

K-04b

ELECTRICIAN TRAINING

SKILL DEVELOPMENT GUIDE

Duty K: PLC (Modicon)

K-04b: Access and Modify Data Table

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Task Preview

Access and Modify Data Table

At Caterpillar, typical PLC problems such as a machine or part breakdown occur. Often, the solution to this problem can be found by modifying a data table. The Learner must exercise extreme caution when modifying a data table. Modifying the Ladder Diagram incorrectly could result in unexpected movement of the machinery or damage to the part.

The Learner locates the needed data table (register) from the Ladder Diagram printout and accesses the Ladder Diagram program using one of the two types of programmers (P190 or P230) to communicate with the processors. The Learner then enters or retrieves the required data as needed from the data register. The Learner saves changes to the Ladder Diagram, if the change is a fixed value for a timer or a counter.

How your skills will be checked

The Skill Check will require you to access and modify a data table in the shop. The Evaluator will arrange the availability of all the tools, materials, and resources you will need to demonstrate the task. 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 a machine timer problem, a part problem, or if data is needed from the data table, access and modify the data table.

Task Standards

1. The location of the needed data register is identified.
2. The stored information from that register is accessed.
3. The data table is modified to improve the machine's current program so that the machine will function according to production specifications.

What You Will Need

This section contains the safety information, tools, and resources you will need before accessing and modifying a data table.



- 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.



- P190 programmer (Typically used with the 184, 384, 484, 584, 884, and 984 processors.)
- P230 programmer (Used with the 984 processor and the 184, 384, 484, 584, and 884 processors in the P190 emulator mode.)
- PLC communication cable
- Tape Loader Tape (P190 only)
- 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)
- Modicon P230 Quick Key reference card
- Ladder Diagram Printout and Cross Reference
- Modbus Plus Data Highway Chart
- Machine Print



Task Steps

Access and Modify Data Table

1. Install the machine program.
2. Turn off the MEMORY PROTECT KEYLOCK. *See Figure 4-1.*

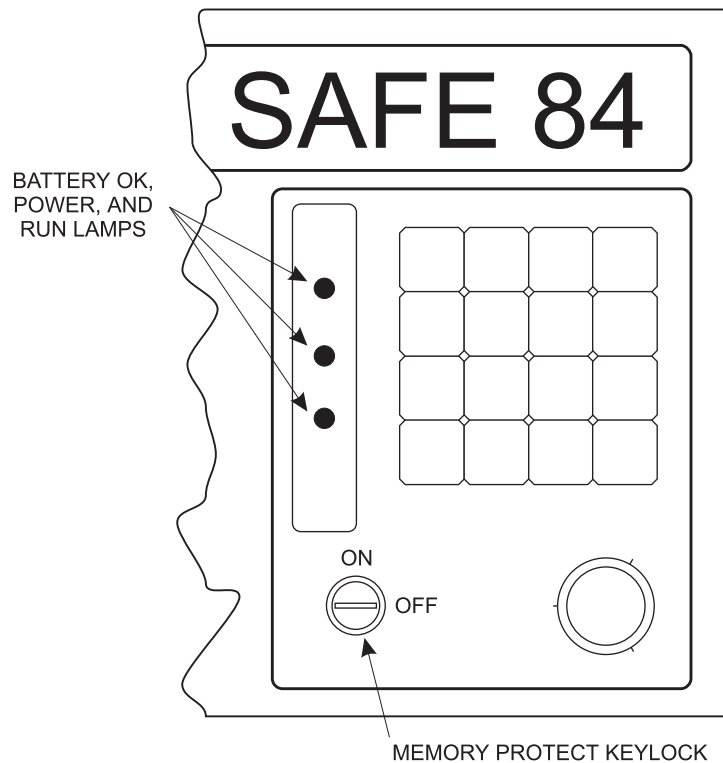


Figure 4-1
MEMORY PROTECT KEYLOCK for the 584 Processor

- If the MEMORY PROTECT KEYLOCK is not turned off, an error message will display “Memory Protect must be off.”

3. **Determine the needed network.**
 - Identify the network from the Ladder Diagram printout cross reference.
4. **Enter the segment which contains the needed network from the Segment Status Display screen. See Figure 4-2.**

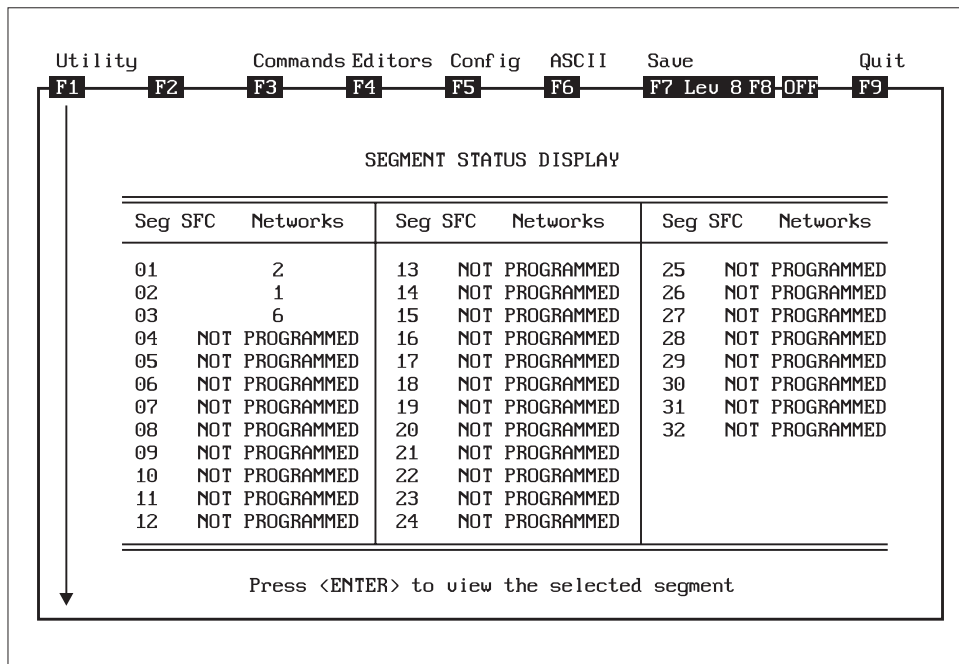


Figure 4-2
P230 Network Segment Status Display Screen

5. **Highlight the needed node.**
 - Using the arrow keys, move the cursor to the node in the Ladder Diagram program including the register needed to modify.

- Typical registers that the Learner will access or modify include timers, up counters, and down counters. See Figure 4-3.

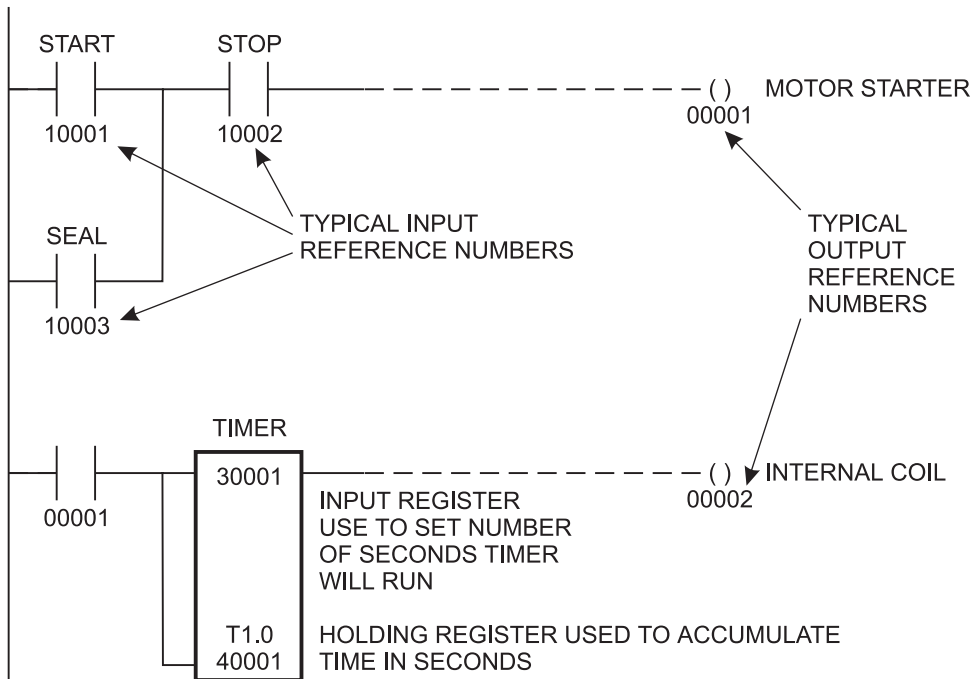


Figure 4-3
Ladder Diagram Reference Numbers and Timer Data Register

6. **Modify the timer register. See Figure 4-4.**

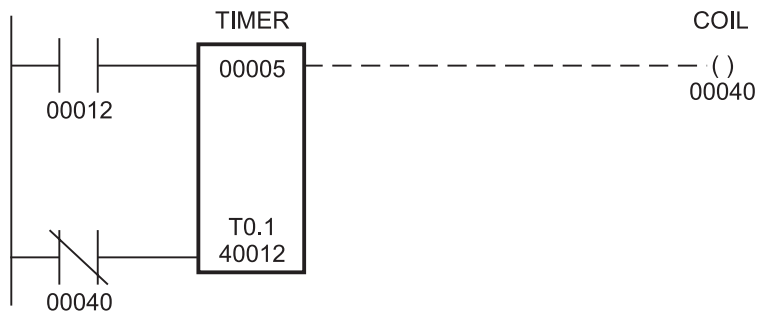


Figure 4-4
Example of a Timer in a Ladder Diagram

- Identify the timer register values. The top number is the timer preset. This is used to set the number of seconds the timer will run. This can be a register (3XXXX or 4XXXX) or a number 1-999. The middle number is for identification and specifies time increments in the holding register (e.g., T.01 identifies the device as a timer with increments every one hundredth of a second). The bottom number is the holding register that is used to accumulate time in seconds. See Figure 4-5.

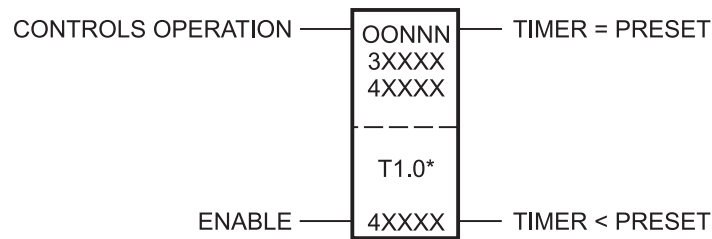


Figure 4-5
Timer Register Values

- If editing the input register then proceed to step 7.
 - If editing the timer type then proceed to step 8.
- 7. Edit the input register.**
- To edit the input register press the up or down arrow key to toggle between preset and accumulator.
 - Enter the new value for the input register on the numeric pad. This will change how long the timer lasts. Do not change the number in the register if the preset is a register. If the preset is a register, change the register contents at the bottom of the screen.
 - Go to the Edit Menu for the P190. Observe the typed number at the AR: prompt for the P190 or the edit screen at the bottom left-hand side of the P230 screen.
 - Press the orange <Enter> key on the P190 or the <Enter> key on the P230 if the number is correct.
 - Verify that the number is changed in the register and activate the coil to test the timer changes.

8. Edit the timer type.

- Edit the timer type to make changes to the timer increments. This number tells you what the device is and for what incremental time it is set (e.g., T1 = timer set to accumulate time once every one second). Incremental time is set in seconds (1), tenths of a second (.1), or hundredths of a second (.01).
- Select timers/counters from the menu at the bottom of the screen.
- Select the timer increment from the menu.
- Verify that the number is changed in the register and activate the coil to test.

9. Modify the up/down counter register. See Figure 4-6.

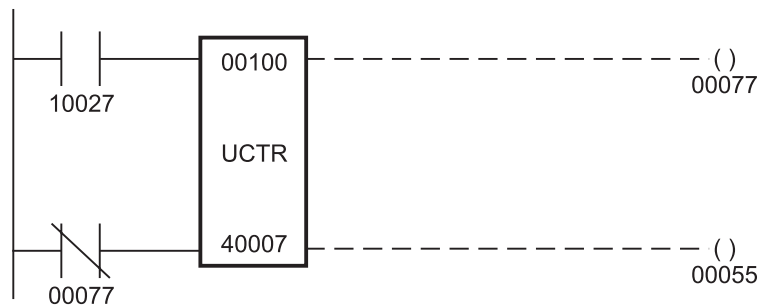


Figure 4-6
Example of an Up Counter

- Identify the counter register values. The top number is the number you want to count up to or down to before the output coil turns on (e.g., 3XXXX). The middle value is the name of the register (e.g., DCTR). The bottom number is the holding register (4XXXX). See Figure 4-7.

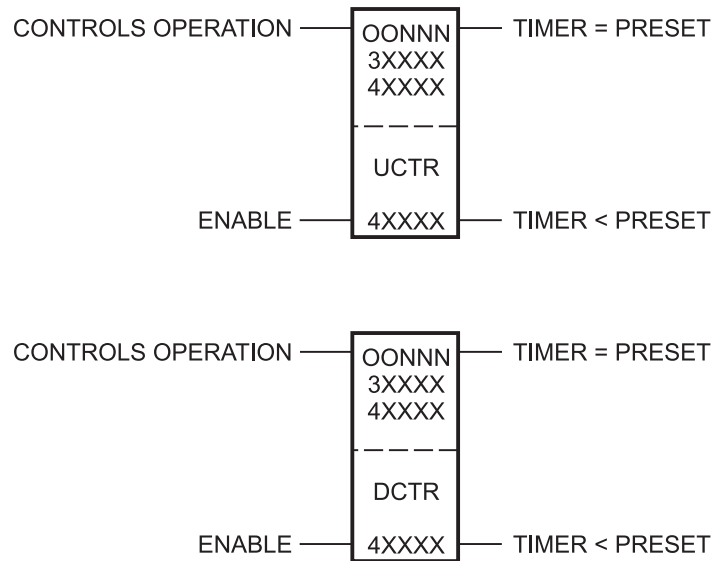


Figure 4-7
Up and Down Counter Registers

- To modify a counter, press the up or down arrow key to toggle between registers.
- Highlight the top register and enter the new value for the register on the numeric pad. This will change the count.
- Observe the typed number in the AR: prompt on the screen.
- Press the orange <enter> key on the P190 or the <enter> key on the P230 if the number is correct.
- Observe the changed number in the register on the screen and activate the coil to test.



Concept Check

Access and Modify Data Table

Answer the following questions to check your understanding of accessing and modifying a data table. 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. Locate the network number in the
 - a. Machine print.
 - b. Modbus Plus Data Map.
 - c. Modbus Plus Connection Box.
 - d. Ladder Diagram printout cross reference.
2. Typical registers that Learners often access or modify include timers, up counters, relays, and coils.
 - a. True
 - b. False
3. The top number in a timer register
 - a. is the Holding Register.
 - b. specifies time increments.
 - c. is for identification.
 - d. is the Timer Preset.
4. When editing the input register, you should never change the number in the register if the preset is another register number. Edit the register contents at the bottom of the screen.
 - a. True
 - b. False

5. A value of “T.1” as the middle value of a timer indicates that it is a timer with what incremental time set?
- a. one second
 - b. one hour
 - c. one tenth of a second
 - d. one hundredth of a second

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

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

Practice making modifications to a register in the machine programs with both types of programmers (P190 and P230) on the job site with your Trainer's supervision. Practice changing the time on the timers. Change the timer increments value and notice the effect when you activate the coil. Change the timer value and notice the difference the increments value has on it. Be prepared to discuss safety issues associated with changing a data register.

Practice Objective 1

You should have entered a network and made changes to a specific timer register. With a Trainer's supervision, you should have practiced changing timer values and activated the coil to notice the difference in your changes.

Practice 2

Practice making modifications to a register in the machine programs with both types of programmers (P190 and P230) on the job site with your Trainer's supervision. Practice changing the count on up and down counters. Activate the coil and notice the number prompt counting to the specified number. Be able to discuss safety issues associated with changing a data register.

Practice Objective 2

You should have entered a network and made changes to a specific up or down counter register. With your Trainer's supervision, you should have practiced changing counter values and activated the coil to notice the difference in your changes.

Practice 3

Practice locating and identifying the problem devices in the Ladder Diagram printout.

Practice Objective 3

You should have located a “problem” device on the machine and noted its location ID number. You should have located that device on the Machine print and noted the register reference number. Using the register reference number from the print, you should have located the device in the Ladder Diagram Cross Reference, which will tell you where the device is located in the Ladder Diagram. You should have found the device on the Ladder Diagram printout and noted the network reference number, which is the network number you need to modify the program.

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.

