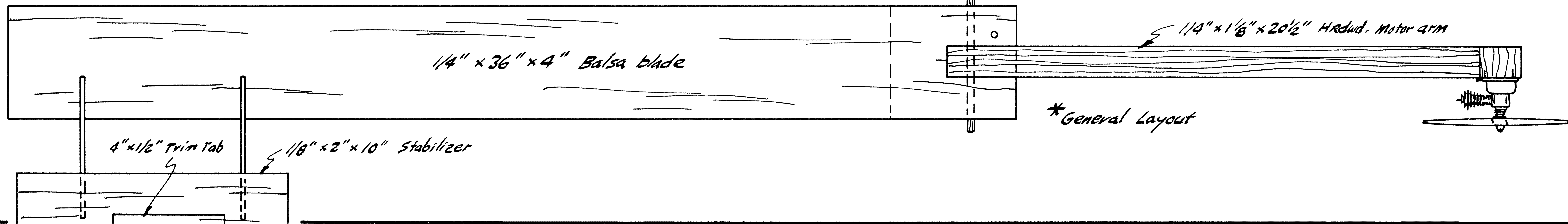
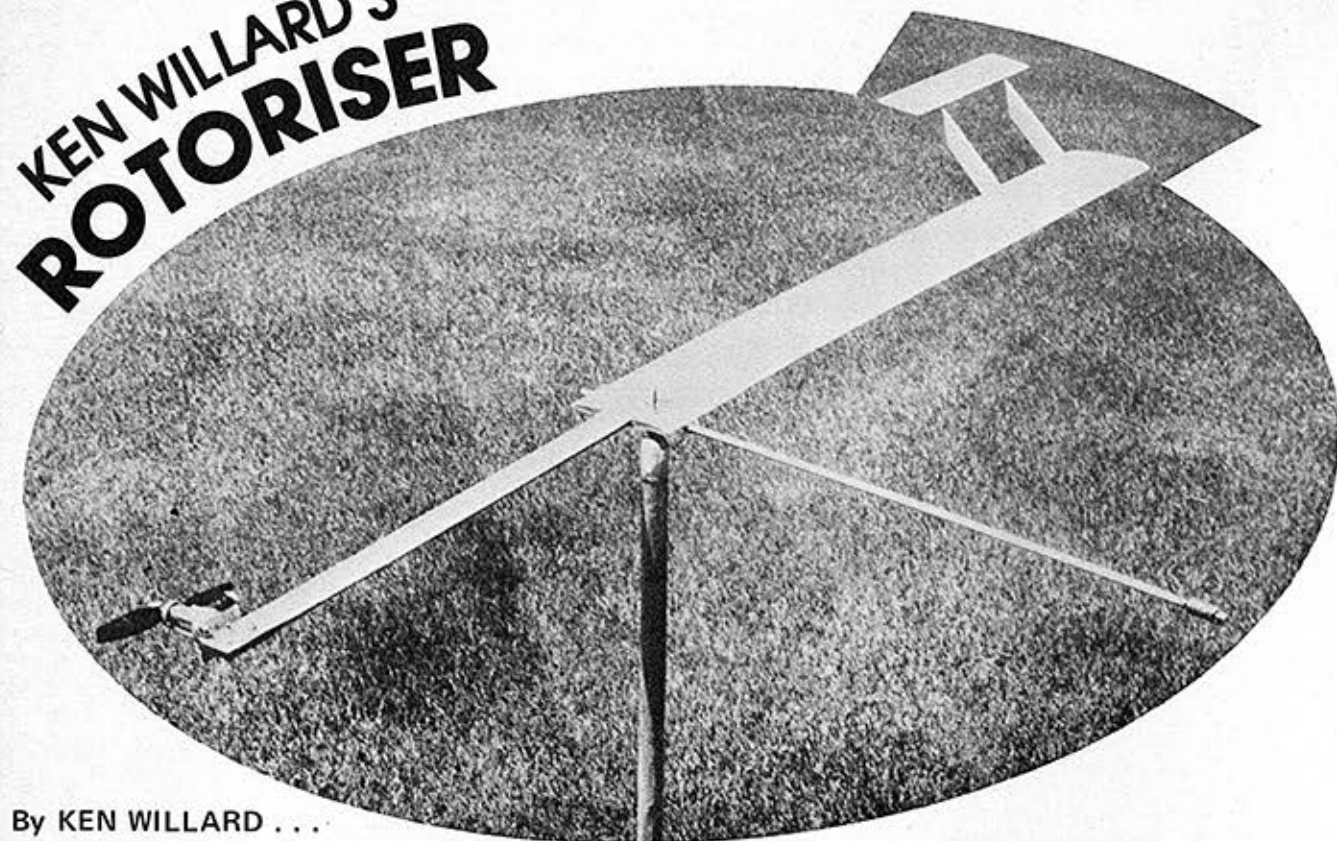


' ROTORISER '

BY: Ken Willard



KEN WILLARD'S ROTORISER



By KEN WILLARD . . .

You could call it a free flight, single rotor blade helicopter and you wouldn't be wrong. The *Rotoriser* is a model you should build when you are in the mood for something simple and exciting.

• The *Rotoriser* is a free flight fun machine. It won't win any contests, nor will it set any records, but you'll have more fun with it than you'll have with many other flying machines, simply because it's easy to build, easy to launch and fly, and, by varying the trim tab on the stabilizer, you can get a wide variety of flight patterns.

The concept of the *Rotoriser* was developed originally by Charles W. McCutchen back in 1954. Various designs based on the concept have been published at times, principally in European magazines. The one which appears here, with some minor modifications which I have added, was designed by a young man in Florida. I saw the machine

in Vince Arias' Hobby World, was intrigued, and figured that you would be equally fascinated by its flight capabilities.

The design concept is generally called the "McCutcheon Machine" after its inventor. However, I chose the name *Rotoriser* because, if you happen to get the .049 reed valve engine going backwards and try to fly it, you'll soon find out that it's a "Rotorooter." (Apologies to the sewer pipe cleaners, of course.) But you won't do that . . . will you?

CONSTRUCTING THE ROTORISER

Construction of the *Rotoriser* is so simple that you can build it in one evening and fly it the next day. So let's make one.

First, assemble all of the various components in a convenient location near your workbench. The bill of materials lists what you will need.

Make the main rotor blade out of the piece of balsa which is 1/4x4x36 inches long. Shape the sheet into a flat-bottomed airfoil as shown in the full-size cross section on the plans.

Cut a slot in the center section of the main blade, 2-1/2x1-1/8.

Insert the end of the 1/4x1-1/8x20-1/2 inch hardwood motor arm into the slot on the main blade and glue it in place.

Reinforce this center section joint with a piece of 1/16x4x4-1/2 inch plywood, glued to the bottom. Then further strengthen it by covering that section

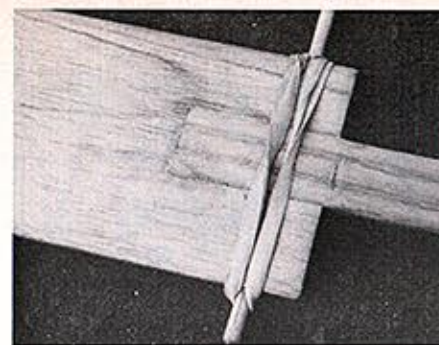
ROTORISER BILL OF MATERIALS

(All measurements in inches.)

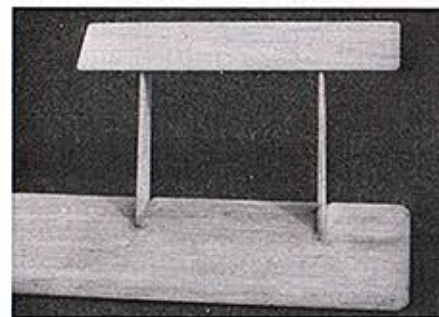
1/4x4x36 Balsa sheet (medium hard).
1/4x20-1/2x1-1/8 Hardwood (basswood, spruce or pine).
1/4x24 Dowel.
1/8x10x2 Balsa sheet (medium).
3/16x12x1 Balsa sheet (medium).
1/16x4x4-1/2 Plywood sheet.
1/2x1-1/2x1-1/8 Hardwood, 2 pieces needed.
1/2-Inch wood screws, 4 needed.
4-1/2x9 Piece of fiberglass cloth.
Some epoxy, glue, and either strip lead or modeling clay for balance arm.

LAUNCH PAD

Three-foot stick.
Three-inch nail.
Wheel collar to fit nail, or washer to solder to nail.



Center section details. Note the rubber bands holding balance boom. No hole drilled yet.



Stabilizer is mounted on the end of the rotor blade. Trim tab is not yet cut out.

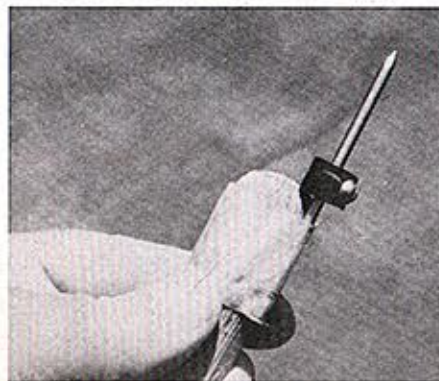


The business end showing the more difficult metal mount. Use a wooden mount!

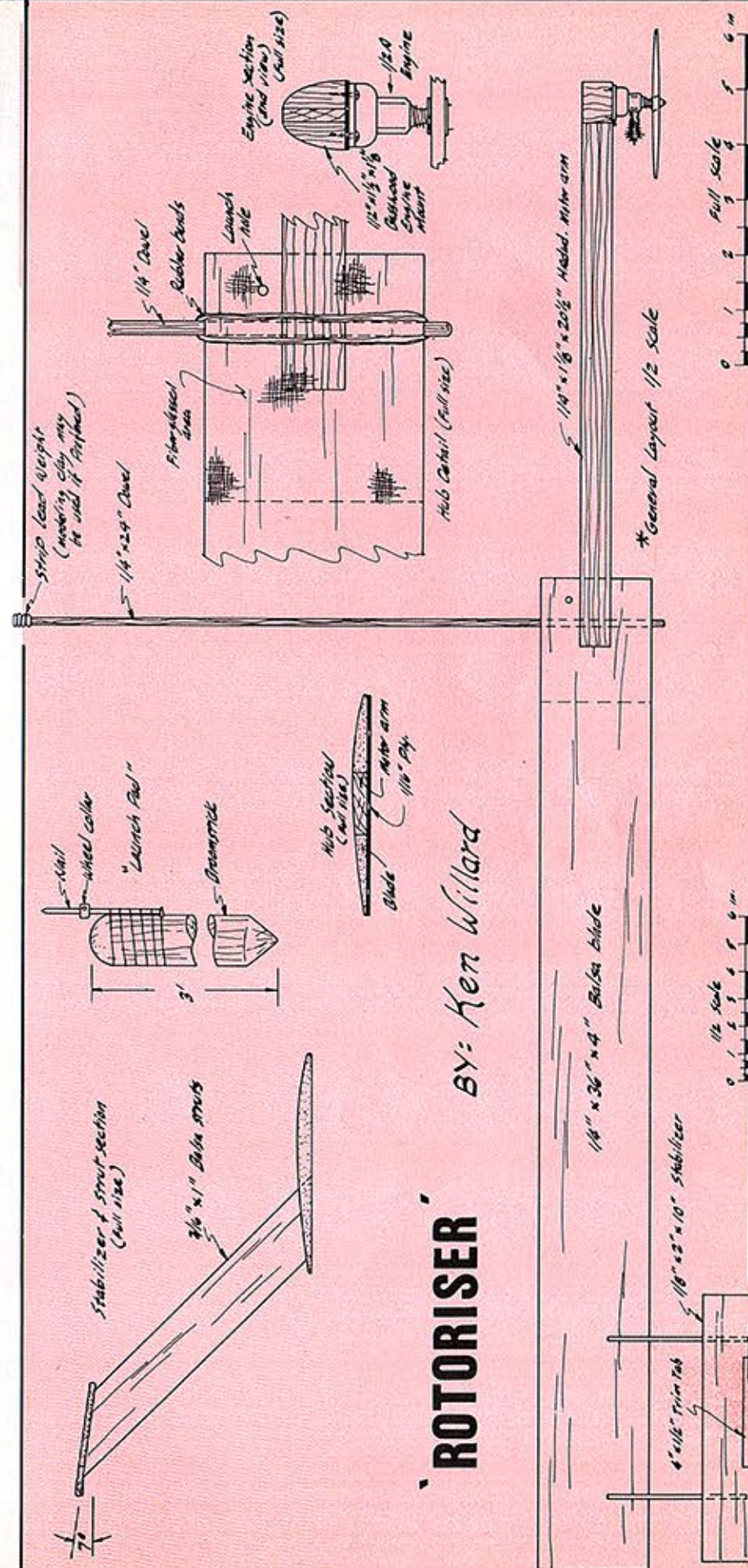
with fiberglass cloth wrapped around it and resined in place.

Make the engine mount by gluing the 1/2x1-1/2x1-1/8 basswood blocks on the end of the motor arm. Shape them to the contour shown in the plans. (The photos show a metal mount, which is optional,

Continued on page 69



Launching pad details. A nail with a wheel collar is taped to a three-foot broom handle.



BY: Ken Willard

ROTORISER

but a bit more difficult to make.)

Next, at the end of the main rotor blade, cut slots at the location shown on the plans, and glue the stabilizer struts in place.

Trim the top of the stab struts at an angle of six degrees to the flat bottom of

the rotor blade. The trailing edge of the stab will be raised about 1/4-inch from the leading edge to achieve this angle. It is not too critical.

Cut out the 1/2x4-inch trim tab on the stabilizer, then attach it to the stab with soft wire (pipe cleaner wire is excellent for this purpose) so it can be bent to various settings.

Glue the stabilizer to the struts.

Dope the entire assembly to fuel proof it. You can use clear dope, or, if you prefer, colored dope to suit your taste.

The balance arm is a 1/4-inch dowel, 24 inches long, with some lead or modeling clay on the end. The arm is held on the rotor blade by rubber bands. That makes it easy to remove and store alongside the rotor blade for ease of transport. It also serves to absorb the shock of hard landings, which do occur at times.

Drill a hole in the center of the rotor arm at the location shown. With this as a balance point, add lead strip or modeling clay to the end of the balance arm until the whole assembly balances. You

might also have to add some ballast at the end of either the rotor blade or the motor arm, depending on the grade of balsa and the amount of dope you used. Naturally, balance it with the engine mounted.

Now, let's make the "launch pad." Cut off about three feet of an old broomstick handle, and tape a nail to the end, pointed end of the nail sticking up. Blunt the end so you don't stab yourself with it. Shave the other end of the stick to a point, so you can stick it into soft earth.

Solder a washer on the nail, or alternatively, attach a wheel collar at the point level with the end of the stick. The nail sticks up about an inch from there. The washer or wheel collar serves as a bearing surface.

Construction is now complete. It's time to make some test flights.

FLYING THE ROTORISER

For your first flights, select an open area preferably covered with grass or low growing weeds. Pick a day when the wind is either calm or very light.

Shove the end of the launching pad into the ground far enough so that the

top end is held firmly in place.

Fuel up the engine, start it up, and adjust it to run. Let it run for about thirty seconds, then set the Rotoriser on the launcher with the nail sticking up through the hole in the center section. Hold the machine level, using the end of the rotor blade, then let go. The Rotoriser will start rotating, gain speed, and then lift off. Watch it carefully, because it may be slightly out of balance and sway towards you. Get out of the way and let it continue. It will stabilize and climb up until the engine stops, then autorotate down.

The rate of climb will be determined by the angle of the stabilizer and the setting of the trim tab. If you want a fast climb, set the trim tab even with the stabilizer. For slower ascent, bend the trim tab slightly down. With some experimentation, you can actually get the machine to lift off and spin slowly up to about ten feet, then wander around until the engine stops. Or, set the trim tab up, and the Rotoriser will virtually disappear overhead . . . but the autorotation coming down is pretty ragged. It's your choice.

If it so happens that the ground is too hard to stick the launching stick into the turf, you can launch the Rotoriser by hand. But it's a pretty sporty course.

There are two ways. One is to hold the Rotoriser at the center section with the engine running, then launch it upwards with a twisting, clockwise action, then get out from under it, fast!

The other way gives you a bit of leeway, although you still have to be alert. With the engine running, hold the Rotoriser by the end of the rotor blade, then toss it into the air with a spinning action in the same way that you toss a Frisbee. Do it level, or it will circle out and around and come right back towards you.

Obviously, the safest way is to use the launcher.

When the Rotoriser is in powered flight, the noise is sort of a "whomp, whomp, whomp" as the blade rotates. It will draw kids to it like a light draws moths.

As I said in the beginning, it's a real fun machine, both for you and your spectators. Kids love it.

At least, kids like me and you! ●