

# Getting started in model rocketry

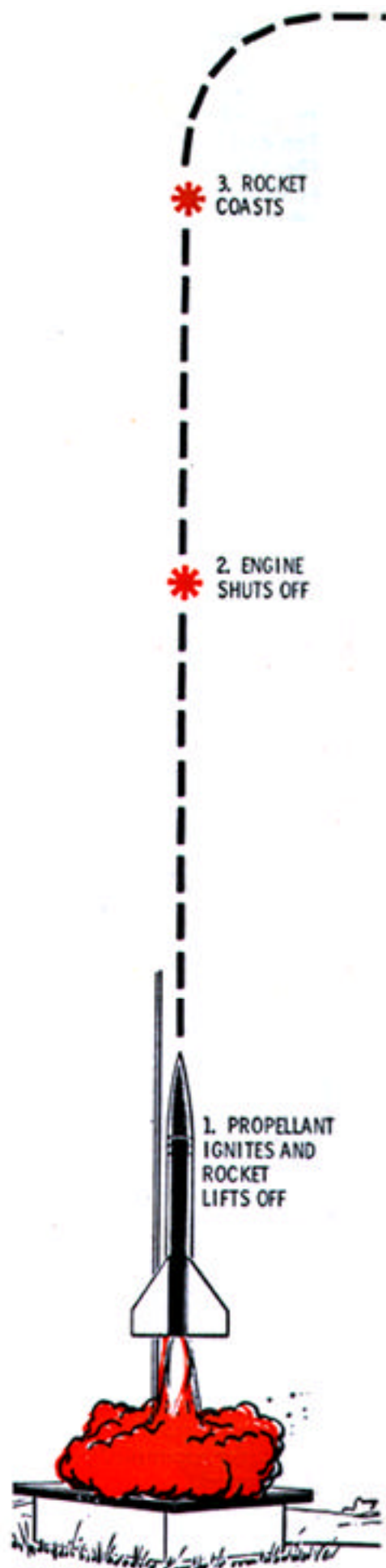
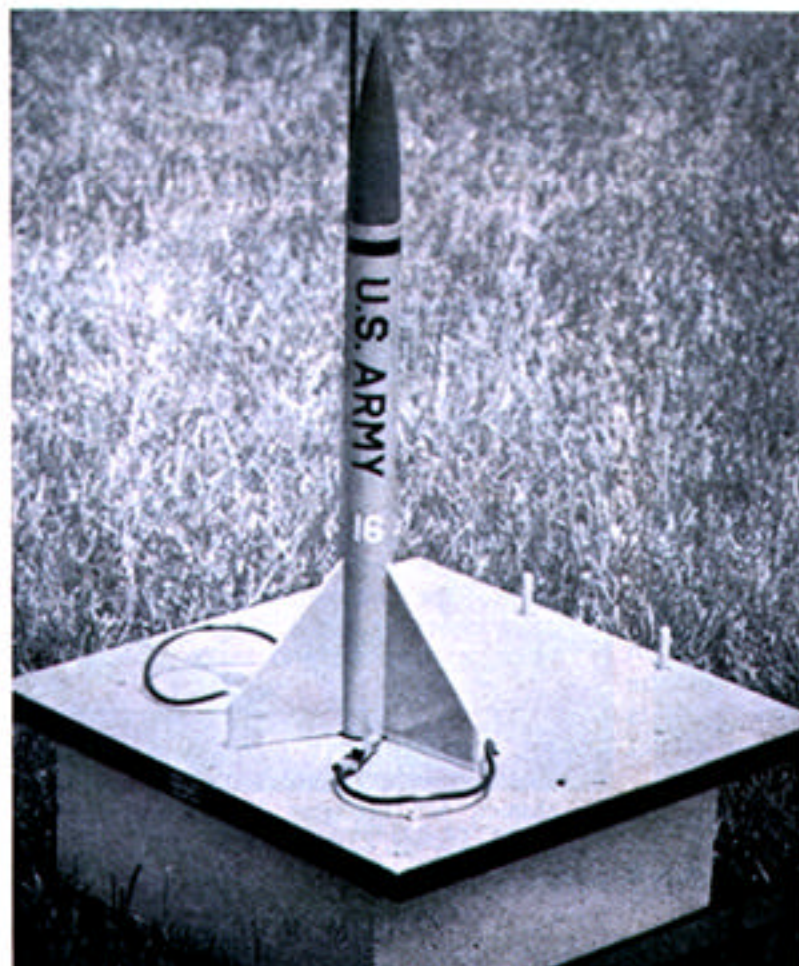
Here's how to build a battery-operated launcher, a remote-control firing station and a solid-fuel ship to make this modern hobby safe and exciting

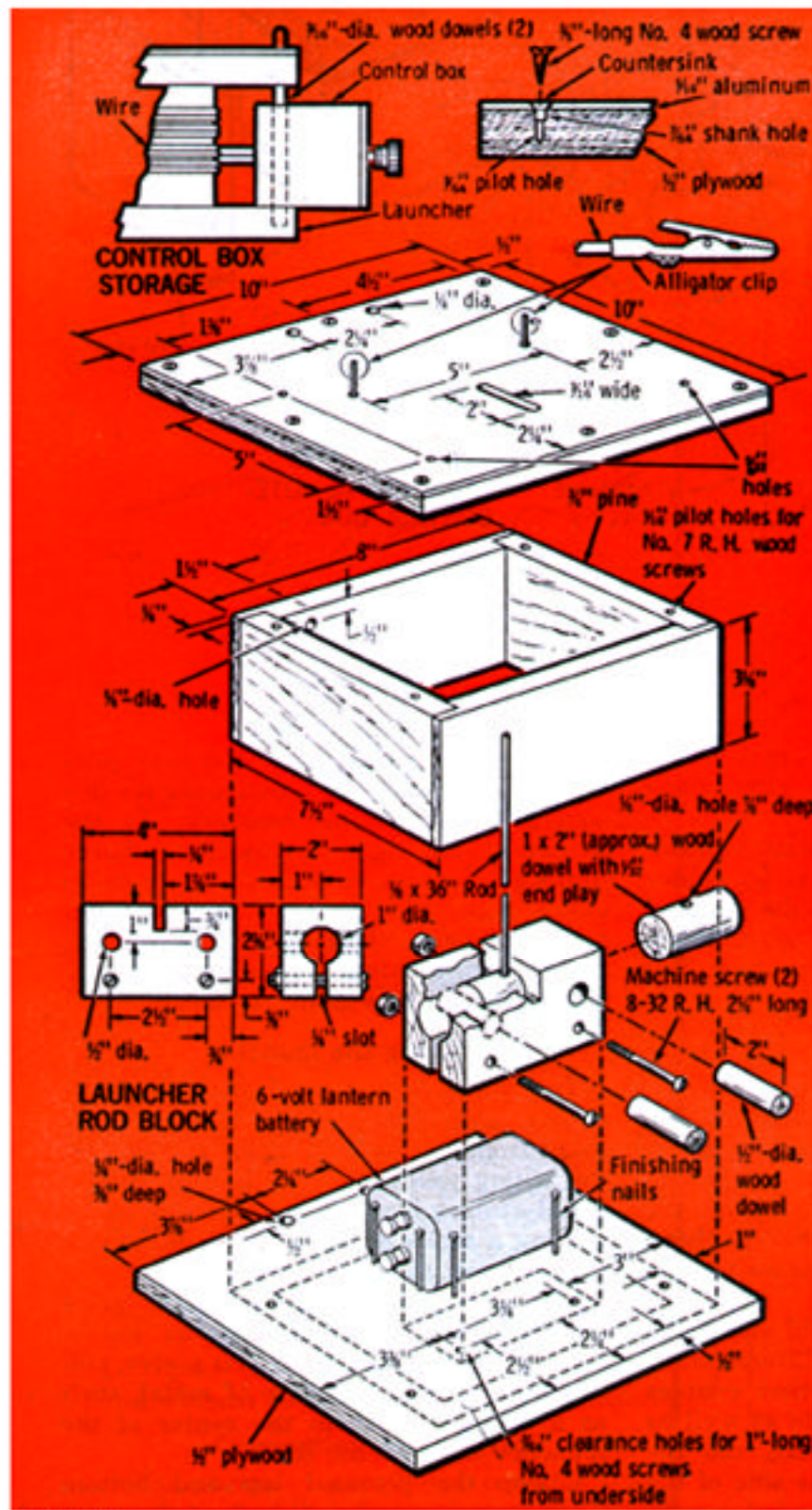
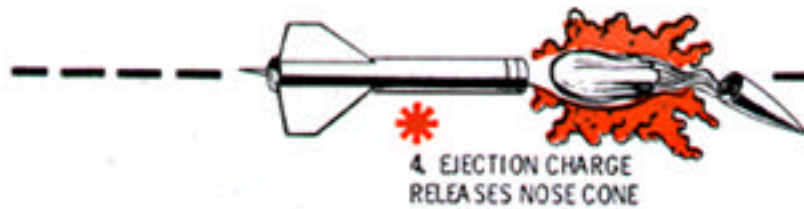
By EUGENE FLORIDA

Technical art by Don A. Evans Illustration by ZIK Associates, Ltd.

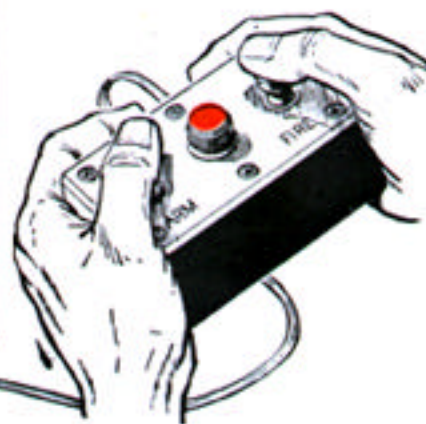
ALL OVER THE COUNTRY dads are helping sons build model rockets for the same reason they used to monopolize their youngsters' electric trains. The fact is, for any age, there's a lot of thrill and challenge in fashioning a slim, gleaming, needle-nosed projectile and watching it streak skyward in a fiery blast of its engine.

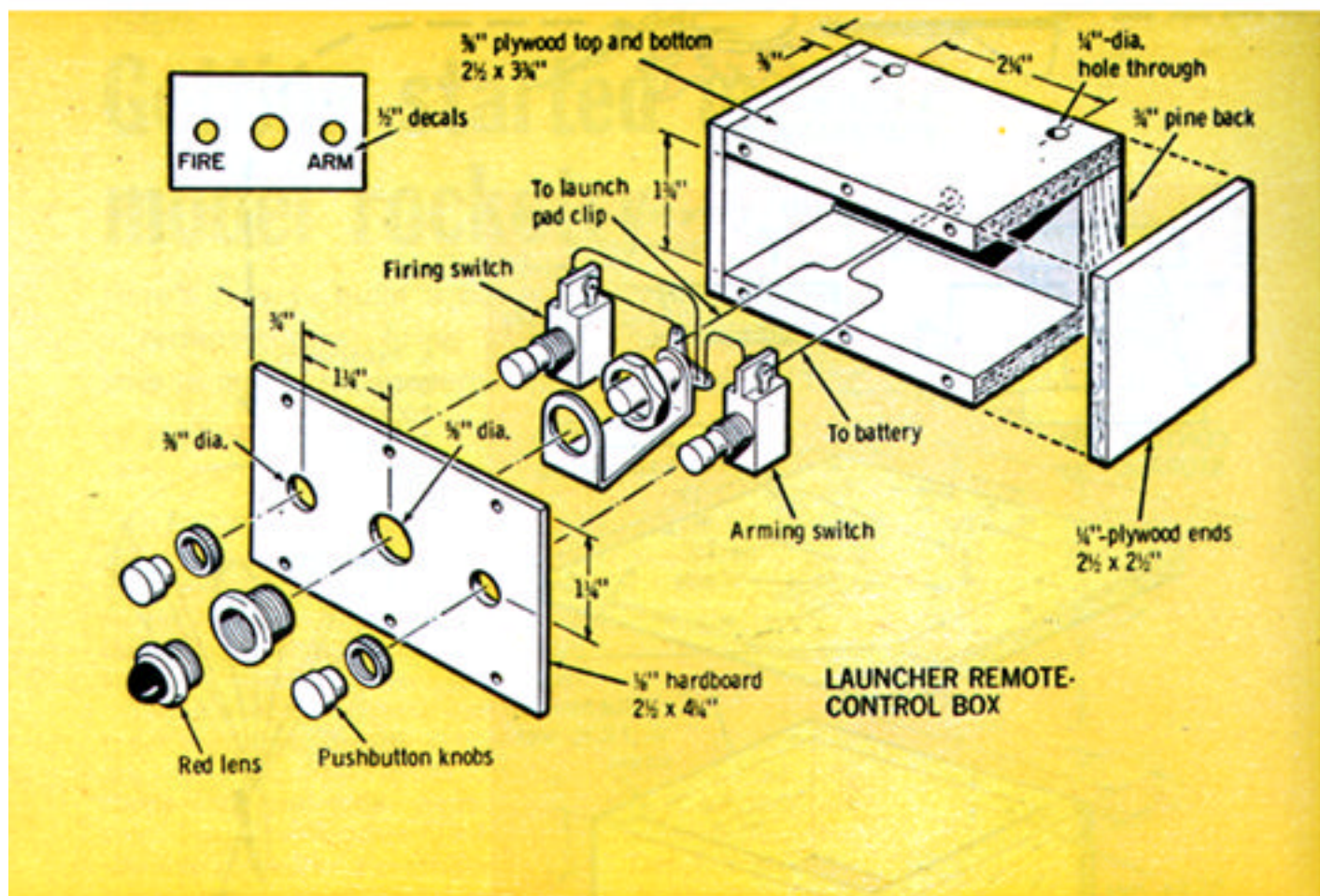
Today's model rockets come in a fascinating array of types and sizes. They're safe when handled with care and are easily assembled from kits and parts sold by hobby shops and mail-order houses. The rocket engines are simple cardboard tubes filled with a solid propellant that slip into place like a cartridge in a gun. Depending on the size of engine used, model rockets can reach altitudes of 1000 feet or more. The propellant is ignited electrically





5. PARACHUTE  
OPENS AND  
ROCKET FLOATS  
TO EARTH





by a special Nichrome wire, supplied with each engine, that heats to a glow when connected to a battery.

The remote-control launcher shown here adds to the fun and safety by allowing you to set up a rocket on the pad and then move well away for the actual firing—just as big rockets are launched. The

battery is built into the launcher's base, and the portable control box is connected to it

by 15 feet of wire. A clever two-button control eliminates any chance of firing the rocket accidentally—you have to have both buttons pressed at the same time to complete the circuit.

The launch rod used to hold and guide a rocket during the initial lift-off stage has a novel tilting feature that enables models to be fired at an angle as well as straight up. For easy handling, the remote-control box stores in the side of the launcher, and its wire is coiled neatly around the base.

While any rocket can be used with the

launcher, the model suggested here provides a lot of exciting action since it's designed for parachute recovery. At the height of its flight, an ejection charge blows off the nose cone, a miniature parachute pops out, and the rocket floats gently to earth. Just under a foot long, it's a trim-looking, yet simple, design that's easy for a beginner to tackle.

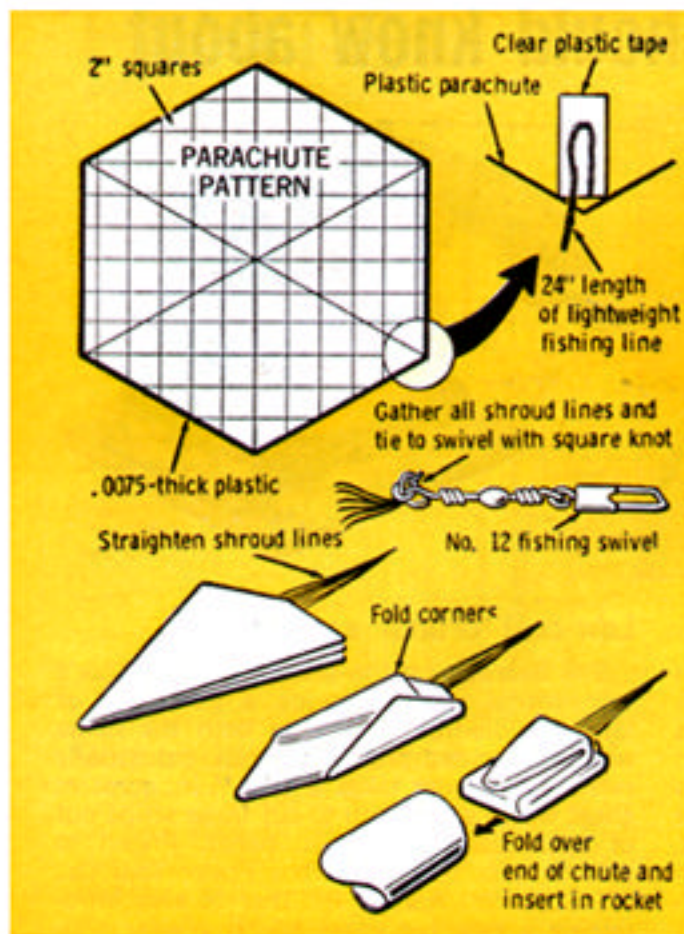
#### Making the launcher

The launcher is topped with a 10-in.-square aluminum plate to protect the wood from the rocket's blast. The slot for the tilting guide rod can be cut with a metal-cutting blade in a saber saw or by drilling a series of  $\frac{3}{16}$  in. holes and filing out between them.

The full-width aluminum plate gives the launcher a sleek appearance but is not absolutely essential. If you prefer, you can fasten a smaller piece of metal, such as a coffee-can lid, in the center of the launcher to catch the blast.

Clamp the plywood top and bottom pieces together and drill both at the same time for all holes that line up. The sides are assembled as a unit first to form a





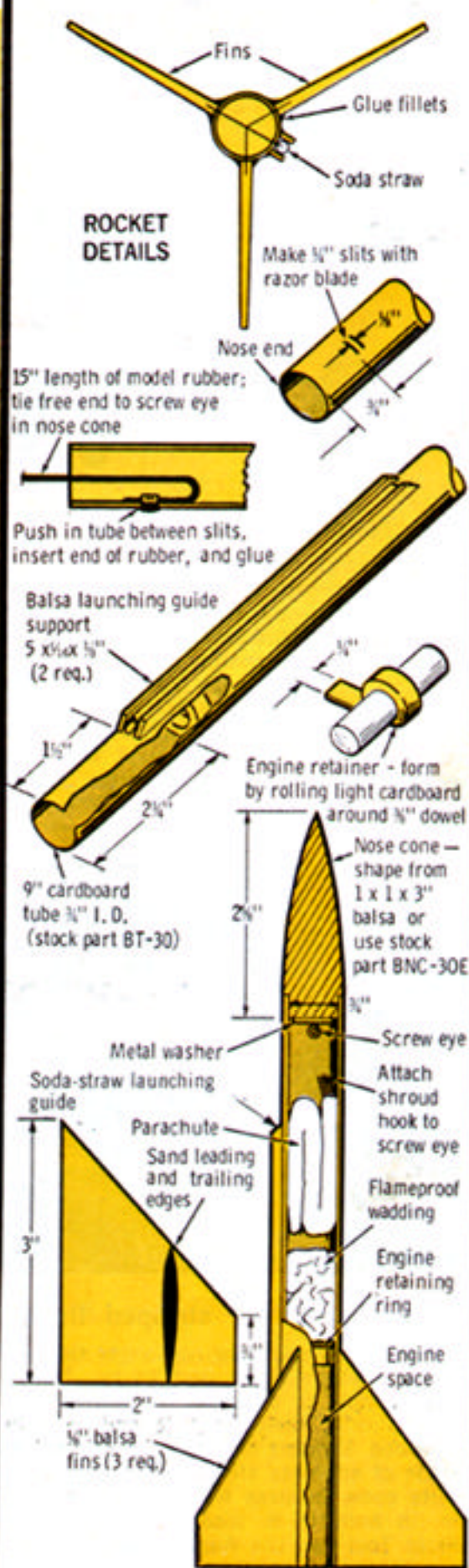
box; then top and bottom are screwed on.

The tilting mount for the launching rod consists of a  $\frac{3}{4}$ -in. dowel clamped snugly in a split block. Tighten the block just enough so that the dowel is free to turn but will hold in any position. This way, you can tilt the rod and it will stay until you move it. Half of the block is screwed rigidly to the base, and the other half is free to adjust pressure on the dowel.

For firing power, a 6-volt lantern battery is concealed inside the launcher. If you prefer, you can also use four regular  $1\frac{1}{2}$ -volt flashlight batteries wired in series to provide 6 volts. Two wires with alligator clips on the ends run up through the launching platform for connection to the rocket's ignition wire. To keep the blast out of the guide-rod slot, a small disc of metal with a hole in the center can be slipped on the rod. It will slide with the rod without hampering its tilting feature.

#### Connecting the control

The portable control box contains two normally open pushbutton switches and a pilot light. The circuit is arranged so that  
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## MODEL ROCKETRY

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the first button, labeled "Arm," turns on the power and lights the pilot lamp. Although electricity is passing through the ignition wire, the wire does not heat up because the current is being used by the bulb. The second button, "Fire," shorts out the pilot lamp so the light goes off and the wire gets red hot. If either button is pushed alone, the rocket can't fire.

Be sure to test out the control before firing an actual rocket. Follow the accompanying diagram for wiring the switches and lamp. Attach the clips on the launcher to a spare ignition wire without inserting it in a rocket engine. The wire should heat up only when both buttons are pressed. Pushbutton switches and 6 to 8-volt pilot-light assemblies are available at radio-parts stores or from mail-order houses like Allied Radio in Chicago and Lafayette Radio, Syosset, N.Y.

Solder all connections. Drill two holes down through the control box to match the holes in the top and bottom of the launcher. Short dowels through these holes pin the control box to the launcher when it's not in use.

### Making the rocket

While you can make your own rocket body, it's generally easier and better to start with a stock part. Commercial bodies are thin, lightweight cardboard tubes that come in different lengths and diameters. These and other rocket parts are available from Estes Industries, Inc. of Penrose, Colo., one of the biggest model-rocket supply houses.

The rocket shown here is based on a 9-in. body tube with an inside diameter of  $\frac{3}{4}$  in. This is Estes part No. BT-30. You can buy a stock nose cone to fit (Estes No. BNC-30E) or shape your own from balsa. The fins, parachute and other odds and ends are all homemade.

The only tricky part is installing the engine retaining ring. This is formed by winding a strip of  $\frac{1}{4}$ -in.-wide cardboard around a  $\frac{3}{8}$ -in. dowel until you build up a ring that will fit snugly inside the body tube. Apply glue to the strip as you wind. When the ring is complete, slide it into the body tube just ahead of the engine.

Since the rocket is designed to use  $2\frac{3}{4}$ -in.-long engines, position the ring  $2\frac{3}{4}$  in. from the after end of the body tube. You can use an actual engine to push the ring in place, stopping when the rear end of the engine is flush with the end of the body. Coat the inside of the tube with glue at the proper point first. Be sure the ring is firmly anchored as it must with-

stand much of the engine's forward thrust.

A short length of soda straw cemented to the side of the rocket provides a guide for the launching rod. The rod is inserted in the straw and supports the rocket at the desired angle on the launcher.

The parachute is made from plastic drop cloth or cleaning-bag material. Attach shroud lines and tie their ends to a small fishing swivel of the type that comes with a snap hook. Clip the swivel to a small screw eye in the end of the nose cone. Also run a length of rubber from the screw eye to the rocket body as shown. This keeps rocket and nose cone together when the parachute is released.

### Blasting off

The rocket is prepared for flight by packing the space above the engine with about  $1\frac{1}{2}$  in. of loose mineral-wool insulation. This protects the parachute from the hot ejection blast. Dust the parachute with talcum powder before inserting it in the rocket so it will slide out and open up easily without sticking. To prevent the plastic from taking a set, don't store the chute in the rocket for long periods. Keep it unfolded until minutes before use.

Rocket engines are rated according to the amount and duration of their thrust. The first few flights should be made with a modest  $\frac{1}{4}$ A.8-2 engine so you can become familiar with the rocket's characteristics at low altitudes. This engine has a 17-second thrust duration. Later, you can try a more powerful  $\frac{1}{2}$ A.8-2 engine with a 40-second thrust. Both engines have a 2 to  $2\frac{1}{2}$ -second time delay before the ejection charge. They should give flights of 100 to 200 feet or better.

Wrap the engine with masking tape to provide a tight fit inside the body tube. To attach the ignition wire, bend it at the middle to form a V with a rounded point, and press this point into the small hole in the back end of the engine. The wire is held in place by tamping a tiny wad of tissue paper into the hole on top of it. Attach the battery clips to the wire and you're ready to fire.

Before you blast off, here are a few final tips: In some states, rockets may be classed as fireworks and declared illegal so be sure to check the situation in your area before going ahead. In any case, never attempt to make your own propellant and use only engines recommended for your particular size and type of rocket. Don't launch a rocket at more than  $25^\circ$  from vertical or it may fly off dangerously close to the ground. Watch your eyes around the point of the 36-in.-tall guide rod, and stay at least 10 feet away from the rocket during a launch. ★★