

CONSTRUCTION HANDS-ON WORKSTATIONS ZONE



Telecommunications Service Technician



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This Construction Zone workstation will teach you the basic fundamentals of installing telecommunication cables, as you acquire skills by performing hands-on activities. No prior knowledge of the trade is required, as the Construction Zone curriculum will introduce you to professional tools and provide step by step instructions to use them in skills practice.

Before working on the activities, you will learn:

- What telecommunications service technicians do
- What job opportunities exist for telecommunications service techs
- What telecommunications is
- How a network works
- What telecommunications cables are available and what are the functions and properties of each

After you have learned how a telephone works and what the Public Switched Telephone Network looks like, you will measure, cut, and run telephone cable from a punch block to two voice line jacks. After you have learned how television works, you will measure, cut, and run coaxial cable for a cable television hookup.

WORKSTATION OVERVIEW

You will complete the following tasks:

- Wire a punch block using a punchdown tool
- Measure, cut, run, and staple telephone cable
- Make connections at two voice line jacks
- Test a phone line using a tone generator and inductive amplifier
- Measure, cut, run, and clip coaxial cable
- Strip telephone cable and wires with a data/phone cable stripper and a wire stripper
- Strip coaxial cable with a coaxial cable stripper
- Install crimp-on F connectors with a cable crimper
- Make cable connections at a splitter and a snap-in cable connector
- Make DSL connections at a punch block and snap-in jack
- Disassemble telephone, data, and cable television circuitry

TELECOMMUNICATIONS SERVICE TECHNICIAN SKILLS OBJECTIVES

Activity Day 1

- Define telecommunications service technician
- Describe two key duties that service technicians perform
- List several skills that are advantageous for telecommunications service technicians
- Describe the training most service technicians receive
- List five types of academic institutions that offer telecommunications service technician programs

Activity Day 2

- Define telecommunications
- List the three components necessary to telecommunicate
- Define network
- State the properties and applications of UTP, STP, coaxial, and fiber optic cables
- List the services offered under the "triple play" strategy
- Explain the function of a work order

Activity Day 3

- Identify the parts of a telephone
- Define the terms transmitter and receiver
- Describe how the parts of a transmitter work together to transmit signals
- Describe how the parts of a receiver work together to convert signals to sound waves
- Define local loop
- Define demarcation point
- State the function of a network interface
- Define the acronym PSTN
- Distinguish between analog and digital transmission, and identify which type is used for each part of a telephone network
- Identify the parts of a tape measure
- Make accurate measurements using a tape measure
- Identify the parts of a side cutter
- Use a side cutter to cut wire

Activity Day 4

- Define the term punch block
- Explain the function of an IDC
- Identify the different parts of a punchdown tool
- Identify the different parts of a cable stripper
- Differentiate between daisy chain and home run wiring layouts
- Use a cable stripper and punchdown tool to install 4-pair wire onto a 66 punch block

Activity Day 5

- Define the term bridge clip
- Identify the different parts of a staple gun
- Safely use a staple gun to secure telephone cable to studs
- Identify the different parts of a wire stripper
- Safely use a wire stripper to prepare UTP wire for connection
- Identify the different parts of a screwdriver
- Distinguish clockwise rotation from counter-clockwise
- Identify the different parts of a pair of needle nose pliers
- Safely use needle nose pliers to make wire end loops
- List the modern standard color code for Category 5 cable and the corresponding outdated color code for 4-wire telephone cable

Activity Day 6

- Identify the different parts of a tone generator
- Define tone generator
- List and state the function of the three operational modes of a tone generator
- Identify the different parts of an inductive amplifier
- Define inductive amplifier
- Use a tone generator and inductive amplifier to test a phone circuit

Activity Day 7

- Define cable television
- Define headend
- State the function of various headend equipment, including an RF modulator, an RF demodulator, a satellite receiver, a combiner/amplifier, and a fiber optic receiver
- Define HFC
- State the function of a drip loop
- Define ground clamp
- Define ground block

Activity Day 8

- Define coaxial cable stripper
- Identify the different parts of a coaxial cable stripper
- Describe the features of a crimp-on cable connector
- Define cable crimper
- Identify the different parts of a cable crimper
- List the steps required to install a crimp-on connector
- Safely use a coaxial cable stripper to remove insulation from cable
- Terminate each end of a length of cable with F connectors
- Identify the different parts of a hammer
- Safely use a hammer and cable clips to secure coaxial cable

Activity Day 9

- Define the term Internet
- Define protocol
- State the function of four major Internet protocols: IP, TCP, SMTP, and HTTP
- Define ISP
- Define POP
- List three ways of accessing the Internet
- Explain how DSL can use the same pair of wires as a phone line
- Connect a DSL line using a snap-in jack
- Use a tone generator and inductive amplifier to test a DSL circuit

Activity Day 10

- Safely use a screwdriver to remove and loosen screws
- Disconnect all wires from connectors and terminals
- Use a side cutter to remove cable clips and wire staples



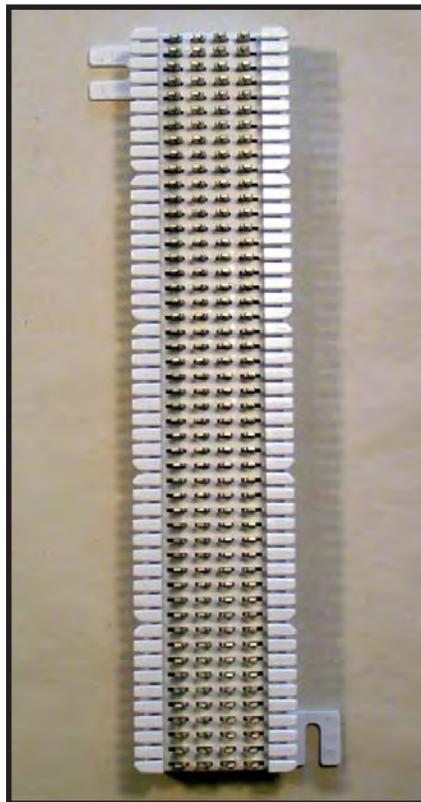
Activity Introduction

Your task is to make connections on a punch block using a punchdown tool. Before you begin, you will learn about a punch block and IDC terminals. You will learn how to use a punchdown tool and a data/phone cable stripper to make connections.

Activity Day 4 Tools & Materials	
 <i>Safety Glasses</i>	 <i>Data/Phone Cable Stripper</i>
 <i>Punchdown Tool</i>	

Punch Block

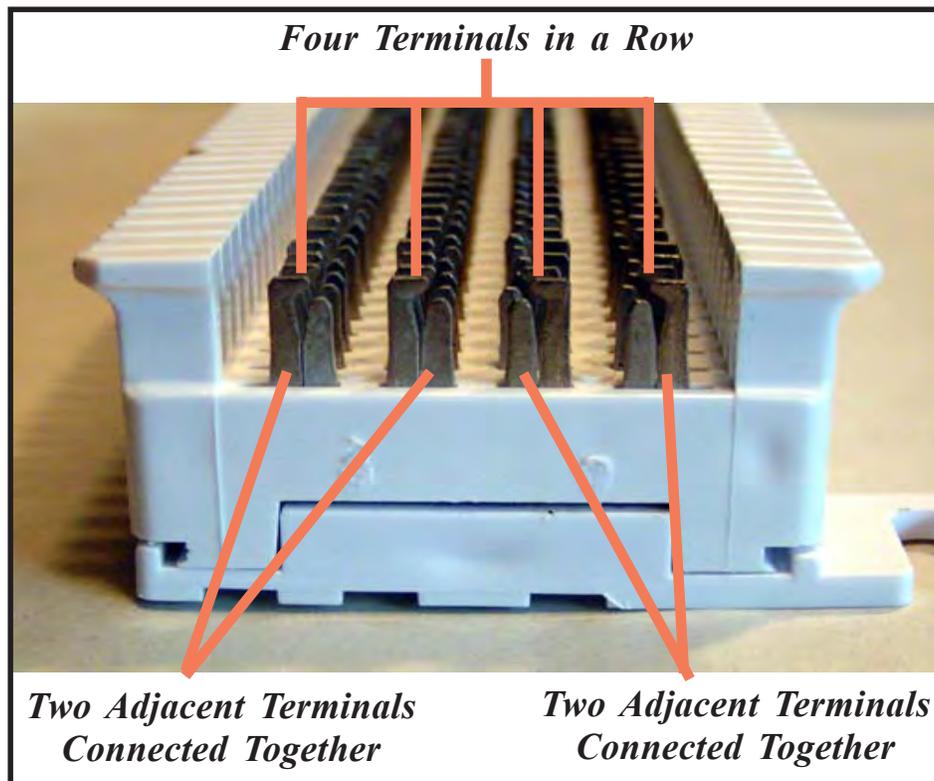
A terminal is a connecting point where two circuits are spliced together. A punch block is a mounting for permanent terminal connections. It is often used as a transition between the phone company's wiring and a subscriber's equipment. It is used for distributing and neatly connecting UTP or STP wiring inside a building. Punch blocks are often the central hub of a building's telephone network.



Punch Block

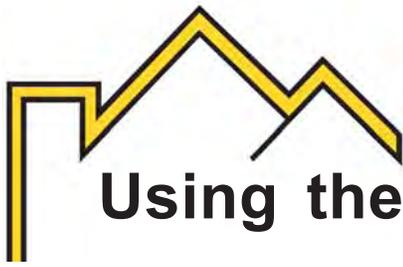
Punch blocks get their name from the type of connector used. An IDC, or insulation displacement connector, cuts through the insulation as a wire is pushed into it. The copper wire is "punched" down into a sharp slot in a metal terminal. A blade cuts through the wire's insulation as it is punched down and makes an electrical contact while holding the wire in place. Punch blocks are also called punch-down blocks, terminating blocks, and quick-connect blocks.

You will install a 66 block, which is common in telephone applications because it provides a quick way to connect telephone lines. The 66 block has 50 rows of connectors, or terminals. Refer to the photo below. Each row has four side-by-side terminals allowing for one pair of wires on each side. Each pair consists of two terminals connected together internally, allowing connection of one phone wire to another wire. You can terminate 100 wires on each block (50 rows x 2 pairs).



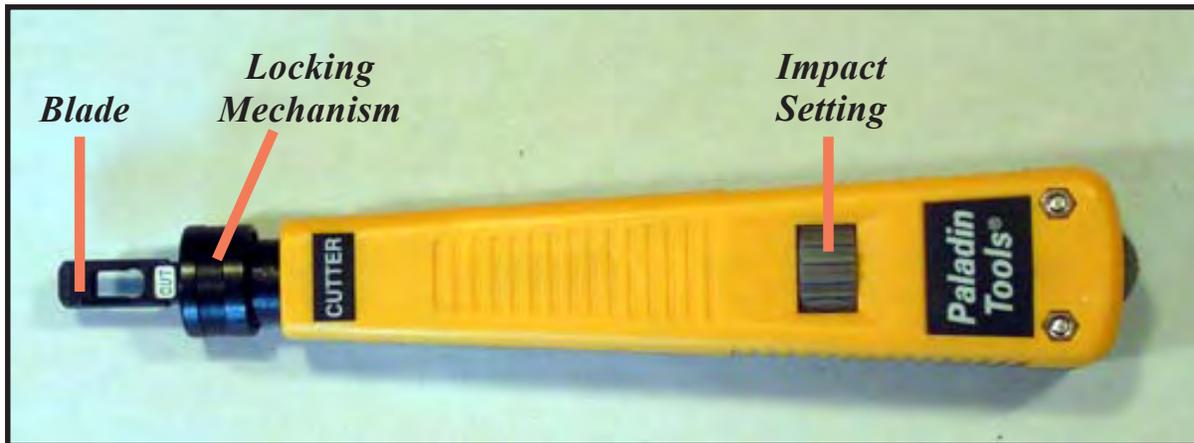
66 Punch Block

You will use 3-pair wire that is 24 gauge. This cable gets punched down one wire per each pair on the side of the row. The incoming and outgoing wires are connected with cross-connect jumper wires punched down on the inside terminals of the rows. The wire pairs on punch blocks must not be allowed to untwist more than 1/2 inch or the cable's performance will be compromised.



Using the Punchdown Tool

The parts of a punchdown tool are called out in the photo below.

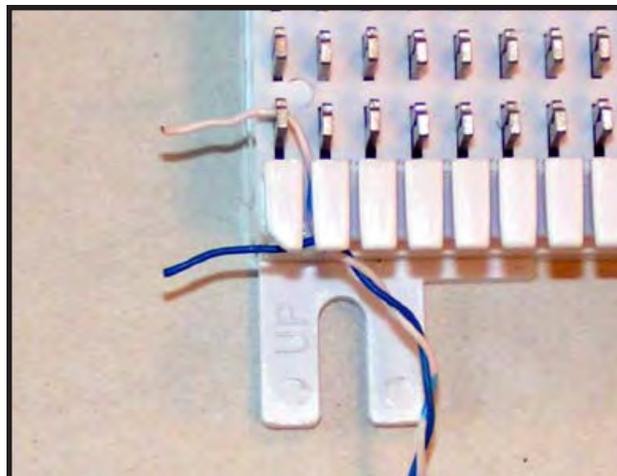


Punchdown Tool

A punchdown tool is a device that makes connections on punch blocks with a push of the handle.

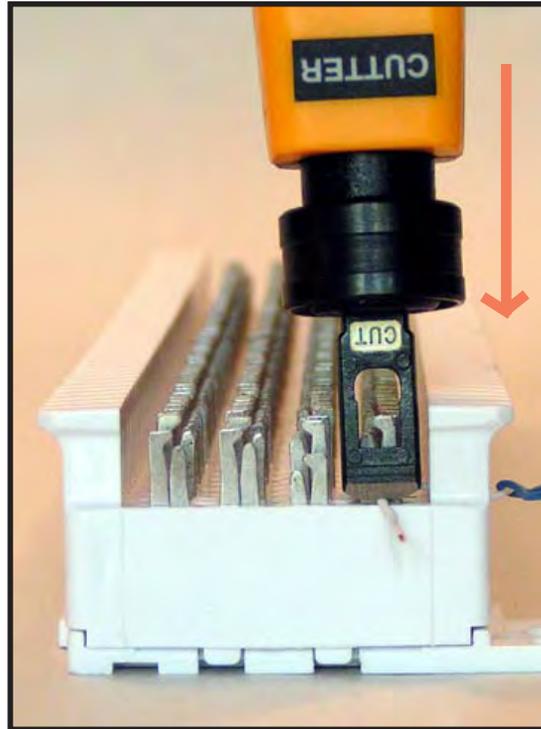
To install the blade in the tip of the tool, pull down the spring-loaded locking mechanism and insert the blade. Then release the mechanism. To cut and punch down wires, install the CUT side of the blade up as shown above. For just a punchdown operation, install the opposite side up.

To use a punchdown tool, place the unstripped telephone wire in the center of a terminal (between the teeth) on a punch block as shown below.



Wire Placed in Punchdown Terminal

Locate the tool blade over the wire and the terminal. Press down the tool in a firm, steady motion until the wire seats in the terminal as shown below.



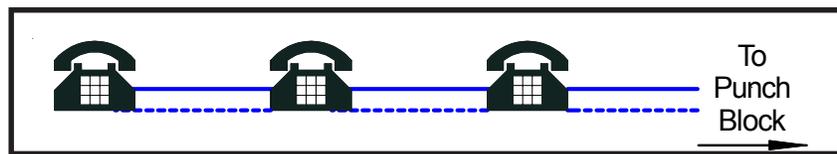
Punching Down and Cutting

The wire will be punched into the IDC slot of the terminal. Remove the tool and, if you are using the CUT side of the blade, the excess wire will be cut off.

Set the adjustable impact setting to LO for all 24 AWG wires, and to HI for 23-22 AWG wires.

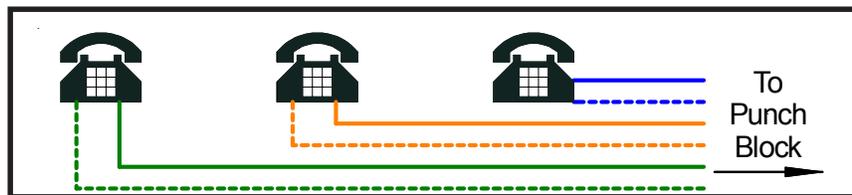
Wiring Layout

Before installing wire into a punch block, you must determine your wiring layout. There are three types of layouts that most phone wiring adheres to. A daisy chain is a wiring layout wherein all phones in a home or building are connected in serial as shown below. In this case, one chain of cable is run from one phone jack to the next



Daisy Chain

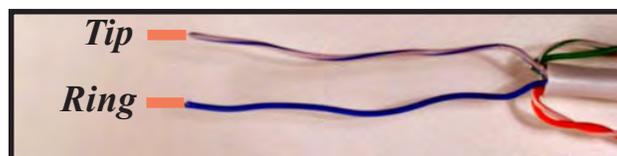
A home run is a wiring layout wherein every phone jack and piece of equipment has its individual cable leading back to the punch block. This method requires more cable, but makes for a more flexible system.



Home Run

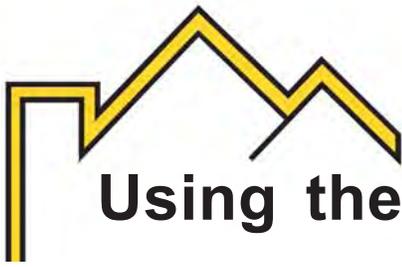
Mixed wiring is a mix of daisy chain and home run layouts in any pattern.

The individual wires within the cable's outer jacket are color-coded with an industry-standard pattern. The 3-pair UTP wire at your workstation has six wires--three in solid colors and three in stripes. Each pair is made up of a solid colored wire twisted with a striped wire containing that same color. The striped wire is called the tip wire, and the solid wire is called the ring wire.



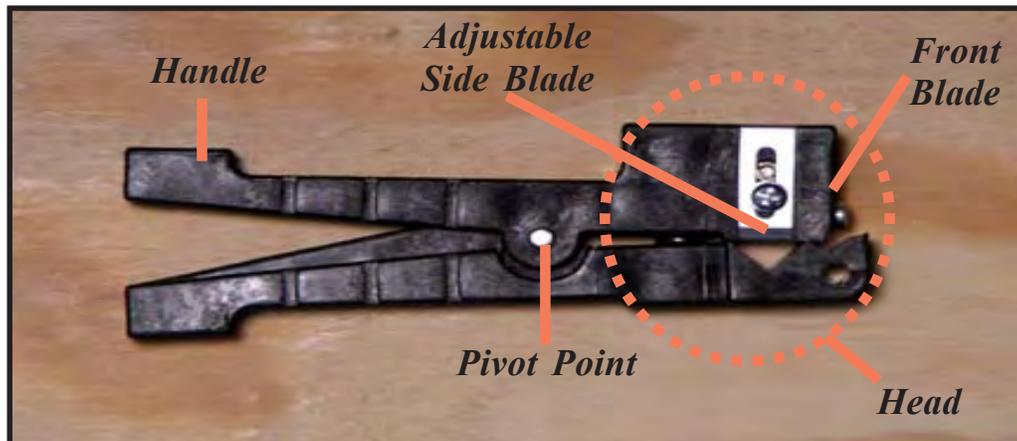
Tip and Ring Wires

Each pair represents an individual circuit from a subscriber to his CO, or Central Office. Therefore, you may hear technicians say that the blue pair is Line 1, or the green pair is Line 3, etc.



Using the Data/Phone Cable Stripper

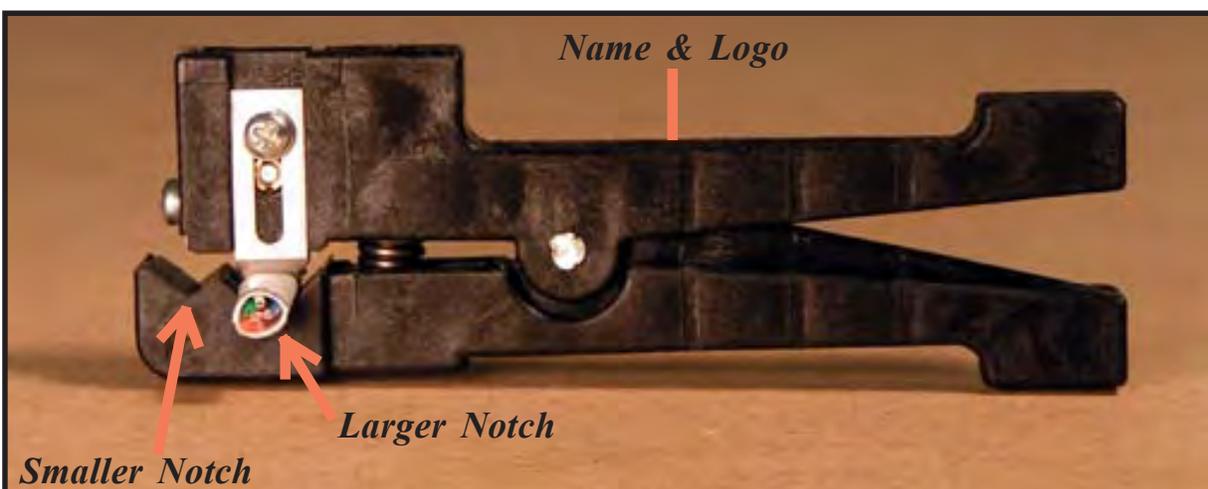
The parts of a cable stripper are called out in the photo below.



Data/Phone Cable Stripper

A cable stripper is a tool that removes the outer insulation from a cable. The cable stripper shown above is a data/telephone cable stripper that works with the Category 3 UTP cable you will install at this workstation. The blades are adjustable for different cable thicknesses, but you will not perform an adjustment. The stripper is small and lightweight, and it's simple to operate.

To strip the insulation from 3-pair UTP wire, first orient the tool so that the name and logo are on top of the stripper, and the blades are facing down. Refer to the photo below. Place the cable in the larger of the two notches.



Positioning Cable in the Stripper

Name: _____ Date: _____

Telecommunications Service Technician - Activity Day 4 Workbook Questions

1. Define punch block

2. What is the function of an IDC?

3. A 66 punch block has _____ rows of _____ pairs each.

Match the terms on the left with the parts of a punchdown tool on the right.

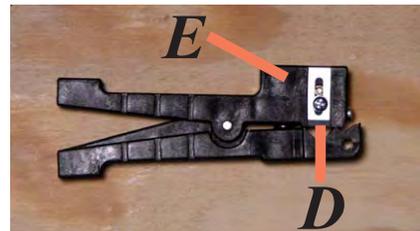
- 4. Locking Mechanism _____
- 5. Impact Setting _____
- 6. Blade _____



7. True or False: In a daisy chain, each phone and piece of equipment has its own cable. _____

Match the terms on the left with the parts of a data/phone cable stripper on the right.

- 8. Blade _____
- 9. Head _____



10. Which configuration represents the industry standard color code for punch blocks? _____

- A. GOBL
- B. OBLG
- C. BLOG
- D. GBLO

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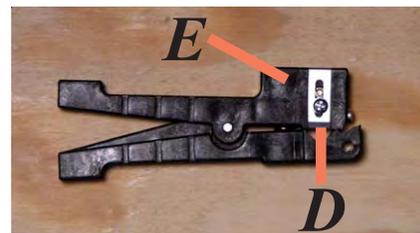
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