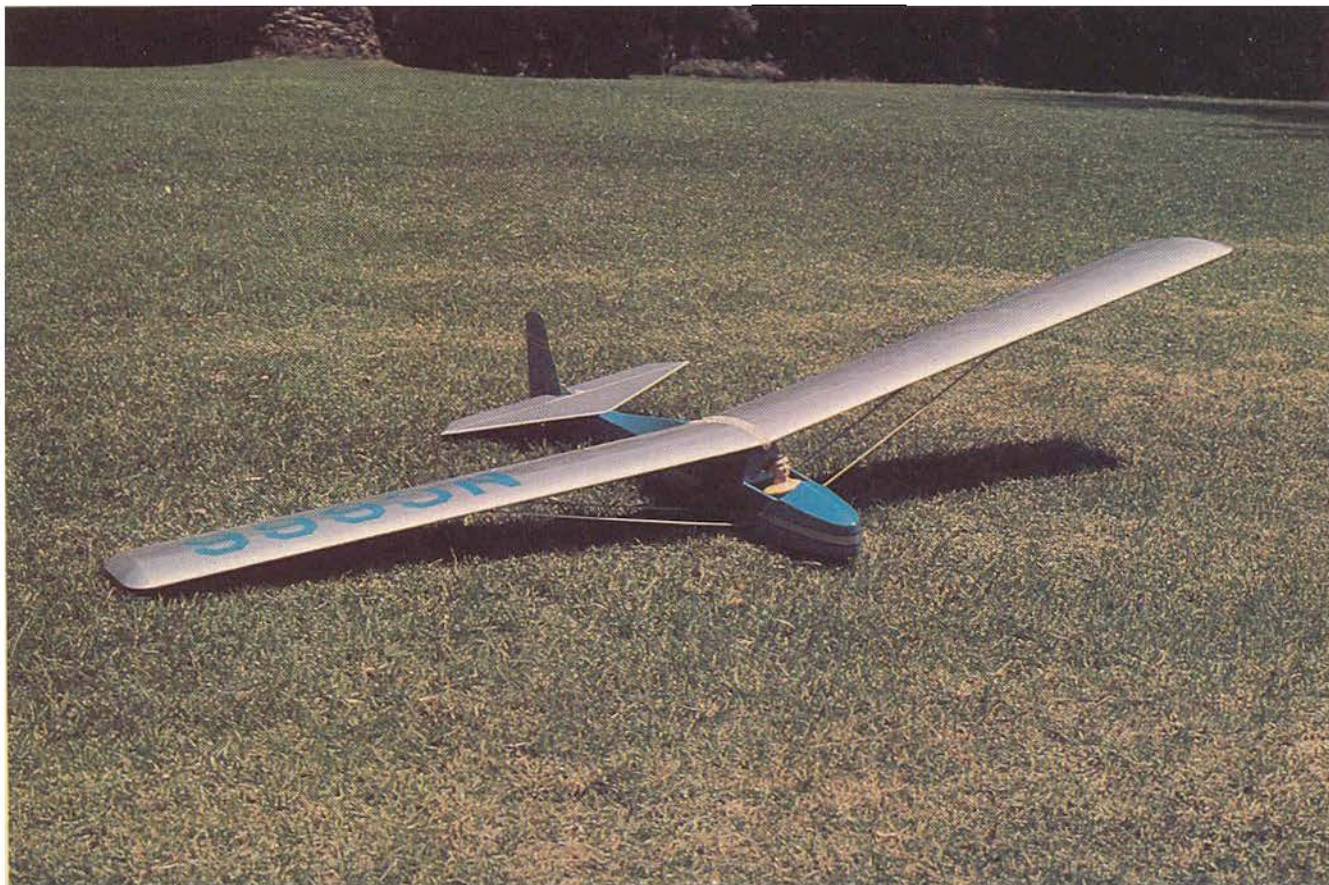


CADET UT-1

By Lee Renaud

With the interest in Stand-Off Scale sailplanes growing by leaps and bounds, the Cadet UT-1 is a natural for competition or general sport flying.



This two-channel sailplane is a Stand-Off Scale model suitable for general sport flying or a quickly built competitive ship. With interest in Stand-Off Scale sailplanes increasing, this simple design will let you fly another event with a minimum investment in time and materials. The nostalgic design also provides a welcome change from the sterile appearance of the modern fiberglass sailplanes. Despite the small size and simple construction, the Cadet tows very well on hi-start or winch, and will turn in outstanding thermal flights. Control response is excellent and the overall performance is similar to most non-scale designs of this size. If you are looking for a fun ship with a different look, clean off your workbench and order the full-size plans. A visit to your local hobby shop will provide all the materials without straining the budget.

The Cadet was an off-shoot of the

glider training program established by the U.S. Armed Services during World War II. The design is an American version of the famous British Kirby Cadet, used extensively in England before and during World War II.

The Cadet UT-1 was first flown in May 1943, at Meriden, Connecticut, and was built in Brooklyn, New York. The design of the Kirby was modified to suit American requirements, both structurally and aerodynamically, but overall performance was quite similar. Maximum glide angle was 14.7:1 at 31 mph, and the stall speed was 25 mph. Sinking speed was around four f.p.s. at the 30 mph speed. Red line air speed was 65 mph, certainly not a high performance ship by today's standards.

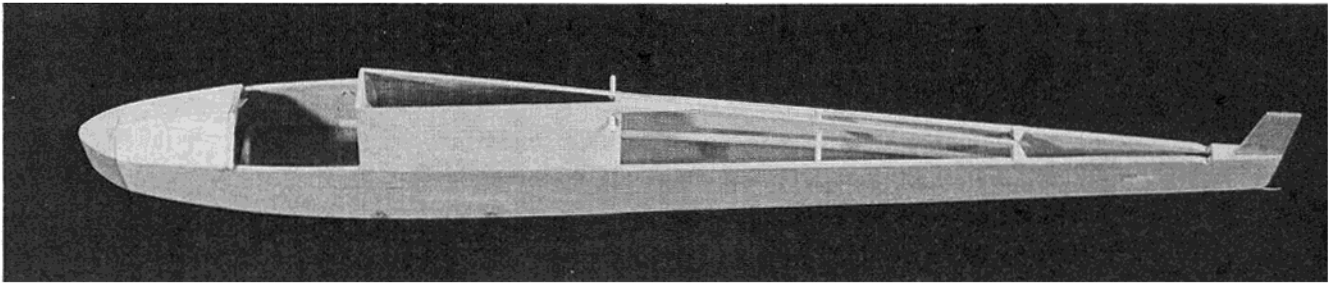
Construction was all wood except for the struts, fittings and control systems. With an empty weight of 276 pounds, and a maximum gross of 450 pounds, the wing loading was only 2.6 pounds

per square foot. The Cadet completed a test program of nearly 200 flights, and an Airworthiness Certificate was granted in November 1948. A company was formed to manufacture kits of the Cadet, but the venture became a casualty of V-J day, along with many similar enterprises.

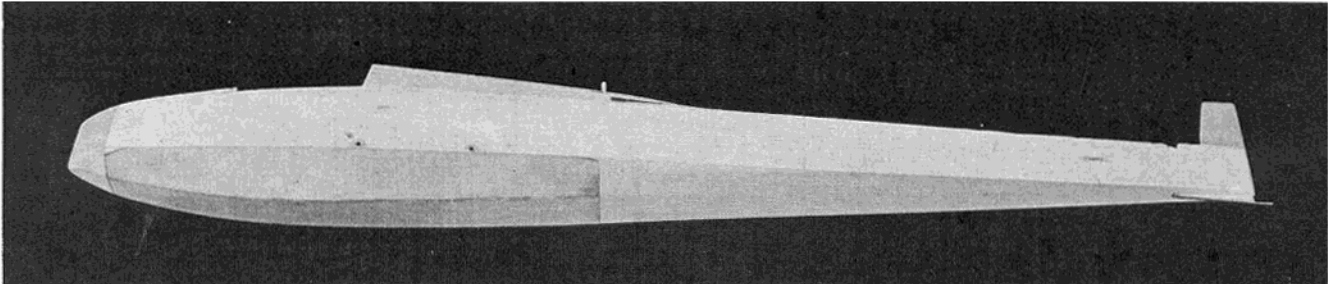
Horizontal Tail Assembly:

Notch the elevator leading edge for the 1/8" x 1/4" spruce elevator tie. Epoxy the tie in place and pin the elevator in place over the plan. Cut the stabilizer outline from 3/16" x 1/4" strip and pin in place over the plan. Be sure the joints fit tightly for maximum strength. Install the trailing edge reinforcement and 3/16" sheet center rib, then cut the rest of the ribs from 3/32" x 1/4 strip and glue in place. Let the completed stabilizer dry thoroughly before removing from your work surface.

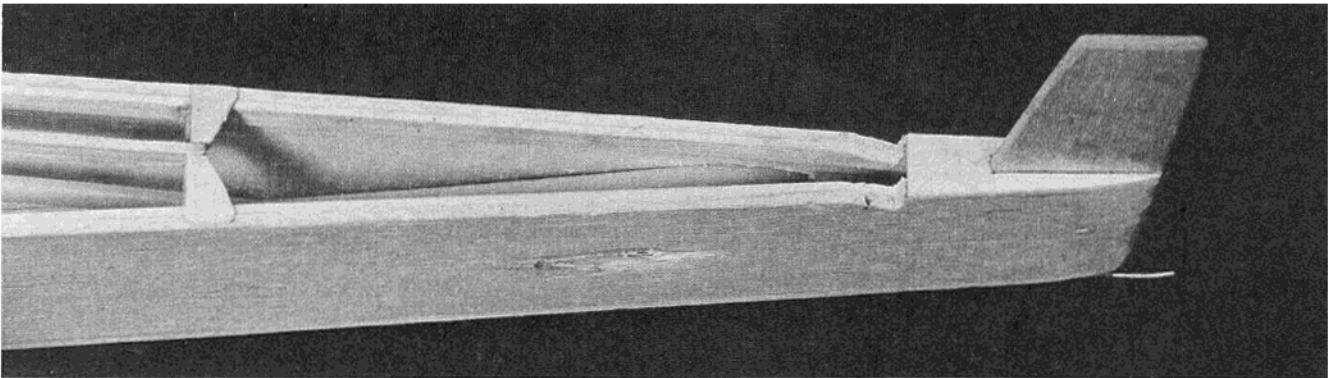
Mark the hinge locations and install the hinges temporarily to check align-



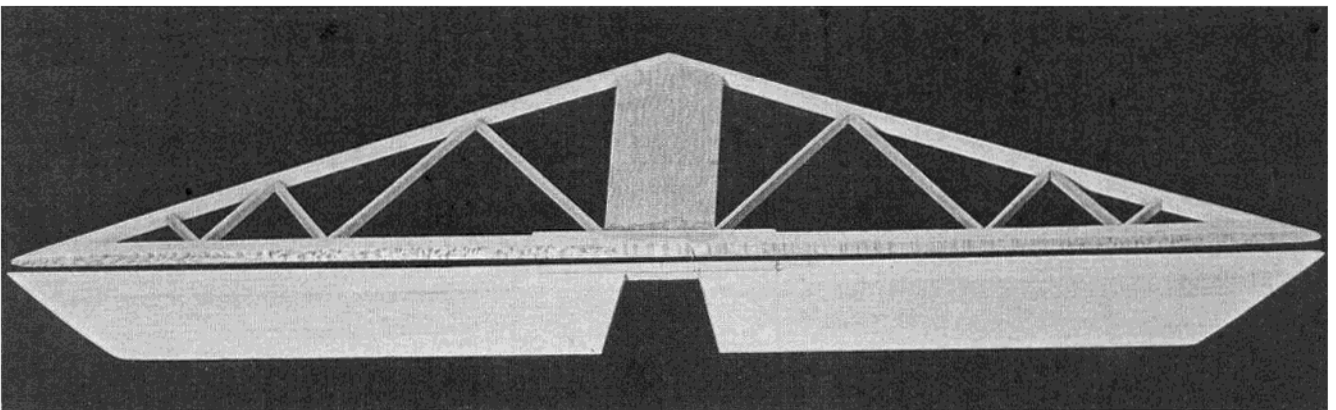
Top view of Cadet basic fuselage construction.



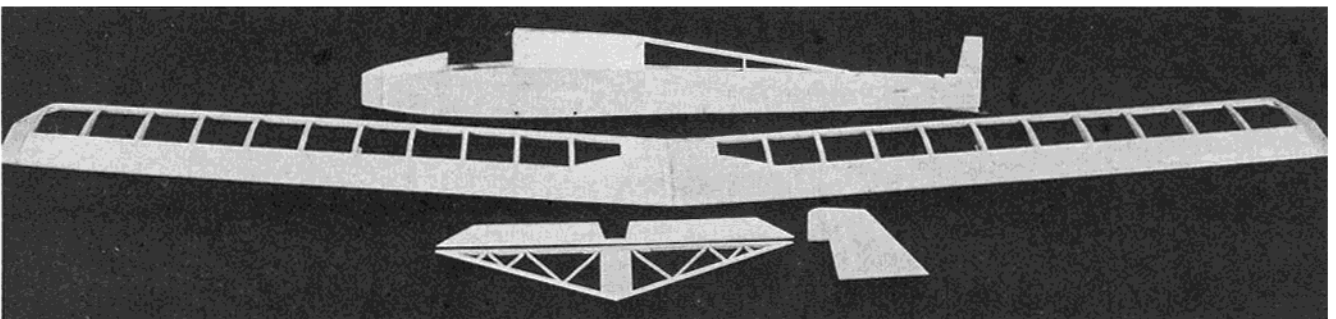
Side and bottom view showing forward planking.



Aft end of fuselage showing vertical fin and pushrod exits.



Fast building stabilizer and elevators.



The completed framework ready for covering.

ment. Remove the elevator and bevel the leading edge to permit free movement, then cut out the section behind the spruce tie. Reassemble to check that the movement is smooth without any binding. Mark the location for the horn mounting screws and drill the 3/32" diameter holes. The horizontal tail is now ready for sanding and covering.

Fin And Rudder Assembly:

Glue the rudder parts together over the plan and install the 1/8" x 1/4" anti-warp strip. Mark the hinge positions on the fin and rudder and install hinges temporarily. Remove the rudder and bevel the leading edge section that contacts the fin trailing edge. Drill the horn mounting holes, check the hinge action, and the fin and rudder are ready to sand.

Wing Assembly:

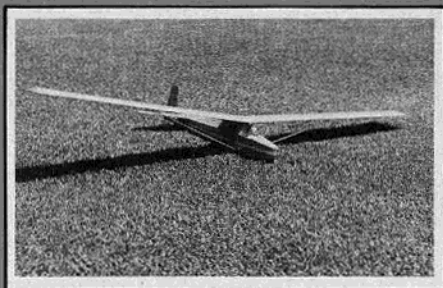
Pin the trailing edge in place and use two or three ribs as spacers to locate the leading edge before pinning in place. Lay the bottom spar in place and glue the ribs in position, using the shear webs to locate the ribs. Cut and install the 1/16" bottom center section sheet, making certain that it is pressed tightly against the work surface. Install the top spar, checking that the top edge is flush with the top of the ribs. Now you can install the spar shear webs. Be sure that the webs do not extend above the top spar.

Install the leading edge sheet, checking carefully that it is tight against the top of the leading edge and spar. Then, add the top center section sheet and the cap strips. Cut the tip gussets and install. Now build the second panel in the same manner. Let both panels dry completely before proceeding to the next step.

Remove any excess stock protruding beyond the tip rib and install the tip blocks. Note that the flat side of the block is on the bottom surface of the wing. Carve the blocks to final shape after the glue is dry. Shape the leading edge and sheet to the cross section shown on the plans, using a small plane. Be sure that both panels are identical. Now sand the wing panels all over, using a rigid sanding block. Cut and install the covering supports for the strut, attach points and sand flush with the rib surfaces. Don't install the strut fittings yet.

Prop up one of the wing panels so that the tip rib is raised 3 3/8" above the work surface. Block sand the end of the panel, hand-launch glider style, to get the proper angle of the center joint. Repeat this step with the second panel and check the fit of the center joint. With one panel flat on the work surface and the tip rib of the second panel raised 6 3/4", the center joint should fit tightly. When satisfied with the fit, join the panels with 5-Minute epoxy. Don't move the wing until the epoxy is thoroughly cured, and use pins or weights to hold the panels securely.

Sand off any excess epoxy around the center joint. Install the .070" x 3 1/2" music wire trailing edge reinforcement



CADET UT-1

Designed By: Lee Renaud

TYPE AIRCRAFT

Stand-Off Scale Glider

WINGSPAN

62 Inches

WING CHORD

6 5/8 Inches

TOTAL WING AREA

409 Square Inches

WING LOCATION

High Wing

AIRFOIL

Eppler E-385 (F.B.)

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

3 3/8 Inches

O.A. FUSELAGE LENGTH

34 1/2 Inches

RADIO COMPARTMENT AREA

(L) 9 3/8" X (W) 2 3/8" X (H) 2 1/2"

STABILIZER SPAN

16 Inches

STABILIZER CHORD (incl. elev.)

4-3/16" (Avg.)

STABILIZER AREA

59 Square Inches

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

5 Inches

VERTICAL FIN WIDTH (incl. rudder)

4" (Avg.)

REC. ENGINE SIZE

NA

FUEL TANK SIZE

NA

LANDING GEAR

Skid

REC. NO. OF CHANNELS

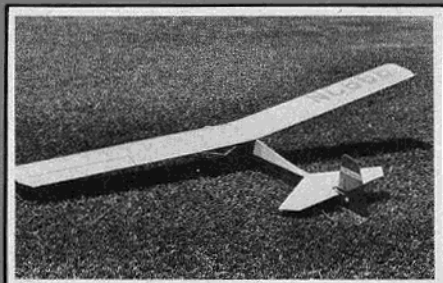
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CONTROL FUNCTIONS

Rudder & Elevator

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Ply & Spruce
Wing	Balsa & Spruce
Empennage	Balsa & Spruce
Weight Ready-To-Fly	17 — 20 Oz.
Wing Loading	6.5 Oz/Sq. Ft.



with 5-minute epoxy. Wrap the joint with 3/4" wide nylon tape using Duco or similar cement to secure the tape. Rub in several coats of glue for added strength and to fill the weave of the tape. Cut a slit through the covering support, and epoxy the strut attach fittings against the side of the rib, with the round section of the Klett hinges just touching the covering supports. Your wing is now ready for final sanding and covering.

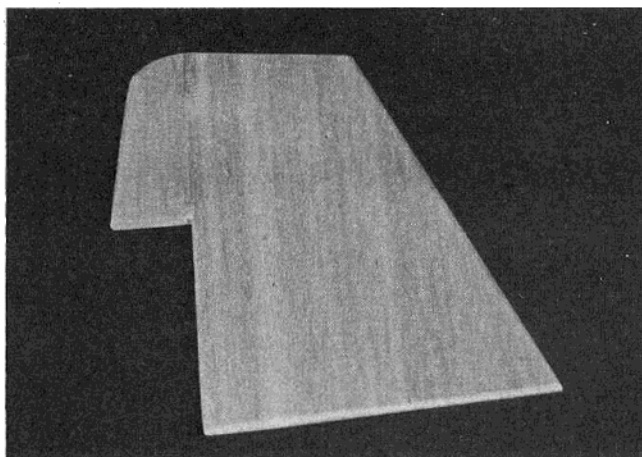
Fuselage Assembly:

Glue the 1/16" x 1/4" spruce stringer and verticals in place on the fuselage sides. Be careful to make a right and left hand side. Install the nose doublers and mark the side assemblies for the former and crosspiece locations. Tack glue a scrap of 1/8" x 1/4" strip into place at the aft end of the sides to act as a temporary tailpost. Glue former F-4 in place, and cut and install the aft 1/8" x 1/4" crosspieces. Add former F-5 and the top stringer and gusset, then install the 3/32" sheet aft bottom. Note that the forward portion of the bottom is slit to allow it to conform to the vee shape of F-4.

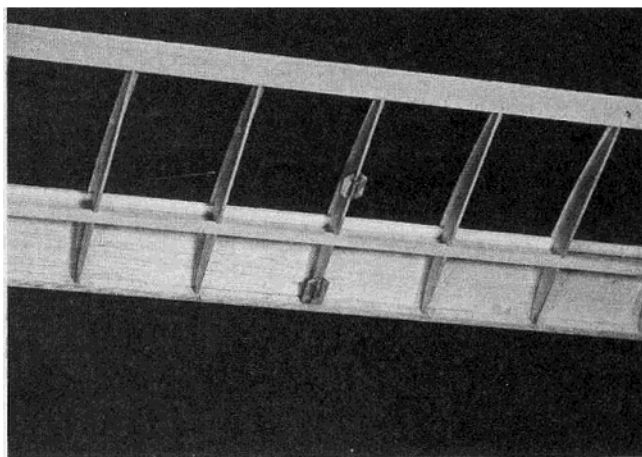
Install formers F-3, F-2A, F-2B, and F-1, working from F-4 forward toward the nose. Use masking tape to hold the sides tightly against the formers and check alignment carefully over the top view on the plans. Be sure that both sides curve evenly and that the fuselage is not twisted. Let this assembly dry thoroughly before continuing assembly. While you are waiting, assemble the wing mounts and glue the 1/16" plywood tow hook mount to the ply forward bottom, and install the blind nut.

Check the operation of your radio system and notch the fuselage sides for the pushrod outer tubing. Install the outer tubes, epoxying securely to the sides as well as F-3 and F-4. Install the 3/32" sheet receiver compartment floor and back. Epoxy the servo rails in place and temporarily mount the servos to check pushrod action. It's a lot easier to correct any problems now before finishing the assembly of the fuselage. Be sure that you can easily install the receiver and battery pack with the servos in place.

Install the 1/8" ply wing hold-down plates F-6 and F-7, using 1/4" triangle stock reinforcements. Next install the wing mounts on each side of the fuselage, trimming the spruce cap flush with the top stringer. Add the 1/4" sheet fillers at the stab leading edge, trimming so that the stab fits flush behind the fillers. Notch the top edge of the sides so that the elevator tie clears in full down elevator. Install the 3/32" top nose sheet, beveling the edges for a good fit at the center and against the sides. Use a sanding block to bevel the lower edge of the sides to match the vee shape of the formers and install the 1/16" plywood forward bottom. Glue one side in place with 5-Minute epoxy and let dry. Check fit the second side and correct any prob-



The rudder is of simple two-piece sheet balsa construction.



View of underside of wing showing strut anchor locations.

lems before installation. Trim any excess flush with F-1 and glue the noseblock in place. Drill $3/16$ " diameter holes in the sides and install the tubes across the fuselage for the strut retaining bands. This completes the basic fuselage assembly.

This is a good time to lay out and drill $3/32$ " diameter holes on the wing center line for the mounting bolts, then to temporarily strap the wing on the fuselage. Drill through the wing hole into F-7, checking carefully that the wing is centered on the fuselage. Remove the wing and enlarge the aft hole to $5/32$ " dia. and tap a #6-32 thread in F-7. Install the

wing using a #6-32 x $3/4$ " long nylon screw in aft hole only. Use a thread or stick to trammel the wing so it is perpendicular to the fuse., then drill thru into F-6 when you are sure that the wing is properly aligned. Enlarge the hole thru the wing and tap the hole in F-6. Remount wing and check alignment carefully. Correct any problems before continuing.

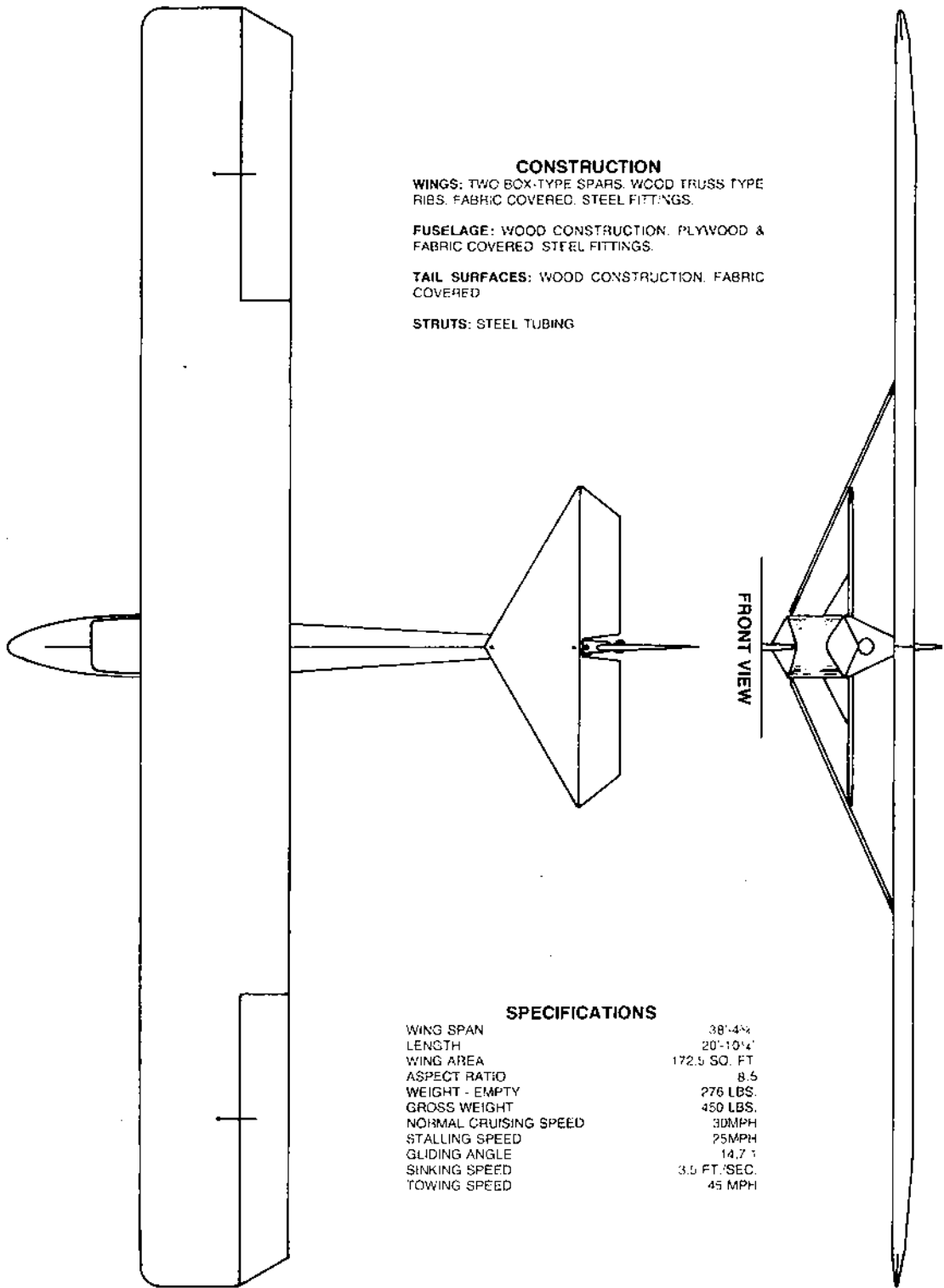
Cut the spruce struts to length and bend the end fittings from #17 common pins. Install the wing attachment fittings and hook the struts onto the attachments in the wing. Check that the strut ends clear the fuselage sides by $1/16$ ", trimming the length, if necessary. Bend

the fuselage attachment fittings and glue to the struts. Wrap the strut fittings with nylon tape or thread to reinforce the ends of the struts. Remove the struts and the wing.

Carve the noseblock to shape and block sand the entire fuselage. When you are satisfied that all contours are final, remove the temporary tailpost and glue the fin in place between the sides, checking alignment carefully. Add the $1/16$ " sheet cap to fill the space around the fin. Trim the excess sheet and sand flush with the sides. You are now ready to final sand and cover your Cadet.



TOP VIEW



CONSTRUCTION

WINGS: TWO BOX-TYPE SPARS, WOOD TRUSS TYPE RIBS, FABRIC COVERED, STEEL FITTINGS.

FUSELAGE: WOOD CONSTRUCTION, PLYWOOD & FABRIC COVERED, STEEL FITTINGS.

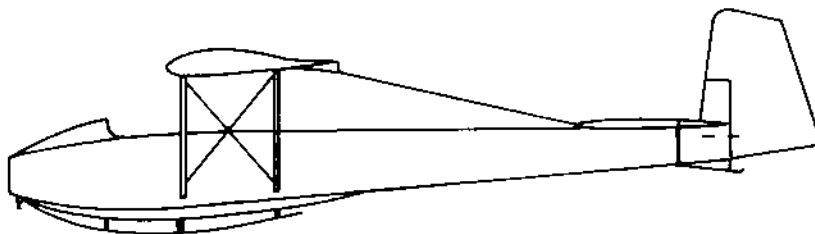
TAIL SURFACES: WOOD CONSTRUCTION, FABRIC COVERED

STRUTS: STEEL TUBING

FRONT VIEW

SPECIFICATIONS

WING SPAN	38'-4"
LENGTH	20'-10 1/2"
WING AREA	172.5 SQ. FT.
ASPECT RATIO	8.5
WEIGHT - EMPTY	276 LBS.
GROSS WEIGHT	450 LBS.
NORMAL CRUISING SPEED	30MPH
STALLING SPEED	25MPH
GLIDING ANGLE	14.7 °
SINKING SPEED	3.5 FT./SEC.
TOWING SPEED	45 MPH



SIDE VIEW

CADET UT-1 GLIDER

Sanding:

Sanding is intended to smooth the surfaces of the wood so that the finished model will look better. Any defect will not be hidden by the final finish, but will show up more visibly. The care and patience spent now will reward you with pride when you show your model to your friends and provide you with the self-satisfaction of doing an outstanding job. The difference between a good looking or poor model is usually sandpaper and there are no substitutes. One hour with a sanding block now will provide satisfaction for the life of the model.

We suggest that the following tools and materials will make this work easier and provide better results: A small block plane such as Sears No. 37057 is great for shaping the leading edges and hardwood parts; in addition, a razor plane is excellent for shaping balsa; several different sanding blocks, covered with different grades of paper, will give true flat surfaces, emery boards are also helpful for tight corners or stubborn spots.

Use the better grades of sandpaper such as Aluminum Oxide or Silicon Carbide open coat. Garnet paper is also satisfactory, but the more common grades of flint paper wear out so quickly that their low cost is offset by the inconvenience and wasted time. Check the shelves of your local hardware store or automotive supply outlet if you can't find these materials elsewhere. We recommend that you use #120 for rough sanding, switching to #220 then to #320 or #400 for final sanding. One sheet of each grade is more than enough to complete this model. Use long strokes and blend the surfaces smoothly. A little water or saliva on dents may raise the wood fibers enough to eliminate the need for filler in most cases. Bad dents or cracks should be filled and sanded smooth.

Re-sand all surfaces with worn #320 or #400 paper by hand and you are ready to cover and finish your model.

Covering And Finishing:

Every modeler usually develops his favorite methods of covering and finishing models. Many times, however, a great deal of weight is added to the model trying to get a super finish. This is bad for any model. For a small airplane, disastrous! Whichever method you choose, keep it light!

We strongly recommend that the entire model be covered in Super MonoKote or Solarfilm. We know of no other way to get a slick, good looking surface with minimum weight build-up. You can use silkspan and dope if you prefer, but be careful to avoid warps.

The wing is covered in four separate pieces, and the stabilizer with two pieces. Follow the instructions provided by the supplier if you use Super MonoKote or similar material. Be careful when

shrinking the material to avoid warping or distorting the structure. Be sure to adhere the covering to the ribs on both the top and bottom surfaces for greater strength.

We suggest that you cover the vertical and horizontal tail surfaces separately, and then remove the material locally to assemble. We also find it easier to cover the tail surfaces before installing the hinges.

IMPORTANT NOTE:

For better turn response and stability both wing panels must be washed-out slightly at the tips. This is easily accomplished by twisting the wing so that the trailing edge is higher than the leading edge and using your iron to re-shrink the MonoKote or by holding the panel in your hands and passing the tip through steam if tissue and dope covering was used. The proper amount of wash-out is shown on the plans and be sure that both tips are the same.

Final Assembly:

Make up the tail skid assembly, remove the covering where it mounts on the fuselage and epoxy the skid in place. Laminate the main skid from two pieces of 1/16" x 1/4" spruce, tapering the nose section as shown on the plans. Remove the covering under the nose of the fuselage where the skid mounts and make up the foam tape shock mounts and stick these on the skid. Glue the skid and mounts in place with Hot Stuff or similar glue. A couple of coats of polyurethane varnish or clear epoxy will add durability.

Remove the covering from the lower surface of the stabilizer and epoxy the stab to the fuselage, checking alignment carefully. Install the elevator and rudder, checking that the surfaces move freely without binding. Mount the control horns and make up the pushrods and install the servos. Check the radio operation to be certain that both surfaces move in the correct direction. Mount the wing on the fuselage and check the balance point. Add weight to the nose until the complete model balances on the wing spar. Install the struts using a small rubber band through the tubes in the fuselage to secure the inboard ends. Make a hook from a small paper clip or music wire to help pull the bands through the tubes.

For extra realism, make a cockpit floor from 1/8" sheet balsa that fits between the fuselage stringers. Use small triangular pieces glued to the fuselage sides to support the floor. A Williams Brothers 1 1/2" scale sport pilot is the right size and worth the effort to paint and install. Add a simple instrument panel, outline the ailerons with striping tape, and you have finished the scale detailing.

Flying:

The Cadet can be easily launched with a standard or heavy duty hi-start, or can be winched if you pulse carefully. Balanced as shown, with the wash-out in the tips, and with neutral control surfaces, the model should thermal with

only minor trim adjustment. Turn response is very good and the Cadet will hold a tight thermal turn with ease. We hope that you enjoy flying your Cadet as much as we did our prototype. □

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