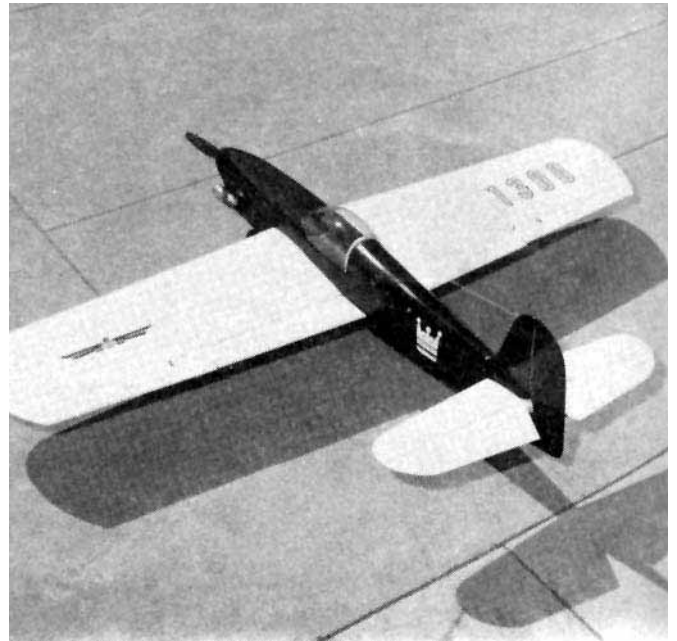




Author holds original 35-powered radio-controlled Nobler which was converted from control-line kit without refinements. It proved feasibility of developing design for contest performance.



With 515-sq.-in. wing area, 5-lb. weight, and well-muffled RC40 engine, Nobler is a lively flyer. Wing is permanently mounted to fuselage, flaps are coupled to elevator function for smoothness.

R/C Nobler

Conversion of a great control-line stunter makes for a new kind of precision flying.

ED SWEENEY

FOR years R/C enthusiasts have thought that a converted control-line model would be a fine radio model. They are right. Some recommended using flaps coupled with the elevator function, as in control-line flying, on a conventional model, and they are right. Fulfilling these conditions, the R/C Nobler has all the great characteristics of its line-bound ancestor.

Using only a 40 R/C engine (about as much power as the non-throttled 35 control-line engine), with a wider, slightly

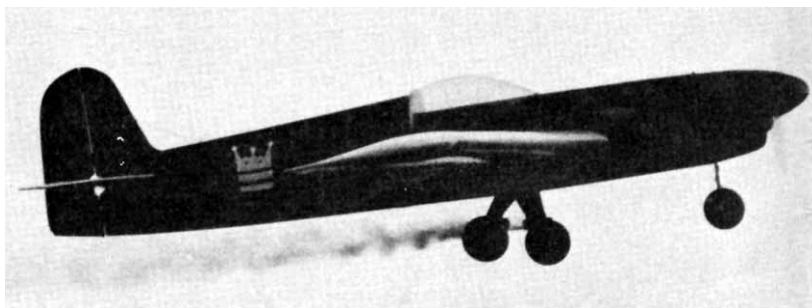
longer fuselage, and the control-line flap area split for independent ailerons and flaps, it has a constant-speed, true neutral stability, and unsurpassed smoothness in flight.

Design changes from the control-line Nobler kit were made only to accommodate equipment installation, a throttled engine, clunk-type fuel tank, and new fuselage structure with extra tail length.

Relatively uniform flying speed is an important factor in the success of a control-line stunt model. In CL flying, control is direct through the wires, so that

an always predictable, constant response is available for accurate maneuvers. The same is true of radio flying. In Noblers, the airfoil regulates the air speed through maneuvers between 55 and 70 mph. Although the weight of the model is a factor in controlling speed, both the control-line and radio versions fly at nearly the same speed. This R/C Nobler weighs about 5 lbs.

Smoothness is the ability of the plane to slice through maneuvers gracefully. Noblers and other control-line models with coupled flaps and elevator fly smoother.



Deep fuselage with mid-wing location affords excellent knife-edge flight and steady windy-weather flying. Distinctive lines evident here with plume of trailing white smoke.



A highly maneuverable aircraft with gentle control responses and limited flying speeds. Also gives relaxed, enjoyable sport flying.

than their counterparts without flaps. Why are they smoother? The required angular rotation of the plane to accomplish a given radius of pitch response is significantly reduced because the relative lift of the wing is variable during the pitch change. While any lift increase increases drag, changing the lift characteristics of the airfoil of the wing is less drag-inducing than just pitch rotation and, hence, the plane does not slow down as much, or rotate as much, in performing. For example, a loop or a sharp turn. However, use of too much flap deflection will cause too much drag and the opposite effect will result. The advantages of coupled flaps is a smoother flight path. This will gain points at a contest.

Another important characteristic of the Nobler is its true neutral stability. The model has no dihedral, no incidence, no thrust off-sets, and a perfectly symmetrical airfoil. The natural aerodynamic traits, in addition to the above factors, produce a model which will remain in almost any attitude it is put into. For example, one can establish a 20-degree bank turn with a touch of up trim and leave the plane alone. It will not spiral into a dive or roll out, but will keep circling until you fly it to another position. True neutral stability requires much less effort by the pilot to set up and perform the stunt maneuvers.

Maneuverability also is helped by the smoothness and constant flying speed of the Nobler. It performs all of the FAI and AMA Class-C and free-style stunts. Its roll response is excellent at all speeds. We found that it tends to yaw into turns slightly with the direction of applied roll — this is a distinct benefit in achieving

axial rolls and easier landings. Four-, eight- and six-teen-point rolls require almost no down-elevator during inverted portions, and top rudder is not really necessary either. Knife-edge flight is a ball; one can literally cross the entire field with the wings perpendicular — make a quarter roll from level flight and apply full top rudder. The square cornered maneuvers are easy. When one sharply deflects the elevators (and flaps), the plane will make an equally sharp response and without losing much air speed. Corners of the top-hat and square vertical-eight are clearly defined.

The airplane also spins well. Rotation is fairly slow and recovery is instant. It helps to add aileron in the direction of the spin to get the rotation started. Snap-rolls come off with no strain and they are also reasonably slow in rotation. The clue to spins and snaps in the Nobler is having a big sharply deflected rudder to offset the stability effects of the flaps at up-elevator command.

Landings and takeoffs are unlike any other R/C model. Takeoff needs only a small, graceful rotation when flying speed is gained. Yank it off, and it jumps into the air, fully under control, no wing-dropping, no spin danger, no dangerous mushing. Because of the relative wash-out effect of the wing tips when the flaps are deflected in up-elevator command, the plane will never unexpectedly drop a wing tip at any flying speed, even during a stall. Because of this characteristic, landings are best made with up-elevator trim. Throttle back to just above idle, apply up-trim and let the model settle to a landing in a level flight altitude — hands off! We mean with the hands off the control sticks! Wing tips are fully stable, and its altitude is fine for landing evenly on the main wheels. The plane will not gallop or wander during the approach. This kind of landing is safe for beginners too. You experts, can drag it. Remember, the Nobler will stall cleanly power off, but with just a little added power it won't stall.

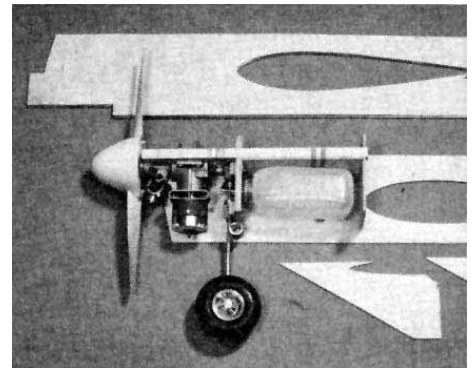
Fuselage: The structure is designed with two ideas in mind. First, it must be capable of withstanding all bad landings and near crashes in spite of the forces applied through the wing, which is permanently mounted in place. Second, it must be self-aligning during construction. These goals are accomplished when gluing the nose unit to the fuselage sides. The overall structure was designed by an

aeronautical engineer. You will never break it unless everything is totally smashed!

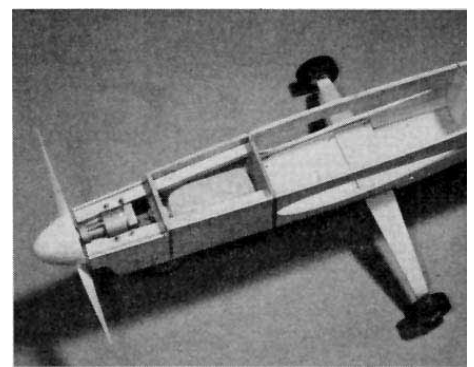
The two basic fuselage construction stages are:

First stage: The motor mounts are located in the firewall and forward bulkhead with rubber-bands. Screw in place the tank compartment hatch. Mount the nose gear and drill holes for the fuel tank outlets. Trim the motor mounts to fit the engine crank-case, drill the mounting holes, and bolt the engine in place. The fuselage doublers, triangular strips, rear doubler, and tail spacer are mounted on the fuselage sides with contact cement.

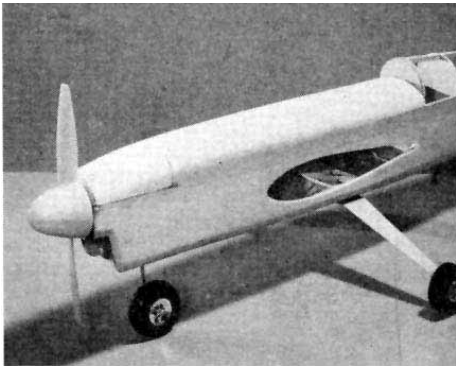
Second stage: Disassemble the motor mount unit and reassemble with epoxy glue, leaving off the tank and nose gear; but bolt the engine in place again. Don't let the tank compartment hatch be glued down. With lots of epoxy glue, mount the fuselage side assemblies to the motor unit, aligning the firewall and bulkhead with the top of the sides, and the maple mounts flush with the forward edge of the sides. Tape or rubber band this together. Place



First stage of fuselage construction gets engine unit aligned, drilled, and bolted as sub-assembly before epoxying together.



Carefully worked-out assembly procedure and structure gives quick construction, correct alignment, and real crash resistance.



Enclosed but well-ventilated engines, a contoured fuselage, give most reliable engine performance. Note gear mounting.

R/C Nobler

this assembly over the top view of the fuselage on a very flat table and make sure the fuselage sides are perpendicular. Your fuselage will be perfectly aligned when the epoxy hardens. You can also check the alignment further by touching the tails of the sides together and seeing that nothing is distorted compared to the top view. However, let the epoxy set with the tail apart.

With the two basic stages complete and all the epoxy hard, glue in place the rear plywood bulkhead and balsa bulkheads, and finally glue the tails together. Check the final alignment over the top view on the plans, then glue on the bottom 3/8" sheet and top 1/4" sq. stringer.

Trim the nose bottom block to fit in place and also cut out a small section behind the firewall to allow for the nose wheel strut and spring coil. Epoxy the block in place using many rubber bands to hold it firmly to the fuselage and the sides. Fill in the joint between the bottom block and the engine compartment sides with tapering scraps of % balsa. Make them fit the cutouts for the spring coil and taper to almost flush with the doublers at the extreme nose. They should also extend slightly below the doublers to provide smooth nose shaping. Deck the top rear fuselage with 1/8" soft sheet balsa. Wetting the exterior side of the sheet will help in bending the balsa to fit the curvature. Epoxy in place the plywood rudder platform.

Make up the hatch with 1/2" balsa. Temporarily cement this in place snugly between the nose block and the rear plywood bulkhead.

With the spinner mounted on the engine shaft, start carving the nose to fit the contours and roundness of the spinner. Carve the hatch to the same roundness as much as possible. The bottom of the

fuselage will require some special attention in shaping because you will be shaping plywood and balsa simultaneously. The goal is to achieve smoothness and roundness from the nose to the tail. Keep in mind that this is the only stage of model building in which weight is reduced as looks are created.

Note how the bottom block is cut out and a piece of plywood is located to mount the main landing gear. Also, locate and glue in the top main landing gear plywood plate inside the fuselage. When mounts are dry, drill and attach the gear with long steel bolts through the plywood-balsa-plywood sandwich into blind nuts in the top plate. Install the nose gear and the fuselage will sit on its legs.

Cut out the rudder, sand it to airfoil shape, and cut the hinge line. Round both surfaces of the hinge line and install the nylon mechanical hinges temporarily. Firmly glue the rudder in place and also the fillets on each side. When dry, contour the fillets into the fuselage shape.

Now it is necessary to have completed wing and stabilizer. Other than the few small modifications from the control-line parts, the wing and stabilizer are built as in the Nobler kit. The few changes can be seen and applied by referring to the plans for the R/C Nobler. Go ahead with all hinging and control horn installation temporarily.

With the ailerons and flaps removed, slide the wing onto the fuselage. Doing so takes patience and some extra trimming of the wing slot. Also slide the stabilizer in place. Do not glue the wing or stabilizer in place until much later. This is done after the fuselage is covered, painted, and trimmed. Likewise, the wing and stabilizer are covered, painted, and trimmed before installation.

With the model temporarily assembled, work out your control system installation. The aileron servo goes in the wing, of course. The battery pack can go about anywhere. There are three available places. One, on the tank compartment hatch; two, behind the aileron servo in the wing (flat packs mounted with double-sided servo tape go here conveniently); and three, below the wing behind the main landing gear location. The last location will require access with a hatch on the bottom.

All servos are installed with double-sided tape. Make and install the pushrod systems. Have all functions working properly before proceeding. All of the

medium size R/C sets will fit in the Nobler.

Disassemble everything. Take out the R/C gear and pushrods. Remove the landing gears and engine. Slide out the wing and stabilizer. Remove the tank compartment hatch. To thoroughly fuel-proof the nose of the plane, paint the interior of the engine and tank compartments with epoxy glue. Vigorously sand the entire model. Install the rear of the top hatch. This extends above the rear deck of the fuselage and mates to the canopy. Go ahead with cockpit details now, if you choose to have them.

To finish the R/C Nobler is quite easy, as the wing, stabilizer, and fuselage are all done separately. All parts will require covering. We used Super MonoKote on the wings and stabilizer on my Noblers, with Coverite on the fuselage and rudder. This combination produces a strong and lightweight finish. Finishing the Coverite to a glossy painted surface is quite easy. After covering, spray on one or two coats of auto primer for lacquer paints. Do not sand these coats; they are for adhesion only of the filler and finishing paints to come. Now spray Hobbypoxy filler (three coats), sanding between each coat — this is when elbow grease counts. Use lots of fresh sandpaper and work until you have a smooth glazed surface. It will take about five coats of color dope to get a perfect finish. Let dope dry between each coat, the last coat for about three days. Do the trim painting and then get out the auto compound. Hand-rub the finish until it is as glossy and smooth as a mirror. Put on your decals and glue the canopy in place.

The wing has been covered and also finished to perfection. Slide it in place and glue it firmly with lots of epoxy. Also epoxy the stabilizer in place. You must check the many alignments of the wing and stabilizer before the glue dries or hardens. Install the hinges with epoxy and hook up the control surfaces. Be sure to tape or MonoKote over the hinge-line gap at all control surfaces. Put in the landing gear and install the motor. Repeat your already -worked-out radio control system installation and check it out. With the plane ready to fly, less fuel in the tank, balance the model.

There is one possible chuck-hole to look out for. When you set up the control surfaces before initial flights, do not let the wing's airfoil shape mislead you by optical illusions! Measure the position for

neutral flaps. Measure the flap movement +1/4". Now arrange the elevator movement (+3/4") and neutral by hooking to the flap horn and elevator horn in appropriate holes. Ailerons should move only slightly farther than the flaps. Set up their neutral to agree with the flaps' position. Rudder setup is easy — get all the movement you can both ways.

If you are ready for the first flight too, you will not have any difficulty with the R/C Nobler. But, it is different, and better, than any plane you have flown before. Here are a few hints to look for and allow for on those first flights. First, allow a slight amount of up-trim at the transmitter trim lever. This will maintain level flight without back pressure on the stick; remember, the plane has no built-in incidence. Shortly after takeoff and climb, throttle back — please. Now trim the ailerons, if necessary, and fly the plane around to get used to it.

The plane does not need all the power of the 40 for fun flying, and you do not need such power on the first flight. Before beginning your first landing, practice and study the model's behavior at slow flight with plenty of altitude. You will notice that a definite stall will develop. The model will drop its nose straight ahead and you will always have aileron control to lift a wing. To make that first landing, give some additional up-trim on the transmitter and throttle back. The model will settle in nose level, slow, and very steady. Just steer it to your landing spot and flare only very slightly. You are down safe and easy.

You will find that with experience, landings in still air at less than 20 mph are easy. This plane never drops a wing in landing configuration, because of the wash-out effect of the wing tips with the downward deflection of the flaps. Spot

landing is too easy; you just fly to the spot with the plane level and stable, none of that nose-high wobbling around.

The R/C Nobler will probably be kitted by Top Flite Models, Inc. To build the R/C Nobler right away, author suggests working from a control-line Nobler kit.