Team 3176 White Paper

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Subteam/Function: Electrical	Subject: Pneumatics
Date/Season: 18/19	White Paper: 3

Abstract

This paper outlines proper safety, setup, and function regarding pneumatics systems.

1. Safety

When using Pneumatics you first and foremost concerns should be safety, safety, and safety. Pneumatics are dangerous and safety glasses are a necessity. Always make sure that everyone in the area knows that the Pneumatics are active. Make sure the pistons are not pointed at people or objects. The compressor will make a loud noise and shake violently, so it's best to either leave it somewhere stable or in someone's hands. The emergency release valve should always be in the open position unless it is your intent to build pressure.

2. Setup

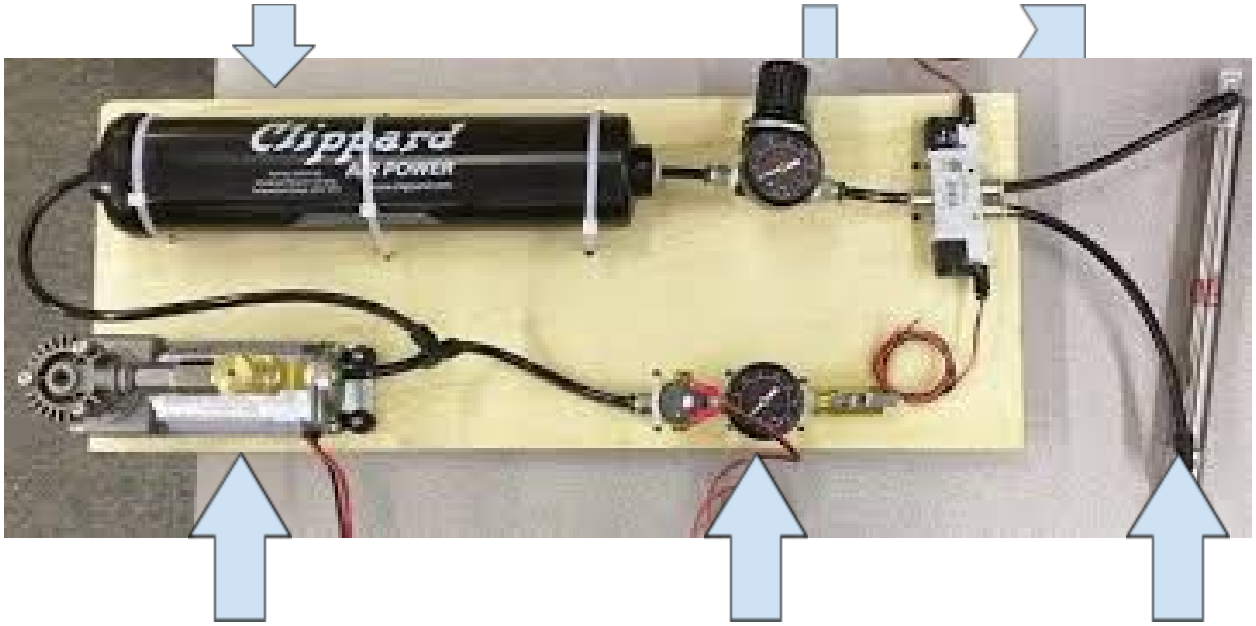
This is an example pneumatic system that extends a single piston. There are four parts required to create a functioning pneumatic system: a compressor to pressurize the system, a tank (one or more) to hold the compressed air, a solenoid to release pressure to a certain point EG. extend/retract a piston, and a piston to translate pressurized air into linear motion/force. All four components are connected via a network of tubes to transport compressed air.

While not technically *required* for a pneumatic system to function, safety components such as pressure gauges, emergency pressure releases, electronic pressure switch (to shut off the compressor at a specific pressure), and pressure regulator are **highly recommended** for safe operation of a pneumatic system.

Figure 1 diagrams an example pneumatic system that extends and retracts a single piston.

Figure 1.

Air Tank, (only use the black clippard plastic ones). Regulator and Gauge. Solenoid Valve



Compressor Pressure Switch, Gauge, and Plug Valve Piston/cylinder

3. Function

The purpose of a pneumatic system is to push or pull an object a fixed distance via a piston. This piston uses compressed air to extend or retract a piston using great pressure, resulting in a sturdy, reliable extension or retraction. In the 2019 game, Destination Deep Space, we used pistons for two functions on the robot: Hatch Panel intake (Crossbow) and Cargo intake (Claw). These pistons served a dual purpose, as they were designed to a) capture game pieces, and b) launch said game pieces.

If this information wasn't clear or you want to know more, go to:
https://firstfrc.blob.core.windows.net/frc2017/pneumatics-manual.pdf
(unless it's out of date)