



INDRAPRASTHA INSTITUTE *of*
INFORMATION TECHNOLOGY **DELHI**

ECE LAB



Safety & Security

LAB SAFETY

Safety is always important when working with electricity and electronics. This includes both the safety for you as well as safety for the circuit components you are working with. Concerns such as high voltage or currents can affect the human body, while static safety and proper component use can affect the life of your circuits.

Personal Safety

While electricity is in constant use by the researcher, both within and outside the laboratory, significant physical harm or death may result from its misuse. When working with high voltages and currents, it is important you remember that you can be hurt if your body becomes the 'circuit', since the human body is a conductor of electricity.

Precautions:

- Work on electrical devices should be done only after the power has been shut off in such a manner that it cannot be turned on accidentally.
- If the power cannot be turned off, use only one hand when working on it. This will prevent a circuit from going through your heart, which could be potentially fatal.
- Internal energy storage devices such as capacitors must be discharged.
- All electrical wiring and construction must conform to standard safety practice.
- Wear insulating gloves made of leather or heavy cotton or rubber while working with high voltage.
- Use only tools and equipment with non-conducting handles when working with electrical devices.
- Never change wiring with circuit plugged into power source.
- Never plug leads into power source unless they are connected to an established circuit.
- Avoid contacting circuits with wet hands or wet materials.
- Check circuits for proper grounding with respect to the power source.
- Do not use highly flammable liquids near electrical equipment.

Component Safety

Many electrical components are likely to be damaged by static electricity. Static charge can build up to many thousands of volts, but with little energy. This cannot harm humans, but it can easily damage electronic components.

To ensure static-safe handling, the best practice is to wear an anti-static strap and connect it to an earth ground such as a computer case or a water pipe. If you do not have an anti-static wristband, you can instead touch a ground every few minutes to discharge your static build up.

Safety guidelines for the students

Following proper safety practices are a must when working with electronic equipment. Not only is there the danger of electrical shock, but the components can explode if not connected properly. Many of today's electronic components are easily damaged by improper handling. The test equipment used in the electronic service industry is expensive and easily damaged if proper operating procedures are not followed.

- **DOUBLE CHECK** circuits for proper connections and polarity prior to applying the power. Observe **POLARITY** when connecting polarized components or test equipment into a circuit.
- Always **OBSERVE POLARITY** when connecting components into a circuit, especially with electrolytic capacitors. Always **CUT** wire **LEADS** so the clipped wire falls on the table top and not toward others.
- **ONLY** work with powered units **WHEN NECESSARY** for troubleshooting. **REPLACE ALL** screws, not just some.
- Avoid **PINCHING** wires when putting equipment back together.
- **ALWAYS REPLACE** shields that were removed during service to avoid signal **RADIATION**.
- Make sure **TEST** instruments are set for proper **FUNCTION AND RANGE** prior to taking a measurement.
- When measuring **UNCERTAIN** qualities, start with the range switch on the **HIGHEST** setting.

Soldering Precautions

- Apply **HEAT** from a soldering pencil for no more than a couple of seconds to **AVOID HEAT DAMAGE**.
- When soldering a multi-pin component, avoid excessive heating to one area of the component; **DO NOT** go from pin to pin in a straight line.
- **KEEP** soldering irons in their protective **STAND** when not in use. **DO NOT TOUCH** the tip end of a soldering iron to check for heat.

Prepare for Emergencies

Since it is essential to react promptly and deliberately to emergencies, students should learn what to do in various emergencies and be prepared to act accordingly – for example, fires, injuries, and spills. Safety devices such as showers, eye washes, fire extinguishers, and spill kits, must be clearly labeled and their use and location known to all those working in a laboratory. Emergency phone numbers, alarms, and escape routes should be clear to everyone.