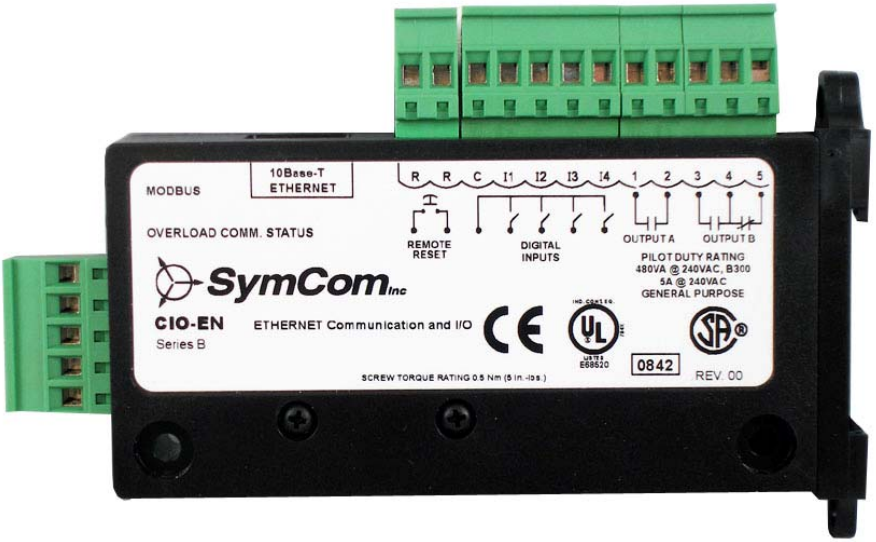
USING THE CIO-EN AND CIO-MB COMMUNICATION MODULES WITH STANDARD MODEL 777 OVERLOADS, RM-1000 REMOTE MONITORS, AND RM-2000 REMOTE MONITORS



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SECTION 1. DESCRIPTION

SymCom's CIO-EN and CIO-MB Communication Modules were designed to operate seamlessly with SymCom Model 777-P/P1 overload relays, adding RS-485 functionality to the 777-P/P1. With a few simple configuration changes, the CIO-EN or CIO-MB communications module will also operate with standard Model 777 overload relays. In addition, the CIO-MB or CIO-EN can be used to establish communication between standard Model 777 overload relays and SymCom's remote monitor displays -- the RM-1000 and the RM-2000.

NOTE: Because the CIO-EN and CIO-MB share the same relevant MODBUS registers, for the purpose of this document the two communications module models will be referred to collectively as CIO communications modules.

This document outlines the steps required to configure the CIO for use with a standard Model 777 overload relay. Section 2 describes configuring the CIO communications module to communicate with standard Model 777 overload relays. Section 3 contains information regarding using the CIO in conjunction with a SymCom Remote Monitor/Model 777 network.

SECTION 2. CONFIGURING THE CIO FOR USE WITH STANDARD MODEL 777 OVERLOAD RELAYS

The CIO can be configured using any MODBUS master. This section describes how to configure the CIO using a PC running SymCom's Solutions-M software Version 3.05. **These instructions are applicable for Solutions-M Version 3.05 or higher. Please contact SymCom of visit www.symcom.com for Solutions upgrade information.**

NOTE: Users wishing to configure the CIO-EN or CIO-MB using a different MODBUS Master device should refer to the appropriate CIO Programming Guide which contains the CIO's MODBUS memory map.

To configure the CIO using SymCom's Solutions, the device must be powered and connected to the PC using RS-485 (the CIO-EN can be connected using RS-485 or Ethernet). Refer to the appropriate CIO Installation Instructions to ensure that the device is connected correctly.

2.1. In SymCom's Solutions, add the appropriate CIO communications module to a network. (For more information about setting up a network in Solutions and adding devices, please see the Solutions Installation Guide.)

2.2. Once the CIO has been added, an icon for that device will appear on the screen. Click on that icon to load the **Device Properties** panel. This panel will appear on the right side of the Solutions screen. Using the drop down menus in the **Device Properties** panel, the **Real-time**, and **Setpoint** values can be viewed.

2.3. In the **Setpoint** section, change the CIO parameters as follows:

2.3.1. Verify that the **Network Communication Configuration Bits** are set correctly. In the **Device Parameters** menu, click on the **Network Communication Configuration Bits** parameter. A button icon will appear next to the parameter value. Click the button to configure the bits.

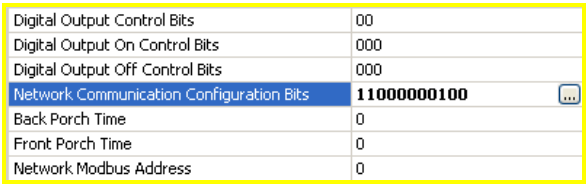

FIGURE 1: Click on the parameter to configure the settings

The window shown in FIGURE 2 will appear.

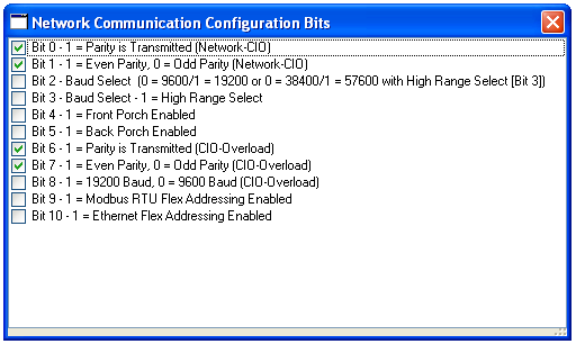

FIGURE 2: Network Communication Configuration Bits

Bits 0, 1, 2, and 3 are dependent on the network being implemented. Refer to Section 3 for information regarding the use of the CIO in conjunction with a Symcom Remote Monitor/Model 777 network.

Bits 4 and 5 are dependent on the application. These bits do not affect the CIO's ability to operate with a standard Model 777 overload relay.

Bits 6, 7, and 8 are dependent on the overload being used. For standard Model 777's, parity is transmitted (Bit 6 = 1), parity is even (Bit 7 = 1), and the baud rate is 9600 bps (Bit 8 = 0).

Bits 9 and 10 (if applicable) should be set to zero for standard 777 overload relays.

2.3.2. Set the **Fault Register Modbus Address**, the **Pending Fault Register Modbus Address** and the **Warning Status Register Modbus Address** to 75.

Limit Block 3 Number of Words	**30**
Limit Block 4 Start Address	**1**
Limit Block 4 Number of Words	**1**
Fault Register Modbus Address	**75**
Pending Fault Register Modbus Address	**75**
Warning Status Register Modbus Address	**75**
Command Line Register Modbus Address	**100**
Command Line - Start Command	**170**
Command Line - Stop Command	**221**

FIGURE 3: Configure Fault and Warning Status Register Addresses

NOTE: The **Pending Fault** and **Warning Status** functions do not work with standard Model 777 overload relays.

2.3.3. Set the **Real-Time Storage Block Configuration Bits** as shown below. Click on the **Real-Time Storage Block Configuration** parameter in the **Device Properties** menu. A button icon will appear. Click on the button to open the window shown below.

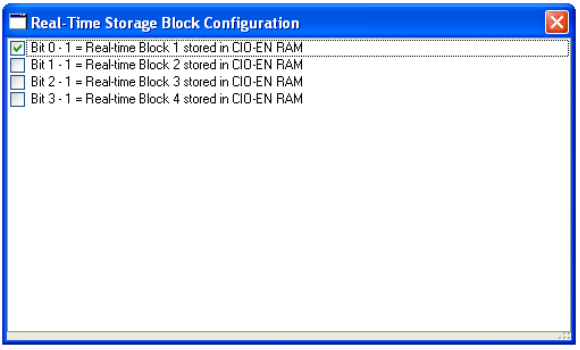

FIGURE 4: Real-Time Storage Block Configuration Bits

2.3.4. Set the **Real-Time Block 1 Start Address** to 43. Set the **Real-Time Block 1 Number of Words** to 23.

Logic Block Mask B CMB	**0000**
Overload Modbus Address	**1**
Real-Time Storage Block Configuration	**0001**
Real-Time Block 1 Start Address	**43**
Real-Time Block 1 Number of Words	**23**
Real-Time Block 2 Start Address	**1**
Real-Time Block 2 Number of Words	**1**
Real-Time Block 3 Start Address	**1**

FIGURE 5: Real-time Block 1 Addressing and Number of Words

2.3.5. Set the **Limit Storage Block Configuration Bits** as shown below. Click on the **Limit Storage Block Configuration** parameter in the **Device Properties** menu. A button icon will appear. Click on the button to open the window shown below.

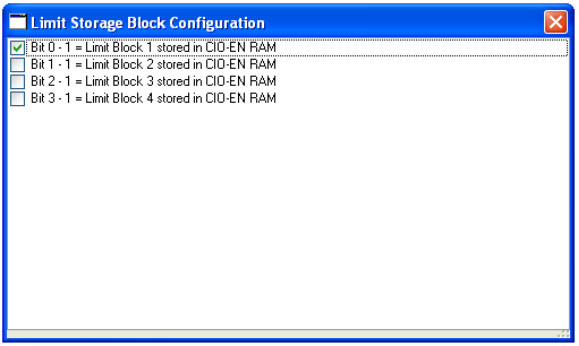

FIGURE 6: Limit Storage Block Configuration Bits

2.3.6. Set the **Limit Block 1 Start Address** to 210. Set the **Limit Block 1 Number of Words** to 23.

Real-Time Block 4 Start Address	**1**
Real-Time Block 4 Number of Words	**1**
Limit Storage Block Configuration	**0001**
Limit Block 1 Start Address	**210**
Limit Block 1 Number of Words	**23**
Limit Block 2 Start Address	**132**
Limit Block 2 Number of Words	**30**
Limit Block 3 Start Address	**162**

FIGURE 7: Limit Storage Block 1 Addressing and Number of Words

2.3.7. Finally, set the **Overload Modbus Address** to the address of the Model 777 overload relay being used. (i.e. if the Model 777 overload relay address is A01, set the **Overload Modbus Address** to 1)

Logic Block Mask B NAND	**00000**
Logic Block Mask A CMB	**0000**
Logic Block Mask B CMB	**0000**
Overload Modbus Address	**1**
Real-Time Storage Block Configuration	**0001**
Real-Time Block 1 Start Address	**43**
Real-Time Block 1 Number of Words	**23**

FIGURE 8: Set the Model 777 Overload Modbus Address

If the CIO being configured is connected to a powered Model 777, overload data should appear in the Real-time section of the Device Properties listing in Solutions as shown below in Figure 8.

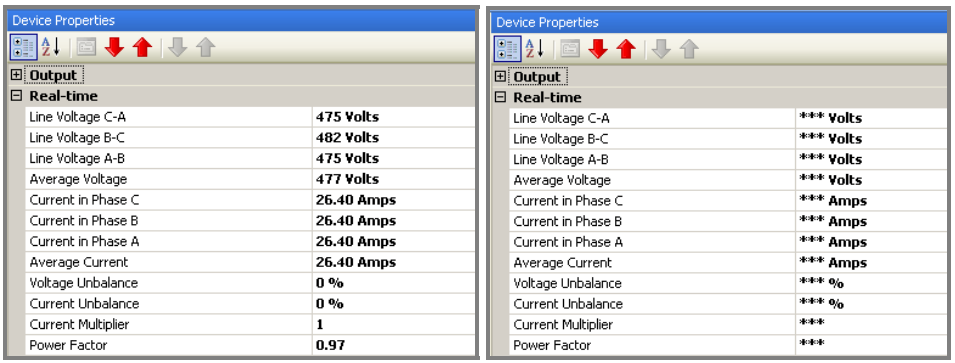

FIGURE 9: Real-time Data Screen With and Without Communication

The CIO is now configured to operate with the standard Model 777 overload relay to which it was addressed.

SECTION 3. USING THE CIO-EN OR CIO-MB TO INTERFACE THE MODEL 777 WITH A SYMCOM REMOTE MONITOR (RM-1000 OR RM-2000)

SymCom's RM-1000 and RM-2000 remote monitoring devices can be used to monitor and/or control SymCom's Model 777 overload relay via an RS-485 Modbus network. Once properly configured (see Sections 2 and 3), SymCom's CIO module can be used to communicate between a Model 777 and a SymCom remote monitor.

To interface a Model 777 to a SymCom remote monitor using the CIO, the Network Baud Rates for the remote monitor and the CIO must be the same. The default Network Baud Rate for both the RM-1000 and the RM-2000 is 9600 bps, while the default rate for the CIO is 19200 bps. Either network baud rate can be used as long as the same is used for the CIO and the remote monitor. Instructions for adjusting the baud rates for the RM-1000, the RM-2000, and the CIO are outlined below.

3.1. To change the Baud Rate for an RM-1000

3.1.1. Press 'MODE' to get to the 'MAIN MENU'.

3.1.2. Use the 'SCROLL' keys to select '4_SETUP MENU'.

3.1.3. Press 'ENTER'.

NOTE: The 'MODE' key can be used to switch to the previous mode or menu. It can be thought of as a *previous*, *escape* or *back* button.

3.1.4. Use the 'SCROLL' keys to select '43_Comm Settings'.

3.1.5. Press 'ENTER'.

3.1.6. Use the 'SCROLL' keys to select '431_Slave Comm'. Press 'ENTER'. This screen will show the current communication configuration. The default is '9600, E, 1, >=Std<'. If the current communication configuration is satisfactory, proceed to Step 3.1.12.

3.1.7. To apply custom settings, press the 'SCROLL' keys until the display reads 'Custom >?Cst<'.

3.1.8. Press 'ENTER'.

3.1.9. Use the 'SCROLL' keys to view the settings for Slave Baud, Slave Parity, and Slave Stop.

3.1.10. To configure a parameter, press 'ENTER', then use the 'SCROLL' keys to view the available settings for each parameter.

3.1.11. Press 'ENTER' to select the desired setting.

3.1.12. Use the 'MODE' key to exit the current mode and return the RM-1000 to the 'MAIN MENU'.

3.1.13. Use the 'SCROLL' keys to Select '1_REAL TIME' mode. Press 'ENTER'.

3.1.14. Verify that communication has been established by referring to Section 3.4. If a Model 777 overload relay has been added to the RM-1000 network and communications are configured correctly for each device, overload data should appear in the RM-1000 Real Time Section. It may be necessary to use the 'ADDRESS' keys to scroll to the correct Model 777 address. Use the 'SCROLL' keys to view the data.

NOTE: Refer to the RM-1000 User's Manual for information on adding Model 777 overload relays to the RM-1000 network. As many as 16 overloads can be monitored simultaneously with the RM-1000, although only data from one overload is displayed at a time. Each overload must be given its own address, and the RM-1000 must be put into '45_Learn Network' mode to find all of the attached Model 777 overload relays.

3.2. To change the Baud Rate for an RM-2000

3.2.1. Use the 'MODE' key to select 'SETUP' and 'CHANGE SETUP' mode. (both the 'SETUP' and 'CHANGE SETUP' LEDs must be lit.)

3.2.2. Scroll to the 'NETWORK BAUD' screen.

3.2.3. Use the up and down arrow keys to select the desired baud rate.

3.2.4. Press 'ENTER'.

3.2.5. Return the RM-2000 to 'REAL TIME' using the 'MODE' key.

3.2.6. Verify that communication has been established by referring to Section 3.4.

3.3. To change the Network Baud Rate for the CIO

3.3.1. Using SymCom's Solutions, verify that the **Network Communication Configuration Bits** are set correctly.

3.3.1.1. For communication with the RM-2000, Bits 0 and 1 must be set to 1.

3.3.1.2. To select **9600** bps, set Bits 2 and 3 to 0.

3.3.1.3. To select **19200** bps, set Bit 2 to 1, Bit 3 to 0.

NOTE: The **Network Baud Rate** for the CIO must match the network baud rate of the MODBUS device it is being connected to- in this example, a remote monitor. However, the **CIO-Overload Baud Rate** must be set

for use with the Model 777 overload relay (9600 bps). Therefore, only Bits 1 – 3 should be adjusted to configure the device for communication with a remote monitor. Bits 4 – 10 do not affect the **Network Baud Rate**, and should be configured according to Step 2.3.1 for use with a 777 overload relay.

3.3.2. Verify that communication has been established by referring to Section 3.4.

3.4. Information regarding SymCom Remote Monitor/Model 777 Overload Relay Communication

The communication status can be verified from both the CIO and the remote monitoring device (RM-1000 or RM-2000).

3.4.1. Verifying Communication Status from the RM-1000

If communication with the Model 777 is not established or is lost during operation, the '1_REAL TIME' mode screens will contain asterisks rather than Model 777 information. If communication between the Model 777 and the RM-1000 is established using the CIO, Model 777 data will appear in the RM-1000 '1_REAL TIME' mode screens rather than asterisks.

3.4.2. Verifying Communication Status from the RM-2000

If communication with the Model 777 is not established or is lost during operation, the green 'COMM STATUS' LED on the RM-2000 will not be lit and the 'REAL TIME' mode screens will contain asterisks. For example, the screen showing 3-phase voltages and average voltages will look like:

V 1 2 =	*	V 2 3 =	*
V 3 1 =	*	V A V =	*

FIGURE 10: RM-2000 Screen Indicating No Communication

If communication between the Model 777 and the RM-2000 is established using the CIO, Model 777 data will appear in the RM-2000 'REAL TIME' mode screens rather than asterisks.

3.4.3. CIO Status indicators

The Module Network Status (**MNS**) LED on the CIO indicates whether the CIO is communicating with the MODBUS device to which it is connected. (In this example, either an RM-1000 or RM-2000 remote monitor.) The following table describes the various MNS LED states.

TABLE 1: MNS LED State Table

For this state:	LED is:	To indicate:
Not Powered	Off	The CIO is not powered.
Upstream Modbus/RTU Comm. Operational	Green	The CIO is communicating with an upstream Modbus/RTU device and the CIO is powered.
Upstream Modbus/RTU Comm. NOT Operational	Flashing Green	The CIO is powered but upstream communications are not established.

The Overload Communication Status (**OLC**) LED on the CIO indicates whether the CIO is communicating with the Model 777 overload relay to which it is connected. The following table describes the various OLC LED states.

TABLE 2: OLC LED State Table

For this state:	LED is:	To Indicate:
Not Powered	Off	The CIO is not powered.
Overload Comm. Operational	Green	The CIO is communicating with an overload device and the CIO is powered.
Overload Comm. NOT Operational	Flashing Green	The CIO is powered but overload communications are not established.

For additional support, please contact SymCom's technical support group at (800) 843-8848 or technicalsupport@symcom.com.