

Ankle Whip (aka Ankle Tickler)

Northern California Haunters Group - 9.17.2016

Materials

Plumbing



6 x **PVC Plug** : 1/2" Schedule 40, threaded



1 x **PVC Adaptor** : 1/2" Schedule 40, slip-on to threaded



1 x **PVC Elbow** : 1/2" Schedule 40, 90-degree, slip-on to threaded



4 x **PVC Tee** : 1/2" Schedule 40, 90-degree, slip-on to threaded to slip-on



1 x **PVC Pipe** : 1/2" Schedule 40, 5-10 feet

Hardware



3 **Wire Connectors** (Gray – Min 2 #22)



20-50 feet of **Lamp Wire** (18 gauge, 2 conductor)

Pneumatics (all components available at www.frightprops.com)



2 x **Male Connector Push-On Fitting** – 1/4 Threads, 1/2 Tubing
(<http://www.frightprops.com/male-connector-push-on-fitting-0742-0349.html>)



5 x **Male Connector Push-On Fitting** – 1/4 Threads, 5/32 Tubing

(<http://www.frightprops.com/male-connector-push-on-fitting-0742-0349.html>)



5 feet of 1/2" **Polyethylene Tubing**

(<http://www.frightprops.com/polyethylene-tubing-0714-0009.html>)



10 feet of 5/32" **Polyurethane Tubing**

(<http://www.frightprops.com/polyurethane-tubing-0746-0307.html>)



1 x **Breather Vent** – 1/4 Threads

(<http://www.frightprops.com/breather-vents-0740-0014.html>)



1 x 3-Way **Solenoid** with 1/4" Ports (12VDC)

(<http://www.frightprops.com/3-way-valve-with-1-4-inch-orifices-0922-0001.html>)



1 x **Nipple** - 1/4 Threads

(<http://www.frightprops.com/pneumatics/fittings/miscellaneous-fittings/nipple-0737-0122.html>)



1 x **Pressure Regulator** (1/4" ports)

(<http://www.frightprops.com/pneumatics/regulators-line-filters/miniature-regulator.html>)



1 x **Quick Connect** - male 1/4" threads

(<http://www.frightprops.com/pneumatics/fittings/compressor-and-air-tool-fittings/quick-connect-male-threads-0734-0012.html>)

Miscellaneous



12VDC Power Adapter



Manual Trigger (Switchcraft ED903 is a nice one)

Needed tools / extras

- 1/4" - 18NPT tap
- Drill, and 7/16" drill bit for tap, plus smaller bits for starter holes
- Medium sized Crescent wrenches (can also use 7/16", 1/2", 9/16" wrenches)
- Wire strippers and pliers
- Soldering iron (if using the Switchcraft ED903 or other switch that requires soldering)
- Teflon tape
- PVC cement

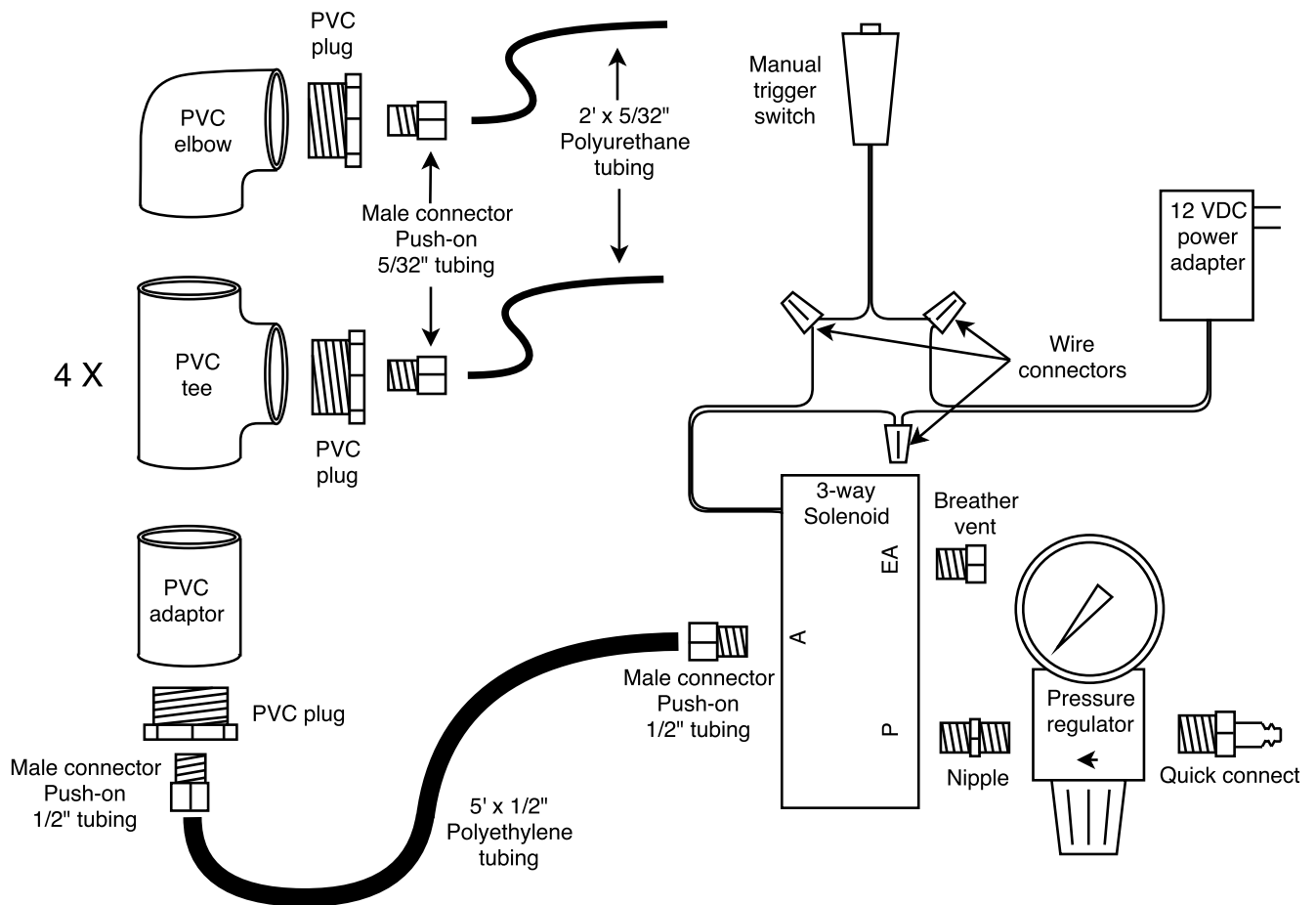
Preparing the PVC

For each of the 6 **PVC Plugs**, drill starter holes in the top of the plug, eventually working up to a 7/16" bit. Lots of folks have drills with a 3/8" chuck. If that's you, then you'll need to find a 7/16" bit that has a 3/8" shank so that it will fit in your drill.

After drilling the 7/16" holes through the tops of the **PVC Plugs**, use the 1/4" - 18NPT tap to thread these holes so they'll accept the **Male Connector Push-On Fitting**.

Assembling the Pneumatics

The diagram below gives an overview of everything that needs to be assembled. Detailed descriptions of each step follow the the diagram.



There's really no wrong order to hook things up in, but below is an order that is straightforward to follow. It is important for all airflow connections to have a tight seal. Apply Teflon tape on each threaded end before screwing it in, including when screwing metal connectors into PVC. I usually wrap the Teflon tape 2 or 3 times around the male threads to have a tight fit.

Screw a **Male Connector Push-On Fitting** for 1/2" tubing into the "A" port of the **Solenoid**. This is one of the big push-on fittings.

Screw the **Breather Vent** into "EA" (Exhaust for "A") port of the **Solenoid**.

Screw the **Nipple** into the "P" (Pressure) port of the **Solenoid**. Look for an arrow on the **Pressure Regulator**. This is the air flow indicator. Screw the **Pressure Regulator** onto the **Nipple** so that the air flow indicator arrow points towards the **Nipple**. Screw the **Quick Connect** onto the open port on the **Pressure Regulator**.

Decide how much distance you'd like between the **Manual Trigger** and the Ankle Whip, and cut that amount of the two conductor **Lamp Wire**. Err on the side of making the cable too long. You can easily shorten it later if you want to. Use wire strippers to strip off 1/2" of insulation from both ends. Attach each lead on the **Manual Trigger** to a different conductor on one end of the **Lamp Wire**. If you're using the Switchcraft ED903, you'll need to solder each wire into place and wrap the solder point with a bit of electrical tape.

On the **12VDC Power Adaptor** cut off the connector that would normally plug into a phone, tablet or other device. Use the wire strippers to separate the two small wires, and strip off 1/2" of insulation. On the two wires coming out of the **Solenoid**, likewise strip off 1/2" of insulation. Use one **Wire Connector** to fasten together one wire from the **Lamp Wire** with one wire from the **12VDC Power Adaptor**. Use another **Wire Connector** to fasten the other wire from the **Lamp Wire** to the one wire from the **Solenoid**. Use the last **Wire Connector** to fasten the remaining **Solenoid** wire to the remaining **12VDC Power Adaptor** wire. Notice that we weren't careful about which wires the **12VDC Power Adaptor** wires connects to. That's because it doesn't matter. The **Solenoid** will work with the power connected either way. Plug the **12VDC Power Adaptor** into a power outlet and see if pressing the **Manual Trigger** makes the **Solenoid** click. If it does, then it's working correctly. If the **Solenoid** isn't clicking, look back at the diagram and try to track down a missing or bad connection.

Now that your **Solenoid** is happily clicking, it's time to test out the pneumatics with air pressure applied. This is a potentially dangerous situation with even moderate air pressure. Therefore, being extra careful about safety is important.

- The first thing is to make sure the **Solenoid** is not powered. Unplug the **12VDC Power Adaptor** from the power outlet.
- Plug a pressurized air hose into the **Quick Connect**. The needle on the **Pressure Regulator** should jump up to some value. Unlock the **Pressure Regulator** by pulling its knob outward. Twist the knob until it reads around 20 PSI. Lock the **Pressure Regulator** by pushing the knob in until it clicks. We will increase the pressure later, but 20 PSI is reasonable for testing.
- Plug the **12VDC Power Adaptor** into a power outlet and press the **Manual Trigger** a few times. You should get bursts of air out of the **Solenoid**. If you don't, try unlocking the **Pressure Regulator** and dialing up the pressure a bit (but you definitely shouldn't need to go over 30 PSI). If you cannot get any air out, go back and check both the electrical and air connections.

Screw the five **Male Connector Push-On Fitting** for 5/32" tubing into five **PVC Plugs**. Screw one of these **PVC Plugs** into the **PVC Elbow**, and the other four **PVC Plugs** into the **PVC Tees**. Cut the 10 feet of 5/32" **Polyurethane Tubing** into 5 equal lengths, and insert into the push-on fittings.

Screw the one remaining **Male Connector Push-On Fitting** for 1/2" tubing into the one remaining **PVC Plug**. Then screw this **PVC Plug** into the **PVC Adaptor**.

Cutting the PVC Pipe and Final Assembly

If you've got a long straight hallway or walkway where the Ankle Whip will be used, then you can probably just cut the **PVC Pipe** into one short piece (could be as short as 3") to go between the **PVC Adaptor** and the first **PVC Tee**, and then four equal pieces. If you have a more custom setup though (in front of a door, along a curved wall, going around a corner), then you may want to carefully measure where you cut your **PVC Pipe**, and maybe you'll need additional PVC connectors. However you decide to cut the **PVC Pipe** up, you can pressure test it without using PVC cement. This requires that all the PVC connectors you have are tightly pressed together so they don't accidentally shoot off. But as long as you've got lots of open air outlets, the pressure shouldn't build up inside the PVC pipe.

After you've cut your **PVC pipe** into the desired sizes, insert the segments between the **PVC Adaptor**, **PVC Tees** and **PVC Elbow**. Connect the 5 feet of 1/2" **Polyethylene Tubing** to the **Male Connector Push-On Fittings** on the **PVC Adaptor** and the **Solenoid**.

We had the **Pressure Regulator** set to around 20 PSI when we were testing the pneumatics, but this is too low for running the Ankle Whip. With a pressurized air hose plugged into the **Quick Connect**, dial up the **Pressure Regulator** to 60 PSI. Plug the **12VDC Power Adaptor** into a wall output and test the Ankle Whip. Depending on the total length of PVC pipe used and if you've hooked up more or less than 5 "whips", you may need more or less pressure. 60 PSI should work well with 5 whips and 10 feet of **PVC Pipe**, but your mileage may vary. When you've found a pressure that you like, lock the **Pressure Regulator** by pushing the knob in until it clicks.

After you're happy with your Ankle Whip's setup, apply PVC cement to all of the PVC pipe / PVC connectors. Coat the inside of each PVC connector thoroughly before inserting the **PVC pipe** to make sure you'll have an air tight seal. It's very important to cement all the PVC together as when the Ankle Whip is in use, people will be stepping on the **Polyurethane Tubing** (which is totally fine, it's soft and can handle this) and restricting the air flow. If all the tubing were knotted / kinked / stepped on at the same time, it's possible there would be no air outlet and the PVC would fly apart. This is also a reason I chose to use a 3-port solenoid. You really need only a 2-port solenoid for this prop (one port for air in, one port for air out), but having the exhaust port is an extra safety measure. When the solenoid is not letting high pressure air through, any remaining pressure in the PVC will be able to vent out through the exhaust port. After the PVC cement dries, you can paint the PVC piping and connectors. Be sure to protect the push-on fittings with masking tape so they don't get gunked up with paint.

The Ankle Whip uses a lot of air, so you'll need a pretty big compressor to feed it. If you've got an 8+ gallon compressor that can hold 120+ PSI, then you'll be in great shape. A 1-gallon pancake compressor is very unlikely to work. The 6-gallon large pancake compressors are probably ok. Since this uses a lot of air, the compressor will need to run often to refill itself. You'll be happier if you have a long air hose so you can stash your compressor far enough away to not be heard.

Here's a YouTube link showing something very similar to what is described in these instructions:

<https://www.youtube.com/watch?v=Cal-sIAVJY0>