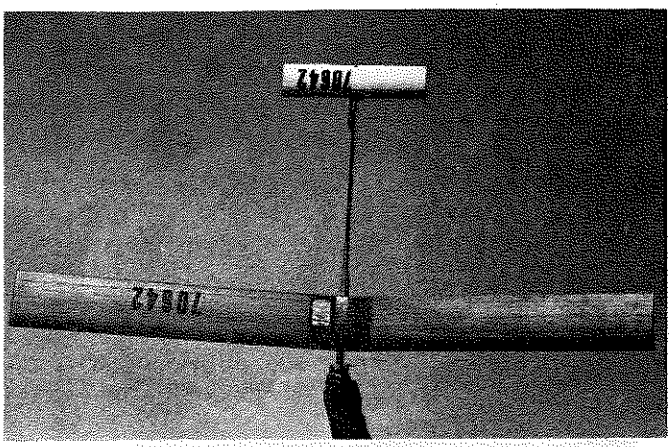

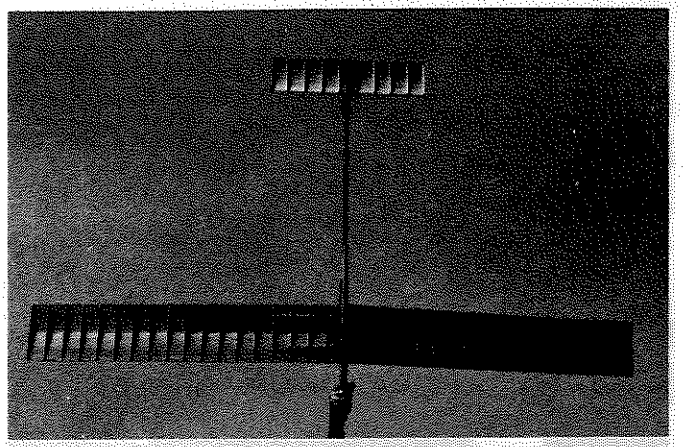

TYRO A/2 • NORDIC •

By WILLIAM H. LANGENBERG . . . Designed for the author's 15 year old son, this all sheet balsa A/2 Nordic is just the thing for anyone of any age who would like to enter the scientific world of free flight.

TYRO – (ti ro) a beginner in learning, a novice, an amateur.

The TYRO is aptly named. It is intended to be a Nordic glider for the flyer, of any age, who is new to the event. More specifically, it was designed for my son Robert, age 15, when he outgrew junior competition and moved up to the senior class. Tiring of the A/1 glider he had been flying, and perhaps too flushed with success, he desired to move up to the "big time" A/2 leage, and requested a new model design to build and fly.

The first time the TYRO appeared at a contest, one of Robert's competitors sidled up to me and queried sarcastically, "What is that boxy looking thing? It looks like an overgrown A/1."

He was right on both charges. But he was premature with his disparagement, for at the end of the contest, he trailed far behind Robert in the standings. A fluke? Not really. That result has since been repeated several times.

As a long time Nordic flyer and former FAI team member myself, it has been my contention for many years that a consistent winner in this event need not have a complicated, difficult-to-build, or even streamlined model. In my judgment, the criteria for repeated success are (1) a consistent, durable, all-weather model, stable on the tow and in the glide, and (2) a dedicated flyer with the experience and ability to sense rising air and the tenacity to tow and release his model into it consistently.

The TYRO was designed with this belief in mind. Accordingly, among the design objectives were simplicity of design and construction, durability, and consistency. The first two ruled out curved wing and stab planforms and built up construction, and they dictated the use of a fiberglas rod tail-boom. Ample V-dihedral instead of polyhedral was used to eliminate two wing joints. The wire wing joiners were employed to minimize folded wings on tow, a relatively common problem among inexperienced flyers in towline events. A clockwork DT timer was utilized instead of a fuse, because of local fire hazard regulations, but a simple fuse dethermalizer would be equally satisfactory. No gadgets of any kind were used. Durability was fostered by the fiberglas rod tail-boom, plus spruce leading and trailing edge reinforcements. Consistency was enhanced by the forward center of gravity (CG) location, with positive wing incidence and ample dihedral, and stable towing characteristics.

With this background, let's get on with construction.

STAB

Begin construction with the stabilizer, since it is similar to the wing, but easier to build. Select a piece of 1/16 x 3 x 36 inch very light, warp-free balsa. Cut off a piece 18 inches long, then glue another 1/16 x 7/8 x 18 inch section to it. Finally, glue the 1/16 x 1/8 spruce leading and trailing edges to the balsa. Sand this resulting 1/16 x 4-1/8 x 18 inch sheet smooth on both sides, and apply one coat of dope to the underside. Set this aside to dry. Next, cut out the 1/16 bass rib template and sand to shape as shown on the plan. Using this template, cut out 11 stab ribs from 3/32 soft sheet balsa, pin them together and sand them to shape.

Note that the ribs are longer than the stab chord. This is done for a reason.

Pin the ribs to the plan through the overhang at each end. Next, carefully glue the 1/16 x 4-1/8 x 18 stab surface, doped side down, to the ribs. Be sure to pin it carefully to the ribs so that the true airfoil shape is obtained. When dry, remove the stab from the building board, add the DT rubber band hooks, DT string wire, and center reinforcing members under the leading and trailing edges. Cut off the excess leading and trailing edges of the ribs and sand the entire stab to shape. Apply three coats of dope, sanding the upper surface smooth after each, and set aside to dry and season.

RUDDER

The rudder is cut from a piece of soft 1/8 x 3 inch sheet balsa. It is 3-1/2 inches high. Sand it to the airfoil shape on the plan and apply one coat of dope. Next, cut out the movable rudder from 1/16 sheet, apply one coat of dope, and join it to the fin with cloth hinges as shown on the plan. Add the 1/16 hard balsa rudder stops on both sides. Cement the rubber band and auto rudder hooks in place, and give the entire assembly two more coats of dope.

WING

Start the wing by selecting two sheets each of soft 3/8 x 3 x 36 and 1/16 x 3 x 36 inch sheet balsa. Dope one side of each. Next, pin the two 3/8 inch sheets to the workbench, doped side down, and glue the 3/16 square spruce leading edges in place. Also glue the 1/16 x 3/16 spruce trailing edges to the 1/16 sheet at this time.

While these are drying, cut out the 1/16 bass rib template and sand it carefully to the shape shown on the plan.

As was the stab template, the wing template is longer than the chord, so that the ribs can easily be pinned in place during construction. Using the wing rib template, cut out 38 wing ribs from soft 3/32 sheet, pin them together and sand carefully to uniform shape.

Now remove the 3/8 sheets from the building board and bevel the top rear edge as shown on the plan to 1/16

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thickness. Rough carve the leading edges to shape at this time also. Scribe the rib locations on the underside of the 3/8 sheets. Pin them upside down on the building board and glue the ribs in place. When the two structures have thoroughly dried, remove them from the board and pin them down again, this time right side up, using the excess rib lengths for this purpose. Glue on the 1/16 sheet after-surface of the wing, doped side down, making sure that proper airfoil shape is maintained. After drying, remove the wing halves from the board, cut off the excess rib leading and trailing edges, and sand the wing to final airfoil shape. Apply three coats of dope, and sand the upper surface smooth after each.

The 1-1/2 inch center section of the wing is assembled in the same manner as the wing, except that it is a solid mass composed of seven 3/16 balsa ribs, with two 1/16 bass sheet ribs at each end. The center section is drilled out to house the 1/16 and 3/32 I.D. aluminum tubings which hold the wing wire joiners.

To install the wing joiners, notch the root ribs as shown on the plan and glue the 1/16 x 1/4 spruce fillers to the undersides of the wing roots. Next glue the 1/16 and 3/32 I.D. aluminum tubings in place, and fill in the remainder of the notches with 1/8 x 1/4 balsa flush to the bottom surface of the ribs. See the plans and photographs for details. Add the 3/16 spruce sheet bevel joints to the end of each wing root, and bevel them to allow 9 inches dihedral under each wing tip. Sand smooth the entire wing. As the last step, cut the 1/16 and 3/32 music wire wing joiners to length, bend them to shape as shown on the plan, and carefully epoxy them in the appropriate tubing of the wing center section, ensuring that they are in proper alignment.

To facilitate handling in the field, and to enhance strength, the wing center section and the first 4 inches of each wing root are covered with fiberglas cloth and resin. In addition, the 1/16 sheet bass wing tip ribs are added to protect the wing, particularly after the model lands in windy weather.

FUSELAGE

The key to a simple, durable fuselage is the fiberglas rod tail-boom. These are available from several commercial sources advertised in the model magazines, the NFFS Digest, or from most fishing equipment stores. Select a warp-free boom, as light as possible, and sand it smooth. Saw it to 29-1/2 inch length. Next, cut the fuselage core from 3/8 inch bass on a jigsaw, notching the rear to accept the boom. Also cut the timer and ballast holes in the core. Now epoxy the boom into the fuselage core, ensuring that alignment is correct. Glue the 3/16 sheet balsa fuselage side pieces in place, and finally, epoxy the 3/16 bass cheek to the right side of the nose.

Now cut the stab trailing edge stop from 1/4 inch sheet balsa, and glue together the leading edge platform. Epoxy the shaped stab leading and trailing edge platforms to the fuselage, together with the DT hook. Glue the rudder in place, and add the external aluminum tubing DT and auto-rudder line guides as shown on the plan, together with the auto-rudder tube.

When this assembly has dried, lay the fuselage on its right side and melt lead into the ballast compartment until the balance point is about 1/8 inch aft of the CG location shown on the plan. Now epoxy the 3/16 bass left cheek in place. Carve and sand the fuselage to final shape. Bend the towline hook to shape shown on the plan and epoxy it in place. Epoxy the wing center section in place, ensuring it is properly aligned. Finally, give the fuselage two coats of clear dope, and add the DT and auto-rudder lines as shown on the plan. Glue the DT timer in place. Set the stab on its platform and check to ensure that the CG is located precisely as shown on the plan. If it is not, drill out or add to the ballast until the location is correct. Also ensure that the towhook is in proper position. The CG and towhook must be accurately positioned as shown to obtain consistent, stable tows.

FLYING

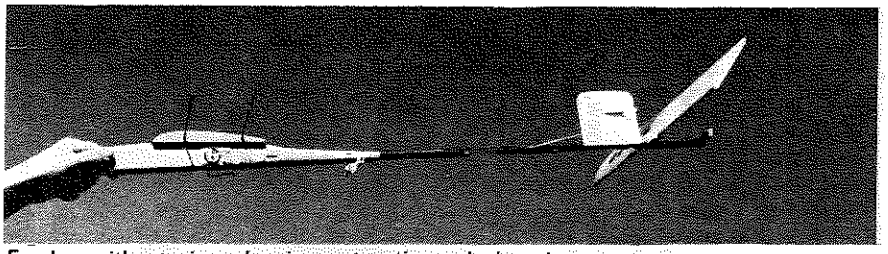
In my opinion, towline glider events are particularly desirable for junior and senior flyers. Since I have withdrawn from the contest scene . . . other than coming out of the woodwork every two years for the FAI program . . . it has become apparent to me that some younger flyers are primarily substitute participants for their fathers. This is a condition which I deplore. One escape from it lies in the hand-launch and towline glider events. In these, the adolescent flyer is on his own. Daddy cannot throw or tow his son's gliders, hence the younger competitors have a much better opportunity to compete fairly with their peers. In my judgment, this is the way it should be.

To begin flight tests of the TYRO, assemble the model and check that the wing and stab are properly aligned. The rudder stop should be set to allow about 1/8 inch left offset after the auto-rudder line is released. Now hand-glide the model to check the glide, which should be flat with a slight left turn. Adjust the glide by raising or lowering the stab trailing edge as necessary.

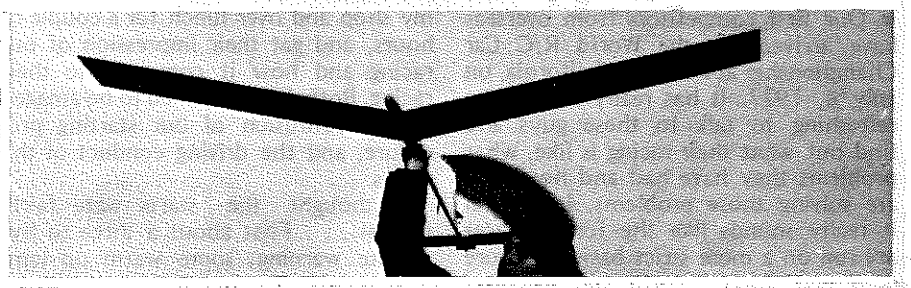
After hand glides are satisfactory, prepare for the first tow. Tie a 9 inch length of heavy monofilament line to the towhook for use as the autorudder release. Let out about 50 to 70 feet of towline and tow into the wind. If the model is accurately built as shown, the tow should be straight and stable until the model climbs directly overhead. Should the glider climb too slowly and weave on the tow, move the towhook back. Conversely, if it zooms up or veers off to one side, move the towhook forward. The model can usually be made to tow straight by adjusting the setting of the right rudder stop.

Once a stable, overhead tow is achieved, practice thermal detection and releasing the model into rising air. A/2 gliders, primarily because of their size and weight, are much simpler to tow than the smaller A/1 models, which sometimes tend to weave or oscillate on the line.

The TYRO provides a simple means to enter the Nordic glider event. The model is truly easy to build, simple to adjust, and very forgiving on the tow. Its performance is consistent and often exciting. I hope you will get a great deal of pleasure from the model if you choose to build it. ●



Fuselage without wings, showing root section and wing wires.



The author's son Robert, ready for launch. Squarish appearance of design belies its performance capabilities. The big thing is knowing when and where to launch.