K-01b

ELECTRICIAN TRAINING

SKILL DEVELOPMENT GUIDE

DUTY K: PLC (Modicon)
K-01b: Connect and Operate a Programmer

Issued 01/01/98

Task Preview

Connect and Operate Programmer

The Learner uses the P190 programmer mostly to communicate with the 184 and 384 series processors, although the P190 is capable of communicating with all PLC types. Connection of the P190 includes plugging in the data communications cable designed for the required PLC. If required, the Learner will hook up the P190 to the Modbus Plus. Operating the P190 involves using the command keys, software label keys, numeric pad, alphanumeric pad, shift key, and arrow keys as required by P190 program tapes. This tape driven programmer requires that the Learner load a programmer tape to enable communication with the processor.

The P230 programmer is used to communicate with the 584, 884, and 984 processors and is the only programmer that can perform online menu functions. The Learner may need to use the online menu routing procedure and must use extreme caution when doing so. Connecting the programmer to the wrong PLC when using the ONLINE menu routing procedure could result in a machine breakdown or personnel injury.

How your skills will be checked

The Skill Check will require you to connect and operate a programmer. All tools, materials, and resources will be available. The Evaluator will verify that your demonstration meets the skill objective by observing or measuring each task standard. You must demonstrate safe work practices during the Skill Check. Contact your Evaluator whenever you are ready for the Skill Check.

Skill Objective

Upon notification of any task requiring communication with a PLC, connect and operate either the P190 or P230 programmer.

Task Standards

1. Connection of the programmer results in communication between the programmer and the required PLC. Communication is established when the unit number of the PLC is entered and the programmer prompt allows you to continue without an error message.

2. Operation of the programmer results in your having access to the required machine program. Access to the program is established when the Segment Status screen is displayed.

3. You should be able to identify all the interfaces between the 984 and 184, 384, 484, and 584.

What You Will Need

This section contains the safety information, tools, and resources you will need before connecting and operating a programmer.

- Follow all Caterpillar Facility Safety Standards when performing this task in the plant.
- You will perform this task online. Perform the steps carefully; mistakes could result in injury to personnel or damage to the equipment.
- Use caution when working around the PLC; high voltage is present on the inside of the PLC cabinet door and near the I/O chassis.
- Avoid having liquids near the programmer keyboard.

- P190 programmer (Typically used with the 184, 384, 484, 584, 884, and 984 processors.)
- P230 programmer (Used with the 984 processors and the 184, 384, 484, 584, and 884 processors in the P190 emulator mode.)
- PLC communication cable
- Tape Loader Tape and Program Loader Tape (P190 only)
- Modicon Bus Plus (Used with all processors.)

- Basic Help Keys, available on programmer software
- Modsoft Programmer User's Manual (GM-MSFT-001 Rev. F)
- Ladder Diagram printout
- Modbus Plus Data Highway Chart
- Machine Print

Task Steps

Connect and Operate Programmer

P190 PROGRAMMER:

1. Connect the P190 programmer.

- o You will need a data cord that will hook up with the type of processor you will be using.
- o Locate the data cords.
- o Connect the proper data communication cable to the programmer and the PLC. Supply power for the P190 programmer unit. *See Figure 1-1.*

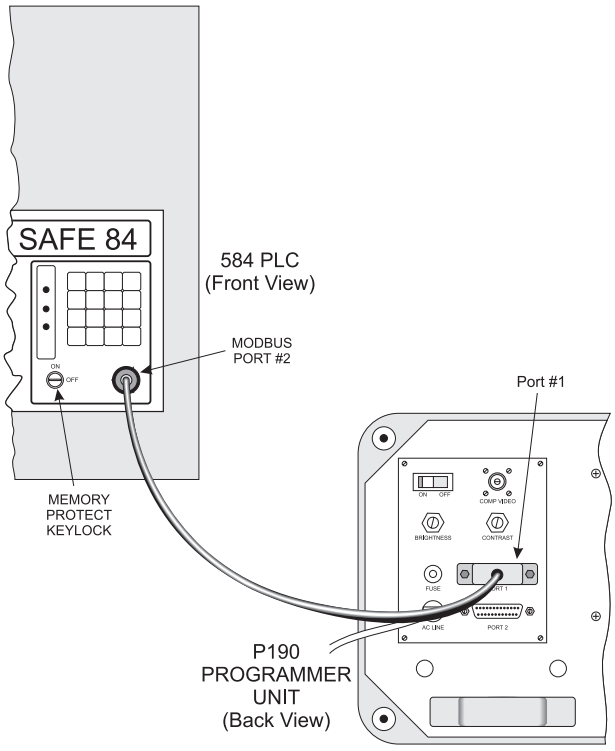

Figure 1-1
Data Communication Cable Hook-up on the P190 Programmer

2. Power up the unit.

- The P190 has a toggle switch located at the right rear of the unit near the top (when viewed from the front).
- When the prompt to “Insert Tape” appears, the P190 is warmed up.

3. Insert the tape. ***See Figure 1-2.***

- When the “Insert Tape” prompt appears, insert the required action tape.
- Insert the tape loader tape if loading program or backing up software.
- Insert the programmer tape if programming.

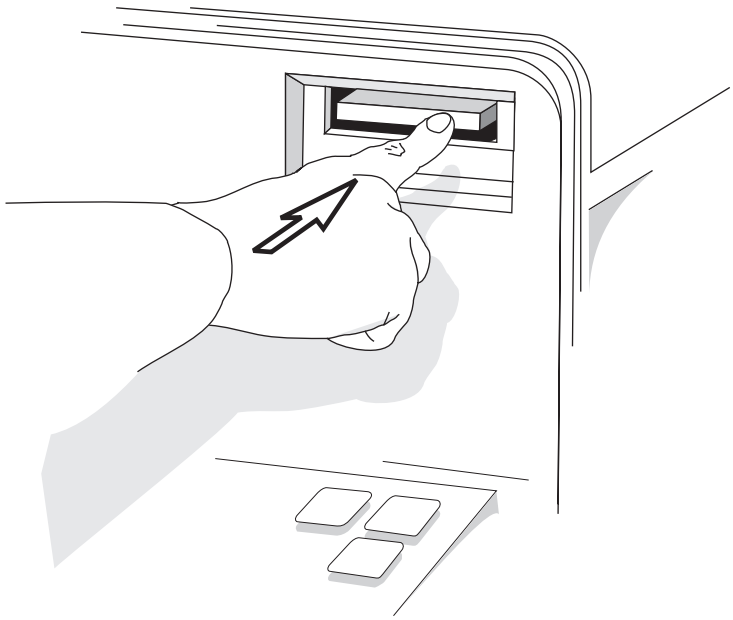

Figure 1-2
P190 Tape Drive Slot

4. Attach the unit.

- When the prompt appears on the software label keys, enter the unit number assigned to the PLC on which you are working and press the <Attach unit> software label key. *See Figure 1-3.*

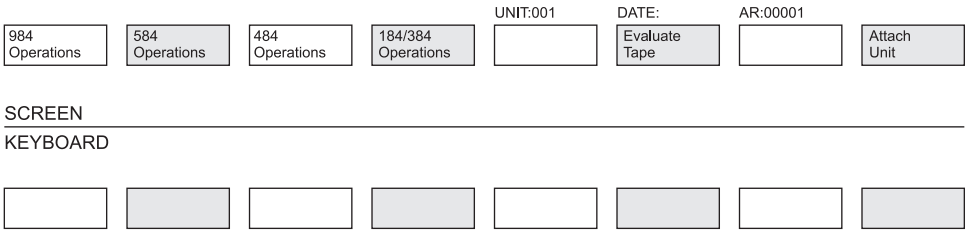

Figure 1-3
DH+ NETWORK MENU Screen

5. Load a program.

- Perform the procedure in Skill Development Guide "K-03: Load Program" to work with a PLC machine program.

P230 PROGRAMMER:

1. Identify the PLC unit number.

- Locate the PLC number on the Modbus Plus data highway chart. *See Figure 1-4.*

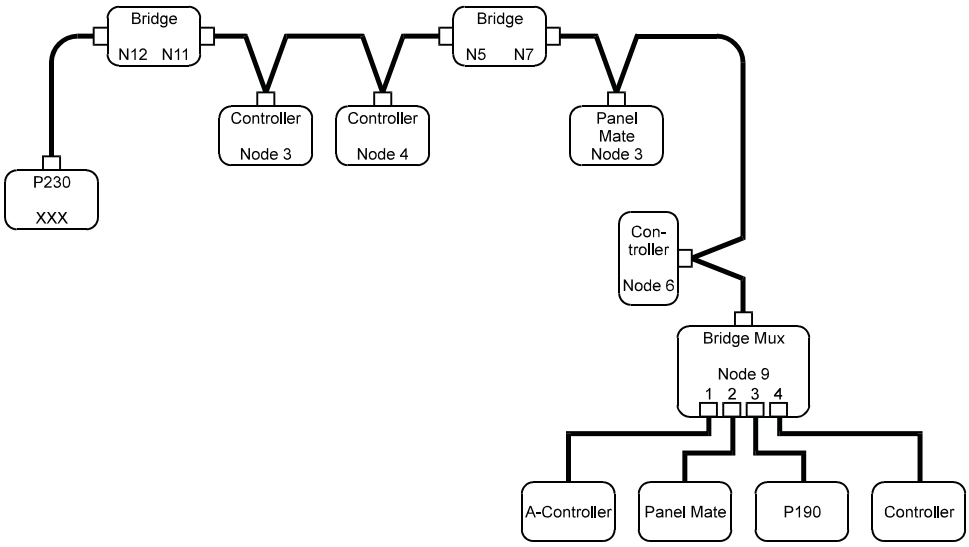

Figure 1-4
Example of the Modbus Plus Data Highway Chart

- The Modbus Plus data highway chart is usually located next to the Machine Print, taped on the work cabinet door.

2. Power up the unit.

3. Enter the Modsoft Directory.

- When the DOSSHELL screen appears, tab over to the directory side and put the cursor on the Modsoft directory using the arrow keys.

4. Enter the Modsoft program.

- Using the <Tab> key to toggle from the directory side of the screen to the file side of the screen, move the cursor to the right side (file side). From the file listings, move the cursor with the up and down arrow keys to select "Modsoft exe." and press <Enter> to select the file.

5. Press <Enter> when the MODSOFT default screen is displayed. ***See Figure 1-5.***

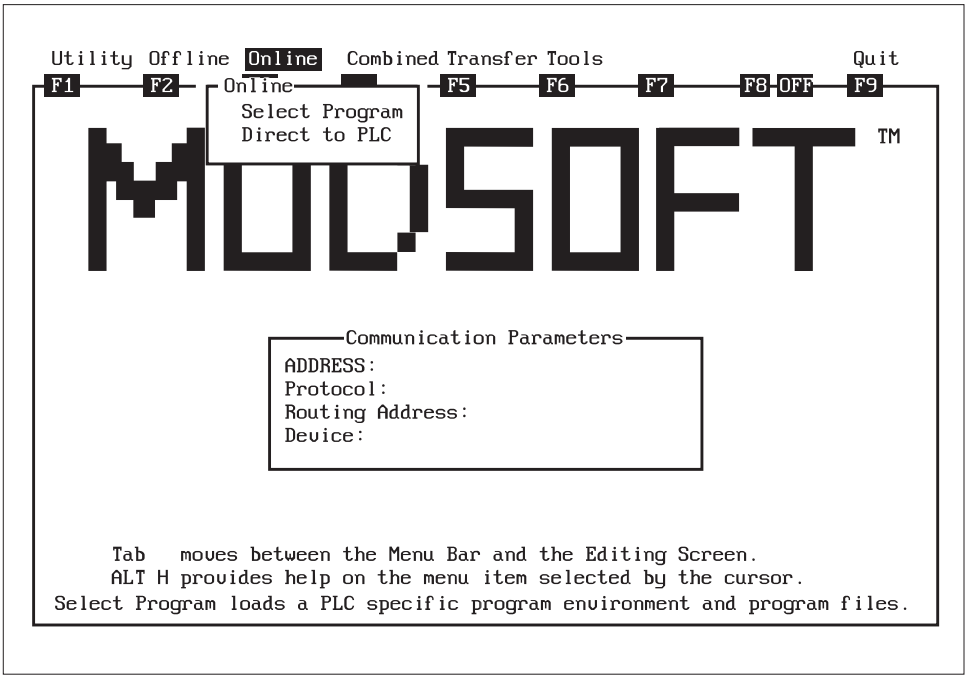

Figure 1-5
MODSOFT Default Screen

- The MODSOFT Main Menu screen should now be displayed. *See Figure1-6.*

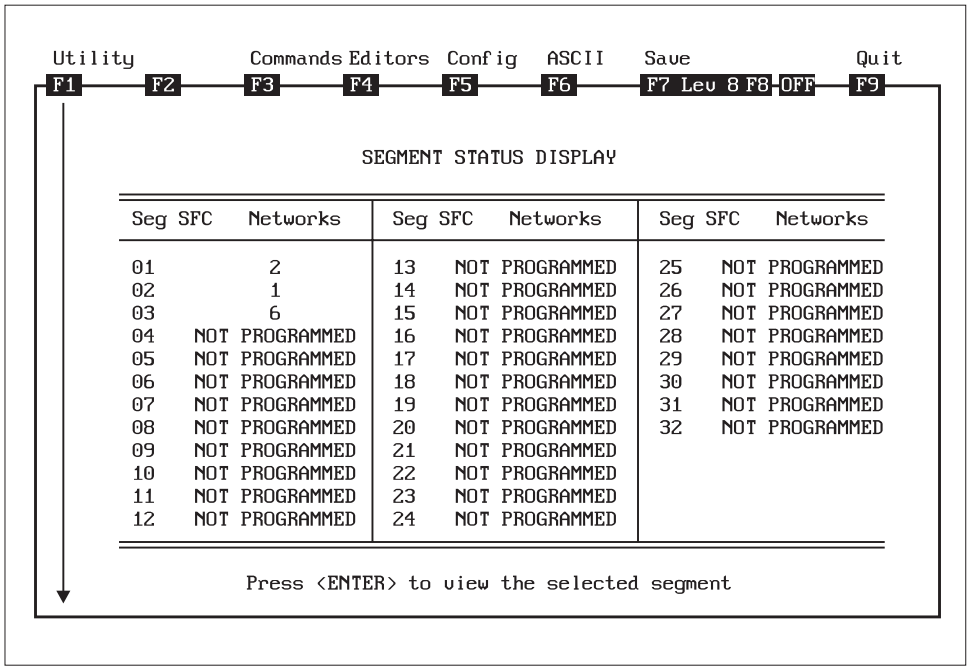

Figure 1-6
MODSOFT Main Menu with Menu Options

6. Access the machine program.

- Select COMBINED from the menu.
- Select the program name from the list of names provided.
- If the program is listed, then move the cursor to the program name and press <Enter>. Proceed to step 8 to verify that communication is established.
- If the program is not listed, then go to the routing procedure in Step 7.

7. Perform the routing process.

WARNING: The routing procedure is dangerous if you enter the wrong address; doing so could result in a "wreck." The MEMORY PROTECT KEYLOCK should be on.

- If the name you want is not listed on the Combined-Select Program, menu, then follow the routing procedure to communicate with a processor in a remote address. Locate the processor address on the Modbus Plus Data Highway Chart. *See Figure 1-7.*

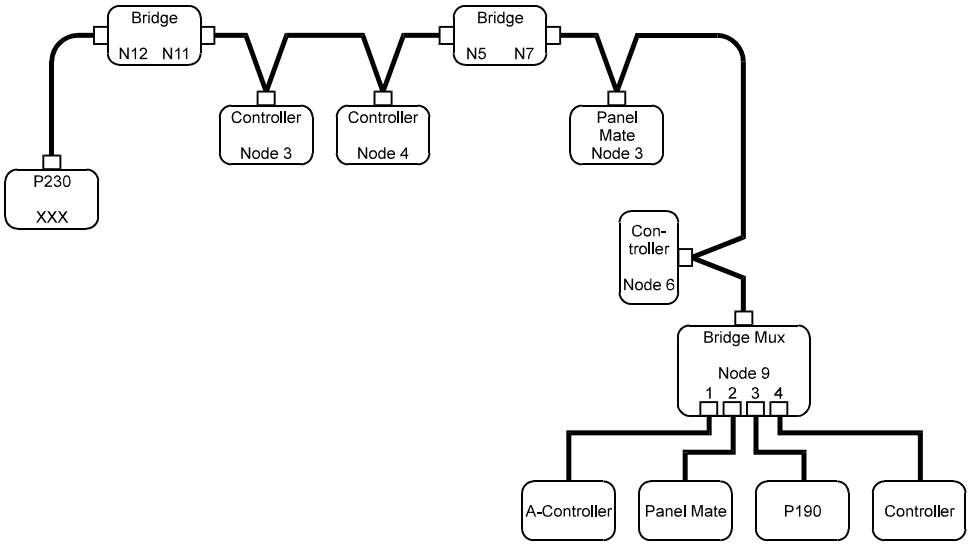

Figure 1-7
Example of the Modbus Plus Data Highway Chart

- Using the example in Figure 1-7, the desired processor you would want to find is “Processor A” communicating from Programmer “xxx”.
- Write the node number of the processor from Modbus Plus with a decimal to the left of the number. Processor A is located at Port 1 of the “bridge mux” so the address is “.1” from the example in Figure 1-7.
- Trace from the processor back to your programmer.
- If the processor is connected to a “bridge mux”, then include its number and the port number that the processor is connected. The port number would be the processor number, 1.
- Enter the “bridge mux” number next. At this point your address consists of “.9.1”
- If you come to a “bridge” write the node number from side of bridge closest to programmer. From the example, the first bridge you encounter has the node “5” closest to the P230. Your address should now read “.5.9.1”

- The second bridge you encounter in the example has a 12 at the node closest to the P230. Your address should now read 12.5.9.1
- There should be a period between each connection.
- Following Figure 1-7, as an example, the address from the P230 “xxx” processor to the “A” processor located at the 1 port of the bridge mux is “12.5.9.1”.
- Enter Modsoft.
    a. From the Modsoft Main Menu select “ONLINE”.
    b. Use the “Select Program” option to verify that the program is not already set up as a “hot key”. This automatically enters the routing address if it is listed.
    c. Select the “Direct to PLC” option.
    d. Press <Enter> to find the available nodes on the network.
    e. When the “Communication Parameters” window appears (*See Figure 1-8*) at the bottom of the screen, observe the following options and enter the information requested. The information provided is from the previous example.

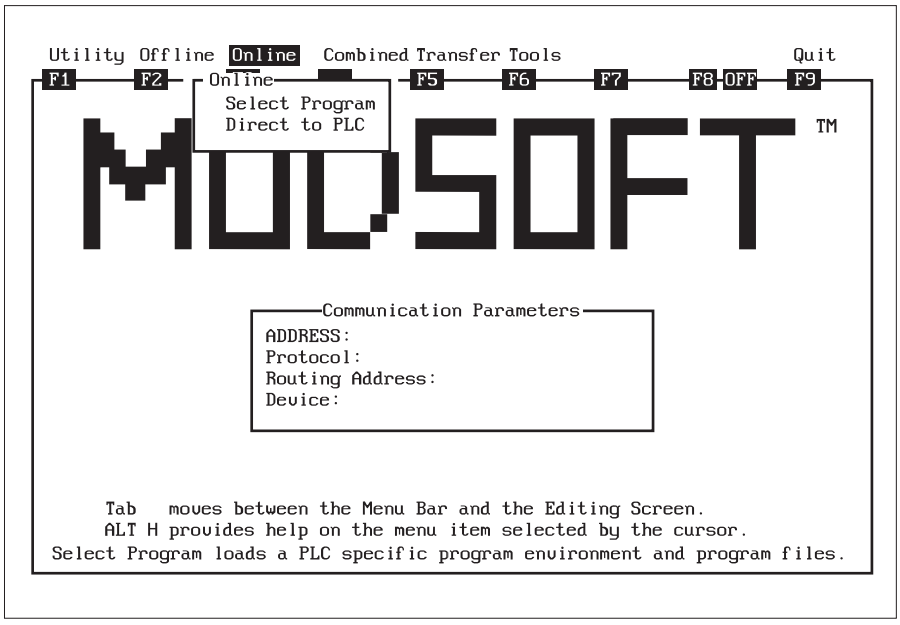

Figure 1-8
Communication Parameters Window

1) ADDRESS: “01” (from example)
This is the address of the processor you are contacting.

2) PROTOCOL: “MODBUS+”

This is the typical protocol selection used.

3) ROUTING ADDRESS: “12.05.09.00”

Notice that the last two digits are 00 and not 01. Enter this address twice.

4) DEVICE: Enter nothing here

f. Communication is being established when “Transferring Configuration to Panel” appears on the screen.

8. Verify that you have accessed the program.

- When the Segment Status Display screen is displayed you have accessed the machine program. *See Figure 1-9.*

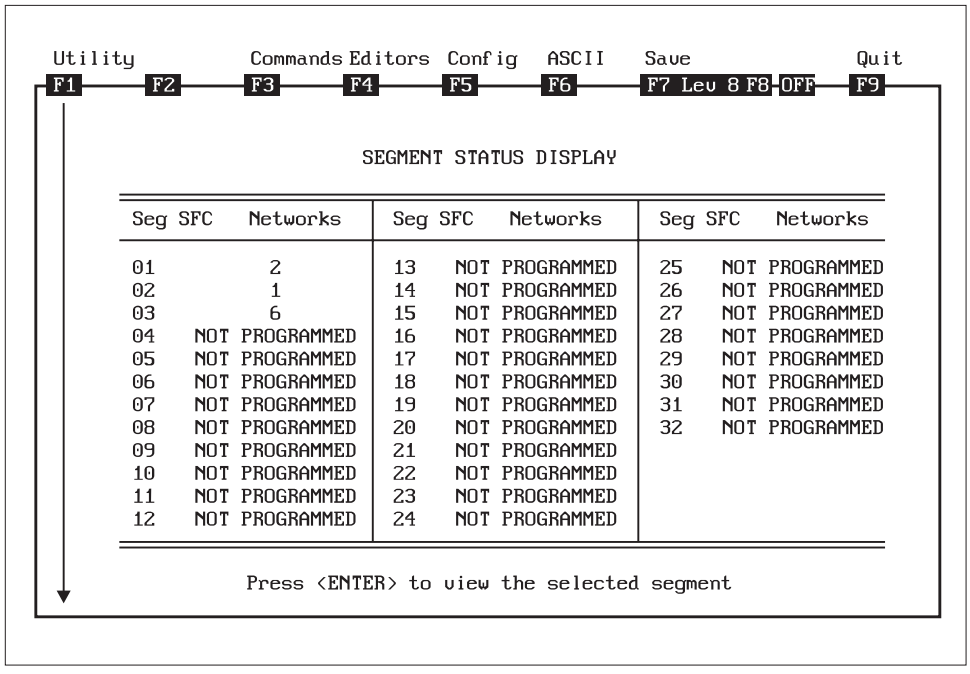

Figure 1-9
Segment Status Display Screen

Concept Check

Connect and Operate Programmer

Answer the following questions to check your understanding of connecting and operating a programmer. Circle the correct answer in each question. Then compare your responses with the answers at the bottom of this page. Some of the questions may have more than one correct answer. If you have difficulty answering a question, review the Skill Development Guide or ask your Trainer for assistance.

1. When loading a program on the P190 programmer, the first tape you should use is the

    a. Program Loader Tape.

    b. Tape Loader Tape.

    c Programmer Tape.

    d. Backup Tape.

2. If the machine program you are looking for is not listed from the “Select Program” screen in the Combined menu, you should find the remote address and enter what menu to proceed?

    a. OFFLINE

    b. Utilities

    c. ONLINE

    d. Routing

3. When using the Routing procedure, you should write the number farthest away from your programmer when encountering a “bridge”.

    a. True

    b. False

4. When entering a remote address, the MEMORY PROTECT KEYLOCK should be in the ON position.

    a. True

    b. False

5. The machine program is accessed and communication is established between the programmer and the PLC when what screen displays?

    a. Segment Status Display

    b. Elements Edit Screen

    c. Main Menu

    d. “Transferring Configuration to Panel” prompt

Answers: (1. b 2. c 3. b 4. a 5. a)

Next Step

If you are ready to demonstrate the task now, ask your Evaluator or Trainer to schedule the Skill Check. However, if you need to practice some of the steps first, continue to the next section.

Practice

The following practice will help prepare you for the Skill Check. Ask your Trainer to set up the practice for you. After you complete a practice, ask your Trainer to check your work.

Practice 1

Locate all PLCs in the area. Observe all Modicon PLC types (184, 384, 584, 884, and 984) and learn where the data communication cable plugs into each processor. Identify all the interfaces between the 984 and 184, 384, 484, and 584. Determine which processors are already connected to a programmer and which ones will need programmers supplied.

Practice Objective 1

You should have become familiar with the location of all PLC units in the area so that when called upon you will know if a programmer is required. You should also have become familiar with the various types of Modicon PLCs in the area including the 184, 384, 584, 884, and 984. You should be able to identify all the interfaces between the 984 and 184, 384, 484, and 584.

Practice 2

Practice connecting and operating both types of programmers. Connect a P190 on the job site with a Journeyman's supervision at a location in which a programmer is not already connected. Attempt to connect the P190 to all PLC units so that you will be familiar with the communication cable required for each unit and the hook-up locations for each unit. Operate the programmer and verify that it is communicating with the processor.

Practice Objective 2

You should have been able to identify the different types of cables required to hook a P190 up to all PLCs. Verify your connections by accessing the PLC program. Be sure to leave the MEMORY PROTECT KEYLOCK in the ON position.

Practice 3

Identify a machine's processor that is not accessible from the programmer from which you are working. Note the address for this machine's processor and call up this program from the "ONLINE" menu in MODSOFT, on a P230 programmer.

Practice Objective 3

You should have been able to locate a remote address in the online mode for accessing machine programs. Practice using the Routing process. When the Segment Status Screen is displayed, you have successfully communicated with the PLC.

Next Step

Continue to practice until you are ready for the Skill Check. When you are ready to demonstrate the task, ask your Evaluator or Trainer to schedule the Skill Check.