E-zine Newsletter
Issue #4

A Unique Dethermalizer for Parachutes

Lightweight design offers good reliability and no smoke or fire.

By Tim Van Milligan

Note: This article has appeared twice before. Once in the Journal of the International Space Modeling Society, and again in Apogee Techinical Publication #20.

I'm writing this plan based on a sample of the S3A dethermalizer that Phil Barnes sent me, for this purpose. First, I agree with Phil that this dethermalizer is one of the more ingenious ideas I have seen in a long time. The operation of the device is very simple, and reliability should be very high.

The design originated from the free-flight glider world, and was published by Jerry Zierdt. Phil Barnes got the idea from Bob Parks, via Dave O'Bryan; but it appears Phil has done a lot of work adapting the dethermalizer for use in model rockets. Hats off to Phil.

Although the operation is simple, construction of this device is a little bit harder. You cannot make one simple drawing of this thing, because it has a lot of little hidden items on it that are all very critical. So, a lot of the drawings are redundant, but I couldn't get everything into a couple of drawings, and even if I could, they would be so cluttered that it would be hard to decipher.

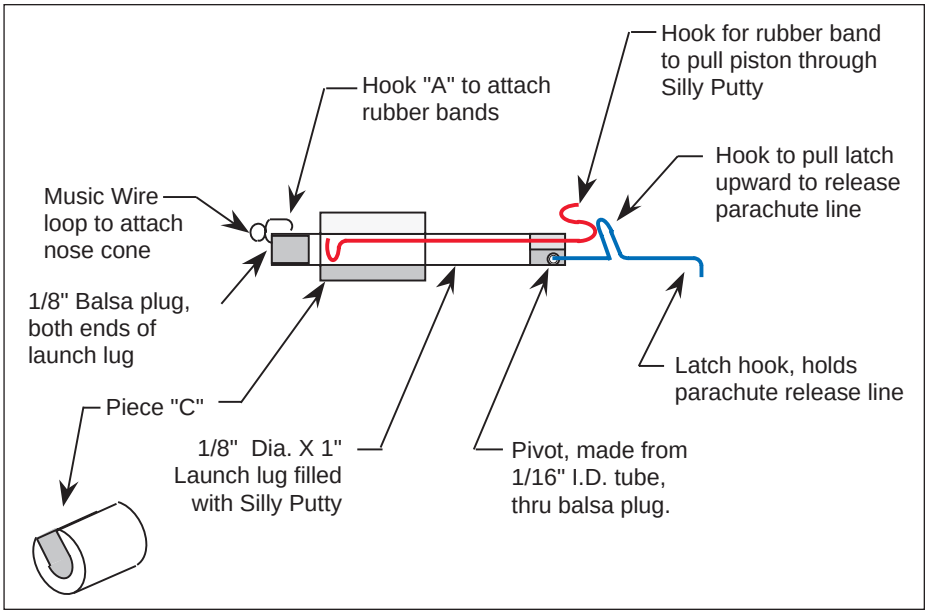


Figure 1: The heart of the "Silly Putty" dethermalizer; the piston.

Figure 1 shows the heart of the dethermalizer, which is the "Silly Putty" piston. Yes, I said *Silly Putty*! This magic material, invented in 1949 is really a very thick and highly viscous liquid. The putty is held inside of a 1/8" launch lug that is plugged on both ends. On one end of the tube (for lack of a better term, *the Front*) a fixed music wire loop is attached. This loop serves two purposes, to attach the dethermalizer to the nose cone, and to hold the small orthodontic rubber bands.

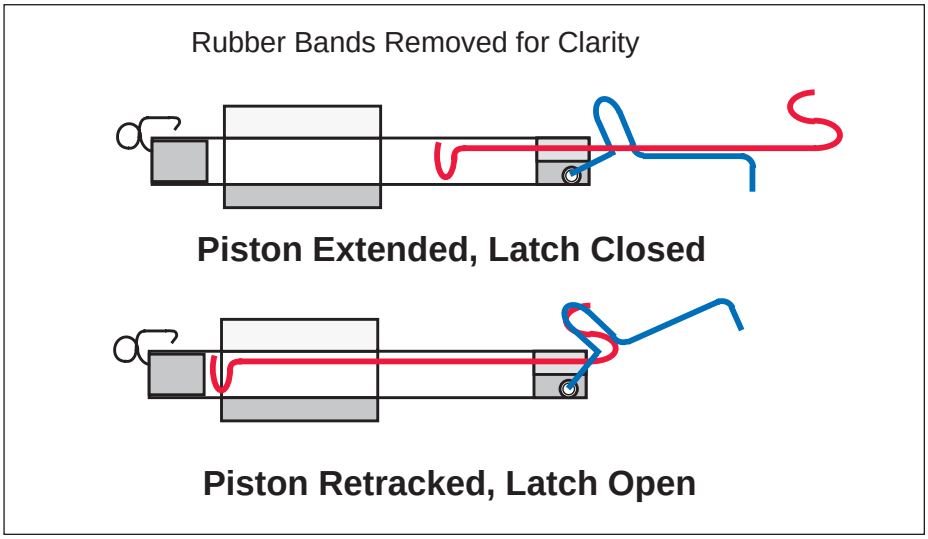


Figure 2: Operation of the Latch and the Piston wires.

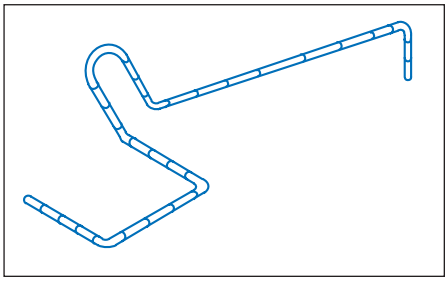


Figure 3: Isometric view of music wire latch hook.

A very small diameter tube is inserted in

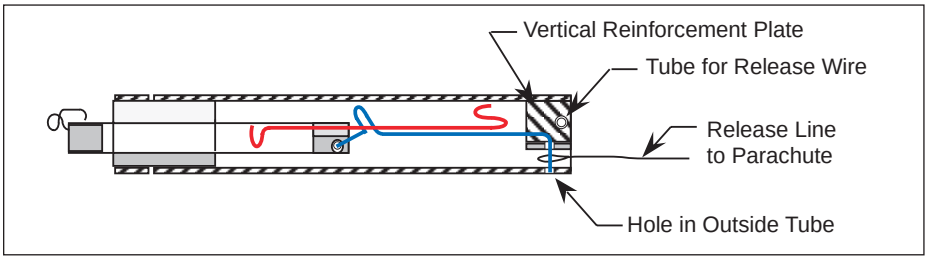


Figure 4: Cut-away of completed mechanism (looking from side).

the other end of the Silly Putty tube. It is through this tube that a music wire piston is pulled. When buying the parts for this dethermalizer, find the right size music wire that will just fit through the small K&S (brass or aluminum) tube. This will help keep the putty from leaking out when the piston is pulled out.

The "S" shape end of the wire is to hold the rubber band that pulls the piston through the putty. The rate the piston is pulled through the putty can be controlled by the number and/or the tension of this rubber band. The more bands, the faster the dethermalizer. Another way to control the rate is by increasing the length of the silly putty tube.

What makes the dethermalizer work is the latch hook (shown in Figure 3). The latch hook is closed when the piston wire is extended, and is open only when the piston is in the fully retracted position. This is because the hook is prevented from rotating upward by the extended piston wire. See Figure 2.

The latch hook is connected to the silly putty tube by being inserted through a pivot point tube, which runs through the plug on the back end of the tube (as shown in figure 1). The location of the two tubes through the same plug can be a problem. Position the tube that runs parallel to the axis of the silly putty tube against the inside edge of the tube (not in the center: concentric). Then looking at the back face of the putty tube, rotate the tube so the parallel tube is in the "12 o'clock" location. Then the latch hook pivot would enter the side of the tube at the "9 o'clock" position. Figure 1 and 2 both show this location.

The loop on the latch hook is for the rubber band which pulls the latch to the open position when the piston is in the retracted position. The other end of the rubber band is held on the "front" loop.

Piece "C" is made from a short length of balsa. Its purpose is to hold the silly putty tube inside the outer fiberglass tube. The silly putty tube is not centered inside the outer tube, but is placed lower so that the latch has more room to rotate upward.

Figure 4 is a cut-a-way view of the completed assembly looking in from the side. As can be seen in this view, when in the closed position, the latch hook penetrates two holes; one in a plywood plate, and the other in the side of the outer fiberglass tube. This prevents the release line to the parachute from coming off, until the latch rotates to the open position.

That is basically how the dethermalizer works; what follows is the mechanism for starting the "timer" once the nose cone is deployed. This was the part of the dethermalizer that Phil Barnes finally got worked out to make this a viable option for

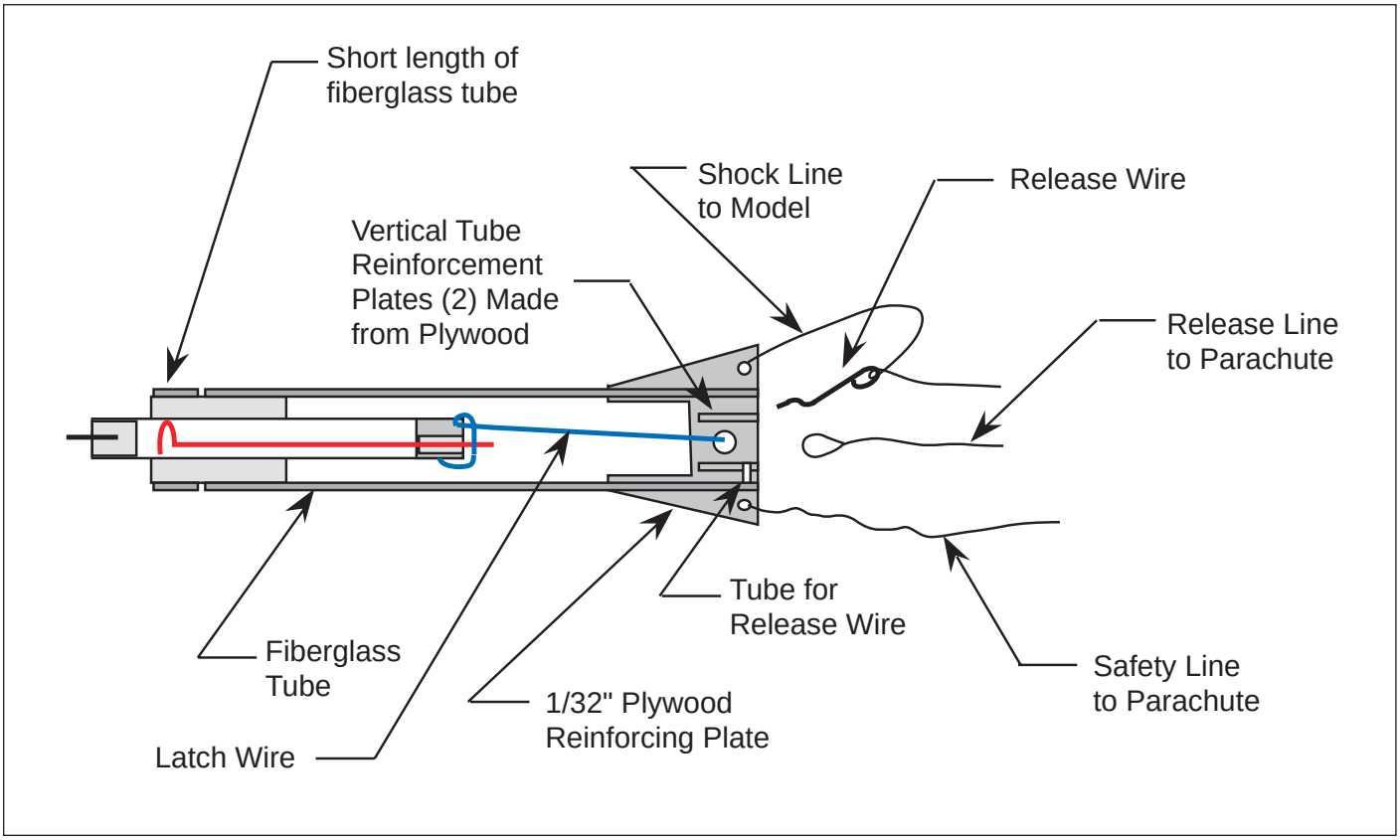


Figure 5: Cut-away view of completed mechanism (looking down from top).

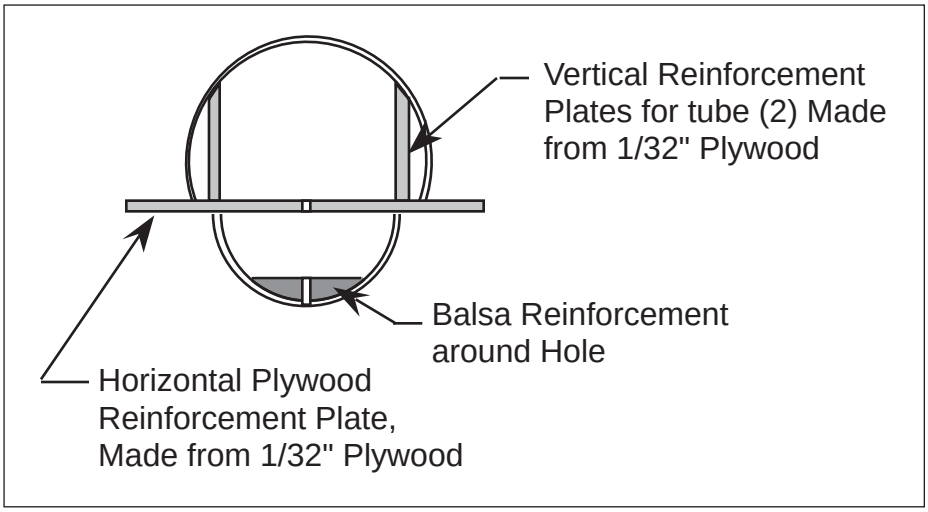


Figure 6: Cross-sectional view of holes for the latch hook wire.

competition. Without this, the mechanism must be set just prior to igniting the engine.

The dethermalizer is "primed" by inserting a "release wire" under the "S" hook on the piston wire, and through a tube in the side of one of the vertical reinforcement plates. The "S" part of the wire is the same part that holds the rubber band(s). The release wire is shown in figure 5, which is another cut-a-way view of the mechanism, but this time looking down from the top. As can be seen from the view, the release wire is attached to the shock cord line, so that when the nose separates from the body, the shock cord is stretched, and the released wire is pulled out of the tube. This releases the piston wire, and starts the operation of the dethermalizer.

Figure 6 shows a cross-section of the "back" side, where the latch wire penetrates the horizontal reinforcement plate and the side of the fiberglass tube. When Phil inserted the horizontal plate in the tube, he purposely deformed the bottom of the tube to make extra room for the latch wire. This makes it easier to attach the release line to the parachute. Another thing that he did was to reinforce the hole with a carved piece of balsa around the exit hole through the outer fiberglass tube.

As can be seen from figures 4 & 5, the outer tube is made from two pieces of fiberglass tubing. The reason for this is so that the tube can be easily taken apart to inspect the mechanism. The short length is glued to piece "C," while the longer piece is just taped to the short piece. When everything is prepped for flight, the mechanism is slid into the blue foam ring, which is already glued inside the nose cone. The dethermalizer is just held in place by a loose friction fit. Since the mechanism is attached to the nose cone by a shock cord line (shown in figure 7) is isn't necessary that it be firmly affixed to the nose cone. Phil stuffs the loose shock cord line through the hole in the foam ring ahead of the dethermalizer. He uses the "stuffer tool" which is shown in figure 8.

The other tool that Phil custom made to help in prepping the dethermalizer is a long piece of music wire with a hook at one end. This tool is used to pull the piston out to the full extended position.

One last comment. The shock cord line and the safety line to the parachute are shown in figure 5 as being tied to the horizontal reinforcement plate. I drew them this way for simplicity, but in reality, they are attached by fishing snap swivels.

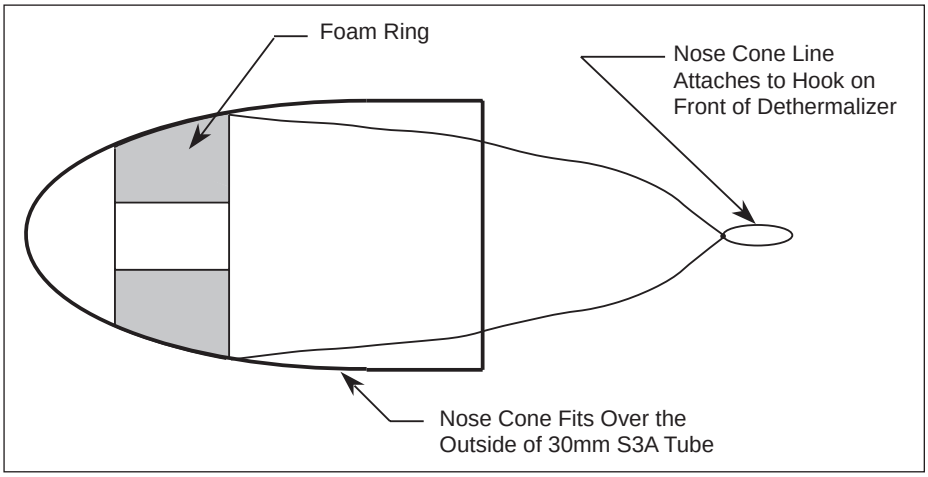


Figure 7: Foam ring added to nose cone for dethermalizer installation.

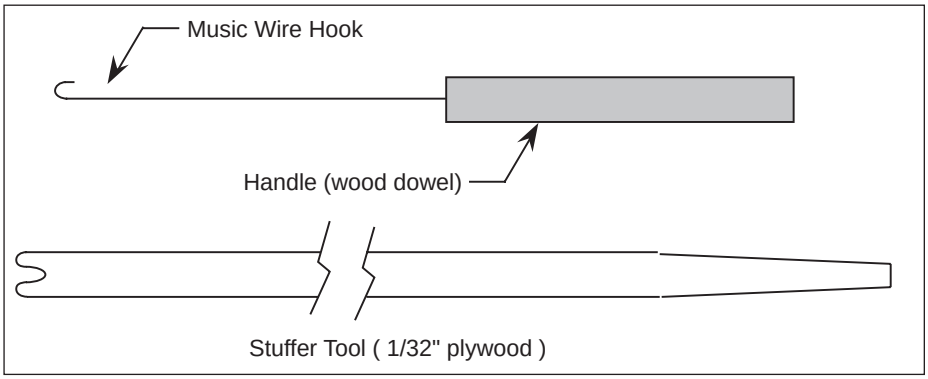
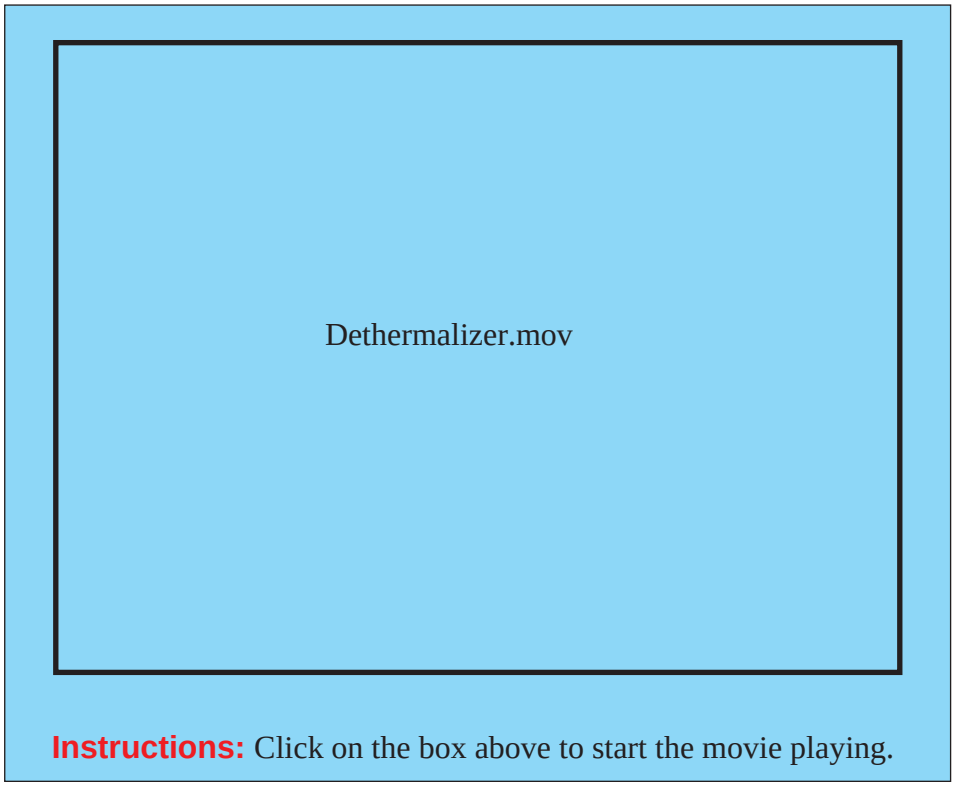


Figure 8: Helpful tools which allow the dethermalizer to be prepped faster. Two times times actual size.



Instructions: Click on the box above to start the movie playing.

Here is an annimation created by Norman Dziedzic that shows the operation of the dethermalizer. The rubber band is removed for clarity.