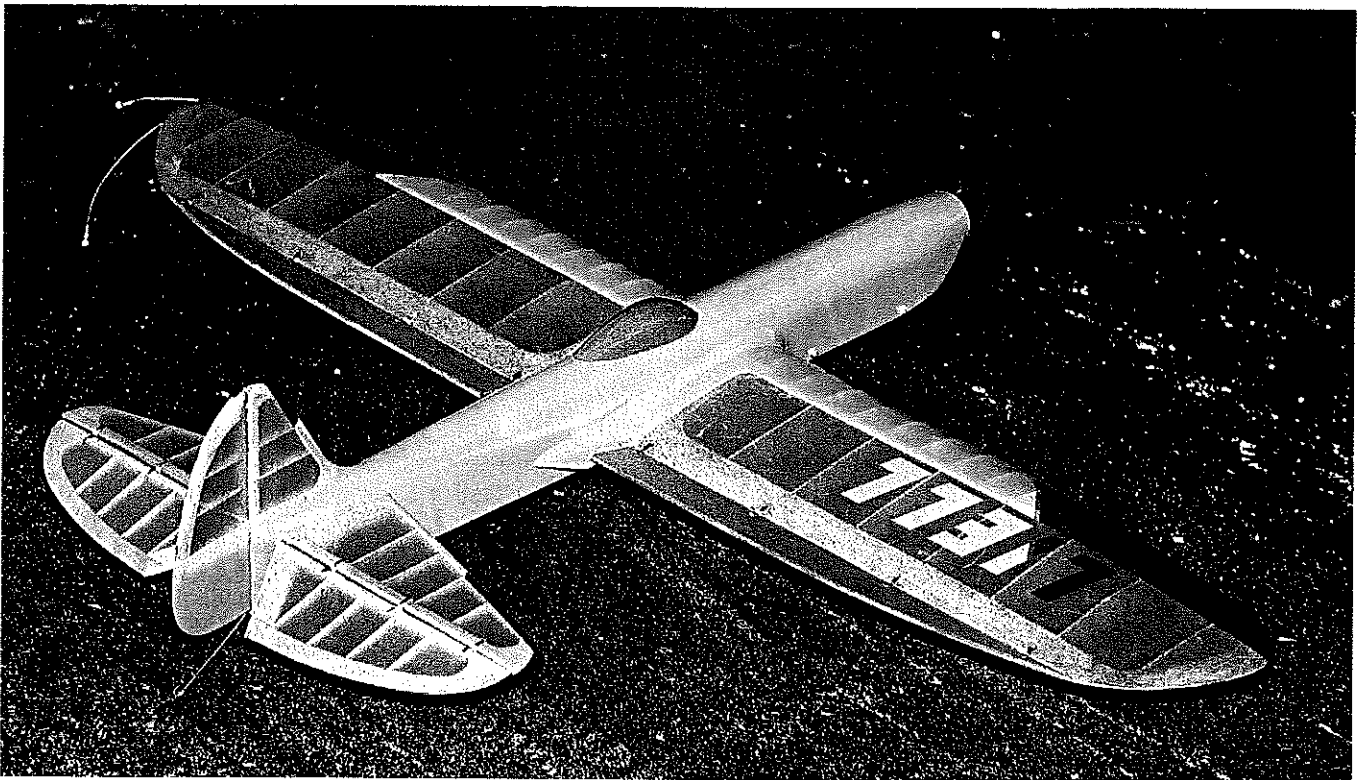
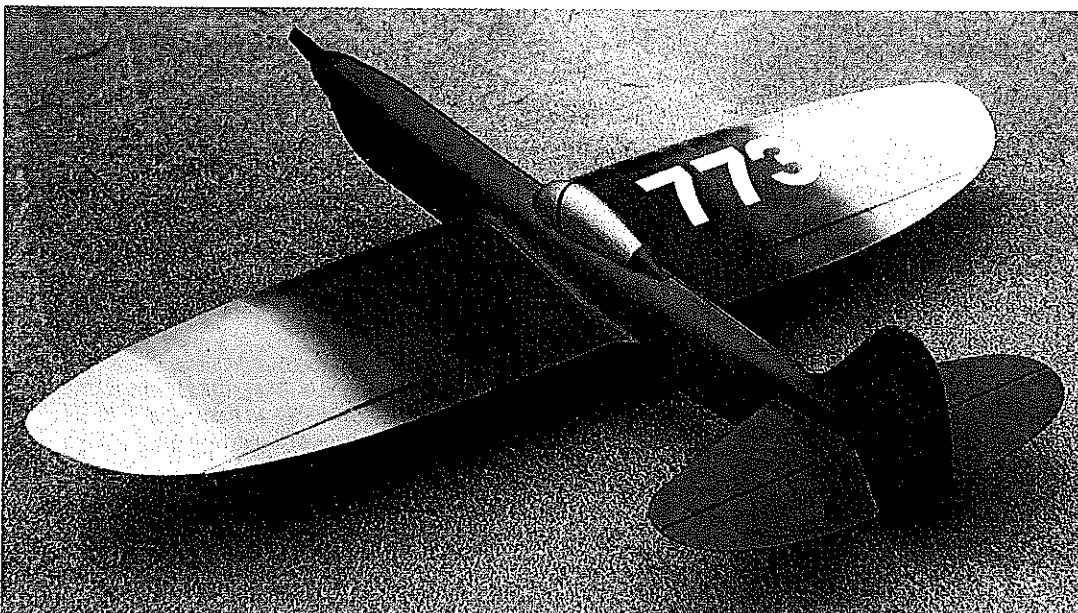


Cheap Thrill

867
 ■ Jim Thomerson



Tee Dee .049-powered version with built-up tail did not require nose weight for proper balance.



Sheet balsa tail surfaces are optional, but at possible penalty of nose weight, as on this Tee Dee .049-powered model.

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I've enjoyed designing and building small Control Line Stunt airplanes since the days of the Atwood Wasp .049. Designs have gradually grown from 24 to 36 inches in wingspan and from six to seven ounces up to 11-13 ounces in weight. From time to time, a model has been powered by an .074 or an .09.

Today there are a number of high-quality small engines, diesel and glow, in the .049 to .10 size range. You are encouraged to try your favorite in a Cheap Thrill. The plans show front-end modifications for the Tee Dee .09.

I fly Stunt competitively, at the PAMPA (Precision Aerobatics Model Pilots Association) Advanced level, with the goal of maintaining and increasing my competence so that I can conduct flying sessions without mishap and fly my airplanes well enough for all present to enjoy them. The Cheap Thrill flies the pattern very well, with a surprisingly solid feel. My 1/2As have handled wind better than some of my larger Stunt airplanes, and fly when everything else stays in the van.

The 1/2As and their slightly bigger siblings are great fun to build and fly.

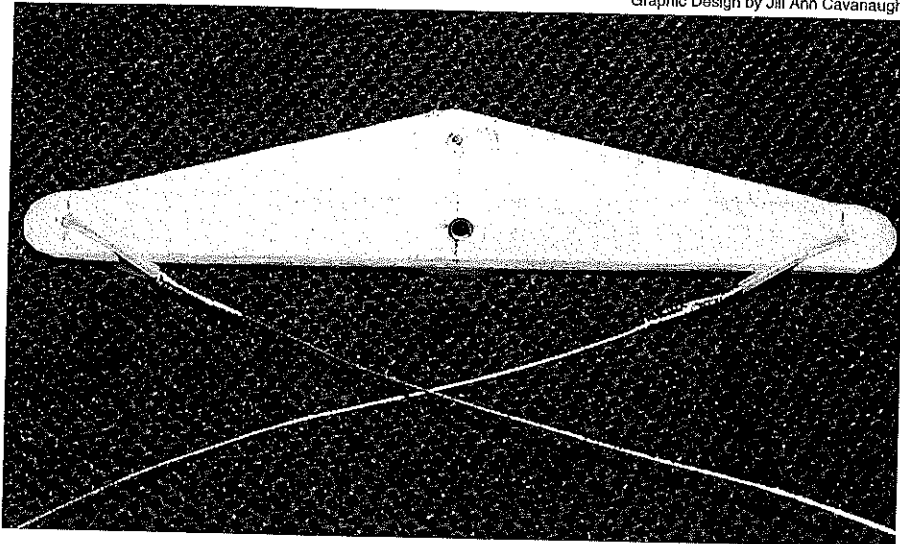
CONSTRUCTION

Stabilizer and Elevator: The built-up construction is recommended for the 1/2A, but I have used very light 3/16 sheet with good results. The control horn shown is a small Veco.

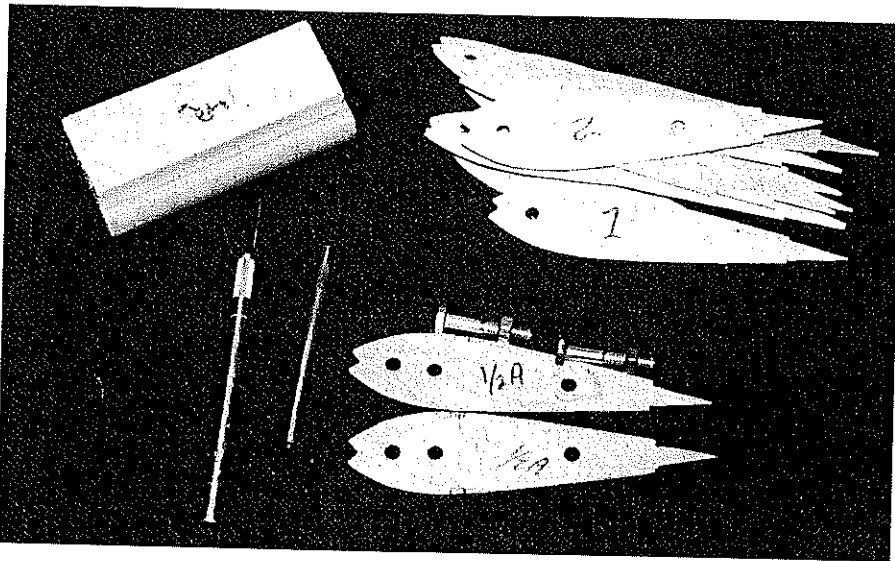
Sand the stab and elevator to shape. Using thin cyanoacrylate (CyA) glue, cover the center of the stab with a two-inch-wide piece of lightweight glass cloth (not necessary on the built-up stab). Put on a couple of coats of clear dope and sand the stab and elevator as smooth as you can with 400-grit sandpaper. Cover with tissue. Continue with clear dope, sanding between coats with 600-grit paper to knock off any fuzzies until uniformly shiny, and set aside until later.

Wing: If you don't want to build the wooden four-inch bellcrank as shown on the plans, Sig or Brodak can supply fairly light four-inch bellcranks.

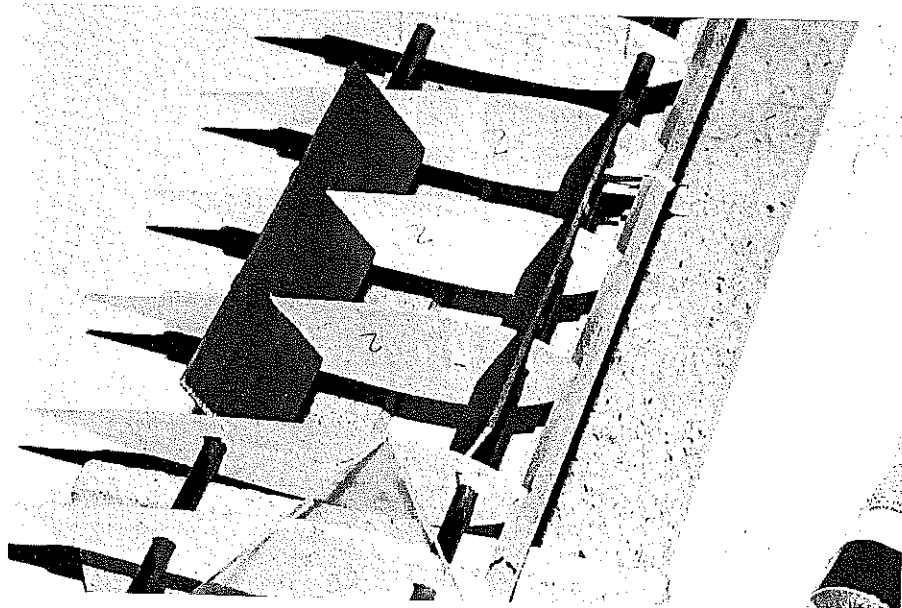
I prefer to use one of the commercially available 1/2A flexible leadouts, but .018 stranded control line will work fine. Slip on a one-inch length of large-size CyA glue applicator tubing over the bellcrank end of each leadout. Center this tubing in the bellcrank end hole and slide the leadout wire through it until about two inches stick out. Wrap the



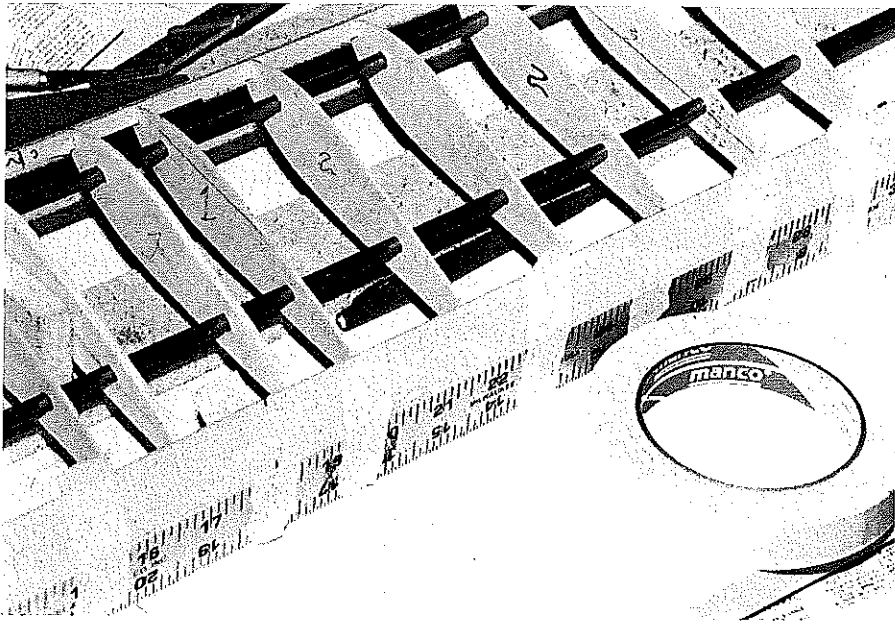
Homemade four-inch bellcrank with leadouts attached. Commercial units from Brodak or Sig Manufacturing can be substituted.



Templates, bolts, tools required to make center-section wing ribs (see text).



Spacer fixtures accurately position the wing center-section ribs. Note rubber bands around the leading edge and the front wing jig rod, and angled fixtures.



Trailing edge taped to metal yardstick. Top TE sheeting ready to be glued.

leadout with fine wire as shown in the *AMA Competition Regulations* and clip off the excess. Fine beading wire, available at craft stores, is good for wrapping leadouts and control line ends.

When the wrap is finished I rub on Sig-Ment, to help hold the wire and to smooth the surface to prevent possible hangups. Leave the outer ends unfinished for now. Note that one leadout will be about four inches longer than the other when finished, to ensure that the line connectors don't snag.

Make templates for the center section ribs from plywood or aluminum and stack 14 pieces of light quarter-grain $\frac{1}{16}$ balsa between them. If you will assemble the wing on a Great Planes

wing jig as shown in the photos, holes for the jig rods need to be accurate in size and position.

Sharpen one end of a piece of $\frac{1}{4}$ brass tubing by trimming it down to a sharp edge from the inside. Make a half-dozen or so little cuts in the sharp edge to make it work like a miniature hole saw. Cut holes in the rib blanks using the rib templates and then bolt the stack between the templates with $\frac{1}{4}$ -inch bolts.

Carve and sand the ribs to shape, but do not cut the spar notches. The ribs are drawn slightly oversize at the juncture with the trailing edge sheet so that you can sand them down neatly after assembly.

Trim four ribs down $\frac{1}{32}$ on the top and bottom. These are your center ribs that will be sheeted with $\frac{1}{32}$ balsa. Mark them #1 so you don't lose them among the other ribs.

Trim down four ribs to make two each of ribs 3 and 4.

Because of their elliptical shape, the wingtips beyond these ribs will have to be assembled off the jig. Cut out the rest of the ribs, the $\frac{1}{16}$ sheet trailing edge strips, $\frac{1}{4}$ sheet tip pieces, the $\frac{1}{8}$ sheet flaps, and the two rib-position jigs.

Slide the ribs on the wing jig rods in proper sequence; make sure the jig is sitting square and flat, and tighten it down. Position the ribs roughly, then block, tape, or pin one of the center ribs in position so that it is vertical and perpendicular to the rods. Stick a couple of pins into the leading edge between the last two center-section rib positions on either side, put the leading edge in place, and wrap a small rubber band around the pin and the front jig rod to hold it there. Check that the center rib is still true and glue it to the leading edge.

Use the two wing-rib jigs to position the next rib. Set the jigs at 45° to assure that the rib is square in all directions. Glue the rib to the leading edge. Do this for all the center section ribs.

Put the lower trailing edge strip in place by pinning it to the two ribs at either end of the center section. Recheck your center rib; glue the center-section ribs to the trailing edge. Use the jigs to line up ribs 3 and 4 and glue them to the trailing edge (but not to the leading edge).

Block a straightedge parallel with the rear edge of the lower trailing-edge strip.

Cheap Thrill

Type: CL $\frac{1}{2}$ A Stunt

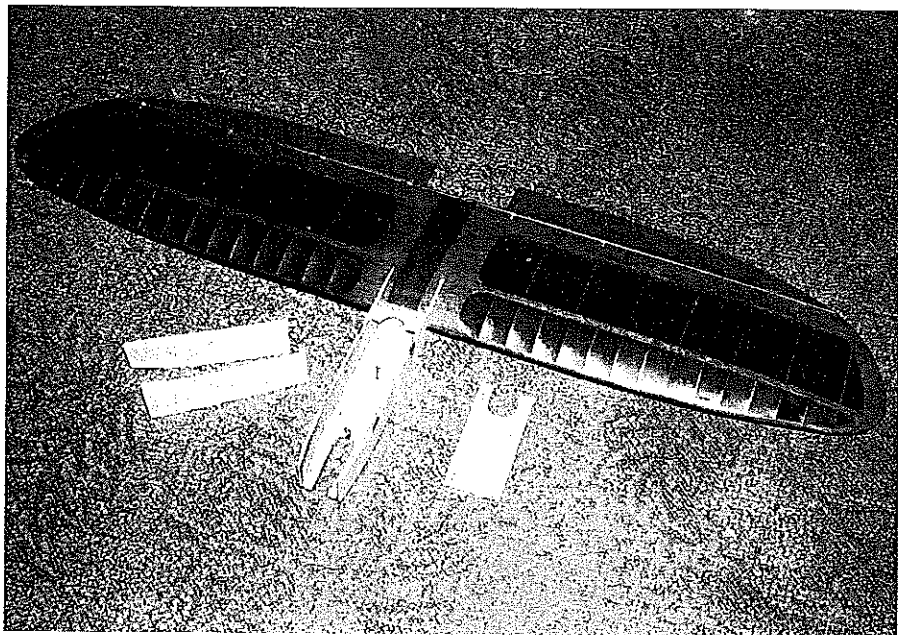
Wingspan: 36 inches

Engine: .049-.09

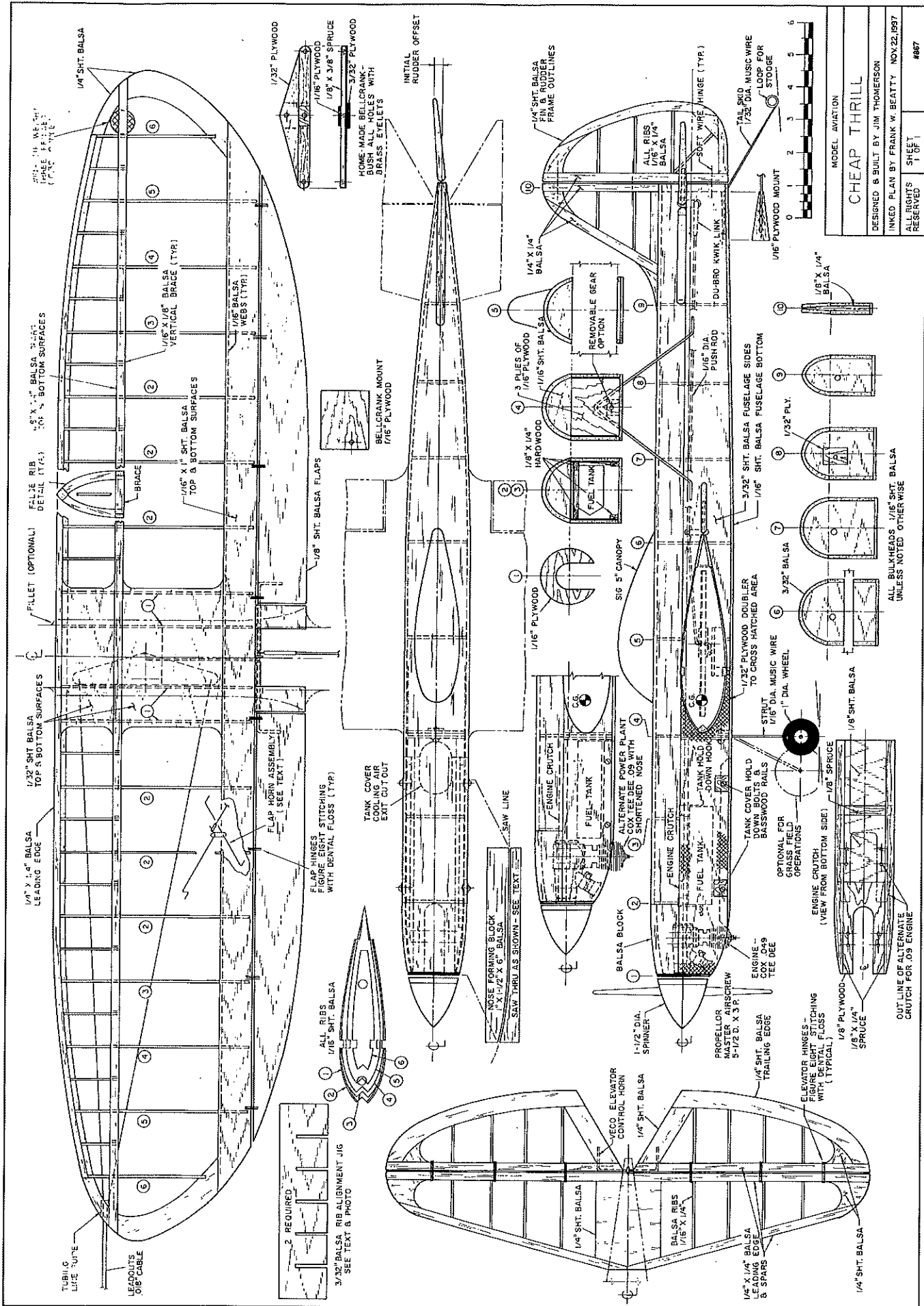
Flying weight: 13 ounces

Construction: Built-up

Covering/finish: Tissue and dope



Front end of fuselage has been glued to the wing—take care during alignment.



MODEL AVIATION
CHEAP THRILL
 DESIGNED & BUILT BY JIM THOMERSON
 INKED PLAN BY FRANK W. BEATTY NOV. 22, 1997
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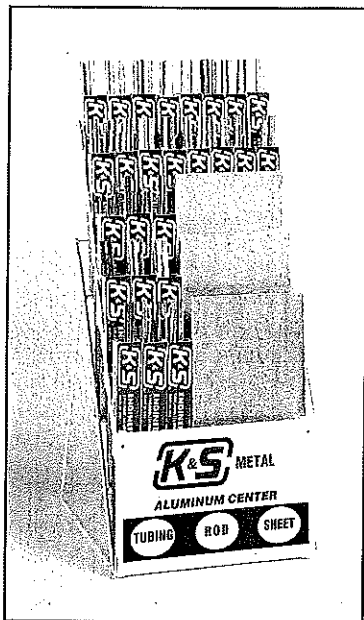
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Tape the trailing-edge strip to the straightedge. Lay the top trailing-edge strip in place and tape it to the straightedge.

Check that everything is straight and fits are satisfactory, then lift up the top strip and put glue along the ribs. Drop the top strip back in place and pin it down to the ribs. Use thin CyA to tack the rear of the trailing-edge strips together. Don't get any on the tape strips!

When dry, pull out all of the tape that is inside the trailing edge.

Check that everything is square and retape the trailing edge to the straightedge. Cut pieces of 1/16 sheet to make trailing-edge webs between all center-section ribs out to rib 4. Squeeze the tips of the trailing-edge strips together, and wick thin CyA in from the inside.

Use a straightedge and a sharp pencil, carefully mark the position of the top spar on each rib (don't use a pen; ink may bleed through the covering). Make a rib-notching tool by gluing a piece of 220-grit sandpaper to a strip of 1/8 x 1/4 x 1. Glue a wider piece to the other side of the strip to act as a sanding stop. Carefully sand a spar notch in the top of each rib on the wing jig.

Check that everything is square, check the spar fit, and glue the top spar in, except to ribs 3 and 4. The spar should go in the thickness of the sandpaper below the edge of the ribs so that final sanding will make a smooth surface.

Remove the wing from the jig and finish gluing the rear of the trailing-edge strips. Turn the wing over, spar down, on a flat surface. Mark, notch, check, and install the second spar. When dry, inspect the partially-finished wing to assure that everything is still square.

Sight down the tip of the wing, pinch the top and bottom spar tips

together, and glue. Thick CyA and accelerator is best here. Glue the 1/4 sheet tip pieces between the trailing edge and the spars, again being careful to center them.

Slide rib 6 into place and mark the spar positions. Sand the spar notches and glue rib 6 in place. Do the same with rib 5, then do the other tip. Add the 1/16 trailing web edge between the tip ribs.

Soak the unattached part of the leading edge by wrapping it with wet paper towels for a few minutes. Press the leading edge into the tip rib notches and glue it in place. Install the forward tip pieces, then cut out the inside tip and install the flattened 1/4 aluminum tubing guide for the leadouts. Both leadouts come out one opening so that control input will not make the airplane yaw.

Install the 1/16 plywood bellcrank mount. Block it up from the inside of the bottom spar with a piece of 1/4 square. Hold the bellcrank in place and mark the leadout positions on the inside wing ribs. Cut leadout holes in these ribs with a Dremel tool and 1/4 ball cutter or a sharp knife. Also cut out for bellcrank clearance.

Install the flap pushrod in the bellcrank. Run the leadouts through the holes in the ribs and out the tip guide; then install the bellcrank. Fill in below the plywood mount with scrap balsa to give good glue contact with the bottom center-section sheeting. Sheet the wing center section.

Mark a centerline all the way around the center-section sheeting. Finish the outer ends of the leadouts (Remember that one is four inches longer than the other.) Glue three pennies in the outer wing for tip weight.

Use the center rib templates to cut out 28 1/16 false half-ribs. Notch for the spar with the sanding tool. Cut slots for false ribs in your rib jig templates and

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use the templates to position the false ribs. Trim the false ribs toward the tips to length and sand them down to airfoil contour after all are installed.

Glue a vertical piece of hard $\frac{1}{16} \times \frac{1}{8}$ to the sides of each half-rib between the spars. This will considerably increase wing rigidity. Use a long sanding block to assure that the rear line of the trailing edge is straight so the flaps can be made to fit tightly against it. Sand the wing down smooth, again using a long sanding block.

The wing can be covered now, or later as you prefer. It is rigid enough for one of the plastic films. A two-inch-wide strip of lightweight glass cloth around the center section will do no harm, particularly if you plan to use a larger engine.

The flaps are flat with rounded edges. Cover them with the same material you used on the wing. Make a flap horn in the same manner as the elevator horn, but instead of $\frac{1}{16}$ piano wire, use a more-flexible steel wire (comes in small rolls at the hardware store, 14 or 16 gage), one that will hold up to flight stresses but soft enough to allow you to tweak the flaps to adjust for any wing warp that might sneak in.

Cut two pieces of aluminum or brass $\frac{1}{16}$ ID tubing as shown on the plans and slip them on either side of the flap horn before you bend the ends. Cut the center trailing edge to clear the flap horn and recess the mounting tubing so that the wire part of the horn is flush with the trailing edge.

Install the flaps, using your favorite hinge system. I usually use figure-8 hinges made of dental floss. Cut small notches in the leading edge of the flaps so that the hinges do not push the flaps away from a tight fit with the trailing edge. If you end up sticking the flaps to the trailing edge with later coats of dope, simply take a piece of dental floss and floss the hingeline to free up the flaps.

Bend the flap pushrod to length with a simple right-angle bend to go through the hole in the flap control horn. You may want to make the flap pushrod in two pieces, overlapped $\frac{1}{2}$ - $\frac{3}{4}$ inch, wrapped with beading wire and soldered after careful adjustment of length to center the flaps and give equal movement (about 30° is plenty) each way.

Fuselage: Cut a gluing jig for the forward sides from a block of balsa. Cut the front sides from moderately hard $\frac{3}{32}$ sheet and the doublers from $\frac{1}{32}$ plywood. Install the $\frac{3}{32}$ plywood inserts for the tank cover hold-down bolts. Glue a side and doubler with five-minute epoxy and clamp in the jig until dry. Be sure to make a right side and a left side.

Cut the $\frac{1}{8} \times \frac{1}{4}$ spruce or basswood rails for the tank cover and clamp them to the sides. Drill for 3-48 bolts (use 2-56 bolts and nuts if you can't find 3-48s) and install blind nuts on the inside of the rails. Cut the bolts off almost flush with the blind mounting nuts.

For the $\frac{1}{2}$ A, make the engine crutch out of $\frac{1}{8}$ ply for the engine mount, $\frac{1}{8}$ balsa with grain running across the crutch, and a $\frac{1}{8} \times \frac{1}{4}$ spruce piece for the rear tank mount hook. (The tank is held in place with rubber bands.)

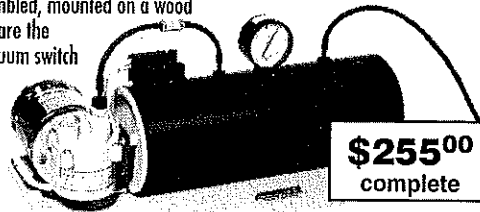
Drill the engine mount holes and install 3-48 blind nuts. Glue two strips of $\frac{1}{8} \times \frac{1}{4}$ spruce down each side of bottom of the crutch and trim to shape. For an .09 make the engine mount from $\frac{1}{4}$ plywood and let it stick up $\frac{1}{8}$ inch above the crutch. Install the tank mounting hooks.

Bend a landing gear from $\frac{1}{16}$ piano wire and install it in the landing gear mount. A removable landing gear will allow you to change to suit field conditions. If you want a removable landing gear, epoxy the landing gear wire to the cutout plywood triangle. Glue the sandwich together and slide the gear in place. Glue a scrap of $\frac{1}{16}$ plywood to the rear of the gear sandwich to

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accommodate the thickness of a 3-48 blind nut. Drill the sandwich for a 3-48 bolt and install the blind nut.

Put pieces of thin plastic, overlapping the bottom edges of the fuselage sides, between the sides and the tank cover rails and bolt them on. Install a temporary former to hold the front end square about where the bend of the sides starts.

Assemble the fuselage sides, crutch, and landing gear mount using 45-minute epoxy. Clamp it all together, making sure everything is square and straight. Glue the hard 1/16 balsa tank cover to its rails.

Install the fuselage front end on the wing on a flat surface. Tack-glue temporary spacers to the flap bearing tubes at the rear of the wing to hold it level. Line up the centerline of the leading edge with centerline marks on the fuselage. Get everything square and tack the front end in place with CyA. Don't rush this step. Mix epoxy and microballoons to make a thick paste and make a small fillet around the wing joints on the inside of the fuselage.

Cut the rear fuselage sides from light 3/32 sheet. Glue the rear fuselage sides to the wing, being sure that everything is square, and pull them together at the rear and glue to the 1/8 x 1/4 tail post. Be very careful to get the rear of the fuselage centered.

Cut the formers for the rear fuselage from 1/16 sheet and put them in place. Check for alignment and CyA them in.

Make the elevator pushrod. Flatten the end of a 1/16 ID brass tube and drill a 1/16 hole 1/8 inch from the end, then cut the tube about an inch long. Insert the free end of the flap pushrod through the 1/16 hole and solder on a washer to keep it in place.

Solder a Kwik-Link on the end of a piece of 1/16 piano wire. Hinge the stab and elevator and attach the Kwik-Link to the elevator horn. Hold the tail assembly in place and measure the pushrod. Cut it where about 1/2 inch will insert into the brass tube at the flap horn with the

controls neutral. Sand this end of the pushrod to a shiny finish for a good solder joint.

Install the pushrod and glue the stab in place, making sure everything is lined up and square. Adjust the pushrod length and solder it into the brass tube. Be sure that the controls are free and there is no binding.

Bend the tailskid from 1/2 wire for the 1/2A; 1/16 for the .09. Slip a small piece of fuel line or other flexible tubing over the tailskid where it exits the fuselage to keep it from fatiguing and breaking at that point. Sew the tailskid to the 1/16 plywood mount with dental floss or beading wire, then epoxy it. Install the mount with epoxy. Sheet the bottom of the fuselage with 1/16 or 3/32 balsa.

Install the engine and tank. Cut any openings needed for needle valve, tank tubing, etc. Cut the nose ring from 1/16 plywood and tack-glue it to the back of the spinner with 1/16 balsa spacers in between. Put the spinner and prop on the engine and glue the nose ring to the fuselage. Glue in balsa filler blocks. Cut the spinner loose and remove the engine. Shape the lower nose to your liking.

Glue in the top formers on the front fuselage. Fuelproof the blind nut side of the engine mount and any other place you will have trouble reaching after the nose is completed. The fuselage top can be completely planked with soft 1/8 square or 1/16 sheet, either completely or with stringers and tissue in the rear. Carve the top front noseblock or build it up out of sheet. Hollow it to about 3/16, making sure it clears your engine crankcase.

Build up the rudder, or use light 3/16 sheet for the .09. The rudder is hinged with copper wire so that you can adjust it to correct for yaw if need be. Glue the fixed rudder in place, but install the movable rudder as the last thing you do to finish the airplane.

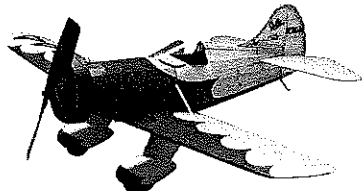
Fill any dings or low spots with lightweight spackling compound. Mix it with a little water and Titebond glue to make a thick paste. Sand everything

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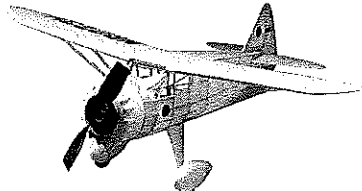
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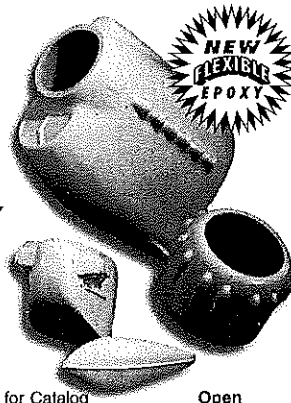
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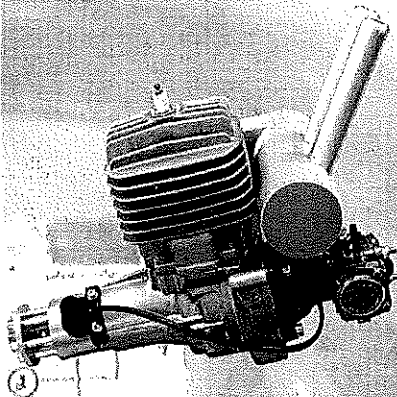
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down, put on a couple of coats of thin dope, and sand a little more. Cover the nose with light glass cloth or silk; cover the rest of the body with tissue or silkspan. Add the 1/8 fillet strips for the flaps.

Mask off the wing fillet area. Mix up a thick paste of water, light spackling compound, microballons, and Titebond, and form the fillets. Sand them down when dry and cover with tissue or silkspan, using Titebond as the adhesive.

The inside of the nose and tank compartment will benefit from a coat of epoxy. Dope the fuselage until it is uniformly shiny, with light sanding between coats.

Canopy: The canopy is a Sig five or six-inch plastic canopy. First step in installation is cutting the canopy loose from the excess plastic. A Dremel tool with a saw blade is a great help. Simply trim the flat plastic sheet to within 1/4 inch of the canopy, then use the remaining flat plastic as a guide for the chuck of the Dremel tool.

Tape a sheet of coarse sandpaper to the top of the fuselage and rub the canopy back and forth until it matches the fuselage contour. Use your favorite method to attach the canopy. With opaque canopies, thick CyA seems to work OK. An opaque canopy can be attached before or after final clear dope coats.

Power Plant: If the engine does not handle well and run right, nothing else matters. Install an engine you know well. If you are working with a new or unfamiliar engine, set it up on a test stand with the fuel system you'll use in the airplane, and get to know it.

The TD .049 needs about 1.5 ounces of fuel, and the .09 needs 2.5 ounces, to complete the AMA Stunt pattern. The tank should be uniflow; that is, the pressure line should terminate near and about 3/8 inch forward of the fuel pickup tube. The tank is sealed, except for the pressure and fuel lines, during running. If you don't want to run pressure, the uniflow is your air vent for the tank.

The 1/2A flies well on 42-inch .008 stranded lines. These are fragile and

must be handled carefully. TD .09 airplanes fly fine on 52-foot .012 lines. I wipe lines down with a piece of paper towel and untwist them before each flight and at the end of the flying session. The smaller Sullivan control handle is light and works well with this size airplane, or make your own custom handle from 1/8 plywood.

Flying: If you are patient and careful, you have an airplane that will give you many pleasant flights. For the first flight or two, use just a half-tank of fuel and don't do anything radical.

For the first flight you are mostly interested in whether the airplane flies level and parallel to the circle. If it flies with one wing noticeably high, tweak the flaps to get it reasonably level. Start out with about 1/4 inch rudder offset and adjust the rudder as needed so that you are looking directly down the wing in level flight. With any luck, no rudder offset will be needed.

Once the airplane flies level and parallel to the circle, try some climbs and dives to get a feel for control sensitivity. Fly a couple of high laps to see if it hangs out and the engine doesn't sag. If all is well try a couple of loops, then a few inverted laps. If the outside wing flies low inverted, you have too much tip weight; if it flies high, too little. Make the needed change and take a little tweak out of your flaps.

Don't do anything more exciting than wingovers, loops, lazy eights, and inverted flight until the airplane and engine work to suit you. Then, if that is your goal, put in enough fuel to do the AMA pattern. Fly the pattern through the horizontal square eights, then fly level, counting laps until the engine quits. If it flies at least 20 more laps, you had plenty of fuel to finish the pattern.

You are on your own. Have fun! →

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