

**CTI Model 5250-TI5
CTI Model 5251-TI5
Access Modules**

INSTALLATION AND OPERATION GUIDE

Version 4.2

CTI Part #062-00109

062-00100

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PREFACE

This ***Installation and Operation Guide*** provides installation and operation instructions for the CTI Model 5250-TI5 and Model 5251-TI5 Access Modules for SIMATIC® Series 500 and 505 programmable controllers. The two models function identically with differences only in the data display technology. The Model 5250-TI5 has a Liquid Crystal Display (LCD), while the Model 5251-TI5 contains a Vacuum Fluorescent Display (VFD).

This document assumes familiarity with the operation of SIMATIC® Series 500 and 505 programmable controllers. Refer to the appropriate SIMATIC® user documentation for specific information on the SIMATIC® Series 500 and 505 programmable controllers and I/O modules.

This ***Installation and Operation Guide*** contains two main parts:

- I. **Access Module Installation and Operation** gives an overview of the Access Module, provides installation instructions, and covers operation (Chapters 1-3).
- II. **Configuration Program Installation and Operation** provides instructions for the use of the Software Configuration Program.



Figure 1 *The 5250-TI5 and 5251-TI5 Access Modules*

USAGE CONVENTIONS

NOTE:

Notes alert the user to special features or procedures.

CAUTION:

Cautions alert the user to procedures which could damage equipment.

WARNING:

Warnings alert the user to procedures which could damage equipment and endanger the user.

KEY SEQUENCE

WX/WY
DRUM

Select Drum

5

Key the address

HELP
READ

Read the state

SHIFT LED

DISPLAY

DRUM 1

DRUM 5 ☐

DRUM 5
DSP 16 DCP *****
DSC 16 DCC 00000
SEC/CNT 01.000

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CHAPTER 1. DESCRIPTION

The Model 5250-TI5 and Model 5251-TI5 Access Modules provide a simple, yet flexible, interface to the SIMATIC® Series 500 and 505 Programmable Controllers. The Access Modules are designed to monitor and (optionally) modify Discrete I/O (X/Y), Control Relays (CR), Timers/Counters (TCP/TCC), V-memory (V), Word I/O (WX/WY), and Drums/Event Drums. PLC memory locations are continuously monitored to detect internal PLC errors and user configured alarms and event messages.

The Access Modules provide a rugged, compact panel for the operator, technician, and engineer who need to access PLC memory locations without using a VPU or TISOFT. This interface provides the ease of use and flexibility needed for numerous operation, diagnostic, and maintenance applications.

Included with each module is a menu-driven software configuration program which runs on IBM-compatible computers. (The configuration package is covered in Chapter 4 of this *Installation and Operation Guide*.) By following simple command prompts, users can assign custom tag names to PLC memory locations, define alarms and messages, select operator password, designate read-only memory locations, and specify V memory locations for the transfer of real-time clock data. Once created, the configuration file can be transferred to or from the battery-backed memory in the Access Module.

1.1 Features

Compact, industrial panel mount design including NEMA 4 rated (water-tight) front panel and convenient plug-in communications and power cables

Access to SIMATIC® 500 and 505 PLC memory locations by address or tag names

Password protection for individual memory locations prevents unauthorized changes while allowing all monitoring functions

Read-only option prevents altering critical data

Flexible alarm handling permits selection of partial or complete display interruption, alarm storage, and event logging

Context-sensitive Help screens

Real time clock that can be transferred to user-specified V memory locations

Displays and dynamically updates PLC memory locations (tag names) embedded in user defined messages

1.2 Theory of Operation

The executable program and commands which allow the Access Module to interact with the SIMATIC® 500 and 505 Series Controllers are permanently stored in internal ROM (Read Only Memory). Custom configuration parameters, including user-assigned tag names, alarms, and messages, are stored in battery-backed RAM.

The Access Module software provides two command sets for the operator. The primary command set allows the user to monitor PLC status and monitor/change X/Y, WX/WY, V memory, Drums, Timer/Counter, and Control Relay (CR) locations. The auxiliary command set displays the status of the Access Module, display and edit the Real Time Clock, create a screen to dynamically display four (4) data points, set PLC communications baud rate, and upload/download a configuration file to/from a PC running the TI5 Configuration Software program. Additionally, the Model 5251-TI5 permits the user to specify the time delay before the VFD Screen Saver is activated.

Procedures for using each of these commands are described in the Chapter 3.

1.3 Battery Replacement

The Access Module is equipped with an internal 3.6V Lithium battery that should provide memory backup for approximately 8 years when operated in normal environments. Battery life can diminish if the unit is subjected to extreme temperatures or frequent temperature cycles.

It is recommended that the unit be returned to CTI for service when battery replacement is required. However, a qualified technician can access the battery by removing the rear panel. A replacement battery can be ordered from CTI (Part #075-00009).

1.4 Front Panel Description

The Access Module front panel contains a data display (LCD or VFD), 20 key membrane keypad, and four (4) status LEDs, as shown below.

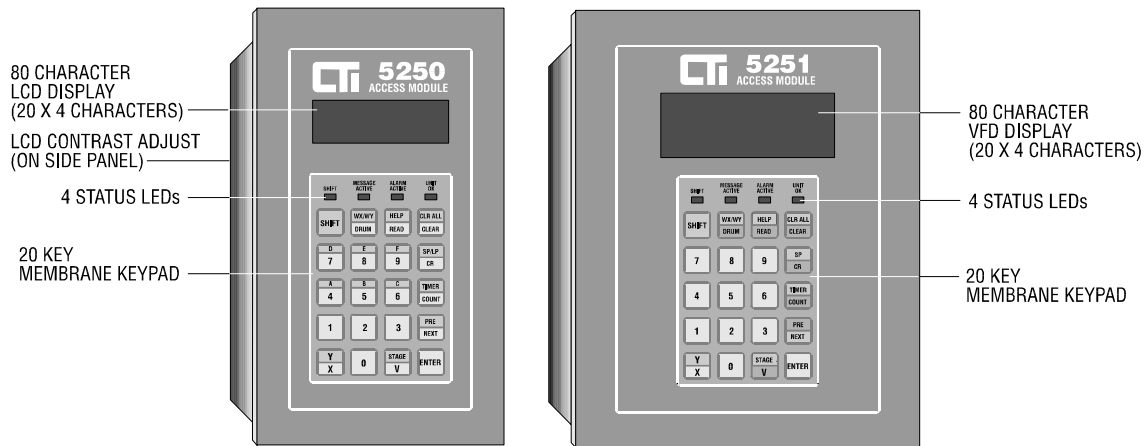


Figure 2 Front Panel Description

An 80 character (4 Line by 20 Characters) **Data Display** is provided with each unit. Model 5250-TI5 contains a 1" by 3" LCD with wide viewing angle. Model 5250-TI5 includes a VFD with 5mm by 3mm character size.

The **Keypad** is used to access PLC memory locations, edit values, and specify the Auxilliary Command set (described in Section 3.5).

The **"SHIFT" LED** is illuminated when the "SHIFT" mode is active. The next key pressed causes the alternate (Blue-labelled) function to be called.

The **"MESSAGE ACTIVE" LED** is illuminated when an Event Message appears on one or more lines of the data display. An Event Message is a special type of alarm that interrupts the data display but does not create an entry in the Alarm Storage Queue. See Section 3.8 for details on messaging.

The **"ALARM ACTIVE" LED** is illuminated whenever one or more "unacknowledged" alarm messages exist in the Alarm Storage Queue. Alarm Queue messages are created when the Access Module detects an alarm condition configured for this action. See Section 3.7 for a description of alarms.

The **"UNIT OK" LED** indicates that the Access Module is properly powered and operating normally. If this LED is ON steady, the unit is communicating with the PLC. If the PLC is not responding, this LED is flashing.

1.5 LCD Brightness Control

The Model 5250-TI5 Access Module contains an adjustment screw that allows contrast control for the Liquid Crystal Display (LCD). This contrast control is located in the left side panel below the LCD.

A small screwdriver of approximately 1/8 inch diameter may be used to adjust the contrast setting. The range of control is slightly less than one full turn with factory setting about 50%. **DO NOT PUSH** on the adjustment screw with the screwdriver.

1.6 Communications

1.6.1 Access Module to Personal Computer

The Access Module communicates with an IBM-compatible PC to provide upload/download of custom configuration files to/from the PC. The PC must be running the TI5 Configuration Program provided with the unit.

A cable must be connected between the Access Module PROGRAM Port on the rear panel and a serial port (COM1 or COM2) on the PC. Communication cables may be purchased from CTI or constructed according to the specifications described in Chapter 4 of this manual.

1.6.2 Access Module to PLC

The Access Module can be connected directly to Siemens® Series 500 and 505 PLC Programming Port via a standard communications cable. Cables required to interface to all Series 500 and 505 PLC's are available from CTI or can be constructed as described in Section 2.3.

The Access Module can communicate to the PLC through the PROGRAM Port by either RS-232 or RS-422. This choice is determined by the selection of the proper communication cable. No internal switching is required to select RS-232 or RS-422 operation.

PLC Communications Baud Rate can be set through the TI5 Configuration Program as well as directly from the keypad using an auxiliary command function. Choices are 9600 or 19.2K baud. The other communication parameters (7 data bits, odd parity, 1 stop bit) are fixed and cannot be altered.

If communications with the PLC is disconnected or interrupted by excessive noise, the Access Module UNIT OK LED flashes approximately once per second to indicate the problem.

1.6.3 Access Module Output through AUX Port

The AUX Port on the Access Module rear panel can be used for a second serial connection to a log printer or message display. The pinout for this port is described in Section 2.4.

The AUX Port is configured as RS-232 DTE (Data Terminal Equipment) operation. This port can be used for output only; serial input is not supported. AUX Port communications settings are fixed at 9600 baud, 8 data bits, no parity, 1 stop bit and cannot be altered.

CHAPTER 2. INSTALLATION

2.1 Access Module Mounting

To comply with NEMA 4 specifications, the Access Module must be installed in a NEMA 4 rated enclosure according to the following procedure:

- Step 1. Ensure that there is adequate panel and depth clearance in the NEMA 4 enclosure where the module is to be mounted. Refer to the following figure for overall clearances.
- Step 2. Cut an opening and drill 10 mounting holes in the enclosure panel as shown in the figure below.
- Step 3. Line up the studs on the module with the holes in the enclosure panel. Do not remove the gasket from the studs. Insert the module into the cut-out through the front of the panel. The gasket should be between the module and the front of the panel.
- Step 4. Remove the nuts from the packing envelope and install them onto the studs from the rear of the panel. Tighten the nuts in the sequence and to the torque specifications shown in the figure below.

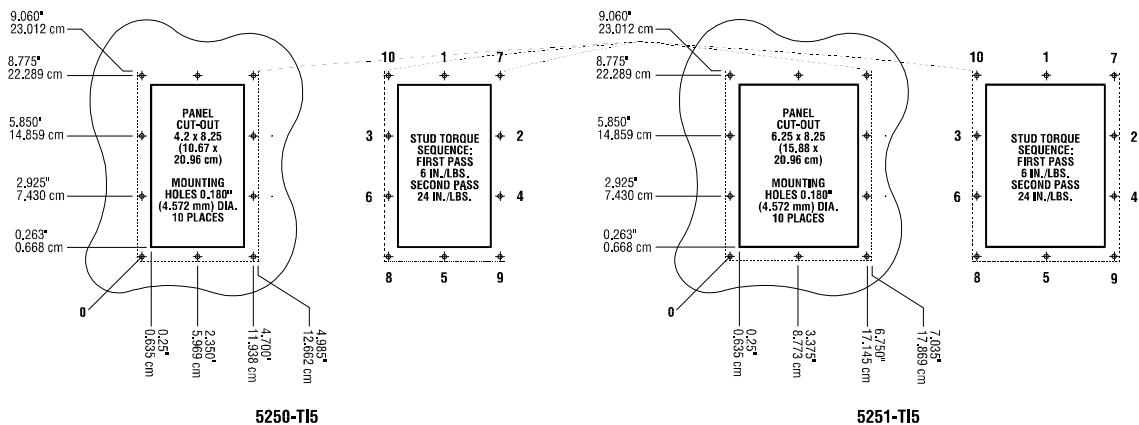


Figure 3 Panel Cut-out and Stud Torque Sequence

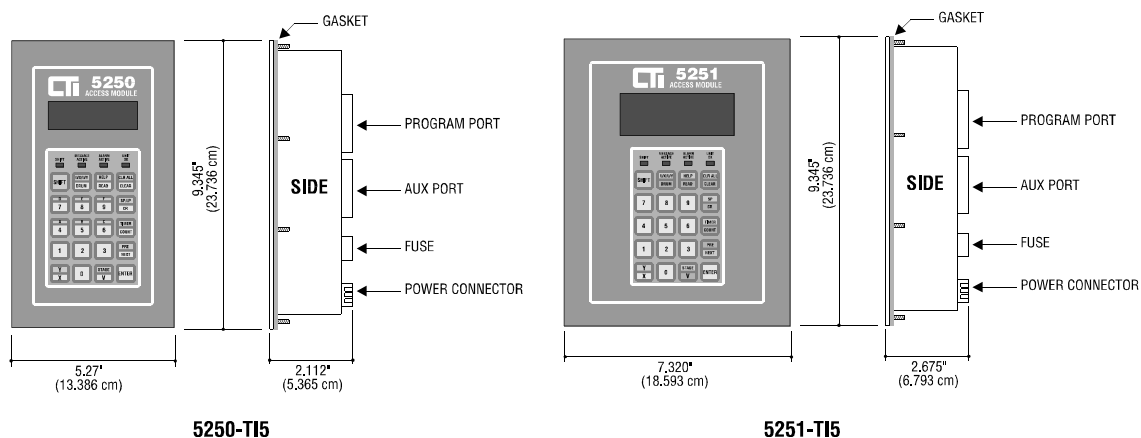


Figure 4 *Module Outside Dimensions*

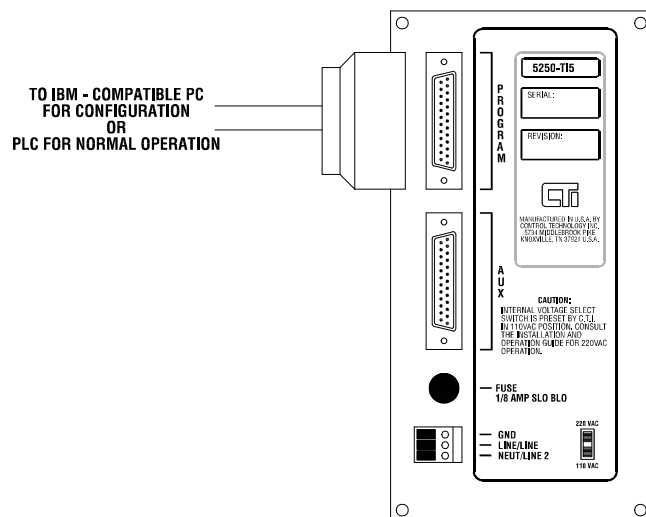


Figure 5 *Rear View of Access Module*

2.2 Connecting Power to the Access Module

110V AC power is supplied to the Access Module by connecting the appropriate lines to the screw terminals of the power connector located on the rear panel. The screw terminal connector is a two-piece part that can be removed from the unit to assist in wiring.

This connector supports wires ranging from 14-18 AWG.

WARNING:

Ensure that the GND pin (top pin on the 3 pin connector) is connected to a suitable ground to prevent personal injury.

WARNING:

Ensure that line power is off when connecting the supply wires to the screw terminals to prevent personal injury.

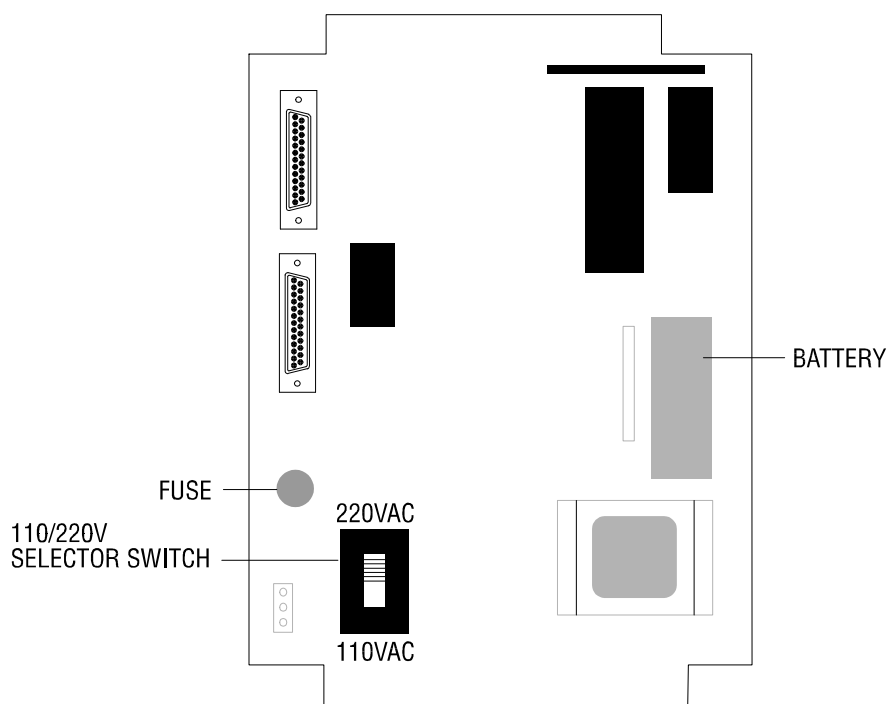


Figure 6 5250-TI5 / 5251-TI5 Printed Circuit Board

For 220V AC operation, remove the 4 screws from the back panel, change the voltage select switch (see above figure) from the 110V to the 220V position. Reinstall the back panel before connecting power to the unit.

WARNING:

Ensure that the voltage select switch is in the correct position before connecting 220VAC. Equipment damage can occur which will void the product warranty. The unit is factory configured for 100VAC.

Power voltages other than 110/220V AC are available by special request. Contact CTI for special voltage requirements.

The Access Module is protected by a 125mA 250V fuse located directly above the screw terminal connector. To remove the fuse, insert a flat-blade screwdriver into the fuse holder and turn counter-clockwise. The replacement fuses should be Littlefuse #218.125 or equivalent. Fuse replacement is accomplished by inserting a new fuse in the holder, place the fuse and holder into the fuse hole, and turn clockwise using a flat-blade screwdriver.

2.3 Connecting the Access Module to a Series 500/505 PLC

The Access Module is connected to a Series 500/505 PLC by attaching a communications cable between the PROGRAM Port on the Access Module and the PLC Programming Port. The PLC Communications Baud Rate can be set through the TI5 Configuration Program as well as directly from the keypad using an auxiliary command function. PROGRAM Port communication parameters are set as follows:

Baud Rate: 9600 or 19.2K (user-selected)
Data Bits: 7
Parity: Odd
Stop Bits: 1

NOTE: Communication settings other than baud rate are fixed.

Standard cables are available from CTI (see Figure 7), or custom length cables can be constructed as described in Figures 8-10.

Cable length for RS-232 connections should be limited to 50 feet or less. Belden 8771 (or equivalent) cable should be used for construction of RS-232 cables.

Cable length for RS-422 interfaces can extend to a maximum of 4000 feet. The RS-422 cable should be constructed of Belden 8723 (or equivalent). The cable shield (drain) should be attached to pin 1 on the Access Module side of the cable only.

Details on connecting the Access Module to Remote Base Controllers are provided in Appendix C.

CPU TYPE	OPERATION CABLE	
	To PLC (RS-232)	To PLC (RS-422)
520	5200-C232	5200-C422
520C	5200-C232	5200-C422
530	5200-C232	5200-C422
530C	5200-C232	5200-C422
530T	5200-C232	5200-C422
560	5200-C232	5200-C422
565	5200-C232	5200-C422
525	5200-C232	5200-C422
535	5200-C232	5200-C422
545	5250-CBAT	5200-C422

PC COM PORT	CONFIGURATION CABLE
9 PIN PORT	5250-CBAT
25 PIN PORT	5250-CBXT

Figure 7 Cable Matrix

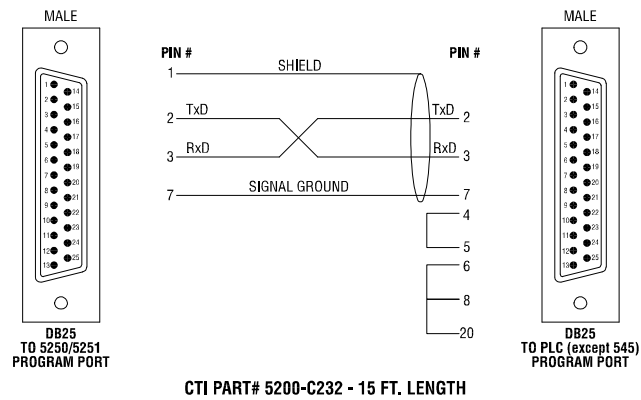


Figure 8 RS232 to 500/505 PLC Cable

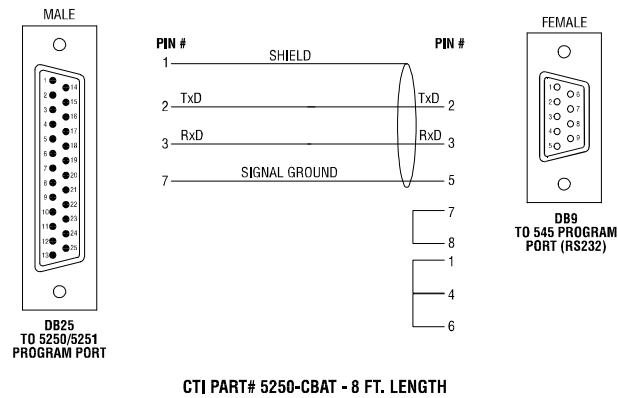


Figure 9 RS232 to 545 PLC Cable

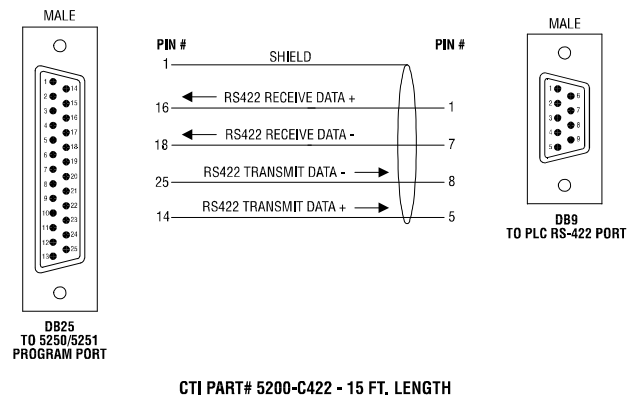


Figure 10 RS422 to PLC Cable

2.4 Connecting the AUX Port to a Serial Device

The AUX Port provides an additional RS-232 serial connection to an event printer or message display. This port can be used for data output only. The AUX Port communications parameters are set as follows:

Baud Rate: 9600
Data Bits: 7
Parity: Odd
Stop Bits: 1

NOTE: All AUX Port communication parameters are fixed.

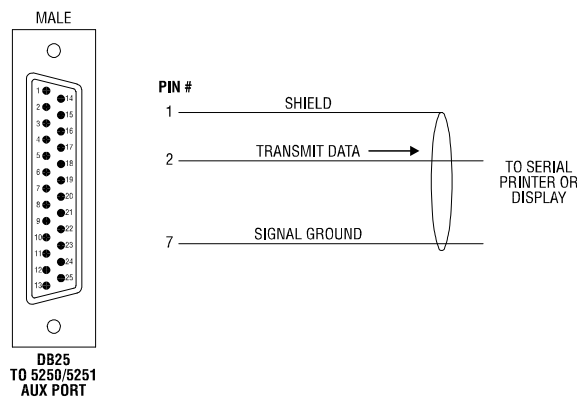


Figure 11 Auxiliary Port Pin-out

2.5 Cleaning the Front Panel

When dirt obscures the keypad or display window, the front panel should be carefully cleaned. The use of a mild soap and water solution or a mild ammonia base window cleaning agent such as Windex (TM) is recommended. Clean the front panel with a soft cloth or sponge using vertical strokes. Wipe off excess cleaner to prevent water spots.

CAUTION:

To avoid damage to the laminated plastic front panel, do not clean with abrasive, alkaline, or solvent cleaners. Do not scrape the front panel with razor blades, squeegees or other sharp instruments.

CHAPTER 3. OPERATION

3.1 Initial Power Up

There are four (4) different screens that may be displayed at power-up based on Access Module status:

```
CTI Access Module
Power Tests Complete
No RAM or ROM errors
TI - 5 v 4.1 12/07/93
```

Figure 12 *Power Up Screen A*

- (1) The normal power up screen without tags and with properly operating battery.

```
Config file : CONFIG1
at 09/01/93 09 : 59 : 07
No RAM or ROM errors
TI - 5 v 4.1 12/07/93
```

Figure 13 *Power Up Screen B*

```
CHECK TCAM BATTERY
Power Tests Complete
No RAM or ROM errors
TI - 5 v 4.1 12/07/93
```

Figure 14 *Power Up Screen C*

- (2) The power up screen with tag names loaded.
- (3) The power up screen with a previously disconnected or discharged battery.
- (4) If power is interrupted while a user-defined screen is in memory, that screen is displayed when power is returned to the unit. See Section 3.5.3 for details on user-defined screens.

If the "UNIT OK" LED flashes after power-up, communications has not been established with the PLC. Ensure that the communication cable is the correct type, and that it is installed properly. Also

ensure that the PLC Baud Rate is set to the same value as configured in the Access Module.

3.2 Keypad Entry

Operation of the Access Module is controlled through the keypad. Included on the keypad are digits 0 - 9 for entering PLC memory addresses and data, and special function keys which access the various features provided by the Access Module.

3.2.1 SHIFT Key

The blue SHIFT key works in conjunction with the dual function keys with blue and white labels (i.e., WX/WY-DRUM and HELP/READ keys). When the SHIFT key is pressed, the SHIFT LED lights and the alternate mode is enabled. If a dual function key is pressed with SHIFT mode enabled, the alternate (blue-labelled) function is activated.

The SHIFT function remains active only until the next key is pressed (even if that key does not have a dual function). The one exception is the use of the PRE/NEXT key, where the SHIFT function remains active until the SHIFT key is pressed again.

The following example demonstrates the use of the SHIFT key.

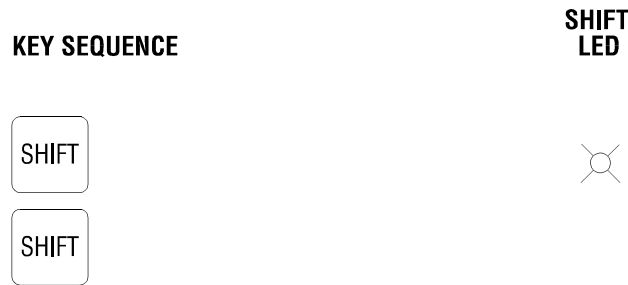


Figure 16 *SHIFT Key*

The following example selects a DRUM, clears the display, and then selects a WX/WY location.

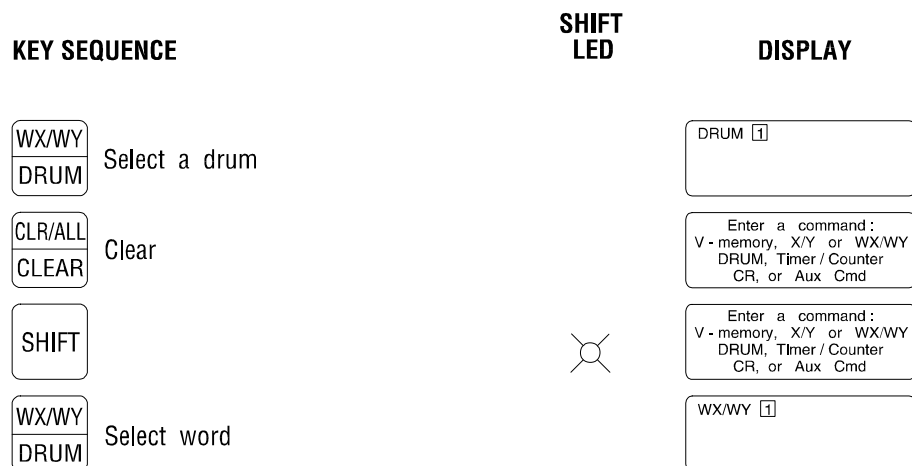


Figure 15 *Use of SHIFT Key to Select WX/WY*

The Access Module executes only "valid" key entries. HELP messages are used extensively to prompt the operator as to the expected key sequence. When an invalid key is pressed, it results in the display of a HELP message or is simply ignored. An invalid keypress will not result in corrupted memory or program violation within the Access Module.

When a "memory variable" (X/Y, V, WX/WY) key is pressed, the selected memory type is displayed. The Series 500/505 PLCs use certain memory areas for dual purpose, and the variable type can be determined only after the address is entered. In this case, both memory types are displayed until the READ key is pressed. The proper label is then displayed. This applies to X/Y (Input/Output), WX/WY (Word Input/Word Output), and TIMER/COUNTER memory areas.

3.2.2 PRE/NEXT Key

The PRE/NEXT key is used to access tag names of similar memory type, scroll through HELP Screens, scroll through alarms, and move to the next editable field. The NEXT function allows the operator to scroll through the variables which have been defined by tag names. When the desired tag is displayed, pressing the READ key selects it. The PRE (Previous) key, selected with the SHIFT function, works like the NEXT key except that it allows scrolling in reverse order.

The following are examples of the PRE/NEXT key. The tag names used here are for example only, real tag names are created during the configuration of the Access Module.

NEXT Key Operation:

KEY SEQUENCE	SHIFT LED	DISPLAY
<div><div>Y</div><div>X</div></div> Select Input/Output		<div>Y <input type="text" value="1"/> CONVEYR1</div>
<div><div>PRE</div><div>NEXT</div></div> Advance to the next assigned tag name.		<div>Y 00002 CONVEYR2<input type="text"/></div>
<div><div>PRE</div><div>NEXT</div></div> Advance to the next assigned tag name.		<div>Y 00003 CONVEYR3<input type="text"/></div>
<div><div>PRE</div><div>NEXT</div></div> Advance to the next assigned tag name. In this example, the tag for X/Y 4 was not defined.		<div>Y 00005 STARTSW<input type="text"/></div>

NOTE: In this example CONVEYR1 through CONVEYR3 were defined in this configuration file as Outputs (Y).

Figure 17 NEXT Key

PRE (Previous) Key Operation:

KEY SEQUENCE	SHIFT LED	DISPLAY
<div>SHIFT</div> Press the SHIFT key		X 00005 STARTSW <input type="checkbox"/>
<div>PRE</div> <div>NEXT</div> Select the previous tag name		Y 00003 CONVEYR3 <input type="checkbox"/>
<div>PRE</div> <div>NEXT</div> Select the previous tag name		Y 00002 CONVEYR2 <input type="checkbox"/>

Figure 18 PRE Key

In this example, the SHIFT function remains enabled until pressed a second time or until the CLEAR key is pressed.

3.3 Reading PLC Memory Locations

The following sections outline the two methods which can be used to access, monitor, and edit PLC memory locations. Examples of both methods are outlined in detail for each memory variable type.

3.3.1 Direct Memory Address Number

The Access Module allows all supported memory types to be accessed using the PLC memory address number (V1658, WX52, X7, etc). This method can be used whether or not a configuration file has been downloaded to the unit.

Memory variable limits are determined by installed PLC type, PLC configuration (set via TISOFT), and Access Module limits (set by TI5 Configuration Program). If the Access Module is used without a configuration file, it attempts to establish memory variable limits based on attached PLC configuration. Default limits are used on some older PLC's.

If a configuration file has been downloaded, the Access Module permits monitoring and editing only those memory locations within the limits set in the TI5 Configuration Program.

3.3.2 Accessing Memory by Tag Names

A memory location can be accessed by tag name if a configuration file has been downloaded to the Access Module. This allows an operator to access memory variables without having to know the PLC memory address. For instance, "PROX 203" refers to "X12" and "TANK VOL" references address "V243".

To access memory locations using tag names, use the following general steps:

- (1) Use the keypad to select the memory type, (i.e. V, X/Y, Drum, Timer/Counter, or WX/WY. Note that the selection of WX/WY requires the use of the SHIFT key first.
- (2) Scroll through the user defined tag names for the selected variable type using the PRE/NEXT key. Scrolling order for each variable type is based on the order that they were defined in the TI5 Configuration File.
- (3) Press READ to display the data for that memory location.

Example:

Assume that the following tags are assigned to V memory. Tags are listed in the order that they were created in the configuration file.

V17 = TEMP1
V300 = TANK VOL
V8 = TIME SEC
V120 = SPEED

When scrolling through these tags using the NEXT key, they are accessed in numerical order by

KEY SEQUENCE	SHIFT LED	DISPLAY	memory type. This is demonstrated in the following example:
<div>STAGE V</div> Select V Memory		<div>V 1</div>	
<div>PRE NEXT</div> Next Tag		<div>V 00008 TIME SEC</div>	
<div>PRE NEXT</div> Next Tag		<div>V 00017 TEMP1 DEG</div>	
<div>PRE NEXT</div> Next Tag		<div>V 00120 SPEED IPS</div>	
<div>PRE NEXT</div> Next Tag		<div>V 00300 TANK VOL</div>	

Figure 19 *Scrolling Sequence*

Press the PRE key (SHIFT,PRE/NEXT) to scroll backwards through the tags for the selected memory type.

After READ key is pressed, other tags of the same memory type can be accessed by pressing the CLEAR key (to stop reading current location) and PRE/NEXT key to continue scrolling starting at the last selected tag name. See Figure 20 for an example.

To access a different variable type, press CLR ALL (SHIFT, CLR ALL/CLEAR) to exit the current mode and follow the general steps listed above for selecting a new memory location.

	KEY SEQUENCE	SHIFT LED	DISPLAY
Read A Tag	<div>STAGE</div> <div>V</div> <div>Select V Memory</div>		V 1
	<div>PRE</div> <div>NEXT</div> <div>Next Tag</div>		V 00120 SPEED IPS
	<div>PRE</div> <div>NEXT</div> <div>Next Tag</div>		V 00300 TANK VOL
	<div>PRE</div> <div>NEXT</div> <div>Next Tag</div>		V 00017 TEMP1 DEG
	<div>HELP</div> <div>READ</div> <div>Read the Memory</div>		V 00017 TEMP1 4024 DEG
	<div>CLEAR</div> <div>Stops Reading Selected Memory Location</div>		V 00017 TEMP1 DEG
	<div>PRE</div> <div>NEXT</div> <div>Continue Scrolling to Next Tag</div>		V 00120 SPEED 500 IPS

Figure 20 Accessing Memory by Tag Name

3.3.3 Discrete I/O Points (X/Y)

The status of a discrete I/O point can be read by direct memory address or tag name. The key sequences are shown in the following figures.

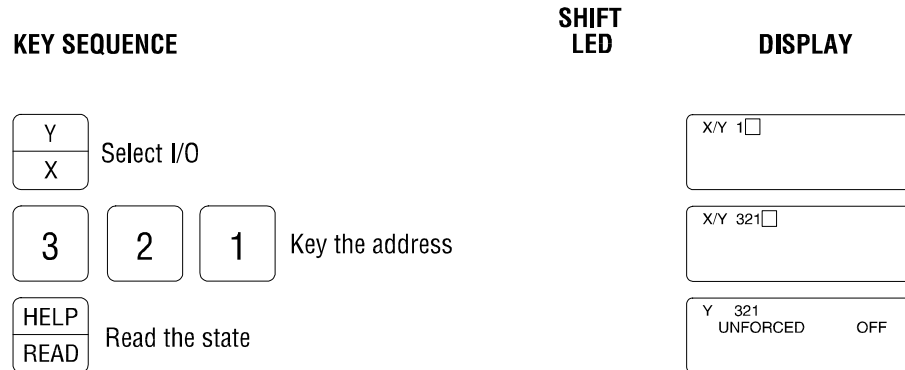


Figure 21 Reading a Discrete I/O by PLC Address

Memory type "X/Y" is displayed until a specific point is entered. The display then shows "Y321" to indicate I/O point 321 is actually configured in the PLC as an Output. The current state is shown as "ON" or "OFF", and the forced state is displayed as "UNFORCED" or "FORCED".

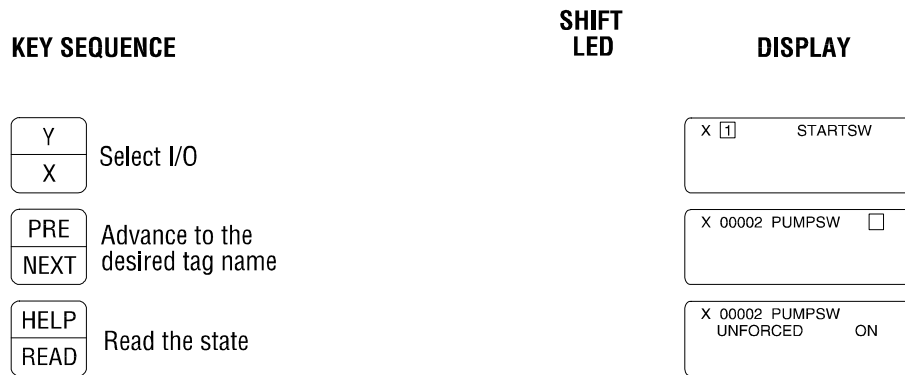


Figure 22 Reading a Discrete I/O by Tag Name

PUMP SW" shows the tag name assigned to Input 2 (X2). The current state of the input is displayed as "ON" or "OFF" message. The actual message text is defined with the TI5 Configuration Program.

3.3.4 Control Relays (CR)

The status of Control Relays can be read by direct memory address or tag name. The key sequences are shown in the following figures.

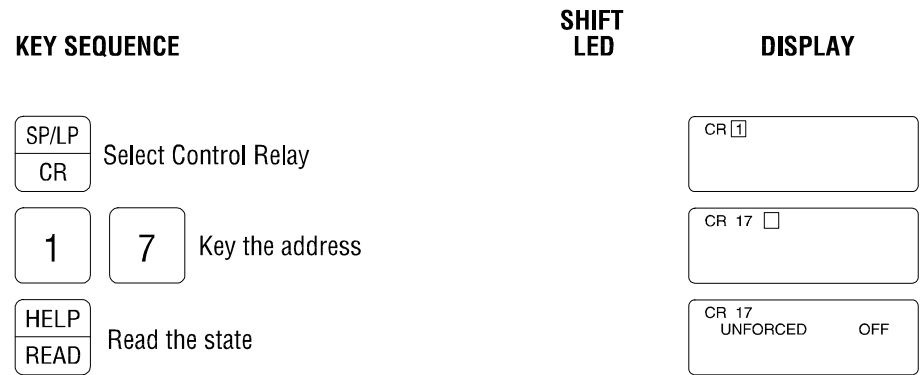


Figure 23 Reading Control Relay Status by PLC Address

The current state of the relay is displayed as "ON" or "OFF".

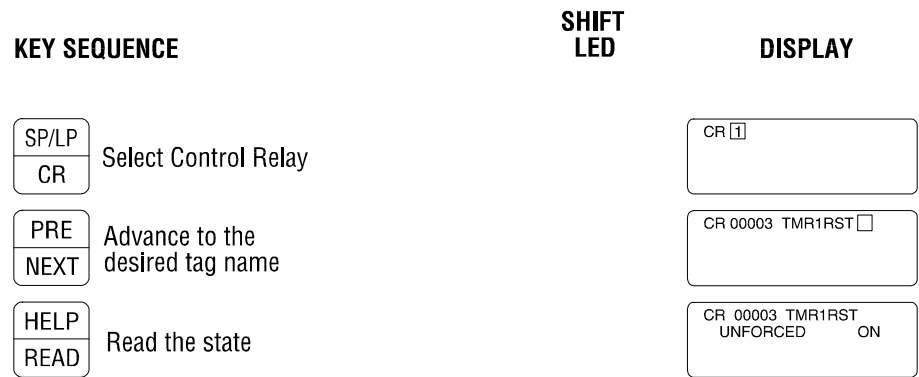


Figure 24 Reading Control Relay Status by Tag Name

"TMR1RST" shows the tag name assigned to the selected memory location. The current state of the CR is displayed as "ON" or "OFF" message. The actual message text is defined with the TI5 Configuration Program.

3.3.5 Timer/Counter

Timer and Counter Preset (TCP) and Current (TCC) values can be read by direct memory address or tag name. Timer/Counter displays also indicate "Protected" status as well as whether the selected location is used in the PLC ladder logic. The key sequences are shown in the following figures.

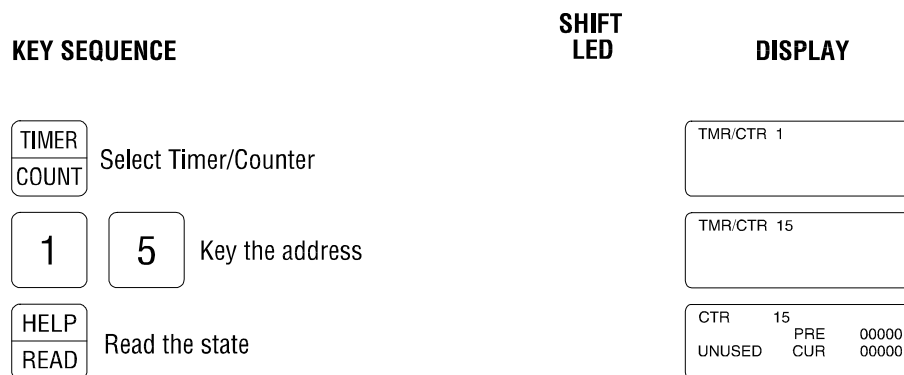


Figure 25 Reading Timer/Counter by PLC Address

The Preset (PRE) and Current (CUR) values for the selected Counter are displayed. The "UNUSED" message indicates that the selected Counter is not currently included in the PLC ladder logic. The tag name assigned to the selected memory location is shown on Line 1. The "PROT" message on Line 2 shows that the selected Timer was programmed as a Protected Timer. The "USED" message indicates that the timer is included in the PLC ladder logic. If "Engineering Units" are defined for the selected tag, it is displayed next to the current value on Line 2.

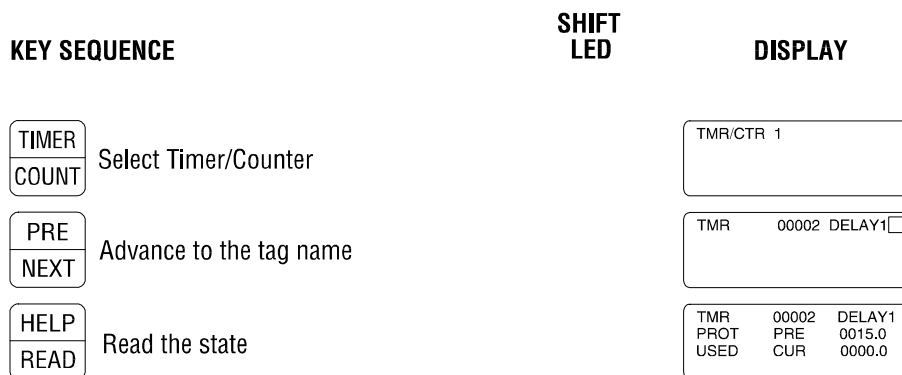


Figure 26 Reading a Timer/Counter by Tag Name

3.3.6 Variable (V) Memory

The value of V-Memory locations can be read by direct memory address or tag name. The key sequences are shown in the following figures.

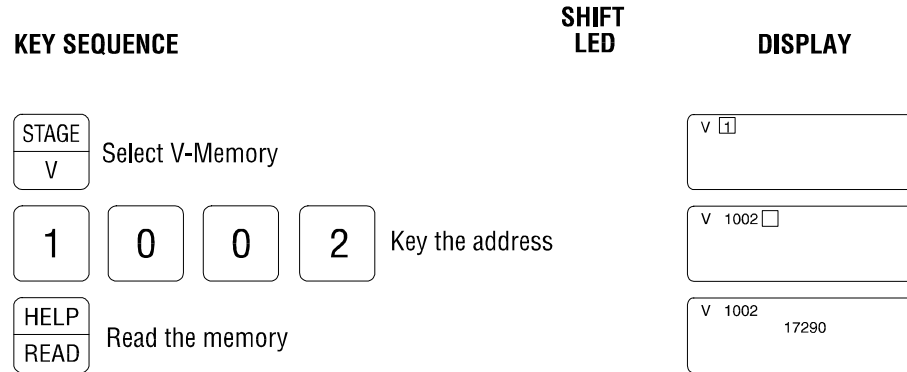


Figure 27 Reading V-Memory by PLC Address

The current value is displayed on Line 2 of the display.

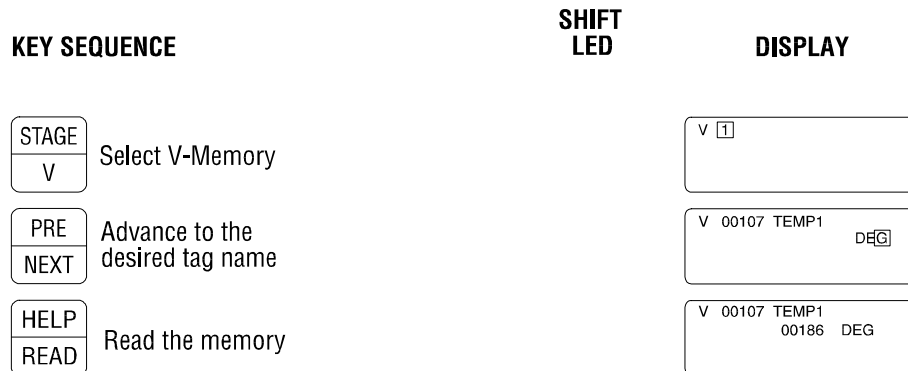


Figure 28 Reading V-Memory by Tag Name

The tag name assigned to the selected memory location is shown on Line 1. If "Engineering Units" are defined for the selected tag, it is displayed next to the current value on Line 2.

3.3.7 Word Input/Output (WX/WY)

Word Input/Output (WX/WY) memory can be read by direct memory address or tag name. The key sequences are described below.

KEY SEQUENCE	SHIFT LED	DISPLAY
<div>SHIFT</div> <div>WX/WY DRUM</div> Select Word Input/Output		WX/WY 1
<div>2</div> <div>2</div> <div>0</div> Key the address		WX/WY 220
<div>HELP READ</div> Read selected memory location		WX/WY 220 21480

Figure 29 Reading WX/WY Location by PLC Address

The current value is displayed on Line 2 of the display.

KEY SEQUENCE	SHIFT LED	DISPLAY
<div>SHIFT</div> <div>WX/WY DRUM</div> Select Word Input/Output		WX/WY 1 TC-112
<div>PRE NEXT</div> Advance to the desired tag name		WX/WY 00004 TC-24
<div>HELP READ</div> Read selected memory location		WX/WY 00004 TC-24 00189 DEG

Figure 30 Reading WX/WY Location by Tag Name

The tag name assigned to the selected memory location is shown on Line 1. If "Engineering Units" are defined for the selected tag, it is displayed next to the current value on Line 2.

3.3.8 Drums/Event Drums

The Access Module can display detailed status of Drums and Event Drums. Abbreviations used for Drums are described below. These definitions are also displayed if HELP is pressed when a Drum is selected.

- DSP = DRUM STEP PRESET
- DSC = DRUM STEP CURRENT
- EDRM = EVENT DRUM
- DCP = DRUM COUNT PRESET (valid only for Event Drum)
- DCC = DRUM COUNT CURRENT
- SEC/CNT = SECONDS PER COUNT

Drum Count Preset (DCP) displays ***** if selected Drum is not an Event Drum.

Drum status can be read by direct memory address or tag name. The key sequences are shown in the following figures.



Figure 31 Reading Drum by PLC Address

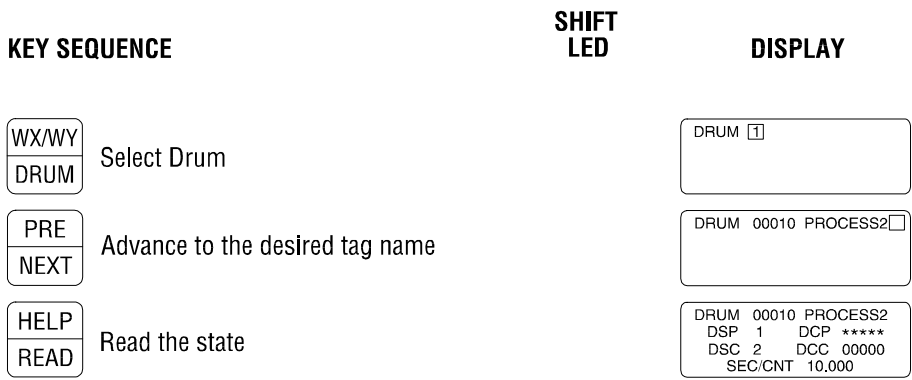


Figure 32 Reading Drum by Tag Name

The tag name assigned to the selected Drum is shown on Line 1 beside the PLC memory address.

If the selected Drum is configured as an Event Drum, parameters for the current Drum Step can be viewed by the pressing the NEXT key. Parameters for all other Drum Steps can be displayed by pressing PRE/NEXT. This key sequence is shown in Figure 31.

KEY SEQUENCE	SHIFT LED	DISPLAY
Display Event Drum		<div>EDRM 7 DSP 16 DCP 00010 DSC 10 DCC 00000 Sec/Cnt 01.000</div>
<div>PRE NEXT</div> Display Current Drum Step		<div>EDRM 7 Viewed Step 10 Drum Cnt Pre 0010 Sec/Cnt 01.000</div>
<div>PRE NEXT</div> Advance to next Drum Step		<div>EDRM 7 Viewed Step 11 Drum Cnt Pre 0015 Sec/Cnt 01.000</div>

Figure 33 *Reading Event Drum DCP Values*

When the Drum DPC Edit screen is displayed, the Drum Count Preset (DCP) for the selected Drum Step can be edited by pressing ENTER. See Section 3.4 for a description of the Edit function.

3.4 Editing a PLC Memory Location

The Access Module can be used to change memory locations and variables in the Series 500 and 505 PLC memory. The general procedure for altering memory locations is described below.

- (1) Display the desired memory location by PLC Address or Tag Name as shown in Section 3.3.
- (2) Press ENTER to edit the data. If the location is configured as "READ ONLY" (as set in configuration file), the message "Write not allowed" is displayed.
- (3) Use PRE/NEXT to move the cursor to the desired field. Some variables have more than 1 field that can be edited.
- (4) Enter new data to be written via the keypad. To change a state of a discrete point (X/Y,CR) or "FORCED" condition, press 1 key for "ON" or "FORCED" and press 0 for "OFF" or "UNFORCED".
- (5) Press ENTER when entry of new data is complete.

If this location does not require a Password (as specified in configuration file), the new value is written to the PLC. In this case, Step (6) is skipped.

- (6) The "PASSWORD?" prompt appears. Key in the 4-digit Password followed by ENTER (default Password is 5250).
- (7) If the correct password is entered, the new value is written to the PLC. The Access Module then returns to the previous screen and begins to read the selected memory location.
- (8) Once a password has been entered for a location, the module will not ask for another Password until a new variable is selected or no keys have been pressed for approximately 4.25 minutes (254 seconds).

3.4.1 Entering Negative Numbers

The Access Module allows entry of negative numbers in support of "Signed Integer" numbers within the Siemens® PLC's. Negative numbers can be entered by the following procedure:

- (1) Display location by PLC memory address or tag name as described in Section 3.3.
- (2) Go into Edit mode and enter new value as described in Section 3.4. In order to change value to a negative number, the entire number must be re-entered.
- (3) When new value is entered (and cursor is located to the right of the number), press SHIFT ENTER to force the displayed number to be assigned a "negative value". This action results in a minus sign being displayed in front of the entered number.
- (4) Pressing SHIFT ENTER again removes the minus sign and treats the edited value as a "positive number".
- (5) Press ENTER to accept the displayed value.

Negative numbers cannot be entered for the following variable types:

X/Y, Control Relay, Timer/Counter, and V-Memory (specified as Unsigned Integer or BCD).

3.4.2 Variable Minimum/Maximum Limits

The Access Module attempts to prevent the entry of invalid data by assigning minimum and maximum limits according to variable type as listed below:

X/Y and CR	0 to 1
Timer/Counter Preset	0 to 65535
Timer/Counter Current	0 to 65535
WX/WY	-32767 to 32767
V Memory (Signed Integer)	-32767 to 32767
V Memory (Unsigned Integer)	0 to 65535
V Memory (BCD)	0 to 9999

In addition, minimum and maximum limits can be specified for each location that is assigned a tag name using the TI5 Configuration software.

If the operator attempts to enter a number which is outside the limits, the display will default to the closest limit.

The following examples assume default limits.

Example 1: If the operator attempts to enter 70000 into TCP22, the display defaults to 65535 (maximum value allowed).

Example 2: If the operator attempts to enter -40000 into WX16, the display defaults to -32767 (minimum value allowed).

3.4.3 Changing a Discrete Variable (X/Y, CR)

The value and/or "forced" state of a discrete variable (X/Y, CR) can be changed by following the sequence described below. Editing of each parameter can be permitted or disallowed for each data point

via the TI5 Configuration Program. Figure 34 shows editing of the memory location value.

KEY SEQUENCE	SHIFT LED	DISPLAY
Display the desired variable		<div>Y 00015 UNFORCED ON</div>
<div>ENTER</div> Select Edit Mode		<div>Y 00015 UNFORCED ON</div>
<div>0</div> Change Discrete Variable value "0" = OFF "1" = ON		<div>Y 00015 UNFORCED OFF</div>
<div>ENTER</div> Accept new value		<div>Y 00015 UNFORCED OFF</div>
Enter Password (if required)		

Figure 34 Changing Discrete Variable Value

NOTE:

Any changes made to Input/Output (X/Y) discrete variable will be overwritten by the RLL program within one PLC scan unless the data point is "forced" to a specific state. Control Relay (CR) changes will also be overwritten by the RLL program if the CR state is set by a rung output (unless "forced").

The "forced" state of a discrete variable (X/Y, CR) can be altered by the following procedure:

KEY SEQUENCE	SHIFT LED	DISPLAY
Display the desired variable		X 00007 UNFORCED ON
<div>ENTER</div> Select Edit Mode		X 00007 UNFORCED ON
<div>PRE NEXT</div> Move cursor to "forced" state field		X 00007 UNFORCED ON
<div>1</div> Change state to "forced"		X 00007 FORCED ON
<div>ENTER</div> Accept new value		X 00007 FORCED ON
Enter Password (if required)		

Figure 35 *Changing Discrete Variable Forced State*

When editing the "forced" state of a discrete variable, a value of "0" must be entered for UNFORCED state and a value of "1" must be entered for FORCED state.

3.4.4 Changing a Timer/Counter

The Current value and/or Preset value of a Timer or Counter can be changed as shown in the following example. Figure 36 describes the editing of the "Current" value.

KEY SEQUENCE	SHIFT LED	DISPLAY
Display the desired variable		TMR 00015 LOOP2 PRE 01000 USED CUR 00179
ENTER Select Edit Mode		TMR 00015 LOOP2 PRE 01000 USED CUR 00179
5 5 0 Key in new Timer Current Value		TMR 00015 LOOP2 PRE 01000 USED CUR 00550
ENTER Accept new Timer Current Value		TMR 00015 LOOP2 PRE 01000 USED CUR 00550 ENTER PASSWORD
Enter Password (if required)		

Figure 36 Changing Timer/Counter CURRENT Value

The "Preset" value can be altered by the following key sequence:

KEY SEQUENCE	SHIFT LED	DISPLAY
Display the desired variable		CTR 00003 PRE 00050 USED CUR 00011
ENTER Select Edit Mode		CTR 00003 PRE 00050 USED CUR 00011
PRE Move cursor to NEXT Counter Preset field		CTR 00003 PRE 00050 USED CUR 00011
4 0 Key in new Counter Preset Value		CTR 00003 PRE 00040 USED CUR 00011
ENTER Accept new Counter Preset Value		CTR 00003 PRE 00040 USED CUR 00011 ENTER PASSWORD
Enter Password (if required)		

Figure 37 Changing Timer/Counter PRESET Value

3.4.5 Changing WX/WY and V Memory Locations

The value of Word Input/Output (WX/WY) and Variable (V-Memory) locations can be modified through the following key sequence:

KEY SEQUENCE	SHIFT LED	DISPLAY
Display the desired variable		V 117 TEMP2 00140 DEG
<input type="button" value="ENTER"/> Select Edit Mode		V 117 TEMP2 00140 DEG
<input type="button" value="5"/> <input type="button" value="5"/> <input type="button" value="0"/> Key in new value		V 117 TEMP2 00550 DEG
<input type="button" value="ENTER"/> Accept new V-Memory value		V 117 TEMP2 00550 DEG
Enter Password (if required)		

Figure 38 Changing WX/WY and V-Memory Values

3.4.6 Changing Drum Parameters

The Edit function supports the modification of Drum and Event Drum parameters, including Drum Step Preset (DSP), Drum Step Current (DSC), Time Base (SEC/CNT), and Drum Count Preset (DCP for Event Drums only). Figure 39 shows the key sequence for changing the DSP.

KEY SEQUENCE	SHIFT LED	DISPLAY
Display Drum		DRUM 2 RT-SEQ DSP 10 DCP ***** DSC 01 DCC 00000 Sec/Cnt 00.500
<input type="button" value="ENTER"/> Select Edit Mode		DRUM 2 RT-SEQ DSP 10 DCP ***** DSC 01 DCC 00000 Sec/Cnt 00.500
<input type="button" value="2"/> <input type="button" value="5"/> Key in new Drum Step Preset value		DRUM 2 RT-SEQ DSP 25 DCP ***** DSC 01 DCC 00000 Sec/Cnt 00.500
<input type="button" value="ENTER"/> Accept new DCP value		DRUM 2 RT-SEQ DSP 25 DCP ***** DSC 01 DCC 00000 Sec/Cnt 00.500
Enter Password (if required)		

Figure 39 Changing Drum DSP Parameter

Other parameters (DSC, SEC/CNT, and DCP) can be altered as shown in Figures 40-41 below:

KEY SEQUENCE	SHIFT LED	DISPLAY
Display Drum		<div>DRUM 2 RT-SEQ</div> <div>DSP 25 DCP *****</div> <div>DSC 01 DCC 00000</div> <div>Sec/Cnt 00.500</div>
<div>ENTER</div> Select Edit Mode		<div>DRUM 2 RT-SEQ</div> <div>DSP 25 DCP *****</div> <div>DSC 01 DCC 00000</div> <div>Sec/Cnt 00.500</div>
<div>PRE</div> <div>NEXT</div> Move cursor to Drum Step Current field		<div>DRUM 2 RT-SEQ</div> <div>DSP 25 DCP *****</div> <div>DSC 01 DCC 00000</div> <div>Sec/Cnt 00.500</div>
<div>2</div> <div>4</div> Key in new Drum Step Current value		<div>DRUM 2 RT-SEQ</div> <div>DSP 25 DCP *****</div> <div>DSC 24 DCC 00000</div> <div>Sec/Cnt 00.500</div>
<div>ENTER</div> Accept new DSP value		<div>DRUM 2 RT-SEQ</div> <div>DSP 25 DCP *****</div> <div>DSC 24 DCC 00000</div> <div>Sec/Cnt 00.500</div>
Enter Password (if required)		
<div>PRE</div> <div>NEXT</div> Move cursor to Time Base field		<div>DRUM 2 RT-SEQ</div> <div>DSP 25 DCP *****</div> <div>DSC 24 DCC 00000</div> <div>Sec/Cnt 00.500</div>
<div>0</div> <div>2</div> <div>2</div> <div>5</div> <div>0</div> Enter new Time Base		<div>DRUM 2 RT-SEQ</div> <div>DSP 25 DCP *****</div> <div>DSC 24 DCC 00000</div> <div>Sec/Cnt 02.250</div>
<div>ENTER</div> Accept new Time Base		<div>DRUM 2 RT-SEQ</div> <div>DSP 25 DCP *****</div> <div>DSC 24 DCC 00000</div> <div>Sec/Cnt 02.250</div>
Enter Password (if required)		

Figure 40 *Changing Drum DSC/Time Base Values*

KEY SEQUENCE	SHIFT LED	DISPLAY
Display Event Drum		EDRM 4 DSP 16 DCP 00010 DSC 10 DCC 00000 Sec/Cnt 01.000
<div>PRE NEXT</div> Display Current Drum Step		EDRM 4 Viewed Step 10 Drum Cnt Pre 0010 Sec/Cnt 01.000
ENTER Select DCP Edit Mode		EDRM 4 Viewed Step 10 Drum Cnt Pre 0010 Sec/Cnt 01.000
<div>1</div> <div>2</div> Key in new Drum Count Preset value		EDRM 4 Viewed Step 10 Drum Cnt Pre 0012 Sec/Cnt 01.000
ENTER Accept new DCP value		EDRM 4 Viewed Step 10 Drum Cnt Pre 0012 Sec/Cnt 01.000
<div>PRE NEXT</div> Advance to next Drum Step		EDRM 4 Viewed Step 11 Drum Cnt Pre 0012 Sec/Cnt 01.000

Figure 41 *Changing Drum DCP Values*

3.5 Auxiliary Commands

The Access Module supports an Auxiliary Command set allows access to internal status information and custom features. Auxiliary Commands can be initiated from the Main Menu as described in the following sections. The operator can return to the Main Menu from any screen by pressing SHIFT, CLR ALL.

3.5.1 Status Display - SHIFT 0

The 5250/5251 Status Screen is accessed by pressing SHIFT 0.

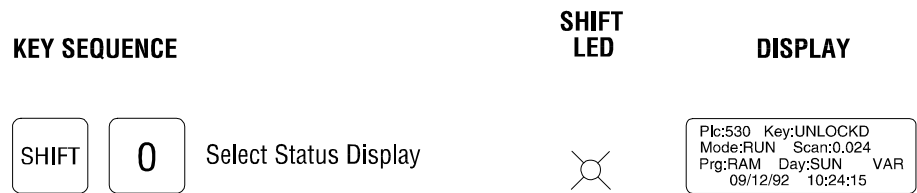


Figure 42 5250/5251 Status Screen

This Status Screen displays the following information:

- Line 1: PLC type and PLC keyswitch position.
- Line 2: PLC Mode and Scan Rate (in seconds)
- Line 3: Location of PLC program (RAM or ROM), Day of Week, and Fixed (FIXED) or Variable (VAR) Scan Rate
- Line 4: PLC Date (MM/DD/YY) and Time (HH:MM:SS)

3.5.2 Date/Time Set - SHIFT 1

The Access Module contains an internal Real Time Clock that can be set from the keypad. The RTC

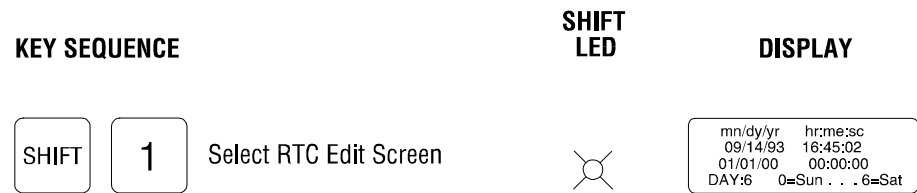


Figure 43 5250/5251 Real Time Clock Edit Screen

Date/T
ime
Edit
Screen
display
ed by
pressin
g
SHIFT
1.

Current Date and Time is displayed on Line 2. Cursor is positioned on Line 3 where new Date/Time is entered.

Validity checks are performed on data entry as follows:

Month: 01-12
Day of Month: 01-31
Year: 00-99
Hour: 00-23
Minute: 00-59
Second: 00-59
Day of Week: 0-6 (where 0=Sunday and 6=Saturday)

Press CLEAR key to erase the previous data entry and allow data to be re-entered. Press ENTER to accept new Date/Time as displayed.

3.5.3 Custom 4-Variable Screen - SHIFT 2

The Access Module permits the creation of a custom screen that displays up to four (4) different PLC memory locations at one time. Each variable is dynamically updated to show current value and can be edited as required. Any memory location can be selected, with the only restriction being that the variable must have a Tag Name assigned (via the TI5 Configuration Program) before it can be included.

Key operations used to create the Custom 4-Variable Screen:

- (1) From Main Menu, Press SHIFT 2 to enter Custom Screen Mode.
- (2) Press ENTER to select the line for variable display. Cursor is initially placed on Line 1, and each subsequent press of ENTER moves the cursor position down one line. One variable can be displayed on each line.
- (3) Press Variable Type key (X/Y, CR, TIMER/COUNTER, V, WX/WY, DRUMS) to select memory type. Use PRE/NEXT key to "scroll" through defined tags in that variable type.

Alternately, the PRE/NEXT key can be used exclusively to select a memory location. If variable type is not chosen, the NEXT key "scrolls" through tags in the following order. (The PRE function "scrolls" in reverse order):

Inputs (X)
Outputs (Y)
Control Relays (C)
Drums
Timers
Counters
V-Memory
Word Inputs (WX)
Outputs (WY)

- (4) Press READ to select tag and begin reading selected location.

The following keystroke sequence demonstrates the creation of a Custom Screen to display 4 different variables on one screen.

KEY SEQUENCE	SHIFT LED	DISPLAY
<div>SHIFT</div> <div>2</div> Select user defined screen		<div><input type="checkbox"/></div>
<div>PRE</div> <div>NEXT</div> Advance to the desired tag name		HEATER
<div>HELP</div> <div>READ</div> Read the state of the variable		HEATER OFF
<div>ENTER</div> Advance to the next line		<div>HEATER</div> <div><input type="checkbox"/></div> OFF
<div>PRE</div> <div>NEXT</div> Advance to the desired tag name		<div>HEATER</div> <div>CONVYR</div> OFF
<div>HELP</div> <div>READ</div> Read the state of the variable		<div>HEATER</div> <div>CONVYR</div> OFF MOVING
<div>ENTER</div> Advance to the next line		<div>HEATER</div> <div>CONVYR</div> <div><input type="checkbox"/></div> OFF MOVING
<div>PRE</div> <div>NEXT</div> Advance to the desired tag name		<div>HEATER</div> <div>CONVYR</div> <div>SPEED</div> OFF MOVING
<div>HELP</div> <div>READ</div> Read the state of the variable		<div>HEATER</div> <div>CONVYR</div> <div>SPEED</div> OFF MOVING 00036 IPS
<div>ENTER</div> Advance to the next line		<div>HEATER</div> <div>CONVYR</div> <div>SPEED</div> <div><input type="checkbox"/></div> OFF MOVING 00036 IPS
<div>PRE</div> <div>NEXT</div> Advance to the desired tag name		<div>HEATER</div> <div>CONVYR</div> <div>SPEED</div> <div>TEMP</div> OFF MOVING 00036 IPS
<div>HELP</div> <div>READ</div> Read the state of the variable		<div>HEATER</div> <div>CONVYR</div> <div>SPEED</div> <div>TEMP</div> OFF MOVING 00036 IPS 00062 DEG

Figure 44 Custom 4-Variable Screen Definition

Once defined, other screens can be called by pressing a Command key or Auxiliary Command while preserving the screen. The Custom Screen is recalled when the other screen is exited (by continually pressing CLEAR key or pressing SHIFT CLRALL unless "ALARM ACTIVE LED" is ON). Monitoring of the selected locations starts immediately when this screen is displayed.

The Custom 4-Variable Screen can be altered at any time to change variables selected for display. With Custom Screen displayed, press ENTER to move cursor to the line to be edited. Select desired tag (using Variable Type and PRE/NEXT keys) and press READ to begin monitoring this memory location. The original variable is restored if READ is pressed before a new tag is selected or ENTER is pressed (to move to new line). The new configuration is saved automatically.

KEY SEQUENCE	SHIFT LED	DISPLAY
ENTER		<div> <input type="checkbox"/> CONVYR MOVING SPEED 00036 IPS TEMP 00062 DEG </div>
ENTER		<div> HEATER OFF <input type="checkbox"/> SPEED 00036 IPS TEMP 00062 DEG </div>
ENTER		<div> HEATER OFF CONVYR MOVING <input type="checkbox"/> TEMP 00062 DEG </div>
SEE NOTE PRE NEXT		<div> HEATER OFF CONVYR MOVING TANK TEMP 00062 DEG </div>
HELP READ		<div> HEATER OFF CONVYR MOVING TANK 00200 GAL TEMP 00062 DEG </div>

Figure 45 *Editing Custom 4-Variable Screen*

The Custom Screen Mode can be exited and screen configuration lost by pressing SHIFT CLRALL. The operator is prompted to confirm the "Exit and Discard" command before it is executed. Pressing any key other than "1" in response to the "Enter 1 to delete" prompt restores the previous Custom Screen Definition. If one or more alarms are pending acknowledgement (indicated by "ALARM ACTIVE" LED being ON), pressing the SHIFT CLRALL keys display the Alarm Queue instead of exiting the Custom Screen Mode.

3.5.4 Download Configuration File - SHIFT 3

This function prepares the Access Module to accept a Configuration File download from an IBM-compatible PC running the CTI 5250/5251-TI5 Configuration Program. The "File Download" operation transfers the selected user configuration file to the Access Module and replaces any previously downloaded file.

The Download Configuration File function is initiated by pressing SHIFT 3. As the file transfer progresses, the screen is updated to indicate percent complete.

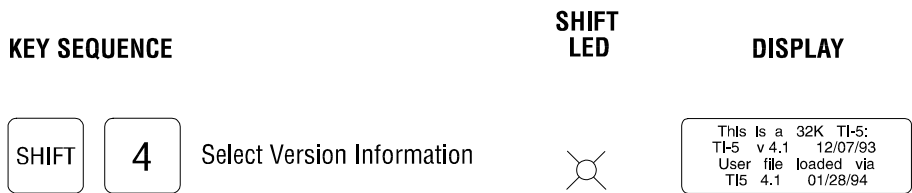


Figure 46 Configuration File Download

This function can be aborted by pressing SHIFT CLR ALL.

3.5.5 Version Information - SHIFT 4

The current hardware, firmware, and Configuration Program version in the Access Module is



displayed by pressing SHIFT 4.

Figure 47 5250/5251 Version Information

This screen displays the following information:

- Line 1: Access Module memory size
- Line 2: Firmware version and release date
- Lines 3-4: Configuration File version (available only if unit contains a downloaded user file).

3.5.6 Upload Configuration File - SHIFT 5

This function initiates a user configuration file transfer from the Access Module to an IBM-compatible PC running the CTI 5250/5251-TI5 Configuration Program. This "File Upload" operation can be used to recreate a configuration file on disk or compare a disk file against the configuration actually in operation. The configuration file in the Access Module is not destroyed by this function.

The Upload Configuration File function is initiated by pressing SHIFT 5. As the file transfer

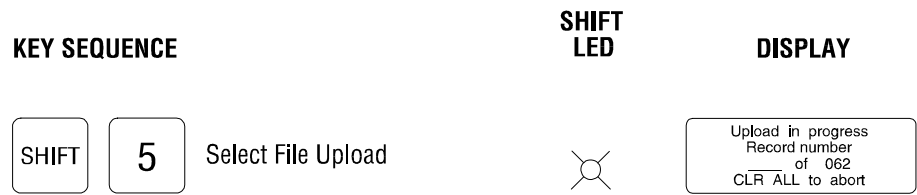


Figure 48 Configuration File Upload

progresses, the screen is updated to indicate percent complete.

This function can be aborted by pressing SHIFT CLRALL.

3.5.7 PLC Communication Baud Rate - SHIFT 6

This Auxiliary Command allows the baud rate used for communications between the Access Module and attached PLC to be changed. This function overrides the "default" baud rate set in the TI5 Configuration Program.

The Access Module can communicate at 9600 and 19200 baud. When the "PLC Communication Screen" is displayed, pressing "1" immediately toggles the baud rate to the new value. Press CLEAR to abort operation and maintain the current baud rate selection.

Note that altering baud rate requires set up modifications for the PLC Programming Port (or equivalent) as well as the Access Module. This operation affects the Access Module port only.



Figure 49 *PLC Communication Baud Rate Edit Screen*

3.5.8 VFD Screen Saver Setup - *SHIFT 7 (5251-TI5 only)*

The Model 5251-TI5 includes a screen-saving feature to extend the life and prevent "burn-in" of the Vacuum Fluorescent Display (VFD). This function specifies the time delay before the screen saver is activated provided no keypad input is detected.

The screen saver can be set to be enabled from 2 to 9 hours after the last keypad entry was made. If "0" is entered, the screen saver is disabled.

When the screen saver is active, the message "CTI 5251" scrolls across the display. The operator can press any key to return to the previous displayed screen.

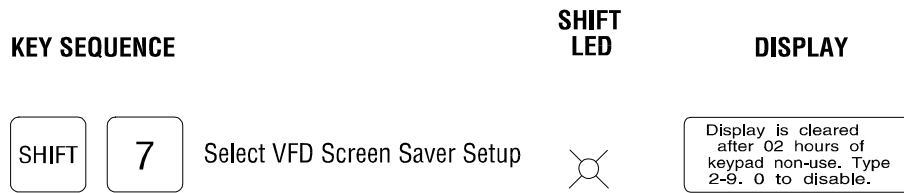


Figure 50 *VFD Screen Saver Setup*

3.6 Using the *HELP* Key

The Access Module includes a context-sensitive "Help" system to guide operators through the expected key entry sequence in order to display and edit PLC memory locations. The HELP key may be pressed at any time to display help information about the procedure currently being performed.

The following example shows how the HELP key may be used to obtain detailed information about a procedure. In this example, the operator is prompted for a password while editing a V-memory location. The operator then presses HELP for more information.

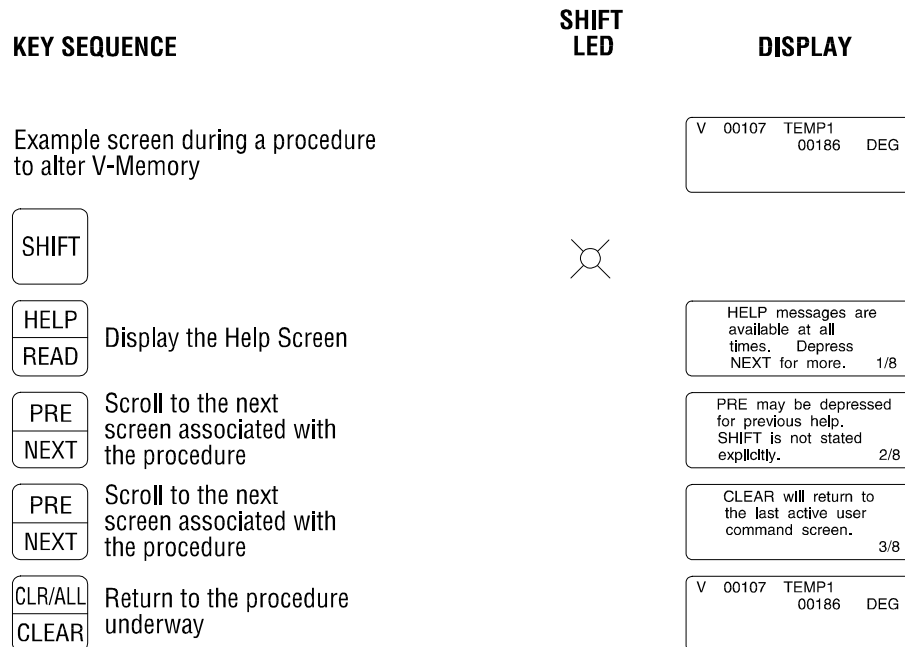


Figure 51 *Using HELP Function*

When a HELP screen is displayed, the "current" and "total" number of Help screens pertaining to this operation is displayed in the lower right corner. In this example, "1/8" indicates that the first of eight Help screens is displayed, while "2/8" indicates the second of eight Help screens. The next Help screen is displayed by pressing the NEXT key.

The HELP mode permits an operator to scroll through all of the Help messages using the PRE/NEXT key. The CLEAR key may be pressed at any time to exit from the Help mode and return to previous screen.

The Access Module continually monitors all PLC memory locations that are associated with an alarm condition as configured using the TI5 Configuration Program and downloaded into the unit. These PLC memory locations are read "in the background" and values compared against the alarm limits specified. The Access Module can read and evaluate approximately 50-60 PLC addresses for alarms each second. Alarms are reported as they occur as well as when they clear.

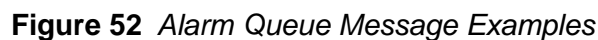
Add Alarm to Alarm Queue (Y or N):

A "(Y)es" response specifies the action as an **alarm**. This results in a message being added to the Alarm Queue. Optionally, a message can also be written to the operator display as determined by the response to the following prompt in the Configuration Program:

A "(N)o" response causes the standard alarm message to be added to the Alarm Queue and no message appears on the operator display. The "standard" alarm messages are formatted as follows. Examples are shown in Figure 52.

Standard Discrete Alarm Message:

	ALARM: Tagname
	AT Date, Time
	CONDITION: Value, Status



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The message added to the Alarm Queue consists of the "standard" alarm message with the user message appearing on Line 1 (in place of ALARM: *Tagname*). If a custom "Alarm Message" is not specified (left blank), the entire "standard" alarm message is added to the Alarm Queue.

An "(A)ll Lines" response allows an entirely custom message to be added to the Alarm Queue as well as written to the operator display. Alarm Messages for Lines 1-4 are specified as part of the alarm definition.

When the tag value is detected in alarm state, the custom message is written to the operator display. If any message lines are not customized (when no message is defined for that line), the information currently displayed on the "blank" lines is not overwritten. The custom message is also added to the Alarm Queue. The "standard" alarm message will appear in the Alarm Queue on lines where custom messages are not specified (left blank).

See Event Messaging (Section 3.8) and 5250/5251-TI5 Configuration Program "Help" system for details on specifying custom Alarm Messages.

When an alarm is detected, the "ALARM ACTIVE" LED is illuminated. This LED remains ON until all alarms have been acknowledged by an operator. The following procedure is used to view and acknowledge alarms in the Alarm Queue:

- (1) When "ALARM ACTIVE" LED is ON, Press SHIFT CLRALL to display the oldest pending (unacknowledged) alarm in the Alarm Queue. The Alarm Queue can not be displayed unless an alarm is pending.
- (2) Press CLEAR to acknowledge the displayed alarm. If this is the only alarm pending, the "ALARM ACTIVE" LED will extinguish. Pressing CLEAR again exits the Alarm Queue display and returns to the previous screen.
- (3) If other alarms are pending, the next oldest is displayed when the first is acknowledged (by pressing CLEAR). As alarms are acknowledged, the display continues to display newer alarms. When all alarms are acknowledged, the "ALARM ACTIVE" LED goes OFF.
- (4) The operator may view alarms without acknowledging them by entering the Alarm Queue and scrolling through the messages by pressing PRE/NEXT. Previously acknowledged alarms are marked with a "grave accent" character (`). As long as CLEAR key is not pressed, the alarms remain pending and the "ALARM ACTIVE" LED remains ON.
- (5) The Alarm Queue may be exited at any time by pressing SHIFT CLRALL. Any unacknowledged alarms remain "pending" and the "ALARM ACTIVE" LED stays ON. The oldest unacknowledged alarm is displayed when the operator re-enters the Alarm Queue.

3.8 Event Messaging

An Event Message is created as a result of a "special" alarm point that is NOT specified to be added to the Alarm Queue for operator acknowledgement. When detected, the "MESSAGE ACTIVE" LED is illuminated (instead of "ALARM ACTIVE" LED as done with normal alarms). The "MESSAGE ACTIVE" LED goes OFF when the operator clears the display by pressing the CLEAR key.

Event Messaging is used to provide operator prompts and process status based on PLC values. Custom Event Messages can be created to interrupt the entire data display or break through to overwrite only specific lines.

"MESSAGES" are user-defined text strings which are associated with event conditions. Messages are created as part of the alarm definition (in TI5 Configuration Program) and can be set to interrupt the data display and/or be transmitted out of the AUX Port to an attached printer or display whenever the associated event goes into alarm state or returns to normal status. The alarm definition specifies whether the data display is not interrupted, (A)ll lines of the display are interrupted, or only the (4)th line is overwritten.

If an event is detected where the interruption of All display lines has been selected, the messages defined as Alarm Message 1 thru Alarm Message 4 for that "Alarm" will overwrite existing information on the data display. If any of the Alarm Message 1-4 lines are left blank (so that no message is defined for the line), the information on the "blank" lines are not overwritten. For example, if "ALARM1" is defined so that All display lines should be interrupted, and messages are created for Line 1 and Line 3 only (Line 2 and Line 4 are left blank). When "ALARM1" occurs, existing text on Line 1 and Line 3 will be overwritten with the messages assigned in the alarm definition, but existing data on Line 2 and Line 4 is not overwritten.

If the interruption of (4)th line is selected, the alarm definition screen permits an "Alarm Message" and "Alarm Termination Message" to be specified. The "Alarm Message" overwrites the 4th line of the display when the corresponding tag value goes into alarm state. The "Alarm Termination Message" overwrites the 4th line when the tag value returns to normal. Either message can be left blank so that the display is not interrupted on the associated event.

Messages may be up to 20 characters in length. Messages can include all ASCII values between 01-7E Hex. Printable ASCII characters (20-7EH) are entered directly (ie, "1" or "A"). Control characters (01-1FH) are designated by "/" followed by the desired control character (ie, "/L" for Form Feed or "/M" for Carriage Return). Control characters are primarily used to send special character sequences to a printer or display attached to the AUX Port. A "slash" can be inserted into a message by entering "//".

It is possible to create a message without text that is not treated as a "blank" message (and overwrites that line on the display). This can be done by creating a message that consists only of a control character (such as "/P").

A message can contain one "embedded tag" that displays the tag value when that message appears on the 5250/5251 screen. This embedded tag value is dynamically updated as long as the message is displayed. Select <F2> to select a tag name when the message is created. Embedded tags are NOT dynamically updated in the following cases:

- (1) when included in a message that interrupts only the 4th line of the data display (as selected when "4" is entered in the "Interrupt Display" field while defining an ALARM)
- (2) when the message is transmitted out of the AUX Port (as selected when "Y" is entered in the "Transmit to AUX Port" field while defining a MESSAGE)

Asterisks (**) are included in place of the tag value in these cases.

Reference the HELP system in the Configuration Program for details on Messaging.

3.9 PLC Errors

The Access Module continually monitors the PLC status and reports errors when detected. The frequency that PLC errors are reported can be specified via the TI5 Configuration Program.

Appendix A contains a list of PLC Communications Errors detected and reported by the Access Module. These are reported as Error Numbers.

Appendix B is a list of both Fatal and Non-fatal PLC Errors. These errors are reported as text messages on the 4th line of the data display and transmitted out the AUX Port when detected. The initial error (since last Configuration File download), and most recent error are displayed.

Refer to the appropriate SIMATIC® manual to respond to PLC Communication and Fatal/Non-fatal Errors.

CHAPTER 4. TI5 CONFIG PROGRAM SETUP AND OPERATION

4.1 Configuration Program Description

The diskette enclosed with the Access Module contains special configuration software that allows true "customizing" for each application. The system designer can use the **TI5 Configuration Program** to assign tag names to PLC memory locations, adding a level of independent external intelligence to the PLC ladder logic program. Alarm conditions and event messages can then be "linked" to these tagged PLC addresses to provide continually monitoring and reporting of operational parameters.

In addition to tags and alarms, the Configuration Program allows a convenient method for selecting various levels of protection for PLC memory - including "Read Only" flags, Password protection, and specifying minimum and maximum limits for editing values. Complete file handling is provided within the program with functions for loading from disk, saving to disk, printing, download to module, and upload from module.

The 5250/5251-TI5 Configuration Program is provided on a 720K DSDD 3.5" diskette and consists of the following files:

5250-5.EXE	Program executable
5250-5.MSG	HELP Message file
5250-5.NDX	HELP Index file
5250READ.ME	Compatibility file (accessed from "Utilities" menu selection)

The Configuration Program includes a very informative "context-sensitive" HELP system that provides detailed description of operation and expected input at every cursor position. HELP is always available by pressing [F1] key.

Operation is very intuitive - just use the cursor keys to move the highlighted bar to an item and press [ENTER] to select. The "Help" selection on the MAIN MENU (displayed at program startup) provides a complete description of all menu items and features included in the current version.

4.2 Hardware Requirements

The Configuration Program will run on any IBM-PC, XT, AT, PS2, or IBM-compatible computer system running PC-DOS or MS-DOS v2.0 or higher. The computer must have a minimum of 512K of RAM, one serial port, and CGA, EGA, VGA, or Hercules monochrome display. Hard disk storage is not a requirement but is useful if multiple configuration files are generated and stored.

4.3 Program Installation

Recommended installation involves the following steps:

- (1) Insert the supplied diskette into the floppy drive and copy all files to a directory on your hard drive. If a hard drive is not available, the program can be started from the diskette.
- (2) Set Current Directory to the one where the files were copied.
- (3) Start program by typing "5250-5". For non-graphics monochrome monitors, enter "5250-5/M".

The MAIN MENU is displayed on program startup.

The Configuration Program operates on a Scrolling Light Bar Menu System. A menu selection can be made by using the LEFT/RIGHT arrow keys or pressing the first letter of the menu item. Press [ENTER] to select an item when highlighted.

Press [F1] at any time for HELP. The on-line HELP system includes a description of each prompt and expected input. The "Help" item in the MAIN MENU contains a detailed overview of the entire program and is recommended for those using this program for the first time.

On startup, three choices are valid:

- (1) Create a new file.
Select "Tags" on MAIN MENU and press [F1] for HELP in starting configuration.
- (2) Load an existing file.
Select "Load_File" from MAIN MENU.
- (3) Upload a file from Access Module.
Select "File_Transfer" from MAIN MENU.

4.4. Computer to Access Module Communications

The computer communicates with the Access Module to transfer custom configuration files to the module (download) and from the module (upload). These functions are located under the "File_Transfer" MAIN MENU selection.

A cable must be connected between a serial port (COM1, COM2, or COM3) on the computer and the Access Module PROGRAM Port. These cables may be purchased from CTI or constructed according to the following specifications:

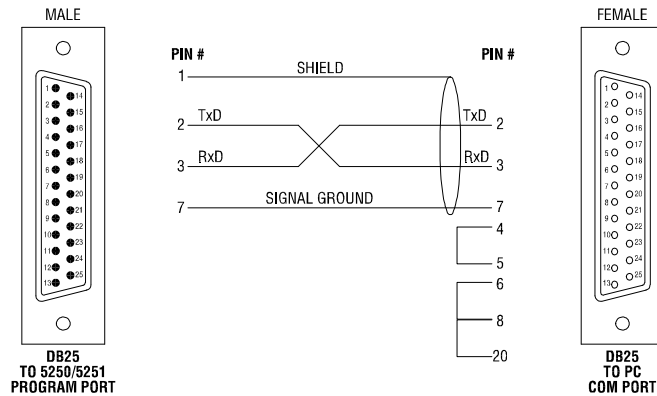


Figure 53 PC 25-Pin COM Port to Access Module

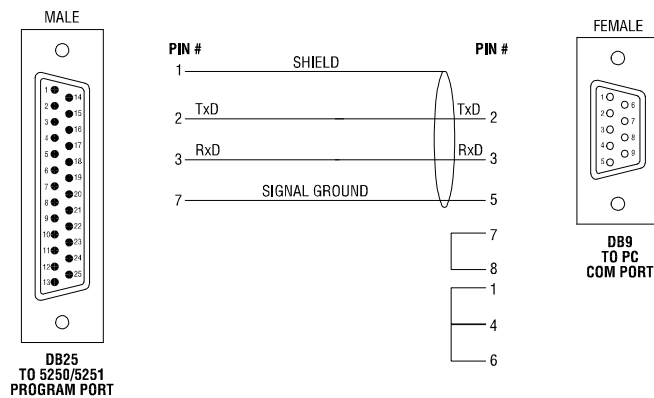


Figure 54 PC 9-Pin COM Port to Access Module

SPECIFICATIONS

Processor/Memory:

CPU: (5250-TI5) 80C32 @ 11 MHz
(5251-TI5) 80C32 @ 20 MHz
RAM: 32K Bytes

Power Requirements:

110/220V AC (switch selected)
35 ma nominal @ 110VAC
24VDC available by special request

Environmental:

Storage temperature: -40° to 80° C (-40° to 158°F)
Operating temperature: 0° to 60° C (32° to 140° F)
Humidity: 5% to 95% R.H. (non-condensing)
Front panel rating: NEMA 4
Fuse: 125mA 250V (Littlefuse #218.125 or equivalent)

Displays:

5250-TI5: 1" X 3" 80 character (4 Line X 20 Char) alphanumeric high temperature
backlit Supertwist LCD with wide viewing angle and contrast control.
5251-TI5: 80 character (4 Line X 20 Character) Vacuum Fluorescent Display (VFD)
with 5 mm x 3 mm character size and luminance control.

Diagnostic/Status: (4) LEDs indicating UNIT OK, SHIFT, ALARM ACTIVE, and
MESSAGE ACTIVE

Keypad:

Numeric Keys: 0 through 9
SHIFT: Selects Alternate key selection
DRUM-WX/WY: Selects Drum or (alt) Word In/Out variables
READ/HELP: Selects Read Mode or (alt) Help screen
CLEAR/CLR ALL: Clears last entry or (alt) Clears display
CR/SP: Selects Control Relays
(SP not used on Series 500/505 PLCs)
COUNT/TIMER: Selects Timers or Counters
NEXT/PRE: Scrolls through tag names, alarms, Help screens, and editable fields
X/Y: Selects Inputs or (alt) Outputs
V/STAGE: Selects V-Memory locations
(STAGE not used on Series 500/505 PLCs)
ENTER: Selects Edit Mode and enters data

Agency Approvals:

Recognized by UL and UL-Canada
Pending Approval: FM

APPENDIX A: COMMUNICATIONS ERROR CODES

The Access Module displays standard SIMATIC® Communication Error Codes. Refer to the proper SIMATIC® manual for additional information. These Error Codes should be very rare when using the 5250/5251-TI5. If any of these Error Codes do occur, contact CTI with information on the Error Code type and the system conditions when the Error Code occurred.

<u>CODES</u>	<u>ERROR DEFINITION</u>
01	Reset Current Transaction
02	Address Out of Range
03	Requested Data Not Found
04	Illegal Task Code Request
05	Request Exceeds Program Memory Size
06	Diagnostic Fail upon Power Up
07	Fatal Error Detected
08	Keylock Protect Error
09	Incorrect Amount of Data Sent with Request
0A	Illegal Request in Current Operational Mode
0B	Network was Not Deleted
0C	Attempted Write Operation did not Verify
0D	Illegal Number of ASCII Characters Received
0E	Illegal Write to Program Memory (Non-Volatile)
0F	Data Not Inserted
10	Data Not Written
11	Invalid Data Sent with the Command
12	Invalid Operation with NIM (obsolete)
13	Store and Forward Buffer Busy
14	No Response from the Special Function Module
15	Illegal Instruction Found in Program Memory
16	Attempted to Write to a Protected Variable
17	No Response from PC
18	Requested Memory Size Exceeds Total Memory
19	Requested Memory Size Incorrect Block Size
1A	Requested Memory Size Less than Minimum Value
1B	Requested Memory Size Larger than Max Value
1C	PLC Busy
1D	Communications Error in HOLD Mode
1E-20	Spare
21	I/O Configuration Error
22-3F	Spare
40-5F	Special Function/Loop Error
60-FF	Spare

APPENDIX B: PLC ERROR CODES

The following is a list of PLC Error Codes which may be reported by the Access Module. Refer to the appropriate SIMATIC® manual for corrective action if a PLC Error is detected.

NON-FATAL PLC ERRORS

- Scan Overrun
- I/O Base Failure
- Special Function Port Failure
- ACIA Port Communications Port Failure
- I/O Module Failure
- Over Temperature
- Too Many Special Function Modules
- I/O Table Does Not Match Installed Modules
- Board Marked Non-Fatal has Failed
- Untraceable Error Flag Set
- Battery Low

The Access Module constantly monitors the status of the PLC and reports any errors on the display screen according to the setup parameters for "PLC Error Reporting" in the Configuration Program (None, 1st Occurrence Only, Hourly).

FATAL PLC ERRORS

- Operating System RAM Parity Error
- Program RAM Parity Error
- Operating System Fatal Error
- Watchdog Timeout
- Dynamic Program Memory Diagnostic Error
- Illegal Op Code
- RAM Diagnostic Failure
- ROM Diagnostic Failure
- Scan Diagnostic Failure
- I/O Fatal Error
- Abnormal Power Loss
- Unidentified Failed Board Present (560/565 only)
- EPROM Card Detected Insufficient RAM to Download

APPENDIX C: OPERATION WITH REMOTE BASE CONTROLLERS

The Model 5250-TI5 and Model 5251-TI5 Access Modules may be attached to SIMATIC® Series 505 Remote Base Controllers that offer an RS-232 communications port. Configure the RS-232 serial port to 9600 baud or 19200 baud to match the "PLC Communications baud rate" setting on the module.

The Access Modules may be attached to SIMATIC® Series 500 Remote Base Controllers that offer an RS-232 communications port. Set the baud rate thumbwheel to match the module setting.

Use CTI Part# 5200-C232 cable with Remote Base Controllers equipped with 25-pin DB connectors.

Use CTI Part# 5250-CBAT cable with Remote Base Controllers equipped with 9-pin DB connectors.

LIMITED PRODUCT WARRANTY

CTI warrants that this CTI Industrial Product shall be free from defects in material and workmanship for a period of one (1) year after purchase from CTI or from an authorized CTI Industrial Distributor. This CTI Industrial Product will be newly manufactured from new and/or serviceable used parts which are equal to new in the Product.

Should this CTI Industrial Product fail to be free from defects in material and workmanship at any time during this one (1) year warranty period, CTI will repair or replace (at its option) parts or Products found to be defective and shipped prepaid by the customer to a designated CTI service location along with proof of purchase date and associated serial number. Repair parts and replacement Product furnished under this warranty will be on an exchange basis and will be either reconditioned or new. All exchanged parts or Products become the property of CTI. Should any Product or part returned to CTI hereunder be found by CTI to be without defect, CTI will return such Product or part to the customer.

This warranty does not include repair of damage to a part or the Product resulting from: failure to provide a suitable environment as specified in applicable Product specifications, or damage caused by an accident, disaster, acts of God, neglect, abuse, misuse, transportation, alterations, attachments, accessories, supplies, non-CTI parts, non-CTI repairs or activities, or to any damage whose proximate cause was utilities or utility like services, or faulty installation or maintenance done by someone other than CTI.

Control Technology Inc. reserves the right to make changes to the Product in order to improve reliability, function, or design in the pursuit of providing the best possible Product. CTI assumes no responsibility for indirect or consequential damages resulting from the use or application of this equipment.

THE WARRANTY SET FORTH ABOVE IN THIS ARTICLE IS THE ONLY WARRANTY CTI GRANTS AND IT IS IN LIEU OF ANY OTHER IMPLIED OR EXPRESSED GUARANTY OR WARRANTY ON CTI PRODUCTS, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE AND IS IN LIEU OF ALL OBLIGATIONS OR LIABILITY OF CTI FOR DAMAGES IN CONNECTION WITH LOSS, DELIVERY, USE OR PERFORMANCE OF CTI PRODUCTS OR INTERRUPTION OF BUSINESS, LOSS OF USE, REVENUE OR PROFIT. IN NO EVENT WILL CTI BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR CONSUMER PRODUCTS, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.

REPAIR POLICY

In the event that the Product should fail during or after the warranty period, a Return Material Authorization (RMA) number can be requested verbally or in writing from CTI main offices. Whether this equipment is in or out of warranty, a Purchase Order number provided to CTI when requesting the RMA number will aid in expediting the repair process. The RMA number that is issued and your Purchase Order number should be referenced on the returning equipment's shipping documentation. Additionally, if under warranty, proof of purchase date and serial number must accompany the returned equipment. The current repair and/or exchange rates can be obtained by contacting CTI's main office at 1-800-537-8398.

When returning any module to CTI, follow proper static control precautions. Keep the module away from polyethylene products, polystyrene products and all other static producing materials. Packing the module in its original conductive bag is the preferred way to control static problems during shipment. **Failure to observe static control precautions may void the warranty.** For additional information on static control precautions, contact CTI's main office at 1-800-537-8398.