

Pneumatic Antenna Launcher User Manual



Early CSV19 Launcher with Zip Reel

Introduction

This document covers use of the CSV19 and CSV17 (or PADS) Pneumatic Launchers for launching lines. These lines are typically used for hoisting antennas for emergency services and amateur radio use. These systems have been designed to increase the safety of this activity compared to the common techniques of catapults (slingshots) and metal weights *or* bow and arrow launching.

These launchers use air pressure to launch tennis balls towing light fishing line over trees. The tennis balls are launched at velocities lower than a tennis serve. The balls are slightly weighted to reduce the velocity needed to carry the line. They are soft and highly visible to increase safety.

If you are preparing tennis balls for launching service, see Appendix A, Launch Ball Preparation.

Antenna Launching Safety

The tennis ball is propelled from the launcher at (up to) velocities similar to a hard serve in tennis. This is enough velocity to cause severe eye injury at close range. Always keep the launcher pointed in a safe

direction, and do not pressurize the launcher until ready to launch. Eye protection such as goggles or safety glasses with side shields is recommended for those in close proximity to the pressurised launcher.

Power Lines

Do NOT launcher near or over high voltage power lines!!! Launch lines may be sufficiently conductive to cause potentially fatal shock or arc flash explosions.

Operational Temperatures

PVC loses strength at both low and high temperatures. Do not use a PVC launcher that is outside the range of about 10-40°C (50-100°F). Do not leave launchers in direct sunlight or in hot vehicles for extended periods of time.

Pressure Safety Relief Valve

If the pressure rating of the materials is exceeded the pressure chamber or valve may burst, potentially creating high velocity plastic fragments. Avoid exceeding the safe pressure ratings of the materials at all times. A pressure safety relief valve is recommended to prevent excessive pressure. Excess pressure is especially possible with high pressure systems or small unregulated electric pumps that can reach high pressures.

Periodic Maintenance

Inspect the launcher thoroughly each time it is prepared for use. Ensure there are no cracks or other damage. Damaged launchers should be repaired, disabled or destroyed. Removing the main valve top is a good way to ensure that the launcher is not pressurized.

Pressure Testing

Annual pressure testing is advised.

Hazards and Personal Protective Equipment

The hazards in antenna launching include (note that this is not an exhaustive list):

- High velocity tennis ball
- High velocity fishing line
- Falling debris from trees
- Plastic fragments from a broken launcher
- Other hazards from the application environment

The recommended Personal Protective Equipment includes:

- Safety goggles or glasses
- Hard hat
- Leather gloves
- Closed toe shoes

Launching Lines for Antennas

Planning the Launch

Select the supporting trees for the Antenna. Considerations include:

- Tree height
- Suitability to support the antenna weight
- Spacing between the trees
- Clearance behind and between the trees to get the antenna up
- Proximity of power lines
- Proximity of vehicles, tents, buildings and other items that might interfere with the installation or be damaged by errant balls

Tip: Launching over the top of the tree generally results in fewer problems than attempting to thread through the branches.

Selecting Launch Direction

The launch line is used to pull up a light support line, so launches generally are from the antenna side launching out away from the antenna. For a heavy antenna (such as a tri-band beam), the light line is used to pull a heavier line, so the launch is from the outside toward the antenna.

Selecting Trajectory

The height and distance of the launch trajectory can be selected to produce the most effective result. Launching too far can cause the line to get involved with trees behind the target. Launching too high may allow any breeze to move the line away from the desired location.

Standing closer to the target tree reduces the horizontal distance the launch will go. Start about 20 feet (7m) from the tree and adjust as needed. To launch over a few trees at once start about the tree height away from the first tree. Adjust as needed.

Selecting Launch Pressure

High launch pressure increases the velocity, height and distance covered by the ball. Launching too far or too short can cause tangles. Optimal launches go as high and far as needed but no more. If you need a high performance launch (150-200 feet high) use full pressure (80psi). Otherwise reduce it as needed. Typically 40-60psi is adequate for a CSV17, or 30-50psi for a CSV19.

Preparing for Launch

Attach the line to the ball. There are two techniques for doing this:

- Tie the line to the wire loop, and cut it, or
- Tie a loop in the line larger than the ball and thread this loop through the wire loop and around the ball. In this case the ball can be detached without cutting the line.

Push the ball down the barrel all the way. Locate the line as needed from the reel going into the barrel.

Move to the launch position. Ensure personnel in the area are aware of the imminent launch and have appropriate safety gear. Ensure the landing area is clear. Pressurise the launcher. Use sufficient pressure but not excessive pressure to avoid launching well beyond the target tree. Experience will be useful here, but pressures from 40psi to 80psi are generally used with the CSV17, and pressures from 30psi to 80 psi are generally used with the CSV19 launchers.

Safety Tip: Avoid carrying a charged launcher around. Pressurize at or near the location and time of launch. Point the launcher in a safe direction, even when it is not charged. Pressure can be safely vented without launching by pushing the pin in the middle of the Schrader valve (charging port).

Launching

Hold the launcher at arms length and look an inch or so over the top of and parallel to barrel to form a sight picture. Put the right hand on the trigger, and use the left hand to support the pressure chamber underneath. Point the launcher slightly above the tree. Operate the launcher by pulling the trigger quickly without jerking the launcher and spoiling the aim.

After the Launch

Untie the ball from the launch line and tie on the nylon twine. We use yellow 140 lb test nylon Mason[®] twine, but other light weight lines may be suitable. This line is adequate for short term temporary antennas, or it can be used to pull up a heavier or more permanent Dacron[®] antenna support line.

Gloves are recommended when winding the launch line in to avoid cuts. Remove the reel from the launcher. Wind the launch line back on the Zip reel with **light tension** on the reel, towing the nylon twine over the tree. **Do not rotate** the Zip or Mini Coaxial reel when rewinding, and do not **wind the reel with too much line tension**. Untie the lines and attach the nylon twine to the antenna, or to a heavier line and pull it up.

Appendix A.

Preparing an Antenna Launching Ball

This is a tennis ball that has been modified to tow a medium weight fishing line. We don't tow a conductive antenna wire directly for safety reasons.

Tools and Materials Needed

- Sharp knife
- Sharp awl or leather sewing awl
- Needle nose pliers or hemostats
- Electrical wiring crimp tool or similar
- Hot melt glue gun and glue
- Tennis balls

- Loop kit (or equivalent)(available from akbeng.com)
- Sand
- Postal scale or similar to weigh 2-5 ounces
- Small cup to measure sand
- Funnel to direct sand into ball
- Safety ball holding tool (optional, this tool is included in deluxe kits, it is a short length of schedule 40 PVC pipe)
- Safety glasses are recommended

Process

If you have the safety ball holding tool it can be used to hold the ball while cutting and poking holes in it, providing a safety barrier. If not, take extra care to avoid finger injury.

- Cut a slot in the ball approximately 1" long
- On either side of the slot punch a hole about 1/2" away from the middle of the slot (two holes total)
- Take a length of the loop wire about 6" long from the loop kit and poke one end into each hole
- Using needle-nose pliers or hemostats, reach in through the slot and fish out the ends of the loop wire
- Slide a crimp tube over the ends of the loop wire and crimp so the wire cannot come out of the tube
- Push this crimp back into the ball
- Measure and add two ounces of sand to the ball (using funnel)
- Reseal the slot in the ball with hot melt glue

Notes

4 oz balls are normally made: 2 oz is the weight of a standard tennis ball and 2 oz of sand is added. For special applications more weight can be had by using more sand – 2-7 oz total weight is possible with sand. Filling a tennis ball with sand produces about 7 oz total weight. Four or five ounces generally produces the optimal launch height and is generally adequate for pulling the line down. More weight may be needed if the ball fails to pull the line down on the other side of the tree.

**This document was modified to PDF format from HTML in order to make it printable
(by Paul VP9KF)**

Footnotes:

To prevent losing the cap from the pressure fill valve, I secured it to the nearby cable tie using a short piece of dacron braided line. Note that there is a small step on the cap which stops the line slipping off (as a precaution I added some white latex caulking to prevent the knots from slipping at all).



Keeping the cap captive prevents dirt from getting into the valve seat.

Carrying around the ‘stuffer’ and tennis balls becomes a handful. I made a lanyard to prevent them getting lost or forgotten across a field somewhere.



I drilled a hole through the end of the ‘stuffer’ and tied a clove hitch around the tube. A quick disconnect clip was tied on the other end of the dacron line so that it could be easily removed or added to the launcher. Again, the knots were secured by adding some white latex caulking.

When my launcher was delivered, the fishing line was not attached to the small screw and washer on the fishing line ‘reel’. As I suspected, the end wasn’t tied off to the launcher! I manually unwound the line off the launcher and attached the line under the washer using a ‘slip’ knot. I also found that it had been run onto the ‘reel’ by rotation and not by ‘end winding’. This meant that there was a twist in the line for each wrap around the ‘reel’. I hand wound the line back on, fighting the twists the whole way, but getting them out. Had my first launch been made with it like this, there would have been a nasty mess and the ball and line may have disappeared without trace. Take the time to check this before use.