2000-SS06

2000-SoftScreen/ Allen-Bradley Data Highway Interface

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XYCOM
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B.1 INTRODUCTION

This section describes the functional definition of the SoftScreen to Allen-Bradley Data Highway interface. The interface to Data Highway is through a 1770-KF2, 1771-KG, or 1785-KE communication controller module (see Figures B-1 through B-3).

The specific communications commands (transparent to the user) required to allow the terminal to sit on the Highway and read and write data are listed below:

- Unprotected Write
- Unprotected Bit Write
- Unprotected Read

The user interface allows the user to monitor or change the areas of the PLC data table via the SoftScreen software menus. The user accesses the data table by specifying an address in the table. The data table area contains the values of timer/counter actual and preset values, and an image of the I/O tables. The target PLC device can be PLC2 series, PLC3, or PLC5.

To access PLC3 and PLC5 devices you must first allocate an integer file in the PLC with a number that corresponds to the station number of the 1770-KF2 module. This is the only file in the PLC3 or PLC5 that can be read by the terminal.

B.1.1 Serial Port Configuration

Data Highway connects to SoftScreen's primary serial port via RS-232C. (The secondary serial port is used for uploading or downloading from the development system or multidrop network.) Make sure the jumpers on the 2000-SoftScreen Workstation are set to RS-232C as shown in Table 2-1 on page 2-5.

> **NOTE**
> Make sure the port you use is the same one specified in your SoftScreen software under Configuration-Ports.

B.1.2 **Electrical Interface**

There are two distinct ways to connect to the PLCs. The first is network configuration, in which all PLCs are networked on Data Highway. The second is stand alone, which is a one to one link between the PLC and SoftScreen via RS-232C. A direct connect via a network configuration requires the 2000-SoftScreen Workstation's serial port to be wired serially to a 1770-KF2 Communication Controller Module (see Figure B-1 below). A direct connect via stand alone requires the SoftScreen Workstation's serial port to be wired serially to a 1771-KGA, 1771-KGB, or 1785-KE Communication Controller Module (see Figure B-2 on the following page).

On the next pages, Figure B-3 shows the stand-alone configurations, while Figure B-4 shows the network configuration.

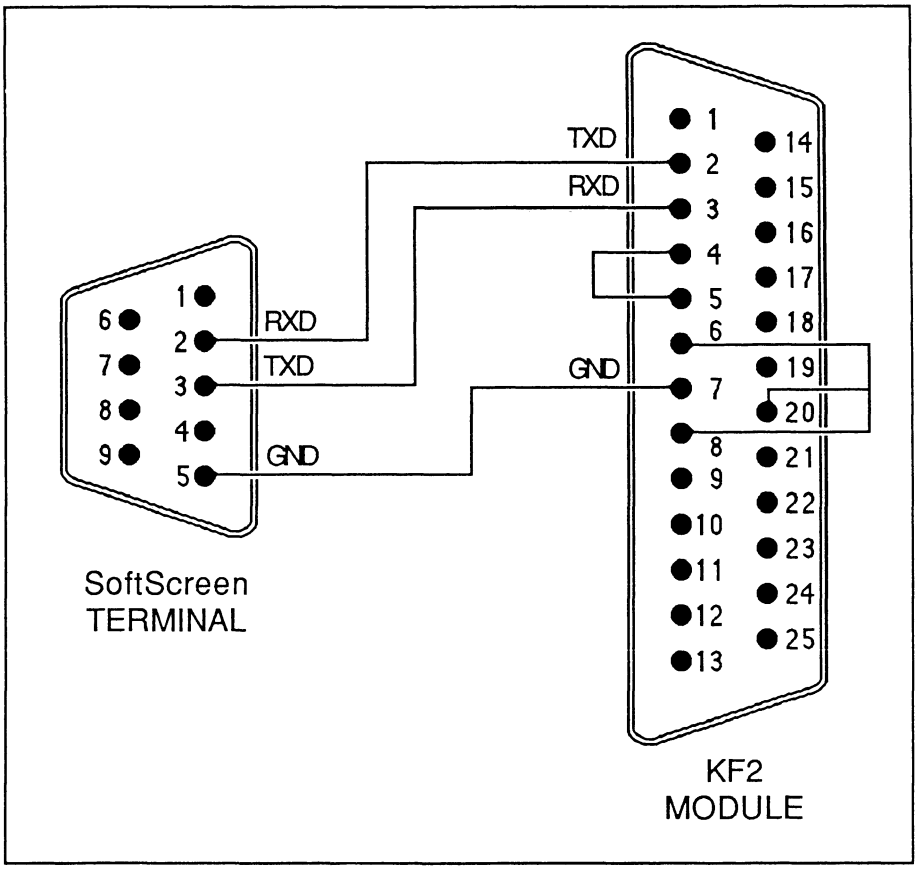

Figure B-1. Cabling to the 1770-KF2

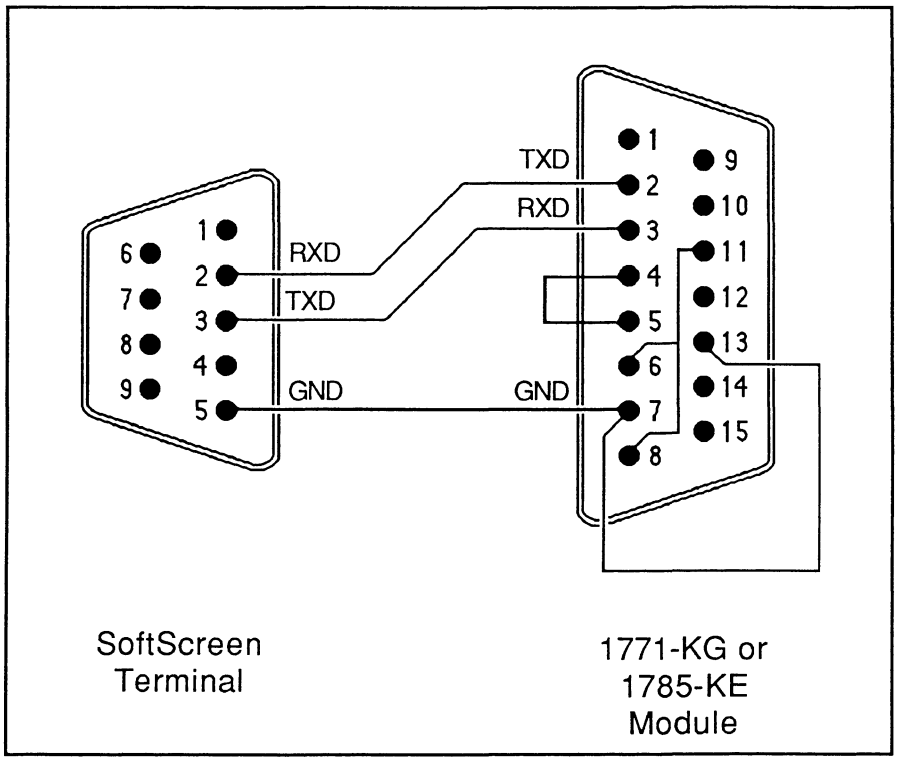

Figure B-2. Cabling to the 1771-KG or 1785-KE

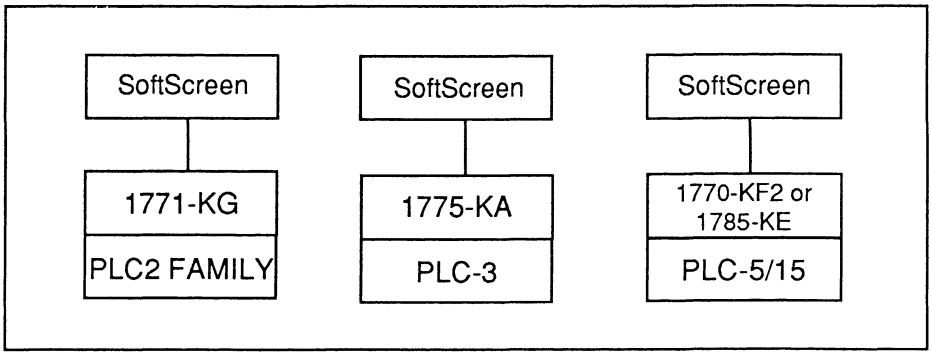

Figure B-3. Allen-Bradley Stand Alone Configuration
(Non-Data Highway, RS-232C Only)

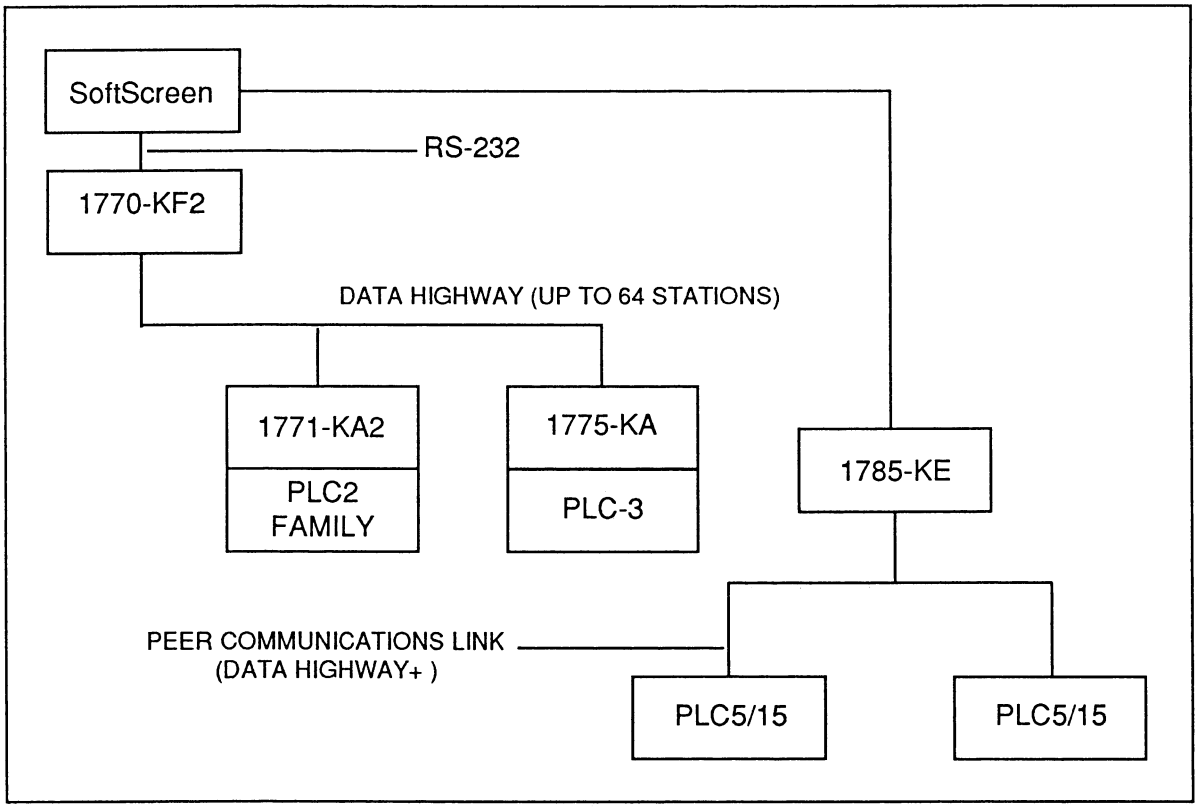

Figure B-4. Allen-Bradley Network Configurations

B.1.3 **Allen-Bradley Data Highway Addressing**

The address expressions specific to the Allen-Bradley Data Highway interface are shown in the table below:

Table B-1. Allen-Bradley Data Highway Addressing

Device	**PLC Address**	**Number Type**	**Size**	**R/W**
All	0-177777	Octal	Word	R/W

For example, if the expression **[PLC1:70 3]** is entered in the development system software for a data display object, the 2000 engine will read and display the value in PLC1, word 70, bit 3.

For more information on expression value formats, see Appendix A of your SoftScreen Development System Manual.

2000-SS07

2000-SoftScreen/ Modicon MODBUS Interface

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Part Number: ***97668-007A***

B.1 INTRODUCTION

This section describes the functional definition of the 2000-SoftScreen to MODBUS interface. The interface to MODBUS is through any MODBUS port on a MODICON programmable controller. The purpose of the MODBUS interface is to access and/or modify registers and coils of the target programmable controller from a Xycom SoftScreen Workstation engine. Thus, the user is able to monitor registers, output coils, and discrete inputs and to change registers via the SoftScreen software menus. SoftScreen supports both MODBUS RTU and MODBUS ASCII protocols.

B.1.1 Serial Port Configuration

Modicon MODBUS connects to the SoftScreen Workstation's primary serial port via RS-232C. (The secondary serial port is used for uploading or downloading from the development system or multidrop network.) Make sure the jumpers on the 2000-SoftScreen Workstation are set to RS-232C as shown in Table 2-1 on page 2-5.

> **NOTE**
> Make sure the port you use is the same one specified in the SoftScreen software under Configuration-Ports.

B.1.2 **Electrical Interface**

The electrical interface for the MODBUS interface is asynchronous RS-232C. Figure B-1 shows the cabling between the 2000-SoftScreen Workstation and the MODBUS 584, and Figures B-2 and B-3 show cabling to the MODBUS 984 via 9 and 25 pin connectors, respectively.

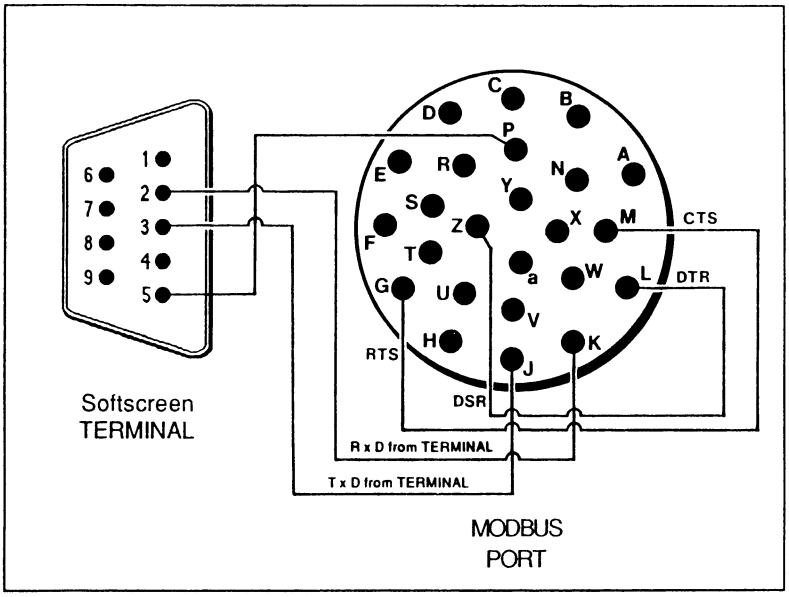

Figure B-1. Cabling to the MODBUS 584

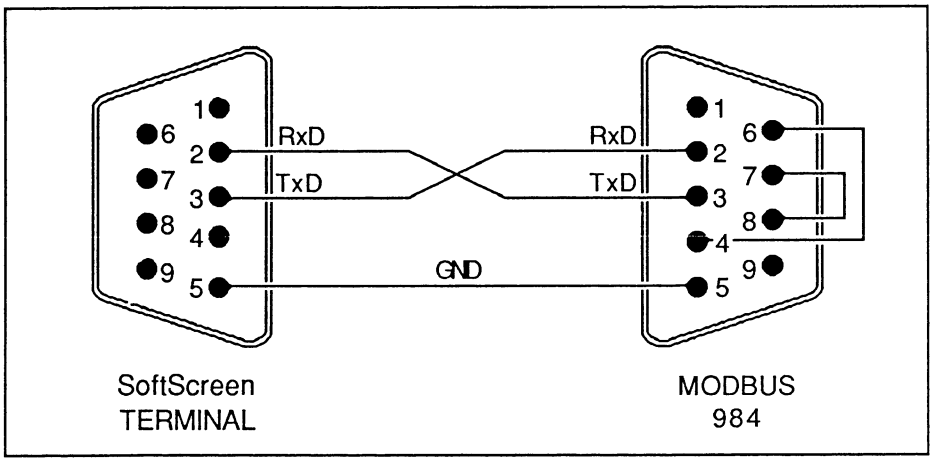

Figure B-2. Cabling to the MODBUS 984, 9-pin

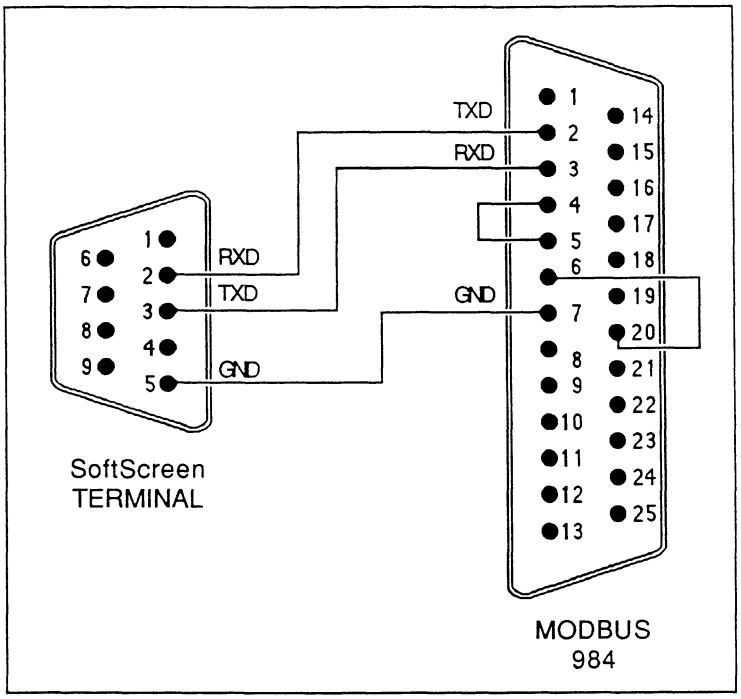

Figure B-3. Cabling to the MODBUS 984, 25-pin

Figure B-4 shows the network configuration for the MODBUS interface.

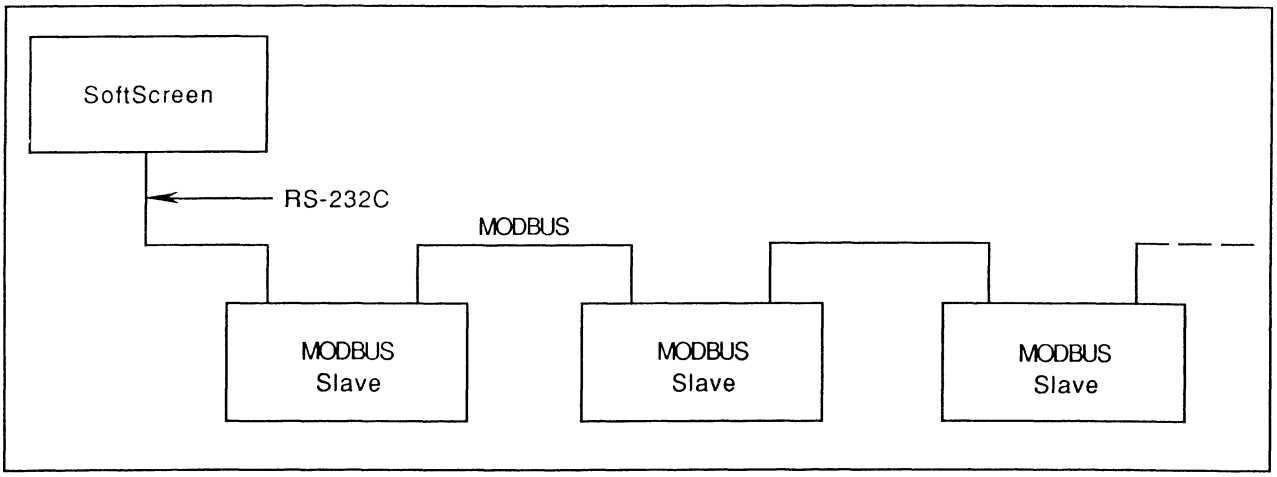

Figure B-4. Modbus Network Configuration

B.1.3 Modicon MODBUS Addressing

The address expression formats specific to the various MODBUS PLC interfaces are shown in the tables below:

Table B-1. MODBUS 384 and 484 Addressing

Device	PLC Address	Number Type	Size	R/W
Coil status	0-999	Decimal	Bit	R
Input status	1000-1999	Decimal	Bit	R
Holding register	4000-4999	Decimal	Word	R/W
Input register	3000-3999	Decimal	Word	R

Table B-2. MODBUS 584 and 984 Addressing

Device	PLC Address	Number Type	Size	R/W
Coil status	0-9999	Decimal	Bit	R
Input status	10000-19999	Decimal	Bit	R
Holding register	40000-49999	Decimal	Word	R/W
Input register	30000-39999	Decimal	Word	R

Expressions follow the same format whether they are used in data display objects, data entry objects, or recipe values. For example, if the expression **[PLC1:40001, SB]** is entered in the development system software for a data display object, the 2000 engine will read and display the value in signed binary of PLC1, word 40001.

For more information on expression value formats, see Appendix A of your SoftScreen Development System Manual.

2000-SS08

2000-SoftScreen/ Texas Instruments 500/505 Interface

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B.1 INTRODUCTION

This section describes the functional definition of the SoftScreen to Texas Instruments Series 500/505 interface. The interface to the TI PLC is through the PLC's programming port.

The purpose of the Texas Instruments driver is to access and/or modify memory, drum variables, and time/counter variables of the target programmable controller from a Xycom 2000-SoftScreen Workstation.

B.1.1 Serial Port Configuration

The Texas Instruments 500/505 PLC connects to the SoftScreen Workstation's primary serial port via either RS-422 or RS-232C. (The secondary serial port is used for uploading or downloading from the development system or multidrop network.) Make sure the jumpers on the 2000-SoftScreen Workstation are set appropriately as shown in Tables 2-1 and 2-2 on page 2-5.

> **NOTE**
> Make sure the port you use is the same one specified in the SoftScreen software under Configuration-Ports.

B.1.2 **Electrical Interface**

The Texas Instruments Series 500/505 PLC connects to the 2000-SoftScreen Workstation through RS-422 or RS-232C. Figure B-1 shows the necessary cabling between the 2000-SoftScreen Workstation and the TI PLC for RS-422, while Figures B-2 and B-3 on the following page show the connections for RS-232C.

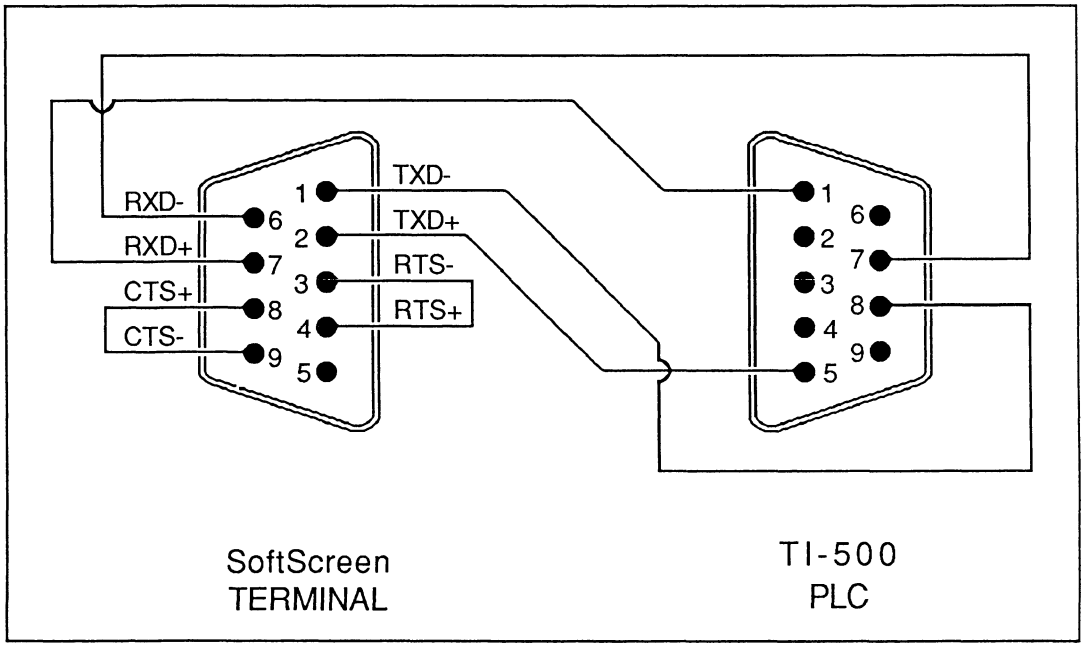

Figure B-1. Cabling to the TI Series 500/505 via RS-422

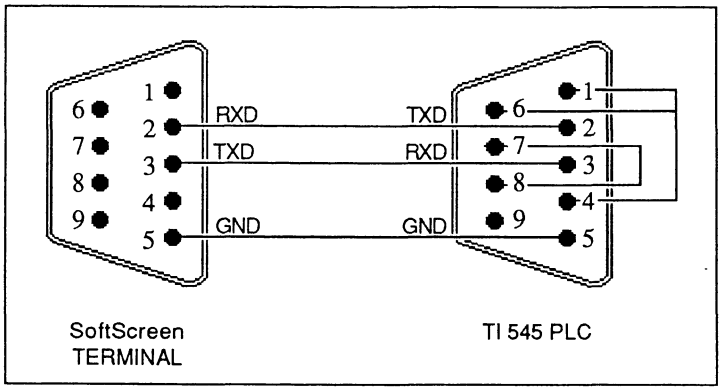

Figure B-2. Cabling to the TI 500/505 via RS-232C, 9-pin

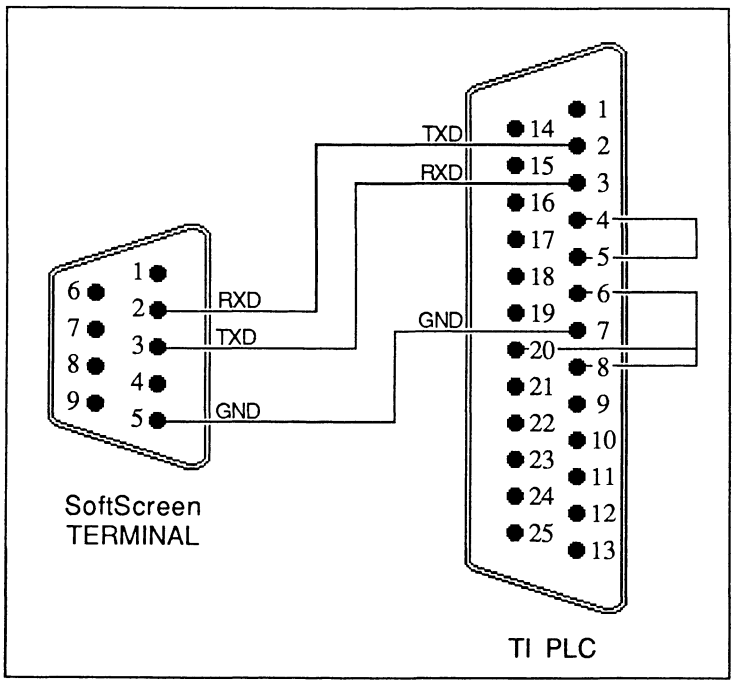

Figure B-3. Cabling to the TI 500/505 via RS-232C, 25-pin

B.1.3 TI-500/505 Addressing

The address expression formats specific to the TI-500/505 PLC interfaces are shown below: All addresses are decimal and have a starting address of 1.

Table B-1. TI 500/505 Addressing

Device	PLC Address*	Size	R/W
Input	X0001-X65535	Bit	R/W
Output	Y0001-Y65535	Bit	R
Internal coil	C0001-C65535	Bit	R/W
Variable	V0001-V65535	Word	R/W
Constant	K0001-K65535	Word	R/W
Word input	WX001-WX65535	Word	R/W
Word output	WY001-WY65535	Word	R
Drum step current	DSC01-DSC65535	Word	R/W
Drum step preset	DSP01-DSP65535	Word	R/W
Status word	STW01-STW65535	Word	R
Timer/counter preset	TCP01-TCP65535	Word	R/W
Timer/counter current	TCC01-TCC65535	Word	R/W
Analog alarm acknowledge	AACK1-AACK65535	Word	R/W
Analog alarm deadband	AADB1-AADB65535	Floating point	R/W
Most significant word of analog alarm C-flags	ACFH1-ACFH65535	Word	R/W
Least significant word of analog alarm C-flags	ACFL1-ACFL65535	Word	R/W
Analog alarm error	AERR1-AERR65535	Floating point	R/W
Analog alarm high alarm limit	AHA1-AHA65535	Floating point	R/W
Analog alarm high-high alarm limit	AHHA1-AHHA65535	Floating point	R/W
Analog alarm low alarm limit	ALA1-ALA65535	Floating point	R/W
Analog alarm low-low alarm limit	ALLA1-ALLA65535	Floating point	R/W
Analog alarm orange deviation alarm limit	AODA1-AODA65535	Floating point	R/W
Analog alarm process variable	APV1-APV65535	Floating point	R/W
Analog alarm process variable high limit	APVH1-APVH65535	Floating point	R/W
Analog alarm process variable low limit	APVL1-APVL65535	Floating point	R/W
Analog alarm rate of change alarm limit	ARCA1-ARCA65535	Floating point	R/W
Analog alarm set point	ASP1-APS65535	Floating point	R/W
Analog alarm set point high limit	ASPH1-ASPH65535	Floating point	R/W
Analog alarm set point low limit	ASPL1-ASPL65535	Floating point	R/W
Analog alarm sample rate	ATS1-ATS65535	Floating point	R/W
Analog alarm flags	AVF1-AVF65535	Word	R/W
Analog alarm yellow deviation alarm limit	AYDA1-AYDA65535	Floating point	R/W

Table B-1. TI 500/505 Addressing (Continued)

Device	PLC Address*	Size	R/W
Constant	K1-K65535	Word	R/W
Loop alarm acknowledge	LACK1-LACK65535	Word	R/W
Loop alarm deadband	LADB1-LADB65535	Floating point	R/W
Most significant word of loop C-flags	LCFH1-LCFH65535	Word	R/W
Least significant word of loop C-flags	LCFL1-LCFL65535	Word	R/W
Loop error	LERR1-LERR65535	Floating point	R/W
Loop high alarm limit	LHA1-LHA65535	Floating point	R/W
Loop high-high alarm limit	LHHA1-LHHA65535	Floating point	R/W
Loop gain	LKC1-LKC65535	Floating point	R/W
Loop derivative gain limiting coefficient	LKD1-LKD65535	Floating point	R/W
Loop low alarm limit	LLA1-LLA65535	Floating point	R/W
Loop low-low alarm limit	LLLA1-LLLA65535	Floating point	R/W
Loop output	LMN1-LMN65535	Floating point	R/W
Loop bias	LMX1-LMX65535	Floating point	R/W
Loop orange deviation alarm limit	LODA1-LODA65535	Floating point	R/W
Loop process variable	LPV1-LPV65535	Floating point	R/W
Loop process variable high limit	LPVH1-LPVH65535	Floating point	R/W
Loop process variable low limit	LPVL1-LPVL65535	Floating point	R/W
Loop rate of change alarm limit	LRCA1-LRCA65535	Floating point	R/W
Loop ramp/soak flags	LRSF1-LRSF65535	Word	R/W
Loop ramp/soak step number	LRSN1-LRSN65535	Word	R/W
Loop set point	LSP1-LSP65535	Floating point	R/W
Loop set point high limit	LSPH1-LSPH65535	Floating point	R/W
Loop set point low limit	LSPL1-LSPL65535	Floating point	R/W
Loop rate	LTD1-LTD65535	Floating point	R/W
Loop reset	LTI1-LTI65535	Floating point	R/W
Loop sample rate	LTS1-LTS65535	Floating point	R/W
Loop V-flags	LVF1-LVF65535	Word	R/W
Loop yellow deviation limit	LYDA1-LYDA65535	Floating point	R/W

***NOTE**
PLC address numbers are for reference only. Check your PLC documentation for memory size limits.

Expressions follow the same format whether they are used in data display objects, data entry objects, or recipe values. For example, if the expression **[PLC0:WX10 3]** is entered in the development system software for a data display object, the 2000 engine will read and display the value in PLC0, word WX10, bit 3.

For more information on expression value formats, see Appendix A of your SoftScreen Development System Manual.

NOTE

SoftScreen and the TI Series 500 PLC store floating point data types in different formats. SoftScreen uses a fixed-point format in which more than 9 significant digits can be displayed, whereas the TI PLC uses IEEE single floating point format in which only 7 significant digits can be displayed. For example, the 8-digit value 1234.5678 can be displayed in SoftScreen, but a digit will be lost when the value is sent to and stored in the PLC. When the value is read back, it may be displayed as 1234.5677 or 1234.5679.

NOTE

If you do not specify floating point format in your exporessions for floating point registers, SoftScreen will automatically assign floating point format, regardless of the default PLC format setting.

2000-SS10

2000-SoftScreen
Square D

P/N 97668-010A

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Part Number: ***97668-010A***

B.1 INTRODUCTION

The Square D interface provides the ability to access and/or modify the data table area of the target SY/MAX PC from a Xycom intelligent terminal. The target SY/MAX device contains up to 9999 readable or writable registers. All processors are supported with the exception of the Model 100, which requires a slightly different software protocol.

The SoftScreen Workstation can be connected directly to a Square D processor or can be connected via the SY/MAX network. In the network configuration, the workstation is connected to a Network Interface module (NIM), which, in turn, is connected to the Square D processor. The NIM can also be connected to a network of NIMs and processors which gives the workstation accessibility to a network of SY/MAX devices.

The user interface provides the ability to monitor or change areas of the SY/MAX devices via SoftScreen menus. The way the user accesses the device is by specifying a Network address (optional) and a register address in the SY/MAX device. All SY/MAX devices will use the decimal numbering system.

B.1.1 Serial Port Configuration

The Square D PLC connects to SoftScreen via RS-422, connects to the SoftScreen Workstation's primary serial port. The secondary serial port is used for uploading or downloading from the development system or multidrop network. Make sure the jumpers are set to RS-422 as shown in Tables 2-1, and 2-2 on page 2-5.

B.1.2 Electrical Interface

The electrical interface for Square D is asynchronous RS-422, linked serially to the target SY/MAX family device. Figure B-1 shows the necessary cabling.

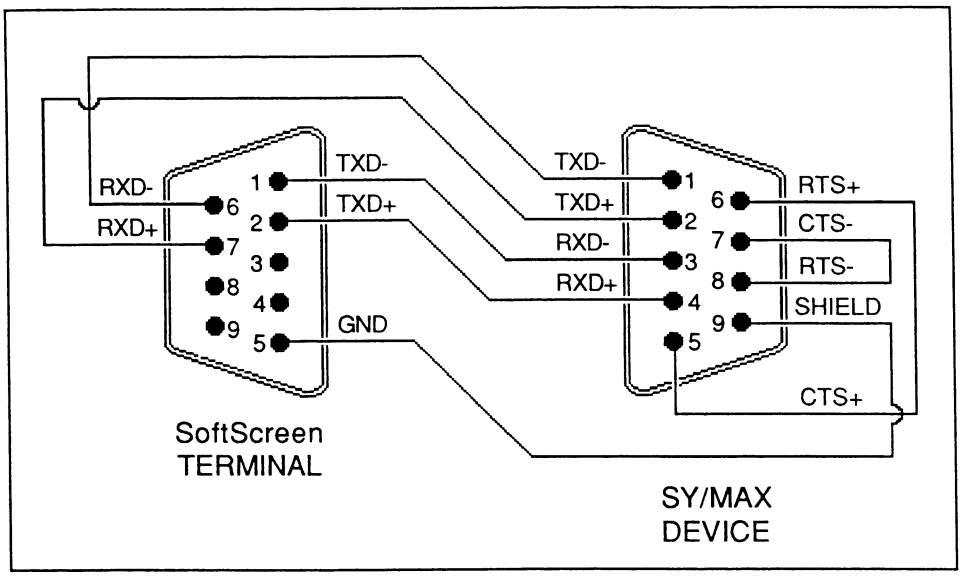

Figure B-1. Cabling to the SY/MAX PLC

B.1.3 Square D Addressing

The address expression formats specific to the Square D PLC interface are shown below:

Device	PLC ADDRESS	Number Type	Size	R/W
All	S0001-S9999	Decimal	Word	R/W

For example, if the expression **[PLC:S1234 3]** is entered in the development system software for a data display object, the engine will read and display the value in PLC1, word S1234, bit 3.

For more information on expression value formats, see Appendix C of your SoftScreen Development System Manual.

B.1.4 Square D Communication Status Register

The communication status registers contain information about the communication between the Square D PLC and the SoftScreen Workstation engine. There are two communication status registers, one for each COM port:

#11 Communication status for the secondary port which is equivalent to port 1
#8 Communication status for the primary port which is equivalent to port 2

The communication status registers are 32-bit fixed point registers with the following bit assignments:

Upper 16 Bits

Bits 0	Receive Error
Bit 1	Transmit Error
Bit 2	Timeout Error
Bit 3	Bit Write Error
Bits 4-15	Unused

Lower 16 Bits

Bits 0-15	Unused

By testing specific bits in the communication status registers, the appropriate text, alarm or message can be generated to indicate the current status of communication. For example, a timeout error would be indicated if the expression evaluated to 1, while a value of 0 would indicate no timeout error.

2000-SS12

2000-SoftScreen/ General Electric Series 6 Interface

97668-012 A

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B.1 INTRODUCTION

This section describes the functional definition of the SoftScreen to General Electric (GE) Series 6 interface. The SoftScreen engine communicates with the GE programmable controller via either RS-232C or RS-422.

The SoftScreen engine always functions as the master device and initiates all commands, and any programmable controllers are considered slaves. The SoftScreen driver uses the CCM2 Master/Slave mode multiple station protocol to communicate with the GE PLCs. All messages are sent "normal sequence." This protocol allows SoftScreen to communicate directly with the GE Series 6 PLC in order to access and/or modify the inputs, outputs, and registers.

This protocol can also be used to communicate with the GE Series 1, GE Series 3, Texas Instruments 305, Texas Instruments 405 (using a HOSTLINK DCU module), and any other PLC that follows the CCM2 protocol. Each of the memory areas for these PLCs has been mapped to correspond to an area in the GE Series 6 as shown below:

Table B-1. Memory Types

SoftScreen GE Series 6	Memory Types
Registers	Type 1 or "31"
Inputs	Type 2 or "32"
Outputs	Type 3 or "33"

Consult your PLC reference material for a cross reference between memory types "1", "2", and "3" and the memory areas specific to your PLC.

B.1.1 Serial Port Configuration

The GE Series 6 PLC can connect to SoftScreen's primary serial port via RS-232C or RS-422. (The secondary serial port is used for uploading or downloading from the development system or multidrop network.) Make sure the jumpers on the 2000-SoftScreen Workstation are properly set to either RS-232C or RS-485 as shown in Table 2-1 on page 2-5.

> **NOTE**
> Make sure the port you use is the same one specified in your SoftScreen software under Configuration-Ports.

B.1.2 **Electrical Interface**

The electrical interface for the GE Series 6 PLC interface is either RS-232C or RS-422. Figure B-1 shows the RS-232C cabling, and Figures B-2 and B-3 on the following page shows the RS-422 cabling.

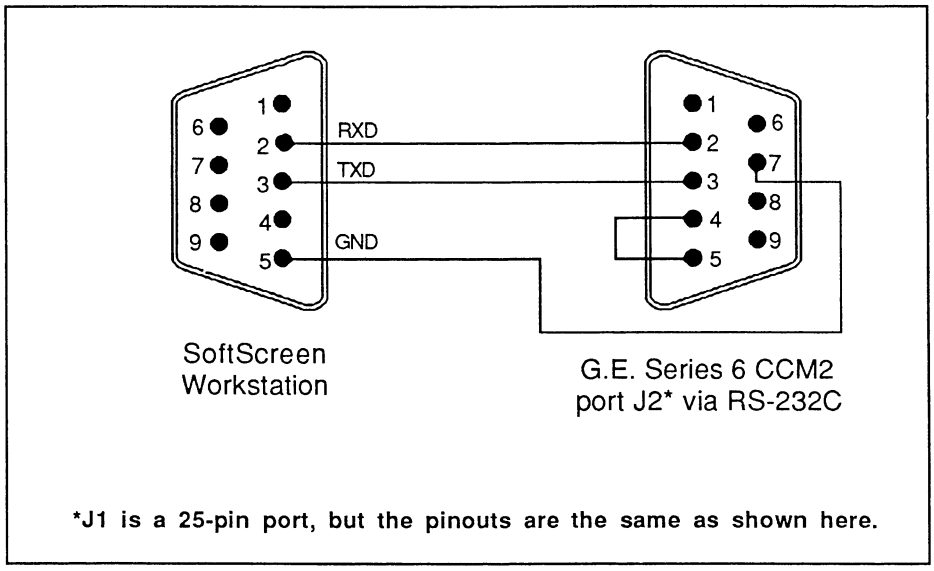

Figure B-1. Cabling to the GE Series 6 via RS-232C

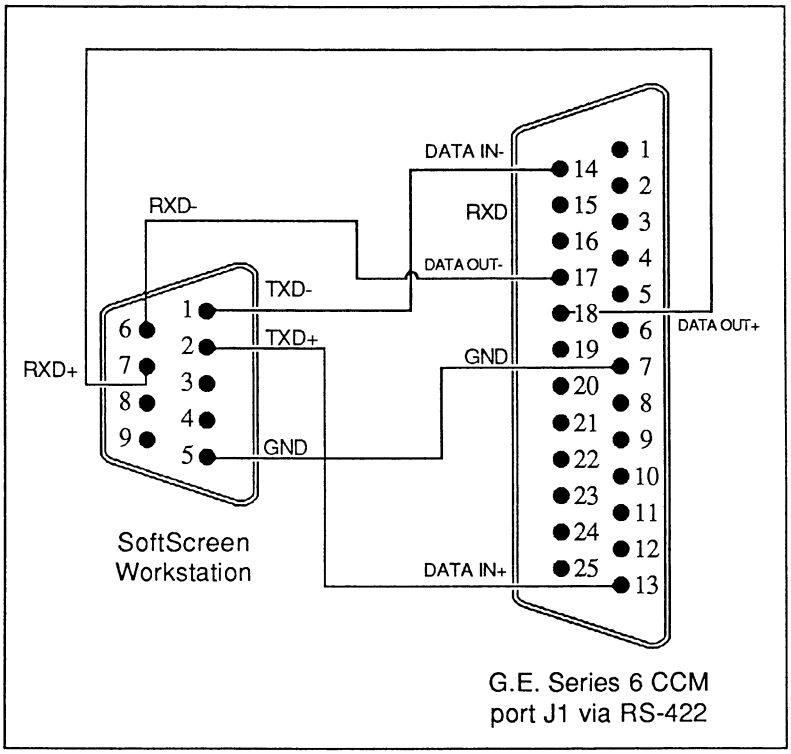

Figure B-2. Cabling to the GE Series 6 via RS-422 and port J1 (25-pin)

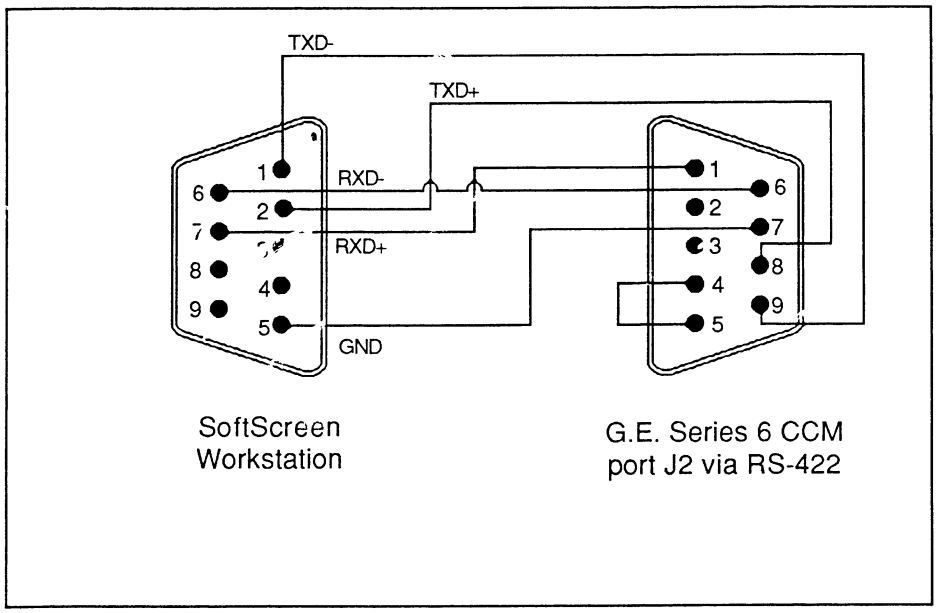

Figure B-3. Cabling to the GE Series 6 via RS-422 and port J2 (9-pin)

B.1.3 General Electric Series 6 Addressing

The address expressions specific to the General Electric Series 6 interface are shown in the table below:

Table B-2. GE Series 6 Addressing

Device	PLC Address	Number Type	Size	R/W
Input	I0001-I65535	Decimal	Bit	R
Output	O0001-O65535	Decimal	Bit	R
Register	R0001-R65535	Decimal	Word	R/W

Example 1

If the expression **[PLC1:R0005 3]** is entered in the development system software for a data display object, the 2000 engine will read and display the value in PLC1, word R0005, bit 3.

Example 2

Using a TI-405 with to hostlink cross reference, reading [R1] (memory type 1, word 1) will result in SoftScreen reading and displaying the value for TMR Accumulator 1.

For more information on expression value formats, see Appendix A of your SoftScreen Development System Manual.

2000-SS13

2000-SoftScreen/ Siemens Interface

97668-013C

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Address comments concerning this manual to:

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Part Number: ***97668-013C***

B.1 INTRODUCTION

The Siemens direct connect can read and write to values within data blocks and can read data from the addresses listed below. Since the programming port does not allow data to be written to these addresses, there will not be a corresponding command to write data to the following addresses:

input image (PII)
output image (PIQ)
flags (F)
timer status
timer value
counter status
counter value

For the input image, output image, and flags, the address used in the PLC program is of the form b.x, where b is the byte number in that address type, and x is the bit number within the specified byte. The address used in SoftScreen is of the form [b x], where b is the byte number in that address type, and x is the bit number within the specified byte. For example, [F3 7] specifies flag memory byte 3, bit 7. See Table B-1 for specifying data block items.

B.1.1 Serial Port Configuration

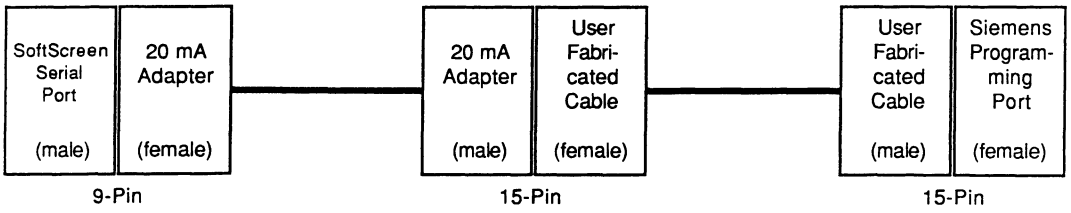
The Siemens PLC connects to SoftScreen via an RS-422 to 20 mA current loop adapter cable, and must connect to the 2000-SoftScreen Workstation's primary serial port. (The secondary serial port is used for uploading or downloading from the development system or multidrop network.) If you are using this adapter cable, make sure the jumpers are set to RS-422/485 as shown in Table 2-3 on page 2-13 of the 2000 Series Industrial Workstations manual.

NOTE
This cable is intended for use with the Siemens 115U 94X PLC. For other CPU models, use a third party RS-422 or RS-232 to current loop adapter.

NOTE
Make sure the port you use is the same one specified in your SoftScreen software under Configuration-Ports.

B.1.2 **Electrical Interface**

The 2000-SoftScreen Workstation connects to the Siemens PLC via an RS-422 to 20 mA current loop adapter, which is optionally available from Xycom. This loop adapter connects to the 9-pin serial port of the 2000-SoftScreen engine and to a 15-pin, user-fabricated cable. The other end of the cable then connects to the Siemens PLC as illustrated in the diagram below:



The pinouts for the connection between the 20 mA adapter and the Siemens programming port are shown in Figure B-1.

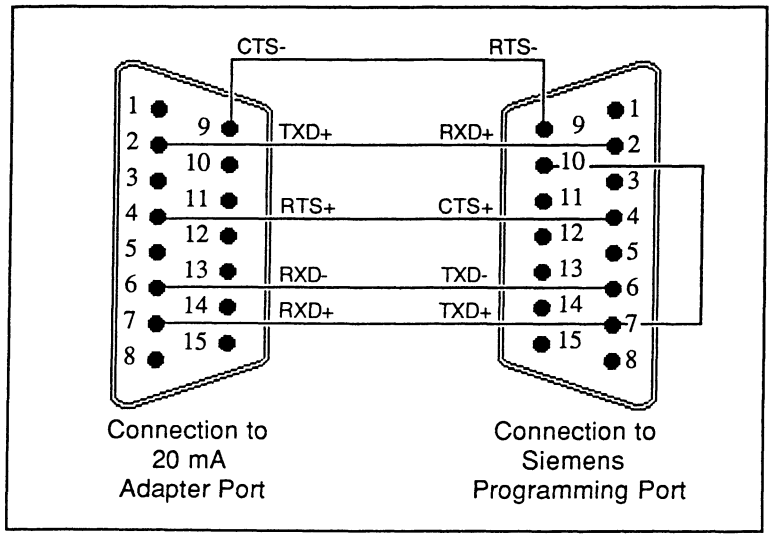


Figure B-1. User-Fabricated Cable for use with Xycom RS-422 to 20 mA Current Loop Adapter

B.1.3 **Siemens Addressing**

All Siemens addresses are in decimal. The address expression formats specific to the Siemens PLC interfaces are shown in Tables B-1 through B-3.

Table B-1. Siemens 100 Series CPU Addressing

Device	100 CPU Address	102 CPU Address	103 CPU Address	Size	R/W
Input (I)	10000-IQ127	I0000-I0127	I0000-I0127	Byte	R
Output (Q)	Q0000-Q0127	Q0000-Q0127	Q0000-Q0127	Byte	R
Flag (F)	F0000-F0127	F0000-F0127	F0000-F0127	Byte	R
Timer Status (TS)	TS0000-TS015	TS0000-TS028	TS0000-TS0127	Word	R
Timer Value (TV)	TV000-TV015	TV0000-TV028	TV0000-TV0127	Word	R
Counter Status (CS)	CS0000-CS015	CS0000-CS031	CS0000-CS031	Word	R
Counter Value (CV)	CV000-CV015	CV0000-CV031	CV0000-CV031	Word	R
Data Block	DB2-DB63	DB3-DB63	DB2-DB255	N/A	N/A
*Right Byte (DB DR)	DR000-DR255	DR000-DR255	DR000-DR255	Byte	R
*Left Byte (DB DL)	DL000-DL255	DL000-DL255	DL000-DL255	Byte	R
*Word (DB DW)	DW000-DW255	DW000-DW255	DW000-DW255	Word	R/W
*§Floating pt. (DB FP)	FP000-FP254	FP000-FP254	FP000-FP254	Double word	R/W
*Bit in Word (DB BI)	BI000-BI255	BI000-BI255	BI000-BI255	Bit	R

Table B-2. Siemens 900 Series CPU Addressing

Device	921/922 CPU Address	928 CPU Address	941-944 CPU Address	Size	R/W
Input (I)	I0000-IQ127	I0000-I0127	I0000-I0127	Byte	R
Output (Q)	Q0000-Q0127	Q0000-Q0127	Q0000-Q0127	Byte	R
Flag (F)	F0000-F0255	F0000-F0255	F0000-F0255	Byte	R
Timer Status (TS)	TS0000-TS0127	TS0000-TS0255	TS0000-TS0127	Word	R
Timer Value (TV)	TV000-TV0127	TV0000-TV0255	TV0000-TV0127	Word	R
Counter Status (CS)	CS0000-CS0127	CS0000-CS0255	CS0000-CS0127	Word	R
Counter Value (CV)	CV000-CV0127	CV0000-CV0255	CV0000-CV0127	Word	R
Data Block	DB2-DB0255	DB3-DB0255	DB2-DB255	N/A	N/A
*Right Byte (DB DR)	DR000-DR255	DR000-DR255	DR000-DR255	Byte	R
*Left Byte (DB DL)	DL000-DL255	DL000-DL255	DL000-DL255	Byte	R
*Word (DB DW)	DW000-DW255	DW000-DW255	DW000-DW255	Word	R/W
*§Floating pt. (DB FP)	FP000-FP254	FP000-FP254	FP000-FP254	Double word	R/W
*Bit in Word (DB BI)	BI000-BI255	BI000-B1255	BI000-BI255	Bit	R

* See paragraph on the following page
§ See note on the following page

Table B-3. Siemens 90 Series CPU Addressing

Device	90U CPU Address	95U CPU Address	Size	R/W
Input (I)	I0000-IQ127	I0000-I0127	Byte	R
Output (Q)	Q0000-Q0127	Q0000-Q0127	Byte	R
Flag (F)	F0000-F0128	F0000-F0256	Byte	R
Timer Status (TS)	TS0000-TS0031	TS0000-TS0127	Word	R
Timer Value (TV)	TV000-TV0031	TV0000-TV0127	Word	R
Counter Status (CS)	CS0000-CS0031	CS0000-CS0031	Word	R
Counter Value (CV)	CV000-CV0031	CV0000-CV0031	Word	R
Data Block	DB2-DB0127	DB3-DB0255	N/A	N/A
*Right Byte (DB DR)	DR000-DR255	DR000-DR255	Byte	R
*Left Byte (DB DL)	DL000-DL255	DL000-DL255	Byte	R
*Word (DB DW)	DW000-DW255	DW000-DW255	Word	R/W
*§Floating pt. (DB FP)	FP000-FP254	FP000-FP254	Double word	R/W
**Bit in Word (DB BI)	BI000-BI255	B1000-B1255	Bit	R

*These data items are contained within a data block. To access an item, you must specify the data block number, data item type, and data item word address in the form:

[DBnnn-XXwww Bit #]
where nnn is Data Block Number
XX is Data Item Type (DR. DL. DW. FP. or BI)
www is Data Item Word Address
Bit # is optional

Valid bit addresses for I, Q, and F are 0-7. Valid bit addresses for TS, CS, TV, and CV are 0-15. Valid bit addresses for DW are valid for 0-15, and are read only. Valid bit addresses for DR, and DL are 0-7 and are read-only.

To specify the left byte in word 22 of data block 12, use [DB12-DL22]. To specify the floating point value at word address 31 of data block 9, use [DB9-FP31, FP]. To specify Bit 5 of Word Address 20 of Data Block 6, use [DB6-DW20 5].

**For data block bit in word, (DB BI), a bit address from 0-15 must be specified. Data block bit in word addresses are read/write. Example: [DB100-BI100 7]

§NOTE
You must specify floating point format (FP) in your expressions for floating point registers.

For example, if the expression **[PLC1:TS0126 3]** is entered in the development system software for a data display object, the 2000 engine will read and display the value in PLC1, word TS0126, bit 3.

For more information on expression value formats, see Appendix C of your SoftScreen Development System Manual.

SoftScreen's internal value limit is from -32767.9999 to 32767.9999. Therefore, floating point values beyond this range will not be represented accurately.

CAUTION
Writing to the same data block from the PLC program and from SoftScreen may cause PLC lockups.

2000-SS16

2000-SoftScreen/ Texas Instruments 405/435 Interface

97668-016 A

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XYCOM
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Saline, Michigan 48176
(313) 429-4971

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Technical Publications Dept.
750 North Maple Road
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Part Number: ***97668-016A***

B.1 INTRODUCTION

This section describes the functional definition of the SoftScreen to Texas Instruments Series 405/435 interface. The interface to the TI PLC is through the PLC's programming port.

The purpose of the Texas Instruments driver is to access and/or modify memory, drum variables, and time/counter variables of the target programmable controller from a Xycom 2000-SoftScreen Workstation.

B.1.1 Serial Port Configuration

The Texas Instruments 405/435 PLC connects to the SoftScreen Workstation's primary serial port via RS-232C. (The secondary serial port is used for uploading or downloading from the development system or multidrop network.) Make sure the jumpers on the 2000-SoftScreen Workstation are set appropriately as shown in Tables 2-1 and 2-2 on page 2-5.

> **NOTE**
> Make sure the port you use is the same one specified in the SoftScreen software under Configuration-Ports.

B.1.2 **Electrical Interface**

The Texas Instruments Series 405/435 PLC connects to the 2000-SoftScreen Workstation via RS-232C as shown in Figure B-1 below:

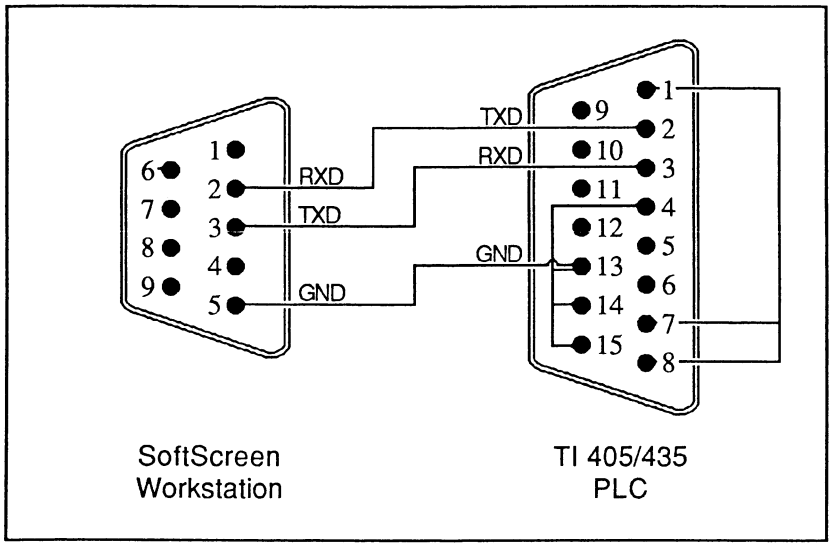

Figure B-1. Cabling to the TI Series 405/435

B.1.3 TI-405/435 Addressing

The address expression formats specific to the TI-405/435 PLC interfaces are shown in the table below:

Table B-1. TI 405/435 Addressing

Device	PLC Address	Number Type	Size	R/W
Timer	T0000-T0177	Octal	Word	R/W
Counter	CT000-CT177	Octal	Word	R/W
User register	U0000-U6377	Octal	Word	R/W
Remote I/O memory	GX000-GX777	Octal	Bit	R/W
Input memory	X0000-X0477	Octal	Bit	R/W
Output memory	Y0000-Y0477	Octal	Bit	R
Control relay	C0000-C0737	Octal	Bit	R/W
Stage memory	S0000-S0577	Octal	Bit	R/W
Timer relay	TR000-TR177	Octal	Bit	R/W
Counter relay	CTR00-CTR177	Octal	Bit	R/W
Special relay	SP000-SP137	Octal	Bit	R
	SP320-SP617	Octal	Bit	R
V memory	V0000-V41230	Octal	Word	R/W
Scratch pad memory	SPD00-SPD8FF	Hex	Byte	R/W

For example, if the expression **[PLC1:CT123 3]** is entered in the development system software for a data display object, the 2000 engine will read and display the value in PLC1, word CT123, bit 3.

For more information on expression value formats, see Appendix A of your SoftScreen Development System Manual.

2000-SS17

2000-SoftScreen
Omron PLC

P/N97668-017A

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Part Number: ***97668-017A***

B.1 INTRODUCTION

This section contains information specific to the 2000-SS17 Omron interface.

The 2000 Workstation supports both Single Link and Multi-link communications configurations. The Single-link configuration is for a single PLC connected to a 2000 Terminal. The Multi-link configuration allows up to 31 PLCs to be connected to a 2000 Terminal. Both configurations support multiplex handshaking. These configurations can be changes by Development System Software.

The direct connect supports the OMRON single-frame format. The PLC interface limits the maximum size of a single-frame message to 131 characters. This limits the operator to a maximum of 29 channels that can be read or written at one time.

> **NOTE**
> Make sure the port you use is the same one specified in the SoftScreen software under Configuration-Ports.

B.2 CONNECTING THE 2000-SOFTSCREEN WORKSTATION TO OMRON

This section describes the functional definition of the 2000-SoftScreen to OMRON interface.

B.2.1 Serial Port Configuration

The SoftScreen terminal can communicate with the OMRON PLC in both RS-232C and RS-422 modes. Figure B-1 shows cabling to the OMRON via RS-232C. Figure B-2, on the following page, shows the connections for RS-422.

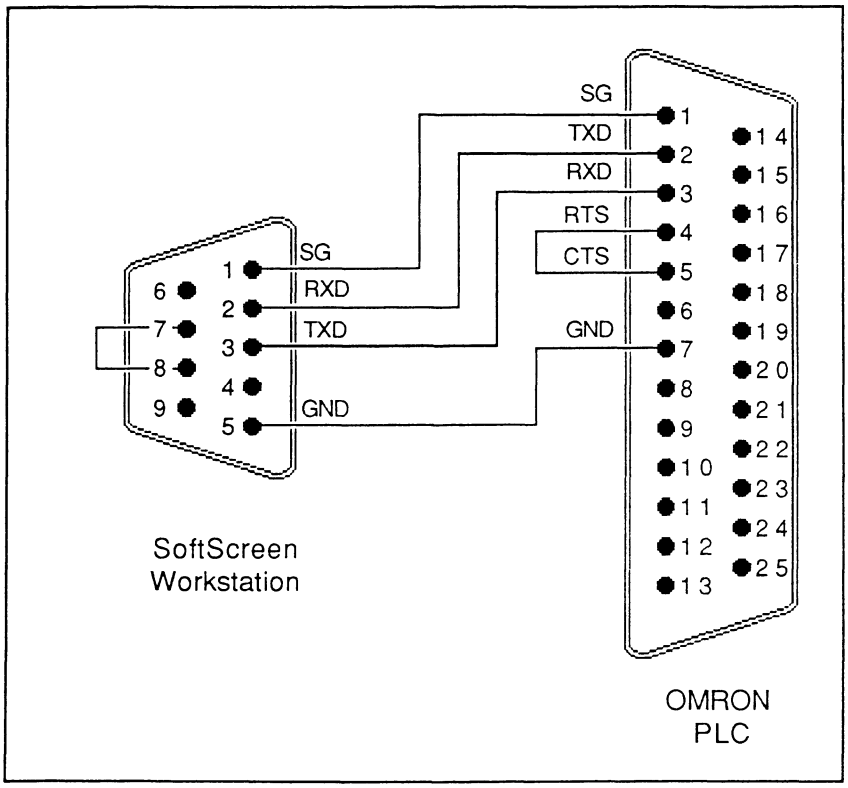

Figure B-1. Cabling to the OMRON via RS-232C

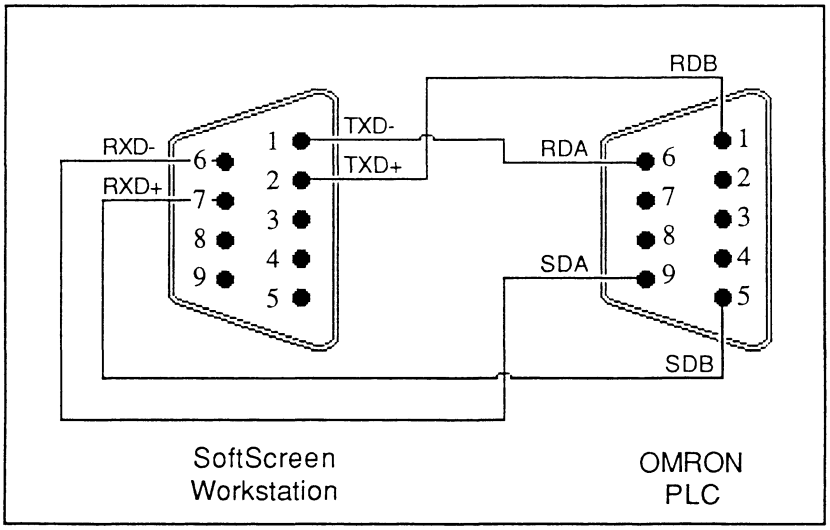

Figure B-2. Cabling to the OMRON via RS-422

B.2.2 **OMRON Addressing**

The address expressions (entered for Expression in various configuration forms) that are specific to the OMRON PLC interface are shown in the table below:

Table B-1. OMRON Addressing

Device	**PLC Address**	**Number Type**	**Size**	**R/W**
Internal relay	IR0000-IR0246	Decimal	Word	R0-246 W30-49 W232-246
Holding relay	HR0000-HR0099	Decimal	Word	R/W
Auxiliary relay	AR0000-AR0022	Decimal	Word	R0-22 W7-22
Data memory	DM0000-DM1999	Decimal	Word	R0-1999 W0-999
Timer/counter	TC0000-TC0511	Decimal	Bit	R/W

Valid bit addresses for all devices except TC are 0-15.

For example, if the expression **[PLC1:DM706 3]** is entered in the development system software for a data display object, the 8320 engine will read and display the value in PLC1, word DM706, bit 3.

For more information on expression value formats, see Appendix C of your SoftScreen Development System Manual.

B.2.3 OMRON Communication Status Register

The communication status register contains information about the communication between the OMRON PLC and the SoftScreen Workstation engine. There are three communication status registers, one for each available COM port:

#8 Communication status register

The communication status registers are 32 bit fixed point registers with the following bit assignments:

Upper 16 Bits

Bits 0-3	Unused
Bit 4	Invalid Message Length Received
Bit 5	Receive Error
Bit 6	Frame Check Sequence (FCS) Error
Bit 7	Timeout Error
Bit 8-15	Response Error Code From OMRON PLC

Lower 16 Bits

Bits 0-15	Unused

By testing specific bits in the communication status registers, the appropriate text, alarm or message can be generated to indicate the current status of communication.

For example, the expression #8&128 could be used to test for a timeout error. A timeout error would be indicated if the expression evaluated to 128, while a value of 0 would indicate no timeout error.

Table B-2 shows the response codes returned by the OMRON HLU.

Table B-2. OMRON Status Register Response Codes

Hex Value of MSB	Omron Status Response
00	Normal completion
01	Not executable in RUN mode
02	Not executable in MONITOR mode
03	Not executable with PROM mounted
04	Address over (data overflow)
0B	Not executable in PROGRAM mode
0C	Not executable in PROM mounted
0D	Not executable in LOCAL mode
10	Parity error
11	Framing error
12	Overrun
13	FCS error
14	Format error (parameter length error)
15	Entry number data error (parameter error, data code error, data length error)
16	Instruction not found
18	Frame length error
19	Not executable (unexecutable error clear, non-registration of I/O table, etc.)
20	I/O table generation impossible (unrecognized Remote I/O Unit, channel over, duplication of Optical Transmitting I/O Unit)
A0	Aborted because of parity error in transmit data
A1	Aborted because of framing error in transmit data
A2	Aborted because of overrun in transmit data
A4	Aborted because of format error in transmit data
A5	Aborted because of entry number data error in transmit data
A8	Aborted because of frame length error in transmit data
B0	Not executable because program area is not 16 Kbytes

2000-SS18

2000-SoftScreen
Mitsubishi Melsec A

P/N97668-018A

Printed in the United States of America
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XYCOM
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(313)429-4971

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B.1 INTRODUCTION

This section describes the function definition of the SoftScreen to Mitsubishi MELSEC-A interface.

> **NOTE**
> The SoftScreen Mitsubishi A driver uses a checksum. You must set the SUM CHECK dipswitch on your PLC to the YES position. See your PLC manual for more information.

B.1.1 Serial Port Configuration

The Mitsubishi PLC can connect to SoftScreen via RS-232C or RS-422 on the SoftScreen Workstation's primary serial port. Make sure the jumpers are set as shown in Tables 2-1 and 2-2 on page 2-5.

B.1.2 Electrical Interface

The electrical interface for the Mitsubishi interface is either asynchronous RS-232C or RS-422. Figure B-1 and B-2 shows the cabling for RS-232C, while Figure B-3 shows the cabling for RS-422.

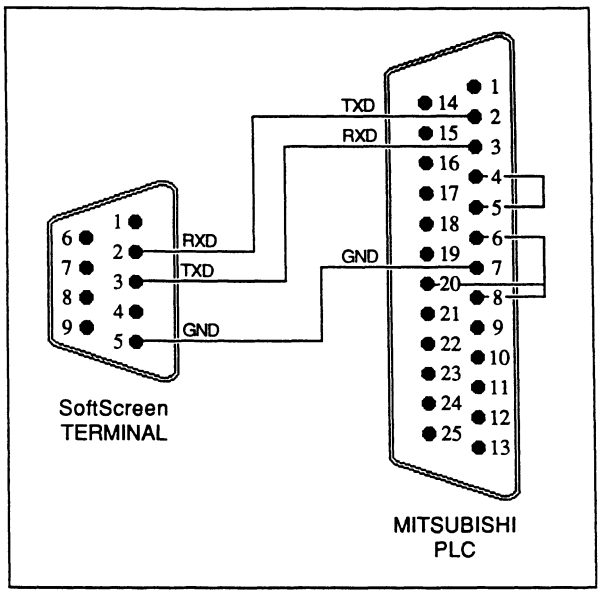

Figure B-1. Cabling to the Mitsubishi PLC via 25-pin RS-232C

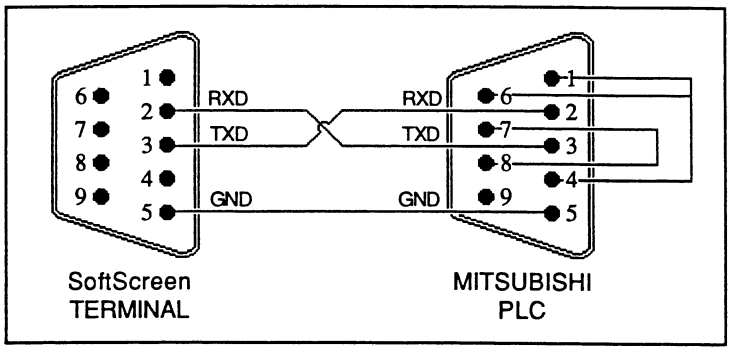

Figure B-2. Cabling to the Mitsubishi PLC via 9-pin RS-232C

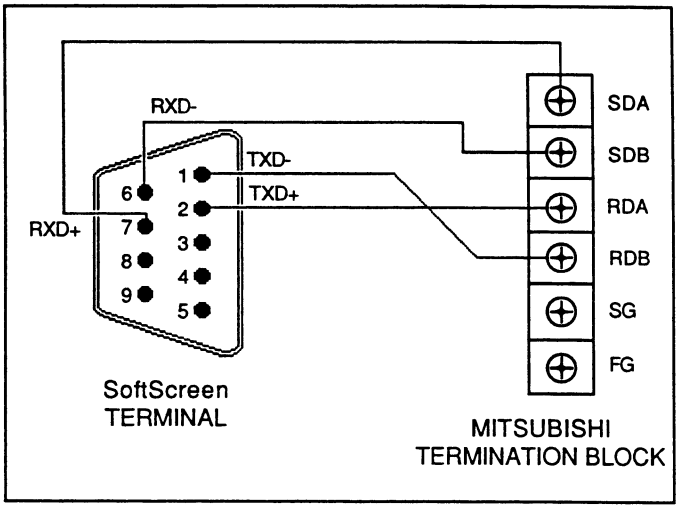

Figure B-3. Cabling to the Mitsubishi PLC via RS-422

B.1.3 Mitsubishi Addressing

The address expressions specific to the Mitsubishi PLC interface are shown in the table below:

Table B-1. Mitsubishi Addressing

Device	PLC Address	Number Type	Size	R/W
Input X	X0000-X07FF	Hex	Bit	R/W
Output Y	Y0000-Y07FF	Hex	Bit	R
Internal relay M	M0000-M2047	Decimal	Bit	R/W
Latch relay L	L0000-L2047	Decimal	Bit	R/W
Link relay B	B0000-B03FF	Hex	Bit	R/W
Annunciator F	F0000-F0255	Decimal	Bit	R/W
Special relay M	M9000-M9255	Decimal	Bit	R
Timer contact TS	TS000-TS255	Decimal	Bit	R/W
Timer coil TC	TC000-TC255	Decimal	Bit	R/W
Counter contact CS	CS000-CS255	Decimal	Bit	R/W
Counter coil CC	CC000-CC255	Decimal	Bit	R/W
Timer value TN	TN000-TN255	Decimal	Word	R/W
Counter value CN	CN000-CN255	Decimal	Word	R/W
Data register D	D0000-D1023	Decimal	Word	R/W
Link register W	W0000-W03FF	Hex	Word	R/W
File register R	R0000-R8191	Decimal	Word	R/W
Special register D	D9000-D9255	Decimal	Word	R
Buffer direct BU	BU100-BU7FF	Hex	Word	R/W
Buffer indirect BI	BI1200-BI1FFF	Hex	Word	R/W
Special function SF	SFXX-AAAA*	Hex	Word	R/W

*Where:
XX is special function unit number, 0x00-0x27
AAAA is the address in SFU, 0x0000-0xFFFF
for example: [SF1E-15CD]

For TN, CN, D, W, R, and BU, the bit addresses are 0-15. For Bl, and SF, the bit addresses are 0-7.

For example, if the expression **[PLC1:TN123 3]** is entered in the development system software for a data display object, the engine will read and display the value in PLC1, word TN123, bit 3.

Table B-1 Mitsubishi Addressing - Continued

Device	PLC Address	Number Type	Size	R/W
Input word XW	XW000-XW07F	Hex	Word	R/W
Output word YW	YW000-YW07F	Hex	Word	R
Internal relay word	MW000-MW127	Decimal	Word	R/W
MW	LW000-LW127	Decimal	Word	R/W
Latch relay word LW	BW000-BW03F	Hex	Word	R/W
Link relay word BW	FW00-FW15	Decimal	Word	R/W
Annunciator word FW	TSW00-TSW15	Decimal	Word	R/W
Timer contact word TSW	TCW00-TCW15	Decimal	Word	R/W
Timer coil word TCW	CSW00-CSW15	Decimal	Word	R/W
Counter contact word CSW	CCW00-CCW15	Decimal	Word	R/W
Counter coil word CCW	MW9000-MW9015	Decimal	Word	R
Special relay word MW				

For more information on expression value formats, see Appendix C of your SoftScreen Development System Manual.

B.1.4 Mitsubishi Communication Status Register

The communcation status registers contain information about the communication between the Mitsubishi PLC and the SoftScreen Workstation engine. There are two communication status registers, one for each COM port:

#11	Communication status for the secondary port which is equivalent to port 1
#8	Communication status for the primary port which is equivalent to port 2

The communication status registers are 32-bit fixed point registers with the following bit assignments:

Upper 16 Bits

Bit 0	Receive Error
Bit 1	Timeout Error
Bit 2	Checksum Error
Bit 3	Bad Response Error
Bits 4-7	Unused
Bits 8-15	PLC Error Codes

Lower 16 Bits

Unused

By testing specific bits in the communication status registers, the appropriate text, alarm or message can be generated to indicate the current status of communication. For example, the expression #8&4 could be used to test for a checksum error. A checksum error would be indicated if the expression evaluated to 1 while a value of 0 would indicate no checksum error.

2000-SS20

2000-SoftScreen
GE Series 90

P/N 97668-020A

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B.1 INTRODUCTION

This section describes the functional description of the SoftScreen to General Electric (GE) Series 90.

B.1.1 Serial Port Configuration

The GE Series 90 PLC can be connected to the SoftScreen Workstation via an RS-485 connection to the primary serial port. Make sure the jumpers are set to RS-422 as shown in Tables 2-1 and 2-2 on page 2-5.

B.1.2 Electrical Interface

Figures B-1, and B-2 show the cabling between the SoftScreen Terminal and the GE Series 90 CPU.

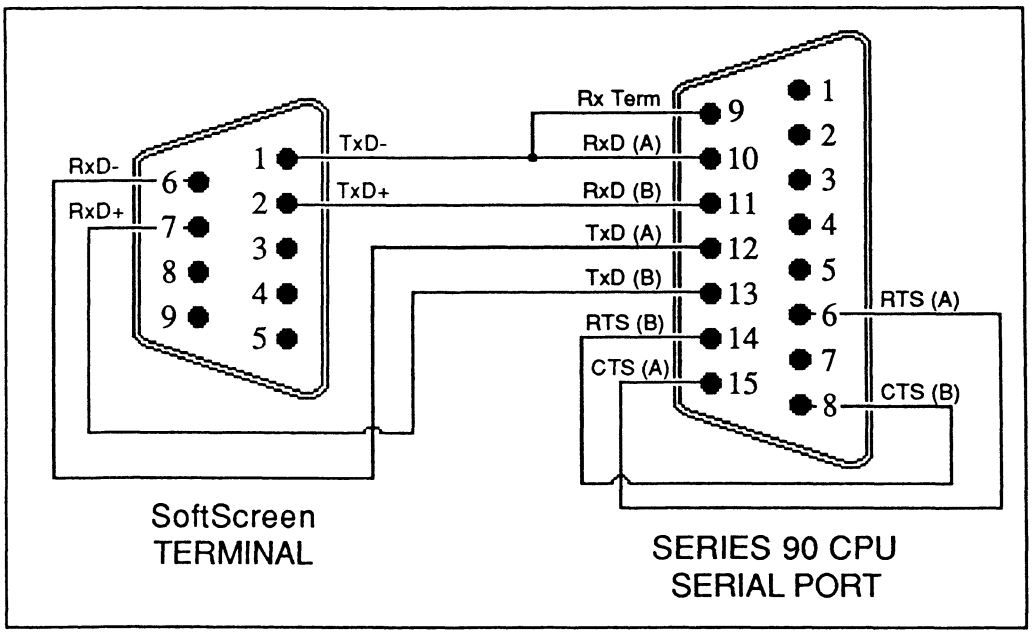

Figure B-1. Point-to-Point Cabling Diagram

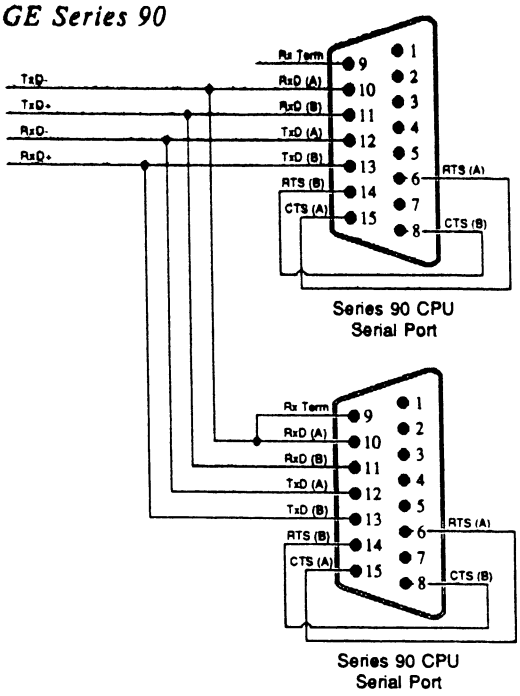

Figure B-2. Multi-drop Cabling Diagram

The address expressions, (entered for Expression in various configuration forms), that are specific to the GE Series 90 PLC interface are shown in the table below:

Table B-1 GE Series 90 Addressing

Device	Range	Dec/Hex	Size	R/W
Input	I0001-I65535	Decimal	Bit	R
Output	Q0001-Q65535	Decimal	Bit	R
Temporary	T0001-T65535	Decimal	Bit	R/W
Internal	M0001-M65535	Decimal	Bit	R/W
SA discrete	SA001-SA65535	Decimal	Bit	R/W
SB discrete	SB001-SB65535	Decimal	Bit	R/W
SC discrete	SC001-SC65535	Decimal	Bit	R/W
S discrete	S0001-S65535	Decimal	Bit	R
Genius global data	G0001-G65535	Decimal	Bit	R/W
Analog input	AI001-AI65535	Decimal	Word/ Bit	R
Analog output	AQ001-AQ65535	Decimal	Word/ Bit	R
Register	R0001-R65535	Decimal	Word/ Bit	R/W

Valid bit addresses for analog input, analog output, and register are 0-15.

For example, if the expression **[PLC1:AI100 3]** is entered in the development system software for a data display object, the engine will read and display the value in PLC1, word AI100, bit 3. See Appendix C for additional expression details.

B.1.3 GE Series 90 Communication Status Register

The communication status registers contain information about the communication between the GE Series 90 PLC and the SoftScreen Workstation engine. There are two communication status registers, one for each COM port:

#11	Communication status for the secondary port which is equivalent to port 1
#8	Communication status for the primary port which is equivalent to port 2

The communication status registers are 32-bit fixed point registers with the following bit assignments:

Upper 16 Bit

Bit 0	Receive Error
Bit 1	Transmit Error
Bit 2	Attach Error
Bit 3	Address Error
Bit 4	Timeout Error
Bit 5	Checksum Error
Bit 6	Parity Error
Bit 7	Protocol Error Engine
Bit 8	Bad command error
Bit 9	Framing Error
Bit 10	Protocol Error PLC
Bit 11	PLC Privilege Violation
Bits 12-15	Unused

Lower 16 Bits

Unused

By testing specific bits in the com status registers, the appropriate text, alarm or message can be generated to indicate the current status of communication.

For example, the expression #8&4 could be used to test for an attach error. An attach error would be indicated if the expression evaluated to 1, while a value of 0 would indicate no attach error.

2000-SS29

2000-SoftScreen Opto 22 Mistic Model 200

P/N 97668-029A

Printed in the United States of America
Part Number: 97668-029A

XYCOM
750 North Maple Road
Saline, Michigan 48176
(313) 429-4971

XYCOM REVISION RECORD

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Address comments concerning this manual to:

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Part Number: ***97668-029A***

APPENDIX B - OPTO 22 MISTIC MODEL 200

B.1 INTRODUCTION

The SoftScreen Direct Connect to the Opto 22 Mistic Model 200 allows the user to use tag names to read/write data. The driver communicates with a mistic 200 CPU running a Cyrano 200 application. SoftScreen's Development System allows the user to read in the Cyrano 200 database, suffix.GML. If the database is changed and reloaded into the development system, any new tag names will be added to the end of the current loaded tag list; this maintains the indexes of any previously configured objects.

B.2 SUPPORTED PLC DATA TYPES

Table B-1. Supported PLC Data Types

Data Type	R/W	Expression Example
Variable Data		
Integer Variable	R/W	[tagname]
Integer Table Variable	R/W	[tagname.index] index = 0-8191
Floating Point Variable	R/W	[tagname]
Floating Point Table Variable	R/W	[tagname.index] index = 0-8191
Timer Variable	R/W	[tagname]
String Variable	R/W	[tagname]
String Table Variable	R/W	[tagname.index] index = 0-8191
Chart Status		
Chart Status	R	[tagname]

Table continued on pages 3 through 5

Only task status, integers, and integer tables allow specifying a bit in the expression. The bit range is 0-15. The return value for flags is either 0 or 1. Digital Board States also allow bit entries.

Table B-1. Supported PLC Data Types (Continued)

Data Type	R/W	Expression Example
Specific PID Loop Data		
PID Enable Flag	R	[tagname]
PID Auto/Manual Flag Internal	R	[tagname.i.f]
PID Auto/Manual Flag External	R	[tagname.x.f]
PID Setpoint Internal	R	[tagname.i.s]
PID Setpoint External	R	[tagname.x.s]
PID Input Internal	R	[tagname.i.n]
PID Input External		[tagname.x.n]
PID Output Internal	R	[tagname.i.o]
PID Output External	R	[tagname.x.o]
PID P Term Internal	R	[tagname.i.p]
PID P Term External	R	[tagname.x.p]
PID I Term Internal	R	[tagname.i.i]
PID I Term External	R	[tagname.x.i]
PID D Term Internal	R	[tagname.i.d]
PID D Term External	R	[tagname.x.d]
Analog Board PID Loop Data		
PID Setpoint External	R	[tagname.PID.s] PID = 0-7
PID Input External	R	[tagname.PID.n] PID = 0-7
PID Output External	R	[tagname.PID.o] PID = 0-7

Table B-1. Supported PLC Data Types (Continued)

Data Type	R/W	Expression Example
Analog Board Data		
Analog Board Enable Flag	R	[tagname]
Analog Point Enable Flag	R	[tagname.point] point = 0-15
Analog Point Internal	R	[tagname.point.i] point = 0-15
Analog Point External	R	[tagname.point.x] point = 0-15
Analog Point Data		
Analog Enable Flag	R	[tagname]
Analog Value Internal	R	[tagname.i]
Analog Value External	R	[tagname.x]
Digital Board Data	**R/W**	**Expression Example**
Digital Board Enable Flag	R	[tagname]
Digital Board State Internal	R	[tagname.i]
Digital Board State External	R	[tagname.x]

Table B-1. Supported PLC Data Types (Continued)

Digital Board Data	R/W	Expression Example
Digital Point Data		
Digital Enable Flag	R	[tagname]
Digital Value Internal	R	[tagname.i]
Digital Value External	R	[tagname.x]
Digital Latch Internal	R	[tagname.i.l]
Digital Latch External	R	[tagname.x.l]
Digital Counter Internal	R	[tagname.i.c]
Digital Counter External	R	[tagname.x.c]
Digital Frequency Internal	R	[tagname.i.f]
Digital Frequency External	R	[tagname.x.f]
Digital TPO Period Internal	R	[tagname.i.t]
Digital TPO Period External	R	[tagname.x.t]
Digital Period Internal	R	[tagname.i.e]
Digital Period External	R	[tagname.x.e]
Digital Pulse Internal	R	[tagname.i.u]
Digital Pulse External	R	[tagname.x.u]
Digital TPO % Internal	R	[tagname.i.%]
Digital % External	R	[tagname.x.%]

B.3 HARDWARE CONFIGURATION

The Opto 22 Mistic Model 200 Processor can communicate using RS-232 or RS-422 serial communications. For multi-drop applications, communication will use RS-422/485 serial communications only.

RS-232 pinouts are listed in the table below.

Table B-2. RS-232 Pinouts

SoftScreen Serial Port	Mistic 200 COM	SoftScreen Signal
2	2	Receive
3	3	Transmit
5	7	Ground
7	4	Request-to-Send
8	5	Clear-to-Send

RS-485 pinouts are listed in the table below.

Table B-3. RS-485 Pinouts

SoftScreen Serial Port	Mistic 200 COM	SoftScreen Signal
1	TX-	Transmit Minus
2	TX+	Transmit Plus
5	COM	Ground
6	RX-	Receive Minus
7	RX+	Receive Plus

B.4 SOFTSCREEN DEVELOPMENT CONFIGURATION

When you select Opto 22 Config from Application-Load-Configuration-Edit-Ports, the Opto 22 Configuration Form, depicted below, appears.

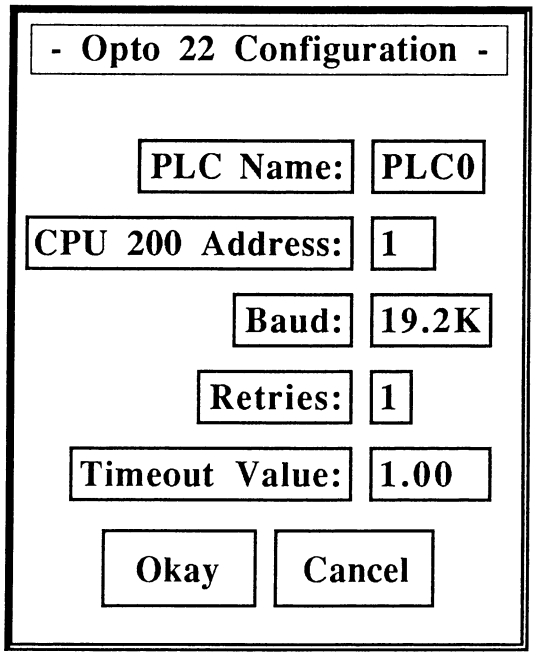

Figure B-1. Opto 22 Configuration Form

Items available when developing an Opto 22 mistic 200 application on the development system are defined in Table B-4 below. For information on the correct settings for your PLC, refer to your PLC manual.

Table B-4. Opto 22 Configuration Form Defined

Name	A five character name to reference the mistic 200 CPU. This will default to PLC0 for Port 2.
Address	The target mistic 200 CPU address. The range is from 1-255. The default is 1.
Baud	The choices are 300, 600, 1200, 2400, 4800, 9600, or **19.2K**.
Retry	The number of retries per command. The range is from 1-9. The default is 1.
Timeout	The communication time out in seconds. The range is 1-655.35. The default is 1.

Click Okay when you are finished. You will then be prompted to enter information into the PLC Configuration Form depicted in Figure B-2, on the next page.

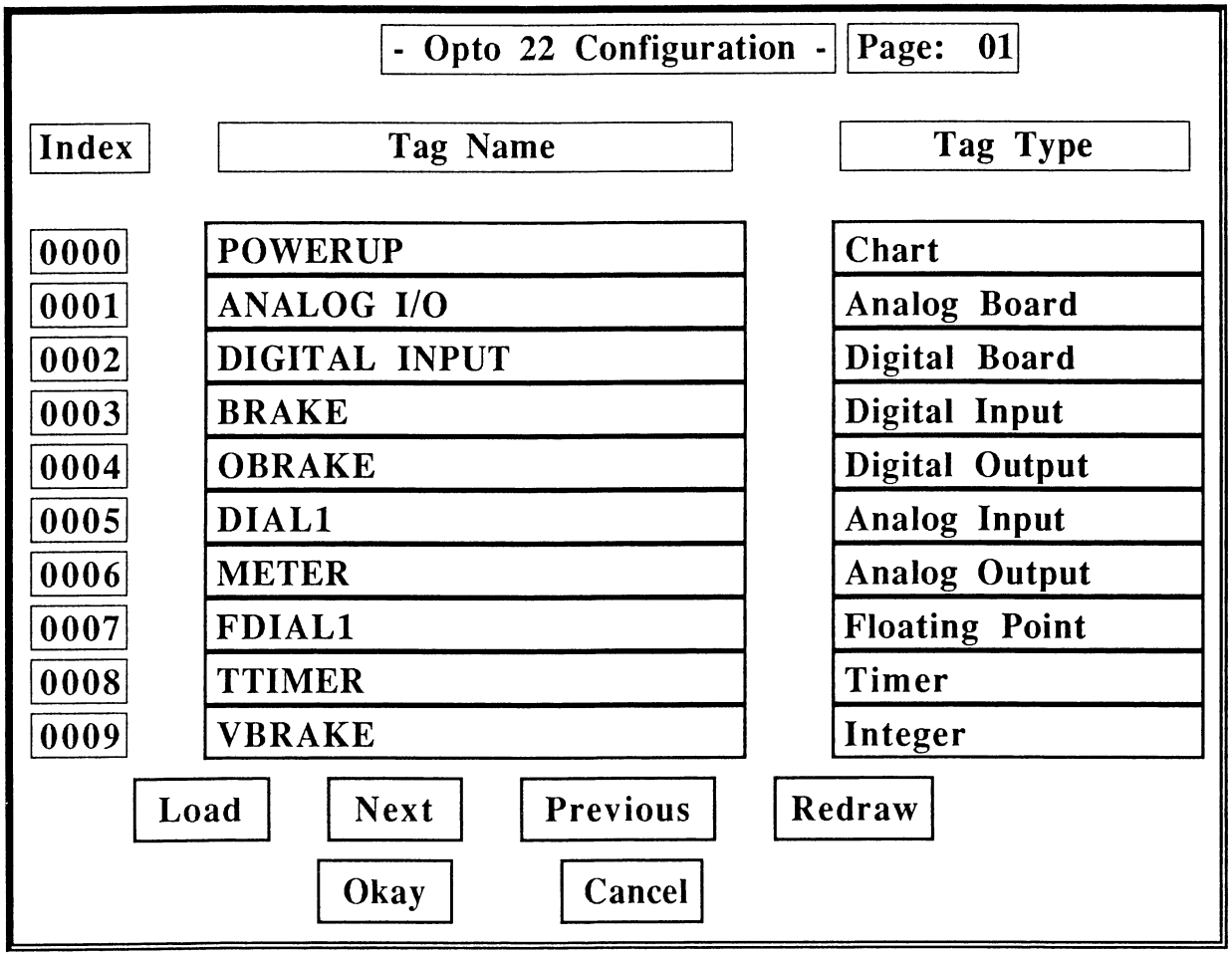

Figure B-2. PLC Configuration Form

Definitions of the items in the PLC Configuration Form are listed on the next page.

Table B-5. PLC Configuration Form Defined

Tag Name	Enter up to 30 characters for each tag name
Tag Type	Tag Types can be one of the supported PLC data types
Load	Brings up the "Load Cyrano GML File" Form
Next	Moves you to the next page, with wrap around abilities
Previous	Moves you to the previous page, with wrap around abilities
Redraw	Readjusts the form, so if one tag is erased, the other tag's will move up one

A list of all tag names and each associated data type is displayed. This information can be loaded from a Cyrano 200's .GML file. To do this, select **Load**. This will bring up the **Load Cyrano GML File Form**, depicted in Figure B-3 on the next page. There is a limit of 2000 tag names per port. If there are more than 2000 tag names in a GML file, all names will be loaded; but the user must delete the extra tag names before exiting the port's configuration. If a tag list exists when another is loaded, the new tag names will be added to the bottom. (Moving items in the list could affect previously configured objects.)

This list could also be created by hand if so desired, and edited if needed later. A tag name may be up to 30 characters. Click Okay when you are finished.

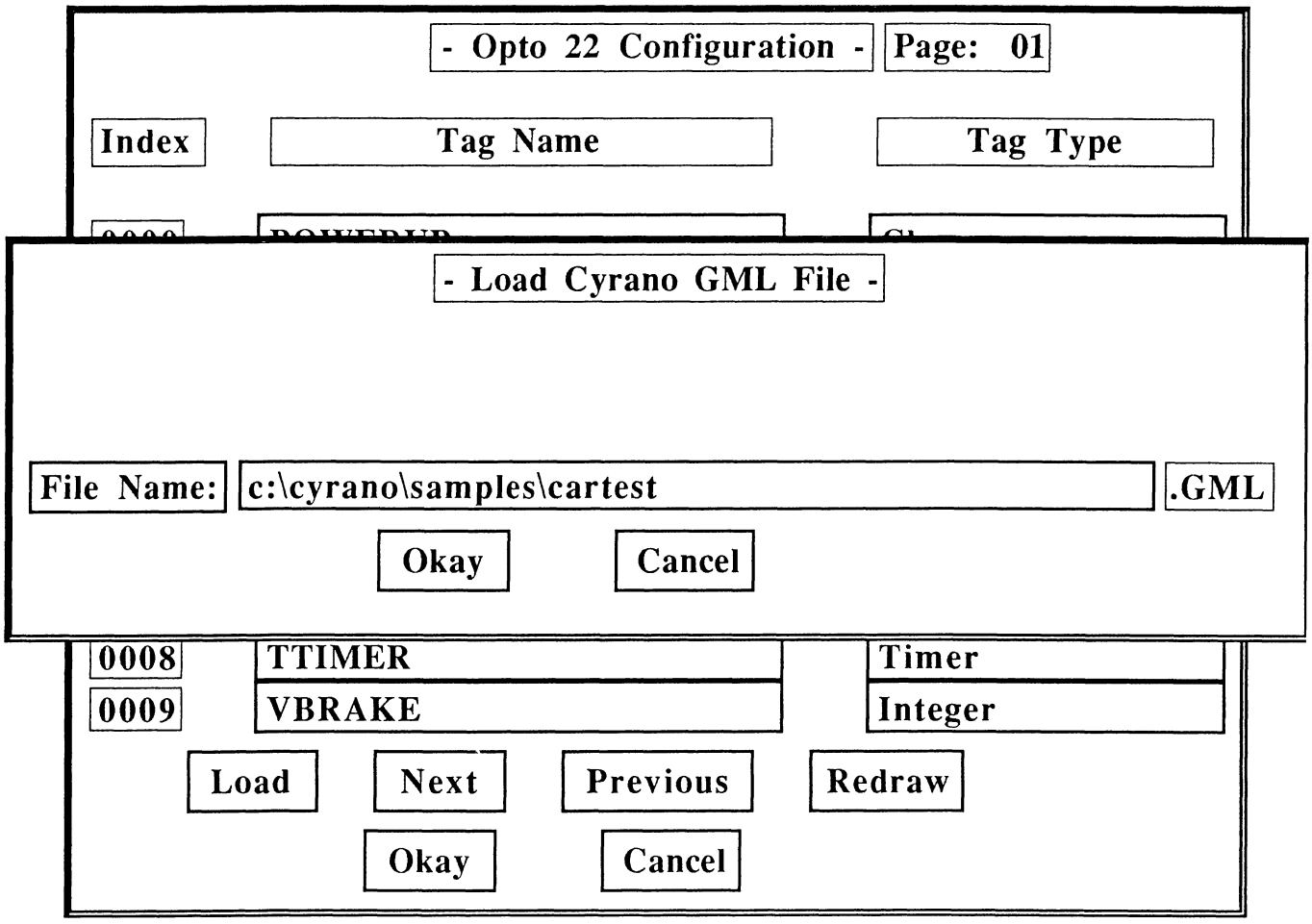

Figure B-3. Load Cyrano GML File

Enter in the path and Cyrano application name of the application containing the tag names. Clicking Okay will load the tag names and return you back to the previous form. Cancel will return you to the previous form without loading the tag names.

B.5 Error Codes

The error codes which can be returned by the driver are listed in the table below.

Table B-6. Error Codes

Error	Definition
0	No Error
1	Undefined Command
2	Checksum/CRC error
3	Buffer Overrun
4	Device lost power since last message
5	Data field error
6	Serial watchdog occurred since last message
7	Invalid data - limits sent are out of range
8	Busy Error
9	Invalid module type specified
10	Invalid event type specified
11	Invalid delay specified for TPO, square wave, or generate pulses command
12	Invalid Tag Information - the tag file is either missing or incorrect
29	Timeout
32	Send Error
38	Bus Error
40	I/O device not configured
50	Empty stack
51	Dictionary full
52	Stack full
55	Definition not finished
58	Out of memory

2000-SS30

2000-SoftScreen
Allen-Bradley SLC-500

P/N 97668-030A

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APPENDIX B - CONNECTING TO ALLEN-BRADLEY SLC-500

B.1 INTRODUCTION

This section describes the functional definition of the 2000-SoftScreen to Allen-Bradley SLC-500 interface. The SLC-500 allows access to the addresses that are available in the SLC PLC.

B.1.1 Serial Port Configuration

The Allen-Bradley SLC-500 communication link goes directly from the Xycom terminal via RS-485 Multidrop to the SLC-500 programming port, (RS-232 connected to the 1747-PIC to the SLC-500 programming port).

> **NOTE**
> Make sure the port you use is the same one specified in your SoftScreen software under Configuration-Ports.

B.1.2 Electrical Interface

Figure B-1 shows the cable pinouts used to connect from the 2000 directly to the SLC-500 programming port via RS-485. (Be sure to jumper the port for RS-485).

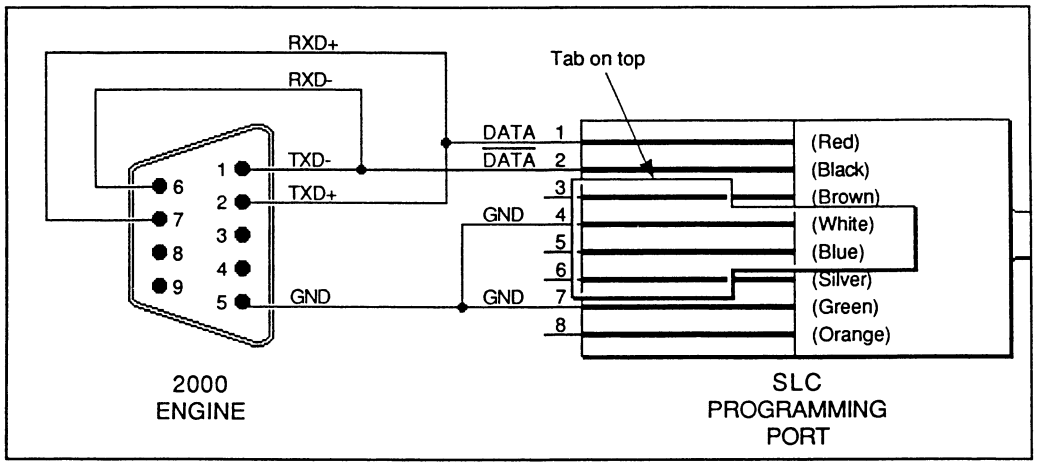

Figure B-1. Cabling to the SLC Programming Port

The cable pinouts used to connect from the 2000 via RS-232 through the 1747-PIC (RS-232 to RS-485 converter) to the SLC programming port are as follows:

Table B-1. RS-232 and 1747-PIC Pinouts

Xycom Engine	9 Pin	1747-PIC	25 Pin
3	TXD	2	-
2	RXD	3	-
7	RTS	4	-
4	DTR	20	-
5	GND	7	-

B.2 SOFTSCREEN DEVELOPMENT SYSTEM CONFIGURATION

This section discusses the Allen-Bradley SLC-500 selectable configuration items that will be found when developing a SLC-500 application on the development system. The configuration items are detailed below:

Baud Rate — Choices are 9600 or 19.2K. Default is 19,200.

Station Address — Assigns a unique Station Address from 0 to 31 for the Xycom Terminals Address on the SLC-500 network *(you cannot have the same Station Address as the PLC).* Default is 0.

Port Connect — Chooses whether you are connecting via RS-232 to the 1747-PIC or connecting via RS-485 **directly** to the SLC-500 programming port. The default is direct.

PLC Type — Choices will be either SLC-500 fixed I/O controller or SLC-502 modular controller.

Allen-Bradley SLC-500 Addressing

The address selections specific to the Allen-Bradley SLC-500 interface are shown in Table B-2 below:

Table B-2. Allen-Bradley SLC-500 Addressing

File Type	File #	Size	R/W
Outputs	0	Word/Bit	R
Inputs	1	Word/Bit	R/W
Status	2	Word/Bit	R
Bit	(3, 10-255)	Word/Bit	R/W
Timers	(4, 10-255)	Word/Bit	R/W
Counters	(5, 10-255)	Word/Bit	R/W
Control	(6, 10-255)	Word/Bit	R/W
Integers	(7, 9-255)	Word/Bit	R/W

Development System Direct Connect Expressions

The following is a list of the Expression Types available for addressing the SLC-500:

1. **[O:E]** or **[O:E.S/Bit]** — Read an Output Data file.

   This expression is used to read a word (16 bits) or bit of output data (outputs from the PLC to the I/O). **E** specifies the slot (0-30), **S** specifies the word number (0-255) for slots having more than 16 outputs. **Bit** is an optional decimal bit number (0-15) in the word being read.

2. **[I:E]** or **[I:E.S/Bit]** — Read/Write an Input Data file.

   This expression is used to read or write a word (16 bits) or bit of input data (outputs from the I/O to the PLC). **E** specifies the slot (0-30) (see page B-7), **S** specifies the word number (0-255) for slots having more than 16 inputs. **Bit** is an optional decimal bit number (0-15) in the word being read.

3. **[S:E]** or **[S:E/Bit]** — Read to the SLC Status file

   This expression is used to read a word (16 bits) or bit of Status data from the SLC status file #2. **E** specifies the element (0-15) (see page B-7). **Bit** is optional decimal bit number (0-15) in the word being read.

4. **[B file:E/Bit]** — Read/Write to a Bit file.

   This expression is used to read or write to a word or bit in a binary file. **File** is the bit file # (3, 10-255) and **E** is the element (0-255) desired. **Bit** is an optional decimal bit number (0-15) in the word being read.

5. **[B file/Bit]** — Read/Write a bit in a Bit file.

   This expression is used to read or write to a bit in a bit file. **File** is the binary file # (3, 10-255) and **Bit** is a decimal bit number in the range of 0-4095 into the file. There are 16 bits per word and up to 255 words in a Binary File.

6. **[T file:E.con/Bit]** Read/Write timer Control values.
[T file:E.pre/Bit] Read/Write timer Preset value.
[T file:E.acc/Bit] Read/Write timer Accumulated value.

This expression is used to read or write to the **control, accumulated** or **preset** values of a timer. **File** is the timer file # (4, 10-255) and **E** is the timer # located in the timer file. **.con, .acc,** and **.pre** specify either the **Control** word, **Accumulated** value word or the **Preset** value word of the timer. **Bit** is an optional decimal bit number (0-15) in the word being read. (**.con**=0 **.pre**=1 **.acc**=2). In the **Control** word of the Timer file, bits 0-7 cannot be accessed because they are reserved for internal PLC use.

7. **[C file:E.con/Bit]** Read/Write counter Control values.
[C file:E.pre/Bit] Read/Write counter Preset value.
[C file:E.acc/Bit] Read/Write counter Accumulated value.

This expression is used to read or write to the **control, accumulated** or **preset** values of a counter. **File** is the counter file # (5, 10-255) and **E** is the counter # located in the counter file. **.con, .acc,** and **.pre** specify either the **Control** word, **Accumulated** value word or the **Preset** value word of the counter. **Bit** is an optional decimal bit number (0-15) in the word being read. (**.con**=0 **.pre**=1 **.acc**=2). In the **Control** word of the Counter file, bits 0-7 cannot be accessed because they are reserved for internal PLC use.

8. **[R file:E.con/Bit]** Read/Write control Control values.
[R file:E.len/Bit] Read/Write control Length value.
[R file:E.pos/Bit] Read/Write control Pointer or Position.

This expression is used to read or write to the **control, length** or **position**/pointer values of a control element. **File** is the control file # (6, 10-255) and **E** is the desired control element located in the control file. **.con, .len,** and **.pos** specify either the **Control** word, **Length** word or the **Position** word for the specified control element. **Bit** is an optional decimal bit number (0-15) in the word being read. (**.con**=0 **.len**=1 **.pos**=2). In the **Control** word of the Control file, bits 0-7 cannot be accessed because they are reserved for internal PLC use.

9. **[N file:E/Bit]** Read/Write to an integer file.

This expression is used to read or write to an element in an integer file. **File** is the integer file # (7, 9-255) and **E** is the integer element located in the integer file. **Bit** is an optional decimal bit number (0-15) in the word being read.

10. **[NETSTAT station]** Read Network Status of a PLC Station.

    This expression will return whether the given PLC **station** (0-31) is active on the SLC-500 network or not. A value of 1 means the station is found and active, a value of 0 means the station is either on the network and inactive, or not on the network at all.

11. **[RUN]** Read/Write the PLC's operating mode.

    This expression will return whether the PLC is in **RUN** mode (1) or **PROGRAM** mode (0). As a write operation, the SLC-500 can be put into **RUN** mode by writing a 1 or **PROGRAM** mode by writing 0.

SLC Fixed Versus SLC Modular I/O Addressing Issues

The SLC-500 fixed I/O controller is addressed via slot numbers 0 through 2. Therefore, the expressions [I:0], [I:1], and [I:2] correspond directly to the three slots in the SLC-500 PLC.

The SLC-501, and SLC-502 processors are modular controllers. These modular controllers can be configured with a maximum of three racks (30 total slots) from a minimum of 4 I/O points to a maximum of 256 I/O points. This allows many different configurations for the I/O. Because of this modularity, the addressing of these modules from SoftScreen needs to be explained further. Slot 0 in any modular SLC controller is reserved for the CPU module. Slots 1 to 30 are available for I/O. Therefore, if you have an Input module in Slot 1 (adjacent to the CPU module), it will be addressed via the expression [I:1]. The catch comes if you move that Input module to Slot 2, and leave Slot 1 empty. The way Allen-Bradley stores the data for the I/O in the corresponding I/O files is to take the first module it finds in the rack, and put it at the beginning of the Input File. Therefore, with SoftScreen, the same expression [I:1] will address an input module in Slot 2 when Slot 1 is left open. Think of it as sliding all of the modules in the rack towards the CPU module, and then using the Physical Slot number to address the desired I/O module. The Allen-Bradley APS Software knows the configuration of the I/O, and can appropriatly adjust the I/O addressing so that you can use [I:2] to address an Input Module located in Slot 2, when Slot 1 is open.

Xycom recommends that you **DO NOT USE** the "I" or the "O" SoftScreen expressions if you plan on *leaving open slots for I/O, or in the future want to insert modules in your backplane after you have developed your SoftScreen application.* Instead, you should move your I/O to a work file with your ladder program, and reference the I/O from that file. This way you will never have to contend with SoftScreen addressing changes if the physical configuration of the I/O racks changes.

> **NOTE**
> If you plan on never changing your I/O set up, the "I" and "O" instructions are recommended.

Error Codes Returned by Driver

The SoftScreen driver for the SLC-500 family is constantly communicating with the SLC PLC. At any time during a message transaction with the PLC, errors could occur. 2000 SoftScreen provides an internal register (#8) that reflects the current error status of the communication link with the PLC. A zero value in register #8 means that there are no errors. A nonzero value indicates some sort of communications error. The list of possible error codes is described below.

Upper 16 bits	
Bit 0	No ACK error. The command sent to the SLC-500 was not acknowledged within a given wait time.
Bit 1	Receive error. The command sent to the SLC-500 was acknowledged, but a response to the command was not received within a give amount of time.
Bit 2	Polling error. The SLC-500 network has been shut down due to errors on the network, or insertion/removal of a SLC-500 station.
Bit 3	Message error. The message # received did not match the message # sent.
Bit 4	SLC error. Everything looks good from the 2000 side, but a local/remote error has been returned by the PLC. The error code returned will be in bits 8-15. See your Allen-Bradley DH/485 protocol manual for a list of the possible local/remote error codes.
Bit 5	SLC extended error. Everything looks good from the 2000 side, but an extended error code has been returned by the PLC. The error code returned will be in bits 8-15. See your Allen-Bradley DH/485 protocol manual under EXT STS for a list of the possible error codes.
Bits 6,7	Unused
Bits 8-15	Contain either a local/remote, or extended error code returned by the SLC-500.
Lower 16 bits	Unused

2000-SS33

2000-SoftScreen Allen-Bradley Data Highway Extended Address

P/N 97668-033A

Printed in the United States of America
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Part Number: ***97668-033A***

APPENDIX B - CONNECTING TO A-B DATA HIGHWAY EXTENDED ADDRESSING

B.1 INTRODUCTION

This section describes the functional definition of the 2000-SoftScreen to Allen-Bradley Data Highway Extended Addressing interface. The interface to Data Highway Extended Address is through the DF1 protocol and uses the extended addressing capabilities of the PLC5. The extended form of addressing allows the specifying of different 'levels' of address from the highest to the lowest.

The specific communication commands (transparent to the user) required to allow the terminal to sit on the Highway and read and write data are listed below:

- Unprotected Write
- Unprotected Bit Write
- Unprotected Read

The user interface allows the user to monitor or change the areas of the PLC data table via SoftScreen software. The user accesses the data table by specifying a file and address in the table. The data table area contains the values of timer/counter actual and preset values, status, integer, floating point, binary, and an image of the I/O tables. The target PLC device can be any Allen-Bradley PLC5 series controller.

B.1.1 Serial Port Configuration

Data Highway Extended Addressing connects to SoftScreen's primary serial port via RS-232C. (The secondary serial port is used for uploading or downloading from the development system or multidrop network.) Make sure the jumpers on the 2000-SoftScreen Workstation are set to RS-232C as shown in Table 2-1 on page 2-5.

> **NOTE**
> Make sure the port you use is the same one specified in your SoftScreen software under Configuration-Ports.

B.1.2 Electrical Interface

There are two distinct ways to connect to the PLCs. The first is network configuration, in which all PLCs are networked on Data Highway Extended Addressing. The second is stand alone, which is a one-to-one link between the PLC and SoftScreen via RS-232C. A direct connect via a network configuration requires the 2000-SoftScreen Workstation's serial port to be wired serially to a 1770-KF2 Communication Controller Module (see Figure B-1 below). A direct connect via stand alone requires the SoftScreen Workstation's serial port to be wired serially to a 1771-KGA, 1771-KGB or 1785-KE Communication Controller Module (see Figure B-2 on the following page).

On the next pages, Figure B-3 shows the stand-alone configurations, while Figure B-4 shows the network configuration.

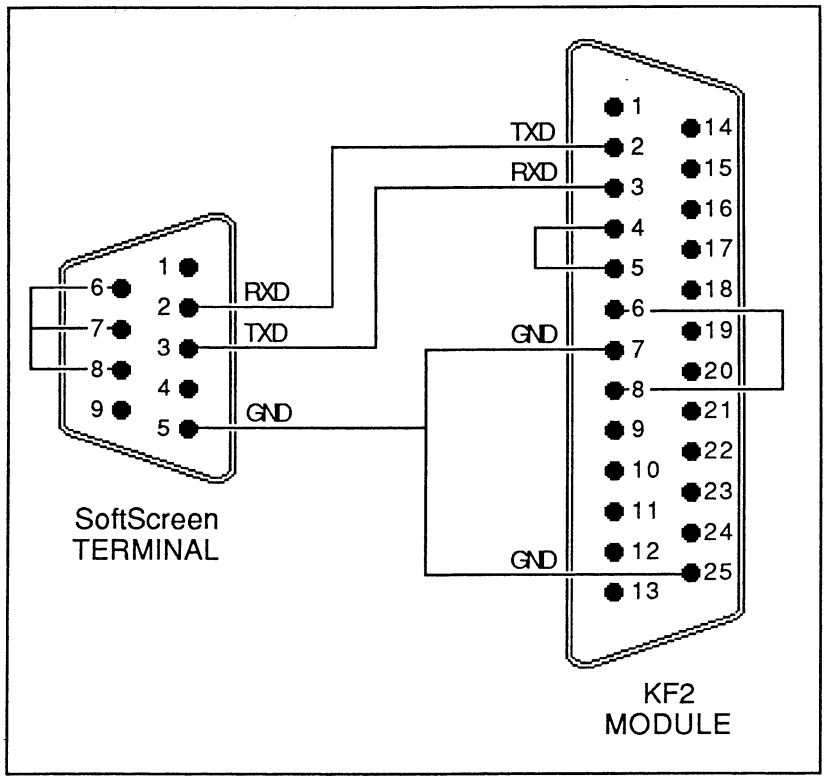

Figure B-1. Cabling to the 1770-KF2

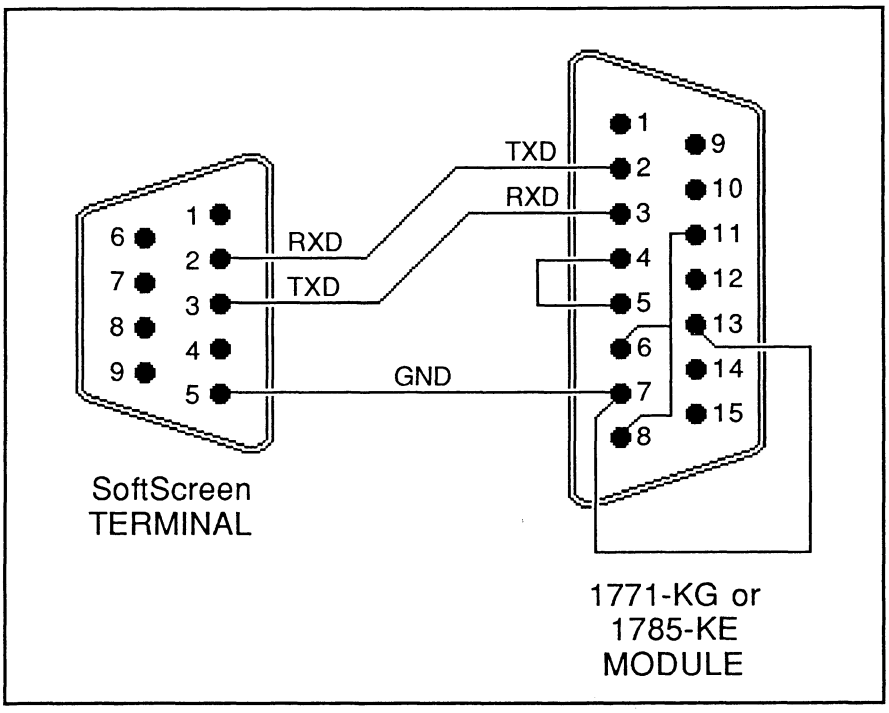

Figure B-2. Cabling to the 1771-KG or 1785-KE

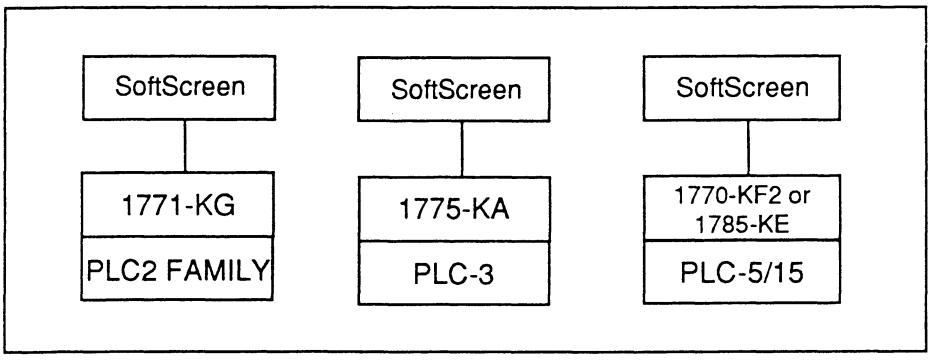

Figure B-3. Allen Bradley Stand Alone Configuration

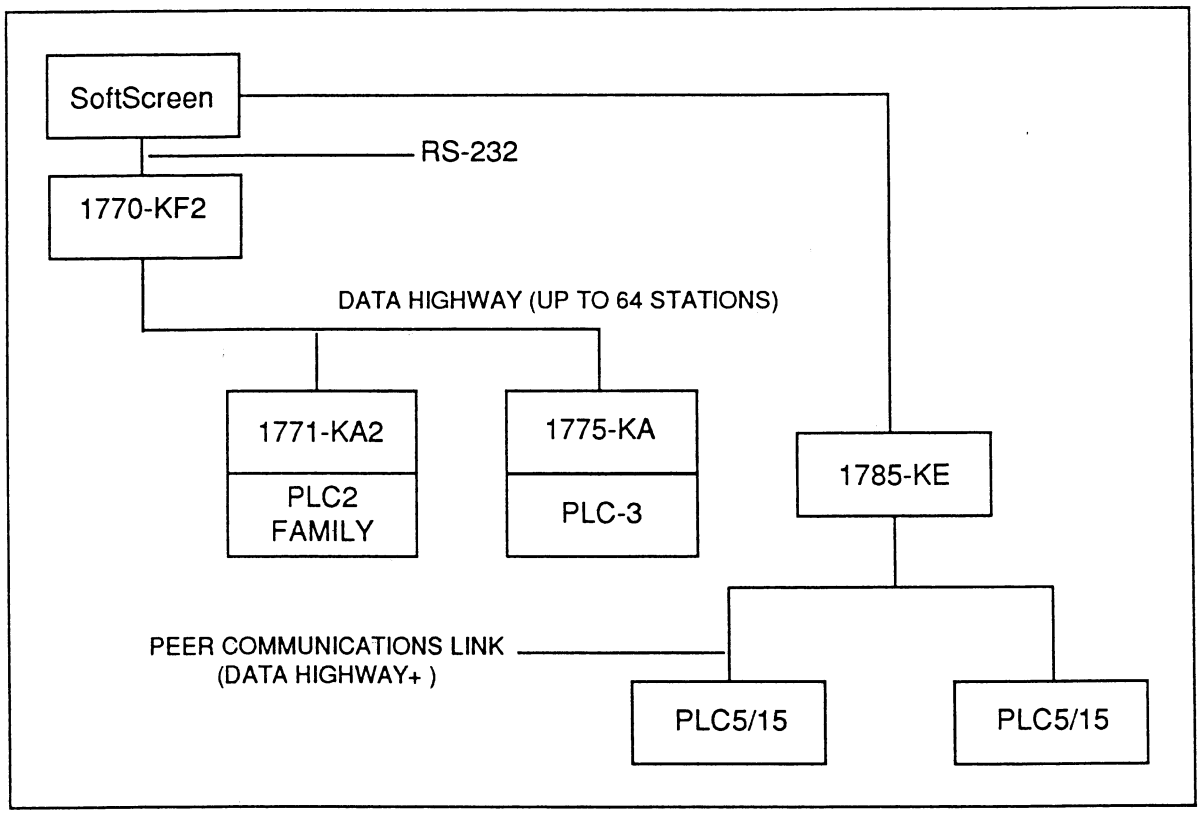

Figure B-4. Allen-Bradley Network Configurations

B.1.3 Allen-Bradley Data Highway Extended Addressing

The address expressions specific to the Allen-Bradley Data Highway Extended Addressing interface are shown in the table below:

Table B-1. Allen-Bradley Data Highway Extended Addressing

File Type	f	a	e	b	R/W
O	-	00-37o	-	0-17o	R
I	-	00-37o	-	0-17o	R
S	-	-	0-31d	0-17o	R
B	3, 9-999d	-	0-999d	0-17o	R/W
B*	3, 9-999d	-	-	0-8191d	R/W
T	4, 9-999d	-	0-999d	0-17o	R/W
C	5, 9-999d	-	0-999d	0-17o	R/W
N	7, 9-999d	-	0-999d	0-17o	R/W
F	8-999d	-	0-999d	-	R/W

* [B f/b] form
d decimal
o octal

Legend

File Types	
I	Input data image area
O	Output
T	Timer
C	Counter
N	Integer
F	Floating point
B	Binary
S	Status
Other Parameters	
a	I/O address. rrg where r = rack # and g = group #
b	bit # (optional)
e	element
f	file #

NOTE

You may use numbers 9-999 to identify any additional bit, timer, counter, control, integer, floating point, ASCII or BCD file types if you need additional file storage.

2000-SS34

2000-SoftScreen/ Eurotherm EI Bisynch ASCII Interface

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B.1 INTRODUCTION

This section documents the SoftScreen serial interface to the Eurotherm PC3000 Process Controller. The driver implements a subset of the Eurotherm EI Bisynch ASCII protocol.

The function block instance.pin names used in the PC3000 program (for example, Zone1_Temp.Val) are used as variable addresses in the SoftScreen application. Eurotherm's Microcell configuration software is used to generate an ASCII import file which is used by SoftScreen. The import file name consists of the Microcell application name with the .EUR extension, and contains the information that allows SoftScreen to map the variable names to actual EI Bisynch addresses. Refer to the Eurotherm *Microcell User Guide* for more information on Xycom export files.

Import files provide SoftScreen with the following information for each variable:

- Name
- Instrument address
- Data type
- Data format
- Information needed to organize the pick list in a hierarchical form

B.2 HARDWARE CONFIGURATION

The Eurotherm driver can communicate to a PC3000 LCM or ICM module using RS-232C or RS-422/485 serial communications through the primary port of the SoftScreen engine.

Port D of the ICM module can be used for RS-232C serial communication. RS-232C pinouts are listed in the table below.

Table B-1. PC3000 ICM Port D
RS-232C Pinouts

SoftScreen Serial Port	PC3000
2 RX	2 TX (orange)
3 TX	3 RX (red)
8 CTS	4 RTS (green)
7 RTS	5 CTS (black)
5 GND	7.8 COM (gray, white)

The Eurotherm part number for this cable is PC3000/CABLE/COMM232/9PIN/3.0M11.

RS-422/485 pinouts are listed in the table below.

Table B-2. PC3000 LCM Ports A-D, ICM Ports A-C
RS-422/485 Pinouts

SoftScreen Serial Port	PC3000
2 TX+	5 RX- (green)
1 TX-	6 RX+ (blue)
6 RX-	4 TX+ (black)
7 RX+	3 TX- (red)
5 GND	7.8 COM (gray, white)

The Eurotherm part number for this cable is PC3000/CABLE/COMM/CRT9C/3.0M11.

B.3 SUPPORTED DATA FORMATS

SoftScreen allows string and fixed decimal display and entry objects. String format accepts ASCII characters. In configuration menus, users can specify the maximum string length for each object. Strings that exceed this length will be truncated from the right until they fit the display field. No mathematical functions or tests are allowed on data in this format.

Fixed decimal format allows up to five decimal digits before the decimal point and up to four decimal digits after the decimal point, with a range of -32768 to 32767.9998 inclusive. If a number received by the driver is too big, it will be displayed as the maximum value allowed. If a number is too small, it will be displayed as the minimum value allowed. For example, floating point numbers less than -32768 are converted to -32678 and numbers greater than 32767.9998 are converted to 32767.9998. For numbers larger than 32767.9998, use the string data display and string data entry objects.

The valid addressing ranges for PLC data types accepted by the Eurotherm driver are listed in the table below:

Table B-3. Eurotherm Addressing

PC3000 Data Type	**String Range**	**Fixed Decimal Range**
Boolean	N/A	0 to 1
Hexadecimal	0 to 80 hex characters	NA
Integer (Dint, Int, Integer, Sint)	-1000000000 to 1000000000	-32768 to 32767
Packed IEEE (Real)	-1000000000.0000 to 1000000000.0000	-32768 to 32767.9998
String	0 to 80 ASCII characters	N/A
Time	00D 00H 00M 00S 000ms to 23D 23H 59M 59S 000ms	N/A
*Date and Time	MMM dd,yyyy hh:mm:ss	NA

*Date and Time are display only; entry is not allowed.

Time variables may be entered and displayed in string format only. The format for the time variable is as follows:

xxD xxH xxM xxS xxxms

where:

x = Decimal Digit
D = Days
H = Hours
M = Minutes
S = Seconds
ms = Milliseconds

Date and time variables are read only. They are displayed in string format:

MMM dd,yyyy hh:mm:ss

where:

MMM = Three character month
dd = Day of the month
yyyy = Year
hh = Hours
mm = Minutes
ss = Seconds

B.4 ERROR CODES

Communication errors are returned by setting bits in communication status register number 8. Error codes that can be returned by the driver are listed in the table below.

Table B-4. Error Codes

Bit	Definition
0	Receive error. This bit is set if the engine receives a character that is different than expected (i.e., an SOH (01h) when data is expected).
1	Illegal command mnemonic or channel number. This bit is set if the command mnemonic or channel number sent by the master is not recognized by the Eurotherm instrument. An end of transmission (EOT) is then sent to the master if the number of retries is equal to 0. If the number of retries is greater than 0, the sequence is sent again.
2	BCC error. This bit is set and an EOT is sent if the Block Check Character (BCC) fails more than the number of retries specified in the Eurotherm Configuration Menu.
3	NAK received from Eurotherm instrument. This bit is set and no further attempts will be made by the driver to transmit the message if a NAK is received from the Eurotherm instrument more times than is specified in the Eurotherm Configuration Menu.
4	Timeout. This bit is set if a transmission from a Eurotherm instrument takes longer than the time specified in the Eurotherm Configuration Menu and there are no retries remaining. This timer is restarted for each transmission block of a multiblock message.
5	Fixed decimal overflow/underflow. This bit is set if fixed decimal format is specified for a display object and data received by the driver are too big or too small to be displayed.
6	Parity error. This bit is set and an EOT is transmitted if the parity bit fails to match the parity of the character.
7	Data format conversion error. This bit is set if an illegal conversion is attempted.
8-15	Not used.

2000-SS35

2000-SoftScreen/ General Electric Series 1 Interface

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B.1 INTRODUCTION

This section describes the functional definition of the SoftScreen to General Electric (GE) Series 1 interface. The SoftScreen engine communicates with the GE programmable controller via RS-232C or RS-422.

The SoftScreen engine always functions as the master device and initiates all commands; any PLCs are considered slaves. The SoftScreen driver uses the CCM2 master/slave mode multiple station protocol to communicate with the GE PLCs. All messages are sent "normal sequence." This protocol allows SoftScreen to communicate directly with the GE Series 1 PLC to access or modify the inputs, outputs, and registers.

This protocol can also be used to communicate with the GE Series 3, Texas Instruments 305, Texas Instruments 405 (using a HOSTLINK DCU module), and any other PLC that follows the CCM2 protocol. Each of the memory areas for these PLCs has been mapped to correspond to an area in the GE Series 1 as shown below:

Table B-1. Memory Types

SoftScreen GE Series 1	Memory Types
Registers	Type 1 or "31"
Inputs	Type 2 or "32"
Outputs	Type 3 or 33"

Consult your PLC reference material for a cross reference between memory types "1," "2," and "3," and the memory areas specific to your PLC.

B.1.1 Serial Port Configuration

The GE Series 1 PLC can connect to SoftScreen's primary serial port via RS-232C or RS-422. (The secondary serial port is used for uploading or downloading from the development system or multidrop network.) Make sure the jumpers on the 2000-SoftScreen Workstation are properly set to either RS-232C or RS-422.

> **NOTE**
> Make sure the port you use is the same one specified in the SoftScreen Development System under Configuration-Ports.

B.1.2 **Electrical Interface**

The electrical interface for the GE Series 1 PLC interface is either RS-232C or RS-422. Figure B-1 shows the RS-232C cabling, and figures B-2 and B-3 on the following page shows the RS-422 cabling.

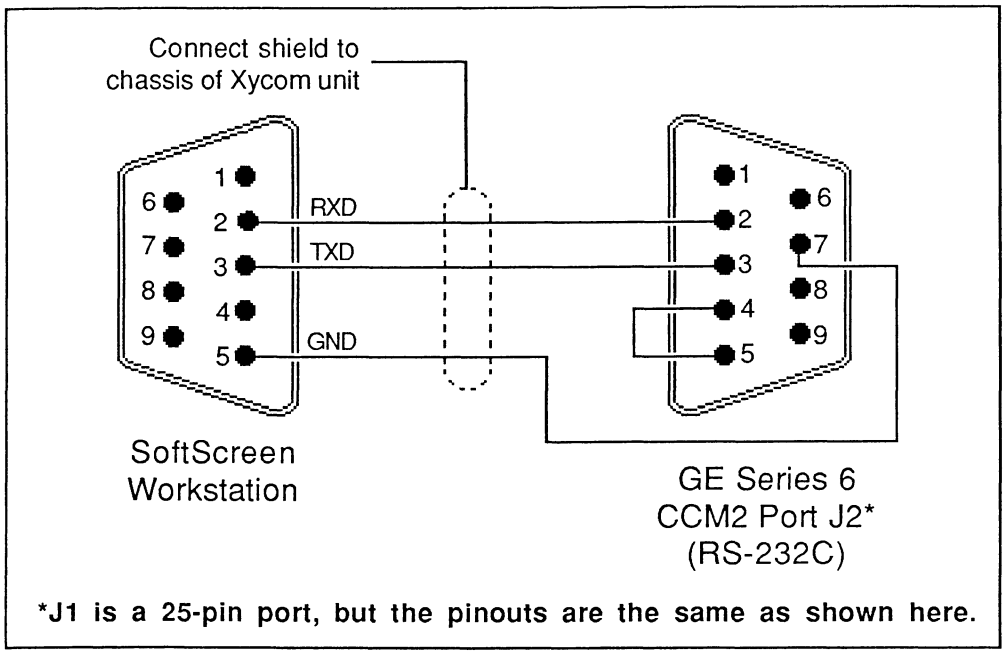

Figure B-1. RS-232C Cabling to the GE Series 1

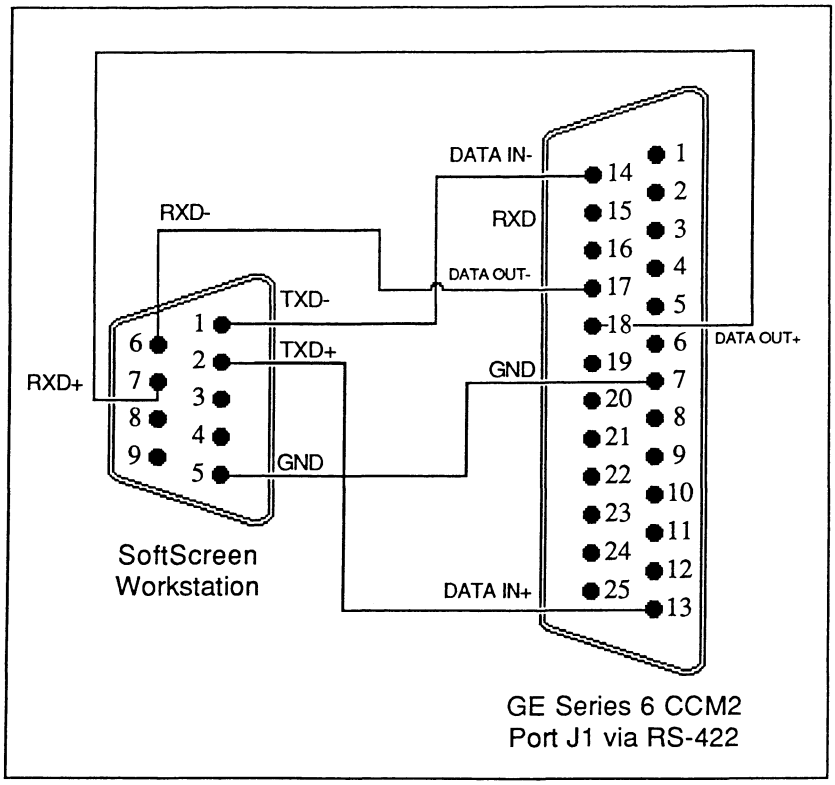

Figure B-2. RS-422 Cabling to the GE Series 1 via Port J1

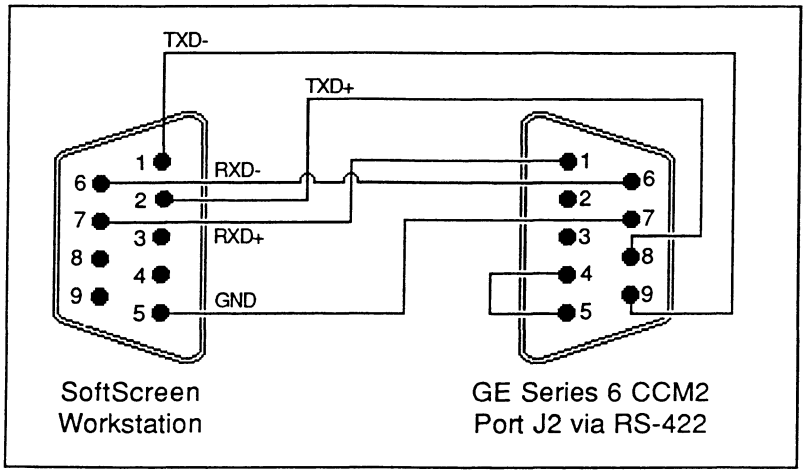

Figure B-3. RS-422 Cabling to the GE Series 1 via Port J2

B.1.3 General Electric Series 1 Addressing

The address expressions specific to the General Electric Series 1 interface are shown in the table below:

Table B-1. GE Series 1 Addressing

Device	PLC Address	Number Type	Size	R/W
Input	I0001-I65535	Decimal	Bit	R
Output	O0001-O65535	Decimal	Bit	R
Register	R0001-R65535	Decimal	Word	R/W

Example 1:

If the expression [PLC1:R0005 3] is entered in the development system for a data display object, the 2000 engine will read and display the value in PLC1, word R0005, bit 3.

Example 2:

Using a TI-405 with a HOSTLINK DCU module, reading [R1] (memory type 1, word 1) results in SoftScreen reading and displaying the value for TMR Accumulator 1.

For more information on expression value formats, see Appendix C of the SoftScreen Development System manual.