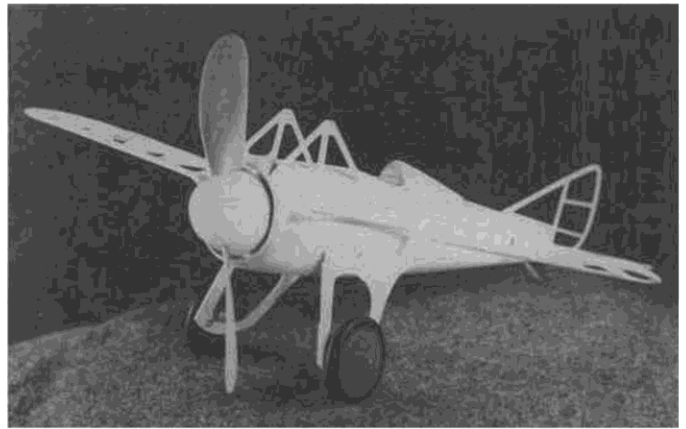


Pilot of Dep is a Peanut shell, marked in the style of Mr. Peanut. Streamlined for 1913!



It's a big spinner, but avoids necessity of making up dummy rotary engine.



1913 DEPERDUSSIN

By A. A. LIDBERG . . . Whether you happen to like this little sausage or not, there's still a valuable lesson to be learned on the technique of building with foam, so slow down and take a longer look.

- This model was designed and developed as an experiment in construction techniques. I wanted to see how foam handled and how well it could be used to duplicate the shape and appearance of a monocoque fuselage. Light flying models have traditionally used formers and stringers to duplicate this type of construction, but the resulting surface is far from smooth and detracts from the scale appearance.

Deperdussin seems to have originated monocoque construction, so one of their planes is an appropriate example. The fuselage on the full-scale racing plane was made up of 3 layers of tulip wood glued together on a form. When dry, the form was removed and the shell was covered on both sides with fabric which was glued on and varnished. The thickness of the finished shell was about an 1/8 inch. Conventional wood ribs and spars covered with fabric were used for the wing and tail. Flown by M. Prevost, this plane won the 1913 Gordon Bennet race at Rheims, France, averaging over 124 mph on the 124.3 mile course. The plane is a true pioneer, considering its vintage and its accomplishments. Due to legal and financial problems, Armand Deperdussin's firm went bankrupt. Under the guidance of Louis Bleriot, the revived company was known worldwide by its initials (SPAD), the designation of its WW I fighter plane.

Because this model project was an experiment, some lessons were learned, so I can share the failures as well as the successes with other modelers. I started by making up some test sections of foam to see how it reacted to various model

finishes and glues. I knew that conventional model cement and dope could not be applied directly to foam because of the dissolving effects. White glue was applied to smoothly sanded foam and appeared to provide a usable surface, but one that could stand more surface strength. Next, silkspan, applied with both white glue and Titebond, was tried. This seemed to be a good compromise between weight and strength. The best choice at this point was Titebond and one layer of silkspan, which produced a fairly strong skin. White glue acts about the same but cannot be sanded smooth.

I then made up a foam fuselage which was covered with about 6 pieces of silkspan (to conform to the cylindrical contour) applied with thinned Titebond. After the fuselage had dried overnight, I put on a thin coat of nitrate dope with micro-

balloons added to fill in the pores in the silkspan. During the next 20 minutes, wrinkles began appearing in the surface, and as another 20 minutes passed, the wrinkles grew larger until the whole fuselage looked like a prune! While nitrate dope ordinarily dries quickly, and especially so in the 10 or 15% humidity of the Arizona desert, the porous nature of the silkspan had allowed dope fumes to penetrate to the foam, and the foam "went away". This was quite a setback, and I moved on to some other model projects for a few weeks. My interest in the Deperdussin plane remained however, and eventually I came across an article by Hal Cover, describing foam models covered with 1/32 sheet balsa. That article provided the inspiration for this project, as balsa plus Titebond glue creates an effective barrier between foam and dope, while producing an



There's plenty of clearance for large props with scale gear legs and wheels.



Landing gear details. Wheels are BIG! Covering seam shows slightly on fuselage.

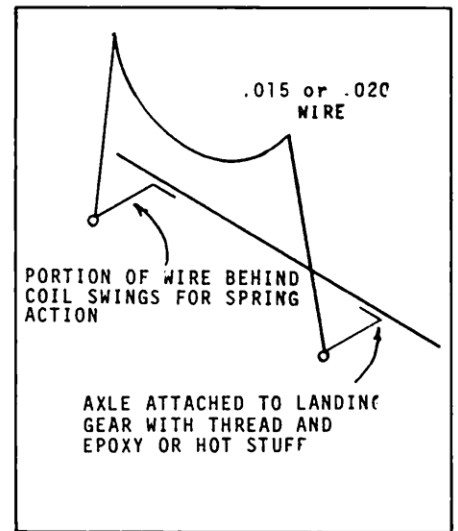
extremely strong model.

Throughout construction of this model, remember to keep it light. Although limited in wingspan by the Peanut scale rules, the fuselage is long in proportion to the wing. Thus, excess weight near the tail must be offset by more ballast weight at the nose, resulting in a heavier-than-desired model. Construction of the fuselage is the most interesting part of the model, so let's start there. Get some light insulating foam from a building supply store, or scraps of foam from an R/C flyer. You won't need much; 2 pieces measuring 1 x 2 x 10 inches will make the fuselage. Tack-glue the pieces lightly together to make a 2 x 2 x 10 inch block. Trace the side view of the fuselage onto one of the original 2-inch sides, so that the joint between the blocks becomes the vertical centerline of the fuselage. Leave a bit of extra material around the outline when cutting, which can be easily done with a hacksaw blade.

Now trace the top view on the block and cut it to shape. Cut the nose former and ring from 1/4 inch balsa. Cut the noseblock hole in the former, glue the ring to the former, and glue the former to only one of the foam blocks . . . so you will be able to split the blocks apart later for hollowing.

The body is circular in shape at the former, becomes more oval-like at the cockpit, and tapers back to a knife edge at the rear. Begin to shape the foam with a very sharp knife. Sand with No. 100, progressing to about No. 320 paper. Exercise some caution in carving and sanding, as the foam will tear or crush if you use too much pressure. Don't cut out the cockpit yet, as it would complicate the covering process.

Now, separate the foam blocks along the original seam, using a thin knife, in preparation for hollowing. I used a piece of copper electrical wire formed into a bulged "U" shape in place of the soldering tip in



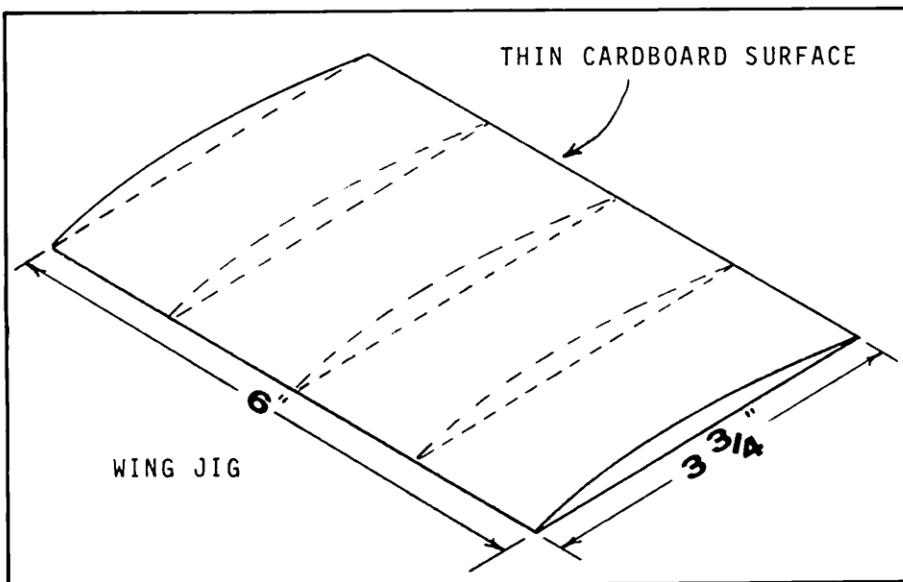
Isometric view of landing gear and axle.

a Weller solder gun. This gadget cuts foam at a controllable rate, because it can be switched on and off as needed to control the temperature. Try to hollow the foam to about 1/8 inch in thickness (less if you're brave, but you run the risk of cutting through to the outside surface), leaving a bit more near the landing gear and the nose former. Hollowing could also be done with a knife and sandpaper, if desired.

Rejoin the fuselage blocks with Titebond and it's time to cover the fuselage. Get some soft, easily bendable 1/32 x 3 sheet balsa and cut two 10 inch long pieces, which will become the fuselage shells. The shell pieces can be sanded quite a bit to lighten them. Leave them rectangular at the front of the fuselage but some material should be trimmed away at the rear to simplify the forming process. Soak one of the shell pieces in warm water for half an hour. Blot the excess water from the balsa and wrap the shell piece around one side of the fuselage, holding it on with masking tape or gauze. Pull the sheet rather tightly around the nose ring. Minor crushing or wrinkling of the balsa won't affect the finished body very much, as the shells will be trimmed and some filling and sanding is inevitable.

After letting the shell dry overnight, trim the top and bottom edges of the balsa so that they lie just at the foam block joint. Put that shell aside and form the other side in the same manner. When dry, trim the second shell to join up to the first shell, and when they are aligned, remove them both for gluing.

Using thinned Titebond, glue both shells to the foam and wrap the assembly with masking tape or gauze, making sure that the shells are joined smoothly. If the shells distorted slightly while they were



Construction of wing jig is described in text.

removed from the foam, some water sprayed on the outside of the balsa should help get things lined up. After another overnight drying, the fuselage is ready for sanding. Now cut out the cockpit, line it with balsa, and make and attach the headrest. M. Prevost did not use a windscreen on his plane, so we are saved from that little chore. Any necessary filling on the balsa shells can now be done with a thick, paste-like mixture of nitrate dope and micro-balloons or talcum powder. Remember that dope will attack foam, so protect any visible foam with a coating of Titebond. Spackling compound could also be used for filling.

Form the middle portion of the landing gear wire to the shape of the lower fuselage curve and then bend down the legs. Form the torsion loops around a nail or round-nosed pliers, and then bend the right-angled ends. Cut a shallow groove just through the balsa shell with a razor saw and attach the gear wire with Titebond or 5-minute epoxy. Attach a straight length of wire for the axle to the landing gear with thread and glue. Make the 2 landing gear fairings from 1/32 medium sheet, with the grain running vertically.

Start the wings by cutting out the jig ribs from 3/32 or 1/8 balsa and gluing them to a piece of thin cardboard (shirt cardboard from the laundry, or cardboard from the back of a tablet). Using the wing jig saves having to block up the trailing edge and each rib because of the undercamber. Put the wing plan over the jig, cover with Saran Wrap or waxed paper and you're ready to pin parts in place, through the jig, down to the building board. Laminate the wingtip on the jig against a cardboard or balsa form, so that it will have both the right shape and proper undercamber. Then, pin down the leading and trailing edges, tip, and the soft 1/8 inch root rib. Cut each rib to length at the leading edge. Add the leading edge bump and the small rib extensions. Glue in all the ribs, and when dry, remove all the pins and sand the wing carefully, while still on the jig, to finish shaping the ribs.

Now locate and cut the spar notches into the top edges of the ribs and glue in the two spars. Make paper tubes (roll up a piece of paper about 3/4 inch sq. on .032 wire, unroll, put on a thin coat of white glue, reroll, and then slide the tube off the wire before the glue dries) for the thread flying and landing wires. Before gluing in place, cut the tubes so they are flush with the upper and lower edges of the rib. For the left wing panel, make a tracing of the right wing and place it,



Foam hollowing gadget . . . copper wire loop heated by soldering gun.



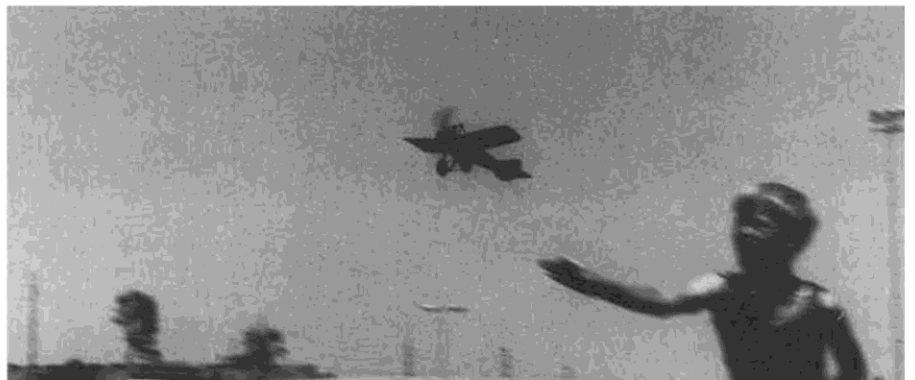
Winding with spinner cap pulled off. Small bits of Velcro hold spinner to back-plate.

upside down, on the jig. If necessary, a few drops of 3-in-1 oil on the drawing will make it nearly transparent.

Make the stabilizer and fin as light as possible . . . use 1/20 sq., if available. Lay out the stabilizer with the spar in one piece so that the halves will be joined. Laminate the fin edge over a balsa or cardboard form.

Covering the model should be done before assembly. The original plane was described as being chocolate brown in color, so I used some brown tissue from Bill Wilson, an

occasional **Model Builder** advertiser. Cover the fuselage with water-dampened tissue, adhered with thin nitrate dope. Each side of the fuselage can be covered with a single piece of tissue about 1-1/2 inches wide. The dampened tissue will form around the fuselage fairly well, except at the nose ring. A few small razor blade cuts in the tissue will allow some overlapping and a better fit here. The remainder of the fuselage can be covered with 6 or 7 smaller pieces. This particular tissue, when dampened, does not work too



Moment of truth. It do fly!

well for me when using thinned white glue for adhesive, because the extra moisture causes it to separate too easily. In contrast, using nitrate dope as the adhesive, the dampened tissue can be lifted and repositioned as needed. When completely covered, the fuselage should be given a thin coat of dope. Overlapped tissue areas which are noticeably darker than the single layer areas can be lightly sanded to thin them and lighten the color.

The wing panels can be covered dry, but damp tissue does a much better job at the tips. Be sure to adhere the tissue to each rib on the underside. The stabilizer, fin, and landing gear fairings can be covered dry.

Assembly begins with the installation of the landing gear fairings. Hot Stuff can be used to attach them so you won't have to push pins through a finished surface. Attach the landing gear wires to the fairings with 5-minute epoxy. Make up some long paper tubes for the landing gear fairings and glue them into notches. Make the 2 cabane struts from 1/32 hard sheet, and install them and the bamboo tail skid. Cut a 1/16 sq. notch at the rear of the fuselage and lightly glue the stabilizer spar into the notch. The forward portion of the stabilizer can be held in place with tape for initial glide and powered flight tests. The tape allows putting in a bit of positive or negative incidence without having to warp a thin surface.

Determine the wing location with the aid of some masking tape temporarily laid on the surface of the fuselage. Make small pinholes to mark the leading and trailing edge locations. Shape the wing roots by wrapping sandpaper around the fuselage and sliding the wing back and forth a few strokes in the area of the pinholes. When the shape is correct, attach each panel with Hot Stuff. The wing and tail surfaces should now be given one coat of thinned nitrate with about 10 drops of castor oil added per ounce to minimize warping.

A thin needle can be used to carry a single black thread through the paper tubes for each of the wires. Don't glue the thread to the wing tubes until you are satisfied with the flying characteristics. . . warps might have to be put in or taken out. Later, when the threads are glued in, add the fixtures at each wing/wire junction. The fixtures can be represented by brown paper measuring 1/8 inch wide at the bottom, 3/8 inch high, and tapered to 1/16 wide at the top.

Make up the noseblock as shown and move on to the spinner. The

spinner on my model was vacuum-formed, but due to the need for weight in the nose of this type of model, acceptable alternatives might be a carved balsa spinner or part of a plastic Easter egg. My spinner fits just over a balsa disk epoxied to the back of the prop. The spinner and disk are held together with some small scraps of Velcro fasteners (check the family sewing basket for this), so the spinner is easily removable for winding, yet stays on in flight. An alternate method would be to permanently attach the spinner to the prop, and wind the rubber with the prop/noseblock assembly removed.

The prop can be made from a 6 inch Guillows or Kaysun. If necessary, bush the prop hub with aluminum tubing to match the prop shaft, which will be .032 or .045 wire to fit the nylon bearing. Form a winding loop in the prop shaft and take advantage of the freewheeling catch built into the hub of most plastic props. For some more "working" nose weight, 1/32 plywood prop blades could be wet-formed and glued to a balsa spinner. Plywood blades would offer some latitude of choice for experimenting with blade area and pitch.

The wheels for this model must be light because they are very large in proportion to its overall size. Mine were made using an electric motor, fitted with a chuck, as a lathe. This can also be done successfully with a hand drill held in a vice or with an electric drill. Rough-cut 2 wheel blanks from 1/4 inch soft balsa, drill a 1/4 inch hole in the center of each blank, and epoxy a 2-inch piece of 1/4 inch dowel into each piece. One dowel/blank assembly at a time is put into the chuck, and a wheel can be shaped by hand or motor power. The wheel can be shaped using sandpaper alone, or if desired, a tool rest can be rigged and small knives or chisels used as turning tools, followed by sanding. Leave the wheel in the chuck and give it a couple of coats of sanding sealer; when dry, sand with very fine sandpaper while the wheel is turning. While rotating the wheel slowly by hand, brush on Floquil Roof Brown for the centers and Flat Black for the tires. With a little practice and properly thinned dope or enamel, you can brush on a clean edge for the tire without benefit of masking tape. Cut the wheel from its dowel mandrel with a razor saw while the wheel is turning slowly. Make a hole for the axle through the dowel center and touch-up the dowel cut with Roof Brown.

The racing number (F-1), engine cooling outlets, wheel center mark-

ings and tail surface hinge lines can be done in black tissue or flat black enamel. Hinge lines correspond to the fin and stabilizer spars. No ailerons or flaps were fitted to the wings, which were probably warped for banking. Artist's frisket material works nicely for masking when using enamel as it is so thin that it leaves a clean edge. The spinner, prop, and cabane struts on my model were painted with Floquil Roof Brown, using a Badger airbrush. Some plastics react to Floquil, so it would be best to check your plastic materials with a drop of the paint before proceeding too far. Floquil dealers have a very informative 1-page brochure, as well as a book (for about \$1.50) describing the paint and its uses.

Make up a motor from a 7 inch loop of 1/8 rubber. Heavier models might require wider rubber. Add clay as necessary to place the center-of-gravity at about 1/3 of the wing chord. Starting with the stabilizer at 0° incidence, try a few test glides. Adjust the stabilizer as needed. For the first power flights, try 50 to 75 hand-wound turns. My model required 1/16 of downthrust packing behind the top of the noseblock. A natural turn will probably be present, but unless it's too tight, side-thrust shouldn't be needed. When you are satisfied with the flight characteristics, glue the stabilizer and the wing threads in place. Work up to the turn capacity of the rubber, using rubber lube and a winder. Good luck, and have fun with your Deperdussin racer.

My primary scale reference was Volume I of "Racing Planes and Air Races", by Reed Kinert, which contains a 3-view and some excellent photos of the plane. A secondary source is the Nov. 22, 1913 issue of "Flight" magazine, which contains a 3-view showing a slightly different plane with longer wings and an extra set of wires going to about the middle of each wing panel. Study of both sources reveals that Prevost flew the short wing (20 foot span) version with the single set of wires, and that two other, earlier versions of the plane with longer wings (21 foot, 10 inch span) and doubled wires also competed in the 1913 Gordon Bennet race. These other planes were flown to third and fifth places.

A source of general information and pictures (but no 3-views) about the pre-WW I period is "Contact", by Henry Serrano Villard. ●