Tech Tips 008

A help series

Dedicated to the dissemination of Detail model building methods and techniques. Materials and methods presented here are not intended as the best or only solutions to the modeling challenge(s) discussed, rather as methods and procedures which have a proven record of success in actual use. Please keep experimenting with new materials and techniques, as this is the only way to expand the fields of knowledge.

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Piston Launchers

Parts List

a. 3/8" OD x ¼" ID x 22" long aluminum tube

Make sure you get this exact size tubing. It can be purchased from local aluminum/steel suppliers, and you may even find it at some well-stocked hobby stored. This tubing if often found in the "trimedge" molding rack, and comes in lengths of 6 or 12 feet. Average cost is $0.85 per foot.

b. 3/32" ID brass tubing, 2 pieces 1" long

c. ½" ID brass tubing, 1 piece 3" long

Both of these are usually found in 12" lengths and are available at most hobby shops. Average cost is $1.20 and $1.85, respectively.

d. 18-gauge hookup wire, 4 feet

Available from Radio Shack for $2.99 a roll.

e. 3/16" diameter rod, 3" long

An old aluminum launch rod will work, or purchase a piece of 0.187" music wire at the hobby shop. Cost is about $1.05.

f. 2 x 2 x ¾" wood, plastic, or other material for use as the base block

g. 13 mm body tube, 18" long. Book price $2.10

h. JT-5 body tube coupler. Book price $1.40

i. 1/4 x 1-1/2 x 1/64" plywood (1/32" plywood will work)

j. #8 x 1" wood screws, 2 each

k. masking tape

l. cyanoacrylate adhesive

m. epoxy

Construction

Begin by fabricating the 3/32" tube with plywood insulator assembly (Figure 1). Cut a 22" section of the 3/8" aluminum support tube. After passing the wires through the tube, insert the subassembly approximately 2/3 the way into the tube and secure in place with CA.

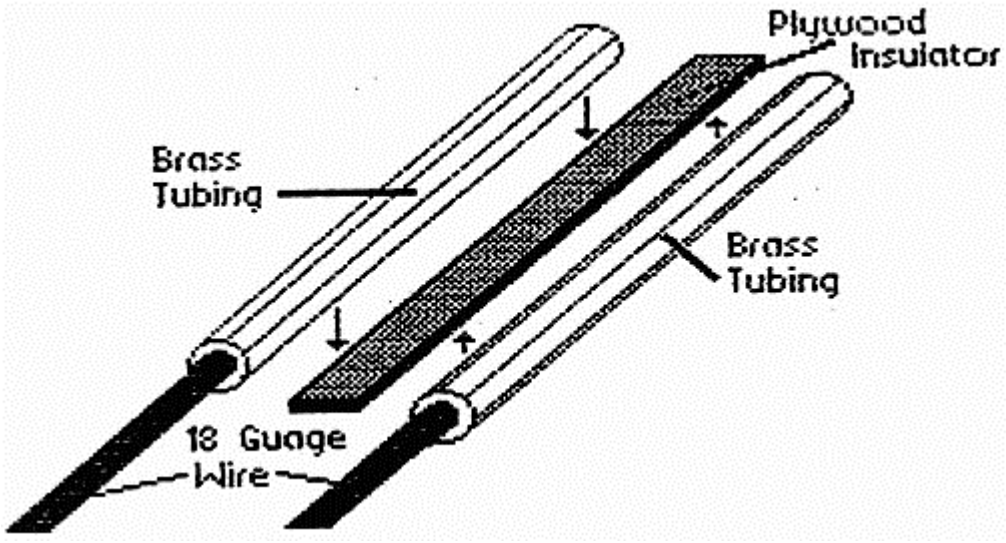

Figure 1. Plywood insulator subassembly

Build up two sections using ¾" masking tape around the tip of the 3/8" tube, allowing the 1/8" brass head tube to be pressed on. Adjust it so that ¼" of the 3/32" brass tube assembly protrudes above the ½" piston head. Fill the void between the ½" head and the 3/32" igniter tubes with epoxy (Figure 2). **Do not allow epoxy or CA to get into the two 3/32" tube ends.**

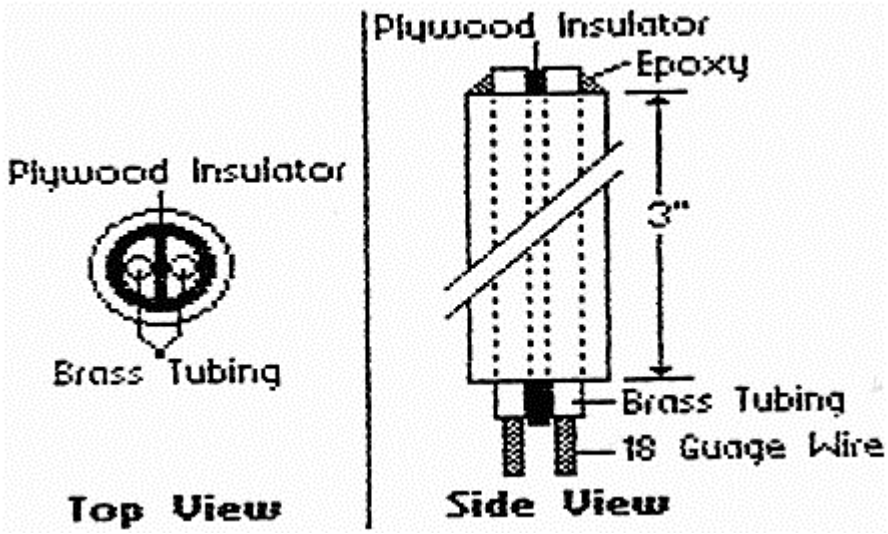

Figure 2. Piston head completed assembly

While that assembly is drying, epoxy the JT-5 into one end of the BT-5 body tube. When both are dry, slide the tube onto the piston, with the coupling end on last. The tube should slide evenly, with little or no wobble, up and down the length of the tube.

Drill a 3/8” hole and a 3/16” hole, about ½” from the edges of the 2 x 2 block, parallel to each other. The 3/8” hole will extend all the way through the block, along the ¾” edge. The 3/16” hole can stop short of the top.

Insert the wires and 3/8” tube through the hole and extend it about ½” below the other side. This should be a fairly tight friction fit. Push the 3” piece of 3/16” rode or music wire into the remaining hole. This rod can be epoxied into place. The piston launcher is now all but complete. The only remaining question is how to make removable stops for the 3/8” piston tube and block junction.

There are several methods. The easiest would be to wrap masking tape around the 3/8” tube, starting 2-1/2” from the bottom. Build up enough tape to form a stop, then install into the wood block. Wrap tape around the base of the tube to prevent it from being pulled.

The next method is to drill two 1/8” holes in the tube, ½” and 2-3/8” from the bottom. This must be done BEFORE the wires are inserted. Use 1/8” hitch pins or cotter pins to keep the tube from pulling out.

Another method is to drill two set screw holes in the wood base block, intersecting the 3/8” rod from the side. Thread wood screws into the holes before the piston support tube is inserted. Remove the wood screws, file the points flat, then reinstall. Gently, but firmly, tighten on the piston support tube.

Our last method is to locally manufacture thumb screw slip collars. Drill the threads from two 3/8”-16 hex nuts. I used brass, but aluminum, stainless steel, or even polished steel will do. Next, drill and tap one of the flat hex faces to accept a 6/32” thumb screw. Install on the 3/8” piston support tube/base block joints.

You may wish to try a combination of these methods, or perhaps develop you own. Remember, the need for removable stops is important. Eventually, the paper piston tube will split, burn, or just wear out. Quick removable stops will allow field replacement of the tube in just a minute or two.

One last word: 18-mm and 24-mm pistons can also be manufactured by adapting this basic design. Now, give it a try. After all, model rocketry is FUN!