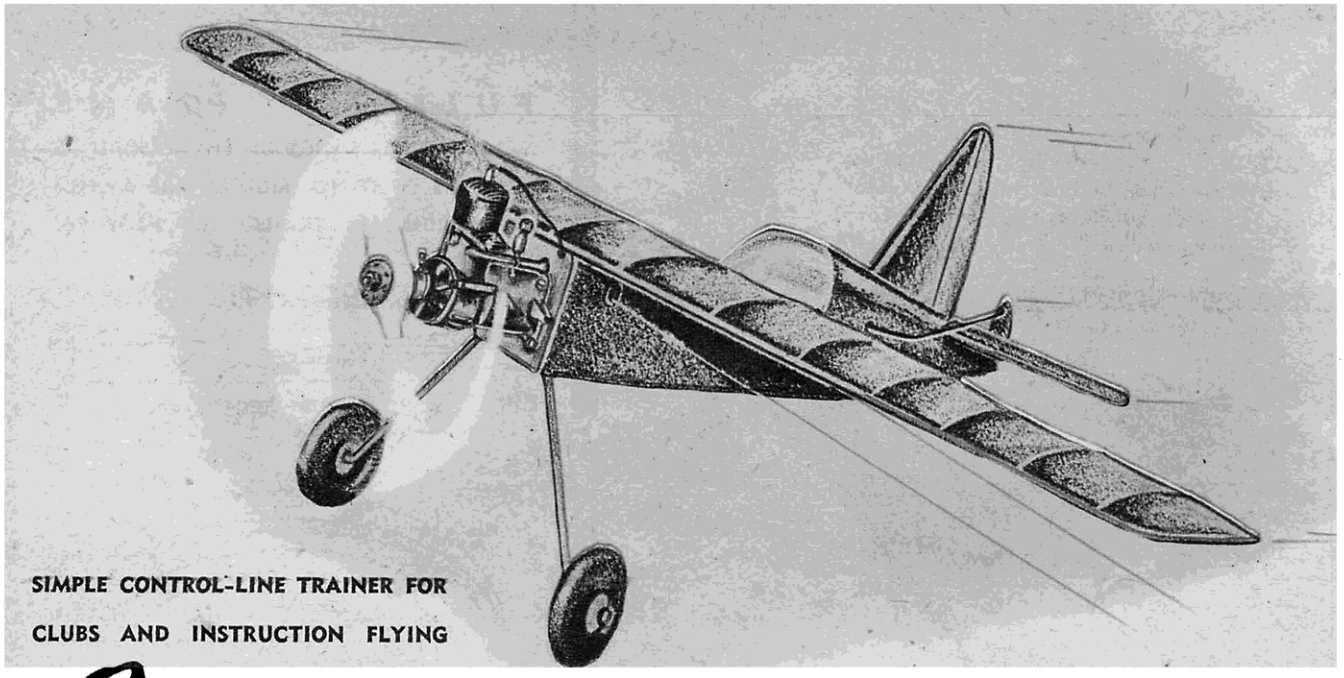


SIMPLE CONTROL-LINE TRAINER FOR CLUBS AND INSTRUCTION FLYING

Beginner's Goat

BY ROY L. CLOUGH, JR.

THIS control-line trainer, together with the operating instructions which go with it, has been worked out carefully to guarantee absolutely good results to the newcomer.

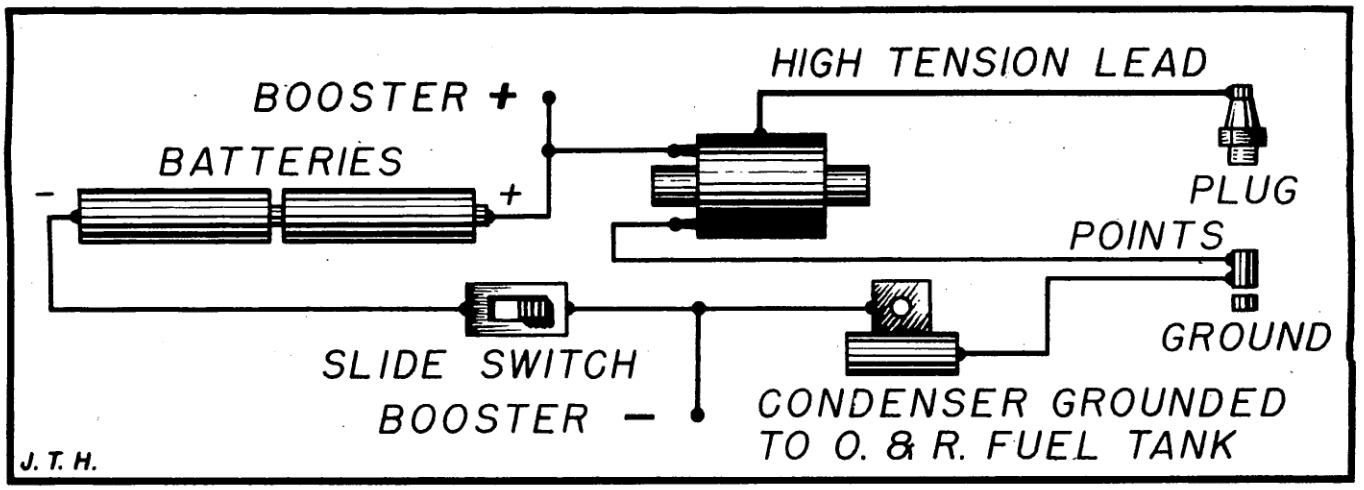
This Goat is the result of a study of the factors involved in building, flying and maintaining a plane which can always be counted on to deliver the goods.

No assumptions have been made that the builder will fly it from smooth fields and only on calm days. On the contrary, we expect it to be treated roughly, flown in relatively high winds from gravel pits and deep grass, in hot weather and in cold, and perhaps in the rain. If a model can perform well under these conditions, and incur no major damage, then it is a "good" plane. The Goat is good.

At this writing the Goat has more than 600 flights averaging better than five minutes each, or a conservative estimate of more than 50 hours in the air. Non-flyers have learned to fly it in about a dozen laps apiece and nearly every member of the Bell City, Bristol, Conn., Aeromodelers has flown it.

The high spots of this design are the wing section, tail configuration, landing gear and engine installation. The airfoil is a section worked out by the writer over a period of years by the effective cut-and-try system. The tail plane offers positive control without trickiness, the landing gear can "take it" and get the ship off ground too rough for most models. The engine installation, being sealed off from the rest of the ship can be dunked in a can of kerosene for cleaning if the plane has nosed over in sandy soil.

Despite the square lines and generally boxy construction this model flies in the neighborhood of 50 mph with an O&R .19. With a trick (*Turn to page 78*)



prop and hot fuel it has hit over 60 mph.

To begin construction, select two pieces of 3/32" sheet balsa, two inches wide, for the fuselage sides. Cut one piece to size and use it as a pattern for the other. The heavy nose block and wing mount block are cut from thick plywood, or soft pine, and are 1¾" wide. Cement the two sides to these pieces after installing the carriage bolt wing stud in the smaller block.

When dry, pinch the tail ends together and tack-cement. Another 3/32" sheet of balsa is laid on for the bottom fuselage covering, then trimmed to shape. Use short bits of scrap cross-wise to cover the sharply curved section near the tail. Install the tail wheel, using a small block of pine to hold the wood screw behind the balsa covering.

The cabin is a light structure, "dummied up" of 1/8" sheet bulkheads and covered with thin cardboard. "Glass-work" is painted on in a light contrasting color. This is durable and easy to assemble.

Lay out the tail surfaces on 1/8" sheet balsa; cut out the stabilizer, rudder and elevator. For hinges use cloth strips, or the more durable metal hinges sold especially for this purpose. The rudder has a permanent setting as seen by the plan. Use plenty of cement in attaching it.

Make up a cardboard template of the wing ribs, then cut out 16 pieces of 3/32" sheet, 1" x 5"; stack and pin them together with the pattern and cut to shape. Saw out the spar notches before unstacking to insure good alignment.

Building the wing is very easy. Select a good hard spar, cut it to 32" length and mark it every two inches, allowing a four-inch gap in the center. Working on a flat board cement each rib to the spar, centered on a mark. Next, before the cement has completely "set" true up the ribs by eye, or with a small square. Put on the trailing edge, allow the cement to dry, then install the leading edge. The center section where the bolt hole is to be drilled is beefed up with extra pieces of spar stock. This section of the wing is flush-covered with sheet balsa. Soft blocks of balsa cap the wing tips and are sanded to a smoothly rounded shape.

Do not round off the leading edge spar or cover the front section with balsa sheet. Cover with light Silkspan, the grain running spanwise. The covering should be water-shrunk and clear doped before pigmenting. Pinning the wing to a board during the water-shrinking process will keep warps from developing. No wash-in or wash-out is used.

Along the front edge of the wing, about a quarter inch from the leading edge the front spar will be visible through the covering. This, we claim, is exactly as it should be, and will produce more lift at low speed than the regular sheet covered leading edge.

Because this article was written to help the beginner, we are going to name names and tell you just which products to use for this particular ship. We have found that those we recommend, in the combination specified, give the best results for this ship.

The plane was designed around the Ohlsson & Rice .19 engine. Use it, or the .23 of the same make. A rotary valve unit is not needed, since the standard side-port engine has plenty of pep. You must use the special O&R tank-mount.

Obtain a 14"-diameter Flo-Torque (low pitch) prop and attach it to the engine in the most convenient cranking position. Hook up the wiring according to the diagram, using red for positive and black wire for negative leads. We recommend the use of the Aerospark Quality coil, together with matched condenser and hi-tension lock lead. Don't fool around with unknown or unmarked coil or paper condensers as these items are subject to failure without warning and are responsible for most of small engine difficulties.

To run in your engine remove the spark plug, turn on the switch and rotate the propeller making certain that a spark jumps with each revolution. Set the timer as far retarded as it will go without shutting off, then replace the plug. Shut off the switch, put about a half a medicine dropper of fuel in the exhaust port and crank the engine over a dozen times. Now you know it is lubricated. Do not put any gas in the tank. Turn on the switch and flip prop until the engine fires and runs out the prime. Do this a half dozen times until you know just how much head prime is required to start. *This is the quickest and best way to start any engine, despite the fact that many people will tell you otherwise.* The reason is that a head prime loosens up any thick oil which may be in the engine, and gets fuel into the cylinder with a minimum of flipping. This is particularly true of cold weather operation.

Fill up the tank, open the needle valve four turns, prime and start the engine. It will run slowly and with a great deal of smoke. Turn down the needle valve slowly until the engine runs steadily. Do not run it so rich that it "hammers" and vibrates excessively, but don't try to find out how lean it will run—yet. Do not advance the spark.

While the engine is running drop a little castor oil in the intake tube from time to time. Run the engine for a good hour this way, then remove the big prop and install a Mercury 8"D 6"P prop. Start in the regular way. Note that now the engine has a tendency to load up with fuel because the small prop lets it run faster. Turn down the needle valve again until it runs steadily. After a couple of hours running you can advance the spark a bit. For the fourth hour of the break-in period experiment with the phenomenon called "leaning out." Start the engine up, set the needle valve where it will run steadily, then pull the spark up until you reach a point where advancing it further will result in no increase in speed. Now turn down the needle valve a little at a time. Suddenly the engine will seem to burst into life with a brand new sound and the increased power and speed will be very noticeable. This is the way the engine must sound in the air, but do not run it this way on the ground or block for any length of time.

After four hours the stiffness should be out of your engine and it is ready to mount in the plane. Also, during this time you will have learned how to operate it—and that is just as important as having a plane to put it in.

Take the timer apart and polish the points bright. Follow O&R instructions as to point clearance, but make the clearance too small, rather than too large if you can't hit it right on the nose. The timer of this engine is as good as any on the market, but if it is to operate satisfactorily it requires occasional intelligent attention—the same as any other mechanical device. Stone up the points every four or five hours whether they need it or not and you will never have any starting troubles from this source.

Possibly all this seems like a tedious and involved procedure, but it is not. A careful breaking-in of your engine insures a long and powerful life, and what you will learn while sweating out a break-in is more valuable than a stack of books on the subject.

Wipe up the engine after taking it from the block, spot the mounting holes on the nose of the ship and drill them out. The landing gear is held in place between the tank and firewall, so gouge a Vee to accommodate the heavy wire snugly—don't try to force the gear into the wood by drawing down on the tank bolts. After trying several brands of wheels we found the Phillips Air-Lite 3" dia. wheel fitted the bill. It will take a beating, never needs inflation, yet has great shock-absorbing powers. After a good deal of flying, oil seeps between the hub and tire and a rough landing may knock it off. This can be successfully forestalled by cementing the tires to the

hubs with gasket shellac before they get oily.

Two small screw-eyes under the left wing tip serve as control wire guides. The bend in the control rod puts it outside the ship where it can be checked. The control horn is bent of sheet aluminum and fastened to the elevator with a bolt and nut. The bellcrank is a Veco. Use the short radius for the control rod and hold it in place with a nut soldered on the wing mount stud.

The coil goes in the section between the wing mount and engine block. Solder the wiring to it before installing, then put the coil in place and pack around it with paper dampened with dope. This will hold it firmly and is wonderful crash-insurance. There is ample room to install a good toggle switch and booster terminals on the right hand side of the ship. The battery is of the "Slimjim" type and is secured to the floor with two small bolts and nuts.

The top section of the fuselage is covered in ahead of the wing, the timer and spark plug wire go through this covering an inch apart. Mount the condenser to one of the tank lugs.

Make a trial assembly of the wing to fuselage, and make sure the control system does not bind. If desired, strips of stock can be cemented to the underside of the wing to lock it in place in the fuselage opening. A wing nut holds the whole works together for flying and is much more convenient and neater than the usual greasy rubber bands.

Since this is a class A ship use an AMA specified line length of 42 feet. Shorter lines are not any easier to learn on and limit space in which to correct mistakes. Use any good stranded cable, preferably cadium plated, since it solders fairly well. Wrap all joints. Do not bother with swivels at this point.

If directions have been followed you need not worry about the balance point of the ship, which we have found by actual test may be a half inch on either side of the wing stud without affecting flying qualities. If possible, you will find it of great psychological benefit to have an experienced flyer test-hop your plane in your presence.

Now, fly it yourself.

Start up the engine, but advance the timer only about half way, or to where the engine is running at half speed. With a competent person holding the plane, walk out and pick up the control handle, check to see that "up" is in the right place and signal for release. When the ship starts forward give it most of the "down" control. Note how the lines begin to exert a pull as soon as the tail comes up. Run the ship around on the ground three or four times making no attempt to take off before you get the feel of turning in a circle. Since the motor is not turning up there is little chance of an inadvertant take-off. Next try to make the ship take off in short easy hops of twenty or thirty feet at a time. This should take about all the "up" control there is. In this way you learn to make a take-off without the usual beginner's mistake of flying the ship up to the end of the lines and piling it in.

After a couple of these "bounce-around" flights, advance the timer a trifle to keep the plane in the air better with less "up" control. Do not allow the plane to rise higher than twenty feet until after you have made a half-dozen flights or so. Concentrate upon watching the plane instead of the plane and ground together. This minimizes the chance of becoming dizzy.

When you are quite sure of the control reactions try zooming and diving, then wing-overs and wheel-rolling, this last being excellent for developing a good sense for putting the model where you want it. The Goat is not a stunt ship so don't try to loop or fly inverted.