ProSoft® TECHNOLOGY

Where Automation Connects.

ProLinx®

CC-Link

ProLinx Gateway

CC-Link version 1.10 Local Station & Intelligent Device

May 21, 2009

DRIVER MANUAL

Important Installation Instructions

Power, Input and Output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods, Article 501-4 (b) of the National Electrical Code, NFPA 70 for installation in the U.S., or as specified in Section 18-1J2 of the Canadian Electrical Code for installations in Canada, and in accordance with the authority having jurisdiction. The following warnings must be heeded:

A WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIV. 2;
B WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES, and
C WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.
D "THIS DEVICE SHALL BE POWERED BY CLASS 2 OUTPUTS ONLY.

All ProLinx® Products

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
AVERTISSEMENT – RISQUE D'EXPLOSION – AVANT DE DÉCONNECTER L'EQUIPMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DÉSIGNÉ NON DANGEREUX.

Markings

ISA	ISA 12.12.01 Class I, Div 2
CSA/cUL	C22.2 No. 213-M 1987

243333

CL I Div 2 GP A, B, C, D
Temp Code T5
II 3 G
Ex nA nL IIC T5 X
0° C <= Ta <= 60° C
II – Equipment intended for above ground use (not for use in mines).
3 – Category 3 equipment, investigated for normal operation only.
G – Equipment protected against explosive gasses.

ProLinx Gateways with Ethernet Ports

Series C ProLinx™ Gateways with Ethernet ports do **NOT** include the HTML Web Server. The HTML Web Server must be ordered as an option. This option requires a factory-installed hardware addition. The HTML Web Server now supports:

- 8 MB file storage for HTML files and associated graphics files (previously limited to 384K)
- 32K maximum HTML page size (previously limited to 16K)

To upgrade a previously purchased Series C model:

Contact your ProSoft Technology distributor to order the upgrade and obtain a Returned Merchandise Authorization (RMA) to return the unit to ProSoft Technology.

To Order a ProLinx Plus gateway with the -WEB option:

Add **-WEB** to the standard ProLinx part number. For example, **5201-MNET-MCM-WEB**.

Your Feedback Please

We always want you to feel that you made the right decision to use our products. If you have suggestions, comments, compliments or complaints about the product, documentation or support, please write or call us.

ProSoft Technology
5201 Truxtun Ave., 3rd Floor
Bakersfield, CA 93309
+1 (661) 716-5100
+1 (661) 716-5101 (Fax)
http://www.prosoft-technology.com

CC-Link Driver Manual
May 21, 2009

ProSoft Technology® Product Documentation

In an effort to conserve paper, ProSoft Technology no longer includes printed manuals with our product shipments. User Manuals, Datasheets, Sample Ladder Files, and Configuration Files are provided on the enclosed CD, and are available at no charge from our web site: http://www.prosoft-technology.com

Printed documentation is available for purchase. Contact ProSoft Technology for pricing and availability.

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Europe, Middle East, Africa: +33 (0) 5.3436.87.20
Latin America: +1.281.298.9109
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Contents

1 CC-Link

In This Chapter

The CC-Link protocol driver acts as a Local Station or Intelligent Device, which enables easy connection to the CC-Link Master-controlled network for data transfer. Configuration options allow the gateway to occupy up to four (4) stations on the CC-Link network. Transient Messaging capability increases overall I/O data transfer capacity by more than 8,000 words. When configured as a Local Station, the gateway allows read-only viewing of the entire CC-Link Master cyclic database from all configured slaves on the CC-Link network.

The module is a stand-alone DIN-rail mounted protocol gateway that provides one CC-Link TE-CON7 4P port and an Ethernet RJ45 connector interface.

CC-Link (Control & Communication Link) is an open-standard-based communication protocol that enables easy connection to Mitsubishi PLCs, and provides fast, reliable communication on this fieldbus network used in automation and process control. CC-Link is the dominant protocol used in Asia, and is rapidly gaining acceptance worldwide.

Interoperability

CC-Link technology is based on the use of an Application Specific Integrated Circuit (ASIC) available from Mitsubishi Electric Automation.

Conformance Testing

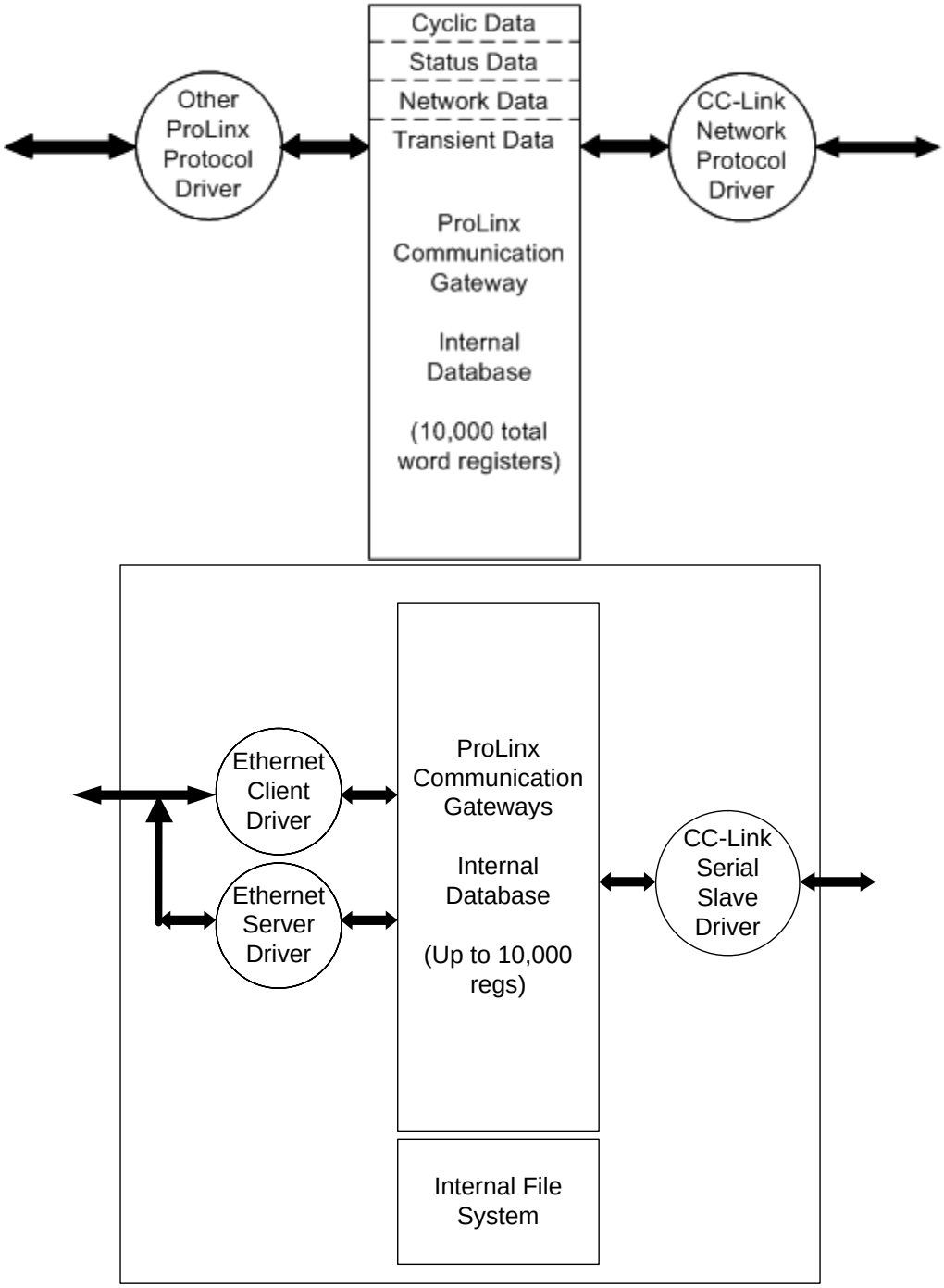
Conformance testing through the CC-Link Partner Association (CLPA) ensures that devices meet the performance specifications necessary to become CC-Link certified.

Document Conventions

In this User Manual, whenever you see "CCLINK", this refers to the ProLinx CCLINK protocol driver implementation. Whenever you see "CC-Link", this refers to the protocol in general or to the protocol implementation on other manufacturers' systems. These difference references allow an easy way to identify exactly which CCLINK/CC-Link protocol implementation is being discussed at any point in the document.

1.1 Internal Database

The module contains an internal database, which is shared between all ports on the gateway. The database is also used to pass information from devices on one network to devices on another network. Data from devices connected to one communications port can be viewed and controlled by devices connected to another port.



You can also configure the internal database, in combination with the Memory Map feature to retrieve and view status and error information generated by the gateway.

1.2 CC-Link Access to Gateway Database

The CCLINK driver supports CC-Link slave functionality as a Local Station or Intelligent Device. Gateway-supported services permit CC-Link Master applications to read from and write to the gateway's internal database.

The internal database of the CC-Link gateway is used as the data source to respond to CC-Link Master read requests and as the data destination for receiving and holding data from CC-Link Master write requests. Access to the database is dependent on the command type from the remote Master, as well as whether the CCLINK driver has been configured to be a Local Station slave or an Intelligent Device slave.

Before you connect the gateway to a network, verify that the network connections are correct and that the gateway is correctly configured. You will use ProSoft Configuration Builder (PCB) to configure the gateway and to transfer the configuration files to and from the gateway.

2 Install ProSoft Configuration Builder Software

You must install the ProSoft Configuration Builder (PCB) software in order to configure the CC-Link. You can always get the newest version of ProSoft Configuration Builder from the ProSoft Technology web site.

To install ProSoft Configuration Builder from the ProSoft Web Site

1. Open your web browser and navigate to http://www.prosoft-technology.com/pcb
2. Click the **DOWNLOAD HERE** link to download the latest version of ProSoft Configuration Builder.
3. Choose **"SAVE"** or **"SAVE FILE"** when prompted.
4. Save the file to your Desktop, so that you can find it easily when you have finished downloading.
5. When the download is complete, locate and open the file, and then follow the instructions on your screen to install the program.

If you do not have access to the Internet, you can install ProSoft Configuration Builder from the ProSoft Solutions CD-ROM, included in the package with your CC-Link.

To install ProSoft Configuration Builder from the Product CD

1. Insert the ProSoft Solutions Product CD into the CD drive of your PC. Wait for the startup screen to appear.
2. On the startup screen, click **PRODUCT DOCUMENTATION**. This action opens an explorer window.
3. Click to open the **UTILITIES** folder. This folder contains all of the applications and files you will need to set up and configure your CC-Link.
4. Double-click the **PROSOFT CONFIGURATION BUILDER SETUP** program and follow the instructions on your screen to install the software on your PC.

Note: Many of the configuration and maintenance procedures use files and other utilities on the CD-ROM. You may wish to copy the files from the Utilities folder on the CD-ROM to a convenient location on your hard drive.

3 Configure the Gateway

In This Chapter

3.1 Using the Help System

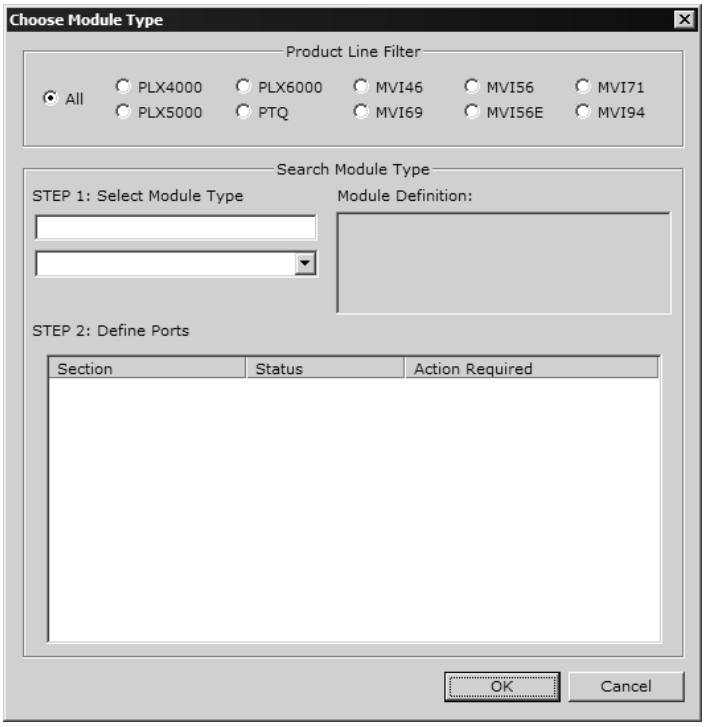
Most of the information needed to help you use ProSoft Configuration Builder is provided in a Help System that is always available whenever you are running ProSoft Configuration Builder. The Help System does not require an Internet connection.

To view the help pages, start ProSoft Configuration Builder, open the **HELP** menu, and then choose **CONTENTS.**

3.2 Adding a gateway

To add a gateway to your project:

1 Double-click the **DEFAULT MODULE** icon to open the **CHOOSE MODULE TYPE** dialog box.



2 On the **CHOOSE MODULE TYPE** dialog box, select the gateway type.

Or

1 Open the **PROJECT** menu and choose **LOCATION.**
2 On the **LOCATION** menu, choose **ADD MODULE.**

To add a gateway to a different location:

1 Right-click the **LOCATION** folder and choose **ADD MODULE**. A new gateway icon appears.

Or

1 Select the **LOCATION** icon.
2 From the **PROJECT** menu, select **LOCATION,** then select **ADD MODULE.**

3.3 Module Entries

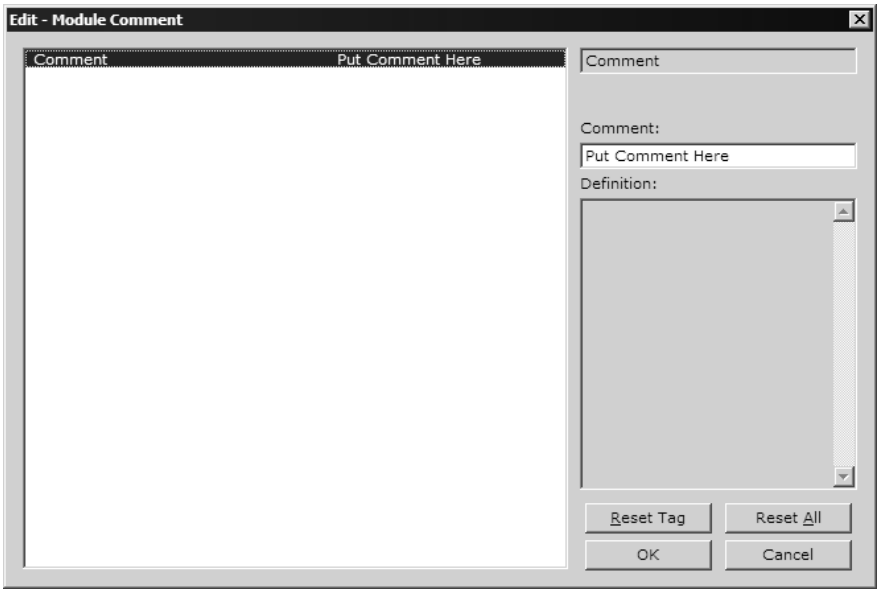
To configure gateway parameters

1. Click on the plus sign next to the icon Comment to expand gateway information.
2. Double-click the Module Comment icon to open the **EDIT** dialog box.
3. To edit a parameter, select the parameter in the left pane and make your changes in the right pane.
4. Click **OK** to save your changes.

3.4 Comment Entries

To add comments to your configuration file:

1. Click the plus sign to the left of the Comment icon to expand the gateway Comments.
2. Double-click the Module Comment icon. The **EDIT - MODULE COMMENT** dialog appears.



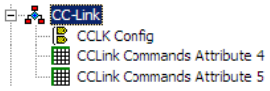
3. Enter your comment and click **OK** to save your changes.

3.5 CC-Link Protocol Configuration

CC-Link Protocol Configuration consists of the following sections:

- CCLK Config (page 15). This section defines the protocol features, gateway memory, and port settings for the protocol
- CCLink Commands Attribute *x* (page 17). The CCLINK driver can use Transient Messages (page 82), in the form of CCLink Command Attributes, to communicate with other devices on the CC-Link network.

The following illustration shows the CC-Link section of the gateway configuration. The rest of this chapter describes each parameter, with default and suggested values.

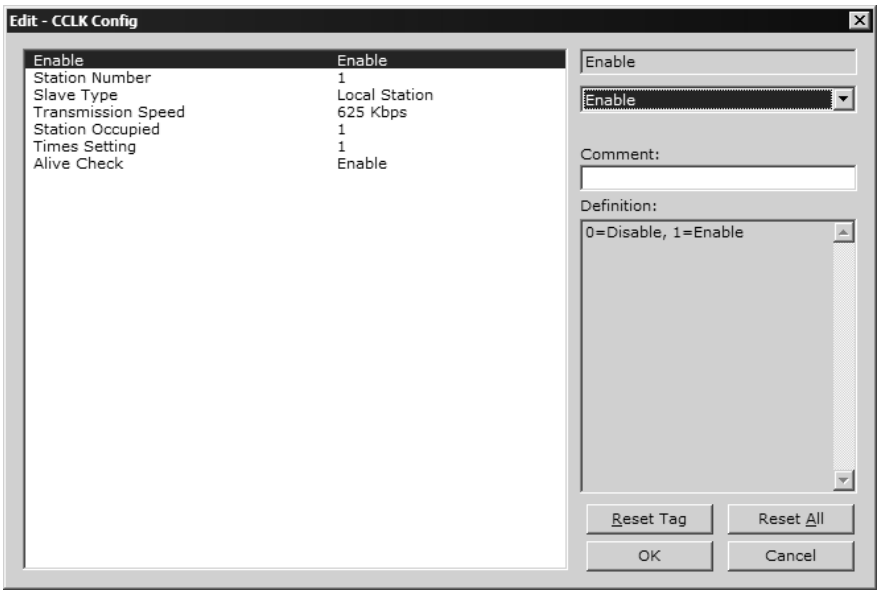



```
[CCLK Config]
Enable                          : Enable        #
Station Number                  : 1             #
Slave Type                      : Local Station #
Transmission Speed              : 625 Kbps      #
Station Occupied                : 1             #
Times Setting                   : 1             #
Alive Check                     : Enable        #

[CCLink Commands]
START
# CCLink Commands Attribute 4
#       Enable              Internal Address    Trigger Register    Register Count    Swap Code
 1      Disable             1300                0                   0                 No Change
END
```

3.5.1 [CCLK Config]

This section defines the protocol features, gateway memory, and port settings for the protocol. To edit this section, expand the **CC-LINK** icon in the Tree View, and then double-click the **CCLK CONFIG** tag.



Enable

0 (Disable)

1 (Enable)

This setting enables or disables the CCLINK serial port on the gateway. You must enable the port to use the CC-Link protocol.

Station Number

1 to 64 to identify the logical station

128 to place the logical station in standby mode

This value identifies stations on the CC-Link network. Each physical station must have a unique station number. You cannot assign the same station number to more than one station.

Note: Some CC-Link devices, including the ProLinx® CCLINK protocol gateway, allowing you to use up to four consecutive logical slave station addresses for each physical slave station. Refer to the S*tations Occupied* (page 16) parameter for more on this feature.

Slave Type

1 = Local Station.

A Local Station can perform Cyclic Data transmission between itself and the Master Station, as well as, perform Transient Message transmission between itself and the Master station or other Local Stations on the network.

2 = Intelligent Device.

In the CC-Link protocol specification, an Intelligent Device can perform Cyclic Data transmission and Transient Message transmission only between itself and the Master Station. An Intelligent device could not normally communicate directly with any other slave stations on the network. However, a CCLINK gateway configured as an Intelligent Device, can perform Transient Message transmissions to both the CC-Link network Master Station and to other slave stations on the network, operating as if it is configured as a Local Station.

Transmission Speed

Defines the transmission speed of the data link.

Value
156kbps
625kbps
2.5Mbps
5Mbps
10Mbps

Stations Occupied

1 to 4

Configures the number of logical slave stations used by a single physical slave station on the network. Choose from one to four stations, depending on the amount of Cyclic Data to be transmitted.

Times Setting

1 for all CC-Link versions

Note: The CCLINK driver currently supports only CC-Link specification version 1.10 and below. Therefore, no other *Times Settings* are possible.

Alive Check

Configures whether or not to perform Alive Check:

- Enable
- Disable

This function enables the check to assure normal operation between the driver software and the Q50BD-CCV2 CC-Link hardware interface board.

3.6 Configuring Transient Messages

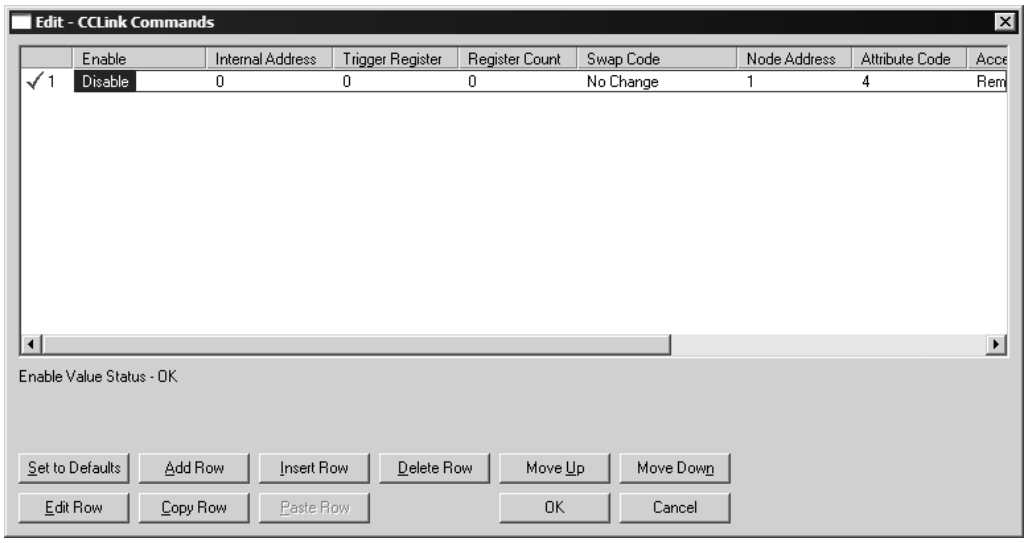
Transient Message Commands send non-periodic (asynchronous) data between the Master Station, Local Stations, and Intelligent Devices. The gateway can issue Transient Messages whether it is configured as a Local Station or as an Intelligent Device. For additional information, refer to CC-Link Transient Messaging Concepts (page 82).

3.6.1 [CCLink Command Attribute x]

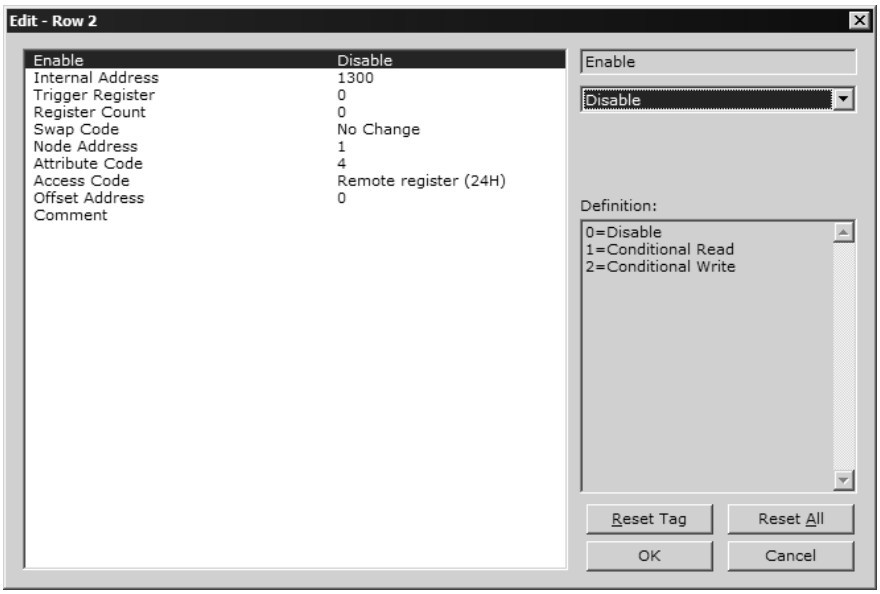
The **[CCLINK COMMAND ATTRIBUTE 4]** and **[CCLINK COMMAND ATTRIBUTE 5]** sections of the configuration file allow you to selectively send Transient Messages between the gateway, the CC-Link Master and other Local Stations and Intelligent Devices on the CC-Link network. The gateway executes the commands in numerical order. "Disabled" commands are skipped.

To configure Transient Message commands, double-click the **COMMAND ATTRIBUTE 4** or **COMMAND ATTRIBUTE 5** sections of the gateway configuration in PCB.

To add a command to the list, click the **ADD ROW** button.



To edit a command, click the **EDIT ROW** button. This action opens the **EDIT** dialog box, where you configure the parameters for the command.



Enable

0 = disable

1 = conditional read

2 = conditional write

The Enable parameter allows you to control execution of each command:

Internal Address

0 to 9998

This is a register address in the gateway's internal database. If the command is a read command, this is the starting address where data will be stored.

Trigger Register

0 to 9999

This is a register address in the gateway's internal database that contains a trigger value that will control the execution of this command.

The trigger value held in the *Trigger Register* determines when the command will be sent. The command will not be sent as long as the Trigger Register contains a value of zero (0). The command will be sent one time when the value in the *Trigger Register* changes from zero to any non-zero value. After the command in sent, the Trigger Register value is automatically reset to zero (0).

Note: In order for the *Trigger Register* to control command execution, the *Enable* parameter must be set to 1 (Conditional Read Command) or 2 (Conditional Write Command), and the *Register Count* must be greater than zero (0).

Register Count

0 to disable to 480

This is the number of registers to read or write. Set this value to 0 to disable the command.

Swap Code

0,1,2,3

This parameter defines the byte order of each four-byte group of data received. This parameter is helpful when dealing with floating-point or other multi-register values, as there is no standard byte order for storing these data types. The following table describes the values and their associated operations:

Swap Code	Description
0	None - No Change is made in the byte ordering (1234 = 1234)
1	Words - The words are swapped (1234=3412)
2	Words & Bytes - The words are swapped then the bytes in each word are swapped (1234=4321)
3	Bytes - The bytes in each word are swapped (1234=2143)

Node Address

1 to 64, 128, 255

The Node Address parameter sets the CC-Link Station Number of the device that will be the target for this command.

- Slave Station: 1 to 64 (01h to 40h, h = hexadecimal, or base 16, numbering system)
- Master Station: 0 (00h)
- Standby Master Station: 128 (80h)
- Broadcast to All Station: 255 (FFh)

Attribute Code

4 or 5

There are two command parameters that control what kind of Transient Message the gateway will send, the Command *Attribute Code* and the Command *Access Code*.

Note: These values are provided for information only, are part of the command, and cannot be modified.

Attribute Code 4 - Use for accessing CC-Link data that exists in the CC-Link communication card memory buffer that is common for all CC-Link network stations. You must specify the address offset into this common network memory buffer according to the logical station address and type of data that you wish to access from a particular station. This data is essentially the same as the Network Cyclic Data that the firmware already copies to the Local Station Database in gateway addresses 0 to1300. Therefore, this *Attribute Code* will have limited practical application and has been included for protocol specification compliance.

Attribute Code 5 - Use for accessing CC-Link database memory on any station capable of receiving and sending Transient Messages. This *Attribute Code* is more useful than *Attribute Code 4* because it extends data access to a wider range of data types beyond common Cyclic Data and common buffer data. *Attribute Code 5* can be used to access timers, counters, link and status data, as well as input/output bit and registers, and more.

Access Code

Various values entered as hexadecimal codes

There are two command parameters that control what kind of Transient Message the gateway will send, the Command *Attribute Cod*e and the Command *Access Code*. Each of the two *Attribute Codes* have different *Access Codes* associated with them. Even though some of the same hexadecimal values are used as *Access Codes* for both *Attribute Code*s, it is the combined *Attribute Code/Access Code* pair which determine the exact type of command transmitted.

Which *Access Code* you can use in a command depends on the selected *Attribute Code*, *4* or *5*, discussed above. Refer to the following tables for a description of the available *Access Codes* for each *Attribute Code*.

Access Codes for Attribute 4

Device Contents	Access Code
Buffer in the Intelligent Device Station	00h
Random access buffer	20h
Remote input	21h
Remote output	22h
Link special relay	63h
Link special register	64h
Remote register	24h

Access Codes for Attribute 5

Device Contents	Name	Bit	Word	Unit	Access Code
Input relay	X	O		Hexadecimal	01h
Output relay	Y	O		Hexadecimal	02h
Internal relay	M	O		Decimal	03h
Latch relay	L	O		Decimal	83h
Link relay	B	O		Hexadecimal	23h

Device Contents	Name	Bit	Word	Unit	Access Code
Timer (contact)	T	O		Decimal	09h
Timer (coil)	T	O		Decimal	0Ah
Timer (present value)	T		O	Decimal	0Ch
Retentive timer (contact)	ST	O		Decimal	89h
Retentive timer (coil)	ST	O		Decimal	8Ah
Retentive timer (present value)	ST	O		Decimal	8Ch
Counter (contact)	C	O		Decimal	11h
Counter (coil)	C	O		Decimal	12h
Counter (present value)	C		O	Decimal	14h
Data register	D		O	Decimal	04h
Link register	W		O	Hexadecimal	24h
File register	R		O	Decimal	84h
Special link relay	SB	O		Hexadecimal	63h
Special link register	SW		O	Hexadecimal	64h
Special relay	SM	O		Decimal	43h
Special register	SD		O	Decimal	44h

Note: Device Contents (data areas or data types) other than those shown above cannot be accessed.

Transient Message Bit-level Access

Both Command *Attribute Code 4* and Command *Attribute Code 5* have Command *Access Codes* that allow transfer of binary, bit-level data. The following cautionary Note and Warning apply to all Transient Message Commands used to access binary or bit-level data types.

Note: Binary bit-level data may not be accessed as single or individual bits, but only in 16-bit, whole-word groupings. When accessing bit-level data, the bits will always be read or written starting on an even 16-bit word boundary in the target database. That is to say that all reads and writes will start at Bit 0 of the word address used in the command. For hexadecimal addresses, the right-most bit = 0 will indicate a word-level boundary bit address (0000h, 0010h, 01C0h, etc.) Therefore, when accessing a bit device (such as Input Relay, Output Relay, Timer (coil), Counter (contact), and so on), you must specify the *Offset Address* in the command as a word address by first converting any hexadecimal address to its decimal equivalent and then divide the bit address by 16. Next, drop any remainder (no decimal point fractions allowed) and the integer result of this division then becomes the *Offset Address* for the command.
Example: Input Relay 5Ah = 90 decimal / 16 = 5.625 = Bit 10 of register 5. *Offset* [word] *Address* = 5.
When dealing with hexadecimal (hex or h) addresses, a shortcut alternative to doing this calculation would be to drop the right-most digit in the hex address and convert the remaining digit or digits to their decimal equivalent.

Example: Timer (coil) 01CAh - Drop the A & convert 01Ch to decimal. *Offset* [word] *Address* = 28. To access individual bits, you will have to read the entire word containing the bit or bits you wish to access. If you wish to change the value of specific bits, you will need read the entire word containing the bit or bits you wish to change, employ a bit-masking technique to change only the bits you want to change, and then write back the entire data word containing the changed bits. WARNING: Anyone creating and using Transient Messages to write bit-level data must use extreme care must be exercised with any bit-masking procedure to avoid unwanted data changes that could result in unexpected equipment operation, which might cause damage to equipment or injury to personnel.

Offset Address

0 and up, always entered as a decimal (base 10) value

This parameter sets the address offset of a memory area in the CC-Link hardware memory buffer or in the memory database area on a remote station that will be affected by the command. The values to use here will vary based on the Command *Attribute Code*, Command *Access Code*, the type of data to be accessed, and the location of that data in the target data area or device.

Even though many CC-Link devices specify memory addresses using hexadecimal numbers, this parameter must always be entered into the PCB Command configuration as the decimal (base 10) equivalent of any hexadecimal address value. If necessary, convert any hexadecimal addresses to decimal numbers before entering the value into this parameter. For additional details, refer to Transient Message Bit-level Access (page 21).

Example: If X100h is the start of your Remote Inputs (RX data area) in a CC-Link Master PLC, then:

- The *Offset Address* to the beginning of the RX data area will be 0 to read the data from X100h through X10Fh.
- To read from the Master RX bit addresses starting at X110h through X11Fh use *Offset Address* 1.
- To read X120h through X12Fh use *Offset Address* 2, and so on.

Comment

0 to 35 alphanumeric characters

3.6.2 Example Commands

The following command examples show how to read and write data from the CC-Link network using Transient Messages. These examples show several of the most typical types of Transient Messages you might need to use. They are not meant to be an exhaustive reference of all possible *Attribute Code/Access Code* combinations, only to present a few, well-chosen, representative ones.

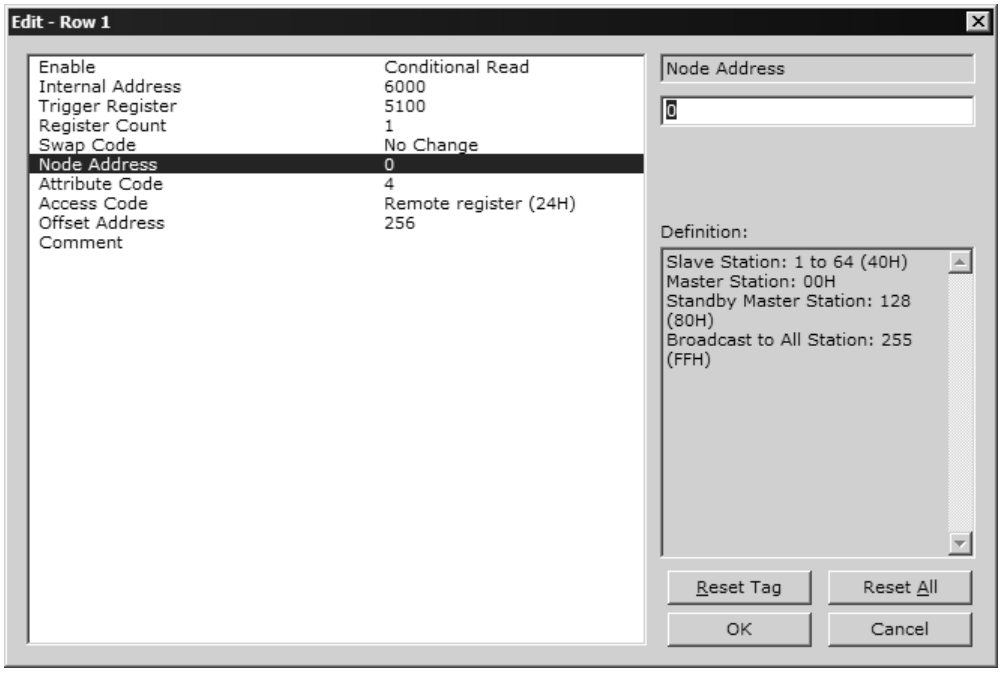
Command Attribute Code 4

Command *Attribute Code 4* is used to access the network data buffer on the CC-Link hardware interface card on the ProLinx gateway or on a remote Station. The lowest *Offset Address* for all listed *Access Codes* will be zero, except for *Access Code* 24h, which must be treated differently.

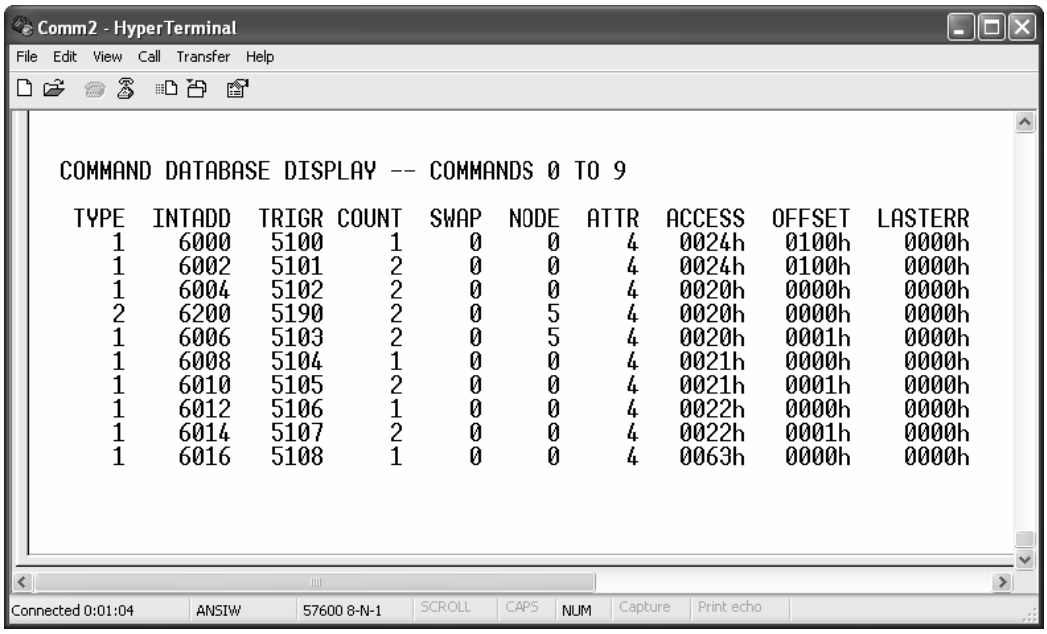
An *Access Code* 24h write command accesses the write register area of the data buffer, which starts at *Offset Address* 0 (00h). An *Access Code* 24h read command accesses the read register area of the data buffer, which starts at *Offset Address* 256 (100h).

For a list of the *Access Codes* available for *Attribute Code 4*, refer to Access Codes for Attribute 4 (page 20).

Note: *Access Codes* 21h, 22h, and 63h access binary bit data. Refer to note on Bit-level Access (page 21).



You can view the Command List from the gateways Config/Debug menu. The following illustration shows an example Command List for commands 0 to 9.

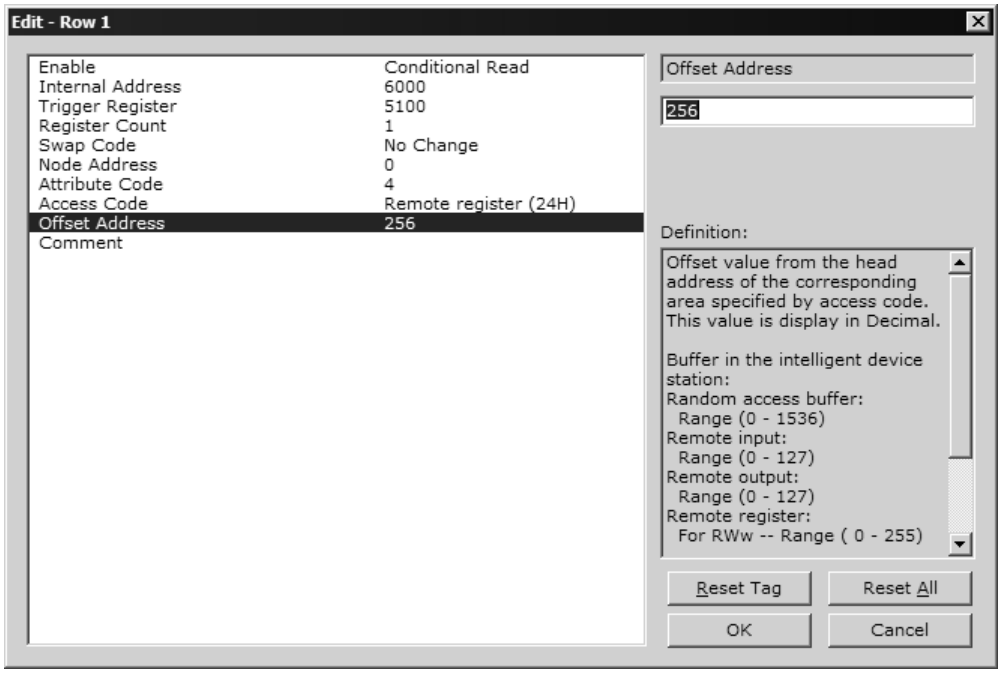


To execute any command entered in the list, use the database *Trigger Register*, which can be controlled by the other protocol on the gateway. Set the *Trigger Register* to any non-zero value to cause the command to be transmitted. The *Trigger Register* value will reset to zero every time the associated command is executed.

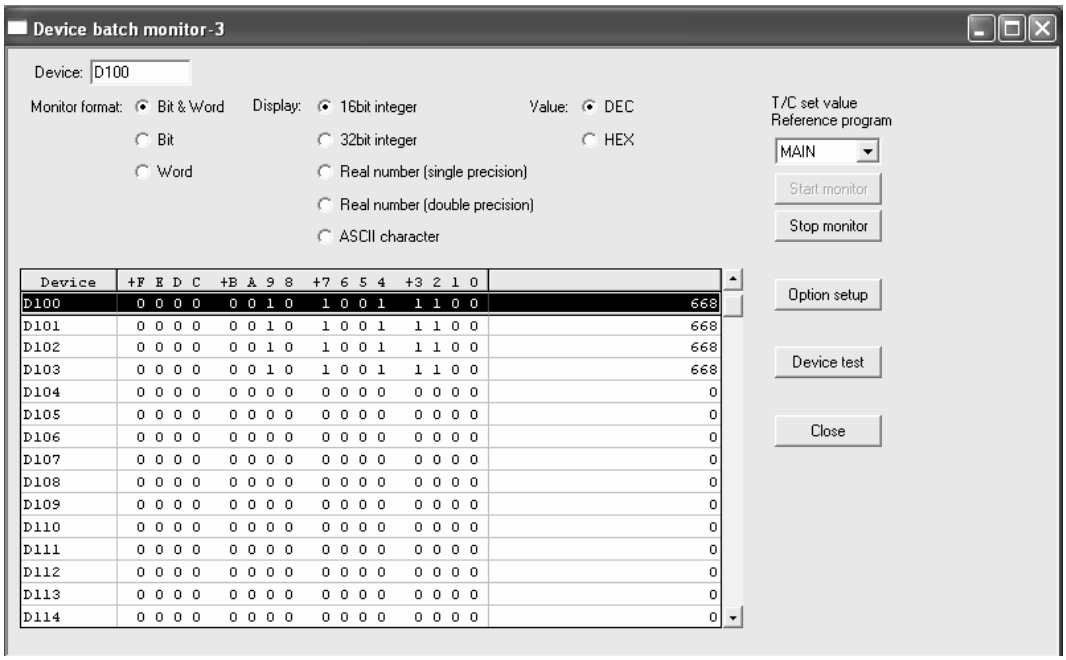
Conditional Read Example

This example issues a Transient Message conditional read with *Attribute Code 4/Access Code 24h*. This command attempts to read data from the Master at offset 256 (0100 Hex), which is the start of the RWr register area in the buffer. Data will be placed in the gateway at address 6000. To execute this command, change register 5100 to any non-zero value.

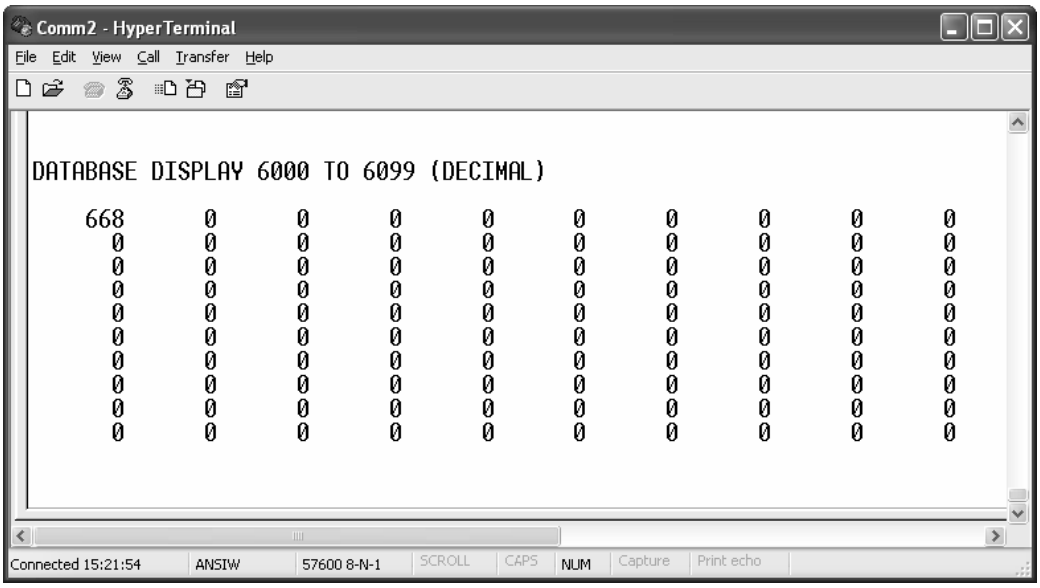
The following illustration shows the command in ProSoft Configuration Builder.



The following illustration shows the source data in a Mitsubishi PLC (notice the Device addresses in the Mitsubishi are shown as hexadecimal values preceded by the letter "D". Each address is a 16-bit register.)



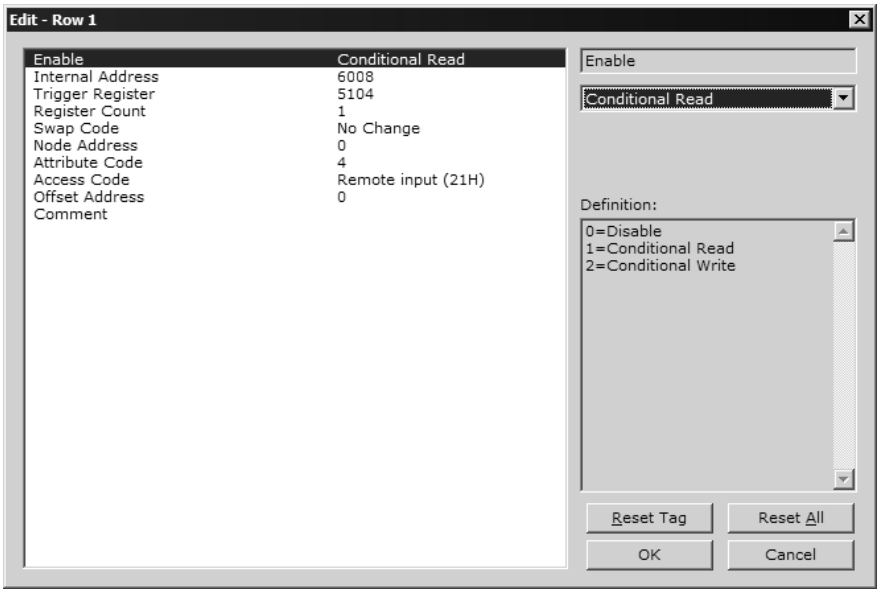
The following illustration shows the data in the gateway's database destination address 6000.



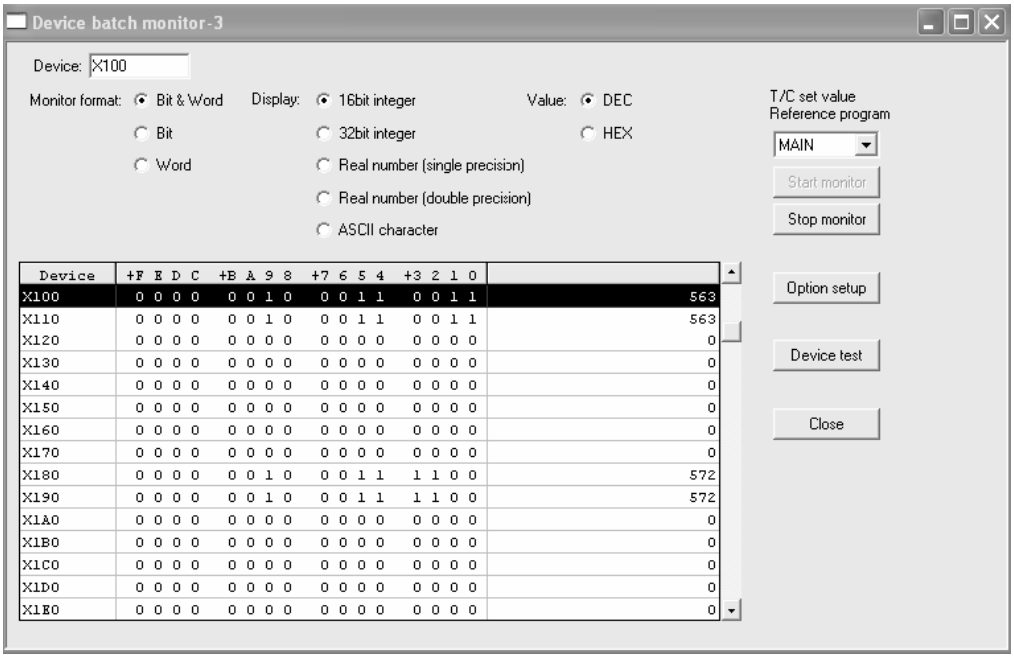
Remote Inputs Example

This example issues a Transient Message conditional read with *Attribute Code 4/Access Code 21h*, which reads the Remote Inputs (RX area). This command will read 16 inputs bits (1 register word), and will place the data in the gateway's database register 6008.

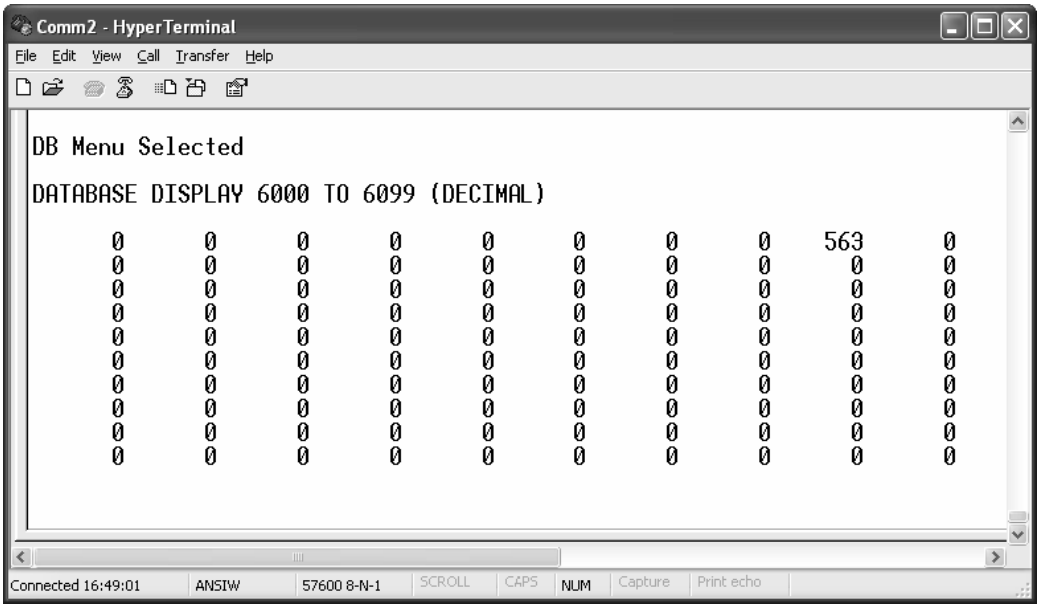
The following illustration shows the command in ProSoft Configuration Builder.



The following illustration shows the source data in a Mitsubishi PLC. Notice that the beginning of the RX data area in the Master is bit address X100. Because X100 is the first register of the RX data area, using *Offset Address* = 0 and *Access Code* = 21h in the PCB command will allow the command to read at the start of the RX data area in the Master.

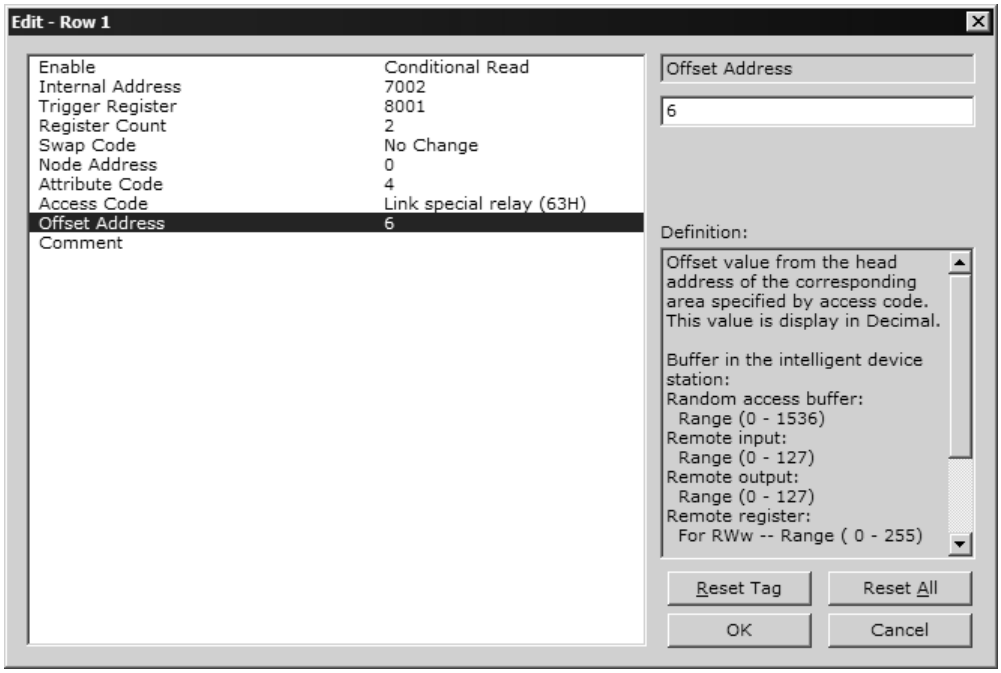


The following illustration shows the source data in the gateway's database destination address 6008.

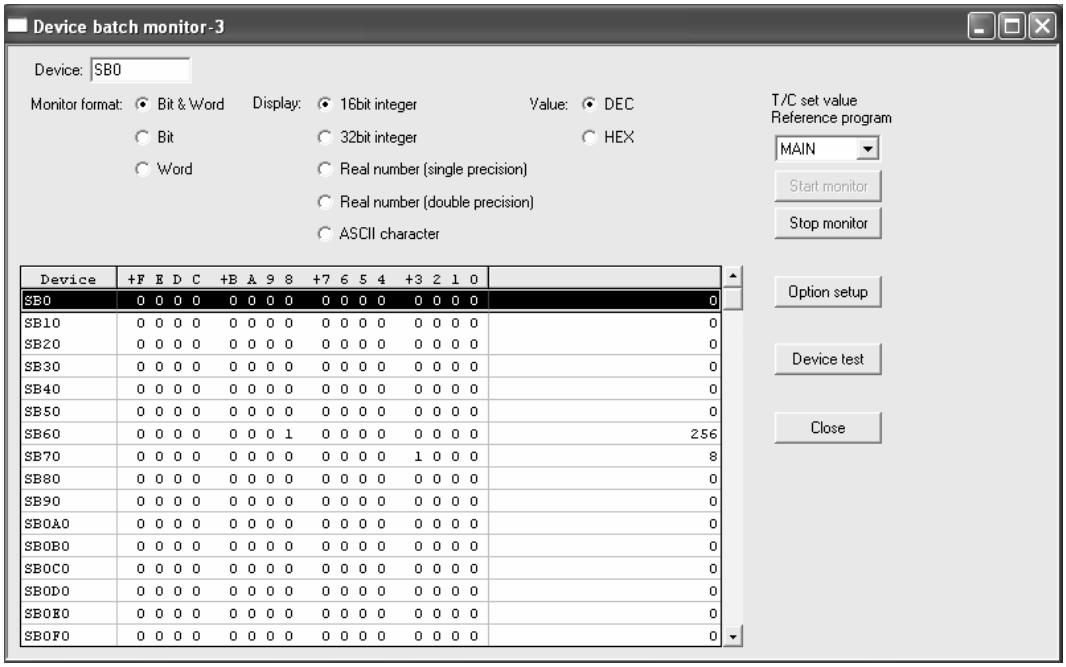


Entering the Command Offset Address

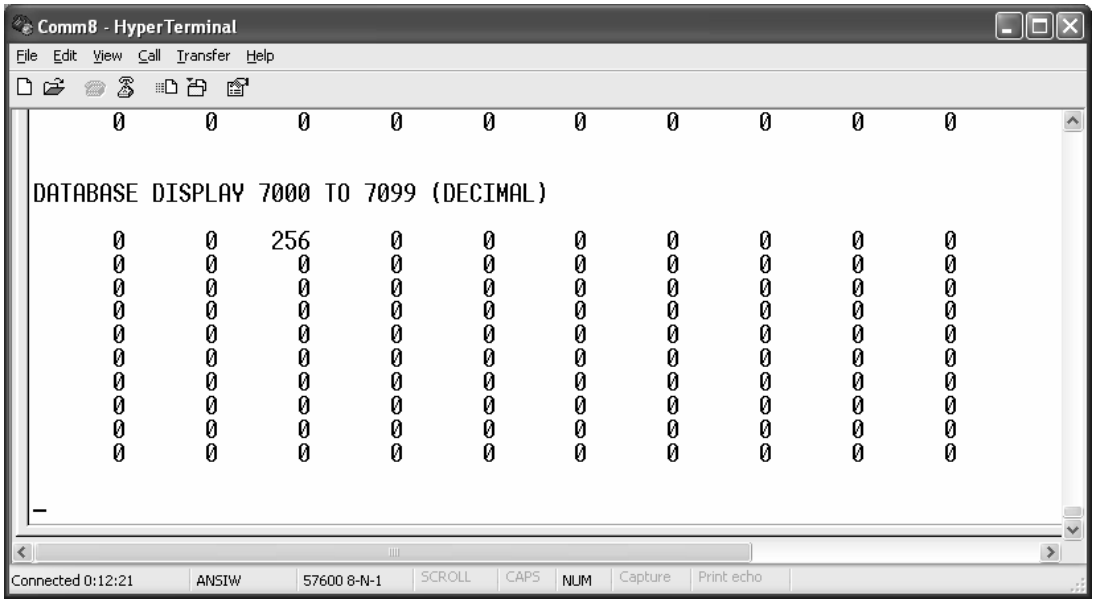
This is an example command for ProSoft Configuration Builder to show how to read Special Link Relay (bit-level data) from address SB60h using *Attribute Code 4/Access Code 63h*. For additional information on how to convert bit-level addresses into *Offset* [word] *Addresses*, refer to Transient Message Bit-level Access (page 21)



The following illustration shows the source data in a Mitsubishi PLC.



The following illustration shows the data in the gateway's database destination address 7002.



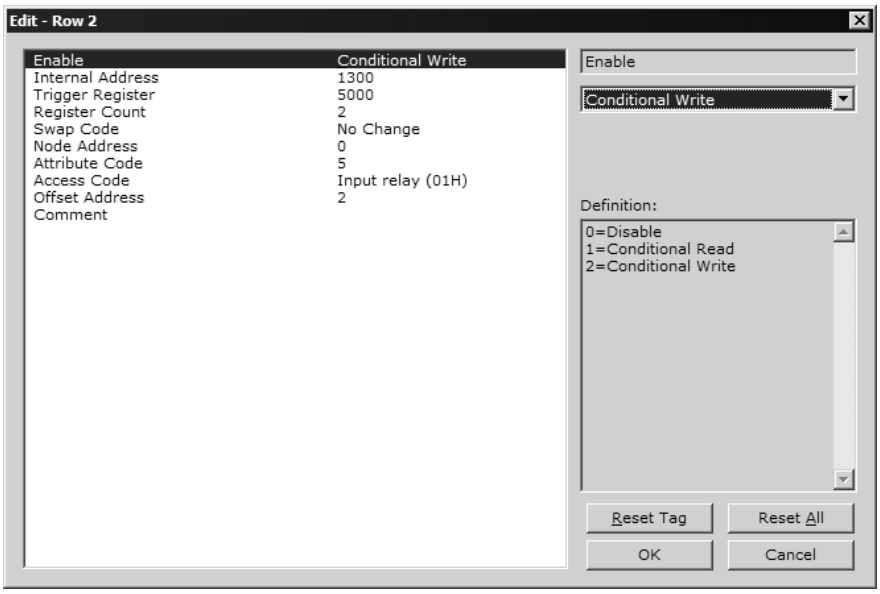
Command Attribute 5

This set of transient messages can be issued between the gateway and the Master. You can also issue these commands from the gateway to other slave stations on the network that can receive and respond to Transient Messages. Most of these examples show messages between a ProLinx gateway and a Mitsubishi PLC configured as a CC-Link Master.

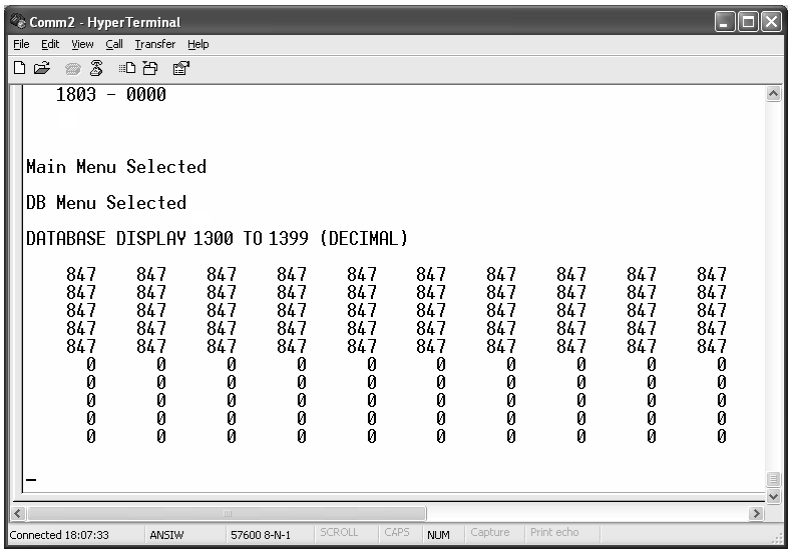
For a complete list of potential *Access Codes*, refer to Access Codes for Attribute 5 (page 20).

Writing to the Remote Input RX Data Area

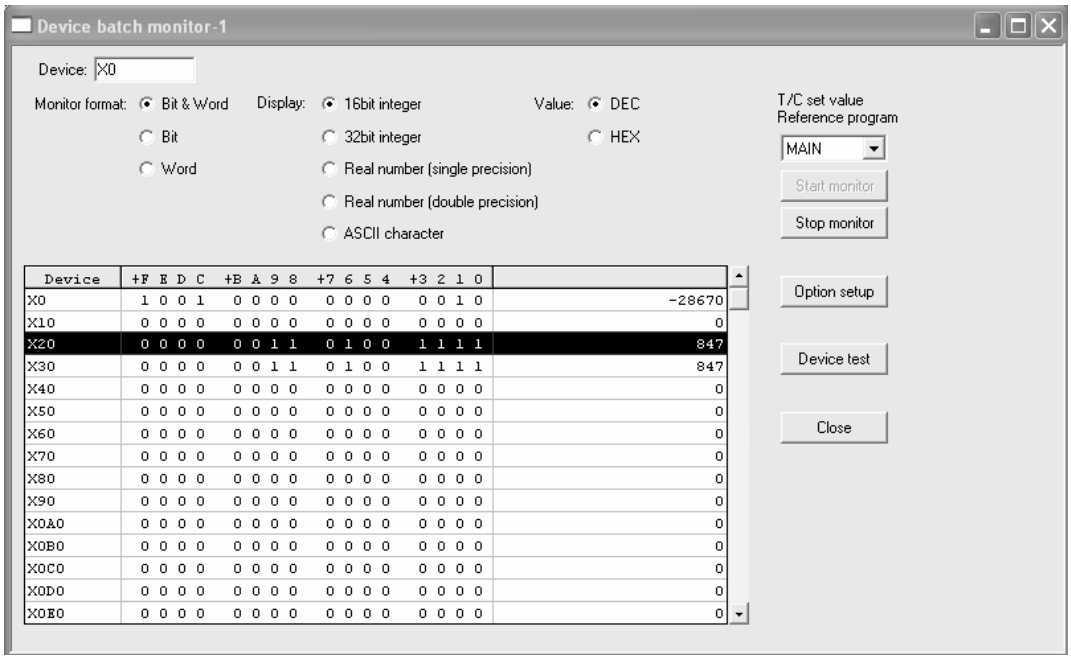
The following example shows how to send a conditional write command using *Attribute Code 5/Access Code 01h,* which writes to the Remote Input RX data area or a Local Station or the X data area in the Mitsubishi Master PLC.



The following illustration shows the source data to be sent to the Master PLC from gateway source address 0.



The following illustration shows the data in destination X20 (word offsets 2 and 3) in the Mitsubishi PLC.



Writing to Counters, Timers or Retentive Timers

Note Take special care when writing or reading from a Timer (T), Counter (C) or Retentive Timers (ST), especially when attempting to read their contacts and coils. Careless use of Transient Messages to these data types can cause PLC faults and/or total loss of CC-Link network communication.

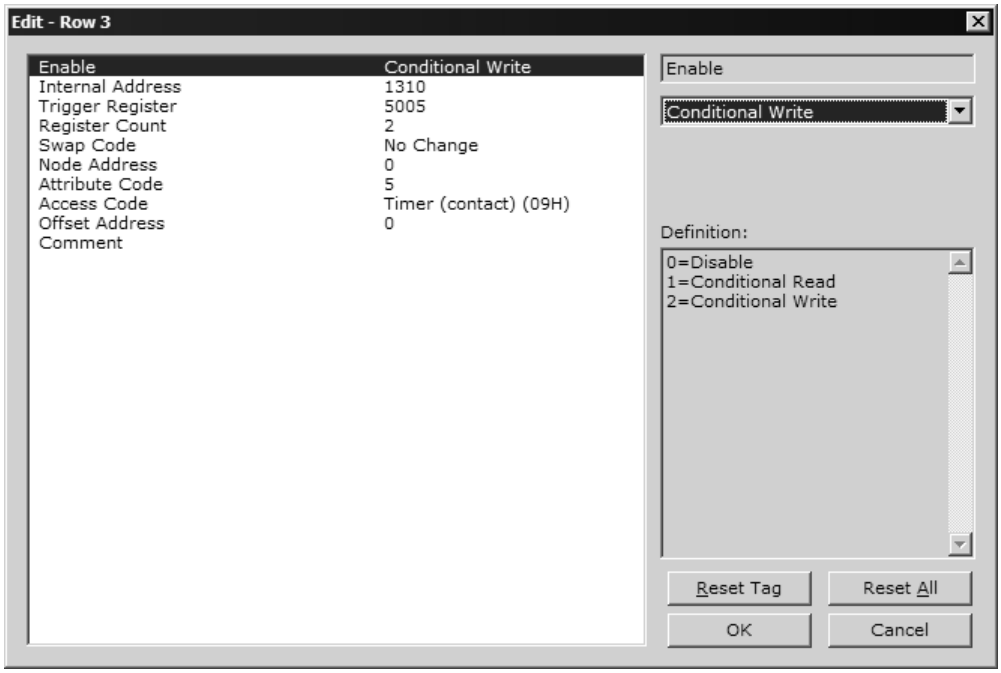
The protocol is able to read contacts and coils only in word groupings of 16. A Transient Message command will read/write the first 16 contacts of the first 16 timers in one register in the database.

A message to read Timer, Counter, or Retentive Timer contacts starting at *Offset Address* = 0 with *Register Count* = 1 actually retrieves contacts for Timers 0-15. Retentive Timers and Counters work the same way as do write commands to the contacts or coils.

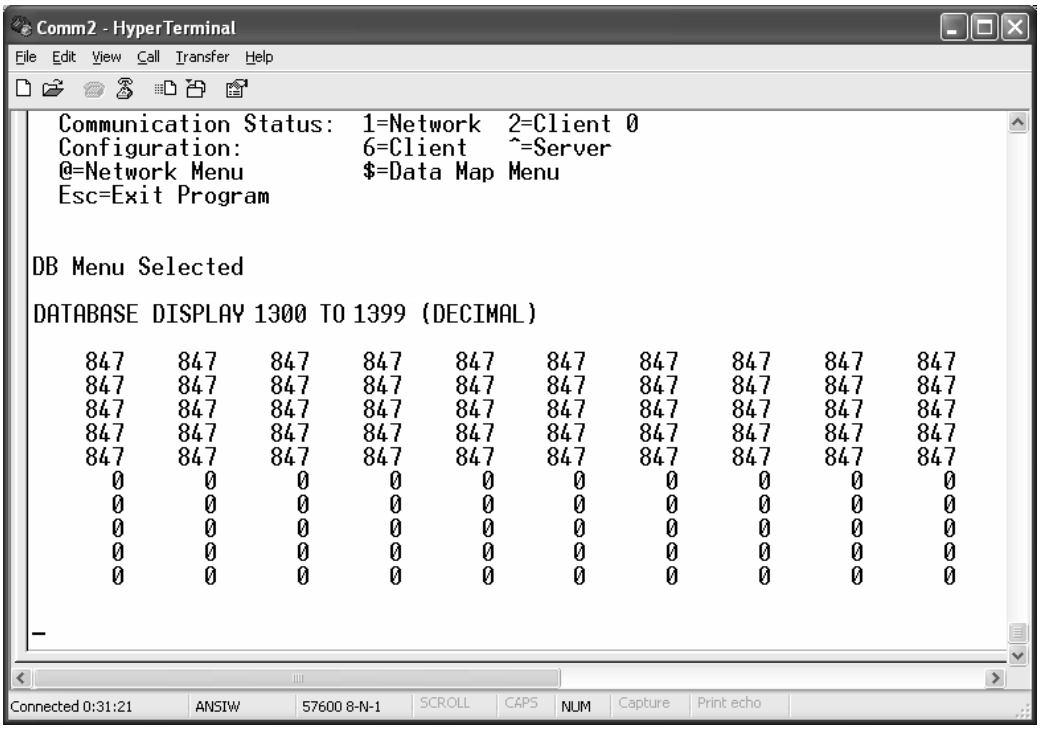
Access Codes for Attribute Code 5 to read or write to Counters, Timers or Retentive Timers are:

- 09 Hex
- 0A Hex
- 89 Hex
- 8A Hex
- 11 Hex
- 12 Hex

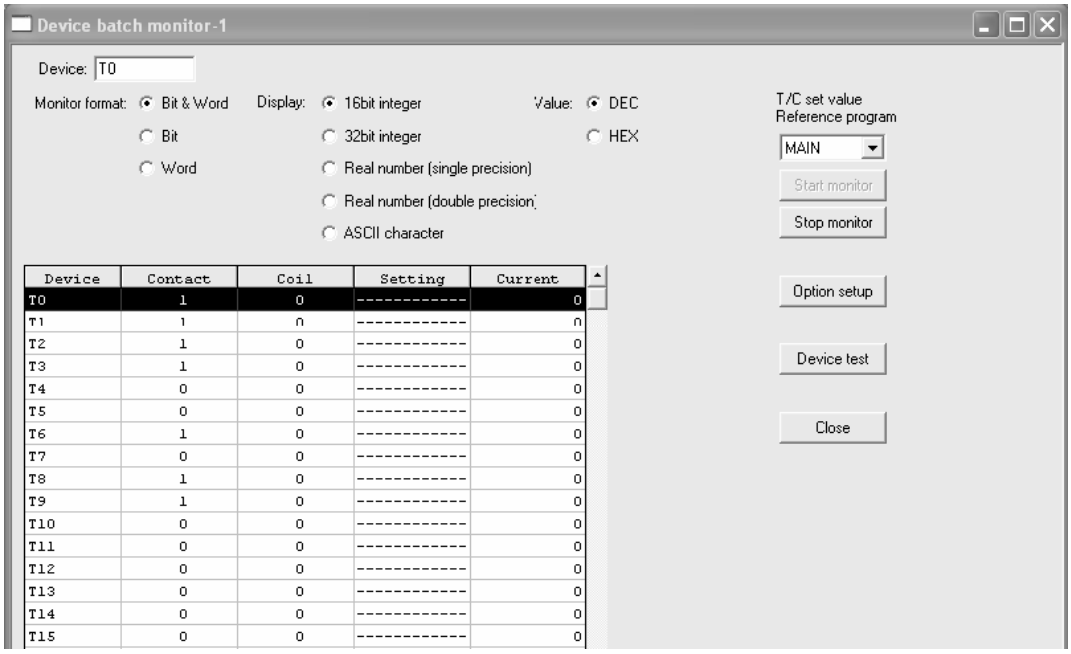
In this example, the following illustration shows a Conditional Write command using *Attribute Code 5/Access Code 09h*.



This message will retrieve data value 847 from gateway database locations 10 and 11, and write the first 32 contacts of the first 32 timers to the Mitsubishi PLC Master.



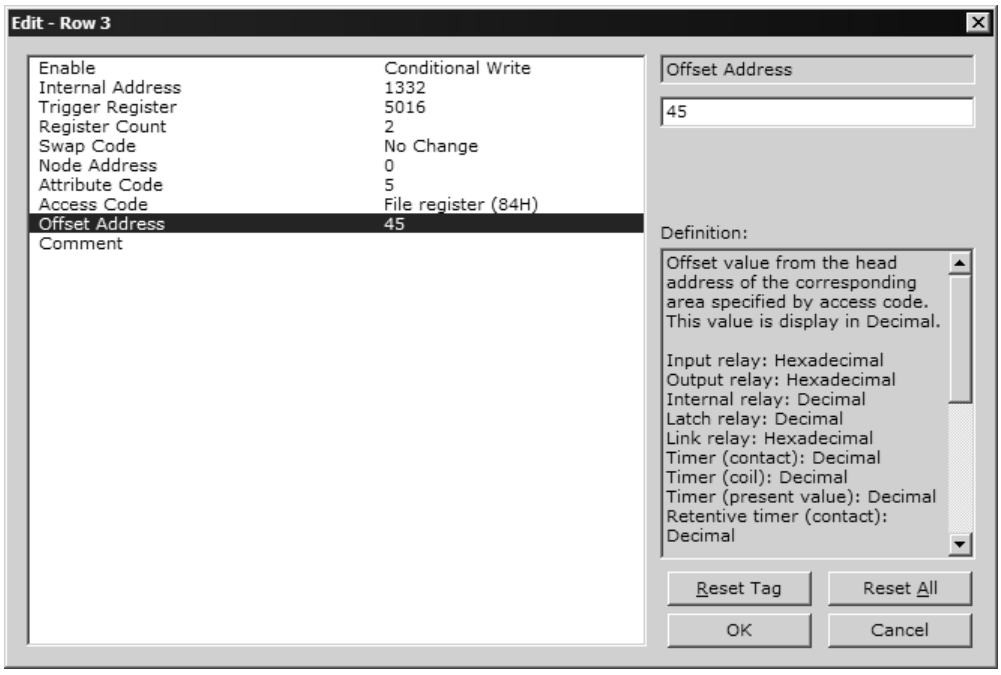
The following illustration shows the data in the Mitsubishi PLC after the command is executed.



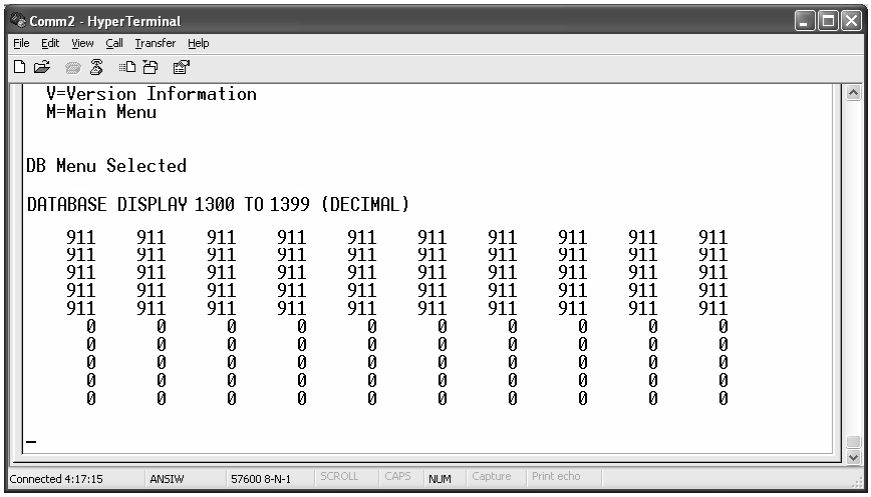
Timers 0 to 31 contain the same data pattern as that from the gateway. The binary value of 847 decimal is 0000001101001111.

Writing to the File Register Data Type

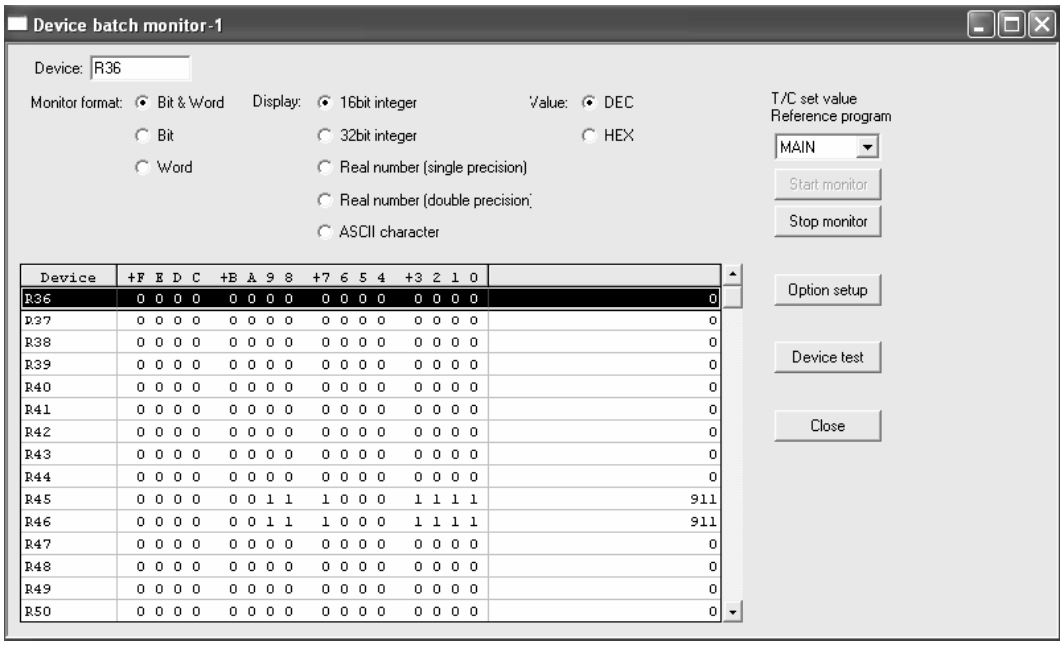
This example shows how to send a conditional write command using *Attribute Code 5/Access Code 84h*. This command writes to the File Register data type (R) from source address 0032 and 0033 in the gateway, to the destination registers R45 and R46 in the File Register data to the Mitsubishi PLC Master.



The following illustration shows the source data in the gateway to be sent to the Mitsubishi PLC Master.



The following illustration shows the data in the destination registers R45 and R46 in the Mitsubishi PLC Master.



Conditional Write Example to Other Than a Master Station

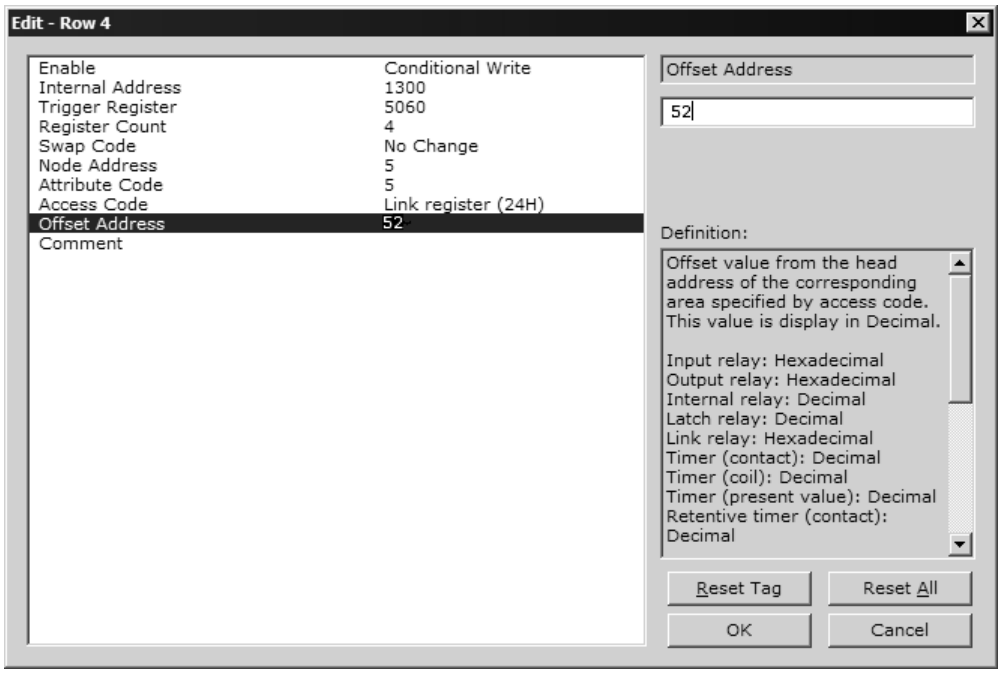
This example shows how to set up a conditional write with *Attribute Code 5/Access Code 24h*. This command will write data from the gateway to another Local Station (in this case, another ProLinx gateway) rather than writing to the Mitsubishi PLC Master Station.

In order to write to the correct offset and because Access Code 24h writes to the RWw data area of the destination station, you must know the start of the RWw data area in the destination Local Station.

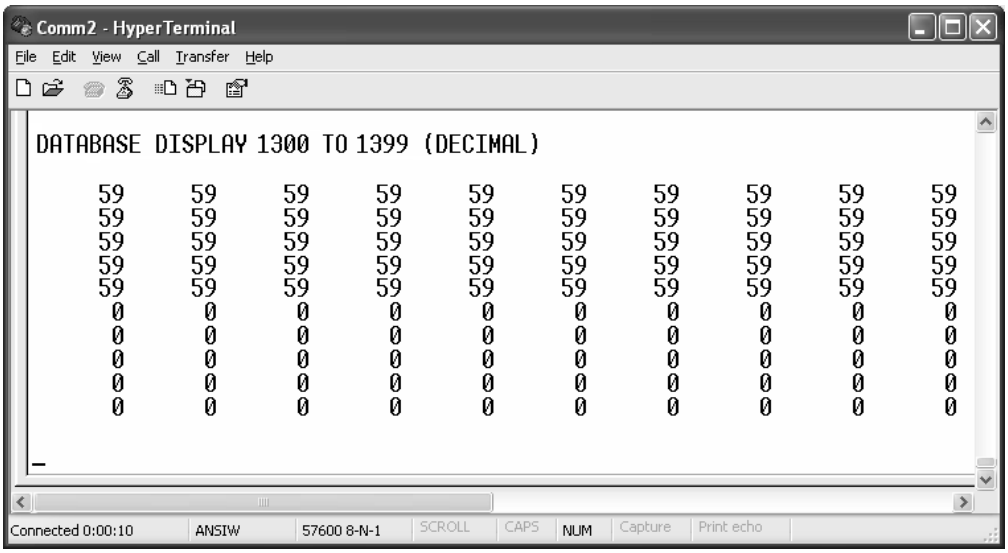
Example: For this example, assume:

1. That you want to send a Transient Message to write data from your local ProLinx gateway to a remote ProLinx gateway
2. That the RWw data area of the remote gateway starts at gateway address 40
3. That the remote gateway is configured to occupy four logical stations
4. That each logical station uses four consecutive words in the RWs data area
5. That the first occupied address in the remote gateway is Station #2
6. And that you want to write to the *Node Address* (Local Station) #5, the fourth logical station in the Remote ProLinx gateway.

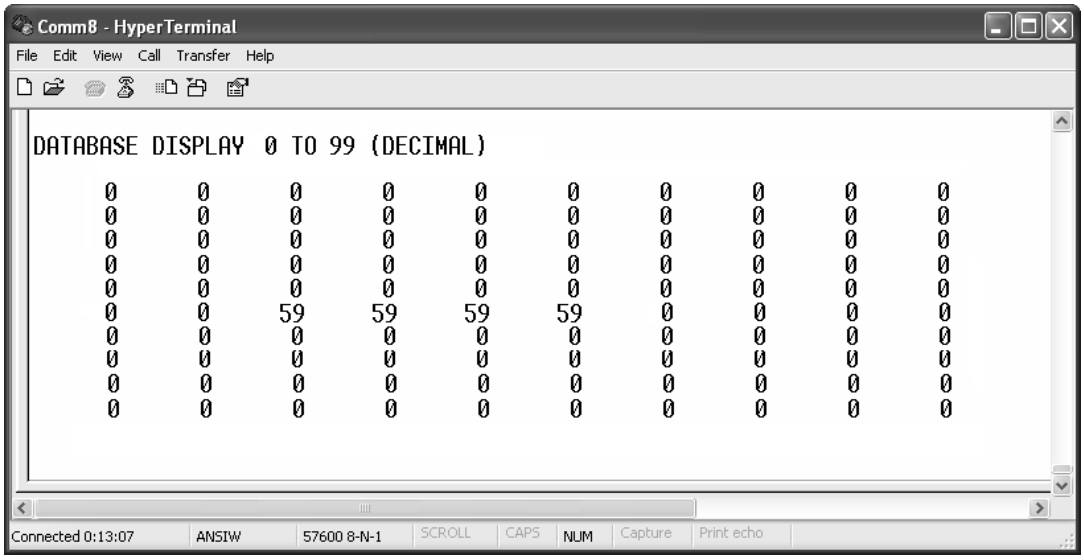
Therefore, because the RWw data area in the remote gateway begins at gateway database register 40, which would be *Offset Address* 40, and you are trying to write to the fourth logical station in that data area, then the destination *Offset Address* you will need to use in the command will be 52.



The following illustration shows the source data to be written from the gateway to Local Station #5 on the network.



The following illustration shows the data as written to the destination station.



3.7 Data Map

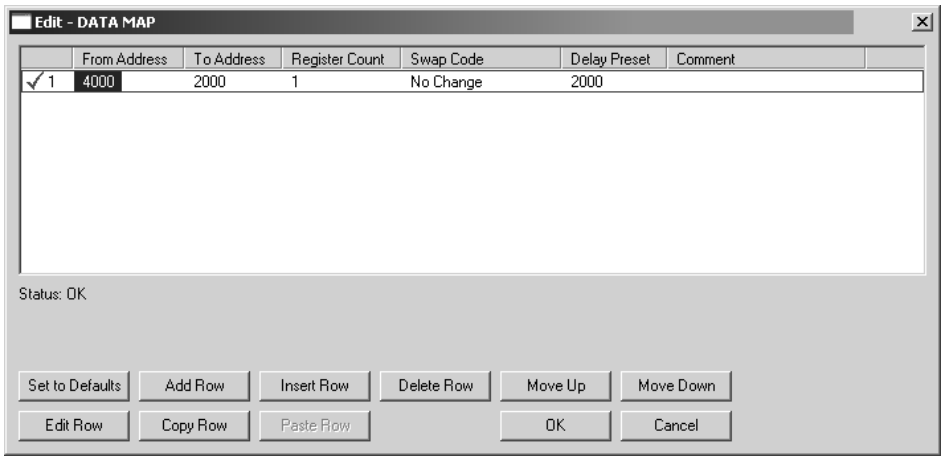
The **[DATA MAP]** section allows you to copy data between areas in the module's internal database.

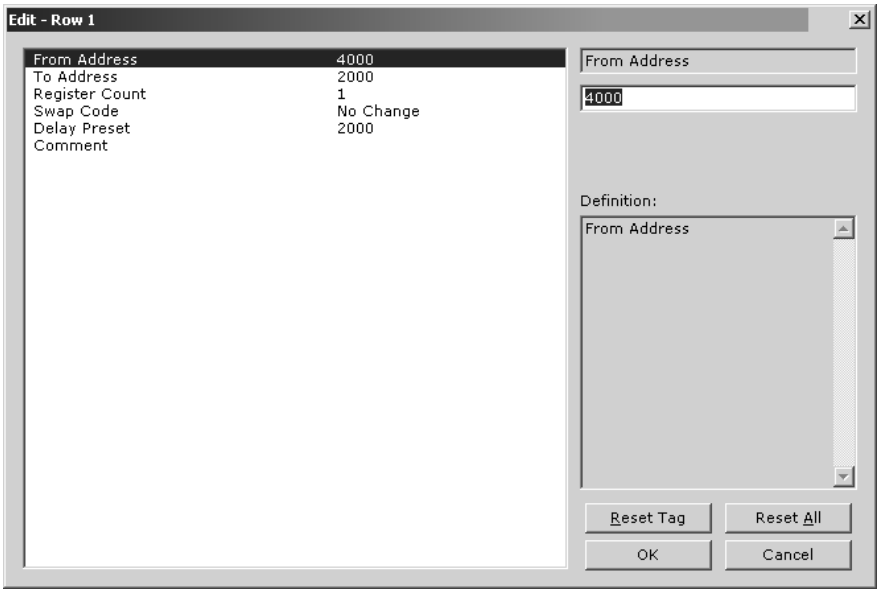
You can copy to 100 registers at a time, and you can configure up to 200 separate copy commands.

For example, you can copy data from the error or status tables in upper memory to internal database registers in the User Data memory area.

You can also rearrange the byte and/or word order during the copy process so that data such as floating point values can be converted to the correct format for a specific protocol.

You can also use the Data Map to condense widely dispersed data into one contiguous data block, making it easier to access.





3.7.1 [Data Map]

From Address

0 to highest Status Data address

The data area for CCLINK consists of registers 0000 to 9999. There is no special status area for the CCLINK driver.

For information on data areas and status areas for other protocols refer to the *ProLinx Reference Guide.*

To Address

0 to 9999

The destination for the copy is always within the Register Data area.

Register Count

1 to 100

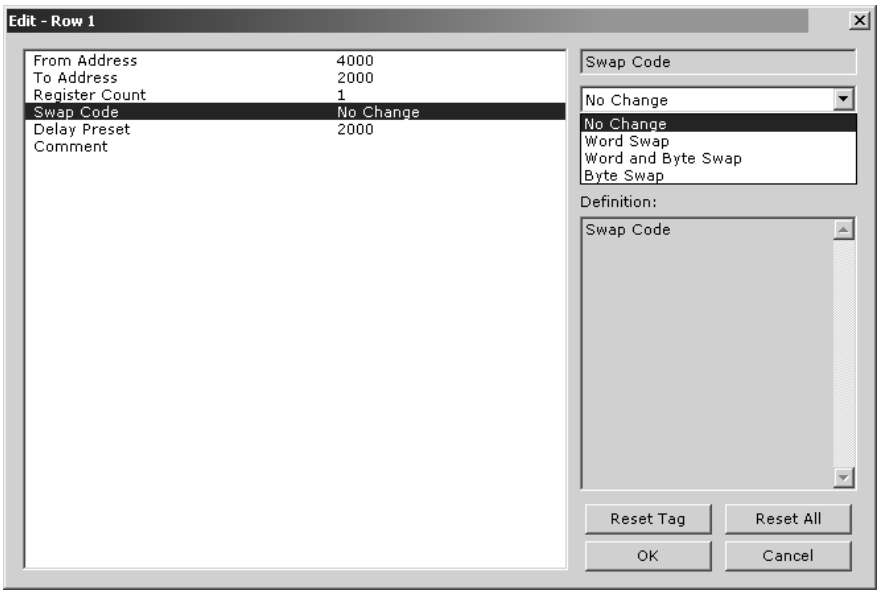
This parameter specifies the number of registers to copy.

Swap Code

- No Change, Word Swap, Word and Byte Swap, Byte Swap

You may need to swap the order of the bytes in the registers during the copy process in order to change the alignment of bytes between dissimilar protocols. This parameter is helpful when dealing with floating-point or other multi-register values, as there is no standard method of storage of these data types in slave devices.

The following table defines the values and their associated operations:



Swap Code	Description
No Swap	No Change is made in the byte ordering (1234 = 1234)
Word Swap	The words are swapped (1234=3412)
Word and Byte Swap	The words are swapped then the bytes in each word are swapped (1234=4321)
Bytes	The bytes in each word are swapped (1234=2143)

Delay Preset

This parameter sets an interval for each [Data Map] copy operation. The value you put for the Delay Preset is not a fixed amount of time. It is the number of firmware scans that must transpire between copy operations.

The firmware scan cycle can take a variable amount of time, depending on the level of activity of the protocol drivers running on the ProLinx gateway and the level of activity on the gateway's communications ports. Each firmware scan can take from 1 to several milliseconds to complete. Therefore, [Data Map] copy operations cannot be expected to happen at regular intervals.

If multiple copy operations (several rows in the [Data map] section) happen too frequently or all happen in the same update interval, they could delay the process scan of the gateway protocols, which could result in slow data updates or missed data on communications ports. To avoid these potential problems, you should set the Delay Preset to different values for each row in the [Data Map] section and set them to higher, rather than lower, numbers.

For example, Delay Preset values below 1000 could begin to cause a noticeable delay in data updates through the communications ports. And you should not set all Delay Presets to the same value. Instead, use different values for each row in the [Data Map] such as 1000, 1001, and 1002 or any other different Delay Preset values you like. This will prevent the copies from happening concurrently and prevent possible process scan delays.

3.8 Printing a Configuration File

To print a configuration file:

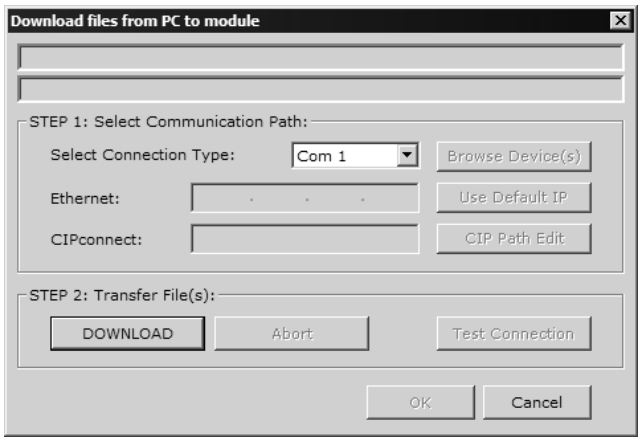
1. Select the **MODULE** icon, and then click the right mouse button to open a shortcut menu.
2. On the shortcut menu, choose **VIEW CONFIGURATION.** This action opens the **VIEW CONFIGURATION** window.
3. On the **VIEW CONFIGURATION** window, open the **FILE** menu, and choose **PRINT.** This action opens the **PRINT** dialog box.
4. On the **PRINT** dialog box, choose the printer to use from the dropdown list, select printing options, and then click **OK.**

3.9 Downloading a File from PC to the Gateway

To download a file from the Configuration Builder to the gateway:

1. Verify that your PC is connected to the gateway with a null-modem serial cable connected to the serial port on your PC and the serial port on the gateway
2. Open the **PROJECT** menu, and then choose **MODULE.**

3 On the **MODULE** menu, choose **DOWNLOAD.** Wait while ProSoft Configuration scans for communication ports on your PC. When the scan is complete, the **DOWNLOAD** dialog box opens.



4 Select the port to use for the download.
5 Click the **DOWNLOAD** button.

4 Diagnostics and Troubleshooting

In This Chapter

There are two ways to troubleshoot ProLinx gateways: LEDs located on the front of the gateway, and a Debug port that provides a view into the gateway's internal database.

4.1 The Configuration/Debug Menu

The Configuration and Debug menu for this module is arranged as a tree structure, with the Main Menu at the top of the tree, and one or more sub-menus for each menu command. The first menu you see when you connect to the module is the Main menu.

Because this is a text-based menu system, you enter commands by typing the command letter from your computer keyboard in the diagnostic window in ProSoft Configuration Builder (PCB). The module does not respond to mouse movements or clicks. The command executes as soon as you press the command letter — you do not need to press **[ENTER].** When you type a command letter, a new screen will be displayed in your terminal application.

4.1.1 Required Hardware

You can connect directly from your computer's serial port to the serial port on the module to view configuration information, perform maintenance, and send (upload) or receive (download) configuration files.

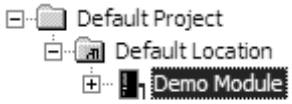
ProSoft Technology recommends the following minimum hardware to connect your computer to the module:

- 80486 based processor (Pentium preferred)
- 1 megabyte of memory
- At least one UART hardware-based serial communications port available. USB-based virtual UART systems (USB to serial port adapters) often do not function reliably, especially during binary file transfers, such as when uploading/downloading configuration files or module firmware upgrades.
- A null modem serial cable.

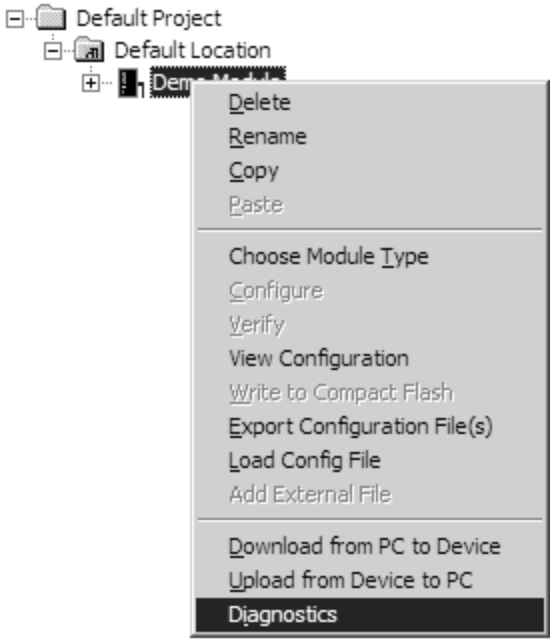
4.1.2 Using the Diagnostic Window in ProSoft Configuration Builder

To connect to the module's Configuration/Debug serial port,

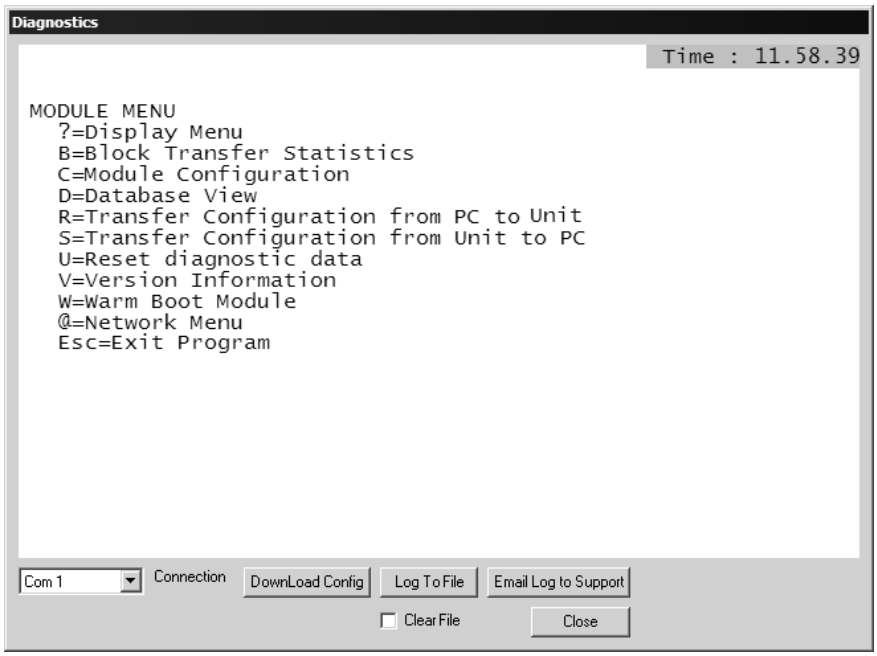
1 Start PCB, and then select the module to test. Click the right mouse button to open a shortcut menu.



2 On the shortcut menu, choose **DIAGNOSTICS.**



3 This action opens the **DIAGNOSTICS** dialog box. Press **[?]** to open the Main Menu.



Important: The illustrations of configuration/debug menus in this section are intended as a general guide, and may not exactly match the configuration/debug menus in your own module.

If there is no response from the module, follow these steps:

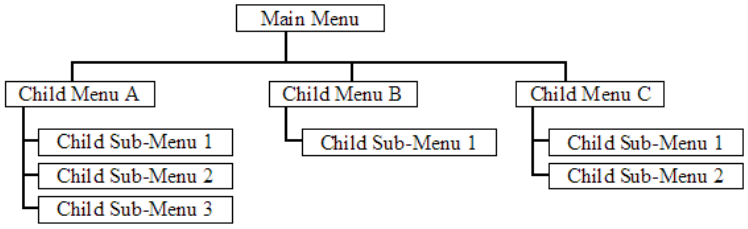
1 Verify that the null modem cable is connected properly between your computer's serial port and the module. A regular serial cable will not work.
2 On computers with more than one serial port, verify that your communication program is connected to the same port that is connected to the module.

If you are still not able to establish a connection, contact ProSoft Technology for assistance.

4.1.3 Navigation

All of the sub-menus for this module contain commands to redisplay the menu or return to the previous menu. You can always return from a sub-menu to the next higher menu by pressing **[M]** on your keyboard.

The organization of the menu structure is represented in simplified form in the following illustration:



The remainder of this section shows you the menus available for this module, and briefly discusses the commands available to you.

Keystrokes

The keyboard commands on these menus are almost always non-case sensitive. You can enter most commands in lower case or capital letters.

The menus use a few special characters (**[?], [-], [+], [@]**) that must be entered exactly as shown. Some of these characters will require you to use the **[SHIFT], [CTRL]** or **[ALT]** keys to enter them correctly. For example, on US English keyboards, enter the **[?]** command as **[SHIFT][/].**

Also, take care to distinguish capital letter **[I]** from lower case letter **[L]** (L) and number **[1];** likewise for capital letter **[O]** and number **[0].** Although these characters look nearly the same on the screen, they perform different actions on the module.

4.2 LED Indicators

4.2.1 Base Module LEDs

LED	State	Description
Power	Off	Power is not connected to the power terminals. This LED is hardware driven, so it only requires power to operate.
	Green Solid	Power is connected to the power terminals. Verify that the other LEDs for operational and functional status.
Fault	Off	Normal operation.
	Red Solid	A critical error has occurred. Program executable has failed or has been user-terminated and is no longer running. Press Reset p/b or cycle power to clear error. If not, use the Debug procedures described later in this manual.
Cfg	Off	Normal operation.
	Amber Solid	The unit is in the configuration mode. The configuration file is being read and the unit is implementing the configuration values and initializing the hardware. This will occur during power cycle, or after pressing the reset button. It also occurs after a cold/warm boot command is received.
Err	Off	Normal operation.
	Flashing	An error condition has been detected and is occurring. Check configuration.
	Solid Red	This condition is indicative of a large number of errors in the application interface communications. The module's error flag is cleared at the start of each command (master/client) or receipt of data (slave/adapter/server).

4.2.2 CC-Link Interface-Specific LEDs

LED	State	Description
RUN	Green	Indicates CC-Link hardware is operating normally
	Off	Indicates a watchdog timer error/possible hardware failure
L RUN	Green	Indicates successful data link execution
L ERR	Red	Indicates a data link communication error
	Flash	Indicates station number or mode changing during operation
SD	Green	Indicates the gateway is sending CC-Link data
RD	Green	Indicates the gateway is receiving CC-Link data
ERR	Red	Indicates a switch setting error (L ERR also turns on) ▪ Master overlap ▪ Parameter error ▪ Communication error

4.3 Status Data

No.	Name	Description
SB0000 (REG 0 bit0)	Data link restart	Restarts the data link stopped by SB0002. OFF: No restart instruction ON: Restart
SB0001 (REG 0 bit1)	Refresh instruction at standby master switching	Gives a refresh instruction of cyclic data after switching to the standby master station. OFF: No instruction ON: Instruction
SB0002 (REG 0 bit2)	Data link stop	Stops the data link of the host. However, this function should be executed carefully since execution of this function at the master station will stop the whole system. OFF: No stop instruction ON: Stop instruction
SB0004 (REG 0 bit4)	Temporary error invalid request	Defines the station specified in SW0003 to SW0007 as a temporary error invalid station. OFF: No request ON: Request
SB0005 (REG 0 bit5)	Temporary error invalid cancel request	Cancels the station specified in SW0003 to SW0007 from a temporary error invalid station. OFF: No request ON: Request
SB0008 (REG 0 bit8)	Line test request	Performs a line test on the station specified in SW0008. OFF: No request ON: Request
SB0009 (REG 0 bit9)	Parameter setting test request	Reads the parameter information of the actual system configuration and sets it to the parameter setting test area. OFF: No request ON: Request
SB000C (REG 0 bit12)	Forced master switching	Forcibly shifts the master station function to the specified master station. OFF: No request ON: Request
SB0010 (REG 1 bit0)	Number of retries clear	Clears the number of retries. OFF: Reset not instructed ON: Reset instructed
SB0011 (REG 1 bit1)	Number of transmission errors clear	Clears the number of transmission errors. OFF: Reset not instructed ON: Reset instructed
SB0014 (REG 1 bit4)	Transient transmission clear	Clears transient transmission errors. OFF: Reset not instructed ON: Reset instructed
SB0015 (REG 1 bit5)	Transient transmission instruction	Prohibits transient OFF: Overwrite ON: Hold
SB0040 (REG 4 bit0)	Data link restart acceptance	Indicates the acceptance status of the data link restart instruction. OFF: Not accepted ON: Start instruction accepted

No.	Name	Description
SB0041 (REG 4 bit1)	Data link restart completed	Indicates the acceptance completed status of the data link restart instruction. OFF: Not completed ON: Start completed
SB0042 (REG 4 bit2)	Refresh instruction acceptance status at standby master switching	Indicates the acceptance status of the refresh instruction at standby master switching. OFF: Not executed ON: Instruction accepted
SB0043 (REG 4 bit3)	Refresh switching completed status at standby master switching	Indicates the execution completed status of the refresh switching at standby master switching. OFF: Not executed ON: Execution completed
SB0044 (REG 4 bit4)	Data link stop acceptance	Indicates the acceptance status of the data link stop instruction. OFF: Not accepted ON: Stop instruction accepted
SB0045 (REG 4 bit5)	Data link stop completed	Indicates the acceptance completed status of the data link stop instruction. OFF: Not completed ON: Stop completed
SB0046 (REG 4 bit6)	Forced master switching executable status	Indicates the executable status of the forced master switching (SB000C) signal. OFF: Not executable ON: Executable
SB0048 (REG 4 bit8)	Temporary error invalid acceptance status	Indicates the acceptance status of the temporary error invalid instruction. OFF: Not executed ON: Instruction accepted
SB0049 (REG 4 bit9)	Temporary error invalid completed status	Indicates the acceptance completed status of the temporary error invalid instruction. OFF: Not executed ON: Temporary error invalid station determined
SB004A (REG 4 bit10)	Temporary error invalid cancel acceptance status	Indicates the acceptance status of the temporary error invalid cancel instruction. OFF: Not executed ON: Instruction accepted
SB004B (REG 4 bit11)	Temporary error invalid cancel completed status	Indicates the acceptance completed status of the temporary error invalid cancel instruction. OFF: Not executed ON: Temporary error invalid station cancel completed
SB004C (REG 4 bit12)	Line test acceptance status	Indicates the acceptance status of the line test request. OFF: Not executed ON: Instruction accepted
SB004D (REG 4 bit13)	Line test completed status	Indicates the completed status of the line test. OFF: Not executed ON: Test completed
SB004E (REG 4 bit14)	Parameter setting test acceptance status	Indicates the acceptance status of the parameter setting test request. OFF: Not executed ON: Instruction accepted

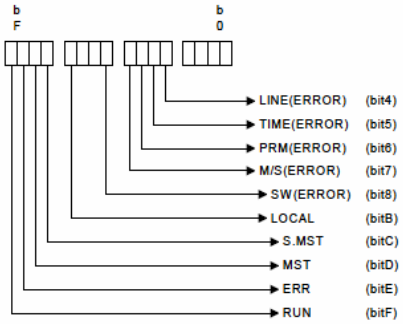
<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>SB004F
(REG 4 bit15)</td><td>Parameter setting test completed status</td><td>Indicates the completed status of the parameter setting test.
OFF: Not executed
ON: Test completed</td></tr>
<tr><td>SB0050
(REG 5 bit0)</td><td>Offline test status</td><td>Indicates the execution status of the offline test.
OFF: Not executed
ON: During execution</td></tr>
<tr><td>SB005A
(REG 5 bit10)</td><td>Master switching request acceptance</td><td>Indicates the standby master station’s acceptance status of the master switching request from the line.
OFF: Not accepted
ON: Instruction accepted (Switching request from the line accepted)</td></tr>
<tr><td>SB005B
(REG 5 bit11)</td><td>Master switching request completed</td><td>Indicates the switching completed status of the standby master station as the master station.
OFF: Not completed
ON: Completed</td></tr>
<tr><td>SB005C
(REG 5 bit12)</td><td>Forced master switching request acceptance</td><td>Indicates the acceptance status of the forced master switching request.
OFF: Not accepted
ON: Instruction accepted</td></tr>
<tr><td>SB005D
(REG 5 bit13)</td><td>Forced master switching request completed</td><td>Indicates the acceptance completed status of the forced master switching request.
OFF: Not completed
ON: Completed</td></tr>
<tr><td>SB0060
(REG 6 bit0)</td><td>Host mode</td><td>Indicates the setting status of the mode setting switch of the host gateway.
OFF: Online (0)
ON: Other than online (0)</td></tr>
<tr><td>SB0061
(REG 6 bit1)</td><td>Host type</td><td>Indicates the station type of the host gateway currently operating.
OFF: Master station (Station No. 0)
ON: Local station, intelligent device station (Station No. 1 to 64)</td></tr>
<tr><td>SB0062
(REG 6 bit2)</td><td>Host standby master station setting status</td><td>Indicates whether standby master station setting has been made or not to the host.
OFF: No standby master station setting to the host
ON: Standby master station setting to the host</td></tr>
<tr><td>SB0065
(REG 6 bit5)</td><td>Input data status of host data link error station</td><td>Indicates the "data link error station’s input data status" setting status of the host.
OFF: Cleared
ON: Retained</td></tr>
<tr><td>SB0066
SB0067
(REG 6 bit6,7)</td><td>Number of stations occupied by host</td><td>Indicates the setting status of the switch information 4, 5 "Number of stations occupied by host". This setting is as indicated below depending on the combination of the switch information 4, 5.
<table>
<tr><th>Number of occupied stations</th><th>Switch information 4</th><th>Switch information 5</th></tr>
<tr><td>1 station occupied</td><td>OFF</td><td>OFF</td></tr>
<tr><td>2 station occupied</td><td>OFF</td><td>ON</td></tr>
<tr><td>3 station occupied</td><td>ON</td><td>ON</td></tr>
<tr><td>4 station occupied</td><td>ON</td><td>OFF</td></tr>
</table></td></tr>
<tr><td>SB006A
(REG 6 bit10)</td><td>Switch setting status</td><td>Indicates the setting status of the switches, etc.
OFF: Normal
ON: Setting error (Error code stored into SW006A)</td></tr>
</table>

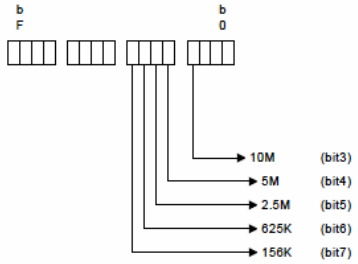
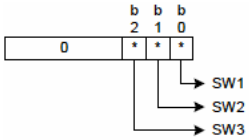
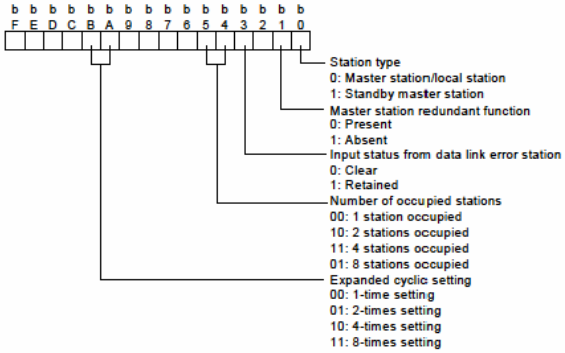
No.	Name	Description
SB006B (REG 6 bit11)	Host operation status	Indicates the operation status of the host. OFF: Normal ON: Error
SB006C (REG 6 bit12)	Link status	Indicates the data link status of the host. OFF: During data link ON: During data link stop
SB006D (REG 6 bit13)	Parameter setting status	Indicates the parameter setting status. OFF: Normal ON: Setting error (Error code stored into SW0068)
SB006E (REG 6 bit14)	Host operation status	Indicates the operation status of the host data link. OFF: During execution ON: Not executed
SB0070 (REG 7 bit0)	Master station information	Indicates the data link status. OFF: Data link by master station ON: Data link by standby master station
SB0071 (REG 7 bit1)	Standby master station information	Whether the standby master station exists or not OFF: Does not exist ON: Exists
SB0073 (REG 7 bit3)	Operation specification status at driver error	Indicates the parameter-based operation specification status at driver error. OFF: Stopped ON: Continued
SB0074 (REG 7 bit4)	Reserved station specification status	Indicates the parameter-based reserved station specification status. (SW0074 to SW0077) OFF: Not specified ON: Specified
SB0075 (REG 7 bit5)	Error invalid station specification status	Indicates the parameter-based error invalid station specification status. (SW0078 to SW007B) OFF: Not specified ON: Specified
SB0076 (REG 7 bit6)	Temporary error invalid station setting information	Indicates whether the temporary error invalid stations have been set or not. (SW007C to SW007F) OFF: Not set ON: Set
SB0077 (REG 7 bit7)	Parameter reception status	Indicates the parameter reception status from the master station. OFF: Reception completed ON: Reception not completed
SB0078 (REG 7 bit8)	Host switch change detection	Detects the setting switch change of the host during data link. OFF: No change ON: Change
SB0079 (REG 7 bit9)	Master station returning specification information	Indicates whether the parameter has been set to no return or a return. OFF: No return ON: Return
SB007B (REG 7 bit11)	Host master/standby master function operation status	Indicates whether the host is operating as the master or standby master function. OFF: Master function ON: Standby master function

No.	Name	Description
SB0080 (REG 8 bit0)	Other station data link status	Indicates the communication status with the remote stations/local stations. (SW0080 to SW0083) OFF: All stations normal ON: Error station
SB0081 (REG 8 bit1)	Other station watch dog timer error status	Indicates the watch dog timer error occurrence status at the other stations. OFF: No error ON: Error
SB0082 (REG 8 bit2)	Other station fuse blown status	Indicates the fuse blown occurrence status at other stations. OFF: No error ON: Error
SB0083 (REG 8 bit3)	Other station switch change status	Detects the setting switch changes of other stations during data link. OFF: No change ON: Change
SB0090 (REG 9 bit0)	Host line status	Indicates the line status. OFF: Normal ON: Error (Wire break)
SB0091 (REG 9 bit1)	Transmission status	Indicates the transmission status of the line. OFF: Normal ON: Error
SB0094 (REG 9 bit4)	Transient transmission status	Indicates whether a transient transmission error occurred or not. OFF: No error ON: Error
SB0095 (REG 9 bit5)	Master station transient transmission status	Indicates the master station transient transmission status. OFF: Normal ON: Error
SB00AC (REG 10 bit12)	Other station parameter status	Other station parameter communication status (SW00AC to SW00AF) OFF: Other than parameter communication in progress ON: Parameters requested
SB00B4 (REG 11 bit4)	Standby master station test result	The test result of Line test 1/Line test 2 is stored. OFF: Normal ON: Error

No.	Name	Description
SW0003 (REG 1)	Multiple temporary error invalid stations specification	Selects whether multiple temporary error invalid stations will be specified or not. 00: Multiple stations indicated in SW0004 to SW0007 are specified. 01 to 64: Single station 1 to 64 is specified. (For the numeral, specify the station number set as the temporary error invalid station.)
SW0004 (REG 2) SW0005 (REG 3) SW0006 (REG 4)	Temporary error invalid station specification	Specifies the temporary error invalid station. 0: Not specified as the temporary error invalid station. 1: Specified as the temporary error invalid station.

	bF	bE	bD	bC		b3	b2	b1	b0
SW004	16	15	14	13	to	4	3	2	1
SW005	32	31	30	29	to	20	19	18	17

No.	Name	Description
SW0007 (REG 5)		SW006 48 47 46 45 to 36 35 34 33 SW007 64 63 62 61 to 52 51 50 49 1 to 64 in the table indicates the station numbers.
SW0008 (REG 6)	Line-tested station setting	Sets the station on which the line test will be performed. 0: Whole system (all stations) 01 to 64: Specified station Default value: 0
SW0041 (REG 63)	Data link restart result	The execution result of the data link restart instruction by SB0000 is stored. 0: Normal From 1 on: Error code (Refer to 4.1 Error Codes)
SW0043 (REG 65)	Refresh switching result at standby master switching	Indicates the execution result of refresh switching at specified standby master switching. 0: Normal Other than 0: Error code (refer to 4.1 Error Codes) is stored.
SW0045 (REG 67)	Data link stop result	The execution result of the data link stop instruction by SB0002 is stored. 0: Normal From 1 on: Error code (Refer to 4.1 Error Codes)
SW0049 (REG 71)	Temporary error invalid station specification result	Indicates the execution result of the temporary error invalid station specification. 0: Normal Other than 0: Error code (Refer to 4.1 Error Codes) is stored.
SW004B (REG 73)	Temporary error invalid station specification cancel result	Indicates the execution result of the temporary error invalid station specification cancel. 0: Normal Other than 0: Error code (Refer to 4.1 Error Codes) is stored.
SW004D (REG 75)	Line test result	Indicates the execution result of the line test. 0: Normal Other than 0: Error code (Refer to 4.1 Error Codes) is stored.
SW004F (REG 77)	Parameter setting test request result	Indicates the execution result of the parameter setting test request by SB0009. 0: Normal Other than 0: Error code (Refer to 4.1 Error Codes) is stored.
SW0058 (REG 86)	Interface board status	The interface board status is stored. 

No.	Name	Description
SW0059 (REG 87)	Transmission speed setting *	The baud rate setting is stored. 
SW005A (REG 88)	Built-in board switch setting status *	The switch setting of the built-in board is stored. 0: OFF 1: ON 
SW005D (REG 91)	Forced master switching instruction result	The execution result of the forced master switching instruction by SB000C is stored. 0: Normal From 1 on: Error code (Refer to 4.1 Error Codes)
SW0060 (REG 94)	Mode setting status *	The mode setting status is stored. 0: Online 2: Offline 3: Line test 1 4: Line test 2 6: Hardware test
SW0061 (REG 95)	Host station No. *	The currently operating host station number is stored. 0: Master station 1 to 64: Local station, intelligent device station
SW0062 (REG 96)	Operation setting status	The operation setting status is stored. 0: OFF 1: ON 
SW0064 (REG 98)	Number of retries information	Indicates the number of retries setting information at error response. 1 to 7 (retries)
SW0065 (REG 99)	Number of automatic returning stations information	Indicates the number of automatic returning stations setting information during 1 link scan. 1 to 10 (stations)
SW0066 (REG 100)	Delay timer information	Indicates the scan interval delay time setting information.
SW0067 (REG 101)	Parameter information	The parameter information area is stored. Fixed to 0: Parameter startup

No.	Name	Description
SW0068 (REG 102)	Host parameter status	The parameter setting status is stored. 0: Normal From 1 on: Error code (Refer to 4.1 Error Code)
SW0069 (REG 103)	Loading status	The station number duplication and parameter consistency of each gateway are stored. 0: Normal From 1 on: Error code (Refer to 4.1 Error Code). Details are stored into SW0098-9B and SW009C-9F.
SW006A (REG 104)	Switch setting status	The switch setting status is stored. 0: Normal From 1 on: Error code (Refer to 4.1 Error Code)
SW006B (REG 105)	Host operation status	The host operation status is stored. 0: Normal 1: Transmission path error detection 2: Parameter error detection 3: CRC error detection 4: Time-out error detection 5: Abort error detection 6: Setting error detection 7: Other error detection
SW006C (REG 106)	Host data link status	The host data link status is stored. 0: Initial status 1: Parameter reception waiting status (local station only) 2: During data link 3: During data link stop 4: During disconnection (no polling request) 5: During disconnection (line error) 6: During disconnection (other) 7: During line test execution 8: During parameter setting test execution 9: During automatic return processing FF: During reset
SW006D (REG 107)	Maximum link scan time	The maximum value of link scan time is stored. (1ms unit)
SW006E (REG 108)	Present link scan time	The present value of link scan time is stored. (1ms unit)
SW006F (REG 109)	Minimum link scan time	The minimum value of link scan time is stored. (1ms unit)
SW0070 (REG 110)	Total number of stations	The last station number set in the parameter is stored. Station 1 to 64
SW0071 (REG 111)	Highest communicating station number	The highest station number (station number of the station number setting switch) that is executing data link is stored. Station 1 to 64
SW0072 (REG 112)	Number of connected stations	The number of stations that are executing data link is stored.
SW0073 (REG 113)	Standby master station No.	The station number of the standby master station is stored. 1 to 64 (Station)
SW0074 (REG 114)	Reserved station specification status *1	The reserved station setting status is stored. 0: Other than reserved station 1: Reserved station
SW0075 (REG 115)		bF bE bD bC b3 b2 b1 b0

No.	Name	Description
SW0076 (REG 116) SW0077 (REG 117)		SW074 16 15 14 13 to 4 3 2 1 SW075 32 31 30 29 to 20 19 18 17 SW076 48 47 46 45 to 36 35 34 33 SW077 64 63 62 61 to 52 51 50 49 1 to 64 in the table indicates the station numbers.
SW0078 (REG 118) SW0079 (REG 119) SW007A (REG 120) SW007B (REG 121)	Error invalid station specification status	Indicates the temporary error invalid status. 0: Normal status 1: Temporary error invalid status bF bE bD bC to b3 b2 b1 b0 SW078 16 15 14 13 to 4 3 2 1 SW079 32 31 30 29 to 20 19 18 17 SW07A 48 47 46 45 to 36 35 34 33 SW07B 64 63 62 61 to 52 51 50 49 1 to 64 in the table indicates the station numbers.
SW007C (REG 122) SW007D (REG 123) SW007E (REG 124) SW007F (REG 125)	Temporary error invalid status	The error invalid station setting status is stored. 0: Other than error invalid station 1: Error invalid station bF bE bD bC to b3 b2 b1 b0 SW07C 16 15 14 13 to 4 3 2 1 SW07D 32 31 30 29 to 20 19 18 17 SW07E 48 47 46 45 to 36 35 34 33 SW07F 64 63 62 61 to 52 51 50 49 1 to 64 in the table indicates the station numbers.
SW0080 (REG 126) SW0081 (REG 127) SW0082 (REG 128) SW0083 (REG 129)	Other station data link status	The data link status of each station is stored. 0: Normal 1: Data link error occurrence bF bE bD bC to b3 b2 b1 b0 SW080 16 15 14 13 to 4 3 2 1 SW081 32 31 30 29 to 20 19 18 17 SW082 48 47 46 45 to 36 35 34 33 SW083 64 63 62 61 to 52 51 50 49 1 to 64 in the table indicates the station numbers.
SW0084 (REG 130) SW0085 (REG 131) SW0086 (REG 132) SW0087 (REG 133)	Other station watch dog timer error occurrence status	Indicates the watch dog timer error occurrence status. 0: No watch dog timer error 1: Watch dog timer error bF bE bD bC to b3 b2 b1 b0 SW088 16 15 14 13 to 4 3 2 1 SW089 32 31 30 29 to 20 19 18 17 SW08A 48 47 46 45 to 36 35 34 33 SW08B 64 63 62 61 to 52 51 50 49 1 to 64 in the table indicates the station numbers.
SW0090 (REG 142)	Line status	The line status is stored. 0: Normal 1: Data link disable (wire break)
SW0094 (REG 146) SW0095 (REG 147)	Transient transmission status	Indicates the transient transmission error occurrence status. 0: No transient transmission error 1: Transient transmission error bF bE bD bC to b3 b2 b1 b0

No.	Name	Description

SW0096 (REG 148)
SW0097 (REG 149)

SW094	16	15	14	13	to	4	3	2	1
SW095	32	31	30	29	to	20	19	18	17
SW096	48	47	46	45	to	36	35	34	33
SW097	64	63	62	61	to	52	51	50	49

1 to 64 in the table indicates the station numbers.

SW0098 (REG 150)
SW0099 (REG 151)
SW009A (REG 152)
SW009B (REG 153)

Station No. duplication status

If the occupied station number of the slave station duplications with the next slave station number, the duplication status is stored.

This does not apply to the case where the head station numbers duplication with each other.

0: Normal

1: Station number duplication (head station number only)

	bF	bE	bD	bC		b3	b2	b1	b0
SW098	16	15	14	13	to	4	3	2	1
SW099	32	31	30	29	to	20	19	18	17
SW09A	48	47	46	45	to	36	35	34	33
SW09B	64	63	62	61	to	52	51	50	49

1 to 64 in the table indicates the station numbers.

SW009C (REG 154)
SW009D (REG 155)
SW009E (REG 156)
SW009F (REG 157)

Loading/parameter consistency status

The consistency status, such as CC-Link version difference, between the parameters and slave stations is stored.

1) Station type inconsistency

(except the combination of the following station types)

Loading	Parameter
Remote device station	Remote I/O station
Intelligent device station	Remote I/O station
	Remote device station

2) Number of occupied stations inconsistency (loading > parameter)

3) Expanded cyclic setting inconsistency

4) Version inconsistency between parameter and loaded remote station

	bF	bE	bD	bC		b3	b2	b1	b0
SW09C	16	15	14	13	to	4	3	2	1
SW09D	32	31	30	29	to	20	19	18	17
SW09E	48	47	46	45	to	36	35	34	33
SW09F	64	63	62	61	to	52	51	50	49

1 to 64 in the table indicates the station numbers.

SW00A0 (REG 158)
SW00A1 (REG 159)
SW00A2 (REG 160)
SW00A3 (REG 161)

Station Type (1)

Indicates the station type of each station in bit units.

0: Remote I/O stations or remote device stations

1: Intelligent device stations

	bF	bE	bD	bC		b3	b2	b1	b0
SW0A0	16	15	14	13	~	4	3	2	1
SW0A1	32	31	30	29	~	20	19	18	17
SW0A2	48	47	46	45	~	36	35	34	33
SW0A3	64	63	62	61	~	52	51	50	49

1 to 64 in the table indicates the station numbers.

SW00A8 (REG 166)
SW00A9 (REG 167)

Station setting information

Indicates the head station of each station in bits.

0: Other than head station

1: Head station

	bF	bE	bD	bC		b3	b2	b1	b0

<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>SW00AA
(REG 168)
SW00AB
(REG 169)</td><td></td><td>
<table>
<tr><td>SW08C</td><td>16</td><td>15</td><td>14</td><td>13</td><td>~</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>SW08D</td><td>32</td><td>31</td><td>30</td><td>29</td><td>~</td><td>20</td><td>19</td><td>18</td><td>17</td></tr>
<tr><td>SW08E</td><td>48</td><td>47</td><td>46</td><td>45</td><td>~</td><td>36</td><td>35</td><td>34</td><td>33</td></tr>
<tr><td>SW08F</td><td>64</td><td>63</td><td>62</td><td>61</td><td>~</td><td>52</td><td>51</td><td>50</td><td>49</td></tr>
</table>
1 to 64 in the table indicates the station numbers.</td></tr>
<tr><td>SW00AC
(REG 170)
SW00AD
(REG 171)
SW00AE
(REG 172)
SW00AF
(REG 173)</td><td>Other station parameter status</td><td>Indicates the parameter status of each station in bit units.
0: Other than communication in progress
1: Parameters requested
<table>
<tr><td></td><td>bF</td><td>bE</td><td>bD</td><td>bC</td><td></td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr>
<tr><td>SW0A8</td><td>16</td><td>15</td><td>14</td><td>13</td><td>~</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>SW08A9</td><td>32</td><td>31</td><td>30</td><td>29</td><td>~</td><td>20</td><td>19</td><td>18</td><td>17</td></tr>
<tr><td>SW0AA</td><td>48</td><td>47</td><td>46</td><td>45</td><td>~</td><td>36</td><td>35</td><td>34</td><td>33</td></tr>
<tr><td>SW0AB</td><td>64</td><td>63</td><td>62</td><td>61</td><td>~</td><td>52</td><td>51</td><td>50</td><td>49</td></tr>
</table>
1 to 64 in the table indicates the station numbers.</td></tr>
<tr><td>SW00B4
(REG 178)
SW00B5
(REG 179)
SW00B6
(REG 180)
SW00B7
(REG 181)</td><td>Line test 1 result</td><td>The test result of Line test 1 is stored.
0: Normal
1: Error
<table>
<tr><td></td><td>bF</td><td>bE</td><td>bD</td><td>bC</td><td></td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr>
<tr><td>SW0B4</td><td>16</td><td>15</td><td>14</td><td>13</td><td>to</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>SW0B5</td><td>32</td><td>31</td><td>30</td><td>29</td><td>to</td><td>20</td><td>19</td><td>18</td><td>17</td></tr>
<tr><td>SW0B6</td><td>48</td><td>47</td><td>46</td><td>45</td><td>to</td><td>36</td><td>35</td><td>34</td><td>33</td></tr>
<tr><td>SW0B7</td><td>64</td><td>63</td><td>62</td><td>61</td><td>to</td><td>52</td><td>51</td><td>50</td><td>49</td></tr>
</table>
1 to 64 in the table indicates the station numbers.</td></tr>
<tr><td>SW00B8
(REG 182)</td><td>Line test result</td><td>Stores the line test result.
0: Normal
Other than 0: Error code (See Section 4.1, "Error Codes.")</td></tr>
<tr><td>SW00C0
(REG 190)</td><td>Retry count</td><td>Stores the retry execution count.
0 or more: Accumulated retry count</td></tr>
<tr><td>SW00E1
(REG 203)</td><td>Transient transmission error count</td><td>Stores the number of errors that occurred during transient transmission.</td></tr>
<tr><td>SW00E2
(REG 204)</td><td>Transient transmission error data pointer</td><td>Stores the next pointer for setting the transient transmission error code.</td></tr>
<tr><td>SW00E3
(REG 205)
To
SW00FF
(REG 253)</td><td>Transient transmission error code</td><td>Stores the error code that occurred during transient transmission. (29 areas) Storage method: Ring buffer</td></tr>
<tr><td>SW0140
(REG 318)
SW141
(REG 319)
SW142
(REG 320)
SW0143
(REG 321)</td><td>Station type (2)</td><td>Indicates whether the remote station is Ver. 2 compatible.
0: Ver. 1 compatible remote station.
1: Ver. 2 compatible remote station
<table>
<tr><td></td><td>bF</td><td>bE</td><td>bD</td><td>bC</td><td></td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr>
<tr><td>SW0140</td><td>16</td><td>15</td><td>14</td><td>13</td><td>to</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>SW0141</td><td>32</td><td>31</td><td>30</td><td>29</td><td>to</td><td>20</td><td>19</td><td>18</td><td>17</td></tr>
<tr><td>SW0142</td><td>48</td><td>47</td><td>46</td><td>45</td><td>to</td><td>36</td><td>35</td><td>34</td><td>33</td></tr>
<tr><td>SW0143</td><td>64</td><td>63</td><td>62</td><td>61</td><td>to</td><td>52</td><td>51</td><td>50</td><td>49</td></tr>
</table>
1 to 64 in the table indicates the station numbers.</td></tr>
<tr><td>SW0144
(REG 322)</td><td>Mounting/Parameter consistency status (2)</td><td></td></tr>
</table>

No.	Name	Description									
SW0145			bF	bE	bD	bC		b3	b2	b1	b0
(REG 323)		SW0144	16	15	14	13	to	4	3	2	1
SW0146		SW0145	32	31	30	29	to	20	19	18	17
(REG 324)		SW0146	48	47	46	45	to	36	35	34	33
SW0147		SW0147	64	63	62	61	to	52	51	50	49
(REG 325)		1 to 64 in the table indicates the station numbers.									
SW148	Parameter mode	Indicates the mode used in the network.									
(REG 326)		0: Ver. 1 mode									
		2: Ver. 2 mode									
SW149	Host parameter mode	Indicates the mode in which the host station is operating.									
(REG 327)		0: Ver. 1 mode									
		2: Ver. 2 mode									

4.4 Error Data

Error Code (Hexadecimal)	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station or Intelligent Device Station
B002	Link stop error	Link stop was implemented when the link was already stopped.	Change the interface board.	Y	N
B102	Link error	A line error has occurred.	Check the interface board.	Y	Y
B103	Setting value error	The setting value of the macro function is invalid.	Change the interface board.	Y	N
B104	Start error	Link startup was implemented when the link was already started.	Change the interface board.	Y	N
B105	Stop error	Link stop was implemented when the link was already stopped.	Change the interface board.	Y	N
B110	Unable to receive transient data	A line error has occurred.	Check the line.	Y	Y
B111	Transient data receiving order error	A line error has occurred.	Check the line.	Y	Y
B112	Transient data length error	A line error has occurred.	Check the line.	Y	Y
B113	Transient data ID error	A line error has occurred.	Check the line.	Y	Y
B115	Link error	A line error has occurred.	Check the line.	Y	Y

Error Code (Hexadecimal)	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station or Intelligent Device Station
B201	Relevant station error when sending	A data link error has occurred at the relevant station at the time of transient transmission.	Check the status of communication with other stations, whether or not a temporary error invalid station is specified, or if the host station is stopped.	Y	Y
B202	Data length error	A line error may have occurred if improper packet data length is identified at the time of transient transmission.	Check the line. Set a data length that fulfills required conditions.	Y	Y
B203	CT value error	The CT value in the CC-Link transient frame is wrong.	Check the value in the CC-Link transient frame.	Y	Y
B204	Failed to ensure error response send buffer	The buffer area could not be ensured at the time of error response transmission.	Wait a while and then retransmit. (Transient operation overload status)	Y	Y
B205	Target station is not intelligent device station	The target station was not an intelligent device station.	Check the target station.	Y	Y
B301	Unable to request processing due to link stop	A line test request was issued while the data link is stopped.	Perform a line test while the data link is being established.	Y	Y
B302	Specified station number exceeds the highest allowable station number	The station number specified for a temporary error invalid request or temporary error invalid cancel request exceeded the highest allowable station number.	Specify a station number that is not greater than the highest allowable station number.	Y	N
B303	No station number specified	No station number is specified for a temporary error invalid request or cancel request.	Specify any station numbers. (SW0003, SW0004 to SW0007)	Y	N
B304	Error station detected by line test (reception status error)	An error was detected in a slave station during line test execution.	Check that the slave station is operational and that the cable is not disconnected.	Y	N

<table>
<tr><th rowspan="2">Error Code (Hexadecimal)</th><th rowspan="2">Error</th><th rowspan="2">Error Cause (Details)</th><th rowspan="2">Corrective Action</th><th colspan="2">Detectability</th></tr>
<tr><th>Master Station</th><th>Local Station or Intelligent Device Station</th></tr>
<tr><td>B305</td><td>Error station detected by line test (response data error)</td><td>An error was detected in the response data looped back as a result of line test execution.</td><td>Replace the slave station subjected to the line test.</td><td>Y</td><td>N</td></tr>
<tr><td>B306</td><td>Specified station is not head station</td><td>A station other than the head station was specified for the temporary error invalid request.</td><td>Specify a head station for the temporary error invalid request.</td><td>Y</td><td>N</td></tr>
<tr><td>B307</td><td>All stations faulty</td><td>All stations were in a data link error state when either of the following requests was issued:
SB0000 (data link restart)
SB0002 (data link stop)</td><td>Request again after the data link becomes normal.</td><td>Y</td><td>Y</td></tr>
<tr><td>B308</td><td>Total number of slave stations (station number error)</td><td>The station number is outside the range 1 to 64.</td><td>Check the station numbers of the mounted gateways for any duplication (including occupied station numbers).</td><td>Y</td><td>N</td></tr>
<tr><td>B309</td><td>Station number duplication</td><td>The station number of the connected gateway was duplicated (including occupied station numbers). Note that this excludes duplication of the head station number.</td><td>Check the gateways' station numbers.</td><td>Y</td><td>N</td></tr>
<tr><td></td><td>Inconsistency between connected gateway and parameter (connected gateway > parameter)</td><td>The station types of the gateway are different from those set as parameters, or the number of occupied stations of the gateway is greater than the parameter. Example:
<table>
<tr><th>Connected gateway</th><th>Parameter Setting</th></tr>
<tr><td>Remote device</td><td>Remote I/O</td></tr>
<tr><td rowspan="2">Intelligent device</td><td>Remote I/O</td></tr>
<tr><td>Remote device</td></tr>
</table></td><td>Set correct parameters.</td><td>Y</td><td>N</td></tr>
</table>

Error Code (Hexadecimal)	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station or Intelligent Device Station
B30B	Inconsistency between connected gateway and parameter	The mounting state does not match the corresponding parameters. (A station, whose station number is set as a parameter, is not mounted.)	Match the mounting status with corresponding parameters.	Y	N
B30C	Switching station specification error	SB0001 was turned ON in other than the master station or a system that does not have a standby master station.	Check if the standby master station exists in the system.	Y	Y
B30D	Initial status	Temporary error invalid station specification and SB requests were issued before starting the data link.	Issue the requests after the data link is started.	Y	N
B30E	Local station not supported	The execution of the function, which is started by SB/SW and executable at the master station only, was attempted at the local station.	Execute the function from the master station.	N	Y
B310	Data link restart error	A data link restart request (SB0000) was executed for the station that was performing a data link.	Execute the data link restart request (SB0000) for the station that has stopped a data link with a data link stop request (SB0002).	Y	Y
B311	Data link stop error	A data link stop request (SB0002) was executed for the station that had stopped a data link.	Execute the data link stop request (SB0002) for the station that is performing a data link.	Y	Y
B312	Standby master station absence error	A forced master to standby master switching request (SB000C) was issued in a system where no standby master station exists or where the standby master station had become faulty.	Execute the request after starting the data link of the standby master station.	Y	N
B313	All stations faulty	A forced master to standby master switching request (SB000C) was issued in a system where all stations had become faulty.	Execute the request after starting the data link of the standby master station.	Y	N
B314	Switching target error	A forced master to standby master switching request (SB000C) was issued to a station other than the master station.	Execute the request to the master station.	N	Y

Error Code (Hexadecimal)	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station or Intelligent Device Station
B315	Forced switching error during master switching	A forced master to standby master switching request (SB000C) was issued again while the master station was being switched to the standby master station.	Check the ON/OFF operation of SB000C.	Y	N
B384	Station number setting error (parameter)	The station number (including the occupied station numbers) of the station information parameter was set to a value outside the range 1H to 40H.	Set a value within the range 1H to 40H.	Y	N
B385	Total number of slave stations error (total number of occupied stations > 64)	The total number of occupied stations set in the station information parameter exceeded 64.	Set a parameter value of 64 or less.	Y	N
B386	Total number of slave stations (all stations reserved specification)	All the numbers of occupied stations were set to 0 in the station information parameter.	Set each of the occupied station numbers to a value within the range 1 to 4.	Y	N
B387	Delay timer setting error	The delay timer was set to a value outside the range 0 to 100.	Set the delay timer to a value within the range 0 to 100.	Y	Y
B388	Station information specification (other than 0 to 3)	The station type in the station information parameter was set to a value other than 0 to 3. (Ver. 1 mode only)	Set the station type to a value within the range 0 to 3.	Y	N
B38A	Station information specification (number of remote I/O stations > 64)	The number of remote I/O stations was set to a value of 65 or more with the station information parameter.	Set the number of remote I/O stations to a value of 64 or less.	Y	N

Error Code (Hexadecimal)	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station or Intelligent Device Station
B38B	Station information specification (number of remote device stations > 42)	The number of remote device stations was set to a value of 43 or more with the station information parameter (addresses 0440H to 04BEH).	Set the number of remote device stations to a value of 42 or less.	Y	N
B38C	Station information specification (number of intelligent device stations > 26)	The number of intelligent device stations (including local stations) was set to a value of 27 or more with the station information parameter.	Set the number of intelligent device stations to a value of 26 or less.	Y	N
B38E	Buffer assignment specification (transfer data size > 4k words)	The total size of the transfer buffers in the station information parameter exceeded 4k words.	Set the total size of the transfer buffers to less than 4k words.	Y	Y
B38F	Buffer assignment specification (unused area)	Writing was performed to a use prohibited (unused) area of the dual port RAM.	Do not write to the use prohibited (unused) area of the dual port RAM.	Y	Y
B390	Standby master station specification (station number error)	The standby master station specification parameter was set to a value outside the range of 0 to 64.	Specify the standby master station number to a value within the range of 0 to 64.	Y	Y
B391	Retry count (other than 1 to 7)	The retry count parameter was set to a value outside the range of 1 to 7.	Set a value within the range of 1 to 7.	Y	N
B392	Specification in the event of a driver error (other than 0 and 1)	The parameter specifying the operation in the event of a driver error was set to a value other than 0 and 1.	Set 0 or 1.	Y	N
B394	Invalid number of automatic return stations (parameter)	The "number of automatic return stations" parameter was set to a value outside the range of 1 to 10.	Set a value within the range of 1 to 10.	Y	N

Error Code (Hexadecimal)	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station or Intelligent Device Station
B396	Duplicate station number error (parameter)	A duplicate station number was specified with the station information parameter.	Set parameters correctly so that no station numbers are duplicated.	Y	N
B397	Station information setting error (parameter)	The station information parameter setting does not meet the following condition: (16 x A) + (54 x B) + (88 x C) ≤2304 A: Number of remote I/O stations B: Number of remote device stations C: Number of intelligent device stations (including local stations)	Set the parameter so that it meets the condition shown on the left.	Y	N
B398	Invalid number of occupied stations (parameter)	The number of occupied stations in the station information parameter (addresses 0220H to 025F) was set to a value outside the range of 1 to 4.	Set a value within the range from 1 to 4.	Y	N
B399	Invalid number of connected gateways (parameter)	The "number of connected gateways" parameter was set to a value outside the range of 1 to 64.	Set a value within the range of 1 to 64.	Y	N
B39A	Standby master station specification (different from host station number)	The "standby master station number" set to the master station is different from the actual station number of the standby master station, or it is a local station number.	Change the parameter setting of the master station, or change the station number setting of the local/standby master station, and then reset the system.	N	Y
B39B	All stations reserved setting	All stations were set as reserved stations.	Check the reserved station settings.	Y	N

Error Code (Hexadecimal)	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station or Intelligent Device Station
B39C	Station type when standby master station is specified Ver. 1 mode: Other than 2 and 3 Ver. 2 mode: Other than 6, 9, C and F	Any other than "intelligent device station" is set in the station type in the slave station setting of the station set as the standby master station. Or, the mode of the master station is different from the one set in the standby master station specification.	Specify the standby master station as an intelligent device station.	Y	N
B39E	8-/16-point setting illegal	A setting of 8-point I/O station or 16-point I/O station has been made for a station other than the remote I/O station.	Configure an 8-point/16-point setting for the remote I/O station.	Y	N
B3A0	Mode illegal (master/local stations)	A model illegal error has occurred between the master and the local or standby master station. The mode differs between the master and standby master stations. The local station is in the Ver. 2/additional mode while the master station is in the Ver. 1 mode.	After setting the master station parameter or local or standby master station parameter again, reset the system.	N	Y
B3A1	Standby master setting illegal	An illegal value has been set in the standby master station information of switch information 5.	Set a correct value in the standby master station information of switch information 5.	Y	N
B3A3	Assignment error	The assignment of RX, RY, RWw or RWr exceeds the maximum number of points, or the total number of RX/RY points in the station information parameter exceeds 8192 in Ver. 2 mode.	Change the station information, decreasing the numbers of RX, RY, RWw and RWr points.	Y	N
B3A4	Parameter mismatch	A mismatch occurred between the master station parameter and standby master station parameter when using the master station duplex function.	Return the master station parameter to the original value.	Y	N

Error Code (Hexadecimal)	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station or Intelligent Device Station
B601	Command type setting error	A nonexistent command type was set.	Set a correct command type.	Y	Y
B602	Send buffer acquisition failed	The send buffer could not be obtained.	Wait a while and then transmit. (Transient operation overload status)	Y	Y
B603	Send buffer acquisition failed	The send buffer could not be obtained.	Wait a while and then transmit. (Transient operation overload status)	Y	Y
B604	Line test in progress	Transient transmission was attempted when a line test was in progress.	Wait a while and then retransmit.	Y	N
B605	Unable to access transient buffer	The transient buffer could not be obtained.	Wait a while and then retransmit.	Y	Y
B606	Unable to access system information	The system information could not be obtained.	With the current system, "unable to access system information" is inconceivable.	Y	Y
B60C	Faulty station detected with line test (response data error)	An error was detected in response data as the result of line test execution.	Replace the slave station subjected to the line test.	Y	N
B771	Transient request overload error	There are too many transient requests to the station.	Wait a while and then retransmit. (Transient operation overload status)	Y	Y
B772	Send buffer awaiting data exceeded maximum	The number of data awaiting transient send buffer acquisition exceeded the maximum.	Wait a while and then retransmit. (Transient operation overload status)	Y	Y
B773	Receive buffer awaiting data exceeded maximum	The number of data awaiting transient receive buffer acquisition exceeded the maximum.	Wait a while and then retransmit. (Transient operation overload status).	Y	Y

Error Code (Hexadecimal)	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station or Intelligent Device Station
B774	Target station not intelligent device	The target station is not an intelligent device station.	Check if the target station is an intelligent device station.	Y	Y
B778	Response timeout	No response was received from the requested station.	Check the requested gateway and cables.	Y	Y
B781	Faulty response data reception	Faulty response data was received.	Check the cable, etc.	Y	Y
B782	Station number specification error	The transmission destination station and transmission source station were the same when other station connection was specified.	Check the station number of the transmission destination. Or, change the setting to host station connection.	Y	Y
B783	Transient storage buffer error	An error occurred in the transient storage buffer at the time of transient transmission exceeding 1K.	Wait a while and transmit the data once again. Check the cable, etc.	Y	Y
B801	Access code setting error	A nonexistent access code/property was set.	Set a correct command type.	Y	Y
B802	Access code error	A nonexistent access code was used.	Use a correct access code.	Y	Y
B803	Data points error	The number of data points is out of range.	Set the number of data points to a value within the range of 1 to 960 bytes.	Y	Y
B804	Attribute definition error Transient transmission unsupported station specification error	The attribute definition is invalid. Or, transient transmission was performed even though the target station does not support transient transmission.	Review the attribute definition. Check the specification of the target station number.	Y	Y
B805	Data amount error	The data amount is out of range.	Set it to a value within the range of 1 to 100 for writing, and within the range of 1 to 160 for reading.	Y	Y

Error Code (Hexadecimal)	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station or Intelligent Device Station
B807	Address definition error	The address number is not a multiple of 16 when accessing a bit device.	Set a multiple of 16 to the address number when accessing the bit device.	Y	Y
B80A	Data length error	The data length is abnormal.	Check the data length.	Y	Y
B80D	(Addresses and points) range error	The specified combination (addresses and points) exceeded the valid processing range.	Make the setting so that the number of processing points does not exceed the device range.	Y	Y
B812	Total number of points exceeded 960 bytes at time of transient transmission	The total number of points exceeded 960 bytes at the time of transient transmission.	Set 960 bytes or less to the number of points.	Y	Y
B823	Remote control mode error	The mode specification for the remote control is incorrect.	Check the mode specification.	Y	Y
B903	No parameter	A transient request was issued to a station for which no transfer buffer area is ensured.	Ensure a transfer buffer area with a parameter.	Y	Y
B904	Buffer size error	When the dedicated instruction is executed, the transfer buffer size setting of the station is outside the setting range.	Set the transfer buffer size of the station within the setting range.	Y	Y
B9FE	Parameter sumcheck error	The sumcheck value of the parameter setting area is abnormal.	Check the sumcheck value.	Y	N
B9FF	Software handshake error	An alive check error is detected in handshake processing with the driver.	Replace the interface board.	Y	Y
BA19	Relevant station error	The station that is being tested stopped communication during the line test.	Check the cable and the relevant station.	Y	N
BA1B	All stations error	A communication error occurred at all stations during line test 1.	Check the cables.	Y	N
BBC1	Mode number switch error	The mode switch setting is outside the setting range.	Check the mode.	Y	Y

Error Code (Hexadecimal)	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station or Intelligent Device Station
BBC5	Master station duplication error	The master station already exists. Alternatively, line noise was detected at power on.	Reduce the number of master stations on the same line to one. Or, check the line status.	Y	N
BBC7	MFP/Hardware error detected	The MFP chip state does not change to the ready state.	Replace the user circuit board.	Y	Y
BD87	User circuit board error detected	A WDT error occurred for NMI.	Replace the user circuit board.	Y	Y
BF01	Send buffer storage location error	Data was set in a send buffer not assigned by the value set for DA.	Check the transfer buffer assignments and DA value.	Y	N
BF02	Transfer buffer size error	The transfer buffer size was not enough to store the header information.	Check the transfer buffer size.	Y	Y
BF03	Data size exceeded	The amount of transferred data exceeded the communication buffer size.	Check the transfer buffer size.	Y	Y
BF04	Transient transmission target station error	Transient transmission was conducted with a station for which no setting was made or a station that is not an intelligent device station.	Check the parameter setting.	Y	N
BF10	Response transmission failed	There is no reception data, or no response waiting.	Transmit the response after receiving a request. Check the value of SW000A.	Y	Y

5 Reference

In This Chapter

5.1 General Overview

All ProLinx® stand-alone communications gateways allow for data transfer between diverse systems, using two normally incompatible communications protocols. ProLinx gateways accomplish this data transfer by storing data in internal 16-bit memory registers. Data can be written into the ProLinx gateway and stored into its memory by either of the two protocols. After data is stored in the gateway's memory; it is then available to be read or written by either of the two protocols, thus allowing data to be passed between devices, controllers, or processors using different protocols.

The physical network interfaces supported by any ProLinx gateway depend on the application protocols installed on it. Some have only serial communications ports for serial-based protocols, some have an Ethernet port for Ethernet-based protocols, and some have both an Ethernet port and one or more serial ports to support passing data between serial-based and Ethernet-based protocols.

The ProSoft Technology® ProLinx CCLINK protocol solution is a Local Station (slave-only, cannot be a back-up Master Station) or Intelligent Device implementation of the CC-Link Partner Association (CLPA) "CC-Link" high-speed serial protocol. The ProLinx CCLINK protocol driver supports the CC-Link protocol specification version 1.10 and allows the gateway to act as a CC-Link slave on your CC-Link high-speed serial communication and control network.

In this document, whenever you see "CCLINK", this refers to the ProLinx CCLINK protocol driver implementation. Whenever you see "CC-Link", this refers to the protocol in general or to the protocol implementation on the Mitsubishi PLC system. These difference references allow an easy way to identify exactly which CCLINK/CC-Link protocol implementation is being discussed at that point in this document.

5.2 CC-Link Overview

5.2.1 Types of CC-Link Data Transfers

The CC-Link protocol allows for two major ways to transfer process data, Cyclic Data transmission and Transient Message transmission. Cyclic Data transmission involves the movement of specific amounts of binary and register input and output data to and from the Master Station and all Slave stations on the network at a regular interval and in a continuously repeating 'cycle'. Such Cyclic Data transmission is 'automatic' and happens under the control of the CC-Link network Master.

Transient Messages allow for data to be transmitted on the network in variable amounts, at irregular intervals, based on specific logical events or register values, and are controlled by the Master Station, Local Station, or Intelligent Device that initiates the message. Transient Messages allow for the movement of data that might not otherwise be available in normal Master-Slave Cyclic Data transfers. Not all CC-Link Slave devices are capable of generating or responding to Transient Messages; but certain types of Transient Messages are supported in the ProLinx CCLINK protocol driver (more on this later.)

In the ProLinx CCLINK implementation, separate internal memory database areas have been reserved to hold specific types of CC-Link Cyclic Data, as well as a large database area for holding Transient Message Data.

The Cyclic Data transfer portion of the CC-Link protocol is a Master-Slave type implementation. That is, there will be one Master Station on the CC-Link network that controls all the Cyclic Data transmission on the network between itself and one or more Slave Stations, which respond to cyclic messages from the Master.

The protocol allows additional data transfer capability by using Transient Messages for data transmission. Transient Message transfers operate in more of a peer-to-peer implementation, in that any Transient Message-capable Station on the network can initiate and respond to Transient Messages from any other Station on the network.

5.2.2 Types of CC-Link Slave Stations

A distinction needs to be made between physical slave devices and logical Slave Stations. A CC-Link network can have a maximum of 64 logical Slave Stations, each with a unique Station Number. Each logical station will be allowed to exchange a fixed amount of each type of Cyclic Data with the CC-Link Master:

- 32 bits of data to be read by the Master Station from the Slave Station
- 32-bits of data to be written by the Master Station to the Slave Station
- Four, 16-bit integer words of data to be read by the Master Station from the Slave Station
- Four, 16-bit words of data to be written by the Master Station to the Slave Station

There are some physical slave devices that have more data than can fit within these rigid logical station limits. The CC-Link protocol allows users to overcome these logical station limits by allowing certain physical slave devices to be configured as one, two, three, or four logical stations, with consecutive logical Station Addresses. Doing so allows one physical slave device to pass a total amount of Cyclic Data equal to the amount allowed for up to four logical stations.

The CC-Link protocol allows for three different types of slave stations:

- Remote I/O Stations - Cyclic binary bit data transfer only, no Transient Messaging, may occupy only one logical station address
- Intelligent Device Stations - Cyclic and Transient data transfers, may occupy up to four logical station addresses
- Local Stations - Cyclic and Transient data transfers, may occupy up to four logical station addresses, will receive a copy of all Slave Station Cyclic and Status data from the network Master and store that data internally

Remote I/O Stations are the simplest form of slave station and are not supported in the ProLinx CCLINK driver because of that type's severely limited data transfer capability. Intelligent Device Stations and Local Stations provide greater data transfer flexibility and are supported in the CCLINK driver.

The CC-Link protocol allows some Local Stations to be set up as CC-Link Standby Master Stations; however, the ProLinx CCLINK driver is currently a slave-only implementation, so the ProLinx gateway cannot be configured as a CC-Link Standby Master.

5.3 ProLinx CCLINK User Data Memory

5.3.1 ProLinx CCLINK Memory Map Overview

Whether the ProLinx gateway is configured as an Intelligent Station or as a Local Station, it will have a memory area in the gateway's CCLINK database to store its own RX, RWr, RY, and RWw data. If the gateway is configured to be an Intelligent Station, its CCLINK database will contain only its own RX, RWr, RY, and RWw data. If the gateway is configured to be a Local Station, its CCLINK database will contain not only its own RX, RWr, RY, and RWw data areas but also a copy of the RX, RWr, RY, and RWw data from all the slaves on the CC-Link network. This data will be contained in a special area called the "Network Data Area." When the gateway is configured as an Intelligent Station, this data area is reserved and not used by the CCLINK protocol driver.

The ProLinx gateway has 10,000, 16-bit memory storage registers available for storing user data. This data can then be passed between devices on the CC-Link network and whatever other network protocol has been provided on the gateway. The other protocol driver may have access to all 10,000 registers and may be able to read from or write to any of these memory locations. However, to preserve CC-Link protocol data partitioning, the ProLinx CCLINK protocol driver will allow access to the ProLinx memory database only as specified in the following table.

The CCLINK driver has specific memory areas assigned for each CC-Link data type with gaps built in between each area to maintain data separation and allow the different CC-Link data areas to start on easily-remembered ProLinx user database memory addresses. These addresses are spaced out to start at some even multiple of ten, as follows:

- **RX** data area starts at ProLinx memory database register address 0
- **RWr** data starts at address10
- **RY** data starts at address 30
- **RWw** data starts at address 40
- **SB** status data starts at address 60
- **SW** status data starts at address 100
- **Network data** (for a Local Station) or the Reserved area (for an Intelligent Device Station) starts at address 500
- **Transient** Message data starts at address1300.

You will notice in the following chart that there are some memory registers between the CCLINK data areas that are not used by the CCLINK protocol driver. These addresses are not accessible to the CC-Link Master. The memory registers in the gaps between these data areas are usually (but not always) accessible by the other installed protocol driver but should not be used to hold user data for your application, since they cannot be accessed by the CCLINK protocol driver.

The following table describes the ProLinx memory layouts for an Intelligent Station and for a Local Station.

Intelligent Device Station

Word Address	Layout Description	Word Length
0000 0007	CCLINK RX bit data area 32 bits per station	8
0010 0025	CCLINK RWr word data area 4 words per station	16
0030 0037	CCLINK RY bit data area 32 bits per station	8
0040 0055	CCLINK RWw word data area 4 words per station	16
0060 0071	CCLINK SB Link Special Relay data area	12
0100 0477	CCLINK SW Special Register data area	378
0500 1285	This is reserved to hold Network data when the ProLinx is configured as a Local Station. It is not used by the CCLINK driver when the ProLinx is configured as an Intelligent Station; but may be used by the DFNT driver. 786 words	786
1300 9999	CC-Link Transient Message Data and extra DFNT data area 8700 words	8700

Local Station

Word Address	Layout Description	Word Length
0000 0007	CCLINK RX bit data area 32 bits per station	8
0010 0025	CCLINK RWr word data area 4 words per station	16
0030 0037	CCLINK RY bit data are 32 bits per station	8
0040 0055	CCLINK RWw word data area 4 words per station	16
0060 0071	CCLINK SB Link Special Relay data area	12
0100 0477	CCLINK SW Special Register data area	378
0500 0627	Network RX Data area 2048 bits	128
0630 885	Network RWr Data area 256 words	256
0900 1027	Network RY Data area 2048 bits	128
1030 1285	Network RWw Data area 256 words	256
1300 9999	CC-Link Transient Message Data and extra DFNT data area 8700 words	8700

5.3.2 ProLinx CCLINK Memory Area Breakdown by Logical Station

As mentioned before, the ProLinx gateway can be configured as one, two, three or four logical stations. Therefore, the RX, RWr, RY, and RWw data areas had to be sized to hold enough data for four logical stations. The following table shows where data for each logical station can be found in each data type area. This same data mapping is used whether the ProLinx CCLINK driver is configured as an Intelligent Station or as a Local Station.

ProLinx Word Address	CCLINK RX Memory by Logical Station	RX Words Used per Station	Total RX Words Used
0000	First Logical Station	2 registers	2 registers
0001			
0002	Second Logical Station	2 registers	4 registers
0003			
0004	Third Logical Station	2 registers	6 registers
0005			
0006	Fourth Logical Station	2 registers	8 registers
0007			

ProLinx Word Address	CCLINK RWr Memory By Logical Station	RWr Words Used per Station	Total RWr Words Used
0010	First Logical Station	4 registers	4 registers
0013			
0014	Second Logical Station	4 registers	8 registers
0017			
0018	Third Logical Station	4 registers	12 registers
0021			
0022	Fourth Logical Station	4 registers	16 registers
0025			

ProLinx Word Address	CCLINK RY Memory By Logical Station	RY Words Used per Station	Total RY Words Used
0030	First Logical Station	2 registers	2 registers
0031			
0032	Second Logical Station	2 registers	4 registers
0033			
0034	Third Logical Station	2 registers	6 registers
0035			
0036	Fourth Logical Station	2 registers	8 registers
0037			

ProLinx Word Address	CCLINK RWw Memory By Logical Station	RWw Words Used per Station	Total RWw Words Used
0040	First Logical Station	4 registers	4 registers
0043			
0044	Second Logical Station	4 registers	8 registers
0047			
0048	Third Logical Station	4 registers	12 registers
0051			
0052	Fourth Logical Station	4 registers	16 registers
0055			

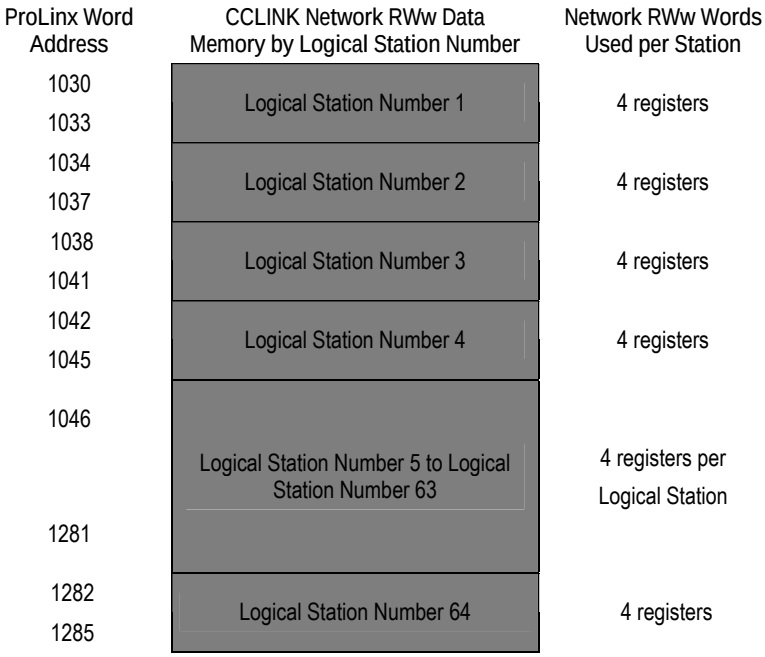
5.3.3 ProLinx Local Station Network Data Area Breakdown

When the ProLinx CCLINK driver is configured as a Local Station, it will receive a copy of the RX, RWr, RY, and RWw data from every slave on the CC-Link network, including its own data. This data copy is stored in a Network Data area, as shown in the ProLinx CCLINK Memory Map Overview. The following chart shows how this Network Data area is broken down by data type and Logical Station Number. You will notice that, once again, the data is grouped into blocks of memory based on the CC-Link data type.

ProLinx Word Address	CCLINK Network RX Data Memory by Logical Station Number	Network RX Words Used per Station
0500	Logical Station Number 1	2 registers
0501		
0502	Logical Station Number 2	2 registers
0503		
0504	Logical Station Number 3	2 registers
0505		
0506	Logical Station Number 4	2 registers
0507		
0508	Logical Station Number 5 to Logical Station Number 63	2 registers per Logical Station
625		
0626	Logical Station Number 64	2 registers
0627		

ProLinx Word Address	CCLINK Network RWr Data Memory by Logical Station Number	Network RWr Words Used per Station
0630 0633	Logical Station Number 1	4 registers
0634 0637	Logical Station Number 2	4 registers
0638 0641	Logical Station Number 3	4 registers
0642 0645	Logical Station Number 4	4 registers
0646 0881	Logical Station Number 5 to Logical Station Number 63	4 registers per Logical Station
0882 0885	Logical Station Number 64	4 registers

ProLinx Word Address	CCLINK Network RY Data Memory by Logical Station Number	Network RY Words Used per Station
0900 0901	Logical Station Number 1	2registers
0902 0903	Logical Station Number 2	2 registers
0904 0905	Logical Station Number 3	2 registers
0906 0907	Logical Station Number 4	2 registers
0908 1025	Logical Station Number 5 to Logical Station Number 63	2 registers per Logical Station
1026 1027	Logical Station Number 64	2 registers



5.4 CC-Link Cyclic Data Concepts

Cyclic data refers to the fixed amount of data that will be transferred between the CC-Link network Master Station and each logical Slave Station. Cyclic data transfers are controlled by the CC-Link Master. Since the amount of data that can be transferred is fixed and since the CC-Link Master controls cyclic transfers, there is very little configuration required for the ProLinx gateway for it to be able to pass cyclic data on the CC-Link network. However, some general information about the CC-Link protocol will help you better understand how the ProLinx gateway works.

Most CC-Link devices, including the ProLinx gateway, use separate memory partitions to hold the different types of cyclic data transferred by the protocol. In programmable logic controllers (PLCs) like the Mitsubishi MEL-SEC Q series, for example, memory is usually partitioned according to whether the data is to be input data (received data) or output data (sent data) and according to the type of data to be stored. Single-bit binary data is usually separated from 16-bit integer register data. The cyclic data type partitions for CC-Link are as follows:

- **RX Remote Input Data (for binary inputs) –** The RX memory area holds single-bit binary cyclic data that is received from Stations on the CC-Link network.
- **RY Remote Output Data (for binary outputs) –** The RY memory area holds single-bit binary cyclic data that is sent to Stations on the CC-Link network.

- **RWr Remote Register Data (for register inputs) –** The RWr memory area holds 16-bit integer register cyclic data that is received from Stations on the CC-Link network. Register data areas can hold bit patterns for many different data types, like bit-packed or bit-mapped binary data, byte-packed single-byte integer data, single or double word integer data, ASCII character code data, single- or double-precision floating point data, and more. Integer data can be Unsigned or Signed. This is because the ProLinx gateway does not do any data type interpretation. It just accurately stores and transmits bit patterns without any manipulation of them and without any regard for what kind of data they ultimately represent.
- **RWw Remote Register Data (for register outputs) –** The RWw memory area holds 16-bit integer register cyclic data that is sent to the Stations on the CC-Link network. The RWw registers can hold the same variety of data as the RWr registers.
- **SB Link Special Relay Data (for binary Station Status data) –** The SB memory area holds binary status bit information about the current link status of CC-Link network. For details, refer to the "Status Data" section of the chapter on *Troubleshooting*.
- **SW Special Register Data (for register Station Status data) –** The SW memory area hold register status information about the current link status of CC-Link network. For details, refer to the "Status Data" section of the chapter on *Troubleshooting*.

The following cyclic data types apply to and exist in only Master Stations and Local Stations:

- **Network RX Data –** This data area contains a copy of the entire Master Station RX Data Area, that is, all the cyclic binary data received by the Master Station from all the Slave Stations on the network.
- **Network RY Data –** This data area contains a copy of the entire Master Station RY Data Area, that is, all the cyclic binary data sent from the Master Station to all the Slave Stations on the network.
- **Network RWr Data –** This data area contains a copy of the entire Master Station RWr Data Area, that is, all the cyclic register data received by the Master Station from all the Slave Stations on the network.
- **Network RWw Data –** This data area contains a copy of the entire Master Station RWw Data Area, that is, all the cyclic register data sent from the Master Station to all the Slave Stations on the network.

One important concept to keep in mind is that the designations "input data" and "output data" are always specified from the point of view of the station on which the data resides. That is, on any given station, "input data" will always be data that station received from another station and "output data" will always be data destined to be sent to another station. For example, a Slave station's RY binary output data area will be used to hold data that will be sent from the Slave to the network Master's RX binary input data area. Likewise, the Master's RY binary output data area will be used to hold data to be sent to one or more Slave RX binary input data area or areas.

Another important concept to keep in mind is that the output data from one station will always be transferred to the input area of another station. This is true for Masters as well as Slaves. All Slave input data will come from the network Master's output data areas. All data received by the network Master into its input data areas will come from the various Slaves' output data areas.

The following tables show two typical examples of how data might flow through the ProLinx memory database between two different processors. Both examples show addressing for a Mitsubishi MEL-SEC Q processor as the CC-Link Master system. One example shows addressing for a Rockwell Automation ControlLogix® Programmable Automation Controller and the other example shows addressing for a Modicon® Quantum PLC system. The addresses shown for those controllers have been arbitrarily assigned for these examples. In actual applications, they are user-selectable and can be changed to suit your specific application.

You should notice:

- Data from the bit write area of the ProLinx goes to the bit read area of the Mitsubishi
- Data from the bit write area of the Mitsubishi goes to the bit read area of the ProLinx
- Data from the register write area of the ProLinx goes to the register read area of the Mitsubishi
- Data from the register write area of the Mitsubishi goes to the register read area of the ProLinx

ControlLogix CPU Controller Tag Memory Areas	ProLinx Memory addresses	ProLinx CCLINK Data Type Memory Areas	Data Direction	Mitsubishi PLC CC-Link Data Type Memory Areas	Mitsubishi PLC Memory Partition Addresses
BinaryIn[0] (BOOL Tag Array) BinaryIn[159]	0000 0007	CCLINK RX bit area 32 bits per station	←	CC-Link RY bit area 32 bits per station	Y100 (Y Bit Memory) Y159
InRegisters[0] (INT Tag Array) InRegisters[15]	0010 0025	CCLINK RWr word area 4 words per station	←	CC-Link RWw word area 4 words per station	D1000 (D Register Memory) D1015
BinaryOut[0] (BOOL Tag Array) BinaryOut[159]	0030 0037	CCLINK RY bit area 32 bits per station	→	CC-Link RX bit area 32 bits per station	X100 (X Bit Memory) X159
OutRegisters[0] (INT Tag Array) OutRegisters[15]	0040 0055	CCLINK RWw word area 4 words per station	→	CC-Link RWr word area 4 words per station	D100 (D Register Memory) D115

Modicon Quantum PLC Modbus Memory Areas	ProLinx Memory addresses	ProLinx CCLINK Data Type Memory Areas	Data Direction	Mitsubishi PLC CC-Link Data Type Memory Areas	Mitsubishi PLC Memory Partition Addresses
0x0001 (Coils - read/write binary data) 0x0159	0000 0007	CCLINK RX bit area 32 bits per station	←	CC-Link RY bit area 32 bits per station	Y100 (Y Bit Memory) Y159
4x0001 (Holding Registers - read/write 16-bit register data) 4x0015	0010 0025	CCLINK RWr word area 4 words per station	←	CC-Link RWw word area 4 words per station	D1000 (D Register Memory) D1015
1x0001 (Input Status - read-only binary data) 1x0159	0030 0037	CCLINK RY bit area 32 bits per station	→	CC-Link RX bit area 32 bits per station	X100 (X Bit Memory) X159
3x0001 (Input Registers - read-only 16-bit register data) 3x0015	0040 0055	CCLINK RWw word area 4 words per station	→	CC-Link RWr word area 4 words per station	D100 (D Register Memory) D115

5.5 CC-Link Transient Data Messaging Concepts

WARNING: Unlike Cyclic Data transfers, which happen almost automatically from the ProLinx gateway's perspective, Transient Messaging requires much more involvement by the user to configure, manage, and maintain data transfers. Before attempting Transient Messaging, the user must thoroughly understand the details of this feature of the CC-Link protocol and must be proficient in using that knowledge. Improper use of Transient Messaging could result in unexpected system behavior, resulting in potential damage to equipment and/or injury to personnel.

5.5.1 General

The Transient Messaging capability of the CC-Link protocol allows for greater flexibility in the way users may transfer data on the network than what is possible using Cyclic Data transfers. Smaller or larger amounts of data can be transferred with Transient Messaging than is possible within the more rigid Cyclic Data structure; and data transfers with Transient Messaging are conditional, not periodic.

Unlike Cyclic Data transfers, which are controlled by the CC-Link Master alone and which happen at a timed, periodic, polling rate, Transient Messages are controlled by the originating station, which could be a Master Station, a Local Station, or an Intelligent Device Station. Transient Messages are non-periodic, that is, they are not scheduled to happen at a regular interval, like Cyclic Data transfers do. Transient Messages are sent only when "triggered" by a logical event. In the ProLinx gateway, the logical event that will trigger a Transient Message is when a non-zero value is stored into a gateway database register designated as the *Trigger Register* in the Transient Message configuration.

When a *Trigger Register* is set to a non-zero value, the ProLinx firmware will create and transmit a Transient Message that is based on the Command configuration contained in the configuration file that was downloaded to the gateway. Once the Transient Message has been sent, the firmware will set the *Trigger Register* value back to zero to indicate the trigger was received and acted upon.

Trigger Registers can be any valid user memory database address, from 0 to 9999 (10,000 register database). This address range includes the CC-Link Cyclic Data area, the Special Status Data areas (SB and SW), the Network Data area, and the Transient Data area. This means that any address in the gateway's database may be monitored for the appearance of a non-zero value as a way to trigger execution of a Transient Message. Therefore, care must be taken when choosing a *Trigger Register* to be sure it will contain non-zero values only when its associated Transient Message needs to be triggered to prevent inadvertent message transmission and avoid overloading the network with Transient Messages.

5.5.2 CCLINK Transient Data Message Memory Areas

To fully understand all the Transient Message options, you must first understand the different memory areas that may be accessed using Transient Messages. There are four primary memory areas to consider:

1 ProLinx Gateway Memory Database Area - This area is the total 10,000 word (10,000 16-bit registers) of physical memory that is available on the gateway. All of this memory area is generally available to whatever other communications protocol driver is installed on the ProLinx gateway along with the CCLINK protocol driver, such as the DFNT EtherNet/IP driver or the MNET Modbus TCP/IP driver. This entire memory database area can also be used as the source or destination address for the *Internal Address* parameter of Transient Message commands.

This area includes the memory addresses assigned for use by the CCLINK driver and directly accessible by the CC-Link network Master; so, care must me taken with setting the *Internal Address* parameter of Transient Message commands so that you do not overwrite CCLINK data areas with Transient Message Data unless you intend to do so.

To avoid inadvertent corruption of the CCLINK Cyclic Data Areas, any *Internal Addresses* used in Transient Message commands should be confined to those assigned specifically for Transient Message Data. These addresses start at gateway memory address 1300 and continue up to address 9999.

2 ProLinx Gateway CCLINK Driver-accessible Memory Area - This area is a sub-set of the entire 10,000 word gateway database and is outlined and explained in the "ProLinx CCLINK User Data Memory" section of the *Reference* chapter. It includes all the Cyclic Data Areas and the Transient Message Data Area.

To avoid inadvertent corruption of the CCLINK Cyclic Data Areas, any *Internal Addresses* used in Transient Message commands should be confined to those assigned specifically for Transient Message Data. These addresses start at gateway memory address 1300 and continue up to address 9999.

3 CC-Link Communications Network Data Buffer Area - This area exists as a memory buffer on the CC-Link communications port hardware. Every CC-Link device on the network will have this memory buffer area built into its hardware. This memory buffer on each device will receive cyclic updates from the CC-Link Master on the network and the data in this memory buffer is what will be copied to the ProLinx Gateway CCLINK Driver-accessible Memory Area. So, for all practical purposes, the two memory areas will contain the same data. The only reason to make a distinction between the two is because different types of Transient Messages will access these two memory areas separately.

Command Attribute 4 will access this buffer data directly from the CC-Link hardware on whatever *Node Address* (Station Address) is set in the Command; but, since this data all comes from the Master Station, all stations should contain the same data, the best practice would be to always use the Master Station *Node Address* for Command Attribute 4 messages.

4 CC-Link Data Memory Database Areas of devices on the network other than the ProLinx Gateway - These areas exist on all Slave Stations and are analogous to the ProLinx CCLINK Driver-accessible Memory Area of the gateway. These areas are the ones that will be accessed by using Command Attribute 5.

5.6 Specifications

5.6.1 Functional Specifications - CC-Link

CC-Link technology is based on an Application Specific Integrated Circuit (ASIC) designed and provided by Mitsubishi Electric Automation. Each CC-Link logical station transfers 4 words as 16-bit register data and 32 bits as binary I/O data to the Master station and receives an additional 4 words and 32 bits from the Master Station. The CCLINK gateway can occupy up to 4 consecutive stations on the CC-Link network increasing its I/O data transfer capacity.

Maximum number of station addresses occupied	4 stations, consecutive addresses
Maximum Number of Devices per network	26-64 Devices depending on type of devices or stations configured
Device Types Supported	Intelligent Device and Local Station
CC-Link Version supported	CC-Link Version 1.10 cyclic data transmission
Message handling	Cyclic Messages and Transient Messages
Cyclic Data Capacity	4 Slave station supporting 4 words and 32bits per station for a total of 24 input data words and 24 output data words per gateway.
Additional I/O Data Transfer Capacity	Transient Messaging extends the data transfer capacity to more than 8,000 additional words
Transient Message Commands	System Information, Memory Access Information, RUN, STOP, Line Test. Memory Read and Memory Write commands
Communication speed	10 Mbps, 5 Mbps, 2.5 Mbps, 625 kbps, 156 kbps
Transmission path format	Bus format (EIA RS485 conformance)
Transmission format	HDLC conformance
Error control system	CRC (X16+X12+X5+1)

5.7 Conformance Testing

Conformance testing through the CC-Link partner Association (CLPA) is in progress and ensures that the gateway meets the performance specifications required to become CC-Link certified.

5.7.1 General Specifications

ProLinx® Communication Gateways provide connectivity for two or more dissimilar network types. The gateways, encased in sturdy extruded aluminum, are stand-alone DIN-rail-mounted solutions that provide data transfer between many of today’s most widely used industrial automation.

5.7.2 Hardware Specifications

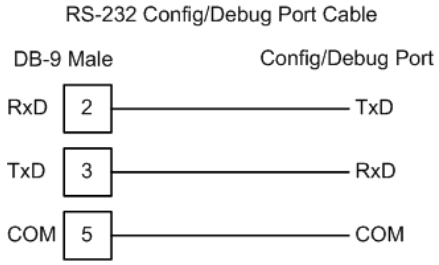
Specification	Description
Power Supply	24 VDC nominal 18 to 32 VDC allowed Positive, Negative, and Ground terminals 2.5 mm screwdriver blade-sized terminals
Current Load	500 mA max@ 32 VDC max
Operating Temperature	-20 to 50°C (-4 to 122°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5% to 95% (non-condensing)
Dimensions	Standard: 5.20H x 2.07W x 4.52D in. (13.2cmH x 5.25cmW x 11.48cmD) Extended: 5.20H x 2.73W x 4.52D in. (13.2cmH x 6.934cmW x 11.48cmD)
General LED Indicators	Power and General Status Application Status Serial Port Activity LED Serial Activity and Error LED Status
CC-Link LED Indicators	Run (Network Status) L Run (Data Link Execution) L Err (Data Link Comm Error) SD (Sending Data LED) RD (Receiving Data LED) ERR (Switch Setting Error)
Configuration Serial Port	DB-9M RS-232 only No hardware handshaking
Ethernet Port	RJ45 Connector, 10Mbit, half-duplex only Link and Activity LED indicators Electrical Isolation 1500 V rms at 50 Hz to 60 Hz for 60 s, applied as specified in section 5.3.2 of IEC 60950: 1991 Ethernet Broadcast Storm Resiliency = less than or equal to 5000 [ARP] frames-per-second and less than or equal to 5 minutes duration
CC-Link Interface	 Pin — Description DA — Data Communication line A DB — Data Communication line B DG — Digital Ground SLD — Shield FG — Frame Ground
Shipped with Each Unit	Mini-DIN to DB-9M serial cable 4 ft RS-232 configuration cable 2.5mm screwdriver CD (docs and Configuration utility) CC-Link to Terminal Block connector

5.7.3 ProSoft Configuration Builder

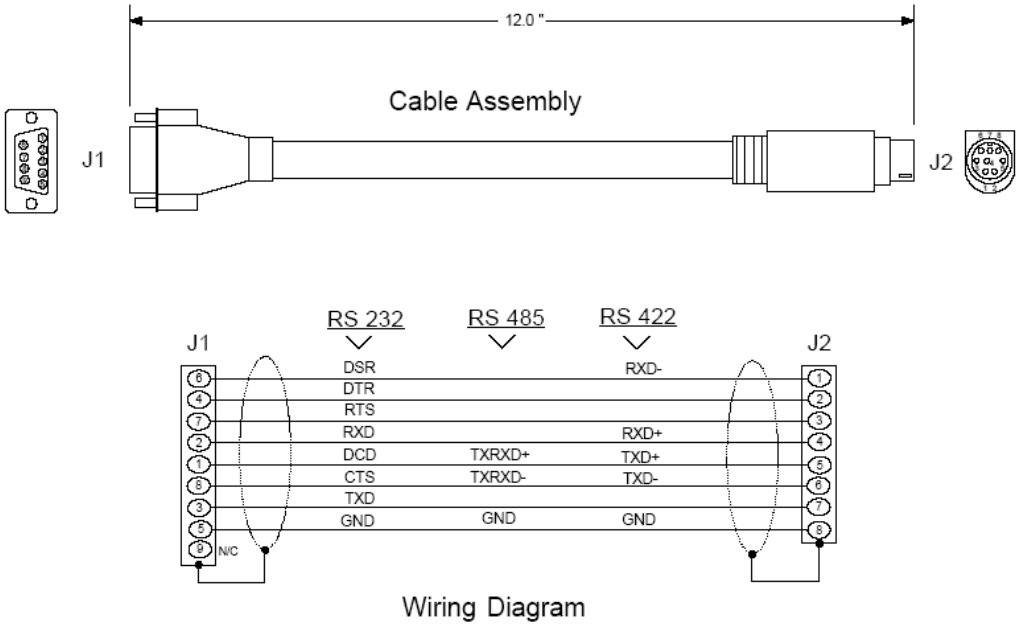
ProSoft Configuration Builder (PCB) provides a quick and easy way to manage gateway configuration files customized to meet your application needs. *PCB* is not only a powerful solution for new configuration files, but also allows you to import information from previously installed (known working) configurations to new projects.

5.8 RS-232 Configuration/Debug Port

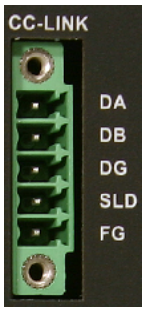
This port is physically a Mini-DIN connection. A Mini-DIN to DB-9 adapter cable is included with the module. This port permits a PC based terminal emulation program to view configuration and status data in the module and to control the module. The cable for communications on this port is shown in the following diagram:



5.9 DB9 to Mini-DIN Adaptor (Cable 09)



5.10 CC-Link Port



Pin	Description
DA	Data Communication line A
DB	Data Communication line B
DG	Digital Ground
SLD	Shield
FG	Frame Ground

6 Support, Service & Warranty

In This Chapter

ProSoft Technology, Inc. (ProSoft) is committed to providing the most efficient and effective support possible. Before calling, please gather the following information to assist in expediting this process:

1 Product Version Number
2 System architecture
3 Network details

If the issue is hardware related, we will also need information regarding:

1 Module configuration and contents of file
   - Module Operation
   - Configuration/Debug status information
   - LED patterns

2 Information about the processor and user data files as viewed through and LED patterns on the processor.
3 Details about the serial devices interfaced, if any.

6.1 How to Contact Us: Technical Support

Internet	Web Site: http://www.prosoft-technology.com/support
	E-mail address: support@prosoft-technology.com

Asia Pacific

+603.7724.2080, support.asia@prosoft-technology.com
Languages spoken include: Chinese, English

Europe (location in Toulouse, France)

+33 (0) 5.34.36.87.20, support.EMEA@prosoft-technology.com
Languages spoken include: French, English

North America/Latin America (excluding Brasil) (location in California)

+1.661.716.5100, support@prosoft-technology.com
Languages spoken include: English, Spanish
*For technical support calls within the United States, an after-*hours *answering system allows pager access to one of our qualified technical and/or application support engineers at any time to answer your questions.*

Brasil (location in Sao Paulo)

+55-11-5084-5178, eduardo@prosoft-technology.com
Languages spoken include: Portuguese, English

6.2 Return Material Authorization (RMA) Policies and Conditions

The following RMA Policies and Conditions (collectively, "RMA Policies") apply to any returned Product. These RMA Policies are subject to change by ProSoft without notice. For warranty information, see "Limited Warranty". In the event of any inconsistency between the RMA Policies and the Warranty, the Warranty shall govern.

6.2.1 All Product Returns:

a) In order to return a Product for repair, exchange or otherwise, the Customer must obtain a Returned Material Authorization (RMA) number from ProSoft and comply with ProSoft shipping instructions.
b) In the event that the Customer experiences a problem with the Product for any reason, Customer should contact ProSoft Technical Support at one of the telephone numbers listed above (page 89). A Technical Support Engineer will request that you perform several tests in an attempt to isolate the problem. If after completing these tests, the Product is found to be the source of the problem, we will issue an RMA.
c) All returned Products must be shipped freight prepaid, in the original shipping container or equivalent, to the location specified by ProSoft, and be accompanied by proof of purchase and receipt date. The RMA number is to be prominently marked on the outside of the shipping box. Customer agrees to insure the Product or assume the risk of loss or damage in transit. Products shipped to ProSoft using a shipment method other than that specified by ProSoft or shipped without an RMA number will be returned to the Customer, freight collect. Contact ProSoft Technical Support for further information.
d) A 10% restocking fee applies to all warranty credit returns whereby a Customer has an application change, ordered too many, does not need, etc.

6.2.2 Procedures for Return of Units Under Warranty:

A Technical Support Engineer must approve the return of Product under ProSoft's Warranty:

a) A replacement module will be shipped and invoiced. A purchase order will be required.
b) Credit for a product under warranty will be issued upon receipt of authorized product by ProSoft at designated location referenced on the Return Material Authorization.

6.2.3 Procedures for Return of Units Out of Warranty:

a) Customer sends unit in for evaluation
b) If no defect is found, Customer will be charged the equivalent of $100 USD, plus freight charges, duties and taxes as applicable. A new purchase order will be required.

c) If unit is repaired, charge to Customer will be 30% of current list price (USD) plus freight charges, duties and taxes as applicable. A new purchase order will be required or authorization to use the purchase order submitted for evaluation fee.

The following is a list of non-repairable units:

- 3150 - All
- 3750
- 3600 - All
- 3700
- 3170 - All
- 3250
- 1560 - Can be repaired, only if defect is the power supply
- 1550 - Can be repaired, only if defect is the power supply
- 3350
- 3300
- 1500 - All

6.2.4 Purchasing Warranty Extension:

a) ProSoft's standard warranty period is three (3) years from the date of shipment as detailed in "Limited Warranty (page 91)". The Warranty Period may be extended at the time of equipment purchase for an additional charge, as follows:

- Additional 1 year = 10% of list price
- Additional 2 years = 20% of list price
- Additional 3 years = 30% of list price

6.3 LIMITED WARRANTY

This Limited Warranty ("Warranty") governs all sales of hardware, software and other products (collectively, "Product") manufactured and/or offered for sale by ProSoft, and all related services provided by ProSoft, including maintenance, repair, warranty exchange, and service programs (collectively, "Services"). By purchasing or using the Product or Services, the individual or entity purchasing or using the Product or Services ("Customer") agrees to all of the terms and provisions (collectively, the "Terms") of this Limited Warranty. All sales of software or other intellectual property are, in addition, subject to any license agreement accompanying such software or other intellectual property.

6.3.1 What Is Covered By This Warranty

a) *Warranty On New Products*: ProSoft warrants, to the original purchaser, that the Product that is the subject of the sale will (1) conform to and perform in accordance with published specifications prepared, approved and issued by ProSoft, and (2) will be free from defects in material or workmanship; provided these warranties only cover Product that is sold as new. This Warranty expires three years from the date of shipment (the "Warranty Period"). If the Customer discovers within the Warranty Period a failure of the Product to conform to specifications, or a defect in material or workmanship of the Product, the Customer must promptly notify ProSoft by fax, email or telephone. In no event may that notification be received by ProSoft later than 39 months. Within a reasonable time after notification, ProSoft will correct any failure of the Product to conform to specifications or any defect in material or workmanship of the Product, with either new or used replacement parts. Such repair, including both parts and labor, will be performed at ProSoft's expense. All warranty service will be performed at service centers designated by ProSoft.
b) *Warranty On Services*: Materials and labor performed by ProSoft to repair a verified malfunction or defect are warranteed in the terms specified above for new Product, provided said warranty will be for the period remaining on the original new equipment warranty or, if the original warranty is no longer in effect, for a period of 90 days from the date of repair.

6.3.2 What Is Not Covered By This Warranty

a) ProSoft makes no representation or warranty, expressed or implied, that the operation of software purchased from ProSoft will be uninterrupted or error free or that the functions contained in the software will meet or satisfy the purchaser's intended use or requirements; the Customer assumes complete responsibility for decisions made or actions taken based on information obtained using ProSoft software.
b) This Warranty does not cover the failure of the Product to perform specified functions, or any other non-conformance, defects, losses or damages caused by or attributable to any of the following: (i) shipping; (ii) improper installation or other failure of Customer to adhere to ProSoft's specifications or instructions; (iii) unauthorized repair or maintenance; (iv) attachments, equipment, options, parts, software, or user-created programming (including, but not limited to, programs developed with any IEC 61131-3, "C" or any variant of "C" programming languages) not furnished by ProSoft; (v) use of the Product for purposes other than those for which it was designed; (vi) any other abuse, misapplication, neglect or misuse by the Customer; (vii) accident, improper testing or causes external to the Product such as, but not limited to, exposure to extremes of temperature or humidity, power failure or power surges; or (viii) disasters such as fire, flood, earthquake, wind and lightning.

c) The information in this Agreement is subject to change without notice. ProSoft shall not be liable for technical or editorial errors or omissions made herein; nor for incidental or consequential damages resulting from the furnishing, performance or use of this material. The user guide included with your original product purchase from ProSoft contains information protected by copyright. No part of the guide may be duplicated or reproduced in any form without prior written consent from ProSoft.

6.3.3 Disclaimer Regarding High Risk Activities

Product manufactured or supplied by ProSoft is not fault tolerant and is not designed, manufactured or intended for use in hazardous environments requiring fail-safe performance including and without limitation: the operation of nuclear facilities, aircraft navigation of communication systems, air traffic control, direct life support machines or weapons systems in which the failure of the product could lead directly or indirectly to death, personal injury or severe physical or environmental damage (collectively, "high risk activities"). ProSoft specifically disclaims any express or implied warranty of fitness for high risk activities.

6.3.4 Intellectual Property Indemnity

Buyer shall indemnify and hold harmless ProSoft and its employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not ProSoft is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Products. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless ProSoft and defend or settle any action brought against such Companies to the extent based on a claim that any Product made to Buyer specifications infringed intellectual property rights of another party. ProSoft makes no warranty that the product is or will be delivered free of any person's claiming of patent, trademark, or similar infringement. The Buyer assumes all risks (including the risk of suit) that the product or any use of the product will infringe existing or subsequently issued patents, trademarks, or copyrights.

a) Any documentation included with Product purchased from ProSoft is protected by copyright and may not be duplicated or reproduced in any form without prior written consent from ProSoft.
b) ProSoft's technical specifications and documentation that are included with the Product are subject to editing and modification without notice.
c) Transfer of title shall not operate to convey to Customer any right to make, or have made, any Product supplied by ProSoft.
d) Customer is granted no right or license to use any software or other intellectual property in any manner or for any purpose not expressly permitted by any license agreement accompanying such software or other intellectual property.

e) Customer agrees that it shall not, and shall not authorize others to, copy software provided by ProSoft (except as expressly permitted in any license agreement accompanying such software); transfer software to a third party separately from the Product; modify, alter, translate, decode, decompile, disassemble, reverse-engineer or otherwise attempt to derive the source code of the software or create derivative works based on the software; export the software or underlying technology in contravention of applicable US and international export laws and regulations; or use the software other than as authorized in connection with use of Product.

f) **Additional Restrictions Relating To Software And Other Intellectual Property**

In addition to compliance with the Terms of this Warranty, Customers purchasing software or other intellectual property shall comply with any license agreement accompanying such software or other intellectual property. Failure to do so may void this Warranty with respect to such software and/or other intellectual property.

6.3.5 Disclaimer of all Other Warranties

The Warranty set forth in What Is Covered By This Warranty (page 92) are in lieu of all other warranties, express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

*6.3.6 Limitation of Remedies ***

In no event will ProSoft or its Dealer be liable for any special, incidental or consequential damages based on breach of warranty, breach of contract, negligence, strict tort or any other legal theory. Damages that ProSoft or its Dealer will not be responsible for included, but are not limited to: Loss of profits; loss of savings or revenue; loss of use of the product or any associated equipment; loss of data; cost of capital; cost of any substitute equipment, facilities, or services; downtime; the claims of third parties including, customers of the Purchaser; and, injury to property.

** Some areas do not allow time limitations on an implied warranty, or allow the exclusion or limitation of incidental or consequential damages. In such areas, the above limitations may not apply. This Warranty gives you specific legal rights, and you may also have other rights which vary from place to place.

6.3.7 Time Limit for Bringing Suit

Any action for breach of warranty must be commenced within 39 months following shipment of the Product.

6.3.8 No Other Warranties

Unless modified in writing and signed by both parties, this Warranty is understood to be the complete and exclusive agreement between the parties, suspending all oral or written prior agreements and all other communications between the parties relating to the subject matter of this Warranty, including statements made by salesperson. No employee of ProSoft or any other party is authorized to make any warranty in addition to those made in this Warranty. The Customer is warned, therefore, to check this Warranty carefully to see that it correctly reflects those terms that are important to the Customer.

6.3.9 Allocation of Risks

This Warranty allocates the risk of product failure between ProSoft and the Customer. This allocation is recognized by both parties and is reflected in the price of the goods. The Customer acknowledges that it has read this Warranty, understands it, and is bound by its Terms.

6.3.10 Controlling Law and Severability

This Warranty shall be governed by and construed in accordance with the laws of the United States and the domestic laws of the State of California, without reference to its conflicts of law provisions. If for any reason a court of competent jurisdiction finds any provisions of this Warranty, or a portion thereof, to be unenforceable, that provision shall be enforced to the maximum extent permissible and the remainder of this Warranty shall remain in full force and effect. Any cause of action with respect to the Product or Services must be instituted in a court of competent jurisdiction in the State of California.

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