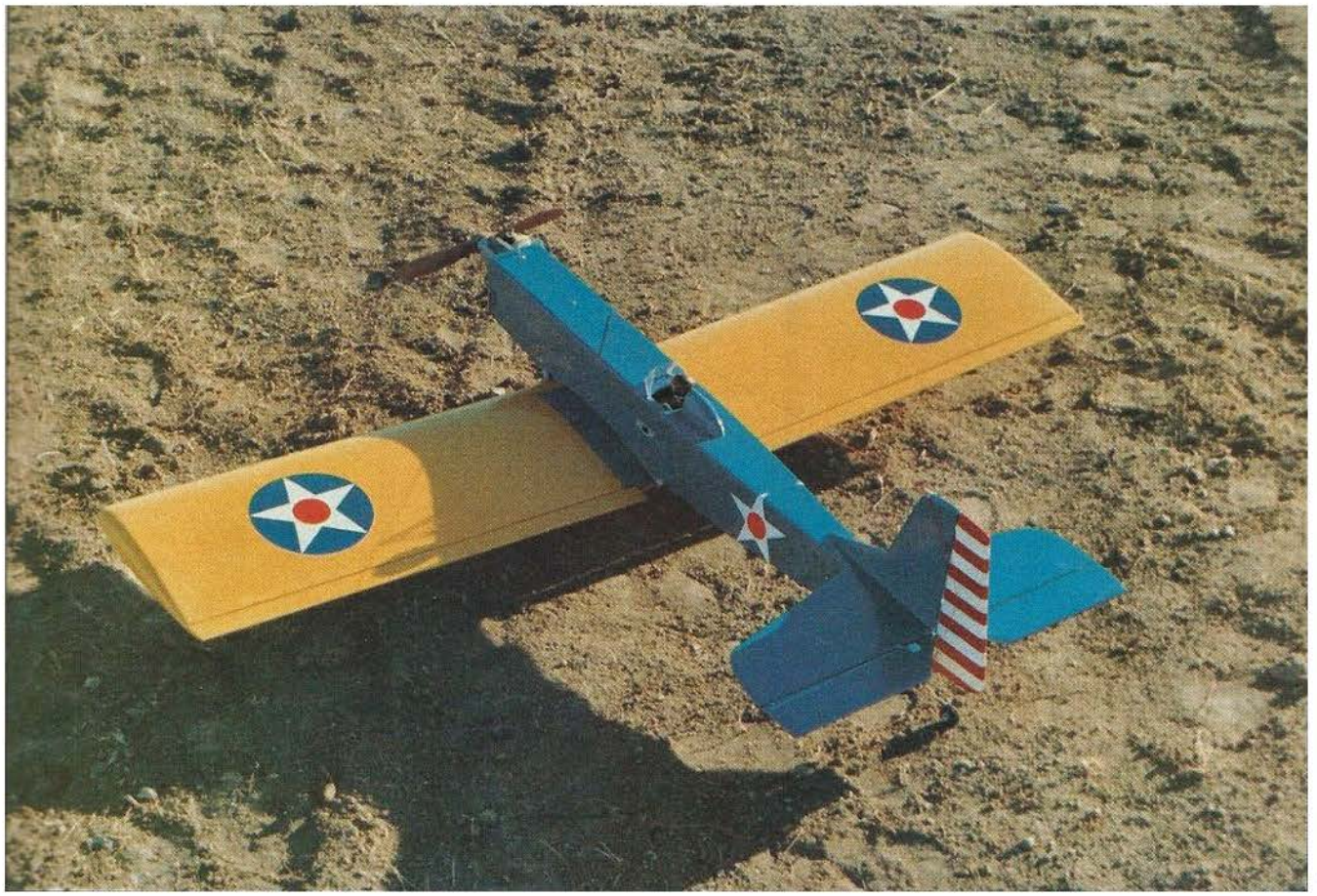
I recommend building with either Titebond or Wilhold resin glue for all joints except those mentioned. Used properly, either of these glues will give joints with strength in excess of the building materials. Make certain that all end-grain balsa and plywood butt joints are double glued. The empennage should have the bulk of the sanding done before it is assembled to the fuselage. Depending on personal preference, the fuselage top may have either open cockpit or canopy.

The wing cores are cut from 1lb. cu. ft. expanded bead foam. If you've never cut a wing core, don't let that stop you; send for a copy of **Foam Wings** from the RCM Anthology Library Series when you send for the plans. Once you get the hang of it, foam cutting is a quick and easy task, and faster by far than a built-up wing.

Fuselage

Begin by cutting the fuselage sides to the outline shown. Make certain that they are identical to insure a true fuselage. Drill the holes in the fuselage sides for the wing dowels. If you plan to use Pylon Gold-N-Rods, the control rod cut-outs should also be made. Cut F1 through F4 from 1/8" ply and mark a vertical centerline on each. If you plan to mount your engine similar to that shown, F3 may be notched for the throttle rod.

Cut the stabilizer and mark a centerline on both the top and bottom surfaces. The



fuselage top is made from a piece of 3/16" x 3" balsa cut 27⅞" long. Mark a centerline on both sides of the top and also mark the positions of F2, F3, and F4 on one side. Be sure these position marks are perpendicular to the centerline. Lay the fuselage top and stabilizer on a flat building board, align the centerlines, and glue the front edge of the stabilizer to the rear edge of the fuselage top. Glue F3 and F4 to the fuselage top where marked and check them with a square or triangle. F2 is now glued down tilted back 2 degrees from the vertical. If you don't have an adjustable square, cut a piece of stiff cardboard to have an 88 degree included angle and use this.

When this assembly has dried sufficiently, glue the fuselage sides to the framers and to the fuselage top, drawing the sides together at the rear directly over the centerline on the stab. Do not glue the sides to the top in the area of the hatch. A fuselage jig works nicely here, but a few weights and some masking tape do a satisfactory job. As long as the assembly is kept flat and the centerlines are observed, it will be impossible to build a crooked fuselage.

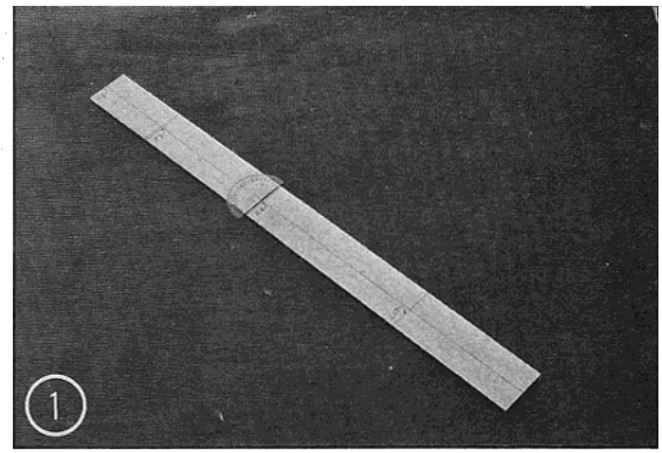
After drying, the fuselage may be turned over and the hatch cut out using a razor saw. If you didn't get glue in the wrong place, the hatch should lift off. The bracing in the nose may now be added as well as the nose bottom which is glued between the fuselage sides. Glue the stiffeners to the hatch and mount it using two #4 sheet metal screws. Glue the balsa braces in the rear portion of the fuselage and add the 1/16" ply wing saddle doublers.

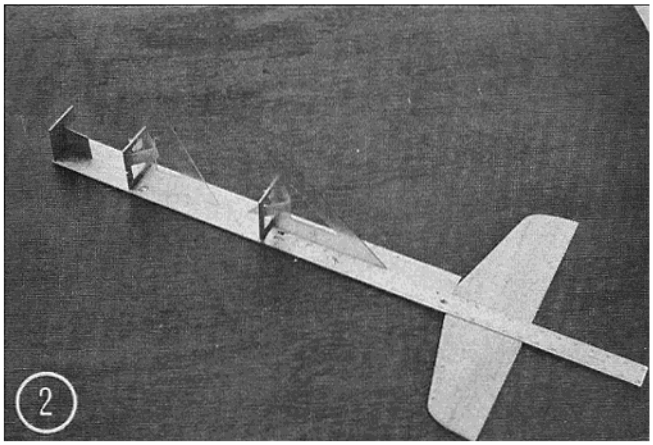
If you are using Gold-N-Rods or something similar, install them now. Cut two outer sheaths about 18" long and scuff one end of each for about 2". Thread the sheaths through the fuselage and out the cutouts. Epoxy the sheaths liberally to the fuselage sides where they exit, making certain the sheaths are completely through the fuselage sides and are pointing toward the future location of the control horns. When dry, the sheaths may be cut flush with the fuselage sides, any gaps filled with filler, and the whole thing sanded flush with the sides using a sanding block. This method makes a neat, clean, rattleproof exit.

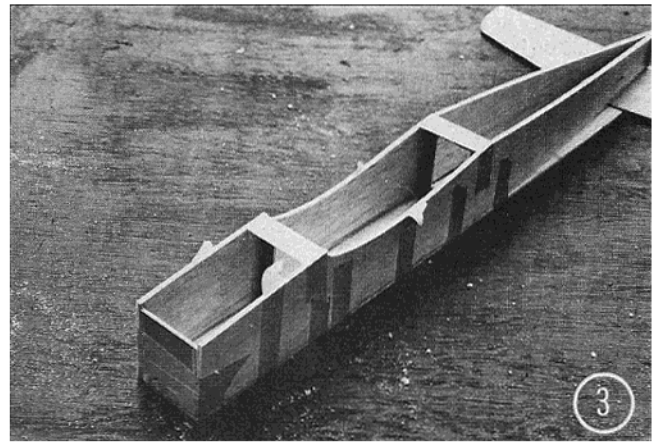
Trim the fuselage top to contour, glue on the fuselage bottom, and add the tail-wheel bracket shim. Double-glue the fin pieces to the top of the stab and fuselage top using the centerline as a guide and squaring them up with a square or triangle.

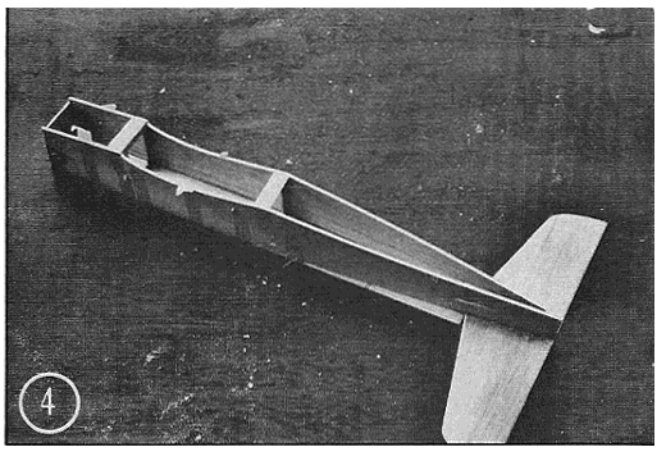
The elevators may be joined using 3/32" wire and epoxy. Make sure the hinge line is straight and the elevators are parallel. Bend the lower portion of the 1/16" tail wheel wire, stick on a wheel collar, stick the wire through the tail-wheel bracket and make the last 90 degree bend as shown on the plans. Cut an appropriate slot in the bottom of the fuselage and epoxy the tail-wheel bracket assembly into place. The elevator and rudder may be fitted at this time. They may be either hinged now or later, depending on your method of finishing. F1 may now be

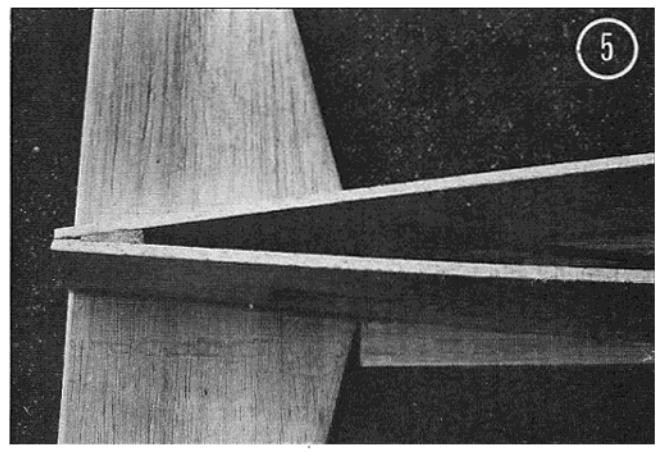
(1) The top fuselage sheet marked with a center line and bulkhead locations accurately laid out with a protractor. (2) Stabilizer butt-glued to top sheet. Bulkheads glued in place and aligned at right angles to top sheet. (3) Fuselage sides are glued to bulkhead and top sheet. (4) Overall view shows masking tape used to secure if slow drying glues are used. (5) Note tail filler piece used where aft end of fuselage is pulled together. (6) Cutting out the hatch with a Zona saw. (7) The full tank compartment after the hatch is cut out.

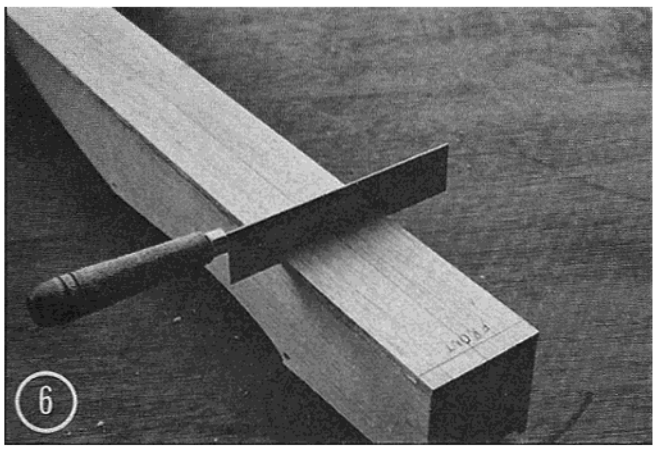


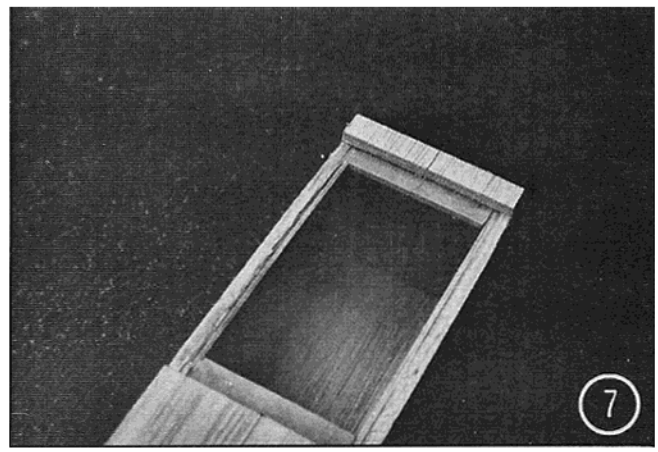


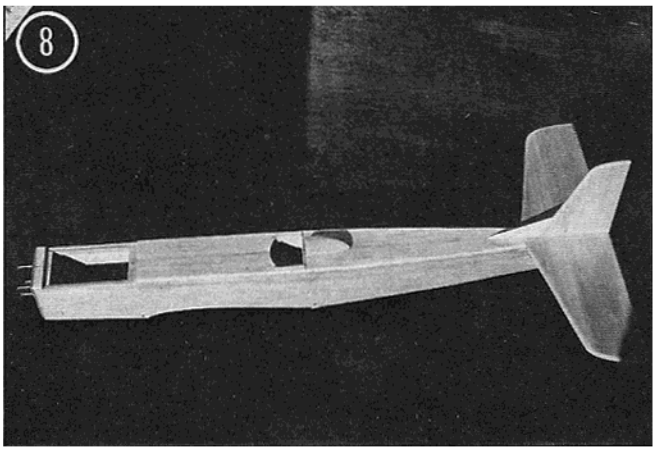


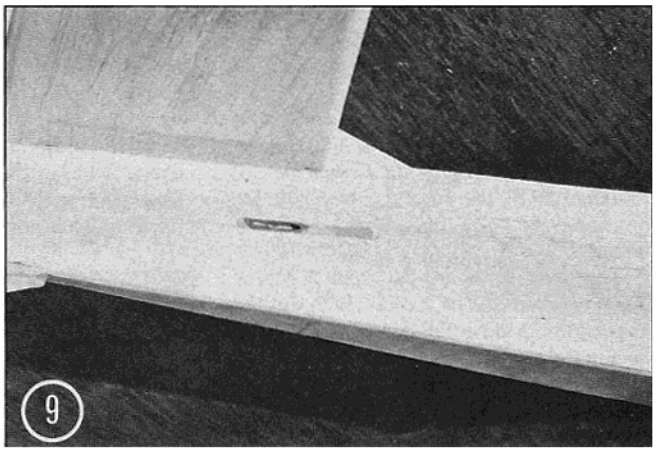


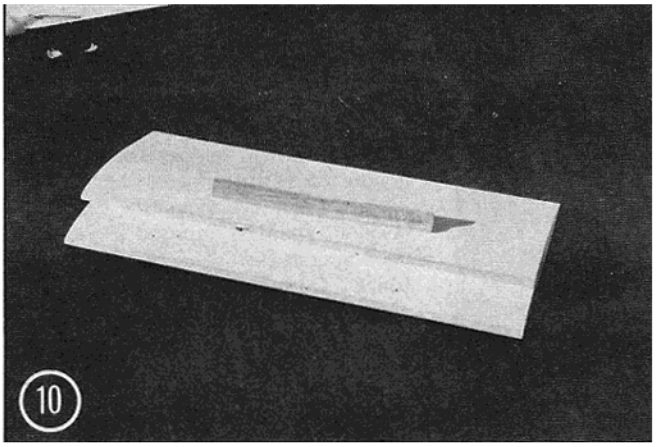


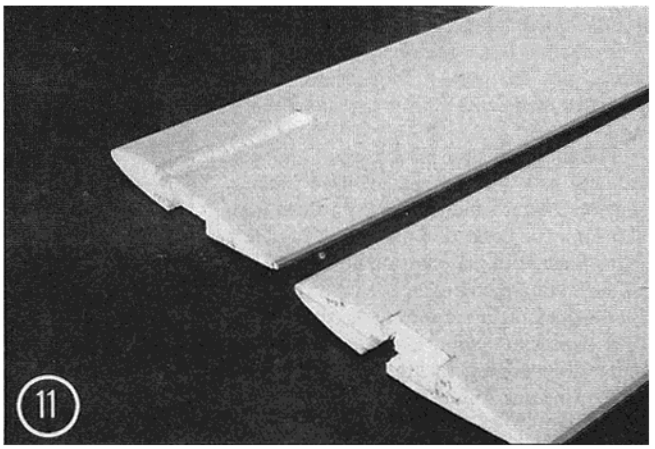


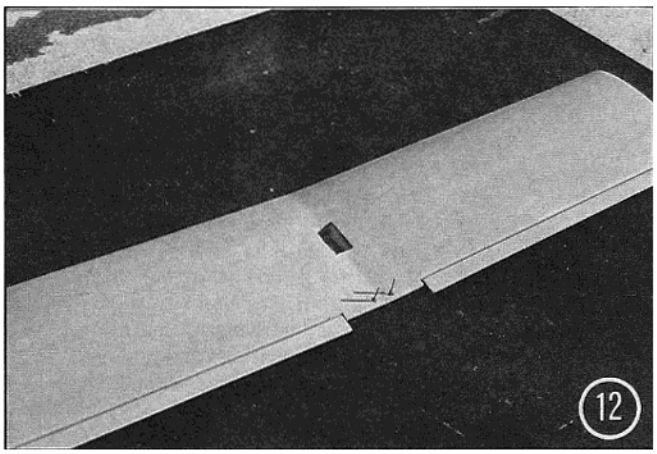


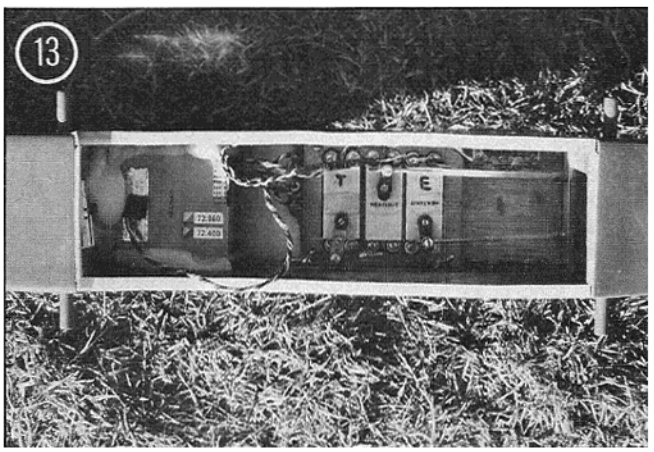


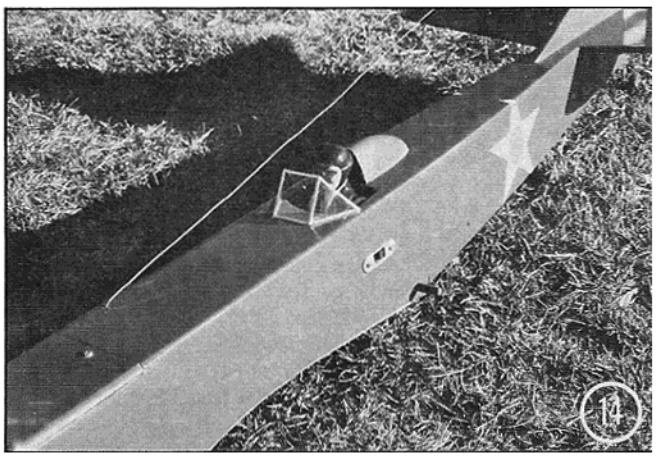












(8) The completed fuselage assembly – quick and rugged. (9) Fair in the outer Gold'N Rod where it exits the fuselage sides. (10) Cutting the foam cores is easy and you can make quite a number of wings in the time it would take you to frame up a conventional wing. (11) Landing gear trunion block cutouts and aileron servo well cut into the foam cores. (12) The finished wing with strip ailerons and linkages installed. (13) View of Heathkit radio installation in the Gee-Tee I. Plenty of room for any radio. (14) View of hatch hold-down, airborne switch. Dowels used for wing hold-down bolts could be substituted.

glued in place after the fuselage front is sanded flush. Masking tape works well here. Drill F1 for the motor mount and throttle rod.

If you plan to make an open cockpit, it should be cut out now and a 3/16" balsa sub-floor added. The wing dowels are not installed until the fuselage is ready for finishing.

Wing

The wing cores are cut from 2" thick foam blocked 8-9/16" x 24-3/4". Cut the parts for the dihedral brace/landing gear mount from 1/8" ply and glue them together as shown on the plans. The landing gear mounts should be spaced 5/32" apart by using some landing gear wire for a gauge. Drill the two 5/32" holes in the brace as shown. Make the cutouts in the wing halves for the dihedral brace and the aileron servo. The dihedral brace fits flush with the wing skins, not the cores! These cutouts can easily be made with a razor saw and a sharp knife.

The wing skins are made by butt gluing a 6" and a 3" wide sheet of 1/16" balsa together. After sanding the seam flush, the skins may be bonded to the cores. Sand the skins flush with the cores on all four edges of each wing panel using a sanding block. Fit the dihedral brace and cut the skins away over the servo cutout. Glue on the leading and trailing edges, sand them to shape, and glue on the tips. When you are sure of the fit of the two wing panels and the dihedral brace, epoxy them together. Hobbypoxy II is a good choice here as it will allow sufficient time for alignment. The 1/16" ply servo floor should be epoxied in place and the foam walls of the servo cutout coated with epoxy for protection. No servo mounts are required if you use servo mounting tape.

Bend the aileron horns from 3/32" wire. Remember, one left, one right! Cut the aileron horn bearings from scrap T.E. stock and groove them for the horns. Grease the aileron horns lightly and epoxy the horns and bearings to the trailing edge. When dry, break the horns loose. Reinforce the dihedral joint with 3" wide fiberglass tape. Don't try to wrap the tape around the trailing edge of the aileron horn bearings as it won't conform to a 90 degree bend. Surfacing resin can be used to bond the fiberglass tape to the wing. Three coats with sanding in-between, should be sufficient to both fill the fiberglass and allow it to be feathered to the wing skin. If you use resin here, make certain the dihedral joint is completely sealed with epoxy so no resin can get at the foam. After the first coat of resin has set, cut the fiberglass where it covers the aileron servo cutout. Fit the ailerons. As with the rudder and elevator they may be hinged now or later.

Finishing

No matter how strong or true an airframe is, it's the finish that people see. The Gee-Tee may be finished with any of the plastic films if desired. The model pictured was finished with catalyzed automotive acrylic enamel over surfacing resin. In case you are not familiar with this method, I'll outline it briefly.

Sand everything smooth using #150 grit no-fill paper. Finish sand with #220 grit no-fill. Apply a thin coat of surfacing resin worked well into the balsa. The first coat should not be expected to do anything except whisker the wood grain. Sand this first coat with #150 to get rid of the roughness but no further. Apply a second, thicker coat of resin and, when dry, sand this coat with more #150. Any shiny spots on the surface indicate that more sanding is required to level that area. A third coat of resin is now applied and sanded with #220 grit. By this time the surface should be filled, smooth, and show no sanding scratches.

Spray on a coat of automotive acrylic primer, 3 parts reducer to 1 part primer. When dry, the primer need only be sanded, where necessary, using #400 wet. Now spray on a coat of catalyzed enamel reduced 2 parts reducer to 1 part enamel. Let this coat flash dry for 10 or 20 minutes then spray a mist coat, 4 parts reducer to 1 part enamel. This mist coat will cover any orange-peel or over-spray, leaving a smooth, glossy finish. Catalyzed automotive acrylic enamel does not go into a brittle curing period so it may be recoated anytime.

Final Assembly

Mount the control horns. The rudder horn fits directly over the tail-wheel wire and the elevator horn mounts directly over the elevator joiner. Don't forget to seal the nose compartment with resin or epoxy; sooner or later you will spring a leak and, if the nose compartment is not sealed, your engine will fly away with your firewall. Mount the engine and the landing gear. Install 1/16" foam seating tape on the wing saddle. Tape your radio gear inside the fuselage and check the aircraft for the proper center of gravity. Move the gear around until the CG is correct and then mount the gear in that position. You'd be surprised how terribly a good aircraft flies when the CG is out of place. Connect the linkages, check everything for proper operation, grab your toolbox and head for the flying field.

Flying

The Gee-Tee flies like any other low-wing aircraft with a decent power-to-weight ratio, however, since it is a tail-dragger, a bit more finesse is required on the runway, especially if you are accustomed to flying trike-geared aircraft.

On a rough runway, don't suddenly punch the throttle from idle to full, or the down-thrust coupled with wheel drag will force the nose into the runway. Don't use full rudder under high thrust, low speed conditions, or the aircraft will spin like a top. Finally, don't be misled into thinking the tail must be held down to keep the tailwheel on the ground for steering. By the time the tail rises normally, there is enough air across the rudder to make it effective. Armed with these ground rules and, after a few minutes of driving around the runway, you should be ready to put your Gee-Tee in the air.

With all control surfaces at neutral trim and the aircraft pointing down the runway, push the throttle to half. After tracking straight for ten or fifteen feet, the tail should be up. The flying is now up to you. Landings aren't difficult. Make your turn on to final at half throttle, 10 feet high and about 100 feet out. Pull the throttle to idle and let the plane settle to 3 feet above the runway. Start applying up-elevator gradually to hold altitude. As the air speed decreases and the angle of attack increases your Gee-Tee should gently settle onto the runway.

All of my Gee-Tee's as well as the several others that have been built, have never been flown below 5000 feet. I'm very interested in hearing how it handles way down there at sea level. □

GEE TEE I

Designed By: Graham T. Hall

TYPE AIRCRAFT
Int. Trainer, Sport & Pylon Racer (15-500 Class)
WINGSPAN
50½ Inches
WING CHORD
10 Inches
TOTAL WING AREA
502½ Square Inches
WING LOCATION
Low Wing
AIRFOIL
Symmetrical
WING PLANFORM
Constant Chord
DIHEDRAL, Each Tip
7/8 Inch
O.A. FUSELAGE LENGTH
35⅞" (F1 to elevator)
RADIO COMPARTMENT AREA
(L) 9½" X (W) 2½" X (H) 2¾"
STABILIZER SPAN
18 Inches
STABILIZER CHORD (incl. elev.)
6¼ Inches (Avg.)
STABILIZER AREA
103 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
6 Inches
VERTICAL FIN WIDTH (incl. rudder)
5¼ Inches (Average)
REC. ENGINE SIZE
.40 Cubic Inch
FUEL TANK SIZE
8 Ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Four
CONTROL FUNCTIONS
Rud., Elev., Ail., Throt.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Foam, Balsa, Ply
Empennage	Balsa
Weight Ready-To-Fly	56 Oz.
Wing Loading	16 Oz./Sq. Ft.

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