

Knowledge Domain: Electrical Simple

Unit: Lighting/ Indicators

Skill: Replacement of Light bulbs (incandescent, fluorescent, LED)

Tools and Parts Required:

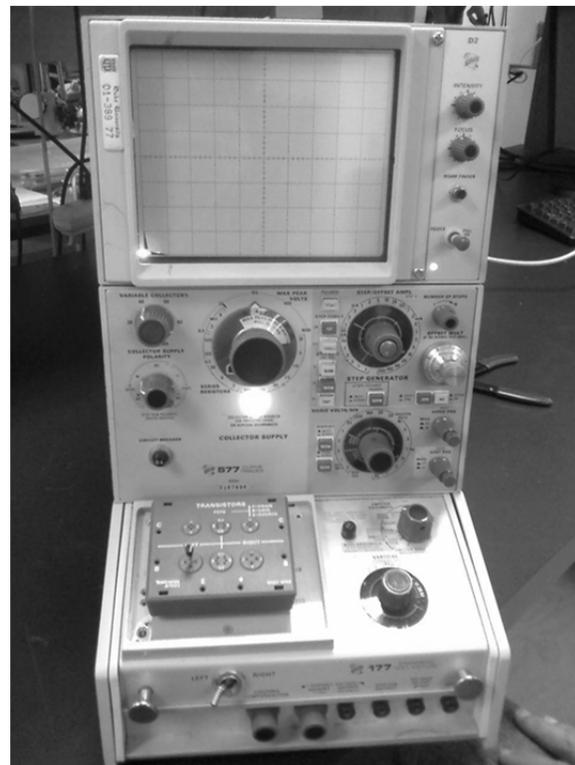
1. A light bulb (incandescent, fluorescent, or LED) to be checked
2. Multimeter or AC voltmeter
3. New light bulb for replacement
4. Tweezers
5. Work gloves

Introduction

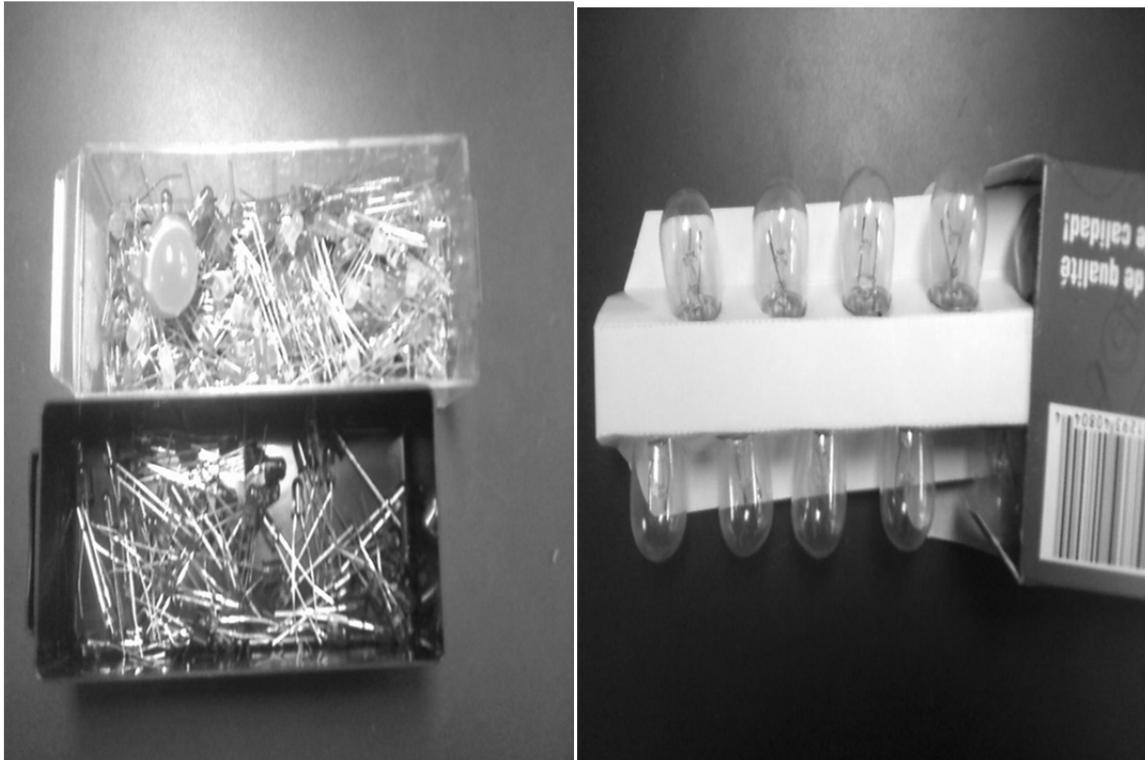
Incandescent and LED light bulbs are used as indicator bulbs in electronic instruments. Indicator lights communicate information about how the equipment is functioning. Non-functional bulbs must be replaced.

Example

The following photos show examples of 2 types of equipment that use indicator bulbs.



Below are photos of LED bulbs (left) and incandescent bulbs (right) that might be used in medical equipment as indicators.



Identification and Diagnosis

It is very important to identify when the indicator light bulb needs replacement. Bulbs should be replaced when it fails to turn on, is broken or is not as bright as before. The user may report that the machine is not working. Check the indicator bulbs if the machine appears to be functioning normally.

You must determine if the indicator bulb is an incandescent bulb or an LED. An incandescent bulb has a visible coil inside. Most colored indicators are LED bulbs.

Procedure

1. Verify that the bulb needs to be replaced. Turn on the device and use the settings that should illuminate the indicator light.
2. If the bulb is broken, carefully remove the bulb from the indicator bulb socket. Follow the procedure below to remove the broken bulb.
 - Wear work gloves.

- Remove the casing of the device using screw-driver to expose the bulb connection.
 - If the indicator bulb is soldered directly to the instrument, you should desolder the indicator bulb terminals.
 - If the indicator bulb is attached to the device in a socket, use tweezers to unscrew the indicator bulb.
3. Identify the type of bulb (either incandescent or LED) that needs replacement:
 - Use the identification and diagnosis section above.
 - The device front panel may also tell you the type of bulb.
 - If the device front panel has no information about the type of bulb, refer to the device manual to find the type of indicator bulb.
 - If you are not able to determine the type of bulb from diagnosis section, panel, or manual, measure the voltage capacity of the indicator bulb: Measure the voltage across the bulb terminals. Turn on the device and place one multimeter probe on either terminal of the bulb socket. The measured voltage is the capacity of the indicator bulb. Record the voltage capacity of the indicator bulb. The replacement indicator bulb must handle this voltage safely. If you are not able to determine the type of bulb from step 3, use only the voltage capacity to determine the replacement indicator bulb.
 4. Identify the type of connector used to connect the indicator bulb with the device. The replacement indicator bulb should have the same connector. Adapting bulbs is difficult. Refer to the skill *Electrical-Lighting/Indicators-Fixtures* for more information on adapting bulbs.
 5. Use the collected specifications to find a replacement bulb in the market. You may not be able to find an exact replacement. If you can match the voltage and the bulb fits, the light will probably work.

For help identifying the technology (LED or incandescent) and the voltage rating associated with the indicator bulb, go to **bulbman.com** or **1000bulbs.com**.

Exercise

Your instructor will give you an indicator light bulb (incandescent, fluorescent, or LED).

If the light bulb requires replacement, refer to the procedure to determine the technology (LED or incandescent) and voltage rating of the replacement bulb.

Identify the type of connector used with the indicator light bulb. Record the specifications of the replacement indicator bulb to use when you search for the replacement indicator light bulb.

Your instructor must verify your work before you proceed to the next step.

Preventative Maintenance and Calibration

Check the indicator light bulbs regularly for faults. Faulty bulbs need to be replaced with new light bulbs of the correct specifications.

A regular planned preventative maintenance (PPM) schedule should include checks for all indicator bulbs, including alarms, at least once per year.

Always calibrate every medical device before returning it to service.