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3100/3101-SEA

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SEABUS Plus Communication Module

USER MANUAL

Please Read This Notice

Successful application of the SEA card requires a reasonable working knowledge of the Allen-Bradley PLC or SLC hardware and the application in which the combination is to be used. For this reason, it is important that those responsible for implementing the SEA satisfy themselves that the combination will meet the needs of the application without exposing personnel or equipment to unsafe or inappropriate working conditions.

This manual is provided to assist the user. Every attempt has been made to assure that the information provided is accurate and a true reflection of the product's installation requirements. In order to assure a complete understanding of the operation of the product, the user should read all applicable Allen-Bradley documentation on the operation of the A-B hardware.

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I Card Overview

The 3100/3150-SEA SEABUS Plus Communication product allows Allen-Bradley 1771 and 1746 I/O compatible processors to easily interface with products support the SEABUS Plus protocol. In particular, the SEA product supports the Siemens 4700, 4300 and Static Trip III at this time. The product is available from ProSoft Technology as either a module or a firmware solution. The firmware solution allows standard Allen-Bradley 1771-DB/B and 1746-BAS modules to be used as hardware platforms.

The SEA product includes the following standard features:

General Specifications

- Two fully configurable serial ports, each capable of supporting the SEABUS Plus protocol

- Support for the storage and transfer of up to 4000 registers to the PLC and SLC data tables

- The data objects for each of the device types is pre-defined, making implementation very easy

- RS-422/RS-485 compatible for multidrop applications with up to 32 slaves per port

- Software configuration (From processor ladder logic)
 - Parity : None, odd, or even,
 - Stop Bit : 1 or 2
 - Baud Rate : 300 TO 38,400
 - RTS to TxD : 0-65535 ms, 1 ms resolution
 - RTS Off : 0-65535 ms, 1 ms resolution

II **Configuring the Module**

2.1 **Hardware Overview**

When purchasing the SEA product, there are two available choices for each platform. These choices are as follows:

<u>PLC</u>	<u>ProSoft Cat Num</u>		<u>Description</u>
	<u>SLC</u>		
Module provided by ProSoft	3100-SEA	3150-SEA	
Firmware only	3101-SEA	3151-SEA	

When purchasing the module from ProSoft Technology, many of the jumper configurations will have been factory set. When purchasing the firmware from ProSoft Technology and the Allen-Bradley module from another source, particular attention must be paid to hardware configuration.

2.2 **Module Jumper Configurations**

The following section details the available jumper configurations for the 1771 and 1746 platform solutions. As needed, differences between the module based solutions and the firmware based solutions are highlighted.

2.2.1 **3100/3101 for the 1771 Platform**

Following are the jumper positions for the 1771-DB Rev B module and the ProSoft Technology 3100-SEA module (See Appendix C for details on jumper locations):

<u>Jumper</u>	<u>3100-SEA</u>	<u>3101-SEA</u>
JW1	N/A	Enabled
JW2	N/A	32K PROM
JW3	N/A	Turbo
JW4	Not Used	ASCII/ASCII
JW5	16 Pt	16 Pt
JW6	Not Used	Not Used
JW7	Enabled	Enabled
JW8	As Needed	As Needed
JW9	As Needed	As Needed

JW1 Watchdog Enable / Disable

Enable

The position of this jumper does not affect the operation of the unit under normal operations. In order to enable the watchdog function, simply place the jumper in the Enabled position.

JW2 PROM select

32K PROM

The position of this jumper is very important to the successful operation of the module. In order to operate with our SEA EPROM, the jumper must be in the 32K PROM position.

JW3 Speed select (Normal / Turbo) Turbo
 The position of this jumper does not affect the operation of the unit under normal operations. Unless there are reasons not to operate in the Turbo mode, we recommend operating in the Turbo mode.

JW4 Port 1 and 2 configuration Position A
 The position of this jumper set must be changed from the shipped default position (D) to the A position. Operation of the module will be unpredictable if the jumper set is not in the A position.

A	PRT 1 = ASCII	PRT 2 = ASCII	DH485 = PGM
B	PRT 1 = PGM	PRT 2 = ASCII	DH485 = RUN
C	PRT 1 = PGM	PRT 2 = DF1	DH485 = DISABLED
D	PRT 1 = PGM DEFAULT	PRT 2 = ASCII	DH485 = RUN

JW5 Backplane 8/16 point 16 Point
 The module has only been tested in the 8 and 16 point modes and has successfully operated in both positions. The 8 point mode should be used when installing the module into old PLC-2 installations.

JW6 Port 2 Baud Rate Not Used
 This jumper is not used by the SEA firmware. All baud rate configuration is performed through the ladder logic data table.

JW7 Battery Enable / Disable Enabled
 This jumper should be placed in the Enabled position when the module is powered up. Although not critical to the operation of the module, this will back up some data registers in the module during a power failure or reset.

JW8/9 RS Configuration for Port 1 and 2 See options on module
 The default from factory is RS-232, but all options are supported by the SEA firmware

2.2.2 3150/3151 for the 1746 Platform

Following are the jumper positions for the 1746-BAS module and the ProSoft Technology 3150-SEA module (See Appendix C for details on jumper locations):

<u>Jumper</u>	<u>3150-SEA</u>	<u>3151-SEA</u>
JW1	As Needed	As Needed
JW2	As Needed	As Needed
JW3	N/A	3-5, 4-6
JW4	N/A	1-3, 2-4

JW1/2 RS configuration for port 1 and 2 See Appendix C
 The default from factory is RS-232, but all options are supported by the SEA firmware

JW3 Memory Selection

3-5, 4-6

When using the 3151 firmware solution with a 1746-BAS module, the EPROM is plugged into the User Socket. When in this configuration, it is essential that the jumper be in the correct position.

With the 3150 module, this jumper will not affect operation of the product.

JW4 Mode Configuration

1-3, 2-4

When using the 3151 firmware solution with a 1746-BAS module, it is essential that the jumper be in the correct position.

With the 3150 module, this jumper will not affect operation of the product.

2.3 Firmware Installation Procedure (3101 & 3151)

The following section details the available jumper configurations for the 1771 and 1746 platform solutions. As needed, differences between the module based solutions and the firmware based solutions are highlighted.

2.3.1 1771-DB Revision B Module

The firmware installation steps are as follows:

1. Remove the card cover from the module
2. Plug the ProSoft Technology EPROM into the module's User Socket. Align the notches on the EPROM plastic carrier with the notches in the User socket. Make sure the EPROM is well seated
3. Replace the card cover
4. Turn the module over and locate the identification sticker in the unused indent. This sticker will be important should the module ever require service.

2.3.2 1746-BAS Module

The firmware installation steps are as follows:

1. Plug the ProSoft Technology EPROM into the module's User Socket. Align the notches on the EPROM plastic carrier with the notches in the User socket. Make sure the EPROM is well seated
2. Remove the plastic lens cover from the 1746-BAS module and slip on the new cover provided with the firmware. Make sure the cover is firmly affixed to the module

Once the firmware has been installed and the module's jumpers have been verified, the hardware is ready to be inserted into the I/O rack.

III **Programming Considerations**

The SEA product family is very easy to implement. In both the PLC and the SLC platforms, the addition of several simple ladder rungs and the configuration of several configuration registers enables the module to operate as a very effective SEABUS Plus Master protocol interface. To ease initial contact with the product we have included a demonstration ladder program in Appendix A. An electronic copy of the ladder logic is available on disk with each product purchase.

The following discussion covers the example logic located in Appendix A in an overview fashion. In addition, an explanation is given on how to adjust the ladder logic for a different application.

3.1 3100-SEA Overview

In order to get the SEA operating with the example ladder logic only one modification should be necessary. The ladder logic BTR and BTW instructions may need to be modified to ensure that the Block Transfer instructions are set up for the correct rack and group (slot) address.

3.2 3150-SEA Overview

The 3150-SEA is also very easy to get operational. After the lens cover and firmware are installed and the jumpers have been configured, the module is ready to be configured. See Section 4 for details on configuring the module.

In order to implement the sample logic, the user must make sure that the correct processor and rack size match up. Also, should it be necessary to re-locate the SEA module, the user should be certain to configure the correct slot as a 1746-BAS 5/02 Configuration.

3.2.1 SLC Processor I/O Configuration

When initially setting up the SLC program file, or when moving the module from one slot to another, the user must configure the slot to accept the SEA module.

It is important that the slot containing the ProSoft module be configured as follows:

- 1746-BAS module or enter 13106 for the module code
- Configure the M0/M1 files for 64 words
- Configure I/O for 8 words

The following is a step by step on how to configure these files using Allen-Bradley APS software. ICOM software users should follow similar steps.

From the Main Menu:

- 1) Select the correct processor program and F3 for Offline programming
- 2) F1 for Processor Functions
- 3) F1 for Change Processor
 Modify the processor here if necessary (Note the SEA will only work with 5/02 or greater processors)
- 4) F5 for Configure I/O
 Select 1746-BAS module for SLC 5/02 or greater, or enter 13106 for module code
- 5) F9 for SPIO Config when the correct slot is highlighted
- 6) F5 Advanced Setup
- 7) F5 for M0 file length - type in 64 and Enter
- 8) F6 for M1 file length - type in 64 and Enter

Esc out and save configuration

3.3 Ladder Logic Considerations

Those familiar with our 1100 family of products will observe that the ladder logic requirements for the SEA are substantially less. Much of the simplification of the ladder logic is due to:

- The module now controls and feeds the Block ID numbers to the ladder logic. All ladder logic associated with manipulating the Block ID number has been eliminated

3.3.1 Operational Overview

On power up the module moves a 255 into Word 1 of the BTR data file. This is a signal that the module needs to receive configuration data before proceeding any further. Once the configuration is received the module will begin transferring data to and from the processor depending upon how many Read and Write block counts have been configured. Once these are completed, the module will then transfer the command blocks if any have been configured.

3.3.2 Example Ladder Logic Overview

The sample logic is setup to perform the following:

1. Operate out of the slot next to the processor
2. Operate as a Slave on Port 1
3. Operate as a Master on Port 2
4. Move 50 words of PLC data table registers to the module in registers 0 to 49
5. Move 50 words of module register space 50-99 into the PLC data table
6. Move up to 5 Modbus Master commands to the module

The following discusses how the logic if more data or commands are needed.

Rung 2: 0

READ DATA FROM SEA MODULE

This rung moves data from the MI file (transfer file from SEA) to ladder memory when the Block ID is = 1. Module request for configuration is also received here. The BTW Block ID word is moved to the BTW Block ID word to setup the BTW.

MD/MI ENABLE	MD/MI DONE			BT READ DATA BLOCK ID = 0
I: 1.0	0: 1.0	+EQU-	-----+	+COP-
]]	+EQUAL	-----+	+COPY FILE
0	0	Src A	MI: 1.0	Source #MI: 1.2
		Src B	0	Dest #N10: 0
				Length 50
				-----+
				BT READ DATA BLOCK ID = 1
		+EQU-	-----+	+COP-
Move data from module to N10		+EQUAL	-----+	+COPY FILE
		Src A	MI: 1.0	Source #MI: 1.2
		Src B	1	Dest #N10: 50
				Length 50
				-----+
				BT READ DATA BLOCK ID = 2
		+EQU-	-----+	+COP-
Move data from module to N10		+EQUAL	-----+	+COPY FILE
		Src A	MI: 1.0	Source #MI: 1.2
		Src B	2	Dest #N10: 100
				Length 50
				-----+
				ENCODES BLOCK
				+MOV-
				+MOVE
				Source MI: 1.1
				Dest MD: 1.0
				*
				*
				-----+
		USER CONFIG DOWNLOAD SELECT BIT		ENCODES BLOCK
		B3		+MOV-
]		+MOVE
		0		Source 255
				Dest MD: 1.0
				*
				*
				-----+

Rung 2: 1

WRITE DATA OR CONFIGURATION BLOCK TO SEA MODULE

This rung moves data from the ladder logic data space to the SEA module. To add additional data, simply add more EQ branches. The command list to support a Master port is moved with Block ID 80 to support up to 5 commands. Configuration data is also moved to this rung.

MD/MI ENABLE	MD/MI DONE	DECODES BLOCK ID 0	WRITES BLOCK
I: 1.0	0: 1.0	+EQU-----+ +EQUAL Src A MD: 1.0 * Src B 0	+COP-----+ +COPY FILE Source #N10: 0 Dest #MD: 1.1 Length 50
		DECODES BLOCK	WRITES BLOCK
Port 1 Slave List		+EQU-----+ +EQUAL Src A MD: 1.0 * Src B 80	+COP-----+ +COPY FILE Source #N7: 50 Dest #MD: 1.1 Length 50
		DECODES BLOCK	WRITES BLOCK
Port 2 Slave List		+EQU-----+ +EQUAL Src A MD: 1.0 * Src B 81	+COP-----+ +COPY FILE Source #N7: 100 Dest #MD: 1.1 Length 50
		DECODES BLOCK	WRITES BLOCK
Configuration Data to module		+EQU-----+ +EQUAL Src A MD: 1.0 * Src B 255	+COP-----+ +COPY FILE Source #N7: 0 Dest #MD: 1.1 Length 30
			USER CONFIG DOWNLOAD SELECT B3 (U) 0
			MD/MI DONE 0: 1 () 0

IV Theoretical Operation

Data transfers between the processor and the ProSoft Technology module occur using the Block Transfer commands, in the case of the PLC, and M0/M1 data transfer commands, in the case of the SLC. These commands transfer up to 64 physical registers per transfer. The logical data length changes depending on the data transfer function.

The following discussion details the data structures used to transfer the different types of data between the ProSoft Technology module and the processor. The term 'Block Transfer' is used generically in the following discussion to depict the transfer of data blocks between the processor and the ProSoft Technology module. Although a true Block Transfer function does not exist in the SLC, we have implemented a pseudo-block transfer command in order to assure data integrity at the block level. Examples of the PLC and SLC ladder logic are included in Appendix A.

In order for the ProSoft Technology module to function, the PLC must be in the RUN mode, or in the REM RUN mode. If in any other mode (Fault/PGM), the block transfers between the PLC and the module will stop, and communications will halt until block transfers resume.

4.1 Writing Data to the Module

This section discusses how the transfer mechanism functions, and how to transfer data, command list and configuration data to the ProSoft module.

Data transfer to the module from the processor is executed through the Block Transfer Write function. The different types of data which are transferred require slightly different data block structures, but the basic data structure is:

<u>Word</u>	<u>Description</u>
0	Block ID code
1-63	Data

In a PLC, the BTW length must be configured for 64 words, otherwise module operation will be unpredictable.

Where:

Block ID Code: A block identifier code between 0 and 255 in value. This code is used by the ProSoft module to determine what to do with the data block. Valid codes are:

<u>Code</u>	<u>Description</u>
0-79	Module Data Memory
80-99	Command List
255	Module Communication Configuration

Data: The data to be written to the module. The structure of the data is dependent on the Block ID code. The following sections provide details on the different structures.

4.1.1 Communications Configuration [Block ID Code 255]

The ProSoft Technology firmware communication parameters must be configured at least once when the card is first powered up, and any time thereafter when the parameters must be changed.

On power up, the module enters into a logical loop waiting to receive configuration data from the processor. While waiting, the module sets the first word of the BTR buffer to 255, telling the processor that the module must be configured before anything else will be done. The module will continuously perform block transfers until the communications configuration parameters block is received. Upon receipt, the module will begin execution of the command list if present, or begin looking for the command list from the processor.

Transferring the Communications Configuration Parameters to the module will force a reset of the communication port, as well as dropping DTR for 200 ms pulses to reset any attached hardware.

The configuration data block structure which must be transferred from the processor to the module is as follows:

<u>Data Word</u>	<u>Description</u>
Port 1	
	Block ID Header = 255
0	N[]:0 Port Configuration Word
1	N[]:1 N/A
2	N[]:2 Baud Rate
3	N[]:3 RTS to TxD Delay
4	N[]:4 RTS off Delay
5	N[]:5 Message Response Timeout
6	N[]:6 Inter-character timing
7	N[]:7 N/A
8	N[]:8 N/A
9	N[]:9 N/A
Port 2	
10	N[]:10 Port Configuration Word
11	N[]:11 N/A
12	N[]:12 Baud Rate
13	N[]:13 RTS to TxD Delay
14	N[]:14 RTS off Delay
15	N[]:15 Message Response Timeout
16	N[]:16 Inter-character timing
17	N[]:17 N/A
18	N[]:18 N/A
19	N[]:19 N/A

System Configuration

20	N[]:20	Read Data Block Count
21	N[]:21	N/A
22	N[]:22	N/A
23	N[]:23	N/A
24	N[]:24	Master Error Table Pointer
25	N[]:25	Block Transfer Delay Counter

Where:

For Port 1 and Port 2

Port Configuration Word: This register contains several communication configuration parameters encoded into the word. These are as follows:

Stop Bits: The number of stop bits to be used is defined as follows:

Bits

13 12

0	0	One stop bit
0	1	Two stop bits
1	x	Invalid Port Configuration

Parity: The parity mode to be used by the module is defined by this word as follows:

Bits

15 14

0	0	No parity
0	1	Odd parity
1	0	Even parity
1	1	Invalid Port Configuration

Baud Rate: The baud rate at which the module is to operate. The baud rate is configured as follows:

<u>Value</u>	<u>Baud Rate</u>
0	300 Baud
1	600 Baud
2	1200 Baud
3	2400 Baud
4	4800 Baud
5	9600 Baud
6	19200 Baud
7	38400 Baud

<p>The module's two ports are limited to an upper baud rate of either 19200 or 38400 baud. The module cannot be configured with one port at 19200 and the other at 38400. If an attempt is made to configure the module in this fashion, a Port Configuration Error will be returned.</p>

RTS To TXD Delay: This value represents the time in 1 ms increments to be inserted between asserting RTS, and the actual transmission of data. The delay, if greater in duration than the hardware time delay associated with CTS, will override the CTS line until the time-out is complete.

This configurable parameter is useful when interfacing with modem based devices, or anytime line noise must be allowed to subside before data is transmitted.

RTS Off Delay: The value in this word represents the number of 1 ms time delay increments inserted after the last character is transmitted and before RTS is dropped. The module automatically inserts a one character width Off Delay, assuring that RTS does not drop until after the last character has been completely sent. Unless working under unusual conditions, this value will normally be configured with a value of 0. The maximum value to be used is 65535 (0xffff).

Message Response Timeout: This register represents the message response timeout period in 1 ms increments. This is the time which a port configured as a Master will wait before re-transmitting a command if no response is received from the addressed slave. The value is set depending on the expected slave response times.

The allowable range of values is 0 to 65535(0xffff). If a zero value is entered, the module will default to a one second timeout value (1000 ms).

Inter-character Timing: This register is used in situations where the end of message character timeout delay must be extended beyond the normal 3.5 character widths. The value entered represents the number of 1 ms intervals of 'no tra counted prior to accepting a message. This parameter will be useful in satellite or packet radio installation where a data transmission may be split between two packets. Increasing this value beyond the system's packet handling time will eliminate timeout errors.

System Configuration

Read Data Block Count: This value represents the number of 50 word data blocks which are to be transferred from the SEA Module to the processor. The blocks returned from the module start at block 0 and increment from there. The maximum block count is 80.

As an example, a value of 5 will return data blocks 0, 1, 2, 3, and 4, or module registers 0 to 249.

If a value greater than 80 is entered, a System Configuration Error is activated
--

Master Error Block Pointer: This value represents the relative starting position in the module's data register table within which the Master Error Data Block is placed. The error block (120 words in length) can be placed anywhere in the module's data space (0 to 3999). The contents of the Error Table can then be obtained as part of the regular Register Data.

If a value greater than 3750 is entered, a System Configuration Error is activated

Block Transfer Delay Counter: This value is used by the module to slow down the block transfer loading between the module and the processor. Excessive Block Transfers can slow down the response time of the SEA's communication ports. This parameter has been provided to allow the Block Transfer timing to be determined on an application basis. A value of 0 is normally used at the factory and is recommended as a starting point.

4.1.2 SEABUS Slave Poll List [Block ID Codes 80 & 81]

A SEA Master port establishes communications and performs various communications functions based on the data which the user has placed in the Slave Poll List. This list, entered into the processor Data Table, is transferred to the module's memory using Block ID codes 80 and 81.

The Slave Poll list consists of up to 32 individual Slave 'Type' configuration positions. The Poll List data allows the SEA Master driver to create the correct command for the appropriate instrument type. The structure of the command configuration data block is as follows:

<u>Word</u>	<u>Description</u>
0	Data Table Pointer
1-32	Slave Type Select

Where:

Slave Type Select: The Slave Type Select parameters allow the user to select the type of slave at each slave address that is to be polled. The slave address for each slave is determined by the position in the Slave Poll List. Valid values are:

<u>Slave Type</u>	<u>Description</u>
1	4700 Meter - Long data read
2	4700 Meter - Short data read
3	4300 Meter
4	Static Trip III - Short data read
5	Static Trip III - Long data read

Writing the Slave Poll List to the Module

The Slave Poll List configuration data is written out to the SEA Module in 33 word blocks per port. The Block Transfer Write data block is structure as follows:

<u>Word</u>	<u>Description</u>
0	Block ID Code (80, 81)
1-33	Slave Poll List Data

Where:

Block ID: The block identifier number allows the SEA Module to decode which portion of the command configuration table is being written. Valid numbers for the block ID are 80 and 81

Slave Poll List Data: Consists of the data outlined in the above discussion.

4.2 Reading Data from the Module

This section discusses how to get data received from the slaves and the command error response codes from the module into the processor.

The transfer of data from the ProSoft Technology module to the processor is executed through the Block Transfer Read function. Three basic different types of data are read from the module into the processor;

- Module Register Data [Block ID 0 to 79]
- Configuration Request [Block ID 255]

The data structure for the block transfer depends on the type of block data. The following sections detail the different types of data.

In a PLC, the BTR length must be configured for a length of 64 words, otherwise module operation will be unpredictable

The ladder logic must be programmed to look at the BTR buffer, decode several words, and then take action. The BTR buffer definition is:

<u>Word</u>	<u>Description</u>
0	Block ID Code
1	BTW Block ID Number
2-62	Data

Where:

BTW Block ID Number: The module returns this value to the processor to be used to enable the movement of register data and command list blocks to the module.

Data: The contents of the module's Register Data space (0 - 3999). This data will contain data received from the slaves, data moved from the processor, and the Slave and Master Error Tables. The values will be 16 bit register values, and should be placed into integer files. Note that the user application ladder logic controls the placement and use of the data registers.

4.2.1 Reading Module Register Data [Block ID 0 to 79]

When a slave read command is executed by the Master, or when a Host writes to the SEA Module, the resulting data is placed into the ProSoft module data register space (Addresses 0 to 3999). This data space is transferred to the processor asynchronously, continuously updating the ladder logic data space.

To make use of the data from the module, the ladder logic must be programmed to look at the BTR buffer, decode the Block ID and then take action. When transferring the Module Register Space Data, the BTR buffer is structured as follows:

<u>Word</u>	<u>Description</u>
0	Block ID Code
1	BTW Block ID Number
2-51	Data (50 words of Data)

Where:

DATA: The Module Register Data. The values will be 16 bit register values, and should be placed into an integer file. Note that the user application ladder logic controls the placement and use of the data registers.

4.2.3 Slave Error Table

The SEA Module monitors the status of all Slave commands. This status is communicated to the processor in the form of a Slave Error Code Table.

The Slave Error Code Table is initialized to zero on power up, and every time the module receives the 255 configuration data block.

The Slave Error Table is an 80 word block. The location of the Error Table is determined by the Slave Error Table Pointer parameter in the Configuration Block.

The structure of the data block is as follows:

<u>Word</u>	<u>Description</u>
0	End of Poll
1-32	Port 1 Slave Error Codes
33-65	Port 2 Slave Error Codes

Where:

End of Poll : This register is a bit mapped value which toggles every scan through the Slave Poll List. The bit map is as follows:

<u>Bit</u>	<u>Description</u>
0	Port 1
1	Port 2

Port x Slave Error Codes: This value represents the current value of the error code for the port. The possible values are detailed in the following section.

4.2.4 Error Status Codes

The Error Codes returned in the Slave and Master Error Code Tables reflect the outcome of the commands and responses executed by the module. Note that in all cases, if a zero is returned, there was not an error. Valid Error Status Codes are as follows:

<u>Code</u>	<u>Description</u>
0	All OK The module is operating as desired.
1	Illegal Function An illegal function code request has been received from the master
2	Illegal Data Address The address, or the range of addresses, covered by a request from the master are not within allowed limits

3	<p>Illegal Data Value</p> <p>The value in the data field of the command is not allowed.</p>
6	<p>Module Busy</p> <p>The module busy status code is returned when a write command from the master has not yet been completed when a second write command is received</p>
8	<p>Message Time-out</p> <p>Communications with the addressed slave have been unsuccessful due to a lack of response from the slave. When this Error Code is received, the command has been attempted three times.</p>
16	<p>Port Configuration Error</p> <p>If this value is returned from the module, one or both of the serial ports have been misconfigured. To determine the exact source of the problem, verify the following:</p> <ul style="list-style-type: none"> - Parity configuration - Stop bit configuration - Baud rate configuration
18	<p>System Configuration Error</p> <p>If this value is returned from the module, one of the system configuration parameters has been determined to be out of range. To determine the exact source of the problem, verify the following:</p> <ul style="list-style-type: none"> - Read Block Count - Master Error Pointer
254	<p>Checksum Error</p> <p>The slave determined that the message checksum was in error, and therefore discarded the message</p>
255	<p>TX Hardware Time-out</p> <p>A time-out has occurred in the transmission of the command from the master, and the command has been aborted. This error is usually an indication that the CTS signal is not being received by the module.</p>

V Hardware Diagnostics

Several hardware diagnostics capabilities have been implemented using the LED indicator lights on the front of the module. The following sections explain the meaning of the individual LEDs for both the PLC and the SLC platforms.

5.1 3100/3101 PLC Platform

The PLC platform product is available in two forms:

- ProSoft Technology Module (3100-CIM)
- Allen-Bradley 1771-DB Revision B card

Operation of the two modules is nearly identical, but labeling on the status LEDs is different. The following table documents the differences between LEDs on the two hardware platforms and explains the operation of the LEDs.

ProSoft CIM Card	A-B 1771-DB Rev B Card
ACTIVE ○ ○ FLT	ACTIVE ○ ○ FLT
CFG ○ ○ BPLN	DH485 ○ ○ BTLO
ERR1 ○ ○ ERR2	LED1 ○ ○ LED2
TXD1 ○ ○ TXD2	PT1X ○ ○ PT2X
RXD2 ○ ○ RXD2	PT1R ○ ○ PT2R

Table 5.1 : PLC Platform LED Indication

ProSoft CIM	A-B DB/B	Color	Status	Indication
ACT	ACT	Green	Blink (Fast)	<u>Normal state</u> : The module is operating normally and successfully Block Transferring with the PLC
			On	The module is receiving power from the backplane, but there may be some other problem
			Blink (1/Sec)	Indicates the module has somehow entered the Basic Programming Mode. Verify jumper JW4 (DB/B only) configuration. If all are correct, then contact the factory
			Off	The module is attempting to Block Transfer with the PLC and has failed. The PLC may be in the PGM mode or may be faulted
FLT	FLT	Red	Off	<u>Normal State</u> : No system problems are detected during background diagnostics
			On	A system problem was detected during background diagnostics. Please contact factory for technical support

Table 5.1 : PLC Platform LED Indication (Cont'd)

ProSoft Name	DB Name	Color	Status	Indication
CFG	DH48 5	Green	Off	<u>Normal state</u> : No configuration related activity is occurring at this time
			Blink	This light blinks every time a Module Configuration block (ID = 255) is received from the processor ladder logic
			On	The light is on continuously whenever a configuration error is detected. The error could be in the Port Configuration data or in the System Configuration data. See Section 4 for details
BPLN	BTLO	Red	Off	<u>Normal State</u> : When this light is off and the ACT light is blinking quickly, the module is actively Block Transferring data with the PLC
			On	Indicates that Block Transfers between the PLC and the module have failed.(Not activated in the initial release of the product)
ERR1 ERR2	LED1 LED2	Amber	Off	<u>Normal State</u> : When the error LED is off and the related port is actively transferring data, there are no communication errors
			Blink	Periodic communication errors are occurring during data communications. See Section 4 to determine the error condition
			On	This LED will stay on under several conditions: <ul style="list-style-type: none"> • CTS input is not being satisfied • Port Configuration Error • System Configuration Error • Recurring error condition
Tx1 Tx2	PT1X PT2X	Green	Blink	The port is transmitting data.
Rx1 Rx2	PT1R PT2R	Green	Blink	The port is receiving data

5.2 3150/3151 SLC Platform

The PLC platform product is available in two forms:

- ProSoft Technology Module (3150-CIM)
- Allen-Bradley 1746-BAS card

Operation of the two modules is nearly identical and labeling on the status LEDs is the same. The following table documents the differences between LEDs on the two hardware platforms and explains the operation of the LEDs.

3150-SEA









COMMUNICATIONS			
	ACT		FAULT
	CFG		BPLN
	PRT1		ERR1
	PRT2		ERR2

Table 5.2 : SLC Platform LED Indication

LED Name	Color	Status	Indication
ACT	Green	Blink (Fast)	<u>Normal state</u> : The module is operating normally and successfully Block Transferring with the SLC
		On	The module is receiving power from the backplane, but there may be some other problem
		Blink (1/Sec)	Indicates the module has somehow entered the Basic Programming Mode. Verify jumper JW3 (BAS only) configuration. If all are correct, then contact the factory
		Off	The module is attempting to Block Transfer with the SLC and has failed. The SLC may be in the PGM mode or may be faulted (<i>Not in initial release</i>)
FLT	Red	Off	<u>Normal State</u> : No system problems are detected during background diagnostics
		On	A system problem was detected during background diagnostics. Please contact factory for technical support
CFG	Green	Off	<u>Normal state</u> : No configuration related activity is occurring at this time
		Blink	This light blinks every time a Module Configuration block (ID = 255) is received from the processor ladder logic
		On	The light is on continuously whenever a configuration error is detected. The error could be in the Port Configuration data or in the System Configuration data. See Section 4 for details
BPLN	Red	Off	<u>Normal State</u> : When this light is off and the ACT light is blinking quickly, the module is actively Block Transferring data with the SLC
		On	Indicates that Block Transfers between the SLC and the module have failed

Table 5.2 : SLC Platform LED Indication (Cont'd)

LED Name	Color	Status	Indication
ERR1 ERR2	Amber	Off	<u>Normal State</u> : When the error LED is off and the related port is actively transferring data, there are no communication errors
		Blink	Periodic communication errors are occurring during data communications. See Section 4 to determine the error condition
		On	This LED will stay on under several conditions: <ul style="list-style-type: none">• CTS input is not being satisfied• Port Configuration Error• System Configuration Error• Recurring error condition
TxRx1 TxRx2	Green	Blink	The port is communicating, either transmitting or receiving data

VI Support, Service and Warranty

6.1 Technical Support

ProSoft Technology survives on its ability to provide meaningful support to its customers. Should any questions or problems arise, please feel free to contact us at:

Factory/Technical Support

Corporate

ProSoft Technology, Inc.

9801 Camino Media

Suite 105

Bakersfield, CA 93311

(661) 664-7208

(800) 326-7066

(661) 664-7233 (fax)

Before calling for support, please prepare yourself for the call. In order to provide the best and quickest support possible, we will most likely ask for the following information (you may wish to fax it to us prior to calling):

1. Product Serial and Version Number
2. Configuration Information
 - Communication Configuration
 - Master Command List
 - Jumper positions
3. System hierarchy
4. Physical connection information
 - RS-232, 422 or 485
 - Cable configuration
5. Module Operation
 - Block Transfers operation
 - LED patterns

An after-hours answering system (on the Bakersfield number) allows pager access to one of our qualified technical and/or application support engineers at any time to answer the questions that are important to you.

6.2 Module Service and Repair

The SEA card is an electronic product, designed and manufactured to function under somewhat adverse conditions. As with any product, through age, misapplication, or any one of many possible problems, the card may require repair. When purchased from ProSoft Technology, the module has a one year parts and labor warranty

according to the limits specified in the warranty. Replacement and/or returns should be directed to the distributor from whom the product was purchased. If you need to return the card for repair, it is first necessary to obtain an RMA number from ProSoft Technology. Please call the factory for this number and display the number prominently on the outside of the shipping carton used to return the card.

6.3 Warranty

6.3.1 General Warranty Policy

ProSoft Technology, Inc. (Hereinafter referred to as ProSoft) warrants that the Product shall conform to and perform in accordance with published technical specifications and the accompanying written materials, and shall be free of defects in materials and workmanship, for the period of time herein indicated, such warranty period commencing upon receipt of the Product.

This warranty is limited to the repair and/or replacement, at ProSoft's election, of defective or non-conforming Product, and ProSoft shall not be responsible for the failure of the Product to perform specified functions, or any other non-conformance caused by or attributable to: (a) any misapplication of misuse of the Product; (b) failure of Customer to adhere to any of ProSoft's specifications or instructions; (c) neglect of, abuse of, or accident to, the Product; or (d) any associated or complementary equipment or software not furnished by ProSoft.

Limited warranty service may be obtained by delivering the Product to ProSoft and providing proof of purchase or receipt date. Customer agrees to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to ProSoft, and to use the original shipping container or equivalent. Contact ProSoft Customer Service at (805) 664-7208 for further information.

6.3.2 Limitation of Liability

EXCEPT AS EXPRESSLY PROVIDED HEREIN, PROSOFT MAKES NO WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, WITH RESPECT TO ANY EQUIPMENT, PARTS OR SERVICES PROVIDED PURSUANT TO THIS AGREEMENT, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANT ABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER PROSOFT OR ITS DEALER SHALL BE LIABLE FOR ANY OTHER DAMAGES, INCLUDING BUT NOT LIMITED TO DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, WHETHER IN AN ACTION IN CONTRACT OR TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY), SUCH AS, BUT NOT LIMITED TO, LOSS OF ANTICIPATED PROFITS OR BENEFITS RESULTING FROM, OR ARISING OUT OF, OR IN CONNECTION WITH THE USE OR FURNISHING OF EQUIPMENT, PARTS OR SERVICES HEREUNDER OR THE PERFORMANCE, USE OR INABILITY TO USE THE SAME, EVEN IF PROSOFT OR ITS DEALER'S TOTAL LIABILITY EXCEED THE PRICE PAID FOR THE PRODUCT.

Where directed by State Law, some of the above exclusions or limitations may not be applicable in some states. This warranty provides specific legal rights; other rights that vary from state to state may also exist. This warranty shall not be applicable to the extent that any provisions of this warranty is prohibited by any Federal, State or Municipal Law that cannot be preempted.

6.3.3 Hardware Product Warranty Details

Warranty Period : ProSoft warranties hardware product for a period of one (1) year.

Warranty Procedure : Upon return of the hardware Product ProSoft will, at its option, repair or replace Product at no additional charge, freight prepaid, except as set forth below. Repair parts and replacement Product will be furnished on an exchange basis and will be either reconditioned or new. All replaced Product and parts become the property of ProSoft. If ProSoft determines that the Product is not under warranty, it will, at the Customer's option, repair the Product using current ProSoft standard rates for parts and labor, and return the Product freight collect.

Addendum to Section 4.1.2

BTW Block ID 80 : Port 1 Slave Poll List

Word	Description
0	Memory Offset (Most likely zero)
1-33	Slave Type ID

BTW Block ID 81: Port 2Slave Poll List

Word	Description
0	Memory Offset
1-33	Slave Type ID

Where:

Memory Offset is used to allow the application programmer to position each ports data within the module. As an example, if Port 1 has a Memory Offset of 0, and the summation of the data collected by Port 1 is 250, the Port 2 Memory Offset can be 250 or greater.

Slave Type ID is used by the module to help identify the type of command to send and the amount of data which will be received. Valid Slave Type IDs are:

0	Skip over this Slave address
1	Siemens 4700 Meter, Long Read
2	Siemens 4700 Meter, Short Read
3	Siemens 4300 Meter
4	Siemens Static Trip III, Short Read
5	Siemens Static Trip III, Long Read

A full description of each Slave Type follows on the next pages

Data Definitions

Type : 1 Siemens 4700 Meter - Long Data Read

0	L-N Volts Phase A
1	L-N Volts Phase B
2	L-N Volts Phase C
3	L-N Volts Phase Avg
4	L-L Volts Phase A-B
5	L-L Volts Phase B-C
6	L-L Volts Phase C-A
7	L-L Volts Phase Avg
8	Phase A Amps
9	Phase B Amps
10	Phase C Amps
11	Phase Amps - Avg
12	Neutral Current
13	KW Phase A-B

- 14 KW Phase B-C
- 15 KW Phase C-A
- 16 Total KW
- 17 KVA Phase A-B
- 18 KVA Phase B-C
- 19 KVA Phase C-A
- 20 Total KVA
- 21 KVAR Phase A-B
- 22 KVAR Phase B-C
- 23 KVAR Phase C-A
- 24 Total KVAR
- 25 KW Demand
- 26 Power Factor
- 27 Frequency
- 28 KW Hours
- 29 KVAR Hours
- 30 Communication Counter

Type : 2 Siemens 4700 Meter - Short Data Read

- 0 L-L Volts Phase A-B
- 1 L-L Volts Phase B-C
- 2 L-L Volts Phase C-A
- 3 L-L Volts Phase Avg
- 4 Phase A Amps
- 5 Phase B Amps
- 6 Phase C Amps
- 7 Phase Amps - Avg
- 8 Neutral Current
- 9 Total KW
- 10 Total KVA
- 11 Total KVAR
- 12 KW Demand
- 13 Power Factor
- 14 Frequency
- 15 KW Hours
- 16 KVAR Hours
- 17 Communication Counter

Type : 3 Siemens 4300 Meter

- 0 L-N Volts Phase A
- 1 L-N Volts Phase B
- 2 L-N Volts Phase C
- 3 L-N Volts Phase Avg
- 4 L-L Volts Phase A-B
- 5 L-L Volts Phase B-C
- 6 L-L Volts Phase C-A
- 7 L-L Volts Phase Avg
- 8 KW
- 9 KW Demand
- 10 Peak KW Demand

- 11 KW Hours
- 12 Phase A Amps
- 13 Phase B Amps
- 14 Phase C Amps
- 15 Avg Amps
- 16 Communication Counter

Type : 4 Siemens Static Trip III - Short Data Read

- 0 Phase A Amps
- 1 Phase B Amps
- 2 Phase C Amps
- 3 Ground Amps
- 4 Neutral Amps
- 5 Avg Phase Amps
- 6 Comm Status
- 7 Breaker Status
- 8 Communication Counter

Type : 5 Siemens Static Trip III - Long Data Read

- 0 Phase A Amps
- 1 Phase B Amps
- 2 Phase C Amps
- 3 Ground Amps
- 4 Neutral Amps
- 5 Avg Phase Amps
- 6 Comm Status
- 7 Breaker Status
- 8 L-N Volts Phase A
- 9 L-N Volts Phase B
- 10 L-N Volts Phase C
- 11 L-N Volts Phase Avg
- 12 L-L Volts Phase A-B
- 13 L-L Volts Phase B-C
- 14 L-L Volts Phase C-A
- 15 L-L Volts Phase Avg
- 16 Total KVA
- 17 Total KW
- 18 KW Demand
- 19 KW Hours
- 20 KVAR
- 21 KVAR Hours
- 22 Power Factor
- 23 Frequency
- 24 Communication Counter

APPENDIX A-1

PLC-5 Example Ladder Logic

PLC 5 SEA Example Data Table

ProSoft Technology 1995
Data Table Report

PLC-5/15 File SEAPLC5

Mon May 22, 1995 Page 7
Data Table File N7:0

Address	0	1	2	3	4	5	6	7	8	9
N7:0	0	0	5	0	0	0	0	0	0	0
N7:10	1	1	5	0	0	0	0	0	0	0
N7:20	4	1	2	100	120	0	0	0	0	0
N7:30	0	0	0	0	0	0	0	0	0	0
N7:40	0	0	0	0	0	0	0	0	0	0
N7:50	1	1	3	0	20	50	0	0	0	0
N7:60	1	1	4	20	20	70	0	0	0	0
N7:70	0	1	16	0	10	0	0	0	0	0
N7:80	1	1	1	0	80	90	0	0	0	0
N7:90	1	1	2	0	80	95	0	0	0	0
N7:100	0	1	5	0	1	4000	0	0	0	0
N7:110	0	1	15	0	80	3084	0	0	0	0
N7:120	0	0	0	0	0	0	0	0	0	0
N7:130	0	0	0	0	0	0	0	0	0	0
N7:140	0	0	0	0	0	0	0	0	0	0
N7:150	0	0	0	0	0	0	0	0	0	0
N7:160	0	0	0	0	0	0	0	0	0	0
N7:170	0	0	0	0	0	0	0	0	0	0
N7:180	0	0	0	0	0	0	0	0	0	0
N7:190	0	0	0	0	0	0	0	0	0	0
N7:200	0	0	0	0	0	0	0	0	0	0
N7:210	0	0	0	0	0	0	0	0	0	0
N7:220	0	0	0	0	0	0	0	0	0	0
N7:230	0	0	0	0	0	0	0	0	0	0
N7:240	0	0	0	0	0	0	0	0	0	0
N7:250	0	0	0	0	0	0	0	0	0	0
N7:260	0	0	0	0	0	0	0	0	0	0
N7:270	0	0	0	0	0	0	0	0	0	0
N7:280	0	0	0	0	0	0	0	0	0	0
N7:290	0	0	0	0	0	0	0	0	0	0
N7:300	-14846	64	64	7	310	0	0	0	0	0
N7:310	0	-1	2	3	4	5	6	7	8	9
N7:320	10	11	12	13	14	15	16	17	18	19
N7:330	20	21	22	23	24	25	26	27	28	29
N7:340	30	31	32	33	34	0	0	0	0	0
N7:350	0	0	0	0	0	0	0	0	0	0
N7:360	0	0	0	0	0	0	0	0	0	0
N7:370	0	0	0	0	0	0	0	0	0	0
N7:380	0	0	0	0	0	0	0	0	0	0
N7:390	0	0	0	0	0	0	0	0	0	0
N7:400	25730	64	64	7	410	0	0	0	0	0
N7:410	0	0	-1	2	3	4	5	6	7	8
N7:420	9	10	11	12	13	14	15	16	17	18
N7:430	19	20	21	22	23	24	25	26	27	28
N7:440	29	30	31	32	33	34	35	36	37	38
N7:450	39	40	41	42	43	44	45	46	47	0
N7:460	0	0	0	0	0	0	0	0	0	0
N7:470	0	0	0	0	0	0	0	0	0	0
N7:480	0	0	0	0	0	0	0	0	0	0
N7:490	0	0	0	0	0	0	0	0	0	0
N7:500	0	0	0	0	0	0	0	0	0	0

Configuration Data

Command List

Block Transfer Write

Block Transfer Read

Configuration Data Block

N7:0 to N7:29 contain port and module configuration data. These parameters are uploaded to the module on a module reset/power up condition automatically. The port configuration parameters allow the ladder logic fully control the module's operation. The system configuration parameters control the number of data blocks that are exchanged between the module and ladder.

Command List

The Command List data block consists of 50 words and 5 commands. The Command List in this example consists of two blocks starting at N7:50 and going to N7:149. In the ladder logic, the Commands List is moved to the module with Block ID 80 and Block ID 81.

Block Transfer Write

This area of the memory map is used simply as a Block Transfer Write control and data buffer.

Block Transfer Read

This area of the memory map is used simply as a Block Transfer Read control and data buffer.

PLC 5 SEA Example Data Table (Cont'd)

ProSoft Technology 1995
Data Table Report

PLC-5/15 File SEAPLC5

Mon May 22, 1995 Page 11
Data Table File N10:0

Address	0	1	2	3	4	5	6	7	8	9
N10:0	-1	2	3	4	5	6	7	8	9	10
N10:10	11	12	13	14	15	16	17	18	19	20
N10:20	21	22	23	24	25	26	27	28	29	30
N10:30	31	32	33	34	35	36	37	38	39	40
N10:40	41	42	43	44	45	46	47	48	49	50
N10:50	-4096	12287	12288	16384	20480	0	0	0	0	0
N10:60	98	87	76	65	54	43	32	21	10	0
N10:70	97	86	75	64	53	42	31	20	9	-1
N10:80	0	0	0	0	0	0	0	0	0	0
N10:90	-4096	12287	12288	16384	20480	-4096	12287	12288	16384	20480
N10:100	0	0	0	0	0	0	0	0	0	0
N10:110	MC	M	1.	40	0	0	0	0	0	0
N10:120	1	0	0	0	0	0	0	0	0	0
N10:130	0	0	0	0	0	0	0	0	0	0
N10:140	0	0	0	0	0	0	0	0	0	0
N10:150	0	0	0	0	0	0	0	0	0	0
N10:160	0	0	0	0	0	0	0	0	0	0
N10:170	0	0	0	0	0	0	0	0	0	0
N10:180	0	0	0	0	0	0	0	0	0	0
N10:190	0	0	0	0	0	0	0	0	0	0

Write Data to SEA

Read Data from SEA

Slave Error Table

Master Error Table

Write data to SEA module

N10:0 to N10:49 contain data that is to be moved to the SEA module. This data will be available for both Master and Slave ports, and is accessed using register addresses 0 to 49.

Read Data from SEA

N10:50 onwards contains data being moved from the SEA module to the processor data table. This data generally represents the results of Modbus Master port read commands or Modbus Slave port write commands received from a host.

Slave Error Table

This data block of 20 words contains several status registers and counters for both ports. This data only has relevance if one or more ports are configured as a Slave port. Included in this data block is also module/firmware information, including product name, serial number and checksum

Master Error Table

This data block contains the status for each individual command in the Command List.

APPENDIX A-2

SLC-5/02 Example Ladder Logic

SLC 5/02 Example Data Table

ProSoft Technology 1995
Data Table Report
Data Table File N7:0

Mon May 22, 1995

Address	0	1	2	3	4	5	6	7	8	9
N7:0	0	0	5	0	0	0	0	0	0	0
N7:10	1	1	5	0	0	0	0	0	0	0
N7:20	4	1	2	100	120	0	0	0	0	0
N7:30	0	0	0	0	0	0	0	0	0	0
N7:40	0	0	0	0	0	0	0	0	0	0
N7:50	1	1	3	0	20	50	0	0	0	0
N7:60	1	1	4	20	20	70	0	0	0	0
N7:70	0	1	16	0	10	0	0	0	0	0
N7:80	1	1	1	0	80	90	0	0	0	0
N7:90	1	1	2	0	80	95	0	0	0	0
N7:100	0	1	5	0	1	4000	0	0	0	0
N7:110	0	1	15	0	80	3084	0	0	0	0
N7:120	0	0	0	0	0	0	0	0	0	0
N7:130	0	0	0	0	0	0	0	0	0	0
N7:140	0	0	0	0	0	0	0	0	0	0
N7:150	0	0	0	0	0	0	0	0	0	0
N7:160	0	0	0	0	0	0	0	0	0	0
N7:170	0	0	0	0	0	0	0	0	0	0
N7:180	0	0	0	0	0	0	0	0	0	0

Configuration Data

Command List

Configuration Data Block

N7:0 to N7:29 contain port and module configuration data. These parameters are uploaded to the module on a module reset/power up condition automatically. The port configuration parameters allow the ladder logic fully control the module's operation. The system configuration parameters control the number of data blocks that are exchanged between the module and ladder.

Command List

The Command List data block consists of 50 words and 5 commands. The Command List in this example consists of two blocks starting at N7:50 and going to N7:149. In the ladder logic, the Commands List is moved to the module with Block ID 80 and Block ID 81.

SLC 5/02 Example Data Table

ProSoft Technology 1995
Data Table Report
Data Table File N10:0

Mon May 22, 1995

Address	0	1	2	3	4	5	6	7	8	9
N10:0	-1	2	3	4	5	6	7	8	9	10
N10:10	11	12	13	14	15	16	17	18	19	20
N10:20	21	22	23	24	25	26	27	28	29	30
N10:30	31	32	33	34	35	36	37	38	39	40
N10:40	41	42	43	44	45	46	47	48	49	50
N10:50	-4096	12287	12288	16384	20480	0	0	0	0	0
N10:60	98	87	76	65	54	43	32	21	10	0
N10:70	97	86	75	64	53	42	31	20	9	-1
N10:80	0	0	0	0	0	0	0	0	0	0
N10:90	-4096	12287	12288	16384	20480	-4096	12287	12288	16384	20480
N10:100	0	0	0	0	0	0	0	0	0	0
N10:110	MC	M	1.	40	0	0	0	0	0	0
N10:120	1	0	0	0	0	0	0	0	0	0
N10:130	0	0	0	0	0	0	0	0	0	0
N10:140	0	0	0	0	0	0	0	0	0	0
N10:150	0	0	0	0	0	0	0	0	0	0
N10:160	0	0	0	0	0	0	0	0	0	0
N10:170	0	0	0	0	0	0	0	0	0	0
N10:180	0	0	0	0	0	0	0	0	0	0
N10:190	0	0	0	0	0	0	0	0	0	0

Write Data to SEA

Read Data from SEA

Slave Error Table

Master Error Table

Write data to SEA module

N10:0 to N10:49 contain data that is to be moved to the SEA module. This data will be available for both Master and Slave ports, and is accessed using register addresses 0 to 49.

Read Data from SEA

N10:50 onwards contains data being moved from the SEA module to the processor data table. This data generally represents the results of Modbus Master port read commands or Modbus Slave port write commands received from a host.

Slave Error Table

This data block of 20 words contains several status registers and counters for both ports. This data only has relevance if one or more ports are configured as a Slave port. Included in this data block is also module/firmware information, including product name, serial number and checksum

Master Error Table

This data block contains the status for each individual command in the Command List.

APPENDIX B

CABLE DIAGRAMS

RS-232

-

RS-422

-

RS-485

Definitions of RS-232C Handshaking Signals

SIGNAL	TITLE	DESCRIPTION
TXD	Transmitted Data	Carries serialized data. It is an output from the module
RXD	Received Data	RXD is serialized data input to the module. RXD is isolated from the rest of the circuitry on the modules
RTS	Request To Send	RTS is a request from the module to the modem to prepare to transmit. RTS is turned ON when the module has a message to transmit. Otherwise, RTS is OFF
CTS	Clear to Send	CTS is a signal from the modem to the module that indicates the carrier is stable and the modem is ready to transmit. The module will not transmit until CTS is on. If CTS is turned off during transmission, the module will stop transmitting until CTS is restored
DTR	Data Terminal Ready	DTR is a signal to the modem to indicate that the module is operational and ready for communication. The module will continually assert DTR
DSR	Data Set Ready	DSR is a signal from the modem to the module to indicate that the modem is operational and ready for communication. The SEA product family does not require the DSR signal to operate correctly. This signal is disregarded by the SEA units.
DCD	Data Carrier Detect	DCD is a signal from the modem to the module to indicate that the carrier from another modem is being sensed on the link. This signal is disregarded by the SEA units.

(Excerpted form Allen-Bradley Publication 1785.6.5.2)

RS-232C Cable Configuration

With Handshaking :

<u>ProSoft Module</u>			<u>Modem</u>
<u>25-Pin</u>	<u>9-Pin</u>		<u>25-Pin</u>
2 TxD	3	-----	2 (Verify pins 2 and 3)
3 RxD	2	-----	3
4 RTS	7	-----	4
5 CTS	8	-----	5
7 GND	5	-----	7
20DTR	4	-----	20

Note

Do not connect pins 14, 16, 18, or 25 on the connector to a modem. These pins are used by the RS-422/485 drivers and may impact the operation of the modem.

Without Handshaking :

<u>ProSoft Module</u>			<u>Device</u>
<u>25-Pin</u>	<u>9-Pin</u>		<u>25-Pin</u>
2 TxD	3	-----	2 RxD (Verify pins 2 and 3)
3 RxD	2	-----	3 TxD
4 RTS	7	----	4 RTS
5 CTS	8	----	5 CTS
			6 DSR
			8 DCD
			20 DTR
7 GND	5	-----	7 GND

RS-422/RS-485 Cable Configuration

Two Wire Mode :

<u>ProSoft Module</u>			<u>Foreign Device</u>
<u>25-Pin</u>	<u>9-Pin</u>		
4 RTS	7	----	
5 CTS	8	----	
14 TxRxD+9		-----	A(+) TxRxD+
25 TxRxD-	1	-----	B(-) TxRxD-
7 GND	5	-----	GND

Four Wire Mode :

<u>ProSoft Module</u>			<u>Foreign Device</u>
<u>25-Pin</u>	<u>9-Pin</u>		
4 RTS	7	----	
5 CTS	8	----	
14 TxD+	9	-----	RxD+
16 RxD+	6	-----	TxD+
18 RxD-	2	-----	TxD-
25 TxD-	1	-----	RxD-
7 GND	5	-----	GND

NOTES: If communication in RS-422/RS-485 do not work, despite all attempts, try switching termination polarities. Some manufacturers interpret (+) and (-) differently.

APPENDIX C

Jumper Configurations

1771 Platform

- 3100 Module
- 1771-DB Revision B Module

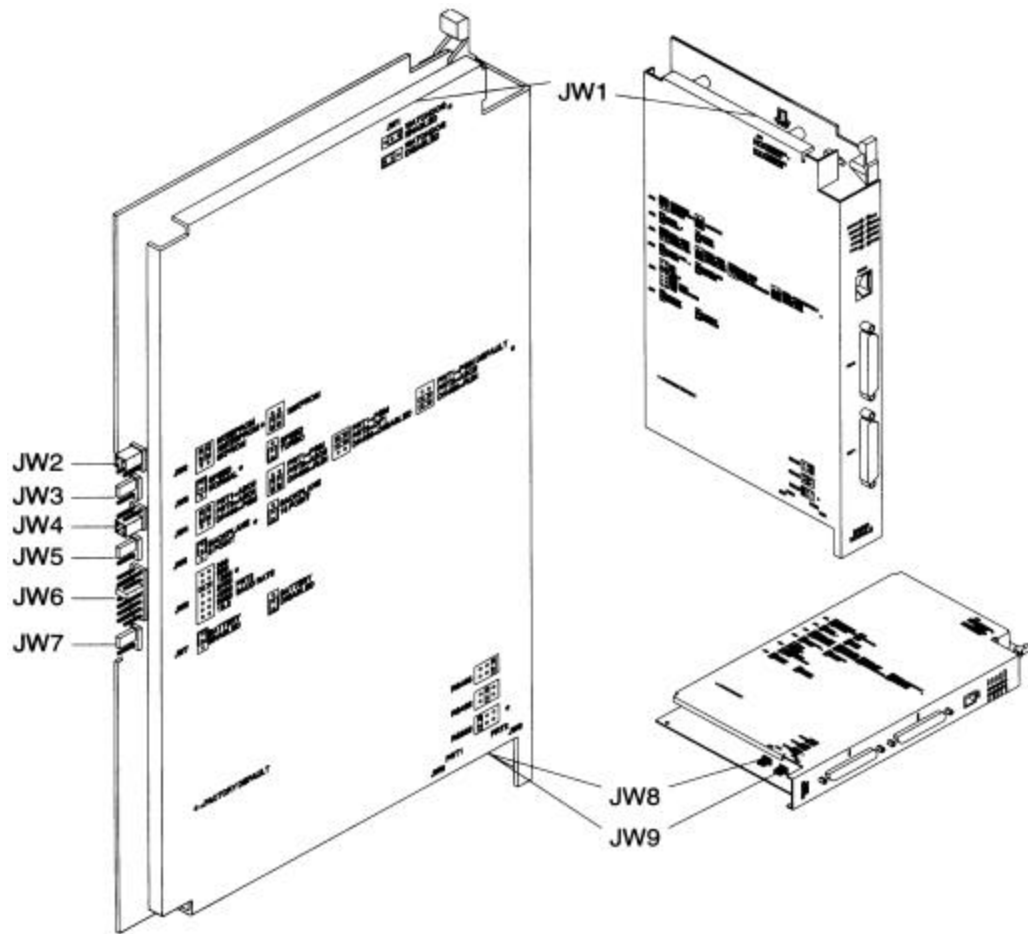
1746 Platform

- 3150 Module
- 1746-BAS Module

3100 Module from ProSoft Technology

The 3100 module from ProSoft Technology is shipped from the factory as a complete unit including any applicable firmware resident in the module.

All jumper configurations have been preset for the module to pass a functional test at the factory. Verify jumper placement with Section 2 of the manual for application specific changes.



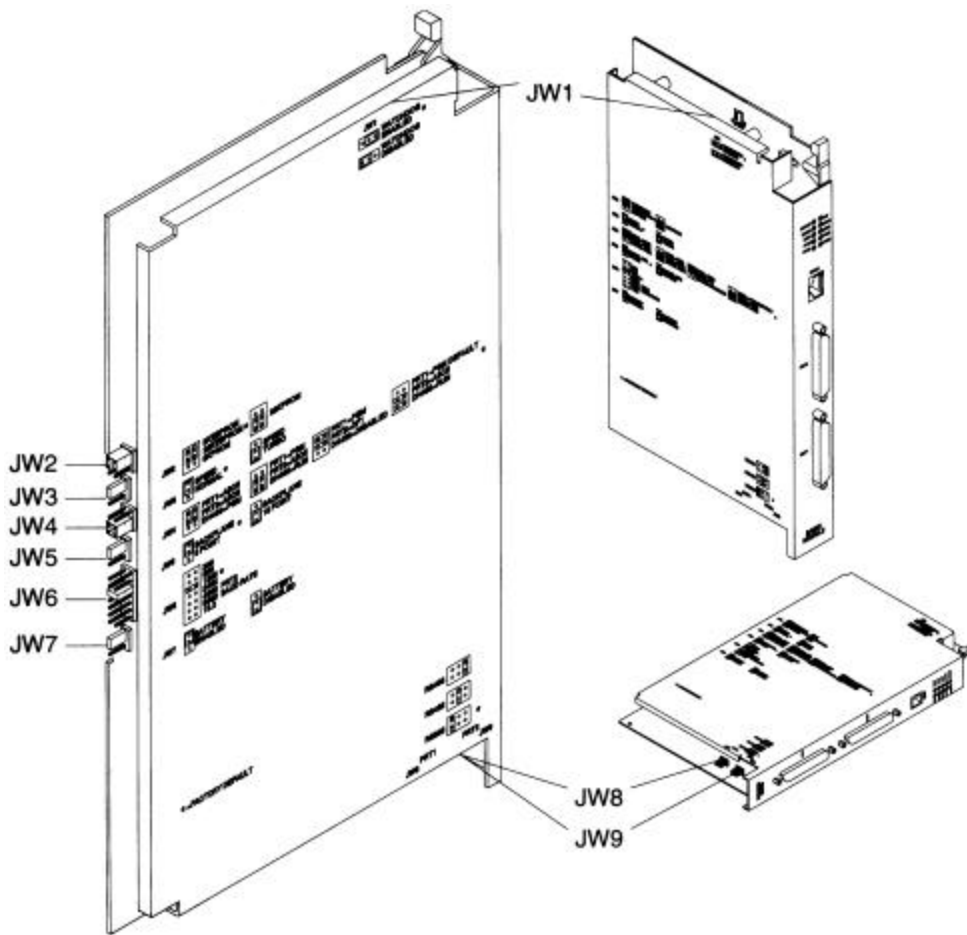
1771-DB Revision B Module from Allen-Bradley

The 3101 firmware solution is installed into an Allen-Bradley 1771-DB Revision B module. To successfully operate the module, the firmware must be installed and the jumpers must be configured.

Section 2 of the manual details the correct positioning for the jumpers.

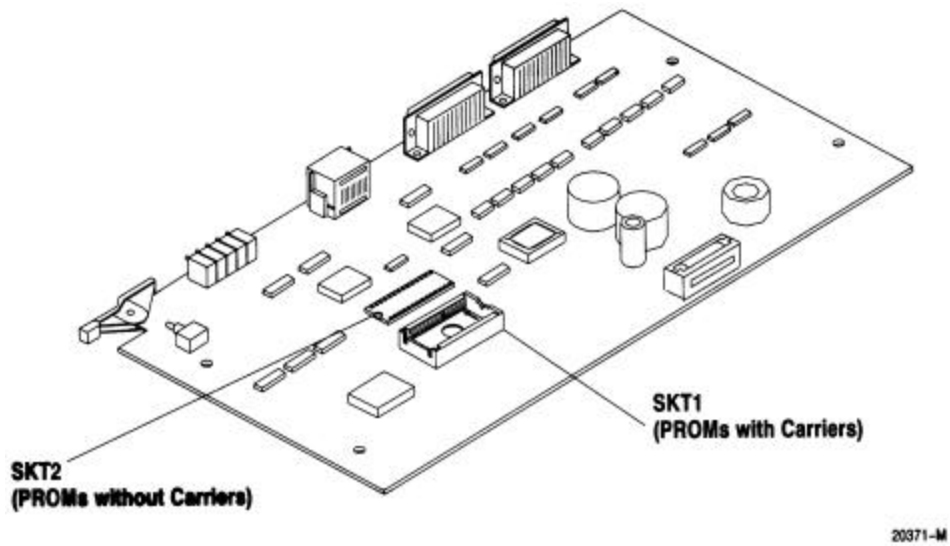
In addition, Section 2 also details the steps necessary to install the firmware chip. The ProSoft Technology firmware is shipped in a plastic carrier to help minimize erroneous installations.

The following diagrams help to identify the physical location of the jumpers on the module and location of the firmware socket.

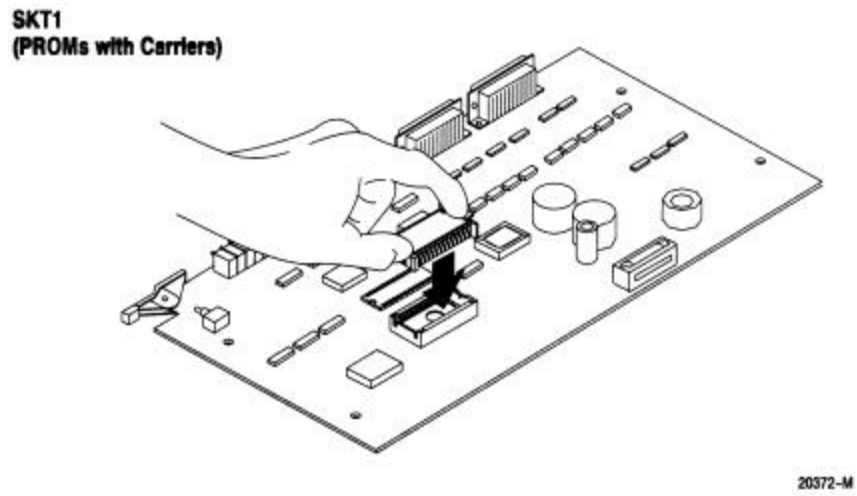


1771-DB Revision B Module from Allen-Bradley (Cont'd)

Firmware installation diagrams:



Firmware Socket Location (SKT1)

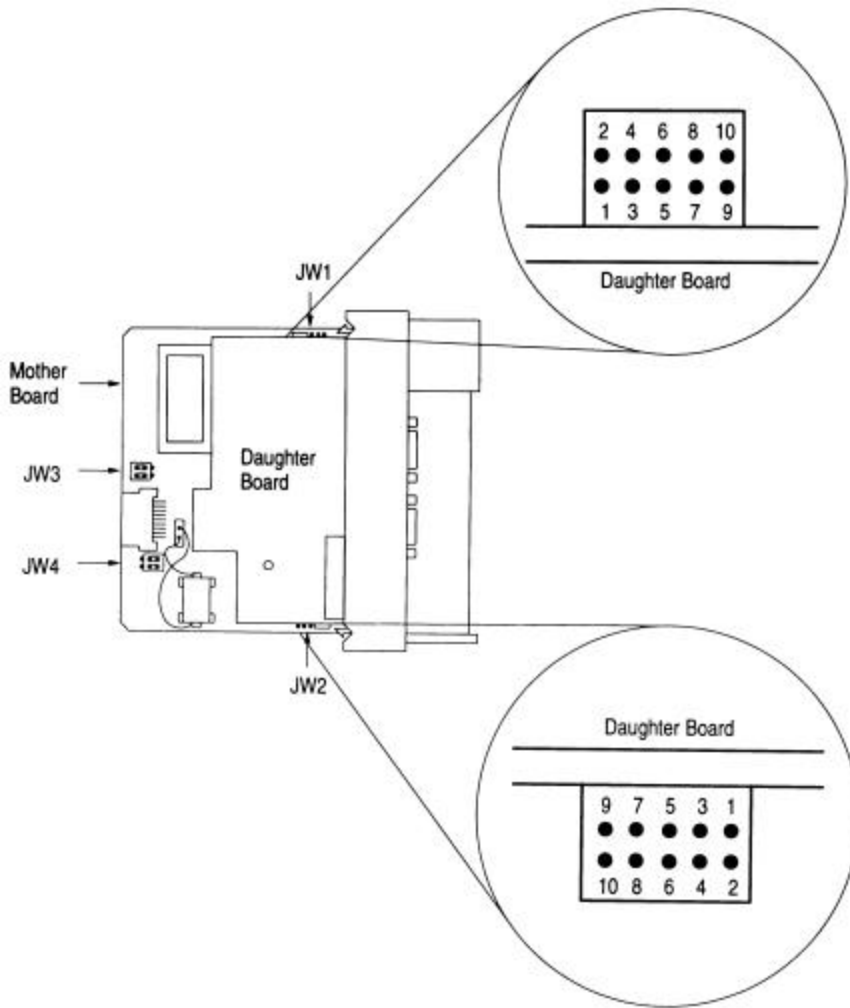


Firmware Installation

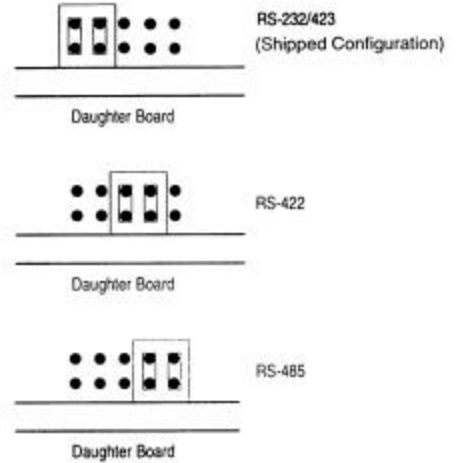
3150 Module from ProSoft Technology

Jumpers JW 1 and JW 2: Port 1 and Port 2 Configuration

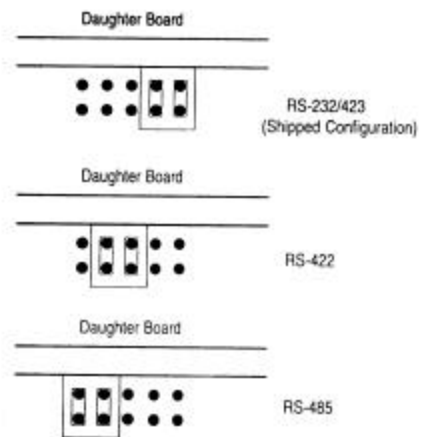
Both of these ports operate electrically in a very similar fashion. The following diagrams depict the appropriate jumper placement.



Jumper JW1 Settings



Jumper JW2 Settings

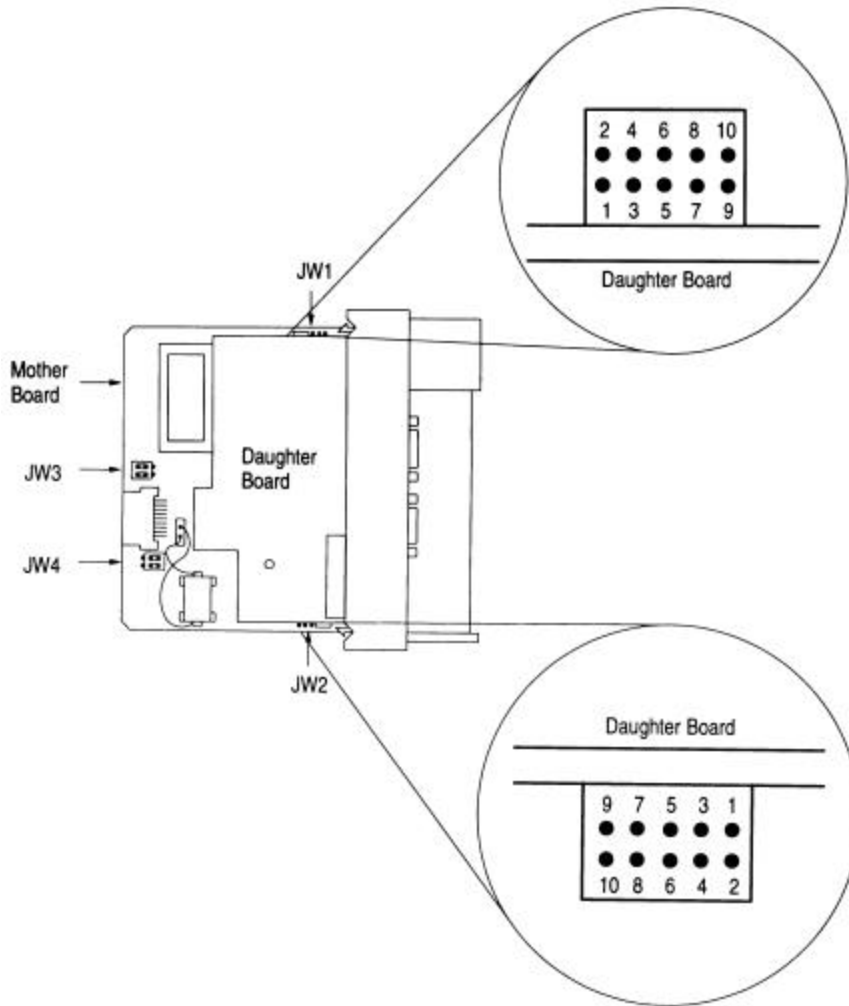


Jumpers JW 3 and JW 4 are not used by 3150 module

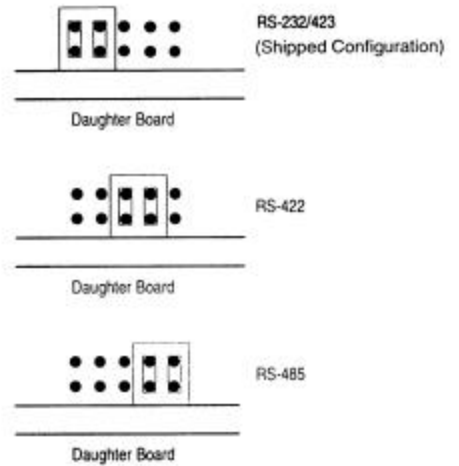
1746-BAS Module from Allen-Bradley

Jumpers JW 1 and JW 2: Port 1 and Port 2 Configuration

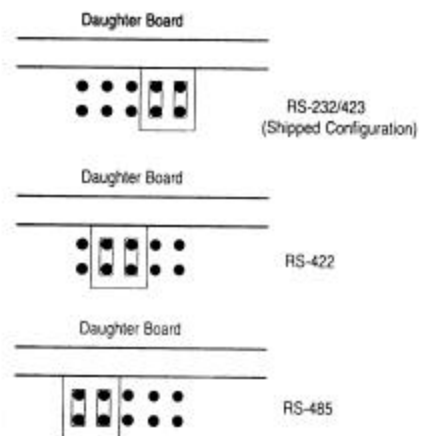
Both of these ports operate electrically in a very similar fashion. The following diagrams depict the appropriate jumper placement.



Jumper JW1 Settings



Jumper JW2 Settings

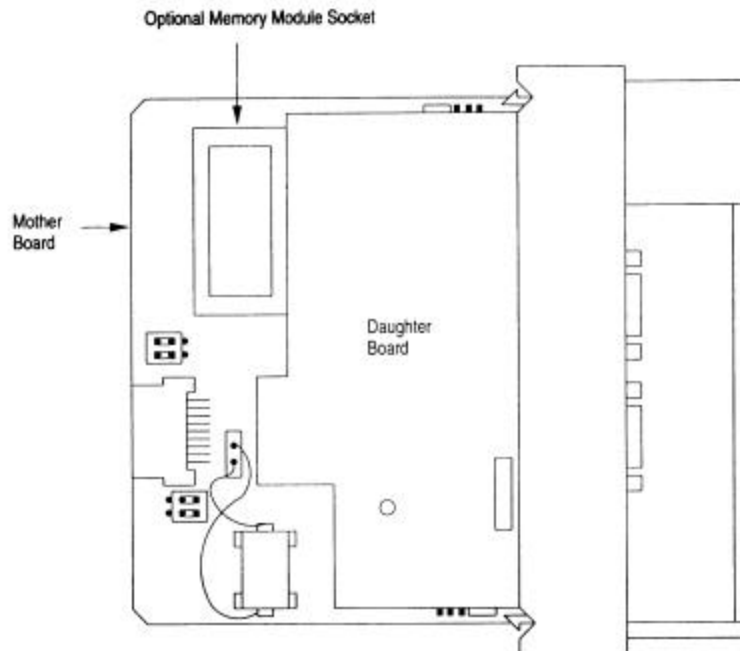
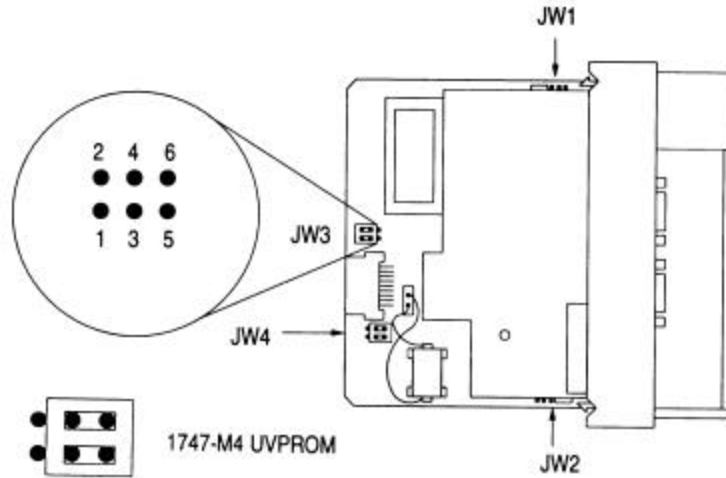


1746-BAS Module from Allen-Bradley (Cont'd)

Jumpers JW 3 : Memory Selection Jumper

This jumper must be selected for the 1747-M4 UVPROM. The jumper must be as follows:

- Jump 4 to 6
- Jump 3 to 5



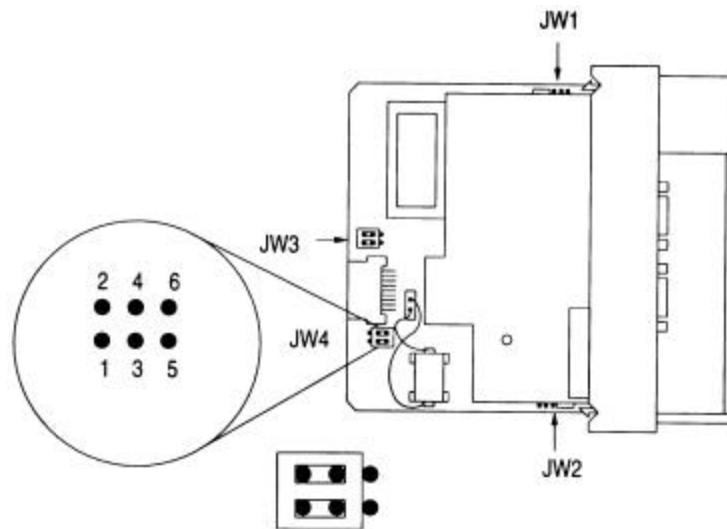
1746-BAS Module from Allen-Bradley (Cont'd)

Jumpers JW 4 : Module Port Configuration

This jumper must be selected as follows:

Jump 2 to 4

Jump 1 to 3



APPENDIX D

Product Revision History

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Product Revision History

05/24/95	Revision 1.40 Initial release of product
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