Knowledge Domain: Mechanical
Unit: Cleaning
Skill: Compressed Air

Tools and Parts Required:

1) **Circuit Board, Computer, or Medical Device to be cleaned**
2) **Can of Compressed Air (may substitute adapted compressor)**
3) **Grounding Strap**
4) **Dust Mask**
5) **Damp Cloth (optional)**
6) **Assorted Cleaning Solvents (optional)**
7) **Paper (optional)**
8) **Tape (optional)**
9) **Electric blower (optional)**
10) **Fan (optional)**

Introduction

Some delicate equipment should not be cleaned using water, brushes, or even soft cloths. Compressed air is a safe way to clean delicate electronics and sensitive equipment.

Example

Below is an example of a keyboard being cleaned with compressed air.

Identification and Diagnosis

Compressed air is used to clean very delicate equipment or electronics. Compressed air is used on circuit boards, computer interiors, and other electronics. Compressed air can also be used to clean multi-pin connectors, keyboards, and anything that is too small to reach with a cloth.

Procedure

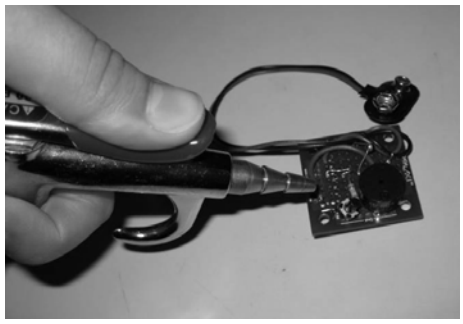
Before beginning, prepare your workspace so you do not damage the equipment. Equipment that is cleaned with compressed air is usually very delicate.

While cleaning a keyboard or a PCB or any electronic equipment, you must consider Electro Static Discharge (ESD). ESD is a cause of many electronic failures. ESD is an accidental excessive discharge of static electricity to electronic components from the human body. Excessive charge destroys the components by altering their internal charge configuration. To prevent ESD, you must take proper precaution.

- Use a grounding strap to ground yourself to the case of the equipment you are cleaning. If you do not have a grounding strap, keep one hand touching the equipment case at all times. Grounding prevents static electricity damage to components. The electricity discharges to the ground instead of the circuit.
- Don't touch any circuit with bare hands,
- Discharge all the DC voltages stored in capacitors or LC circuits to prevent accidental discharge to other components, For small capacitors, you can discharge the capacitor by touching the two lead terminals of capacitor with the tip of screwdrivers with insulated handles. For large or high voltage capacitors, you must attach a resistor, voltmeter or test light onto the capacitor's terminals to discharge the capacitor.
- Switch off the power supply from the machine or circuit several hours before proceeding with cleaning. This will reduce the accidental charges still preserved in the circuit that might cause some problems.

General Tips:

- **Caution**: Do not blow with your mouth on equipment. Breath contains water that may damage equipment. Avoid putting your face close to dusty equipment as it is being cleaned.
- Aim the compressed air towards the largest opening. Blow the dust in one direction to remove it. Blowing in all directions redistributes the dust without cleaning.
- If possible, aim the air away from yourself. Use a dust mask to prevent dust inhalation.
- If possible, use the suction machine to remove the dust.
- Use a fine brush to dislodge dust if necessary.
- Use a filter and a small nozzle to direct the air.



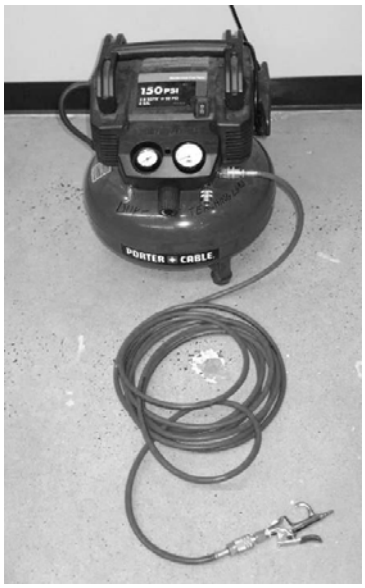
Use a small nozzle to direct the air at the equipment you are cleaning.

- Insure the pressure is set to low. If no settings are available, consider holding the nozzle further from the electronics to reduce air pressure. Hold the nozzle about 5 cm away from the object you are cleaning.
- Never touch the nozzle directly to the electronics.
- Sometimes dust collects in the bottom of the case. Use a cloth dampened with alcohol to wipe up excess dirt from the case before using compressed air.

There are different methods for generating compressed air. When using compressed air for cleaning, you want **high volume** and **low velocity** airflow. For example, a car tire pump is low pressure and fills a large space. A bicycle pump is high pressure and fills a small space. The car tire pump is a better choice for cleaning with compressed air. Use one of the following methods or develop your own method.

Air Compressors and Pumps: Air compressors and pumps generate compressed air. Check the compressor for water condensation. Water will damage electronics.

Look for a compressor that has a low pressure setting. A car tire pump is a good choice for generating compressed air. Use the control valve at the tip to regulate the pressure.



An air compressor

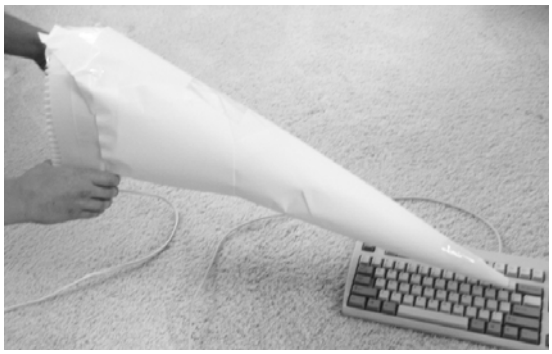
Canned Compressed Air: Computer stores and electronic stores may sell canned compressed air. The air is packaged in an aerosol can. (See “Example” above for a picture).

To use canned compressed air, attach the long, thin nozzle attached to the can. The nozzle directs the air.

Cans of compressed air will become very cold during use. Use the air for a few minutes. Allow the can to warm before continuing.

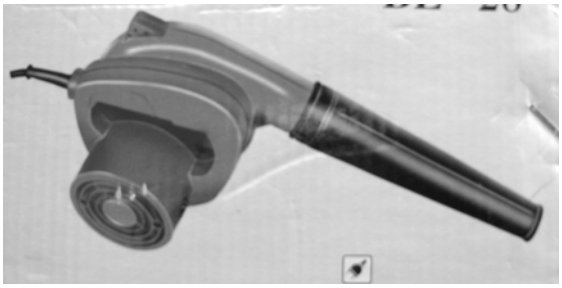
Some sellers offer portable compressed air canisters. Compressed air canisters can be refilled with a bicycle pump or a compressor. Water may also collect in portable canisters. Test the airflow on your skin before blowing directly on electronics.

Fans: A fan generates airflow that is not compressed or directed. To use a fan, you will need to direct the air. Use a cone to direct the air from a larger space to a smaller space. You can create a cone using paper.


Create a cone to direct the air from a fan.

Wrap the paper around the outside of the fan. Use tape or gauze to secure the paper. The cone will work best if no air escapes around the edges. Wrap the paper so it becomes a cone, with a small opening at the tip. The opening at the tip is the nozzle. Use this nozzle to aim the air at the item being cleaned.

***Electric Blowers*:** Electric blowers are often used to blow leaves or dust. They are handheld or back-pack mounted units. Electric blowers may be loud. Wear ear plugs or ear muffs during use. Use the cone method described above to direct the air.


Electric Blower

Exercise

Your instructor will direct you to a piece of medical equipment or computer. Use compressed air to clean the circuit boards, intake fans, and case. Where appropriate, use a damp cloth and solvents before using compressed air.

Your instructor must verify your work before you continue.

Preventative Maintenance and Calibration

Frequent cleanings make cleaning easier. Check your equipment regularly for dirt and dust.

Prevent excess dust and dirt accumulation by checking the air intake. The intake should have a filter in place. Do not place a filter over the exhaust (air output). A filter over the exhaust will prevent dust from exiting.

Always calibrate every medical device before returning it to use.