

Knowledge Domain: Electrical Simple

Unit: Lighting/Indicators

Skill: Fixtures (electrical rewiring, mechanical adaptations)

Tools and Parts Required:

- 1) Soldering Iron
- 2) Solder wire
- 3) Spare wires
- 4) Insulating tape
- 5) Substitute light bulbs (a truck headlight)
- 6) Substitute fixture (if required)
- 7) Wire cutters
- 8) Wire strippers
- 9) Spare wire

Introduction

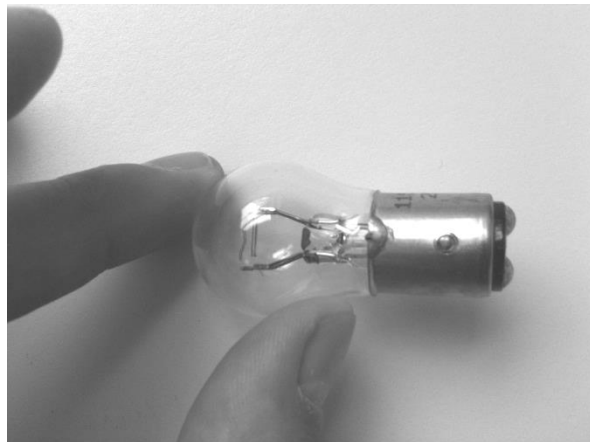
Every light bulb will stop working eventually. Use an exact replacement for the light bulb if an exact replacement is available. Otherwise, suitable substitutions must be made. It is possible to combine various bulbs of different specifications in a new circuit. This skill will show how to replace and adapt fixtures in this method.

Example

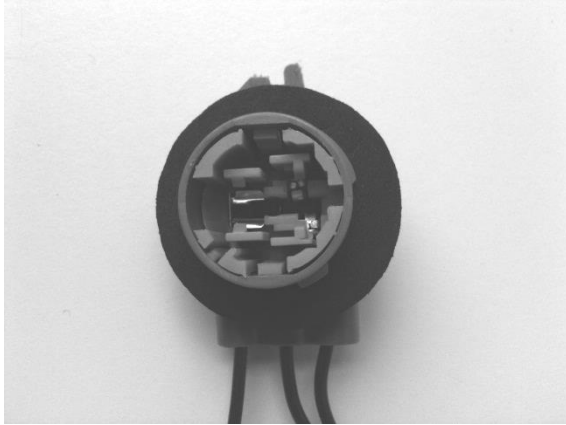
Below are pictures of a light bulb and its fixture.



Light bulb placed in fixture



Light bulb conducting end



Fixture (Socket)



Fixture (reverse side)

Identification and Diagnosis

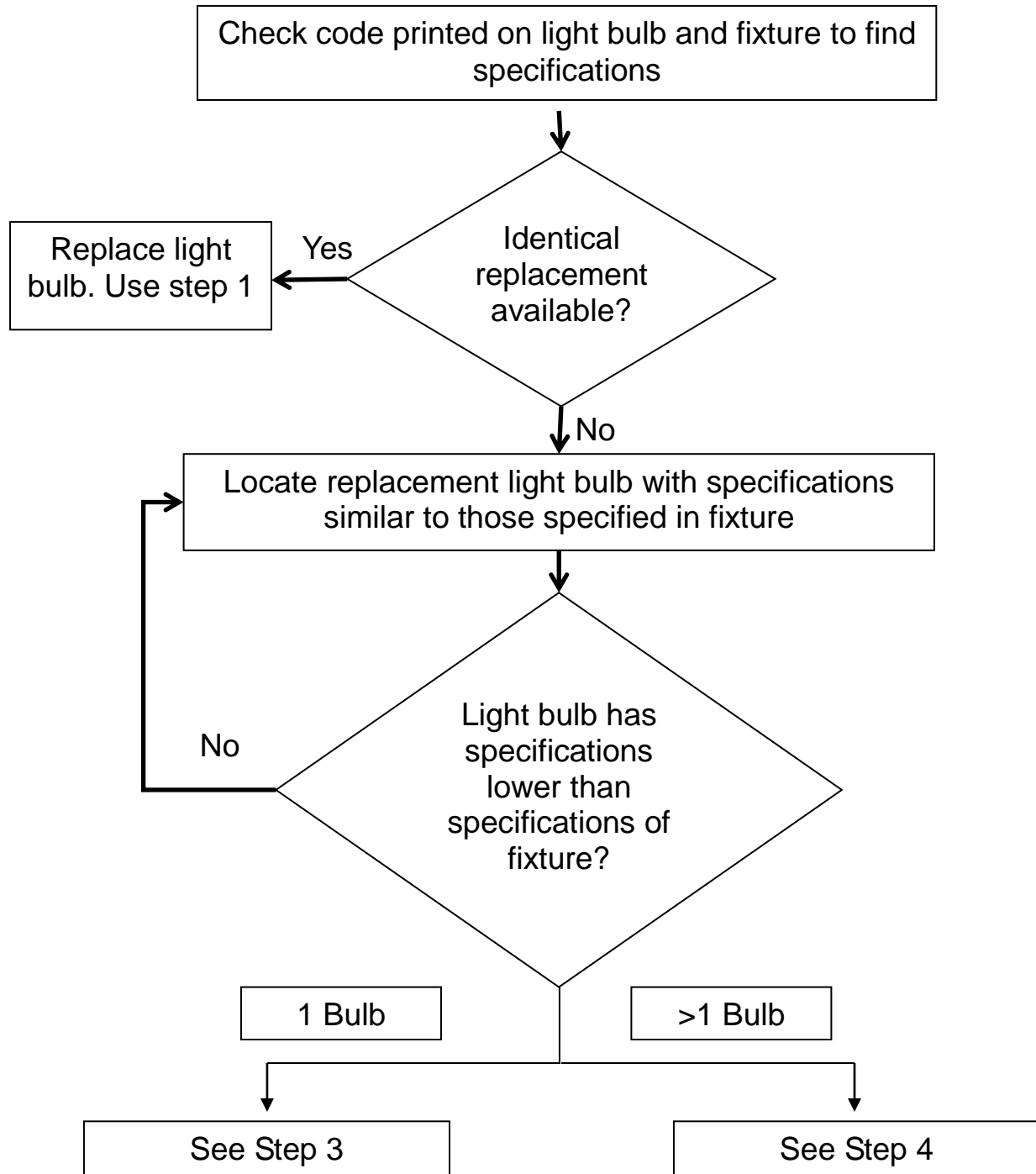
If the bulb is not lighting but there is voltage at the bulb input, then the light bulb is not working. If the bulb is not working the light bulb must be replaced. If you cannot find an exact replacement bulb, you may also need to replace the fixture. In this skill, you will learn to replace and adapt the fixture.

Procedure

1. Determine if the replacement light bulb will fit into the existing fixture. Attach the replacement light bulb if the replacement light bulb fits. If the replacement light bulb does not fit, detach the fixture by removing the light bulb and cutting the wires.

Obtain a suitable fixture that will fit the replacement light bulb. The fixture must be insulated.

Work Flow Chart



2. If no ideal replacement can be found, use several light bulbs. The sum of the voltage ratings of the replacement light bulbs must NOT be greater than the voltage rating of the original light bulb. When adding the specifications of each light bulb, the total voltage must be less than or equal to the specifications of the original light bulb.

For example: Light bulb 1 specification = 6 Volts

Light bulb 2 specification = 6 Volts

Specification of original light bulb = 12 Volts

Light bulb1 (6V) + Light bulb 2 (6V) < = Original Specification (12V)

Use the fewest number of bulbs possible. Using too many bulbs will make it difficult to arrange them in the fixture. If possible, use just one bulb with a specification slightly lower than the required. For example, instead of two 6V bulbs use one 10V bulb. This will make the final step easier.

3. When the bulbs to be used are chosen, make sure a fixture is available for each bulb. If using just one fixture/bulb, attach the fixture to the wires left behind where the original fixture was removed. Attach the wires from the fixture but do not solder until the new bulb has been tested. If the bulb lights, solder the connections made and then find a mechanical solution to attach the fixture to the device (set screws, electrical tape, etc.). This can be the most difficult part of the procedure.
4. If multiple bulbs are chosen, then the fixtures must be soldered together before connected to the device. Connect the fixtures in series so that the output voltage from the first fixture (ground) leads to the input in the second fixture. As in Step 3, check the lights in the device before attaching and soldering the fixtures permanently. Again, attaching the fixtures to the device will likely be the most difficult part of the procedure.

Exercise

Select 2 light bulbs that have similar specifications. Select a table-lamp that needs a light bulb having higher voltage rating than the light bulbs chosen. Can the two light bulbs be used in this lamp? How and why?

Next, your instructor will provide you with the lamp, light bulbs, and wires. Attach the two light bulbs and operate them using the lamp. Use the flowchart. Use steps 1-4 below the flowchart to assist you.

Your instructor must verify your work before you continue.

Preventative Maintenance and Calibration

The sum of the ratings of the replacement light bulbs must NOT be greater than the rating of the original light bulb.

Use caution when working with electricity. Exposed wires are a shock hazard. Use insulating tape to cover any exposed wire to prevent risks of shock injuries.

Do not operate equipment with a temporary lighting fixture for an extended period. Temporary lighting fixtures are acceptable only until the current patient is treated or for a few hours. Temporary lighting fixtures may cause fires or permanently damage the equipment.