# Nieuport

*by MARTIN IRVINE*

The model presented here is based on Nexus 3-view drawings from England that are available in the U.S. from Bob Holman Plans Service*. Recently, an Albatross Publications* "DataFile" was published on the Nieuport 12, and I recommend it as the best source of scale information.

The model came about due to a couple things. First was the success and attractiveness of a 38-inch Speed 400 version I built several years ago. Second was the availability of the ModelAir Tech* 3.6:1 belt drive, which I powered with a DeWalt drill motor. The idea of building an IMAA-legal airplane and powering it with a $110 drive system was too good to resist!

The Nieuport 12 is scaled to use the widely available 5-inch Williams Bros.* vintage wheels. My original target weight was 7½ to 8 pounds, and test flights were made at 8 pounds. The dummy engine, pilot and gunner figures and machine gun added 12 ounces for a total of 8¾ pounds.

## CONSTRUCTION

• **Tail.** I suggest that you build the tail first. It is easy to build and gives you something to look at fairly quickly. I built the stab so it's detachable, but so far, I haven't had to remove it for transportation. The rudder has a laminated outline and a somewhat unusual but very functional hinge. It is detailed on the plan.

• **Wing.** The top wing uses the same airfoil as the Proctor Nieuport 11 and Antic. I like this airfoil because it works well and looks the part. A scale airfoil is heavily cambered but thin. The Antic airfoil has a similar top-surface curvature but is thicker. There is just enough undercamber to give the looks of a WW I model, and it isn't too difficult to cover.

The lower wing airfoil is a Clark Y. On the original, the lower wing was really only a streamlined spar to provide a bridge structure for the wing bracing. On this model, the two panels plug into the fuselage, and all the lifting forces that act on them go through the struts to the one-piece top wing.

*An unusual WW I two-seater for electric or glow*

# 12

## SPECIFICATIONS

**Model:** Nieuport 12

**Type:** WW I two-place biplane

**Wingspan (top/bottom):** 68/63 in.

**Length:** 54 in.

**Weight (ready to fly):** 8.75 lb.

**Wing area:** 1,250 sq. in.

**Wing loading:** 16.12 oz./sq. ft.

**Airfoil (top/bottom):** undercambered/Clark Y

**Radio req'd:** 4 channels (rudder, aileron, elevator, throttle)

**Power req'd:** 400 to 500W belt-drive electric motor or .60 to .80 4-stroke glow engine.

**Power used:** DeWalt drill motor with ModelAir Tech belt drive

**Comments:** designed by Martin Irvine, the Nieuport 12 is an attractive, unusual, two-place WW I biplane built of balsa, ply and spruce. Construction is light and strong; some laminated parts must be made. This model is not recommended for beginner builders or fliers.

Start by building the top wing main spars. They have balsa cores and 1/8x3/8-inch spruce tops and bottoms. Use a level table and a straightedge to make sure they remain straight while the glue dries. All the ribs are cut from the same basic pattern. Trim the center ribs to length, and cut the aileron ribs at the spar and at the aileron LE lines. Note that the ribs between the center section and the aileron have holes for the aileron torque tube. These are reinforced with 1/64-inch or 1/32-inch ply washers as shown on the drawing.

Shim the spars so that the ribs are 1/16 inch above the building board. They will rest on the 1/16x5/8-inch TE. The LE rests on the building board, allowing room for 1/16x1/4-inch capstrips to be added later. Add the top TE piece, the capstrips and the laminated tip. The tips are supported by balsa extensions at the spar locations and are built to give the illusion of a thin airfoil. I suggest that you build the ailerons at the same time as you build the wing panels. You can cut the tip and TE free later. Remember, though, that a fiberglass torque tube will be added before the wing panels are assembled. Don't jump ahead too quickly.

The center section requires extra care in assembly, as it will be stained and covered with clear MonoKote* or a similar covering, so your workmanship will be on display.

The center-section TE will have to wait until the wing is assembled, as the laminated part is used to connect the three panels. The aileron control quadrants can now be built. This is a scale item, as is the method of actuating the ailerons. I made mine from a 1/16-inch-thick fiberglass sheet core and added 1/16-inch ply on either side. I also added carbon-fiber tow between the laminations for insurance, but this was overkill. File and sand the quadrant to an oval cross-section, then check the fit with the torque rods. Also check the rod's fit through the rib holes and eliminate any binding. The two end holes are the critical ones; you don't want any slop here.

When fitting the quadrants, you have a choice: you can build the center section around them (the rear spar goes through the quadrants), or you can carefully break the outer rib, put the quadrant on the spar and replace the rib. Either way, you have to deal with them waggling around during the rest of construction. Sorry! I've marked three holes in the quadrant for the pushrods. The one farthest away from the spar is the scale position, but this gave far too little aileron throw. I had to move the pushrod in a lot.

Now join the wing panels. The dihedral braces are strips of 1/2-inch-wide 1/16-inch ply applied to the front spar and rear

PHOTOS BY MARTIN IRVINE

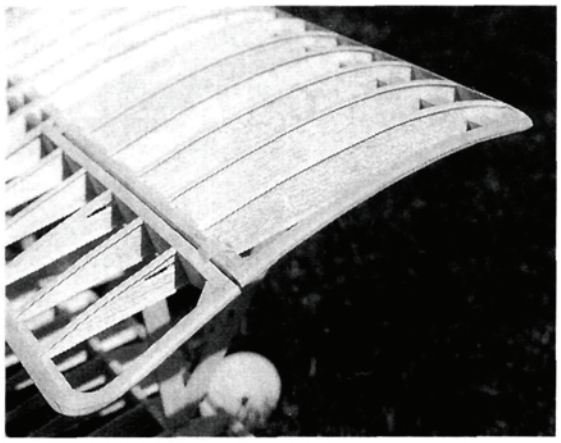
spars. Thin ply allows a bend to be put in so that the braces can be epoxied to the sides of the spar where they will be the strongest. Multiple layers make the joiner strong. The top wing has no dihedral, so glue things together on a flat surface and shimmed up to clear those pesky quadrants. (Actually, this will result in a slight dihedral angle because the chord-line angle is positive, but don't worry about it.) Add the laminated center-section TE and sand to shape. The lower surface capstrips can now be glued on. Use flexible capstrips to follow the rib curvature; the capstrips add a lot of strength.

At this point, you can add the strut mounting points—four cabane and four interplane. These are all made from 3/16-inch ply glued to a larger 1/16-inch ply plate. The 1/16-inch ply plate is glued to the bottom of the spar to brace the 3/16-inch ply, which is glued to the front of the spar.

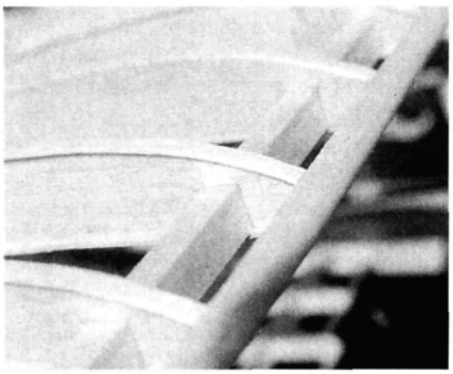
Cut the ailerons free, and fit them to the torque tubes. Sand the LE bevel and "dry-hinge" with Robart* Hinge Points. Note that the hinge line is 1/8 inch behind the LE. This puts the hinge line in the center of the torque rod for minimal binding.

The lower wing is very simple. The spar is in two parts, and there's an upper and lower section with 1/8-inch webbing similar to that on many sport designs. With the moderate camber of the upper surface, the covering is unlikely to droop enough between the ribs to contact the spar. The root is a little different though. On the full-size aircraft, the LE was cut back—for visibility, I think. The wing's major locater is a 1/4-inch brass tube that has a wire hook installed in its center. This tube is bound and glued to the spar. A rubber band is then stretched through the fuselage to hold the two bottom wing panels to the fuselage sides. The 1/16-inch wire pin shown on the plan acts as an incidence gauge.

• **Fuselage.** Lay out the main longerons and the forward "fill-in" sheeting—verticals and diagonals—for both sides. I have

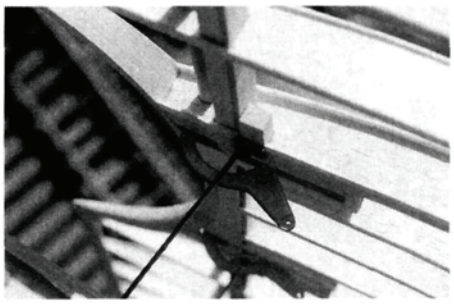


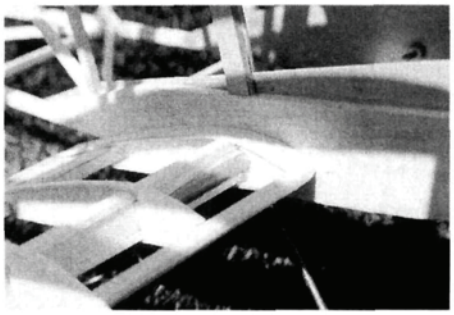
*A laminated wingtip. It has been rounded and the aileron has been cut free.*



*Top: the leading edge, showing the laminated spar—spruce top and bottom—and capstrips. Note how the lower capstrip ties the spar to the front and rear portions of the rib.*

*Bottom: the trailing edge, showing the two-piece TE sandwich, which gives a thin, scale-looking top but a stronger section.*





*Above: the underside of the wing center section. This shows the brass strut-mounting tab and bolt, the dihedral brace and the laminated, TE center-section. The aileron quadrant is attached to the torque tube.*

*Above left: the root section of the lower wing, showing the brass locater tube; just visible to the left is the rear locater-pin bracing. Note how the plywood doubler ties together the wing root, the rear cabane-strut vertical mount, the rear longerons and the rear landing-gear strut mounting.*

## FLIGHT PERFORMANCE

**• TAKEOFF AND LANDING**

Takeoff is quite straightforward. Point the model into the wind and advance the throttle. Get ready to catch any slight swing with the rudder, and after about 10 yards, the tail will come up. In another 10 yards, the Nieuport 12 will lift off.

Landings can be done as a wheel landing or the preferred three-point landing. A crosswind is a problem that will likely result in a ground loop, so keep the nose into the wind.

**• LOW-SPEED PERFORMANCE**

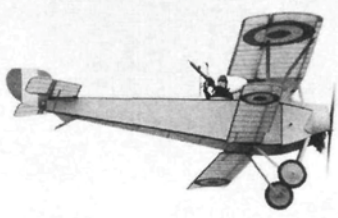
This is what this model is best at. Ailerons are quite ineffective at all speeds, but more so at low speeds. You have to use rudder all the time. If you have built the airframe straight, stalls are gentle and straight ahead.

**• GENERAL FLIGHT PERFORMANCE**

The aircraft can do all the typical WW I maneuvers, but you will have to add power for maneuvering. There isn't, however, a lot of extra power available because of the increased current drain.

Electrics guru Keith Shaw is much better at aerobatics and advanced flying with a plane such as this, and once, he flew my model in low-level figure-8s. Keith was able to reduce the throttle by one click for each flight circuit while still carefully maintaining altitude; the last click stopped the prop! (Astro 205 controller); so it is quite an efficient airframe at low speed.

Aerobatics are possible only in the broadest sense of the word! Touch-and-go's are the best, but lazy-8s and wing-overs look pretty, too. I once tried a loop at great altitude, but it flopped out before it got over the top, and that scared me enough not to try it again!



had good luck building the second side over the first with wax paper over each joint. Notch both sides for the cabane and undercarriage strut mounts, then sand with a large, flat sanding block that's big enough to take a full sheet of sandpaper.

Add the 1/32-inch ply landing gear and cabane doublers. The front two cabane struts plug into plywood cross-pieces, but the rear strut is mounted vertically in a plywood box channel (see section "A-A" on the plan). This is accomplished by notching the longerons 3/32 inch on the inside edge and slipping the rear strut into the plywood channel.

The fuselage is assembled upside-down. The temporary bulkhead is positioned at the rear landing-gear strut mount. The firewall is used to position the fronts of the fuselage sides, and then the rear ends of the fuselage pieces are simply drawn together and glued at the rudder post. When putting in the horizontal cross-pieces, cut them to length so they position the bottom longerons in a straight line that runs from the firewall to the tail post. The top longerons should be straight from the rear of the gunner's cockpit (former F3) to the tail post. This results in a trapezoidal cross-section. Add the plywood cabane and landing-gear strut mounts. These strengthen the fuselage assembly a lot. Leave the section under the battery area (firewall to landing gear) uncovered, as you will need room to mount the battery pack.

This is the best time to fit the cowl. There are several ways to make one. I used a female glass mold, but a quicker method is to carve one from foam about 1/16 inch undersize then cover it with packing tape and three layers of 6-ounce cloth and epoxy. If you do this on a drill press or use an electric hand drill, it will be smooth and true. Sand the cloth with coarse sandpaper until it is smooth, and smear on a slurry of epoxy and microballoons. Sand with fine paper and finish with wet-and-dry paper. You may need another coat of slurry to fill pinholes.

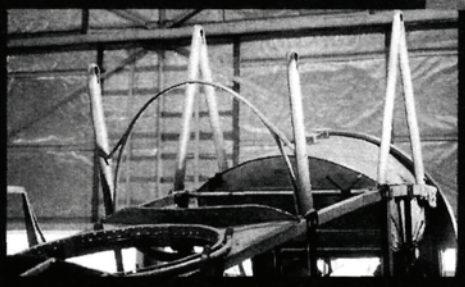
Once you have the cowl done, you can start on the forward fuselage. It is easier to make adjustments to the wooden parts than to try to deal with a mismatch when things have been completed. To ensure a straight stringer location, I cut the notches in the former as I install the stringers. They stand 1/16 inch away from the formers so that the fabric will touch only the stringers.

Bend the landing gear and cabane struts up using the pattern on the plan.

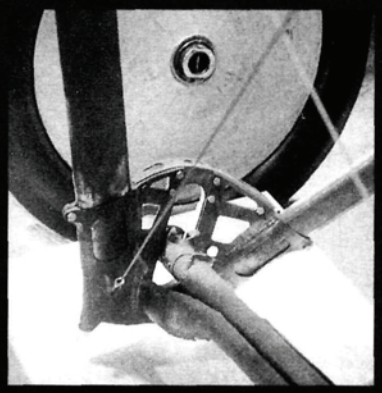
## THE FULL-SIZE NIEUPORT 12

The original Nieuport 12 was a typical 1915 two-seater design. It was a development of the earlier Model 10, the first of the sesquiplanes (one and a half wings) that became the Nieuport trademark. The "10" was also developed into a single-seater—the Nieuport 11 (the famous "Bebe" used by the early French aces and the Lafayette Escadrille).

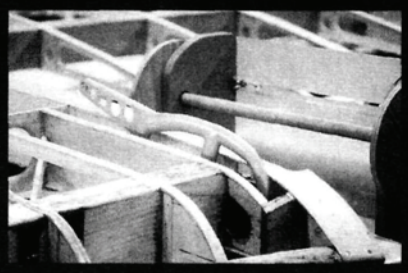
*The tail skid bolted to the rear fuselage.*



*The center-section struts and cockpit.*

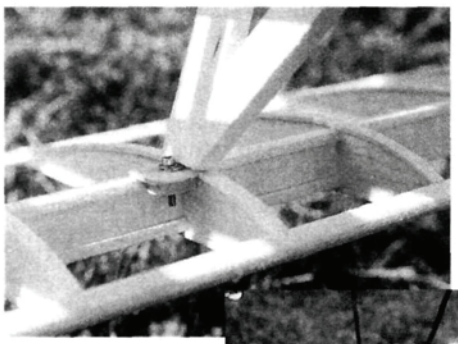


The Nieuport 12 was used by the French, British and Russian air services and was built in Great Britain as well as in France. The only full-size Nieuport 12 still in existence is currently being restored at the Canadian National Air Museum at Rockcliffe Airport in Ottawa. Hopefully, by the time you read this, it will be on display.



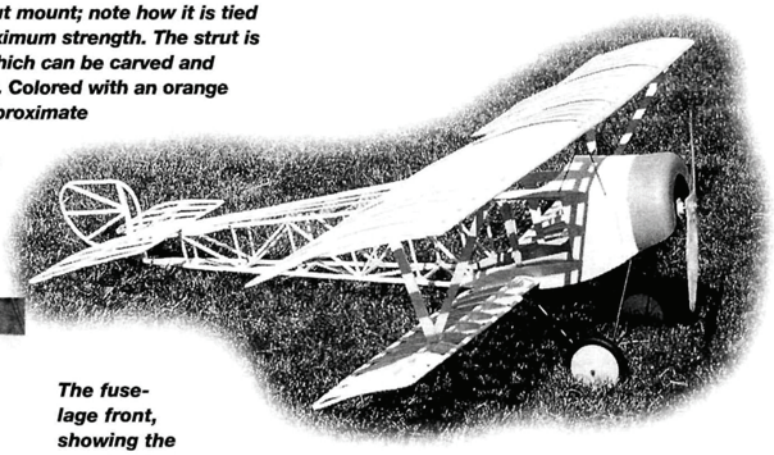
*Above: the lower end of the landing-gear struts (showing the axle mount and the travel limiter).*

*The aileron quadrants mounted in the wing center section.*

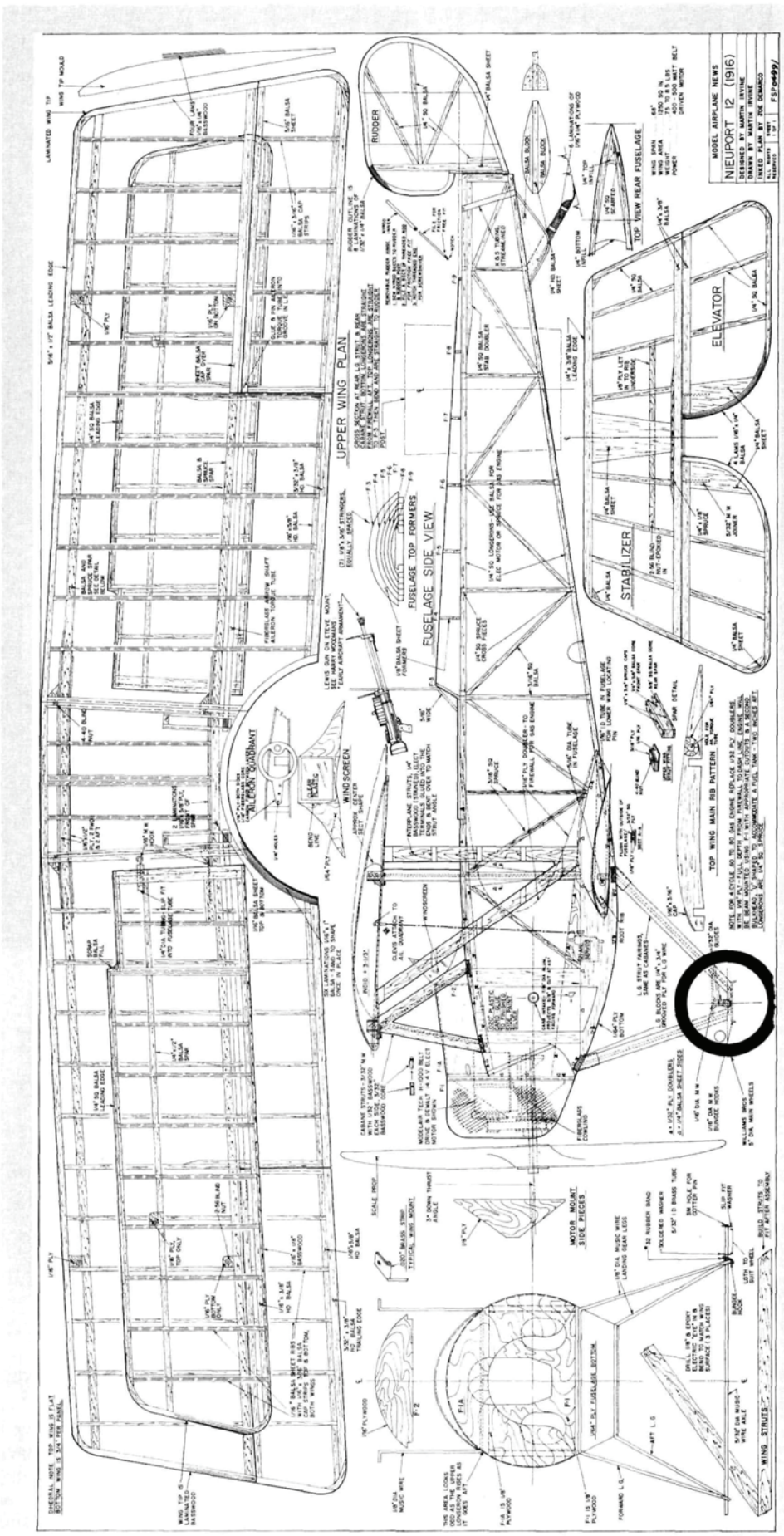


*The interplane strut mount; note how it is tied to the spar for maximum strength. The strut is solid basswood, which can be carved and sanded beautifully. Colored with an orange stain to closely approximate the original's varnished spruce, the struts look beautiful when finished.*

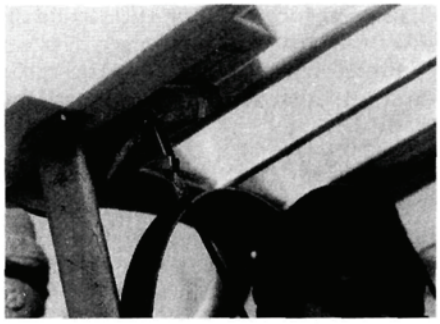
*The fuselage front, showing the plug-in strut mounts.*



*The uncovered airframe is almost too pretty to cover.*




TO ORDER THE FULL-SIZE PLAN, FSP04991, CALL (800) 537-5847, OR SEE PAGE 123



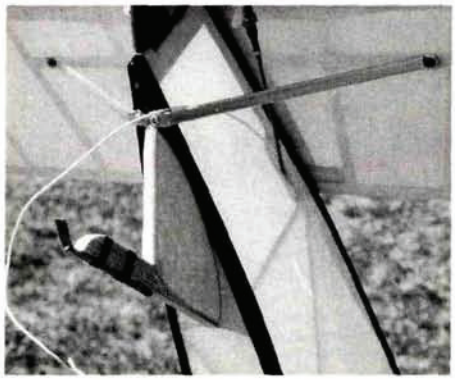
***The underside of the finished center section; note the second pushrod hole. The center section is stained with Ipswich Pine (as are the interplane struts) and covered with clear MonoKote. The hoop behind the pilot is a piece of plastic strip.***

The top mounting tabs are bent out of 0.0325-inch (0.8mm) brass and drilled to fit the wing-mounting bolts. A hint: when you've completed the tabs, attach the wing with 1-inch-diameter, 1/32-inch-thick ply washers placed between the wing and the tabs. Heat the tabs with a large soldering iron, and as soon as the solder flows, tighten the mounting bolt. The plywood protects the wing from burning, and tightening the bolt while the solder flows ensures that the tabs conform to the bottom of the wing.

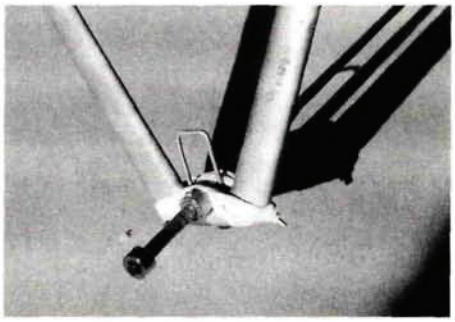
The rear strut is plugged vertically into the fuselage. These have to be well grooved and cleaned before being epoxied into place. The advantage of this method is that the rear strut can be moved up and down a bit to adjust the incidence angle before the epoxy cures. Check the incidence, but don't epoxy yet. The fuselage is much easier to cover and dope with the struts left off. The struts are also much easier to sheathe with basswood while they're off the fuselage.

Now is a good time to assemble the model and fit the interplane struts. These are solid basswood with electric "eye" terminals epoxied into the ends. Check the whole model for incidences and squareness. It is a lot easier to do it now than it will be once the model has been covered.

• **Equipment**. The DeWalt drill motor and ModelAir Tech 3.6:1 H1000 belt drive are mounted on an 1/8-inch ply mount and 3/8-inch maple rails similar to a glow-engine mount. I mounted the battery pack (18-1700 SCRCs) on a plate on top of two rails that run from the forward undercarriage mount to the firewall. Move the battery fore and aft, and once the balance point has been established, leave the pack in place. Add a charge jack and a safety switch when the covering has been completed. The two aileron servos are mounted on each side of the pack with the rest of the radio below and behind them.



*The tailskid and stabilizer struts. The struts are K&S* aluminum tube, and the strut spar is a piece of 1/8-inch ply. The skid uses a core of 1/32-inch-ply strips laminated together, and a metal tip has been added.*



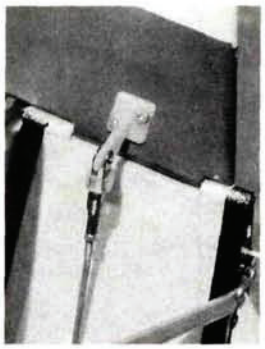
*The axle fitting. A single piece of 1/16-inch wire acts as an axle limiter and bungee pegs. (The plan shows a more scale, more complex version.) Two no. 64 rubber bands on either side are held in place by wheel collars. The wheel rides on a length of brass tube.*

## Glow Conversion

If you want to build the Nieuport and power it with a glow engine, I suggest a 4-stroke .80 or .90. The wings, tail and struts are quite strong enough, but make a couple of changes to the fuselage.

- Replace the 1/4-inch-square balsa longerons with 1/4-inch-square spruce longerons.
- Replace the 1/8-inch firewall with one made of 1/4-inch or 3/8-inch ply.
- Replace the 1/32-inch ply doublers with the larger, 1/16-inch doubler indicated on the plan. You will have to make your own arrangements for the fuel tank.

I would guess that a 6- to 6 1/2-pound model is quite possible—very light!

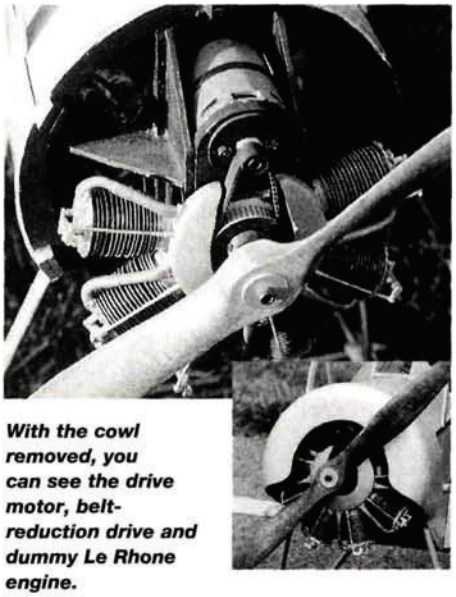


*The rudder hinge is made with sections of inner Nyrod and a wire hinge pin made of threaded rod. At the lower end, this is slotted for a fine screwdriver and thinned after the first couple of threads so that it can be inserted and will pivot freely. The few threads at the end of the pin hold it securely in place.*

### COVERING AND FINISHING

I covered the model with Sig* Koverall. It comes out of the package white, but for an antique look, I dyed it with Dylon synthetic fabric dye. Balsarite is used to adhere the fabric to the framework. Add three or four coats of low-shrink dope, and you're ready for markings. I used low-tack shelf paper to mask the roundels, and I did each color separately, without overlaps. When the model is flying overhead, the sun shines through just as it should.

I used a pilot and observer from Pete's Pilots*; they're quite light and very true to scale. The scratch-built machine gun and Eteve gun mount and ring are based on drawings in Harry Woodman's book, "Early Aircraft Armament." Regard them as models in themselves, and enjoy building them; they add much to the model's appearance. For details on my dummy Le Rhone engine, see my "How to" article in the January 1999 issue, page 76.



*With the cowl removed, you can see the drive motor, belt-reduction drive and dummy Le Rhone engine.*

An unusual, seldom modeled WW I airplane, the Nieuport 12 is a pleasure both to build and to fly. I hope you enjoy yours as I enjoy mine.

**Addresses are listed alphabetically in the Index of Manufacturers on page 126.*