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BLONDIE

CHRIS SACKETT

Do you like high-performance models that are realistic and beautiful? The .21 Proto Speed event might just be what you're looking for.

Anyone should be able to fly .21 Proto Speed and be competitive. The speeds average around 125 mph, which is no problem to fly on 60-foot lines (and the models take off and land easily).

At the 1996 Nats at Muncie, the North American Speed Society (NASS) conducted an unofficial .21 Proto Speed event. Of the 20 entrants, 14 showed; all got flights, and the lineup of these beautiful models was something to behold.

Blondie is now in its third season of competition and is one of the most consistent models around. It has won four first-place trophies and is the holder of the NASS Northwest record at 125.74 mph.

The model uses many local hobby shop items; sources for special parts are included at the end of this article. Aside from the Darp speed pan, construction is balsa, with a little maple thrown in.

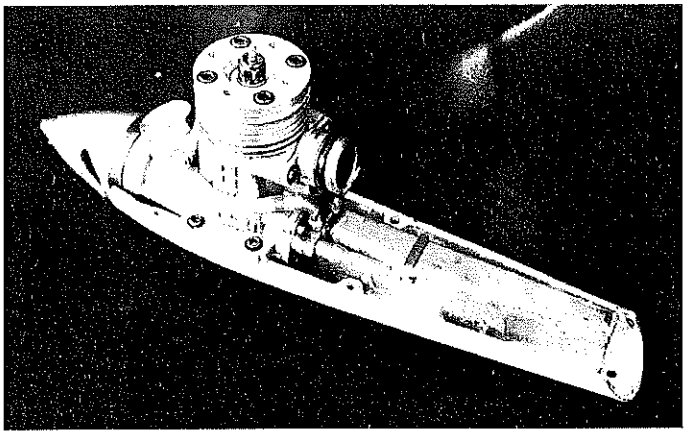
CONSTRUCTION

Wing: It is always best to start with the wing. Select two sheets of 3/16 x 4 x 36 light C-grain balsa for the back half, and two pieces of medium-hard 3/16 x 1 x 36 for the leading edge. The spar is from a blank of 1/2 x 3/8 x 16 maple, which will be installed later.

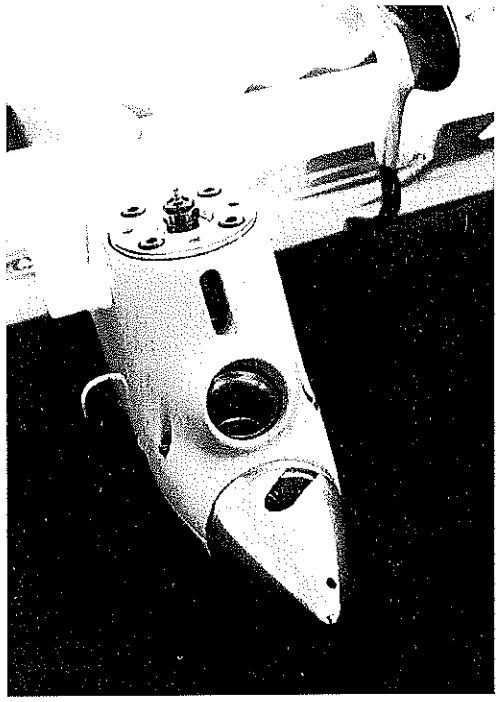
Using a good, flat surface (such as a sheet of l/2-inch plate glass), glue the leading edge blanks to the trailing edge blanks using a slow-drying cyanoacrylate (CyA) glue. Be sure to put weight on the blanks to attain a true and flat joint. Carefully lay out the wing shape; cut and trim to exact outline.

Rout the grooves for the 3/16 aluminum leadout guides. The guides use flattened brass tubing at the tips, pressed and glued into the aluminum tubing.

To help reinforce the leading and trailing edges, cut a strip



NovaRossi .21 engine and fuel system in Darp pan. Note location of remote needle valve assembly. Tank capacity 22cc.



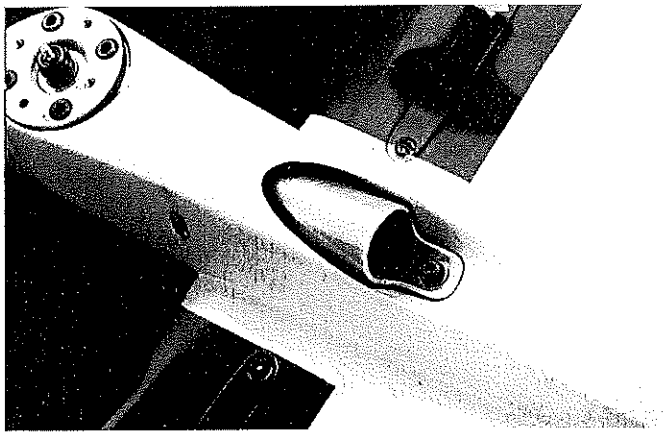
Front view shows cowl setup, ram air venturi duct, single cooling inlet for engine.

of 1/64 plywood 1/4 deep for the leading edge outline and a piece 1/2 deep for the trailing edge. This plywood insert not only strengthens the sharp edges of the wing but also gives you a nice reference line for carving the airfoil.

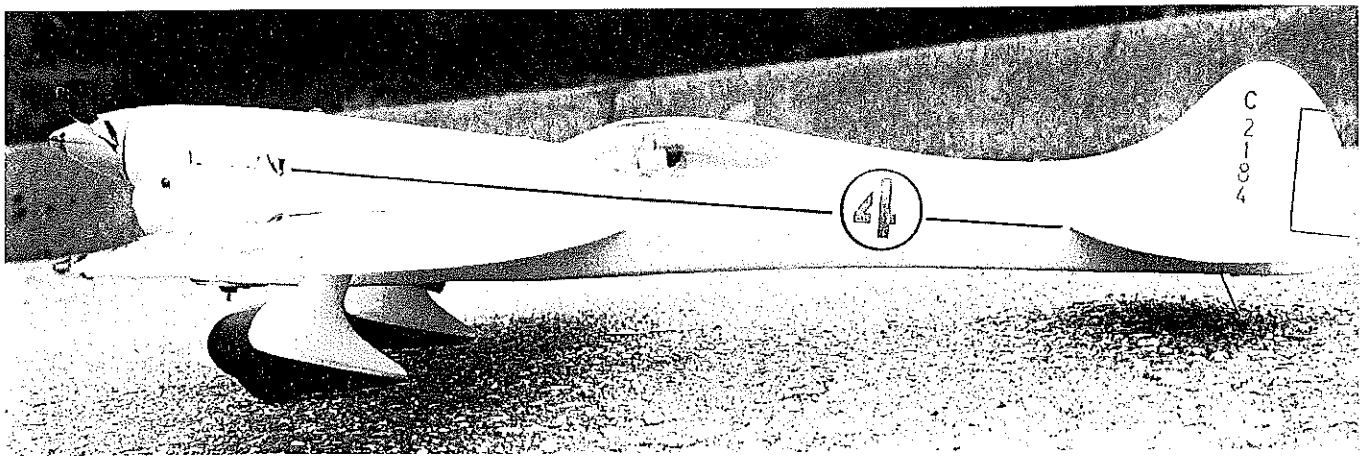
At this point we will bond the wing halves (with the leadout guides and tip weight and plwood inserts) in one operation. The assembly must be done on the aforementioned plate-glass base to ensure a warp-free wing, so take your time and check everything.

Place the bottom half of the wing on your base and glue in the guides and tip weight with slow-drying CyA. Place the 1/64 plywood reinforcement pieces in position with a slow-drying CyA and quickly glue and place the top half of the wing into position. Place a second piece of plate glass on top of the wing, and add weight to it. Use as much pressure as you can on the assembly to get a nice, true finished product.

Wait about 1/2 hour to be sure everything has set up,



Minipipe exit and retaining bolt. Length is 3¾ inches from glow plug. Pipe should have 1/4 clearance for cooling.



TYPE: CL .21 Proto Speed

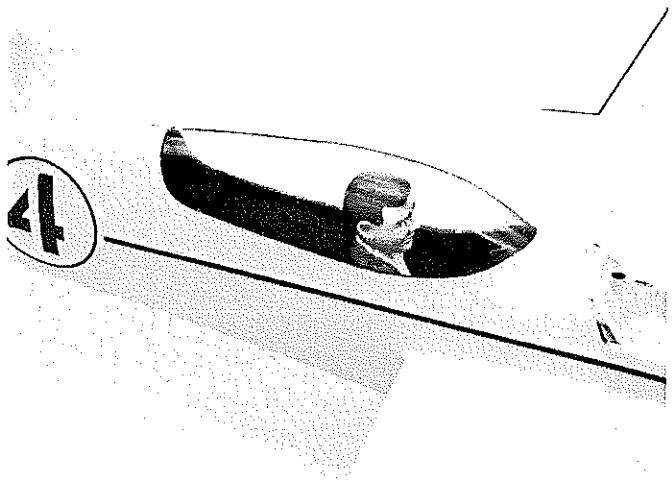
WINGSPAN: 32 inches

ENGINE: NovaRossi .21

FLYING WEIGHT: 23 ounces

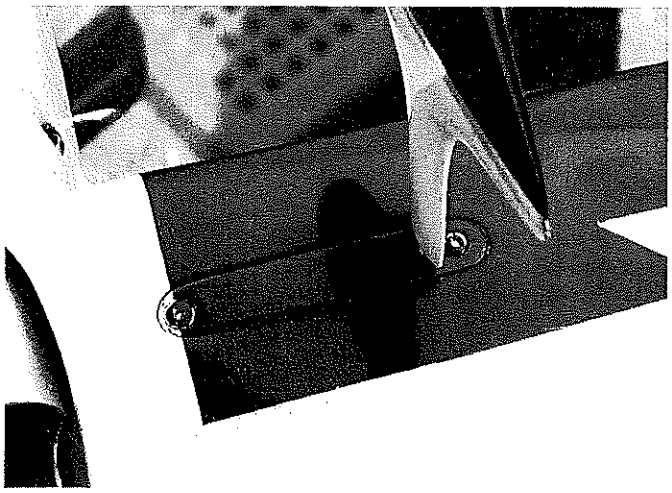
CONSTRUCTION: Balsa, plywood, and maple

FINISH: Epoxy

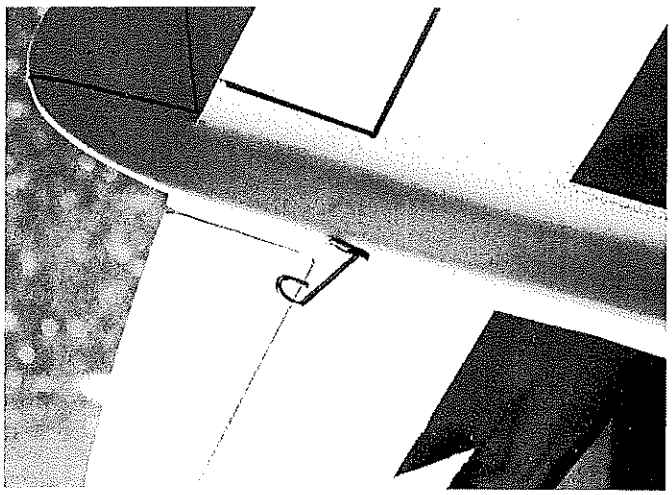


Fuselage is covered with ¾-ounce glass cloth. Pilot is one-inch Williams Bros. Canopy is rear portion of large Sig unit.

BLONDIE



Optional removable main gear has 1/16 aluminum retaining plate, held in place with two 4-40 flat head bolts.



The replaceable tailskid is made from .047 music wire sprung inside a 3/16 streamlined aluminum tube.

.21 Proto Speed

Control Line Proto Speed dates to 1955 when it was introduced for Class B engines. In the early years the event enjoyed tremendous popularity and was the biggest class in terms of Nats entries.

Proto was flown until 1979 when it was dropped as an official event because of lack of interest brought about by outrageously high speeds and loose rules that allowed modelers to push things to the limit—losing the spirit and intent of the event. The pioneers saw this class as sort of a Scale, Beauty, and Speed competition, but over the years the models became oversized Speed models, with tuned pipes, asymmetric wings, tiny canopies, and the most spartan of landing gear.

A couple of years ago, members of the North American Speed Society decided to bring back a Proto Speed class, but with rules that assured truly realistic and beautiful airplanes. The .21 engine was adopted because of its availability and ample power; .29s were in short supply.

The idea is to have a airplane of 125 square inches wing area, with a stab area 25% of the wing area (minimum) and 5% rudder. The canopy must be at least 3½ inches long and must house a one-inch-high scale pilot. The engine must be fully cowled, and the model must sport a two-wheel main landing gear with 1½-inch-diameter wheels. The model must be fully painted and snappy—a small bonus-point system is included in the score.

The model flies on two .016 lines 60 feet long and is timed for one mile (14 laps).

The fuel is the standard contest-supplied 10% nitro and the propeller must have two blades. Detailed rules are available from the North American Speed Society. ✈

Chris Sackett

and check out your work. The wing should feel quite solid and look very true.

Carve and sand the symmetrical airfoil as shown on the plans. You want to taper the wing as much as possible for a clean airplane.

The spar installation was left until now because of the difficulty of carving balsa and maple together. Cut the spar as shown on the drawing and recess the bellcrank area. Taper the spar as close as you can to the wing thickness and cut out the wing to accept the spar.

Because the bellcrank has permanently installed hookup buttons, it must be installed now. Place in position and drill for the ⅛ music wire pin; glue the spar cap with a strong epoxy and set aside. When dry, glue into the wing with epoxy and final-carve and sand to shape.

Sand the wing assembly to a final finish with #320 sandpaper and cover the wing with 1¼-ounce fiberglass cloth, using Z-Poxy from Pacer Technology—it's great for fiberglass cloth covering. Sand smooth when dry and apply another coat of Z-Poxy.

Stabilizer: Use two sheets of 3/32 light C-grain balsa cut to outline with the 1/64 plywood inserted between the sheets ¼ and ½ deep. Carve and sand the stab to a sharp symmetrical airfoil and cover with one-ounce fiberglass cloth. Cut out the elevator and install the elevator horn and outer axle.

The control horn is formed from .047 music wire as shown on the drawing. Solder a piece of brass for the pushrod bushing into the wire loop. Drill to accept the .047 pushrod. Wax the control horn and axle; cut out the pockets in the stab to accept. Mix up some epoxy and finely chopped fiberglass cloth to a puttylike consistency and lay the elevator assembly in place. Spread the glue mixture over the axles and cover completely. This should give you a perfect hinge assembly with no play.

Fuselage: Start out by using a Darp AP 21 magnesium Speed pan. This pan has been specially designed for the event and has a perfect shape and length for Blondie. Hog out the pan (see below) to accept your engine, and drill and tap for the 4-40 x ½ engine tie-down bolts. Locate the positions for the four pan tie-down bolts and tap these 4-40 also; use as much depth as the pan will allow for good, solid, long-lasting threads (¼-5/16 is the norm). Finish-shape the pan to match the spinner and thin as much as you like.

The pan can be lightened internally a great deal. Use a rotary tool to hog the pan out to around .120 thick from front to back of the engine and .090 thick from the rear of the engine to the back of the pan. A pan thinned like this should weigh 40-45 grams.

Make a crutch from two strips of ¼ square hardwood and a blank of medium-hard ⅜ x 2 balsa sheet. Draw the fuselage shape to match your pan and the drawing on the ⅜ sheet. Thin the ¼ square hardwood strips to ⅛ behind the rear of the pan so they will bend easily to form the fuselage contour. Taper and trim toward the rear.

Glue the hardwood strips to the ⅜ balsa using slow-drying CyA. Use small blocks of balsa between the strips to space and align correctly.

All of this must be done over a flat surface, such as the sheet of plate glass mentioned earlier. The wing and stab are built off the crutch, and 0° wing and stab alignment is important.

Mount the engine in the pan and place in position on the crutch. Use a hole saw to cut out the engine area in the bottom fuselage block. The bottom block is 1¾ x 1¾ x 20 medium balsa. Since the fuselage will be ' shaped and blended before assembly, lightly tack-glue the bottom block in place. The same holds true for the turtledeck and rudder.

Make the rudder as shown from 1/64 plywood with sides from 1/16 C-grain balsa. Remove the engine and rough-shape the fuselage to the shape on the drawing. The rudder can be inserted and blended in at this time.

Break the fuselage apart and hollow out the balsa blocks to around ⅛-3/16 wall thickness. Special care and thought must be given to the minipipe exit on the lower block. The pipe is angled downward to clear the wing just slightly; this will vary from engine to engine. Do not clear much wood internally around the lower cowl—only as much as is necessary.

Notch the crutch to accept the wing and the stab. Flip the crutch upside down and

epoxy the wing in place. Do this over your sheet of plate glass and align very carefully. When dry, flip the crutch over and install the stabilizer. Be sure to block the crutch off the glass and once again align carefully.

Install the .055 pushrod (with a guide on it, which will be glued to the bulkhead later).

For extended model life, it is a good idea to give the internal surfaces a couple of coats of thinned clear epoxy paint—especially around the bellcrank area of the wing and all through the back of the fuselage.

Attach the top and bottom fuselage blocks. The rear pan bulkhead is from 1/8 plywood and serves as an alignment key for the pan. Shape the bulkhead to match the back of the pan with no slop.

It is best to install the pan tie-down bolts as early in the construction as is possible. To locate tie-down bolt positions, use 4-0 x 1/4 setscrews installed in the pan, protruding about 1/32. Carefully lower the pan onto the crutch and squeeze them together to leave marks for the tiedown bolts. Mark carefully with a black pen and drill through. It is best to do this in a drill press to get good alignment.

These holes are actually drilled oversize to accept the 5/32 tie-down sleeves. The sleeves are 5/32 brass tubing with 4-40 washers soldered on top. This prevents the bolts from pulling through the wood and ensures a solid attachment.

Finish shaping the engine cowling area. Use a ram duct for the venturi and a single cooling duct for the engine, as shown on the drawing. The pipe should exit the bottom cowling with as shallow an angle as possible; however, it normally is around 8°. This may require a modification to the exhaust stub of the engine.

The pipe should have at least 1/4 clearance around the duct for adequate cooling. Retain the pipe with a single 4-40 x 1/2 bolt at the tip of the exhaust. Use a 4-40 threaded insert, secured with CyA, for this job. The finished fuselage is covered with 3/4-ounce glass cloth.

Cockpit/Canopy: Build a cockpit floor at the base of the crutch from 1/16 hard balsa (grain spanwise); install a balsa bulkhead for an instrument panel, and detail as you like. Select a one-inch Williams Bros. scale racing pilot, paint, and install with a pin and epoxy. You can add other details now if you like.

The canopy can be formed from the rear portions of a larger Sig unit. Check out your local hobby shop for this item, and use your imagination; I tried to find a canopy that would blend in nicely with the design.

Touch up and finish the cockpit interior and attach the canopy by recessing an area around 1/4 wide around the cockpit. The secret to a clean, hidden canopy line is to recess it 1/32 and seal it with 1 1/4-ounce fiberglass cloth. Mask off the finished canopy outline and blend to the fuselage with the help of some epoxy putty.

Landing Gear: The original model uses a removable system but the gear can be mounted permanently if you wish. The removable gear allows you to build and maintain it quite easily, but it does require a bit more work and has to be done with care.

Bend the 3/32 wire as shown on the drawing and install your favorite set of 1 1/2-inch racing wheels. The wheels made by Glenn Lee are well-made and fit this event perfectly.

Notch the spar to accept the gear and drill a vertical hole through the spar for the tang. Make up the gear retaining plates from 1/16 hard aluminum and drill and tap the spar for the 4-40 bolts.

To get a long-lasting thread in the wooden spar, run some thin CyA into the threads.

The landing gear must fit snugly into the groove cut for it or you will have a tough time keeping the gear solid after a number of hard landings. If in doubt, opt for the permanently mounted gear.

The wheel pants are made from two pieces of medium-hard 1/8 balsa glued to the 3/32 wire. The bottoms of the pants are two pieces of 3/16 medium-hard balsa. Once again, it is a good idea to seal the wheel cavity area with a couple of coats of clear epoxy, for long life. Blend and shape the pants to a nice streamlined shape, and cover with two-ounce fiberglass cloth and Z-Poxy.

Tank: The tank is constructed from .008 tin stock. Use 3/32 tubing for the pickup tube and

pressure line. The pickup tube is soldered to the outside of the tank with an .055 hole drilled through after the line is soldered in place. This helps to meter the fuel for a steady run.

Place the pressure tube as shown on the plan. The fill line is ⅛ tubing that is drilled for a 4-40 bolt as a cap. Filling the tank is acheived by the use of a 1/32 tube from the filler.

The tank is attached to the pan with clear silicone glue. Try to position the tank as close as possible to the wing.

To prevent flooding of the engine during startup, use a small ball check valve between the engine and the pressure line. Be sure the tank sits straight and true, especially from side to side, and be sure that the pickup is at the farthest point of the tank's position.

Finish: Because this event includes appearance points as part of the score, a good paint scheme and finish is important. Sand the entire model with 400-grit wet-or-dry paper and check for any nicks or dings. These should be filled with Model Magic filler.

Use a good epoxy paint finish, such as K&B Super Poxy. Spray on a coat of K&B primer and sand most of it off with 320 or 400 wet-or-dry paper.

Spray on your color coats; two light coats will usually do the job. Sand the color coats with 600 wet-or-dry, followed by 1000, 2000, and polish.

Finish up with any other trim lines, lettering, or decals. Spray with two coats of K&B clear epoxy paint and let harden for at least a month. Sand the finish with 600 and 1000 grit, followed by the 2000 grit and polish out with Brasso brass polish for a gorgeous finish. I think you will be suprised at just how good a finish can be obtained with epoxy paint. For an even deeper gloss, wax the model with a modern automotive wax designed for clearcoat finishes.

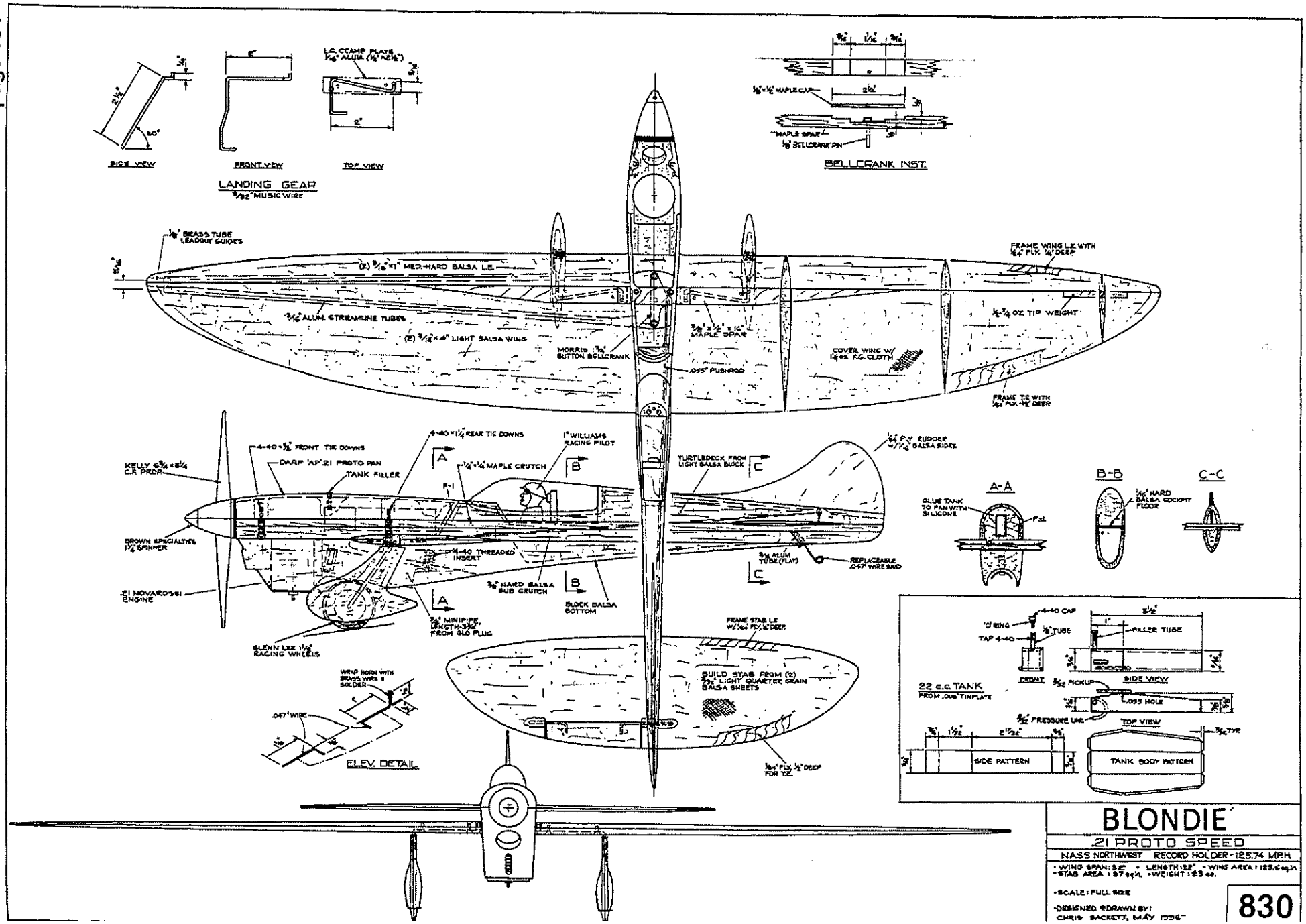
Engine and Propellers: Unlike Speed engines of years ago, most modern .21s do not require extensive rework. The basic .21s are very competitive right out of the box—especially the NovaRossi line. The only modification I did was to install a remote needle valve assembly for ease of operation. These parts are available from Glen Dye at Performance Model Parts (see list).

A propellor of around 6.75 x 5.2 is a place to start. Try some Pylon Racing props or obtain some from speciality makers such as Al Kelly, Mike Hazel, or those made by APC.

Flying: Make up the lines just over 60 feet in length from the centerline of the airplane to the centerline of the handle grip; .016 wire for this is available from Morris Speed Gear.

Fill the tank slowly through the filler—make sure it *is* full. Put a couple of drops of fuel into the venturi, turn the engine over by hand a couple of times, hook up the battery, and push the spinner into the starter. Once the needle valve is set, the engine should start instantly.

Full-Size Plans Available—see page 184



Have your pit man release the model fairly quickly. The tank is good for 16-17 laps—just enough for timing and not much more. Take off with the model in neutral or just a hint of up for fast, smooth takeoffs.

The model is a delight to fly—smooth, stable, and highly realistic! Land the model fairly "hot" while giving slight down control as soon as the wheels touch.

You will quickly find this class of CL Speed flying to be very satisfying, with no wear or tear on the model and virtually no maintenance to the engine; even changing the plug is hardly necessary for many, many flights on the standard 10%-nitro fuel.

For full rules on .21 Proto Speed, write or join the North American Speed Society at the address below. Rules are available for $2; full membership is $24 US and Canada, and $29 elsewhere. If you have any questions or comments on this event I will be glad to hear from you. ✈

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Specialty Equipment Suppliers

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Z Z Prop (Mike Hazel)
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