

Low Cost Rocket Launcher Plans

For the launch pad, bulk, easily available wood was chosen. First a launch pad base was designed from a 2 X 4 with legs from 1 X 2's. Both easy to find and both cheap. A classic three leg design was chosen for ease of use by the students. A tilting option was built in to the design yet no complicated mechanisms were used.

Construction consists of a triangle base, cut from a 2 X 4. Using a table saw set to 30 degrees. An angle cut is made on the end of the board. After which the board is turned over and another angle cut is made which produces a wooded triangle.

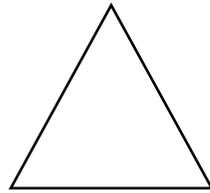


Figure 1. Each cut is made 30 degrees from the vertical. Remember to flip the board over after the cut.

To complete the base construction, 7/16 inch holes are drilled in the center of each side. Absolute center is not needed.

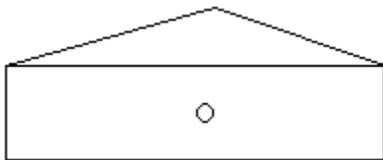


Figure 2. Side view of the launch pad base showing the 7/16 inch hole. Drill a hole in each side. Centering the hole by eye is adequate.

One last hole is needed. This hole is a 1/8 inch hole drilled most, but not all the way through the block in the center of the triangle shaped top.

Now for the legs. They are simple 11 inch cuts from a 1 X 2, sometimes called furring strips. Your pad will need three. After they are cut, drill a 1/4 inch hole in the middle of the wide side about 3/4 inch from one end.



Figure 3. One of the three legs required for each launch pad showing the location of the 1/4 inch hole.

That's all the construction you need to do. Now some premade parts. The pad will need 3 "Hanger Bolts" These are special bolts with screw threads on one end and machine threads on the other. Ask for 1/4 inch 20 hanger bolts, 2 inches long. Here the "20" refers to threads per inch. You also need three wing nuts size 1/4 inch 20 for each pad. You will need a launch rod. For these, visit a welding supply store and ask for 1/8 inch rods 36 inches long. Tell them what you are doing and most of the time they will sell you a rod at cost. You will need a soup can lid with a 1/8 inch hole drilled in the middle.



Figure 4

Assembly method and order.

Thread the wing nuts onto the hanger bolts. It will only go on one end (not the pointy end). After all are threaded, use the wings nuts as handles and twist the other end of the hanger bolt into the holes drilled in the side of the triangular base block. Do this for each of the three bolts. Then using one of the legs as a hammer, tap the wing nuts in the opposite direction they were inserted in order to loosen them, yet leaving the hanger bolts in place. After they are loose, the wings nuts can be removed leaving only the hanger bolt in the block. Now place the legs onto the base block

by putting the hole in the leg over the hanger bolt. Then rethread the wing nut to hold the leg in place. After all three legs are done. The launch rod is pushed into the 1/8 inch hole on top of the block. To complete the pad, the tin can lid blast deflector is slid down over the launch rod. In use, the legs can be adjusted to tilt the pad for wind conditions.

The electric launch controller.

Start with the base of the controller onto which everything else is attached. This turns out to be a simple piece of 1 X 4 wood 6 inches long. Figure 5 is a dimensioned drawing of the base and the holes you need to predrill.

Next you will need speaker wire. You will also need the following materials which can be ordered online.

- (2) 13AC120 test clips (micro clips for the igniter).
- (1) 12BH348 4XAA battery holder.
- (1) 604-L934SGC LED 1 for each controller.
- (1) 300 ohm resistor.

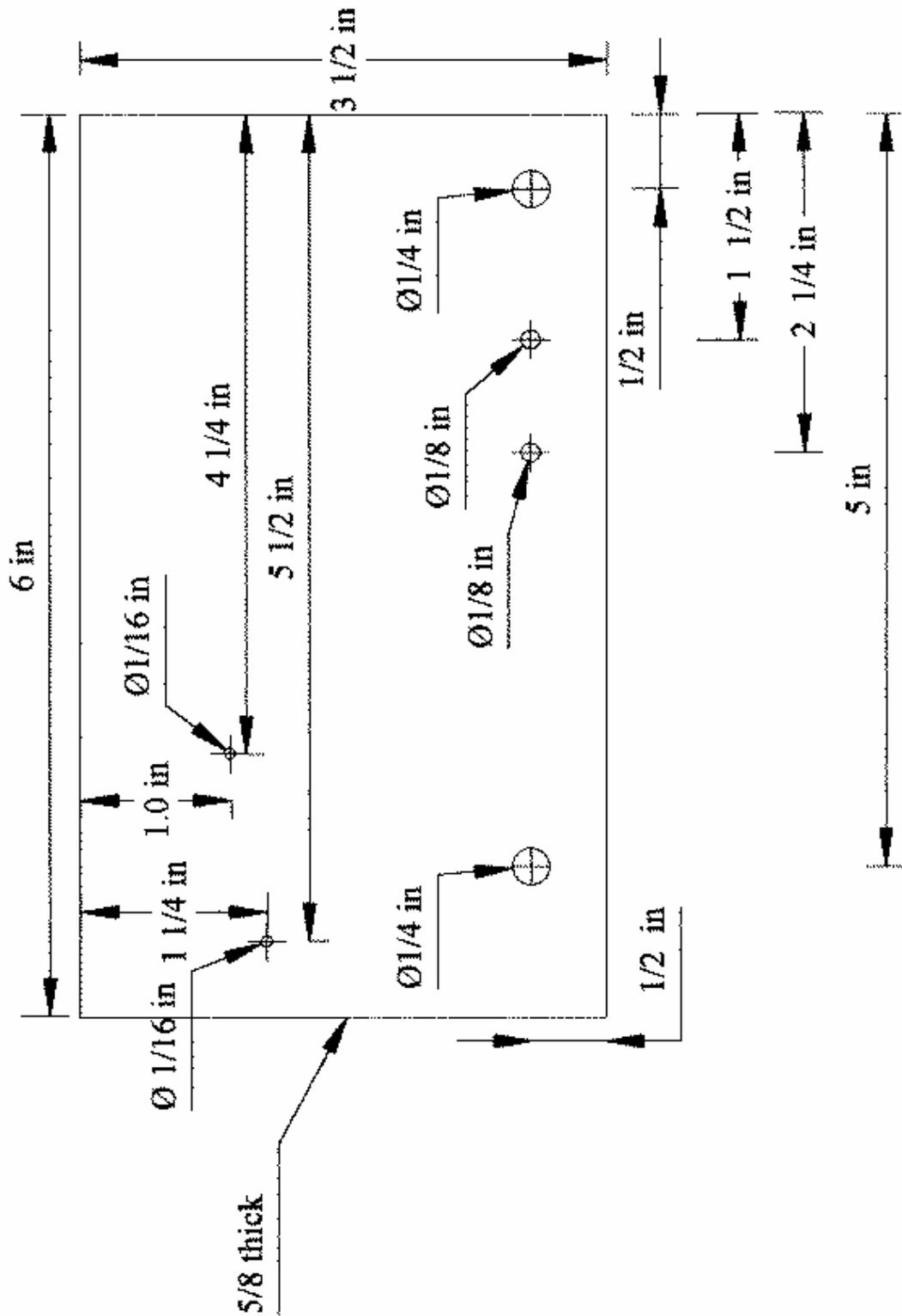
From an office supply store:

- A 1 inch bulldog clip



These following items can be found at any building supply store.

- (2) 6/32 by 1 1/2 inch machine screw
- (2) 6/32 nuts
- (2) #6 X 1/2 inch sheet metal screws.
- One piece of aluminum flashing used for roofing repairs.



Cut the speaker wire into 15 foot lengths. Strip and tin (ask an electronics buddy for help if you don't understand this) about 3/4 inch of the wires on one end and solder the micro clips to the two leads on the other end of the wire.

Solder the led and resistor together and form them into a “C” shape. With one lead of the LED forming the top of the C and one lead of the resistor forming the bottom of the C. Ends of the C should be about 1 and 1/4 inch apart. I also put a curl in the ends of the leads to help them fit around the screws that will hold them down. See figure 6 for a better idea of what this looks like. Note that the LED will only work if it is put in correctly. Try it out first. If it does not work, reverse the LED. Notice that one leg of the LED is longer than the other. Once you figure out which way it should go, use this to help make all the LED/Resistor assemblies correct.

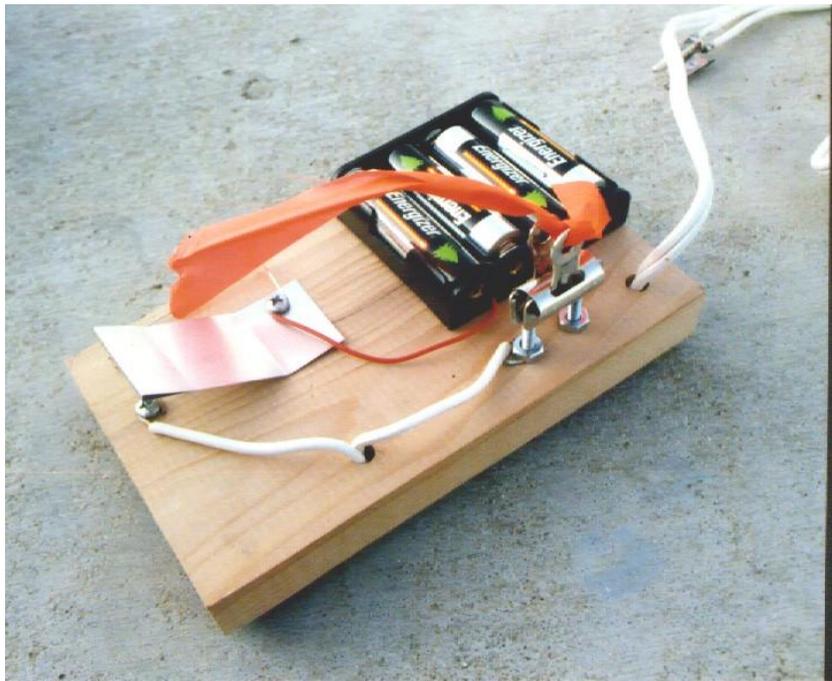


Figure 5

Cut a piece off of the flashing 1 inch wide and 3 inches long. Now fold 1/2 inch of one end over onto itself to form a double thick end. About 1/2 inch from the other end put a bend in the metal to make this switch stand up from the wood when it is attached. Attach the aluminum strip to the wood with the sheet metal screw as shown in the picture. Also drill a 1/8 inch hole on the left side of the switch about 1/4 inch from the side. Insert a sheet metal screw into this hole to hold one end of the speaker wire. Look at the picture in figure 5 to help make sense of the written description. Dimensions of the switch are not critical.

Assembly order of the launch controller is not critical and since the design is so simple the photographs in figures 6 and 7 will tell you just about all you need to know about where the parts go.

It is best to start by hot gluing the battery holder into the upper left corner of the base. Using the tinned end of the speaker wire thread the 15 foot length of wire down into the large 1/4 inch hole close to the top of the base and then up through the other large 1/4 inch hole. Push the machine screws up through the bottom of the base and use the nuts to hold them in place. Once again follow the picture to determine the hookup.

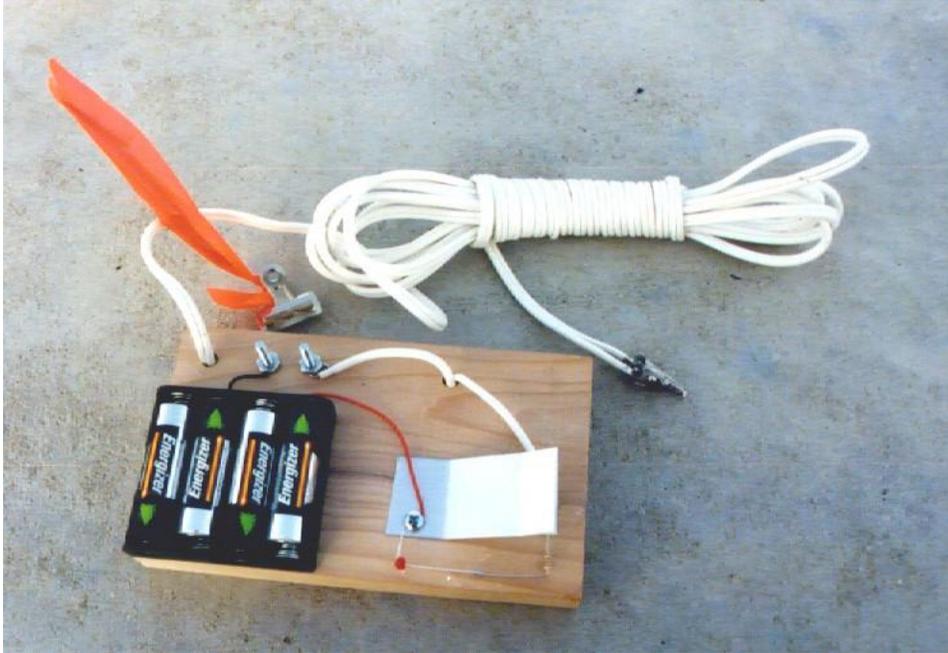


Figure 6

Once complete the controller is used by inserting 4 AA batteries according to the diagram on the battery holder. To arm the controller **after** the rocket is connected, clip the bulldog clip to the top of the machine screws. This completes the circuit and, if the igniter is hooked up correctly, will light the LED. Pressing the switch will complete the circuit and send the rocket skyward.



Figure 7