

NORD 3202

• Challenge is the common theme among modelers. To make a model that looks better, flies faster, higher, longer, more reliable, more realistically, or more aerobatically; builds easier, is stronger; has more scale detail, or whatever it is that is desired in the model, represents the challenge to the modeler. In the 30s and 40s when Megow, Guillow, Comet, and other kit producers were putting out hundreds of kits in the 10- to 50-cent price range, this author built Nieuports, Spads, Fokkers, Aeroncas, Stukas, Spitfires, Fairchild's, Grummans, Ryans, and most every model kitted. These were scale models. After considerable years of practice, the models looked somewhat presentable, but they flew about as far as a strong arm could throw them, and with about as much realism. The psychological implications of this "scale model/no fly"

MODEL BUILDER

syndrome has probably prompted me to concentrate on designing scale models meant for flying.

As the model industry progressed to glow plug engines, which eliminated the bulk and weight of the coil, condenser, batteries, points, and accompanying electrical problems of the ignition engine. Then radio control equipment became available with reliability, small size, and reasonable prices, the second and final step in the miracle that allows us to design, build, and fly a scale model of any aircraft, including the jets with ducted-fan engines.

Fifty years ago the idea of being able to let a model fly out and then have it come back and land where it took off was just a dream. Now we can control our models so they takeoff, climb out, perform aerobatics, throttle down, glide in, and land. Absolutely amazing.

While browsing through the 1958 edition

of *The Observer's Book of Aircraft* a three-view caught my eye, and the more it was examined, the better it looked for an R/C scale model. The Nord 3202 has a planform that approaches the classic pattern model, an in-line engine with neat cowl and a grasshopper-leg landing gear that is short but allows plenty of prop clearance because of the high thrust line. The model Nord 3202 is easily constructed, lightweight but strong enough for everyday flying, looks good, and flies as well as any model yet built by the author. The model presented here is a 1-1/2-inch to 1-foot scale, being 0.125 of the original aircraft.

The Nord 3202 is a two-seat primary trainer designed and built for the French Army during 1957 to 1961 and developed from the NORD 3200 and 3201. These Nord's were the modern-day replacements for the Stampe SV4 biplanes and have a resemblance to the Fairchild PT-19 and Cornell, the DeHavilland "Chipmunk," Zlin, Lampich Pajtas, and the Toyo TT-10, all of which are great flying machines. The Nord 3202 is used for aerobatics and navigation training, has a maximum speed of 161 mph, cruises at 155, and a loaded weight of 2,689 pounds.

Most scale models are linear scale; that is, the lengths and areas and cross-sections are to scale. But how about the rest of it—weight, power, and speed, for instance? Included here is a chart comparing the model with the full-sized aircraft.

Assuming that my factoring is correct, this model is lighter, less powerful, and faster than an exact-scale representation would be. However, another factor to consider is that the air the model flies through is full-sized; the air molecules are eight times (diameter) larger in relation to the model than to the real aircraft. Although it would be possible to make a 5.25-pound model and power it with a 0.51 hp engine, it certainly wouldn't fly at 20 mph. Rubber-powered scale models might fly near scale speed, but they are tremendously lighter and lower powered.

FUSELAGE

The fuselage is built along the conventional box-type method, with two sides built on the plan, then crosspieces are added to form the basic fuselage structure. Formers, plywood pieces, nose pieces, stringers, and planking are added. The



The pretty young lady posing with the NORD is Lee Anderberg, a high school junior at Leland & Gray Union High School in Vermont. Photo taken at The Country Inn farm in Williamsville.

fuselage provides the strength and platform for the flying surfaces, so build it true and sturdy, choosing balsa for the job it has to do. Keep in mind that the model has to balance, so keep the tail light. Before drilling the engine mounting holes, put engine, prop, and spinner together and site-mount it so there is adequate space between spinner and fuselage front. The engine is mounted with 0 to 0 thrust alignment. The photos show pipes coming out of the cowl for a metal tank, which was removed because it sucked air when the model was turned over to start the inverted engine. A regular plastic clunk-tank was installed by cutting a hole in firewall MM2. Depending upon the size and shape of the tank, you will have to cut and fit it into MM2 and provide a sturdy mounting, including padding for vibration reduction to prevent the fuel from frothing. Since an inverted engine starts much easier when the model is turned over (so the engine is upright), a simple plywood box was put together to caddy the starting battery, fuel, tools, etc. and a cradle cut into the top so the model can be turned upside down and held for starting.

Another problem in operation is that the engine is enclosed by the cowl, good for looks, but bad for cooling. The Nord has a nice opening for air to enter, but this air needs to go around the engine cylinder and make its way out the rear cowl exit. With the cowl shown on the plan the model flies, but the cooling is marginal, so any extra exit space would be a plus, even if it were to be non-scale to some extent. The removable bottom cowl piece goes on by slipping it on the front dowel keys, then compressing the brass clip strips and pushing the rear down into place. The brass strips are epoxied to the bottom cowl and have a crimp bent to hold onto the 3/16 sq. longeron above. With tight fits, the cowl will stay in place without any extra hold-downs. Another area of concern is the exhaust. The model has an open exhaust which is simple but noisy; however, where we fly only the woodchucks and porcupines might be inclined to grouse. If you plan to fly near people or at a club site, please use a muffler. The Peace-pipe-type could be kept within the cowl, or a metal-worker could possibly rig up a muffler that exhausted out of the six exhaust stacks (shown on the three-view, but the engine is a four-cylinder?) like the real Nord. Probably my old Enya muffler will be used by simply cutting a large hole in the cowl side, even though this looks gross. Always a battle between scale looks and practicality.

The servos for engine, rudder, and elevator were mounted on a plastic tray furnished with the R/C set; the tray being screwed onto 1/4 x 3/4 x 7 balsa strips glued and braced to the fuselage structure, and the servo mass being low and roughly over the rear 1/3 of the wing. The receiver is wrapped in foam rubber and located in front of the servos, and the battery pack is wrapped and put in front of the receiver, with these weights also being kept low. The original model had balsa and wire pushrods to the tail, but cable pushrods would probably be better and more aesthetic. Make sure all servos, pushrods, and control surfaces as well as the throttle arm

move in freely and the full extent of the servo rotation. Also make sure that the controls move the correct direction. The wing is mounted by the time-honored method of rubber bands. Crude, perhaps, but observing crash damage resulting from plastic screws as a wing mounting device, rubber bands seem better. There are fuselage to wing fillets that have been left off the model. If you are going to use plastic screws for the wing mounts, add the fillets for scale and practical reasons. The cockpit canopy frame was made from strips of 1/64 plywood soaked and shaped around a waxed form. The straight pieces are pine (or spruce), the covering is celluloid glued to the frame, and a pilot is added just to assure the model that someone is in charge. The model finished up so that the balance point was just right without having to add any ballast to nose or tail.

EMPENNAGE

The empennage is also built in the normal manner, with balsa sheet reinforcing where the control horns are to be located. Hinges used were Du-Bro plastic, slotted into the balsa and held in place by a drop of CA glue. Structural glue used on this model was mainly Elmer's white or Titebond.

WING

The wing is made in the usual R/C model manner, with "D"-planked leading edge, two lines of spars with webbing, a "V"-planked trailing edge, capstrips on the ribs, and center section planked. This construction provides great strength with lightness. Remember to build-in some washout in the wingtips to combat tip stall.

Cut out all ribs, pin down 1/8 sq. lower spars (shim rear spar), glue in ribs except No. 1, add 1 x 1/16 trailing edge on bottom (also shim), make sure wing has washout by shimming tip, add 1/4 sq. leading edge trimming notches in rib front for good fit, bevel rear top of trailing edge and glue on 1 x 1/16 top trailing edge, glue in top 1/8 sq. spars, cut 1/64 ply pieces to go in aileron space, soak and bind on 1/2-inch dowel. When dry, glue two pieces together and bind again on dowel. When dry, install in aileron space, add top 1/16 sheet, cover around aileron space, remove both wing panels from plan, block up each tip 2-7/8 inch, glue in rib No. 1, and add bottom 1/16 pieces around aileron space, add 1/16 sheet webbing on front and rear spars, add soft balsa wing tips (hollow out).

Although not shown on plan, 1/64 ply pieces were used inside aileron spaces to provide support for dowel pivots. Add 1/16 sheet top covering on leading edge (sheet butts up against 1/4 sq.), glue on center section planking top and bottom but leaving bottom front until servo mount and servo pushrods to ailerons have been installed. Cut landing gear mounts. Take a deep breath and assemble your wire bending equipment and bend the l.g. wires, wire and solder them to the ply mounts, glue in l.g. assemblies, add leading edge 1/16 sheet planking, add rib capstrips. The ailerons are built by cutting a 1/16 sheet bottom, adding rib pieces, two headers that form the curved front of the aileron, capstrips, and the 1/8 dowel pivots, which allow the aileron to be removed by gluing the inner dowel to the ai-

leron, fitting the aileron in place, then inserting the outer dowel through the tip into the aileron, with the outer dowel being able to come out if necessary. Use thin washers between aileron and wing and trim so aileron moves freely.

In attaching the wheels to the l.g. wires, copper or brass tubes are slipped over the end of the wire, flattened and drilled for the axle, then wheel and axle are put on and the tubes soldered. The gear is sturdy enough for normal operation, but when the model comes in hard on one side, the gear will flex and the wheel will sometimes put a hole in the covering. The wire size could be increased to 1/8, or an extra strengthening wire could be added. It's easy enough to make a field repair with a piece of covering.

FINISHING

Finishing is done by first using the sandpaper to smooth everything, giving the structure on the outside two coats of clear dope, light sanding again, covering the entire model with lightweight silk (or plastic covering if you prefer). The silk requires water shrinking, then two or three coats of clear dope to close the pores, then two or three coats of chrome-yellow fuel-proof dope (if you can leave the white areas of the insignia blank, it will prevent the yellow from bleeding through, assuming the insignia is to be painted on). Remember to give the inside cowl area plenty of soaking-in with fuel-proof dope. Probably, this model could be painted in aluminum if you dislike bright yellow. Wing walk areas were painted black; the areas under the cowl and central wing were painted black. One photo shows a black or dark green area in front of the cockpit. Prop and spinner were gloss black. The Musee de l'Air said one color scheme was a bright yellow plane with "low engine cowl and central wing panels painted in bright black color. Engine nose cowl, wing tips, and rudder were very often painted in Anti-collision fluorescent red... also the spinner in red."

FLYING

Anyone who is at ease flying a four-channel model should have no trouble with this one. First, make sure the model balances at or near the point shown on the plan. Also check to see if one wing is heavier and would unbalance the model sideways. Second, turn on the R/C equipment, stand behind the model, and go through the controls to make sure they are going the right way and that the control surfaces are trimmed in neutral. The original model needed about 1/16 inch of right rudder. Take off using right rudder until the model is heading straight, and because the control surfaces on the Nord are large, don't over-control. Those big control surfaces will be an aid in snap rolls, spins, and other airborne maneuvers. Landings can be on idle or deadstick; the model glides very well.

Best of luck and keep those scale models flying!

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