Chapter 9

STRUCTURED CABLING

PROJECT

PROJECT PLANNING

Safety procedures: Electrical.

- **Never work on a device (e.g. hub, switch, router, or PC) with the case open and the line voltage (power cord) plugged in.**

- **Test electrical sockets with an appropriate voltage tester or multimeter.**

- **Locate all electrical conduits and power wires before trying to install any networking cable.**

- **Properly ground all networking equipment.**

- **Never cut or nick a live 120 or 220 VAC line.**

Safety procedures: Constructive.

- **Wear safety glasses whenever you are drilling or cutting.**

- **Measure carefully before you cut, drill into, or permanently alter construction materials.**

- **Investigate what you will be drilling or cutting into before you begin.**

- **Follow practices of general cleanliness (e.g. minimize dust that can affect sensitive networking devices).**

- **Follow proper ladder placement and safety procedures whenever you must use a ladder.**

Network design documentations

- **Engineering journal**

- **Logical topology**

- **Physical topology**

- **Cut sheets**

- **Problem-solving matrices**

- **Labeled outlets**

- **Labeled cable runs**

- **Summary of outlets and cable runs**

- **Summary of devices, MAC addresses, and IP addresses**

Network installation teams

- **Project manager:**
  - **Safety.**
  - **Keeping other team members focused.**
  - **Seeing that all documentation is performed.**
- **Materials and tools manager:**
  - **Tool kits, cable, connector, testers.**
- **Cable Runner:**
  - **Planning and running cable safely and according to specifications, and testing the cable run.**
- **Jack and Patch Panel Terminator:**
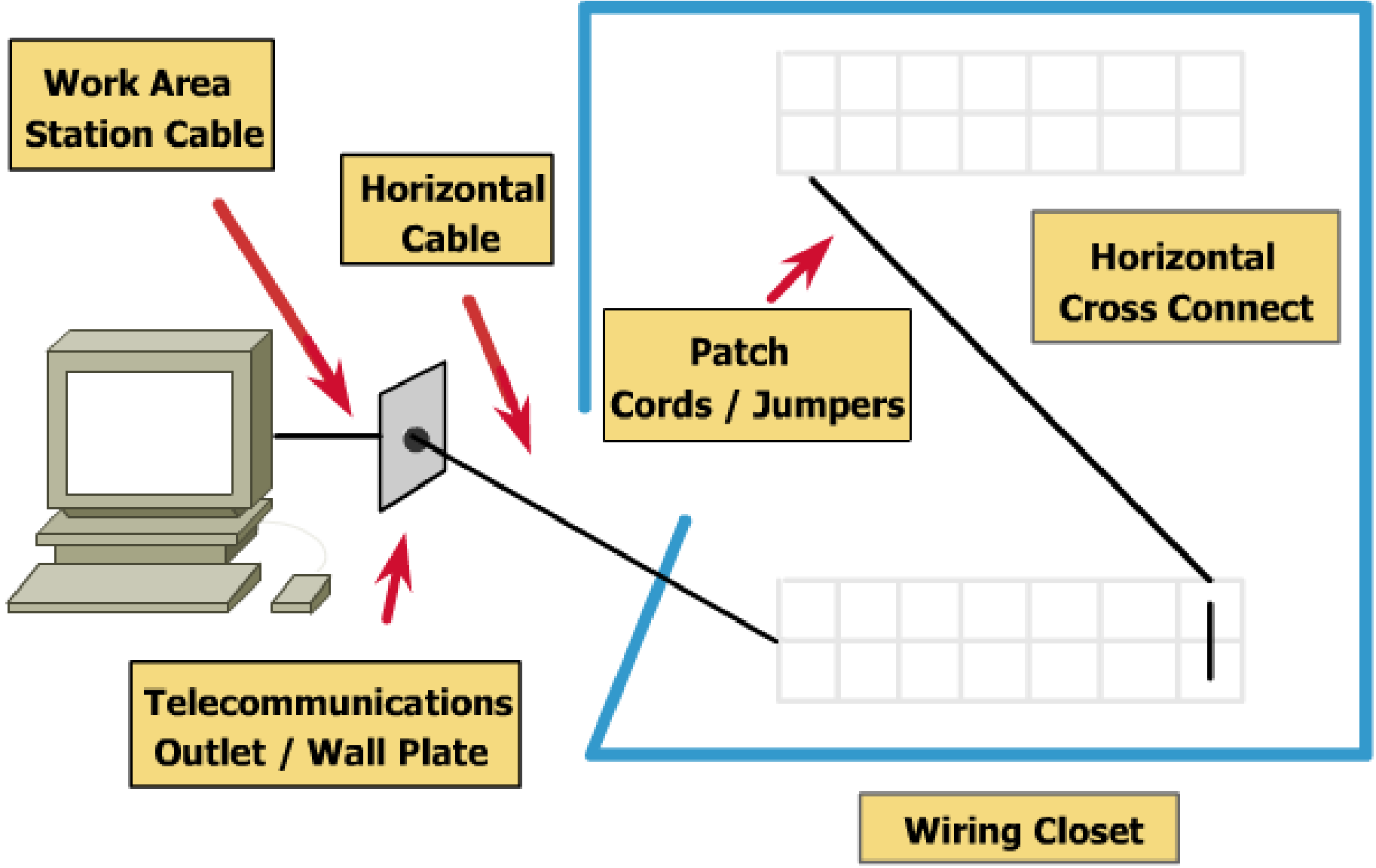 - **Punch downs, jack installations, and testing.**

Work flows

- **Installing outlets.**

- **Installing jacks.**

- **Running cables.**

- **Punching cables into patch panels.**

- **Testing cables.**

- **Documenting cables.**

- **Installing NICs.**

- **Installing hubs, switches, and routers.**

- **Configuring routers.**

- **Installing and configuring PCs.**

RJ-45 JACK AND OUTLET INSTALLATION

Horizontal cabling

Work Area Station Cable

Horizontal Cable

Patch Cords / Jumpers

Horizontal Cross Connect

Telecommunications Outlet / Wall Plate

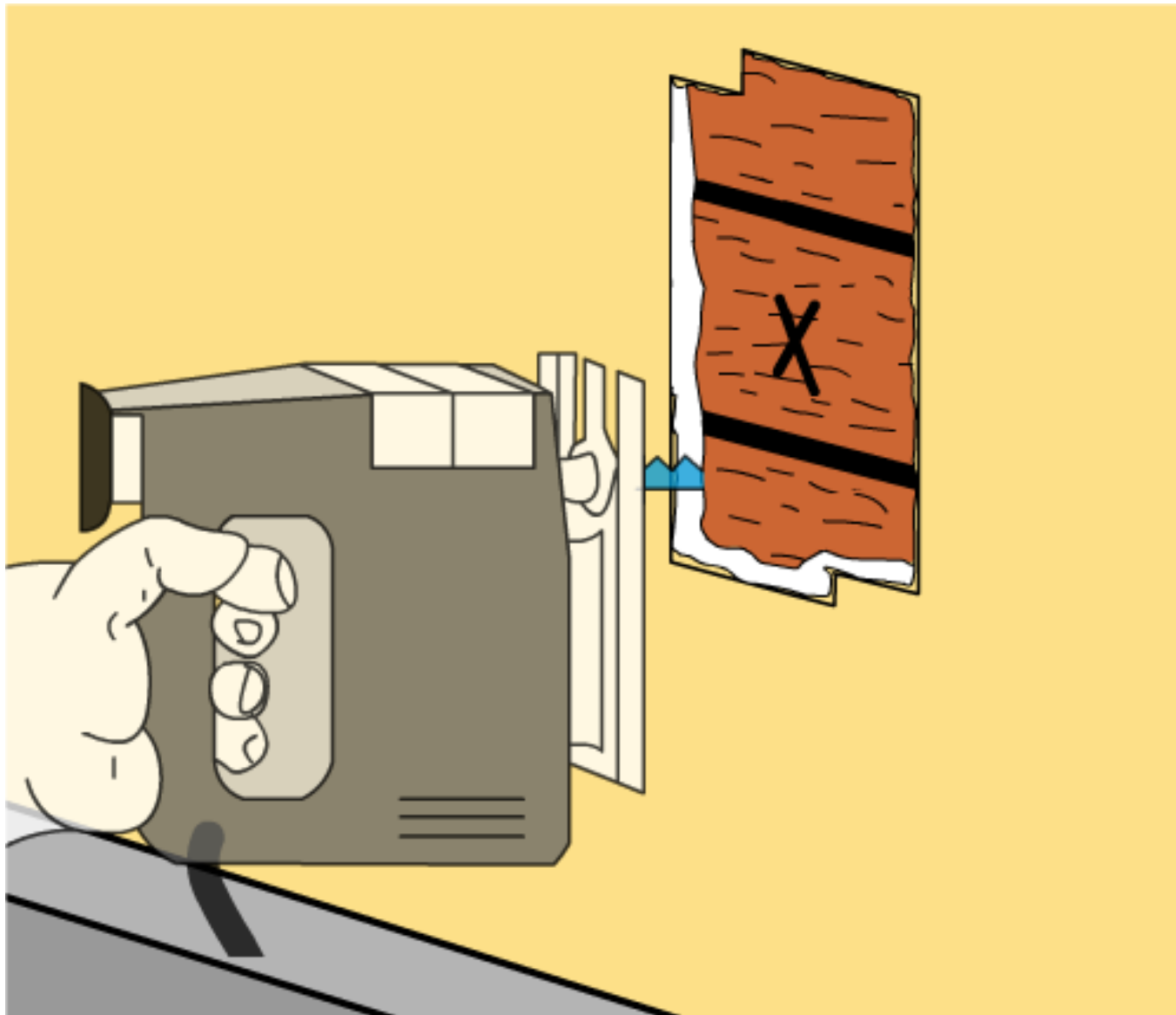**Wiring Closet**

Mounting a RJ-45 jack

- **TIA/EIA-568-A specifies two types of wall mounts that you can use to position an RJ-45 jack onto a wall:**
  - **The surface mount.**
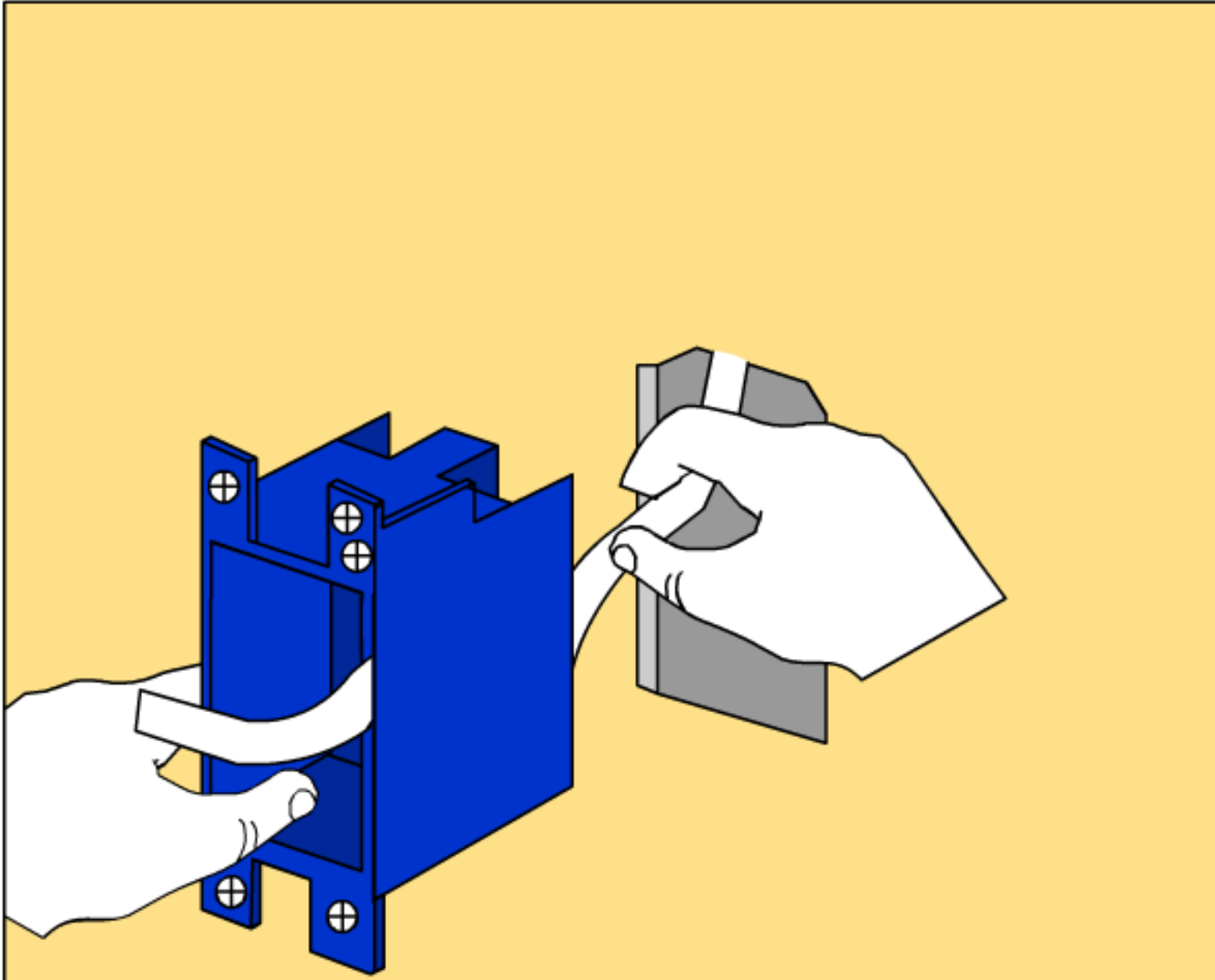 - **The flush mount.**

Drywall surface
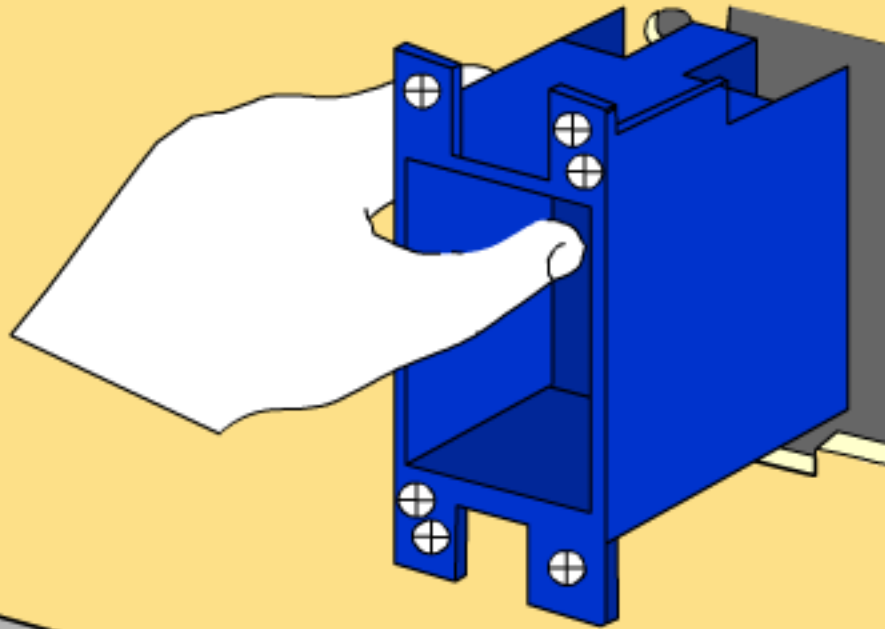
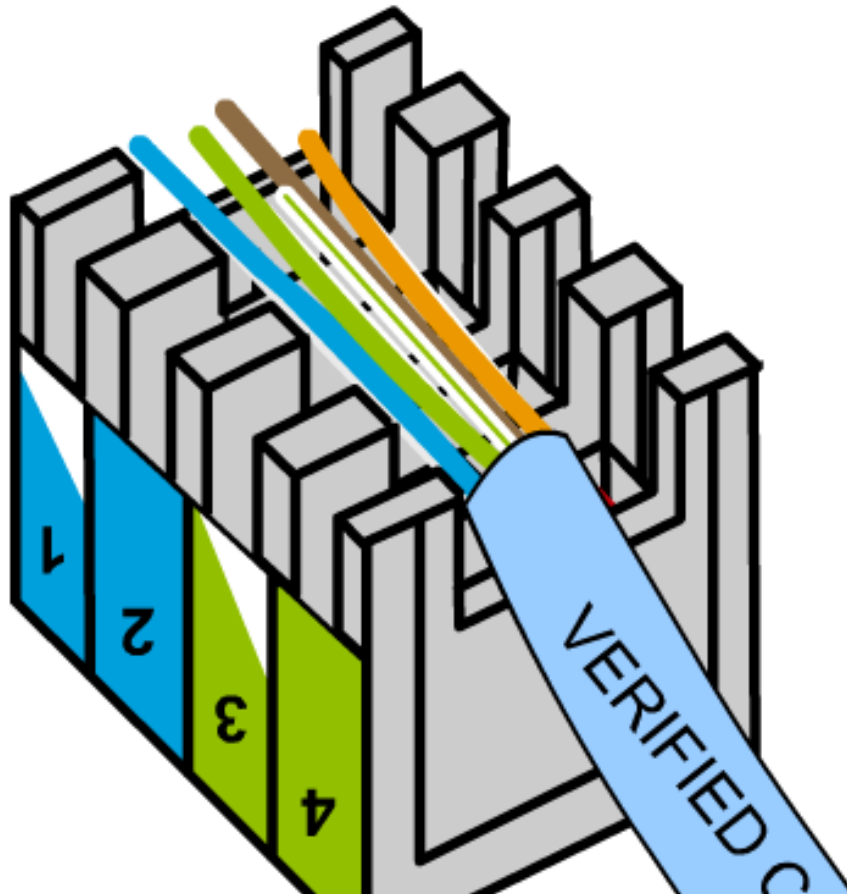Turn off the power to all circuits that go to, or pass through, the work area!
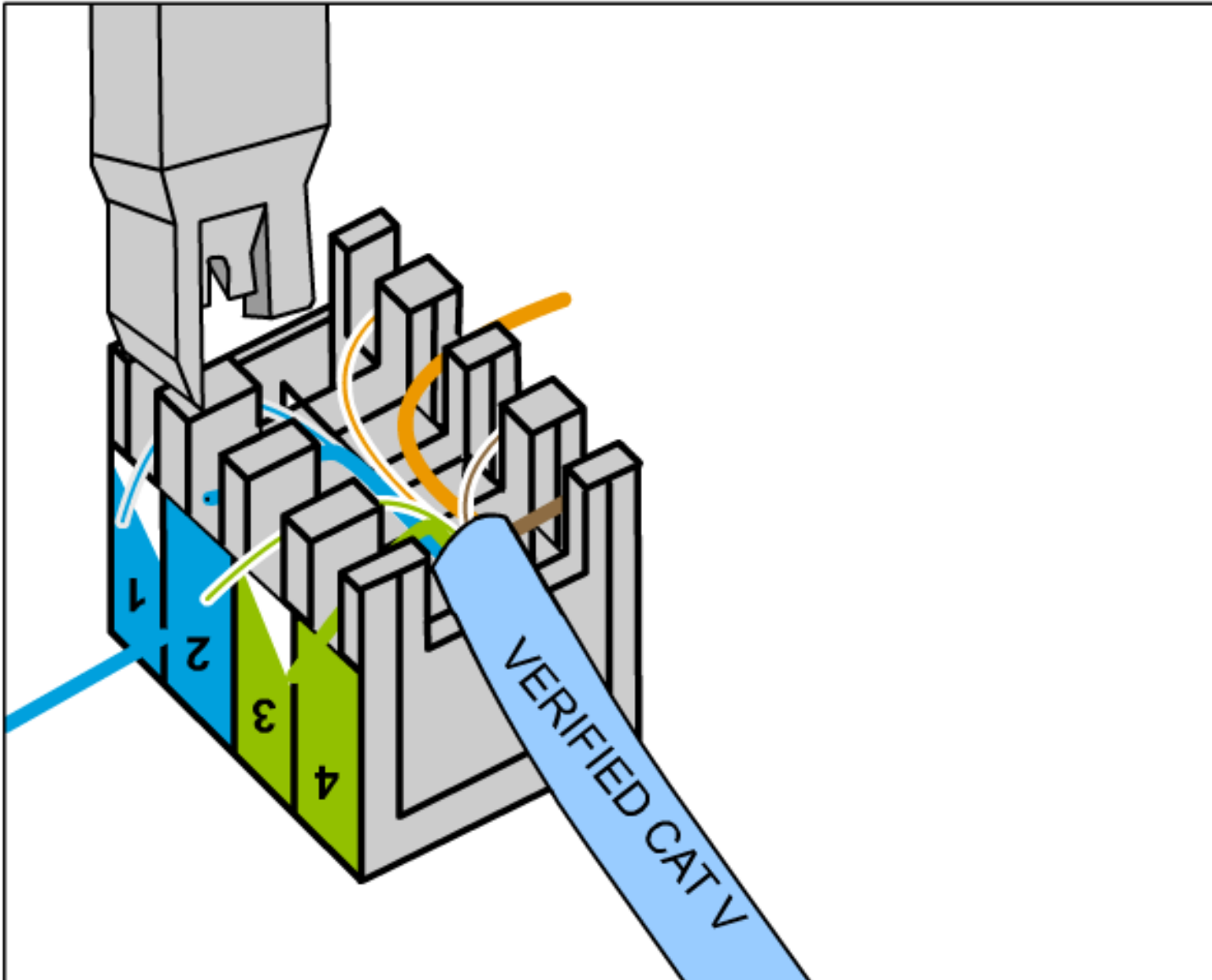
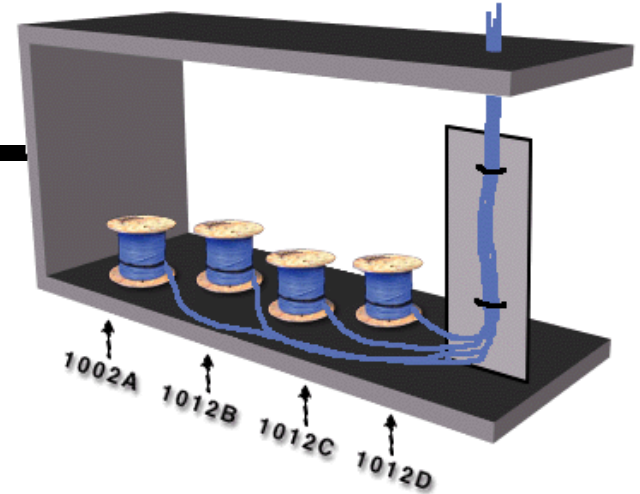# Plaster surface

Flush mounting a box

Laying down wires

Punching wires

VERIFIED CAT V

BASIC OF CABLE INSTALLATION

Installing UTP cabling

- **DO's:**
  - **Use cable ties**
  - **Leave slack**
  - **Leave service coils**
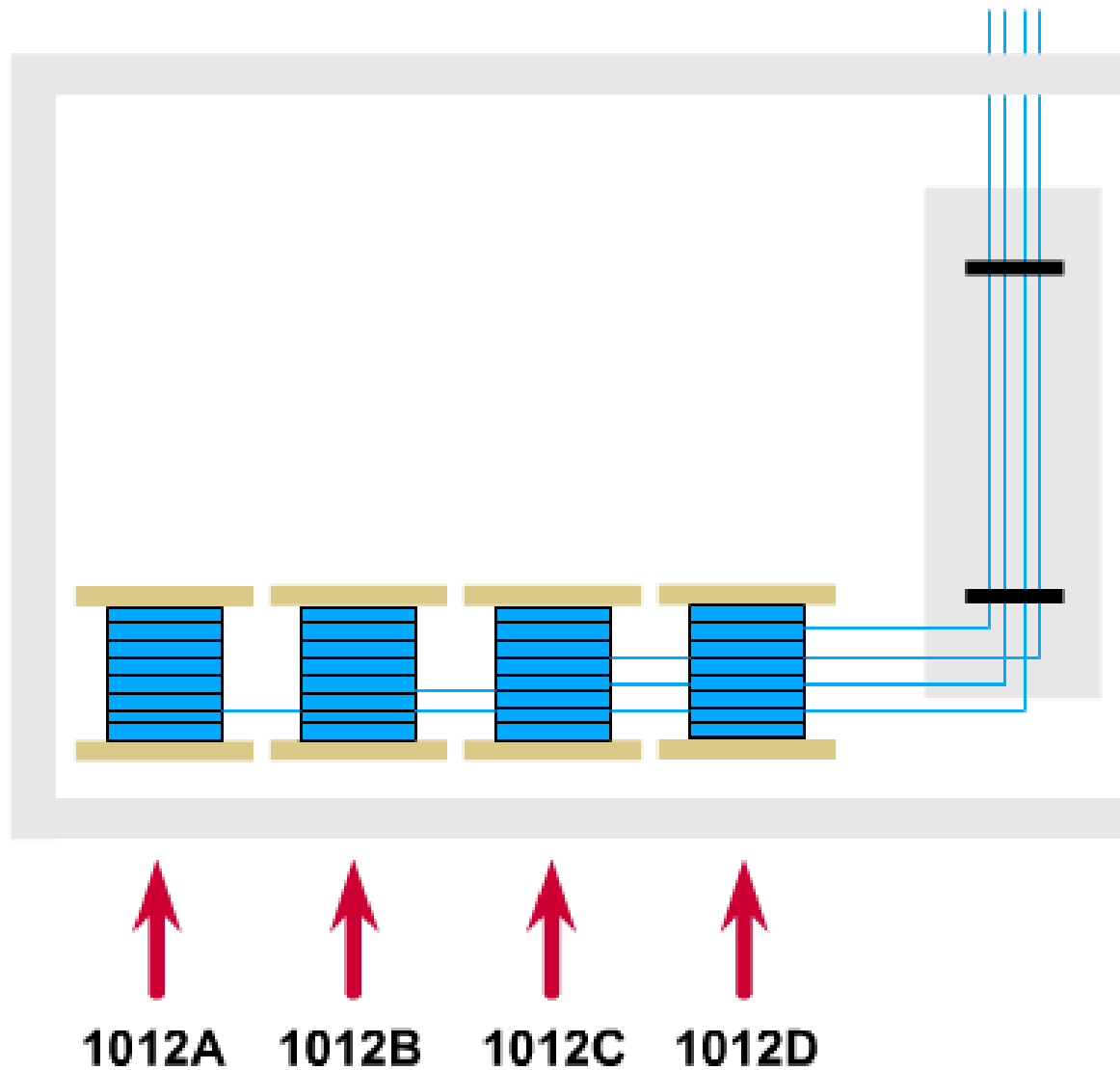 - **Support bars**
  - **Cable management panels**
  - **Use Velcro**

- **DON'Ts:**
  - **Don't untwist > 13mm**
  - **Minimize bend radii**
  - **No > 90° bends**
  - **No kink**
  - **Don't stretch**
  - **No staple guns**

1002A 1012B 1012C 1012D

Ladder rack

Velcro
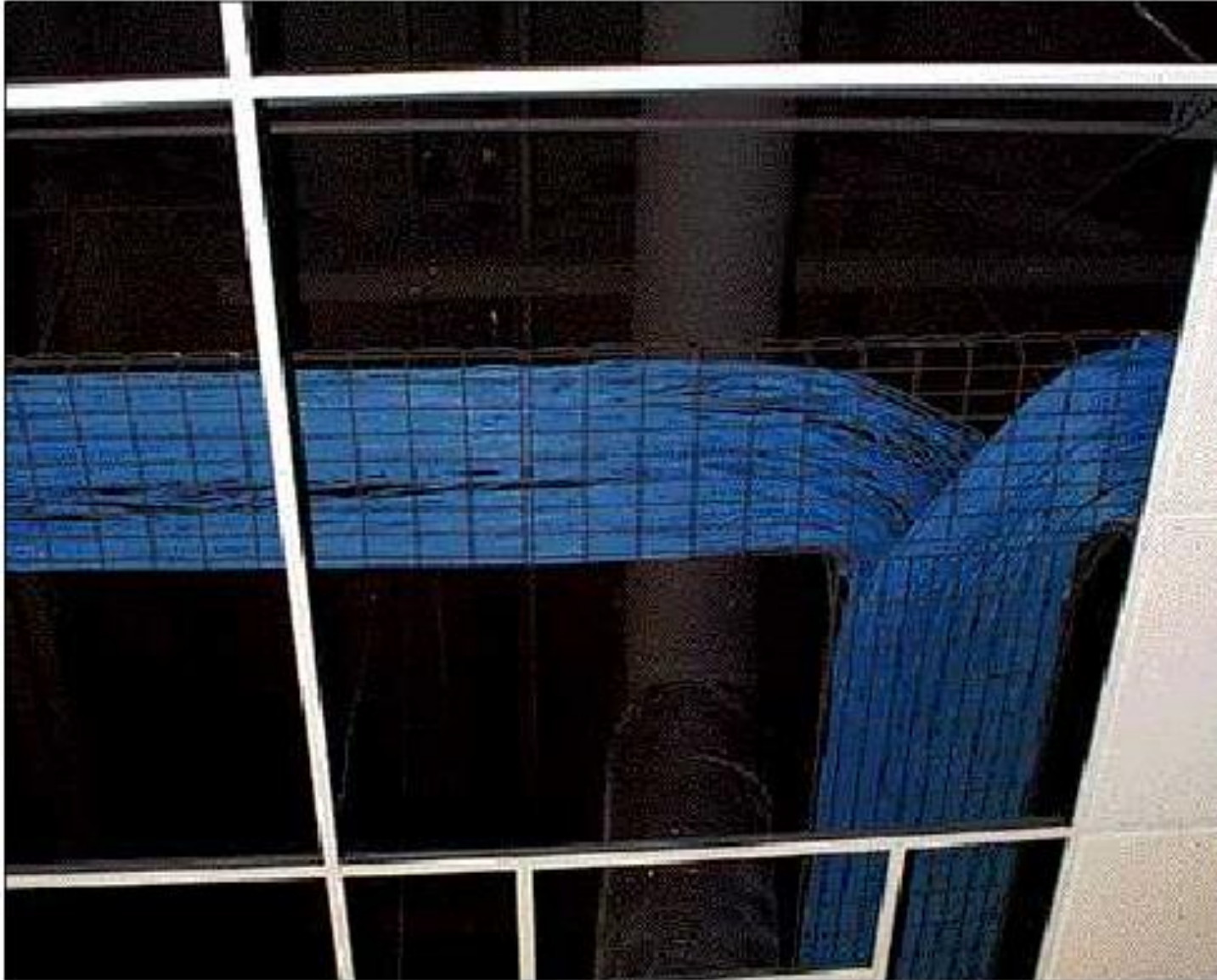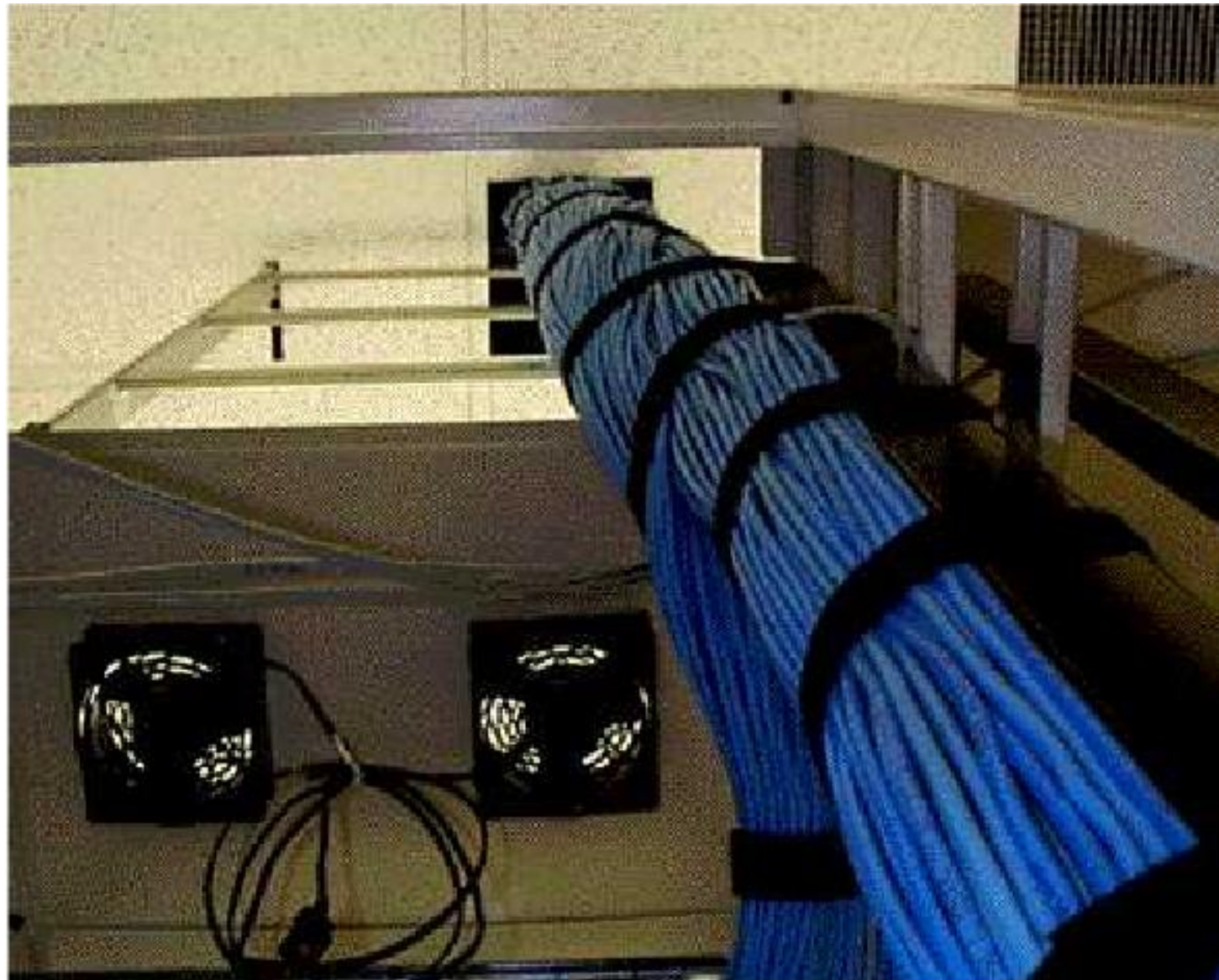
Documenting cable runs

1012A   1012B   1012C   1012D
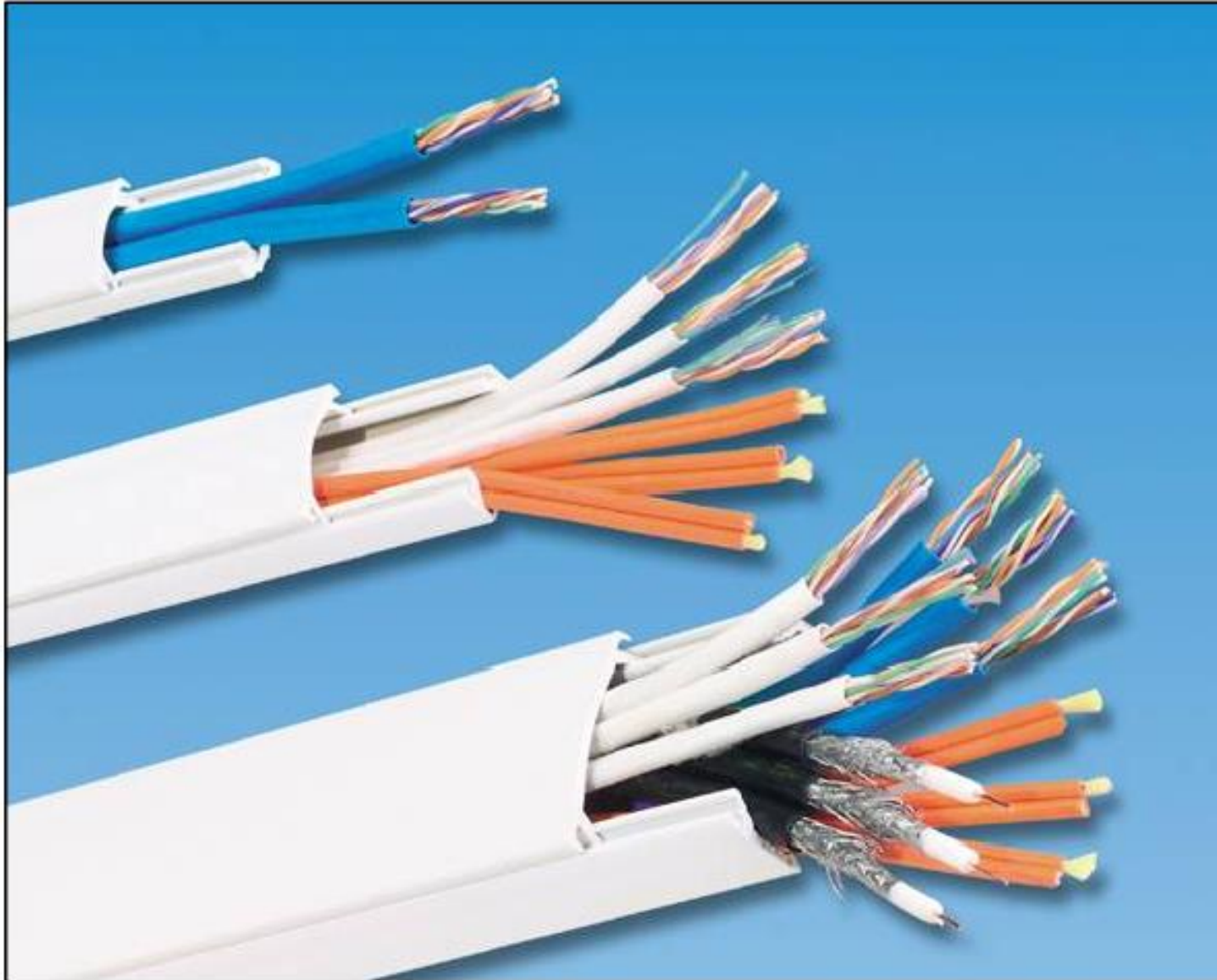
Raceway

Safety rules

- **Turn off power to all circuits that might pass through those work areas.**

- **Before you begin work, learn the locations of all fire extinguishers in the area.**

- **Wear appropriate clothing. Long pants and sleeves help protect your arms and legs. Avoid wearing excessively loose or baggy clothing.**

- **If you anticipate working in a dropped ceiling area, survey the area. You can do this by lifting a few of the ceiling tiles and looking around. This will help you locate electrical conduit, air ducts, mechanical equipment, and anything that might possibly cause problems later.**

Safety rules (cont.)

- If you need to cut or saw, **protect your eyes with safety glasses**. It's also a good idea to wear safety glasses when you work in a crawl space or above a dropped ceiling.

- **Consult the building's maintenance engineer** to find out if it there is asbestos, lead, or PCB where you will be working. If so, follow all government regulations in dealing with that material.

- **Keep your work area orderly and neat**. Do not leave tools lying in places where someone might trip over them. Use caution with tools that have long extension cords. Like tools, they are easy to trip over.
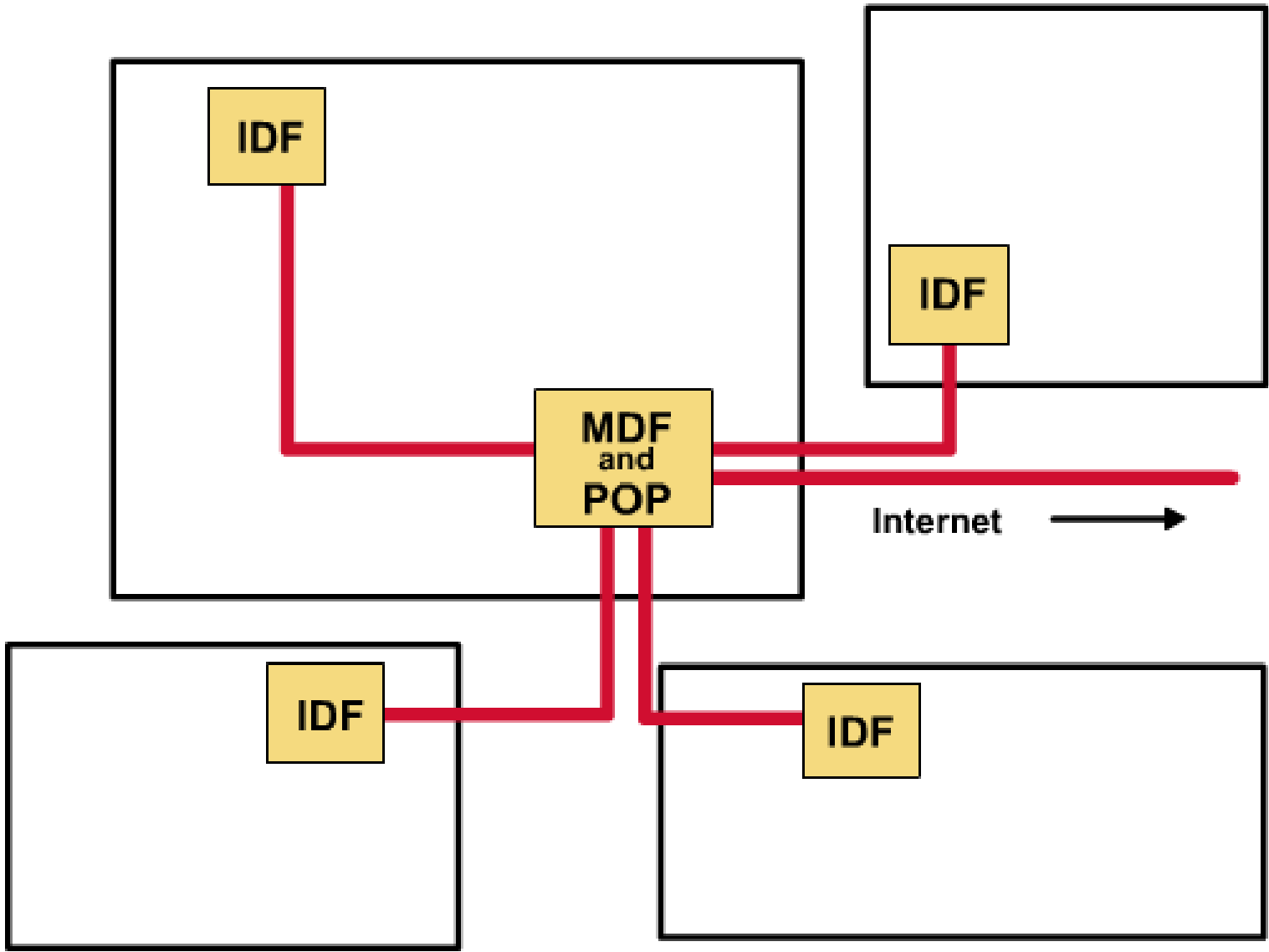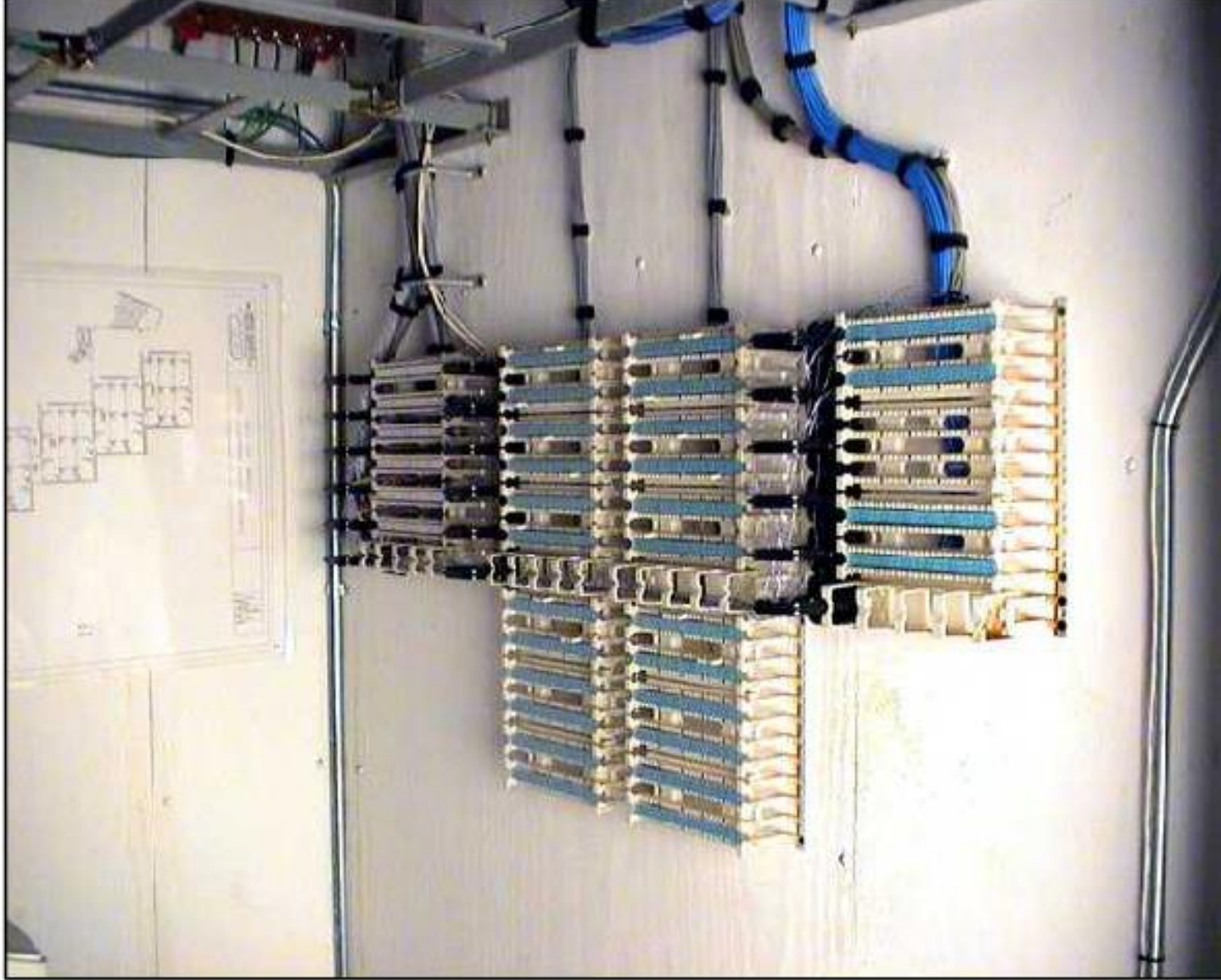
WIRING CLOSETS

AND
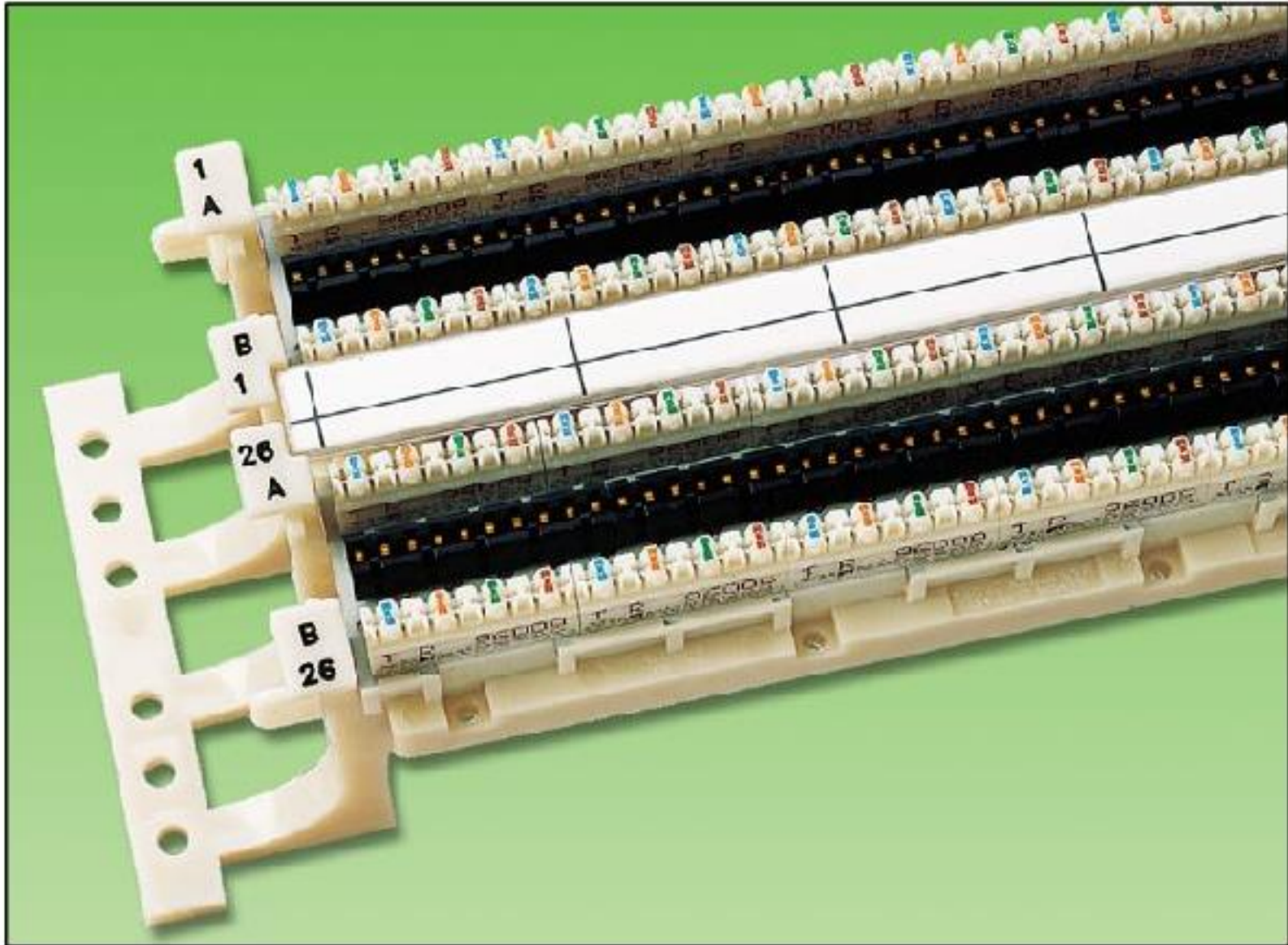
PATCH PANELS

Wiring closets

MDF and IDF

Patch panels

Structure of a patch panel

Laying wires in patch panel

1. **Lay down cable wires in ascending order, by cable number. Use the cable numbers that were assigned when it was run from the work area to the wiring closet.**

2. **Keep the ends of the cable centered above the pin locations.**

3. **Be sure to keep the jacket within 6.4 mm of the pin locations you are working on, in order to avoid exposing too much wire.**

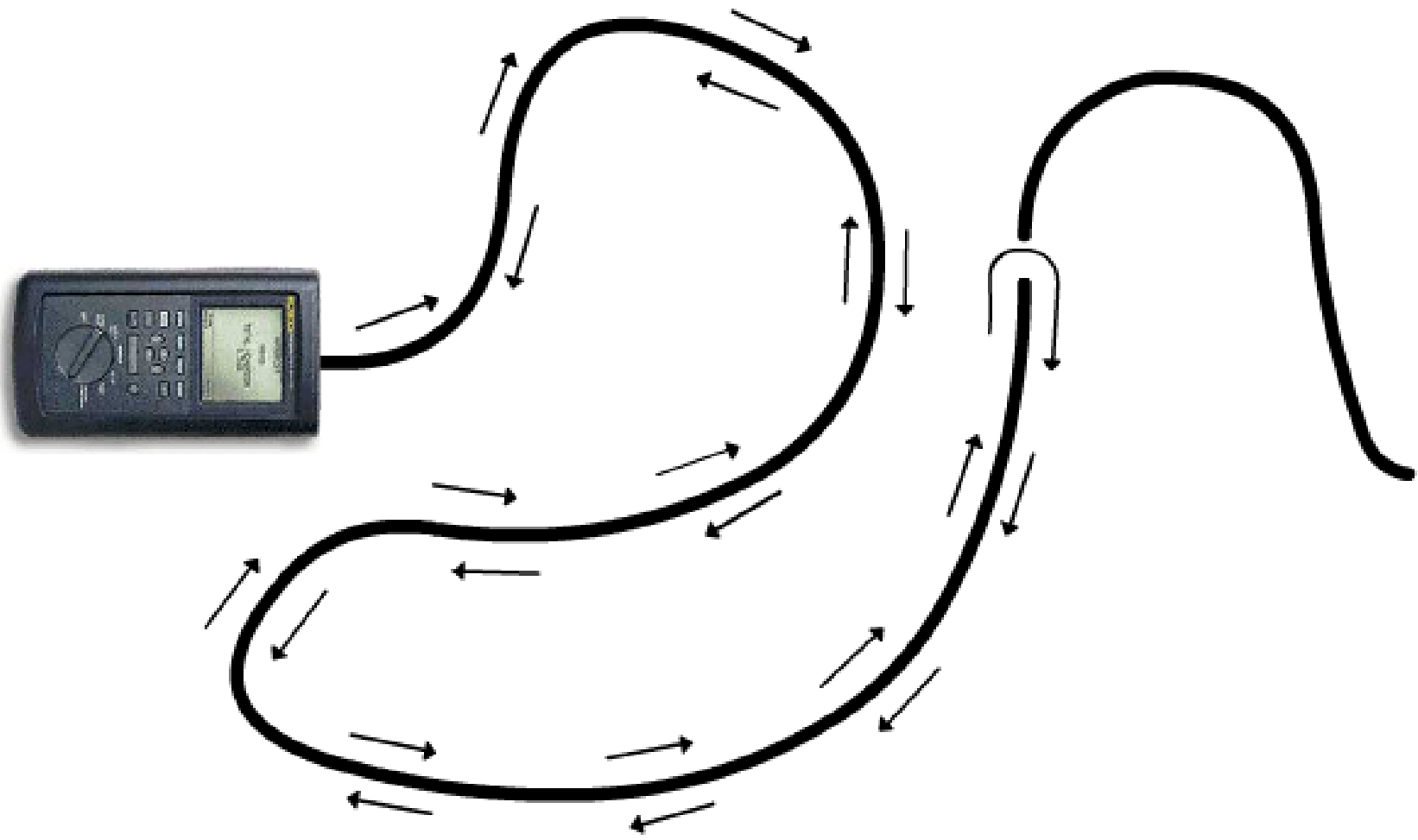4. **You must not untwist the wire pairs any more than necessary.**

CABLE TESTING
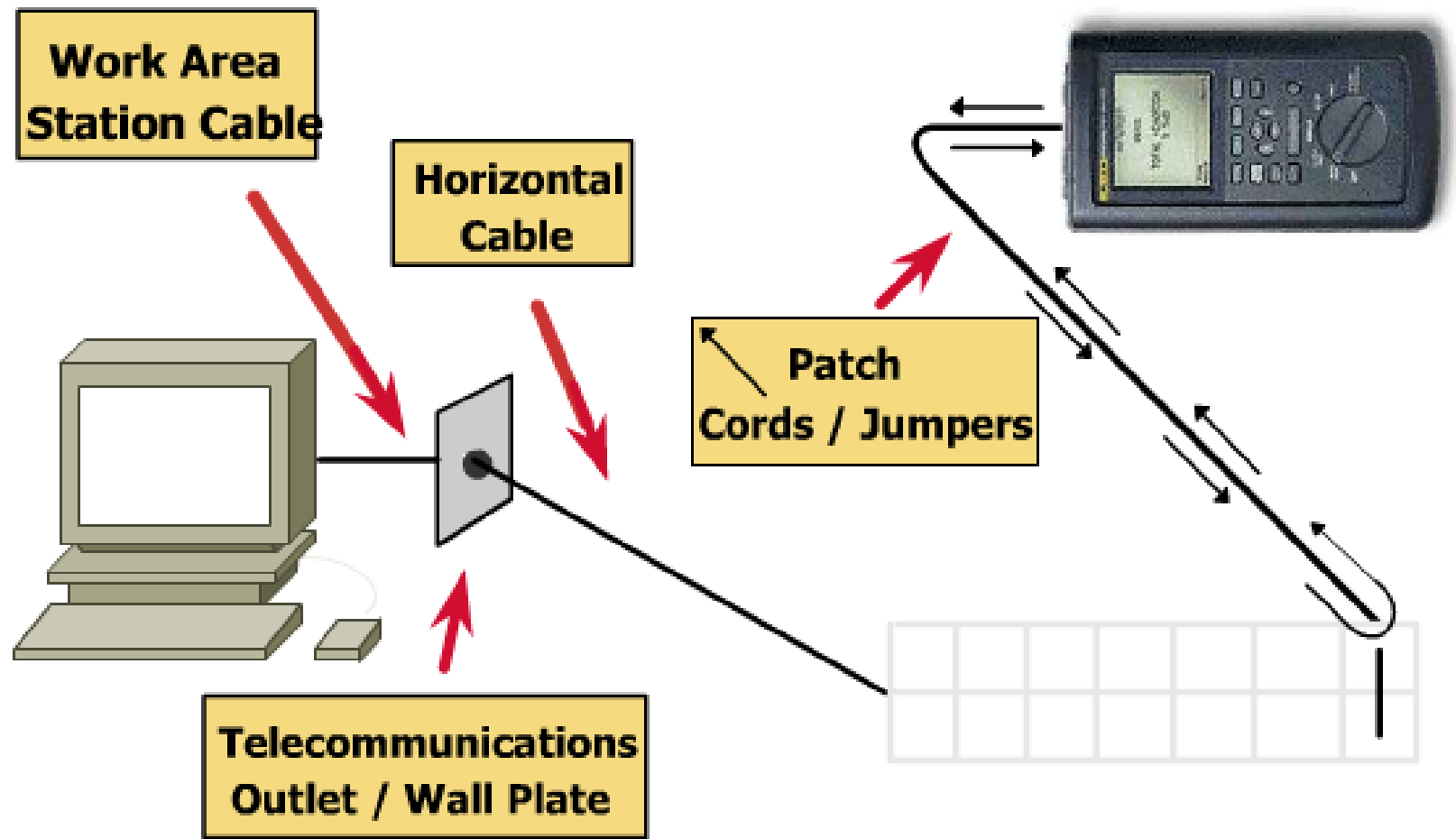
Cable Testers

- **Determine cable distance.**

- **Locate bad connections.**

- **Provide wire maps for detecting crossed pairs.**

- **Measure signal attenuation.**

- **Measure near-end crosstalk. .**

- **Detect split pairs.**

- **Perform noise level tests.**

- **Trace cable behind walls.**

Distance measurements

Time Domain Reflectors (TDRs) measure the distance to open-ended, or shorted cable.

Distance measurements

Work Area Station Cable

Horizontal Cable

Patch Cords / Jumpers

Telecommunications Outlet / Wall Plate

If it reports the distance to the patch panel, instead of a more distant point, then you know there is a connection problem.

Split pairs