

Electrical and Electronics Item Safety

2013-2014 Version

Core Standard 470105-01 ELECTRONICS BASIC
470107-01 ELECTRONICS ADVANCED
470108-01 ELECTRONICS DIGITAL
210117-01 ROBOTICS AND AUTOMATION

General Safety

1. The best practice is to work on electrical items and electronic items with the power to the item disconnected.
2. Approved Eye protection should always be worn when diagnosing and working on electrical and electronic equipment.
3. Remove jewelry and watches before working on electrical devices.
4. Keep work area clear of scraps and litter. Clean up any spills you make immediately. Scrap or liquids inside of electronics will quickly make a simple problem into a major headache.
5. Do not tinker with or disassemble any item until you are certain you are performing the task correctly. Half of the items taken to professionals for repair started out with simple problems before the owner tried to fix it without proper training or knowledge/equipment.
6. Before working in lab or operating machinery clear your mind of all items that will take your attention from the machinery or task at hand.
7. When disassembling items place small parts (screws) into containers and label where they came from. This task will save huge amounts of time when it is time to reassemble an item.

Hand Tools

1. Select and use the proper tool for the job to be performed.
2. Pass sharp-edged tools handle first. Do not toss or throw tools.
3. When cutting with hand tools, cut away from the body and stand clear of others.
4. Do not carry hand tools in pockets.
5. Do not hold small objects in you hand when using jewelers screwdrivers, chisels, gouges, knives, or other sharp tools.
6. Use proper tools and procedures for adjusting and maintaining equipment.
7. When cutting wire using diagonal cutting pliers, cut away from yourself and other facing the

floor.

Battery Charging

1. Use extreme caution when charging lead/acid (car type) batteries. Battery acid is harmful to skin and clothing and batteries can explode when not charged properly.
2. Use baking soda and water to neutralize and remove battery acid.
3. Connect battery charger connections with the charger turned off and/or unplugged.
4. Make certain charger polarity connections are correct before turning on charger.
5. If battery has cell caps remove them before charging the battery.
6. Charging of lead-acid batteries produces hydrogen gas which is extremely explosive.
7. Test batteries using multi-meters or similar test equipment

Electrical Safety

1. Remove rings, watches, and other jewelry before working on electrical surfaces.
2. Remove power from equipment and unplug it except when making voltage measurements or adjustments.
3. When working on live electrical equipment observe the following:
 - a. Use one hand rule (only one hand in or around object)
 - b. Use insulated tools and test equipment
 - c. Make certain hands are dry.
4. Keep electrical items being worked on free of excess parts, residue, or tools. Many shop electrical accidents are caused by conductive items causing shorts in equipment.
5. Inspect power cords for breaks, cuts and worn/torn insulation. Report defective cords to instructor.
6. A good practice is to have another person inspect electrical work before powering it on. Even experts make dumb mistakes that another set of eyes could quickly notice.
7. Ensure equipment is properly grounded before applying electrical power.
8. Do not trust switches to keep you safe, unplug items before working on them.
9. Broken and defective equipment must be labeled and not used until repaired.
10. Disconnect power before removing items or components from circuits.

11. Wall outlet voltage and equipment internal voltages can be lethal. Be cautious.
12. Replace fuses with correct rated fuse. If the proper rated fuse is not available a fuse with a **lower current rating** may be temporarily substituted. Fuses with higher current ratings are never to be placed into an object.
13. Do not cut live electrical wires, **EVER!**
14. Electric circuits with voltage exceeding 400 volts are considered potentially lethal by the United States government and require High Voltage warnings.
15. Electrical currents as low .1 amperes ($1/10^{\text{th}}$ of an amp) can be lethal.
16. Televisions and computer monitors with the old cathode ray tubes (CRT) displays are both an electrocution and explosion hazard. Use extreme care when working on one of these items.
17. Electrolytic capacitors can retain their electrical charges for months. Be careful when handling them.

Test Equipment

1. Inspect equipment for good condition before using it.
2. Use caution when handling test leads. Leads can cause short circuits when accidentally touched or connected improperly.
3. Keep fingers away from the non-insulated portion of test leads
4. Check test equipment settings before turning it on.

Soldering

1. Place soldering irons into holders, do not leave them lying on work surfaces.
2. Allow irons to cool before replacing them into tool rack or drawer.
3. Do not flip excess solder from soldering iron tips.
4. Do not allow soldering iron tips to touch bench surfaces or carpet pads. The burnt residue on the tips can ruin the soldering iron.
5. Most electronic solder is a hazardous compound. It is not to be played with.

Chemicals

1. Chemicals in use in this lab and the method of cleaning/decontaminating/disposing of the chemical is in the material safety data sheets (MSDS) booklet in instructor office.