



NERF Gun Modification Workshop

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NERF Gun Modification Workshop

The objective of this workshop is to introduce an audience to basic engineering, hand tools and aesthetic skills in a fun and manageable way. All with a view to participants gaining the skills and confidence to experiment and attempt to modify a NERF gun.

Before you Start

The gun this workshop focuses on in the [NERF Firestrike](#) (colors may vary), any other NERF toy may not work with this workshop plan as its design is different.

NERF toys come with a fair amount of restrictions to make the toy not shoot at its full potential. In the workshop we will look at the engineering done to restrict (mainly airflow) and see we can do to modify the gun in order to allow more air to freely move through the barrel.

The modifications are not so extreme to cause any harm but rather help the gun to reach its advertised maximum range.

Activity Summary

1. Facilitator/Space introduction
2. Workshop overview
3. Health and Safety Brief
4. Disassemble NERF guns
5. Main painting
6. "Super Advanced Mod"
7. Air Restrictor Mod #1
8. Air Restrictor Mod #2
9. Plunger mod
10. Detail painting
11. Reassemble NERF gun

Materials

These materials are per participant if not specified otherwise.

Tools

Tools required during the workshop. It is not required that one of each is supplied for participants but one tool per two participants is preferred.

- Philips head screwdriver
- Normal tape
- Plastimake
- Side cutters
- Safety Glasses
- Gardening/Worker gloves
- Sandpaper, semi-rough
- Scissors
- Ceramic cups and spoon (1 of each per 4 participants)
- FireStrike NERF gun (1 per participant + spares)
- Electric Drill and surface to drill on

If you are painting during the workshop you will also need:

- Aprons
- Spray paint
- Model paint (silver)
- 2" Paintbrushes
- Paper towels
- Masking tape

You may also need access to the following:

- A safe dedicated area to shoot NERF guns at targets
- A dedicated space for spray painting, this may need to be done outside (depending on spray paint)
- Quick access to boiling water
- Projector screen (presentation / slides)
- Table(s) where participants can use hand tools and make a mess
- A couple of large bins (for general waste and packaging)

Instructions

Rename the steps as you like, use *italics* or **bold** for emphasis

Step Zero: Intro

Introduce yourself and the space for those unfamiliar. Give a really fast breakdown of the workshop so participants know what to expect and what to look forward to. This is also a good opportunity to run through general rules and a health and safety briefing.

Step One: Disassembly

Hand out the NERF guns (don't do this prior to the intro as the participants will be more interested in the toys than your safety brief. let the participants try out the unmodded guns. Make sure they are

using protective eye wear and set up one or several targets beforehand.

Once the participants have finished testing their guns it is time to take them apart.

- Unscrew all 7 screw on the side
- Unscrew the screw at the bottom of the handle
- Take the side off and store screws in a small bag or container (someone always loses something)
- Make sure to remove the nut at the bottom of the handle (on the inside) as well as the spring at the top-right of the gun. Finally also remove the plastic bit with a spring (scope mount) at the top-centre of the gun
- Pull out all the other parts: plunger tube and barrel assemblies, Dart holder, the light and circuit board and finally the two triggers

Step Two: Painting (Optional)

- When using multiple colors the participants have the choice to further split up the sides of the gun which are held together by some tabs in order to give the pieces different colors.
- The orange parts also be painted but make sure to isolate the barrel tip! (Read Below warning).
- Use masking tape to create patterns or when using multiple colors
- Spray paint a very light layer of paint using swooping motions, 20-30 cm from the pieces to avoid runny paint. Let dry for a few minutes and repeat 3 times.
- Let the pieces dry while returning to modify the gun's inner workings

Make sure you mask off the orange tip of the gun before painting the gun as it helps others (including police) to distinguish the toy from a real weapon!

Step Three: Super Advanced Mod

The purpose of this mod is to ensue confidence in the participants.

There is a small hole close to the tip of the barrel, this allows some of the air to escape. Find a piece of tape and cover it up, Voila!

Step Four: Air Restrictor Mod #1

This step can be difficult for some participants, make sure you to help anyone falling behind or getting frustrated. Encourage participants to help each other and don't rush this part.

Before we start we need to take the plunger/barrel assembly apart:

- Remove the barrel stabilizer from the plunger assembly
- Remove the barrel tip from the assembly (Use sidecutters to create a small opening if it's troublesome)
- Remove the barrel from the plunger tube
- Remove the air restrictor from the plunger tube
- Take the air restrictor apart (splits into two pieces)

The mod revolves around creating more space for air to travel and removing the feature that actively stop all airflow once the dart has initiated its movement through the barrel.

- Inside the air restrictor you will find a spring and a three-legged plastic part, these can be discarded as we won't be using them
- Grab the half of the restrictor that has the staff sticking out of it and snip it off at the base using a pair of side cutters
- We are going to remove the Y-shape where the staff was attached and create a smooth, fully circular, hole. Use sidecutters and sandpaper to make it even and try to keep the diameter of the whole close to original size and not bigger than its cylinder.

Step Five: Air Restrictor Mod #2

For this mod we will need the drill (and something to drill on). We'll be using the other half of the air restrictor

- Put the air restrictor with the closed side down and drill a hole through the middle. Starting off with a small bit and working your way up might be a good idea
- When the hole is large enough start sanding evenly until it's fully circular and approximately the same size of the hole we did in the last step
- If you have spare plastimake after the next step use it to fill the gaps in the air restrictor (put the two halves together first), the aim is to direct as much airflow as possible with the least amount of resistance!

Make sure that you can fit the air restrictor in the plunger tube before continuing!

Step Six: Plunger Mod

When the gun is cocked the plunger spring is tensioned. On release the spring forces the plunger through the plunger tube, pushing and compressing air as it travels. A more powerful spring would result in more force and would make the dart travel further. Springs of this size are relatively expensive, difficult to install and could potentially make the NERF gun a little too powerful to be used safely. In this step we will create a unique mod to the plunger which will increase the tension of our spring enough to make a difference without having to remove the spring or disassemble the plunger.

- Put a spoonful of plastimake in a ceramic cup (it will stick to paper and plastic cups) filled with close to boiling water
- When the plastimake is fully transparent take some of it out with a spoon and shape it around

the front of the plunger (but just behind the white tip). You will need to pull the spring back and keep it away from the plastimake until it dries.

- Add more plastimake if needed
- Make sure the plastimake does not meet the small gap in the plunger (allows the gun to be cocked) or is wider than the white tip as it will create extra friction (or won't fit at all) in the plunger tube.
- Use a file or sandpaper to smooth it out and make it fit
- Release the spring when the plastimake has dried and make sure it stop atleast 1 cm from the tip (where it used to be).
- Experiment with the depth of the plastimake but remember the restraints

If you have spare plastimake in after the next step use it to fill the gaps in the air restrictor (put the two halves together first), the aim is to direct as much airflow as possible with the least amount of resistance!

You will most likely need to refill the cups with new water as it cools down.

Step Seven: Reassembly

- Attach you air restrictor (should be reassembled already) to the narrow end of your plunger tube, only one way will fit.
- Make sure the side of the gun with the battery holder is in front of you. It should be facing left, this is important for the next part
- Before we attach the barrel to the plunger tube we need to align them. The plunger tube has two tabs with a hole in them and are placed on opposite side of the tube. The top tab should be in the back of the gun (facing right).
- To attach the barrel correctly (and not upside down) face it pointing left and make sure that the top if the barrel is sticking out further than the bottom. Once this is done, snap it to the plunger tube but make sure you keep both parts aligned.
- Reattach the barrel tip to the barrel using the top holes, if you used sidecutters to make a hole on each side it will be a breeze to put it back on.
- Put the plunger into the plunger tube and don't forget to put the spring back on.
- Put the stabilizer back, simply snap it into place
- You can now put the whole assembly back into the gun. Make sure the plunger tube's tabs correctly align with the pin in the gun.
- Push the plunger spring into the tube and it should settle behind the brackets of the gun.
- The small spring might need a push to get under the ceiling of the gun
- Put the light and its circuit board back and then the two triggers
- Find the little nut and place it in its slot at the bottom of the handle
- Slide the scope mount back into place at the top of the gun
- Finally add the dart holder to the front of the gun
- You are now ready to put the 8 screw back

Step Eight: Detail Paint

This part will give the paint job a cool worn/metallic look. The key to making the item look good is to use as little paint as possible and work in layers

- Dip your brush into the model paint and dry it off on a paper towel.
- Gently brush over the sides of your gun, little by little the edges, corners and raised parts of the gun will start looking silver
- Once given it a few strokes over the entire gun you will have a great finish

Less is more; The detail paint job will look much better if used discretely!

References

Slides (PDF)
Workshop Plan (DOC)

TryIt and Feedback

1. Feedback:

Solution:

2. Feedback:

Solution:

3. Feedback:

Solution:

4. Other observations: