

Knowledge Domain: Electrical Simple
Unit: Fabrication
Skill: Simple Shielded Cables

Tools and Parts Required:

- 1) 1.8 meter of copper electrical wires, 16-gauge stranded (x5)
- 2) 25.4mm of solid copper core conductor wires, 22-gauge (x5)
- 3) Soldering iron
- 4) Solder
- 5) Sponge
- 6) Heat shrink
- 7) Electrical tape
- 8) Scotch tape
- 9) Crimping tool
- 10) Electrician wire scissors
- 11) RJ-45 plug
- 12) Connector for shield cable
- 13) Marker

Introduction

Cables connect medical devices to sources of signal or power. Cables get worn or damaged due to injury or repetitive use. These instructions are for fabricating simple shielded network cables. However, the instructions can be applied to fabricating any cable for which you know the pin out.

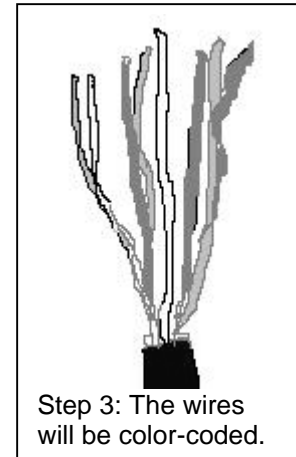
Identification and Diagnosis

If a medical device is not working, you should check the connecting cables. There may be a frayed or torn cable. The connector may not be connecting at the pin site. In that case, please read the skill *Electrical-Connectors-LooseConnectors* or *Electrical-Connectors-Replacing Pins*. Repair or replace broken cables. Fabricate a cable only if you are not able to repair the original cable.

This procedure is specific for network cables. However, the procedure is identical for any cable for which you know the pin out. This procedure cannot be used for lost cables where you do not know the pin out.

Procedure

1. Cut the outer cable jacket lengthwise with a knife. Use care when cutting the cable jacket to avoid cutting the wire insulation.
2. Locate the string inside the cable along with the wires. If no string is found, use the wires themselves to unzip the sheath of the cable. Unzip the cable sheath by holding the sheath in one hand and pulling with the string or wire.
3. Cut away the unzipped cable jacket sheath and cut the twisted pairs of wires about 30 mm. long. The wires will be color coded.
4. Inspect the wires for cuts or scrapes that expose the copper wire. If you see copper wire, cut the entire segment of wires and start over at step one. It is important that the wire's insulation remains intact.
5. Untwist the wire pairs. Cut off the white piece of thread (if it is there). Cut the wires 19 mm long from the base of the cable jacket.
6. **Arrange the wires based on the wiring specifications.** These instructions are for typical network cables. However, if you know the pin out, you can follow the same procedure for any cable. If you are searching for specific pinout layouts of common cables, we suggest the following website:
<http://pinouts.ru/>



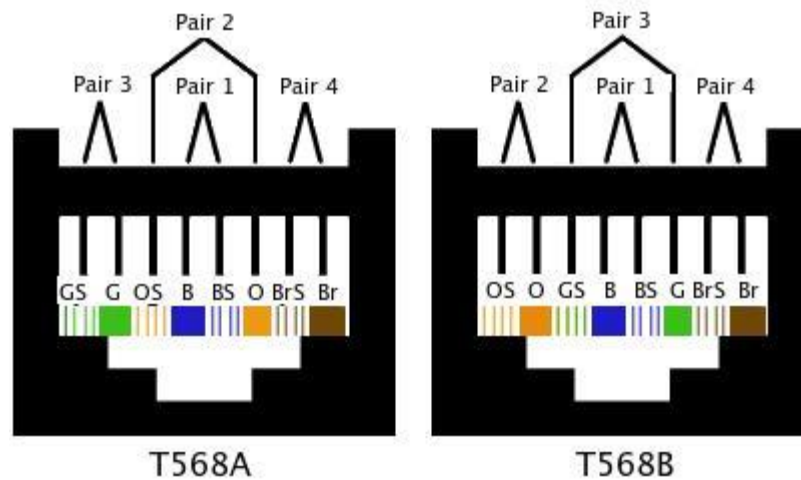
For network cables: There are two methods, 568A and 568B. A straight-through cable is used to connect two different-layer devices (e.g. a hub and a PC). A straight-through cable has both ends wired identically with 568B. Two like devices normally require a cross-over cable. A cross-over cable has one end wired 568A and the other end wired 568B.^[1] This procedure, will explain 568B. The instructions can be adapted for 568A.

- a. 568B - Put the wires in the following order, from left to right:

White with orange stripe
Orange
White with green stripe
Blue
White with blue stripe
Green
White with brown stripe
Brown

- b. 568A – Put the wires in the following order, from left to right:
White with green stripe
Green
White with orange stripe
Blue

White with blue stripe
Orange
White with brown stripe
Brown



7. Press all the wires flat and parallel between your thumb and forefinger. Insure the colors have remained in the correct order.
8. Cut the top of the wires evenly 12.5 mm long from the cable jacket. The cable jacket will be inserted 3.18 mm into the 8P8C connector.
9. Keep the wires flat and in the correct order and push them into the RJ-45 plug. Hold the RJ-45 plug with the flat surface upwards. The white with orange stripe wire is on the left for T568B. . Insure wires are in correct position by observing each hole in the RJ-45 plug. The cable jacket should enter the RJ-45 plug about 6 mm in.
10. Crimp the wired RJ-45 plug. If you do not have a special tool for crimping the wires, you can try to use pliers. Locking pliers can also be used for crimping. Connectors can be reused from other discarded phone, printer, USB or charger cables.
11. Repeat the above steps with the other end of the cable.
12. Test the cable to insure that it will function in the field.

Exercise

Your instructor will provide the necessary wires and material to create your own cable. If there is not enough material to fabricate each of the different kinds, insure that you pair up with another student and observe each other's work.

Preventative Maintenance and Calibration

A missing cable can force a piece of medical equipment out of service. If cables are sometimes lost in your hospital, label cables with the corresponding medical equipment.