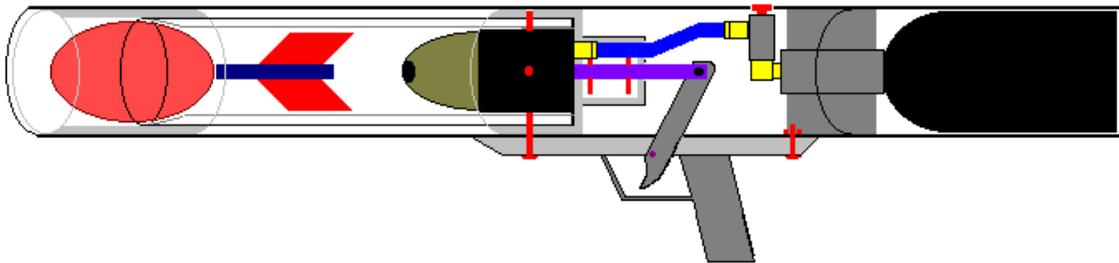


How to Build a SPPL Nerf Rocket Launcher



This SPPL launcher was specifically designed to meet the requirements of SPPL competition rules for Launchers:

- (Limit: one (1) launching device per team and 10 rockets projectiles used per 1 hour game.)
- All rockets must chronograph under the speed of 230 feet per second.
- All rockets must have a device for plugging the barrel and must use ONLY two-inch Nerf rounds.



The following specifications were taken into consideration for the design:

- The ability to fire up to 10 rounds on a single fill.
- The ability to effectively and accurately launch Nerf Pocket Vortex rockets.
- All discharges regulated to under 230 fps and integrated barrel plug.
- Light and compact to allow the user the ability to carry a full load and a primary marker
- The ability to pass a basic safety inspection by game officials.

This guide is intended as a primer for similar launcher designs. The same concept can be used to create a wide variety of personal launchers or even tank mounted defense. Most of the parts used can easily be purchased at most hardware stores or online retailers. Some parts, like the pistol grip, will require some custom work on your part. Rather than simply copying my design I recommend creating something you can truly call your own.

Design Overview

The launcher uses a simulated M203 airsoft round available from most airsoft retailers. The grenade round stores an air charge that is released into the barrel, propelling the Nerf round into the air. The SPPL launcher uses a directly attached 3.5oz tank and uses a release valve to recharge the grenade. The trigger mechanism simply presses the firing disk on the back of the grenade. To fire you simply remove the barrel plug, load a rocket, charge the grenade, aim, and fire.

Safety Considerations

Clearly safety is a big concern whenever you're talking about a custom made launcher. Many scenario games and fields have banned "home made" launchers. This concern is more directed towards the old school ball valve launcher designs. These launchers store compressed air in an expansion chamber that can be very dangerous if over pressurized or improperly sealed. The "thunder grenade" has been extensively tested by the manufacturer and has been used extensively in airsoft. It is very important to evaluate your own launcher design for safety hazards but using a thunder grenade is by far the safest route when compared to other custom designs. You also have the benefit of not having to regulate the air pressure, incorporate safety release valves, or incorporating many of the other measures taken to ensure the safety of a ball valve launcher. The grenades itself is the regulator, expansion chamber, and trigger all rolled into one little package!

Air Source

I used a 3.5oz CO2 tank from RAP4 paintball. Smaller air tanks are hard to find and can be expensive due to the limited supply. I have found that most 9-12oz tanks fit the diameter of the outer launcher shroud as well. Obviously you would need to reinforce the ASA to handle the additional weight if a larger tank is used. Other alternative air sources include a remote line (or just a remote line nipple) or breach loading pre-charged grenade rounds like a shotgun. The grenades can operate on aerosol style green gas or CO2.

Grenade Selection

There are a wide variety of airsoft grenades available. The thunder grenade is made to fire four .68 caliber paintballs. I have only tested the launcher using the thunder grenades but theoretically there may be other grenades that could work just as well, if not better. These grenades fire a wide range of different sized paintballs or airsoft pellets. The disbursement of air from these grenades may reduce the impact of the air on the rocket

and potentially increase the life or distance of a rocket. These grenades are also less expensive since the thunder grenade is in high demand. I highly recommend the thunder grenade but this isn't the only option available.

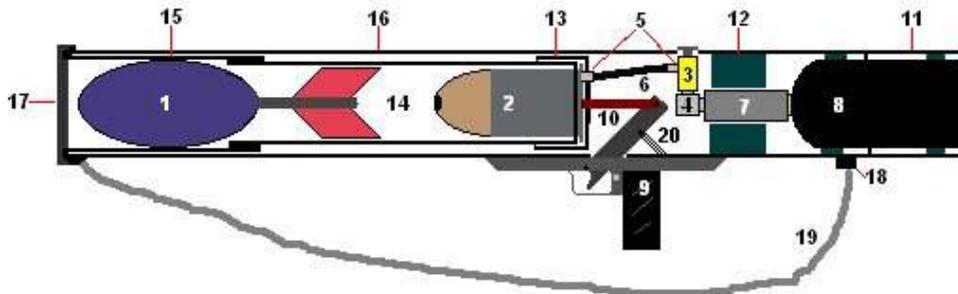
Rocket Selection

This design has only been tested for use with the Nerf Vortex rockets. These are available in the toy section of many retail stores such as Meijer, Kohl's, K-Mart, Dollar General, and several online stores. There is a 'howler' version of the rocket with a built-in whistle that won't work with the barrel size used for this launcher. There are also two different types of Nerf round that I have seen though the packaging is the same. The first type, I assume an older version, has a tail section made from soft foam similar to material used in cheap pool toys. These rockets have a limited life, as the tail section will deteriorate with use (approx 2-3 shots max). The newer rockets have a much more durable tail section made of rubberized foam that should prove to be much more durable.

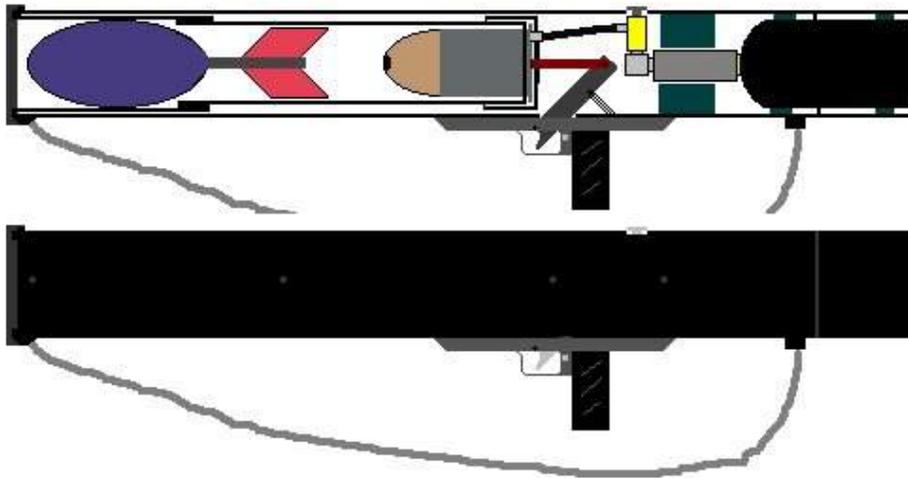
Rocket Preparation

I use a 1.5-inch diameter PVC for all of my barrels. The Nerf Vortex football is slightly less than 2 inches in diameter and the tail fins are a little more than 2 inches. Even with a 2-inch barrel the fins will need to be trimmed to fit inside the barrel. Try to keep the fins even and take off as little as possible; the fins will help stabilize the rocket. You can also extend the life of the rocket by creating a small cap on the back of the tail section using a glue gun. The glue should fill the hole in the middle and cover the rear joints of the fins. Make sure the glue being used isn't something that won't dry into a hard surface like epoxy. You may also want to create some cardboard sabots to protect your rockets; these can greatly extend rocket life on short barrel launchers.

Parts List:



- | | |
|--------------------------------------|--|
| 1. Nerf Vortex Rocket | 11. Tank Cover/End Cap |
| 2. M203 Thunder Grenade | 12. ASA Mount/Brace (PVC End Caps) |
| 3. 3-Way Palmer Push Button Valve | 13. Grub Screw Mounted End Cap |
| 4. 1/8 NPT Street 90 Elbow | 14. 1.5 PVC Barrel |
| 5. 10-32 TO 1/4 Slip Fittings | 15. Loading Breach (1.5 PVC Coupler) |
| 6. 1/4 Macro Line | 16. Launcher Shroud/Body (2.5 Shop Vac Extension) |
| 7. 1/8 NPT Female/Round CA Adapter | 17. M72 Style Barrel Cover/Safety Devise/Sling Mount |
| 8. RAP4 3.5oz CO2 Tank | 18. Sling Bracket |
| 9. Trigger Frame w/Custom Trigger | 19. Canvas Sling |
| 10. Firing Pin (Modified Hex Wrench) | 20. Trigger Return Spring |



Parts are available at most hardware stores:

- 2 Adjustable pipe rings (sling mounts)
- 1 1/4-inch wooden dowel rod
- 1 1.5-inch diameter PVC pipe
- 3 1.5-inch PVC end caps
- 1 1.5-inch coupler or joiner
- 1 1-inch PVC end cap
- 1 2-inch PVC end cap
- 1 2.5-inch shop vac extension tube
- 2 Tubes of fast setting PVC/plastic epoxy
- 1 Tube of red lock-tite thread sealant
- 1 Metal ruler or substitute

- Misc. nuts, screws, and set screws (I don't know the sizes)

Parts available from Palmer's Pursuit Shop or other Paintball Accessory Shops:

- Round CA adapter .825x14 to 1/8 NPT Female (CAHW017)
- 1 1/8 NPT Street 90 Elbow (FITT002)
- 1 3-way Push button valve (PNEU004)
- 2 10-32 to 1/4 slip fit tube (FITT100) (I highly recommend picking up 1-2 extra)
- 1 Macro line (HOSE018)

Other Parts Used:

- 3.5oz RAP4 CO2 bottle (or substitute)
- 1 Tippmann Pro-Lite 12oz tank butt cap (or substitute)
- 1 Tippmann Pro-Carbine trigger frame (or substitute)
- 1 Canvas rifle sling (or substitute)
- 1 M203 40mm Mad Bull Thunder Grenade (or substitute)

All parts can be substituted as needed but the items marked substitute above are either hard to find, must be purchased from a specialty store online, or must be fabricated on your own. I used several unique items I had in my shop so some creativity on your part is required.

Overview

This guide is more of a general overview than a detailed step-by-step instruction manual. I will go into detail of a few topics that I found relatively complicated. I'll only cover the ASA to grenade connection since the air source is really up to you. Just grab your drill and dremel and go to town.

The launcher is essentially an inner PVC barrel modified to hold the grenade round, almost like an M203. A PVC end cap holds the grenade in the barrel. Slip fittings and micro line are used to connect the grenade fill opening to a 3-way push button valve and the ASA tank adapter. Additional PVC is used to hold the ASA and tank in place. A simple trigger system operated a plunger to fire the grenade round. The exterior barrel is a shop vacuum hose extension. The rockets are loaded in the front of the barrel and the push button valve releases air to refill the grenade round.

Grenade air source

It's always a good idea to lay everything out and get a feel for how it all fits together before starting. I would build out the entire air system by itself first. The grenade fill adapter can be removed with a flathead screwdriver. The fill adapter hole is a 1/8-inch

deep hole followed by a narrower threaded opening. As luck would have it the 10-32 to 1/4 slip fit tube fitting has the same threads but you have to increase the size of the initial opening in order for the fitting to reach the threads. If you're careful this can be done without breaking the grenade; i.e. the original fill adapter can still be used. Slowly increase the diameter of the hole with a small sander bit until the 10-32 fitting can easily grip the threads. Use red lock-tite to seal the adapter in place.

I drilled a hole in two PVC end caps and used epoxy to create a mounting point for the ASA. Once the ASA was secured inside the PVC end caps I used red lock-tite to glue seal the 90 degree fitting, 3-way valve, and 10-32 fitting to the ASA. I would wait to cut the macro line until you know how things will fit inside the launcher. I don't recommend applying air to the system until you're ready for final testing. The 10-32 slip fittings can be very fragile; this is why I recommend purchasing at least one extra fitting (I destroyed 2 in the process). If the system isn't secured you can blow a fitting when you air it up outside of the launcher.

Barrel and Grenade Cap

The barrel length is a matter of personal preference and material limitations. You must have enough length for the rocket and grenade plus at least 1/2 inch of wiggle room. Within reason barrel length isn't a big factor though a longer barrel provides more room for air expansion and may affect velocity. The closer the rocket fins are to the grenade the more likely you will need a sabot to protect the rocket fins. Once you have cut the inside PVC barrel to length, bevel the inside edge of the barrel to ease loading. Next, increase the inside diameter of the grenade end of the PVC barrel until the grenade can slide into the barrel end. Since the grenade won't be removed often, openings for easy removal are optional. With the grenade in place attach a PVC end cap over the opening. Mark the end cap location on the barrel and remove the grenade before drilling holes through the cap and barrel for setscrews to secure the end cap. The setscrews should be long enough to hold the end cap in place and lock the grenade in place when installed. Now use epoxy to glue the coupler (1.5-inch PVC coupler) on the end of the barrel; to create a slightly larger barrel diameter for the Nerf football.

Firing Mechanism

Clearly this is the most challenging part of the design. Many of the pictures show my first failed attempt but you get the idea. The trigger is a metal ruler, obviously there are plenty of substitutes but it proved to be an easy metal to work with. The return spring turned out to be unnecessary and is no longer in my final design. The firing pin is made from a wooden dowel rod though I recommend a stronger material if available. The trigger frame was left over from an old pump marker. You can find a variety of trigger frames available on eBay or other online retailers that could work.

The real challenge I found was getting the right angle on the trigger to allow for firing without locking the trigger or requiring an extreme amount of force. The grenade does

require a certain amount of force to depress the firing disk and the angles can add to the required tension. All I can say is test, test, and test until you get it right. You won't be able to fully test the trigger until you're nearly complete so be prepare to have a few failed attempts.

The trigger assembly in the final pictures was my second attempt. I used the same design but I had to adjust the angle of the trigger and doubled up on the ruler to give the trigger more girth. Even after these modifications the trigger is extremely difficult to pull. As long as I can get a shot off when it counts; that's all I care about.

After testing of the launcher I discovered that the firing pin on the grenade has a tendency to get out of alignment and stick in the open position. I recommend fusing the firing pin to the plunger or trigger mechanism. This should help reseal the firing pin correctly. The grenade will cause a good amount of kick back on the trigger mechanism so design accordingly.

Finally, this is not the only one way to trip the trigger on the grenade...don't limit yourself to my mediocre design if you have a better idea.

Mod Images



AirCannonPlans.Com



AirCannonPlans.Com





Disclaimer

This device is not a toy and should never be fired at a person or animal! Always inspect the launcher for signs of wear before use. Clearly you need to handle the launcher with the same care and consideration you would for any paintball or airsoft marker. The internal grenade has highly pressurized air! This should never be left in direct sunlight and always follow the safety guidelines provided by the grenade manufacturer. Never use without pre-approval from field owners and referees and this device should be velocity tested like any paintball marker. It is your responsibility to be aware of any state and local laws preventing such devices. Finally, I do not have the ability to fully test the safe operation of this device! Please use with extreme caution!