AutoMax®
PC Link Interface Module

(M/N 57C445)

Industrial
CONTROLS

Instruction Manual J2-3011-2

RELIANCE ELECTRIC

The information in this user's manual is subject to change without notice.

DANGER

ONLY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD INSTALL, ADJUST, OPERATE, OR SERVICE THIS EQUIPMENT. READ AND UNDERSTAND THIS MANUAL IN ITS ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

WARNING

THE USER MUST PROVIDE AN EXTERNAL, HARDWIRED EMERGENCY STOP CIRCUIT OUTSIDE THE PROGRAMMABLE CONTROLLER CIRCUITRY. THIS CIRCUIT MUST DISABLE THE SYSTEM IN CASE OF IMPROPER OPERATION. UNCONTROLLED MACHINE MOTION MAY RESULT IF THIS PROCEDURE IS NOT FOLLOWED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.

CAUTION

THIS MODULE CONTAINS STATIC-SENSITIVE COMPONENTS. CARELESS HANDLING CAN CAUSE SEVERE DAMAGE. DO NOT TOUCH THE CONNECTORS ON THE BACK OF THE MODULE. WHEN NOT IN USE, THE MODULE SHOULD BE STORED IN AN ANTI-STATIC BAG. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

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1.0 INTRODUCTION

The products described in this manual are manufactured or distributed by Reliance Electric Industrial Company.

This manual describes the AutoMax PC Link Interface module and its associated software. The PC Link Interface module is designed to make any AT-bus personal computer function as a drop on the DCS/AutoMax Network or the DCS/AutoMax Remote I/O network. Multiple PC Link modules can be installed in a personal computer. Each PC Link module is configured separately. The number of modules is limited by the number of expansion slots available and the amount of memory available on your personal computer.

When the Network Communication (RENET) software is loaded, the PC Link Interface module is functionally equivalent to a Network Communications module (M/N 57C404A). Data is organized on the module using the same structure as the Network Communications module. The PC Link Interface module can act as any valid drop, except the Master (drop 0), and can have any valid drop depth. The drop number and drop depth are assigned by the device driver program (supplied by the user). Note that if you are using the PC Link Interface module with the AutoMax Programming Executive software (Version 3.3 or later), the drop depth of the module will be set equal to 1 by the Programming Executive software. The diskette provided with the PC Link module contains a README file that lists the available PC Link device drivers. Refer to your device driver documentation for information on assigning the drop number and drop depth. Refer to the AutoMax Programming Executive instruction manual (J2-3045) for how to use the PC Link module with the Programming Executive software. Refer to Appendix D if you are writing your own device driver.

When the Remote I/O Network (RERIO) software is loaded, the PC Link Interface module functions like an AutoMax Remote I/O Communications module (M/N 57C416). The module can be used in two ways: as maintenance and monitoring tool (passive drop) or as a remote I/O network drop simulator (active drop).

When used passively, the PC Link module can monitor all drops on a remote I/O network drop, accessing the output data being sent from the Master to the Slave drops as well as the input data being sent from the Slave drops to the Master.

When used as a remote I/O network drop simulator, the PC Link Interface module can be configured as an active drop which will receive output data from the Master and send input data back to the Master.

See section 4.2 for information on configuring remote I/O drops on the PC Link module.

1.1 Additional Information

You must be familiar with all the instruction manuals that describe your system configuration. This may include, but is not limited to, the following:

- J2-3001 NETWORK COMMUNICATIONS MODULE INSTRUCTION MANUAL
- J-3606 REMOTE I/O COMMUNICATIONS INSTRUCTION MANUAL
- J-3616 KERMIT COMMUNICATIONS SOFTWARE INSTRUCTION MANUAL
- J-3618 NORTON EDITOR INSTRUCTION MANUAL
- J-3636 COMMON MEMORY MODULE INSTRUCTION MANUAL
- J-3649 AutoMax CONFIGURATION TASK INSTRUCTION MANUAL
- J-3650 AutoMax PROCESSOR MODULE INSTRUCTION MANUAL
- J-3669 AutoMax Pocket Reference
- J-3675 AutoMax ENHANCED BASIC LANGUAGE INSTRUCTION MANUAL
- J-3676 AutoMax CONTROL BLOCK LANGUAGE INSTRUCTION MANUAL
- J-3677 AutoMax LADDER LOGIC LANGUAGE INSTRUCTION MANUAL
- J-3684 ReSource™ AutoMax PROGRAMMING EXECUTIVE INSTRUCTION MANUAL VERSION 2.0
- J-3750 ReSource AutoMax PROGRAMMING EXECUTIVE INSTRUCTION MANUAL VERSION 3.0
- J2-3045 ReSource AutoMax PROGRAMMING EXECUTIVE INSTRUCTION MANUAL VERSION 3.3
- IEEE 518 GUIDE FOR THE INSTALLATION OF ELECTRICAL EQUIPMENT TO MINIMIZE ELECTRICAL NOISE INPUTS TO CONTROLLERS
- Your personal computer and DOS operating system manual(s)
- Other instruction manuals applicable to your hardware configuration

1.2 Related Hardware and Software

M/N 57C445 contains one PC Link Interface Module and two diskettes (one $5^1/_4$-inch diskette and one $3^1/_2$-inch diskette) that contain the PC Link software and sample programs. The contents of both diskettes is the same. The PC Link module can be used with the following hardware and software:

1. M/N 57C430A, 57C431, or 57C435 AutoMax Processors.
2. M/N 61C126 ReSource Portable Computer, or other IBM/AT™ -compatible personal computer running DOS version 3.1 or later.
3. M/N 57C404 Network Communications Module.
4. M/N 57C416 Remote I/O Communications Module.

2.0 MECHANICAL/ELECTRICAL DESCRIPTION

This section describes the mechanical and electrical characteristics of the PC Link Interface module.

2.1 Mechanical Description

The PC Link Interface module is a printed circuit assembly that plugs into an expansion slot of an AT-compatible personal computer. The module consists of a printed circuit board. There are two status LEDs on the rear of the module. Both the red LED and the green LED will be turned on when the personal computer is powered up. They will remain on during the software installation. After you run the batch file to configure the module, both LEDs will be turned off. After the drop number and drop depth are assigned, the green LED will be turned on. There are two BNC connectors on the rear of the module that are used for connecting the PC Link module to the network coaxial cable. There are six DIP switches on the module which are used to set the port address. See figure 2.1 for an illustration of the module.

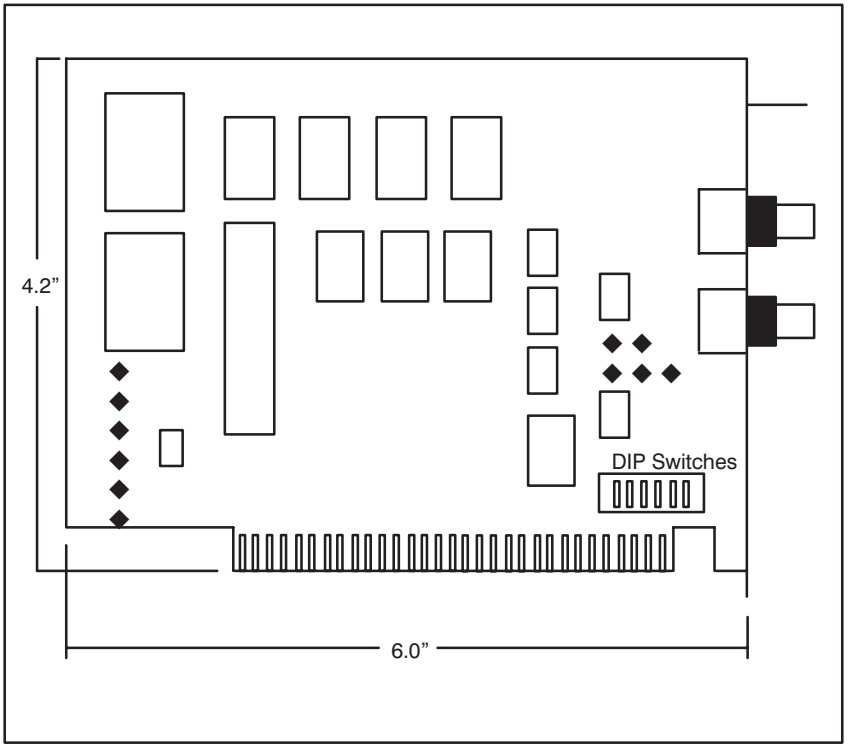


Figure 2.1 - PC Link Interface Module

2.2 Electrical Description

The PC Link Interface module contains a V40™ microprocessor with 128K of RAM to implement the low-level communications functions. The module's memory is divided into 8 blocks of 16K bytes. The module's memory map is mapped into a 16K window of host memory space. The module's memory block contains all the tables and buffers that are used to pass information to and from the network. There is no ROM on the module. The appropriate interface software is downloaded to the module, enabling Remote I/O or Network Communications using the same module by loading the appropriate software onto the PC Link module.

3.0 INSTALLATION

This section describes how to configure the port address and base memory address and how to install the module in the personal computer.

3.1 Initial Installation

The PC Link Interface module can be installed in any AT-compatible personal computer. The module requires an I/O port block of 8 bytes and 16K of host memory space. The port address is set using the DIP switches on the module. The memory address is set under software control by writing to a specific port in the port block.

3.1.1 Configuring the Port Address

Before installing the PC Link Interface module in the personal computer, you must select an I/O port address for the module. The switches on the module set the base port address of the 8 byte I/O block used to load software and access the module. Table 3.1 shows the possible port locations and the corresponding switch settings. It is suggested that unless there is a conflict with some other hardware in your personal computer you do not change the port location from its default value (0x0250). If multiple modules are installed in the same personal computer, each must be assigned a separate port address. Note that if you are using the PC Link Interface module with the AutoMax Programming Executive software, the port location must be set to one of the following: 0x0250, 0x0258, 0x0260, 0x0268. No other port locations are recognized by the Programming Executive software.

Table 3.1 – Port Locations and DIP Switch Settings

Host I/O Address	SW1 Bits						
	6	5	4	3	2	1	Remarks
0x0200	OFF	OFF	OFF	OFF	OFF	OFF	
0x0208	OFF	OFF	OFF	OFF	OFF	ON	
0x0210	OFF	OFF	OFF	OFF	ON	OFF	
0x0218	OFF	OFF	OFF	OFF	ON	ON	
0x0220	OFF	OFF	OFF	ON	OFF	OFF	
0x0228	OFF	OFF	OFF	ON	OFF	ON	
0x0230	OFF	OFF	OFF	ON	ON	OFF	
0x0238	OFF	OFF	OFF	ON	ON	ON	
0x0240	OFF	OFF	ON	OFF	OFF	OFF	
0x0248	OFF	OFF	ON	OFF	OFF	ON	
0x0250	OFF	OFF	ON	OFF	ON	OFF	Default (See Note)
0x0258	OFF	OFF	ON	OFF	ON	ON	(See Note)
0x0260	OFF	OFF	ON	ON	OFF	OFF	(See Note)
0x0268	OFF	OFF	ON	ON	OFF	ON	(See Note)
0x0270	OFF	OFF	ON	ON	ON	OFF	
0x0278	OFF	OFF	ON	ON	ON	ON	
0x0280	OFF	ON	OFF	OFF	OFF	OFF	
0x0288	OFF	ON	OFF	OFF	OFF	ON	
0x0290	OFF	ON	OFF	OFF	ON	OFF	
0x0298	OFF	ON	OFF	OFF	ON	ON	
0x02A0	OFF	ON	OFF	ON	OFF	OFF	
0x02A8	OFF	ON	OFF	ON	OFF	ON	
0x02B0	OFF	ON	OFF	ON	ON	OFF	
0x02B8	OFF	ON	OFF	ON	ON	ON	
0x02C0	OFF	ON	ON	OFF	OFF	OFF	
0x02C8	OFF	ON	ON	OFF	OFF	ON	
0x02E0	OFF	ON	ON	ON	OFF	OFF	
0x02E8	OFF	ON	ON	ON	OFF	ON	
0x02F0	OFF	ON	ON	ON	ON	OFF	
0x02F8	OFF	ON	ON	ON	ON	ON	PC Serial Port 2
0x0600	ON	OFF	OFF	OFF	OFF	OFF	
0x0608	ON	OFF	OFF	OFF	OFF	ON	
0x0610	ON	OFF	OFF	OFF	ON	OFF	
0x0618	ON	OFF	OFF	OFF	ON	ON	
0x0660	ON	OFF	OFF	ON	OFF	OFF	
0x0668	ON	OFF	OFF	ON	OFF	ON	
0x0630	ON	OFF	OFF	ON	ON	OFF	

Table 3.1 – Port Locations and DIP Switch Settings (Continued)

0x0638	ON	OFF	OFF	ON	ON	ON	
0x0640	ON	OFF	ON	OFF	OFF	OFF	
0x0648	ON	OFF	ON	OFF	OFF	ON	
0x0650	ON	OFF	ON	OFF	ON	OFF	
0x0658	ON	OFF	ON	OFF	ON	ON	
0x0660	ON	OFF	ON	ON	OFF	OFF	
0x0668	ON	OFF	ON	ON	OFF	ON	
0x0670	ON	OFF	ON	ON	ON	OFF	
0x0678	ON	OFF	ON	ON	ON	ON	
0x0680	ON	ON	OFF	OFF	OFF	OFF	
0x0688	ON	ON	OFF	OFF	OFF	ON	
0x0690	ON	ON	OFF	OFF	ON	OFF	
0x0698	ON	ON	OFF	OFF	ON	ON	
0x06A0	ON	ON	OFF	ON	OFF	OFF	
0x06A8	ON	ON	OFF	ON	OFF	ON	
0x06B0	ON	ON	OFF	ON	ON	OFF	
0x06B8	ON	ON	OFF	ON	ON	ON	
0x06C0	ON	ON	ON	OFF	OFF	OFF	
0x06C8	ON	ON	ON	OFF	OFF	ON	
0x06D0	ON	ON	ON	OFF	ON	OFF	
0x06D8	ON	ON	ON	OFF	ON	ON	
0x06E0	ON	ON	ON	ON	OFF	OFF	
0x06E8	ON	ON	ON	ON	OFF	ON	
0x06F0	ON	ON	ON	ON	ON	OFF	
0x06F8	ON	ON	ON	ON	ON	ON	

Note: These port locations are the only I/O addresses recognized by the AutoMax Programming Executive software.

If you are not using the PC Link module with the AutoMax Programming Executive software, any of the addresses listed in Table 3.1 are possible, although other equipment in the personal computer may conflict with the address chosen. Keep in mind that the I/O space required is 8 bytes, so a setting of 250 actually uses ports 250-257.

3.1.2 Installing the PC Link Module in the Personal Computer

Use the following procedure to install the module:

Step 1. Turn your computer off. Disconnect the power cord.

Step 2. Remove the cover on your computer. Consult the user's manual for your computer on installing add-in boards.

Step 3. Find a free expansion slot in your computer. If you are not sure which slot to use, consult the user's manual for your computer. Use a screwdriver to remove the slot cover screw and the slot cover from your computer.

Step 4. Take the module out of its shipping container. Take it out of the anti-static bag, being careful not to touch the connectors on the bottom of the board or any of the surface of the board.

Step 5. Set the DIP switches for the appropriate port address. See section 3.1.1 and Table 3.1 for more information.

Step 6. Insert the module into your computer. Make sure the gold-striped bottom edge of the board sits firmly in the expansion slot groove, and that the bracket of the board is in the groove which previously held the expansion slot cover. Secure the board with the slot cover screw.

Step 7. Replace the cover on your computer.

3.1.3 Connecting the PC Link Module to a DCS/AutoMax Network or Remote I/O Network

When connecting to the AutoMax Network or a Remote I/O network, the PC Link module should be wired with the same cabling and termination as any other drop. A BNC Tee Adaptor (M/N 45C70) should be used to connect the network cable to one of the BNC connectors on the back of the PC Link module. Note that the second BNC connector on the module will not be used. The network is then complete through the tee, and the module can be connected or disconnected without disturbing the rest of the network. Stop any application tasks that are running before disconnecting the PC Link drop.

The module does not have an onboard terminator. If it is at the end of the coaxial cable system, it must be terminated with a 75-ohm terminating load (M/N 45C71). Refer to the Network Communications Module instruction manual (J2-3001) or the Remote I/O Communications instruction manual (J-3606) for a detailed description of how to connect a drop to the network.

3.1.4 Configuring the Base Memory Address

The PC Link Interface module occupies 16K of host memory space. The base address is user-selectable by writing to a port register which will normally be set automatically by the installation program. The default location is 0xD000. Unless there is a known conflict with other hardware in the host system, the default memory address should be used. Note that if your personal computer is equipped with "ShadowRAM," all ShadowRAM features must be disabled before the PC Link module will function properly. If multiple modules are installed in the same personal computer, each must be assigned a separate memory address. If you are using the PC Link module with the AutoMax Programming Executive software, you must use one of the following base memory addresses: 0xD000, 0xD400, 0xD800, 0xDC00. The memory address is not set by switches or jumpers. It is set when you run the software installation procedure (INSTALL). When you run INSTALL, the memory address is passed into the loader routine which enables the module at a particular memory address. Since the module memory is not enabled until the loader routine installs the software (RENET or RERIO) on it, memory management packages may try to use the intended module address for switching in expanded memory. This must be prevented since it would block any access to the module's physical address and render the module inoperative. Refer to the documentation for your memory management package to determine how to exclude the area of memory where the PC Link module is to reside. Table 3.2 lists the possible locations and describes other hardware that might be using the space.

Table 3.2 – Base Memory Addresses

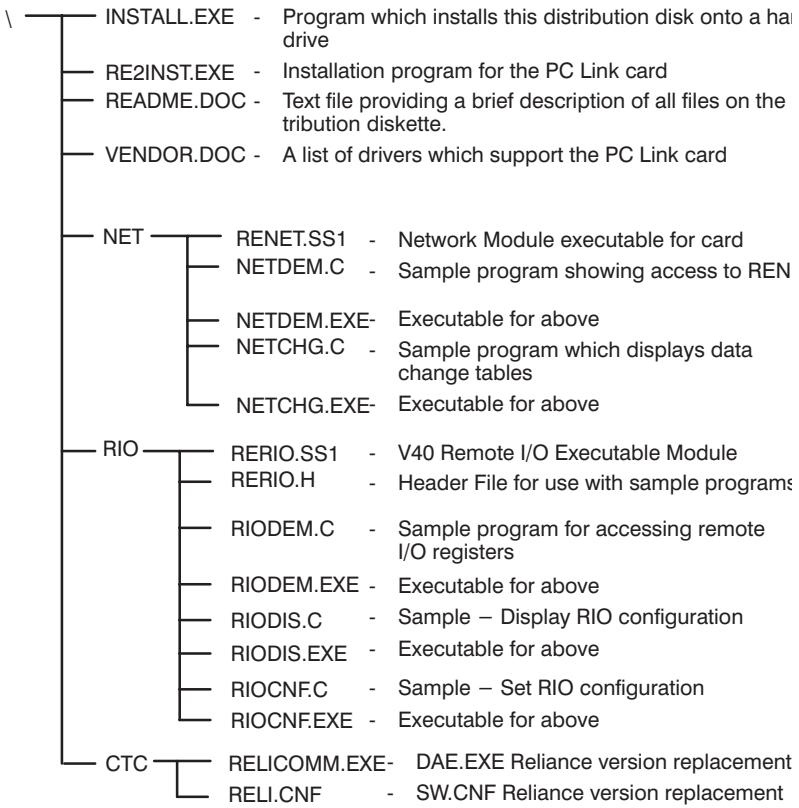
Memory Address	MCR Bits 6 5 4 3 2	Remarks
0x8000	0 0 0 0 0	Occupied by RAM in >512k systems
0x8400	0 0 0 0 1	Occupied by RAM in >512k systems
0x8800	0 0 0 1 0	Occupied by RAM in >512k systems
0x8C00	0 0 0 1 1	Occupied by RAM in >512k systems
0x9000	0 0 1 0 0	Occupied by RAM in >512k systems
0x9400	0 0 1 0 1	Occupied by RAM in >512k systems
0x9800	0 0 1 1 0	Occupied by RAM in >512k systems
0x9C00	0 0 1 1 1	Occupied by RAM in >512k systems
0xA000	0 1 0 0 0	Used by EGA/VGA
0xA400	0 1 0 0 1	Used by EGA/VGA
0xA800	0 1 0 1 0	Used by EGA/VGA
0xAC00	0 1 0 1 1	Used by EGA/VGA
0xB000	0 1 1 0 0	Used by MDA
0xB400	0 1 1 0 1	Used by MDA
0xB800	0 1 1 1 0	Used by CGA
0xBC00	0 1 1 1 1	Used by CGA
0xC000	1 0 0 0 0	BIOS Extensions (hard disk controller)
0xC400	1 0 0 0 1	BIOS Extensions (hard disk controller)
0xC800	1 0 0 1 0	BIOS Extensions (possible EGA/VGA)
0xCC00	1 0 0 1 1	BIOS Extensions (possible EGA/VGA)
0xD000	1 0 1 0 0	Used by EMS memory (Default) (See Note)
0xD400	1 0 1 0 1	Used by EMS memory (See Note)
0xD800	1 0 1 1 0	Used by EMS memory (See Note)
0xDC00	1 0 1 1 1	Used by EMS memory (See Note)
0xE000	1 1 0 0 0	BIOS Extensions (normally unused)
0xE400	1 1 0 0 1	BIOS Extensions (normally unused)
0xE800	1 1 0 1 0	BIOS Extensions (normally unused)
0xEC00	1 1 0 1 1	BIOS Extensions (normally unused)
0xF000	1 1 1 0 0	System ROMs, BASIC
0xF400	1 1 1 0 1	System ROMs, BASIC
0xF800	1 1 1 1 0	PC BIOS
0xFC00	1 1 1 1 1	PC BIOS

Note: If you are using the PC Link module with the AutoMax Programming Executive software, you must use one of these 4 base memory addresses.

3.1.5 Loading the PC Link Software

The diskettes provided with the PC Link module contain the Network Communication (RENET) and Remote I/O Network (RERIO) software as well as a loader program (INSTALL) that reads the code for the software, loads it into the module, and then enables the module. The loader program then waits for module diagnostics to be completed and reports the status of the installation.

The PC Link software diskette contains the files listed below:



Use the steps that follow to load the software onto the PC Link interface module.

Step 1. To begin installing the PC Link software, insert the PC Link diskette in floppy drive A: or B:.

Type **A:INSTALL** <CR> or **B:INSTALL** <CR>

The initial screen describes the information needed to complete the software installation. See figure 3.1.

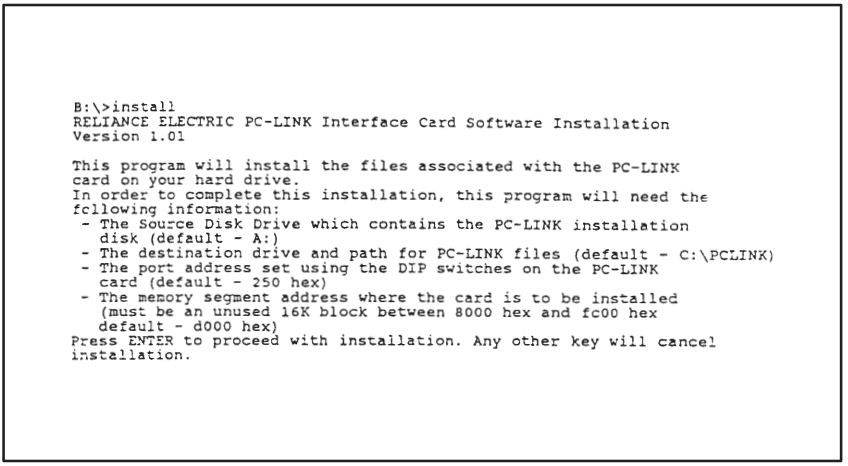


Figure 3.1 - Loading the PC Link Software

Press ENTER to continue the installation. Pressing any other key will cancel the installation.

Step 2. A screen will be displayed that lists the four required parameters and their defaults (see figure 3.2). You can change any parameter by pressing the number that precedes it. You will be prompted for a new entry for that parameter.

If you are using the PC Link Interface module, with the AutoMax Programming Executive software, you must set the destination path for the PC Link software to the directory that contains the Programming Executive software.

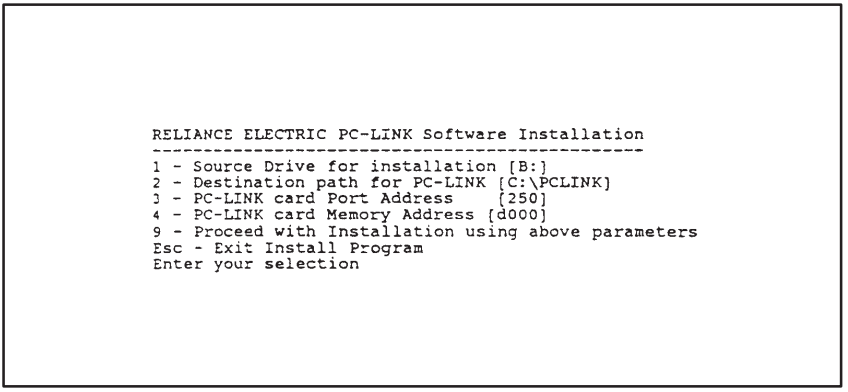


Figure 3.2 - Loading the PC Link Software (cont)

When you have finished making changes, or to accept the default parameters, press 9. To cancel the installation, press ESC.

During the installation procedure, subdirectories <DRV>:\<PCLINK>, <DRV>:\<PCLINK>\NET, and <DRV>:\<PCLINK>\RIO will be created on the hard disk if they do not already exist. PC Link files will be copied from the floppy disk to the hard disk. These files will require approximately 250K of hard disk space. Two batch files, NET.BAT and RIO.BAT, will also be created.

Step 3. When the installation is complete, the following message should be displayed:

Installation Successful

To load the network driver, run the <DRV>:\<PCLINK>\NET.BAT batch file.

To load the remote I/O driver, run the <DRV>:\<PCLINK>\RIO.BAT batch file.

If you are using the PC Link Interface module with the AutoMax Programming Executive, the installation procedure is complete. Note that before the PC Link module can be used for communication to the AutoMax rack, you must configure on-line communication using the AutoMax Executive software. Refer to instruction manual J2-3045 for the Communication Setup procedure.

If you are not using the AutoMax Executive software, and if you are installing more than one PC Link module in the same personal computer, continue with step 4. Otherwise, go to step 5.

Step 4. Edit NET.BAT and RIO.BAT. Add a line for each additional PC Link module. Make certain that each module is assigned a unique port address and memory segment address. For example, if NET.BAT contains the following line,

RE2INST RENET	250	D000	0
	port address	memory address	interrupt level

and you are using two PC Link modules, you could add:

RE2INST RENET 258 D400 0

for the second module, assuming that the port and memory addresses were free.

Step 5. Type **NET.BAT** at the <DRV>:\<PCLINK> prompt to load the Network Communications (RENET) software onto the PC Link module.

or

Type **RIO.BAT** at the <DRV>:\<PCLINK> prompt to load the Remote I/O Network (RERIO) software.

If the installation was unsuccessful, an error code will be returned by INSTALL. See Appendix C for a description of the error codes.

3.2 Module Replacement

To replace a module that is connected using a tee adapter, use the following procedure:

Step 1. Stop any application tasks that may be running.

Step 2. Disconnect the tee adapter from the PC Link module.

Step 3. Turn your computer off. Disconnect the power cord.

Step 4. Remove the cover on your computer.

Step 5. Use a screwdriver to remove the screw from the bracket holding the PC Link module and remove the module.

Step 6. Take the new module out of its shipping container. Take it out of the anti-static bag, being careful not to touch the connectors on the bottom of the board or any surface of the board.

Step 7. Set the DIP switches to match the port address set on the old module.

Step 8. Insert the module into your computer. Make sure the gold-striped bottom edge of the board sits firmly in the expansion slot groove, and that the bracket of the board is seated properly. Secure the board with the bracket screw.

Step 9. Replace the cover on your computer.

Step 10. Turn on power to your computer.

Step 11. Re-connect the tee adapter to the module.

4.0 PROGRAMMING

The sections that follow describe using the PC Link module as a drop on a DCS/AutoMax Network or a Remote I/O network. After the PC Link module has been installed in the personal computer and the INSTALL program has been run to configure the port address and memory location (see section 3.1.5), the module can be used for either DCS/AutoMax network or remote I/O network applications. However, it can be configured for only one application at a time. To switch applications, simply run the appropriate batch file (NET.BAT or RIO.BAT). If you are using the PC Link module on a DCS/AutoMax network, you must assign the drop and drop depth using your device driver program. If you are writing your own device driver for DCS/AutoMax Network communication, or are using the PC Link module on a remote I/O network, refer to Appendix D.

4.1 DCS/AutoMax Network Communications (RENET)

Loading the Network Communications software (RENET) onto the PC Link module enables it to function like a Network Communications module (M/N 57C404). The PC Link module can act as any valid drop, except the Master (drop 0), and can have any valid drop depth. The drop and drop depth are assigned by the device driver. Refer to your device driver program documentation for the procedure used to assign the drop number and drop depth.

4.2 Remote I/O Network Communications (RERIO)

Loading the Remote I/O software (RERIO) onto the PC Link module enables it to function like a Remote I/O Communications module (M/N 57C416). When configured as a passive drop, the PC Link module can monitor all drops on a remote I/O network, accessing the output data being sent from the Master to the Slave drops as well as the input data being sent from the Slave drops back to the Master. When configured as an active drop (for network simulation), the PC Link module will receive output data from the Master and send input data back to the Master. The PC Link module can act as any valid drop. Refer to Appendix D for the procedure used to configure the drop number.

4.3 Register Configuration

Registers controlled by the PC Link module are defined as network variables. If you are using the AutoMax Programming Executive version 3.0 or later, you define these registers only in the racks that access the PC Link-controlled registers. If you are using the PC Link module only to monitor the network, you do not need to define the PC Link registers in the AutoMax Programming Executive.

If you are using the AutoMax Programming Executive version 2.1 or earlier, you define registers (using NETDEFs) in the configuration task for the rack that will access the PC Link-controlled registers. If you are using the PC Link module only to monitor the network, you do not need to define the PC Link registers in any configuration task.

5.0 DIAGNOSTICS AND TROUBLESHOOTING

This section describes how to troubleshoot the PC Link module. See Appendix C for a list of the error codes that can be displayed by the PC Link module. If the problem cannot be corrected using the procedures below, the unit is not user-serviceable.

DANGER

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5.1 The Red LED is On and the Green LED is Off

Problem: The red status LED on the PC Link module is on and the green LED is off. Both LEDs should be on when power to the personal computer is turned on. Both LEDs should turn off after either NET.BAT or RIO.BAT is run. An error code signifying the problem should be displayed on the screen. See Appendix C for error codes. If the red LED remains on after the problem indicated by the error code has been corrected, replace the module.

Appendix A

Technical Specifications

Ambient Conditions

- Storage temperature: −40°C - 85°C
- Operating temperature: 0°C - 50°C
- Humidity: 5−90% non-condensing

Dimensions

- Half Length, Single Slot 8-bit PC/AT Bus Card
- Height: 4.2 inches
- Width: 6.0 inches

Maximum Power Dissipation

- 2.6 Watts

Power Requirements

- 5 Volts 400 mA
  12 Volts 50 mA

Appendix B

Installation Error Codes

The following error codes may be returned by the loader program when INSTALL is run, and displayed on the personal computer screen:

1 Invalid Parameters

2 Bad Port and/or Memory Address

3 Module Memory Error

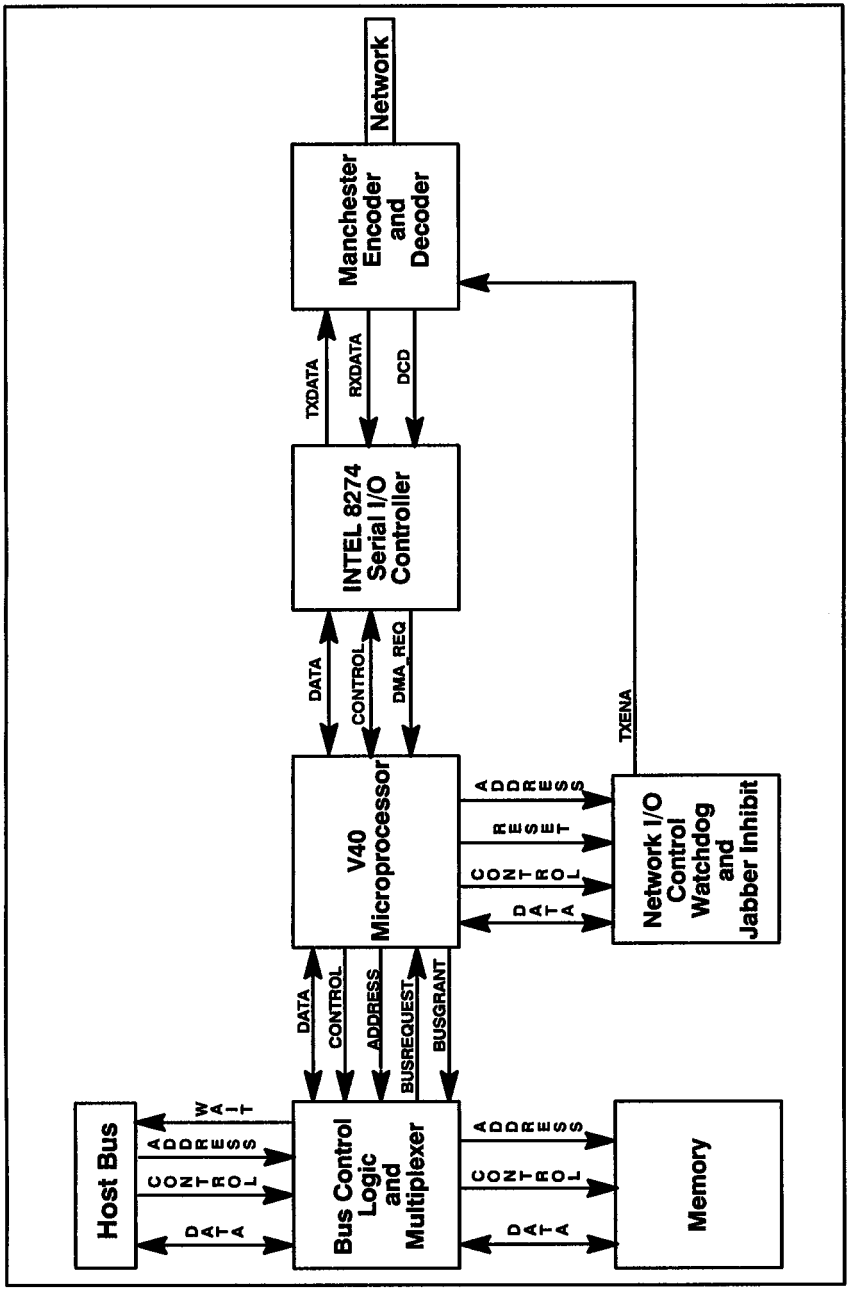
4 Module Processor Error

5 Module Error

6 Module Software Module Not Found

Appendix C

Module Block Diagram



Appendix D
(This is only here for page numbering sequence)

Appendix D
Programming Notes

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1.0 INTRODUCTION

This appendix describes the memory organization of the RENET and RERIO software that can be loaded onto the PC Link module. The descriptions and tables included in this appendix will be useful if you are writing your own device driver for the PC Link module. If you are using a commercially-available driver, you do not need to read this appendix.

In this appendix, any drops which the PC Link module emulates will be referred to as virtual drops. Monitoring data to and from other drops on the network will be referred to as “passive monitoring.” Any non-virtual drop on a network will be referred to as a “real” drop.

2.0 DCS/AUTOMAX NETWORK COMMUNICATIONS (RENET)

Loading the Network Communications software (RENET) onto the PC Link module enables it to function like a Network Communications module (M/N 57C404). The PC Link module can act as any valid drop, except the Master (drop 0), and can have any valid drop depth.

2.1 Differences Between RENET and a Network Communications Module

The AutoMax Network stores registers in high-byte low-byte format, while the standard for NEC's microprocessors (used on the PC Link module) is low-byte high-byte. The PC Link module automatically swaps the order of the bytes for all registers in the drop table.

The PC Link module has no way of implementing a "read only" register. This means that no error will be generated if a user writes to a read only register.

The drop number is written into memory rather than being read from thumbwheel switches. Status bits 14 and 15 are implemented to indicate good or bad drop numbers. The drop status bits are maintained for all active drops, even though the module acts only as a Slave. These bits only indicate that a given drop is responding to the Master and do not necessarily reflect valid operation of the drop.

2.2 RENET Memory Organization

The RENET memory is a 16K block starting at offset 0 in the installed segment. Although 16K is available, not all of it is used. Any references to module memory in this appendix assume the installed segment address.

The memory organization of the PC Link module running the RENET software is summarized in Table 1:

Table 1 - RENET Memory Organization

Address	Name	Set By	Description
000-1BFF	DATA__TABLE	BOTH	Drop Register Image Table
1F00-1F37	DATA__CHNGE	BOTH	Data Change Table - one byte for each drop. A non-zero value indicates that data for the specific drop has changed.
1F38	STAT__CHNGE	BOTH	Status Change - Set to 0xFF any time active drop status changes.
1F39	GLOB__CHNGE	BOTH	Global Change - Set to 0xFF any time STAT__CHNGE is set to 0xFF, or DATA__CHNGE is set to 0xFF, for drops which are enabled in the EN__GLOB__CHNGE table.
1F3A	EN__GLOB__INT	HOST	Enable Global Change Interrupt
1F40-1F77	EN__GLOB__CHNG	HOST	Enable Global Change Drop Table - a non-zero value for a particular drop causes GLOB__CHNGE to be set if DATA__CHNGE for the given drop is set.

2.3 Drop Register Image Table (DATA_TABLE)

The Drop Register Image table is divided into 56 drops. Each drop consists of 128 bytes or 64 registers. Drop register locations can be calculated using the following formula:

Register_Location = (Drop*128) + (Register*2)

For example, to access Drop 6 register 31, the user would read/write to:

offset = (6*128)+(31*2)
= 768+62
= 830 decimal or 0x33E

2.3.1 Drop 0 Register Definition

Drop 0 contains the status and control registers. They are defined in Table 2:

Table 2 - Drop 0 Register Definitions

Register	Description	Access
0	Not Used	
1-3	Not Used	
4	Drop 0-15 status bits in bits 0-15	Read Only
5	Drop 16-31 status bits in bits 0-15	Read Only
6	Drop 32-47 status bits in bits 0-15	Read Only
7	Drop 48-55 status bits in bits 0-7	Read Only
8-11	Not Used	
12	Drop Number	Read/Write
13	Not Used	
14	Messages Received	Read/Write
15	Receive Timeouts	Read/Write
16	CRC Errors	Read/Write
17	Overrun Errors	Read/Write
18	Abort Errors	Read/Write
19	Messages Transmitted	Read/Write
20	Drop Depth	Read/Write
21	Not Used	
22	Not Used	
23	Not Used	
24	Not Used	
25	Not Used	
26	Not Used	
27	Not Used	
28	Not Used	
29	Card ID = 6466 (1942h)	Read Only
30	Not Used	
31	Not Used	
32-39	Broadcast Data	Read Only
40-62	Not Used	
63	System Use Only	

Note that the PC Link module will not go “on line” while either the drop number or the drop depth is equal to zero (which is the initial state). The module will still monitor all other active drops and provide all register information without going “on line.”

Registers 4 through 7 contain the drop status bits which indicate the current status of the Network. A “1” indicates that a drop is active and a “0” indicates that a drop is not active. The status bit for the Master (drop 0) is maintained as well. Note that the PC Link module maintains status bits for all drops on the network including its own. These registers are read only.

Register 12 defines the drop number for the module and corresponds to the thumbwheel switch on a M/N 57C404 Network Communications module. After initial module installation, the drop number is zero. The host application places the desired drop number in this register. If the number is greater than 0 and less than or equal to 55, bit 15 will be set to indicate a valid drop number; otherwise bit 14 will be set to indicate an invalid drop number. These status bits are similar to those used when setting the drop depth on the Network Communication module. The PC Link module will not go “on line” without a valid drop number. If the drop number is a duplicate of another active drop on the network, communication errors and unpredictable communication will result. The drop depth must also be considered when checking for duplicate nodes.

The diagnostic counters include registers 14-19. Register 14 (Messages Received) will increment while the PC Link module is connected to a Master. Registers 15-18 count various communication errors. These counters are listed in Table 2 in section 2.3.1 of this appendix. The following are possible causes of communication errors:

- Bad cables or connections
- Improper network termination
- Any duplicated drops on the network

The host may write to these error registers to clear them at any time. Register 19 (Messages Transmitted) will be incrementing anytime the module is responding as an active drop or group of drops.

Register 20 defines the PC Link module drop depth. After initial module installation, the drop depth is zero. The host places the drop depth in this register. If the depth number plus the drop number is less than or equal to 56, bit 15 will be set to indicate a valid drop depth; otherwise bit 14 will be set to indicate an invalid drop depth. This is the same as setting the drop depth on the Network Communications module.

The PC Link module will not go “on line” without a valid drop depth. If the block of drops selected by the drop number and drop depth duplicates any other active drops on the network, communication errors and unpredictable communication will result. The module may be taken “off line” at any time by writing zero to register 20.

Register 29 is set by the PC Link module to 6466 decimal, or 1942 hex. This may be used to confirm that a PC Link module is running at a specified address.

Registers 32 through 39 are the broadcast data registers. They are read only and are updated from the Master every 2.6 ms. Broadcast data register information is sent as part of the update message to every drop. This means that even in a worst case situation with 56 drops on a network (including the Master) with a total update time of 143 milliseconds (2.6 ms/drop * 55 drops), the broadcast registers will still be updated by the Master every 2.6 ms.

2.3.2 Drop 1-55 Register Definitions

The register definitions for drops 1-55 can be summarized as follows:

Registers 0 through 31 contain 32 words of output (to the Master). These registers are read/write if the module is actively responding as this drop; otherwise, these registers are read only.

Registers 32 through 63 contain 32 words of input (from the Master). These registers are read only.

2.4 Data Change Table (DATA_CHNGE)

The data change table contains one byte for each drop. Drop 0 corresponds to the first location in the table (1f00h). The RENET software places 0xFF in the data change table for a particular drop any time data in the drop changes (other than that written by the host). The data change byte for drop 0 is affected only by changes to the broadcast data registers (32-39).

Rather than poll drops continuously, a host application may check the DATA_CHNGE flag for a given drop. If it is zero, no data in the drop has changed and the host may proceed accordingly. If the data change flag is set to 0xFF, the host then clears the flag to zero, and reads the updated data for the drop.

2.5 Status Change Flag (STAT_CHNGE)

This flag is set to 0xff by the RENET software if any data in the drop status registers change (registers 4-7 of drop 0). Any change to these registers indicates that one or more drops have gone on/off line.

Rather than monitor the drop status bits continuously, the host need only monitor the STAT_CHNGE flag. If it is zero, no drops have gone on or off line, and the host may proceed accordingly. If the status change flag is set to 0xFF, the host then checks the relevant bits in the drop status registers (registers 4-7 of drop 0).

2.6 Global Change Flag (GLOB_CHNGE) and Enable Global Change Table (EN_GLOB_CHNGE)

The Global Change flag is used in conjunction with the Enable Global Change Drop Table to provide a flag which is set only when data in selected drops changes. The global change flag will also be set if the status changes (See section 2.5 of this appendix).

For example:

A particular application needs only to monitor drops 0, 3, and 7.

The host places 0xff in the EN_GLOB_CHNGE table for drops 0, 3, and 7 at locations 0x1F40, 0x1F43, and 0x1F47. The GLOB_CHNGE flag will be set any time data in any of the given drops changes.

The host needs to monitor the GLOB_CHNGE flag only. If it is set, the host clears it to 0. The host then checks the status change flag and the data change flags for the given drops and proceeds accordingly.

3.0 REMOTE I/O NETWORK COMMUNICATIONS (RERIO)

Loading the Remote I/O software (RERIO) onto the PC Link module allows it to monitor all drops on a remote I/O network, accessing the output data being sent from the Master to the Slave drops as well as the input data being sent from the Slave drops back to the Master. The PC Link module may also be configured as an active drop which will receive output data from the Master and send input data back to the Master. The PC Link module can act as any valid drop and can have any valid drop depth.

3.1 RERIO Memory Organization

The RERIO memory is a 16K block starting at offset 0 in the installed segment. Although 16k is available, not all of it is used. Any references to card memory in this appendix assume the installed segment address. The memory organization of the PC Link module running the RERIO software is summarized in Table 3.

Table 3 – RERIO Memory Organization

Address	Name	Set By	Description
0000	MODULE__ID	RERIO	Module identification word. Set by RERIO to 15A1H. Host may use to verify RERIO software is present.
0400–1FFF	DATA__TABLE	BOTH	Remote I/O data table. Divided into Drops, Slots and Registers.
2000H	RECONFIG	BOTH	Reconfigure byte. Host sets to 0FFH to cause card to re-configure using new information.
2001–2007	VIR__ENA	HOST	Virtual drop enable table. Configuration packet must be present for all drops enabled in this table. RERIO reads these values only during reconfiguration.
2009–200F	PASV__ENA	HOST	Passive drop monitor enable table. Configuration packet must be present for all drops enabled in this table. RERIO reads these values only during reconfiguration.
2011–2017	VIR__ACT	RERIO	Virtual drop active table. Set by RERIO to indicate that the given virtual rack is being updated by the Master.
2020	ACT__MAS	RERIO	Set to 0FFH by RERIO whenever an active Master is connected, even if no drops are enabled.
2021–2027	DROP__ACT	RERIO	Drop active table. Set by RERIO to indicate that the given rack (virtual or real) is being updated by the Master.
2100H–27FF	CNF__BUF	BOTH	Drop configuration buffers. One 256 byte buffer for each drop.

MODULE_ID is a single register which is set to 15A1H by the RERIO software at install time. The host may read this register to make sure the RERIO software is present.

The data table (DATA_TABLE) is divided into 7 drops (1–7). Each drop consists of 16 slots. Each slot consists of 32 registers. This organization matches the standard Remote I/O configurations with real remote racks and Remote Heads. Drop/slot/register locations can be calculated using the following formula:

Register_Location = (Drop*1024) + (slot*64) + (Register*2)

For example to access Drop 6, slot 3, register 7, the user would read/write to:

offset = (6*1024)+(3*64)+(7*2)
= 6144+192+14
= 6350 decimal or 0x18CE

RECONFIG is set to OFFH by the host to indicate that the module should re-configure itself using the current data in the virtual drop enable table (VIR_ENA), the passive drop monitor enable table (PASV_ENA), and the drop configuration buffers (CNF_BUF). If the PC Link module detects a non-zero value in this location, it will stop all virtual drops and stop all updating of passive drop data. The PC

Link module will then clear the lower four bits of the RECONFIG byte. The host may use this to indicate that it is all right to write the new configuration. The host may also place any initial data in the DATA_TABLE at this point. When the configuration information is complete, and all data in the DATA_TABLE is in the desired state, the host then clears the remaining bits of the RECONFIG byte. The PC Link module will then go “on line” and begin passive monitoring if enabled. This process is demonstrated in the sample program RIOCNF.C.

The VIR_ENA table is used to enable virtual drops. It consists of 7 bytes (2001H−2007H) corresponding to the 7 possible remote I/O drops. Drop 1 is enabled by the host writing a non-zero value in 0x2001; drop 2 is enabled with 0x2002, etc. These locations are checked only during a re-configure. Any changes after a re-configure is complete will have no effect. If a virtual drop is enabled, the host must also fill in appropriate configuration information in the configuration buffer table (CNF_BUF) which corresponds to the drop being enabled. See section 3.2 of this appendix for more information on drop configuration.

The PASV_ENA table is used to enable passive monitoring of real drops, and consists of 7 bytes (2008H−200FH) corresponding to the 7 possible remote I/O drops. Drop 1 monitoring is enabled by the host writing a non-zero value in 2009H; drop 2 is enabled with 200AH, etc. These locations are checked only during a re-configure. Any changes after a re-configure is complete will have no effect. If passive monitoring for a given drop is enabled, the host must also fill in appropriate configuration information in the CNF_BUF which corresponds to the drop to be monitored. See section 3.2 of this appendix for more information on drop configuration.

The VIR_ACT table is filled in by the RERIO software and is used to indicate to the host that a given virtual drop is actively communicating with the Master. A non-zero value in 2011H indicates that drop 1 is virtual and active; 2012H indicates the status of drop 2, and so on.

ACT_MAS is a one-byte flag is set by the RERIO software to indicate to the host that the PC Link module is receiving from the Remote I/O network Master. This will be non-zero as long as the PC Link module is receiving from the Master, except during a re-configure, when all status indicators are cleared.

The DROP_ACT table is filled in by the RERIO software and is used to indicate to the host that a given drop (virtual or real) is actively communicating with the Master. A non-zero value in 2021H indicates that drop 1 is active; 2022H indicates the status of drop 2, and so on. Note that an active status for a real drop indicates only that the Master is successfully communicating with the drop. It does not necessarily indicate that the given drop is operating correctly.

The CNF_BUF table starts at 2100H and consists of 7 buffers, each 256 bytes long. The buffer at 2100H holds configuration information for drop 1, 2200H contains information for drop 2, and so on. The configuration information can be filled in by the host for virtual and passively monitored drops. The PC Link module will receive configuration information over the network for a given real drop any time that drop goes inactive and becomes active again. The RERIO software will automatically update the CNF_BUF for the given drop, but will not re-configure. If the Master goes inactive and then becomes active again, the PC Link module will update the configuration for all the real drops on the network. The PC Link module will overwrite any configuration information in the

configuration buffers with any updates it receives over the network. See section 3.2 of this appendix for more information on drop configuration.

3.2 Drop Configuration

The Reliance Remote I/O network protocol uses “configuration packets” to define the slot/register allocations for a given drop. These configuration packets are sent on the network only when a drop first comes “on line” with the Master. The RERIO software will capture these configuration packets and place them in the CNF_BUF area. If the PC Link module is started after a real drop is already active, the module has no way to determine the configuration for the given real drop. In order to ensure that the module has configuration information for all real drops on the network, the user can disconnect the Master and then re-connect it. When re-connected, the Master will request configuration packets from all the real drops, and the PC Link module will capture them as they are sent to the Master.

The configuration packet defines the model number, hardware type, and slot/register configuration for a given drop. Table 4 defines the format of a configuration packet:

Table 4 – Configuration Packet

CNF__BUF Offset	Field Name	Size (bytes)	Description
0–3	NOT__USED	4	Do not use these locations; RERIO will fill them in.
4–15	MOD__DES	12	This 12 byte ASCII field describes the model and revision of the given drop. This is “419451-0xxx ” for a remote rack, and “419451-1xxx ” for a Remote Head. xxx is the revision of the module, and the last character must be a space.
16–143	SLOT__MAPS	128	Slot maps for the given drop. There are 16 slot maps, each containing one double word for the outputs, and one double word for the inputs.
144–145	INPUT__MAP	2	A one word value which defines the input bit map for a given I/O Head. This field is not used for an I/O rack.

There are 16 slot maps (SLOT_MAPS) for a given drop. Each slot map consists of two double words (each double word is 4 bytes). The first double word is the output register map; the second double word is the input register map. The double word register map is defined in Table 5:

Table 5 – Double Word Register Map

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	#7	#6	#5	#4	#3	#2	#1	#0
1	#15	#14	#13	#12	#11	#10	#9	#8
2	#23	#22	#21	#20	#19	#18	#17	#16
3	#31	#30	#29	#28	#27	#26	#25	#24

If the bit for a given register is set in the output register map, the register is an output register. If the bit for a given register is set in the input register map, the register is an input register. A register may not be both an input and an output; therefore any bits set in the output map for a given slot must not be set in the input map. All input and output register blocks must be contiguous. A sample program which demonstrates the creation of configuration packets, called RIOCNF.C, is provided on the distribution diskette.

3.3 Double Word Fragmentation

Due to the 16-bit limitation of the PC Link module, the module is accessed from the host one word at a time. When a double word value register is read or written, it is actually read or written as two words. If the PC Link module writes a double word value in between the host's two accesses, the host will have one word which is from the old double word value and one word which is from the new double word value.

To protect from fragmentation during reads, each double word is read twice in succession. The results of the two reads are compared. If the results are the same, the value is ok. If the values are different, the value must be read again, but his new read will not be fragmented since information for this drop will not be updated for at least 2.6 milliseconds.

For example, if the PC Link module was to change a double word value between the host's two word reads for the double word, it will not update that double word again until the next network scan which is a minimum of 2.6 milliseconds later. If the values of the two host double word reads (1 assignment and 1 compare) are different, we know that the double word value will not be updated for at least 2.6 milliseconds. As long as the next access is within this time period, the double word value read will not be fragmented.

3.4 Sample Programs

Three sample programs are provided with the RERIO software. These programs are described in sections 3.4.1-3.4.3.

3.4.1 Reading the Remote I/O Network Configuration (RIODIS)

RIODIS uses the configuration packets in the configuration buffers to generate a text file which describes the configuration for all the drops. These configuration packets can either come from the network or may have been previously placed on the card by the host.

3.4.2 Setting the Remote I/O Network Configuration (RIOCNF)

RIOCNF takes a text file which contains the configuration information for the network and places it on the PC Link module. RIOCNF uses the same text file format as RIODIS.

The following steps describe a typical startup procedure:

Step 1. Run RIO.BAT to install the RERIO software on the PC Link module.

Step 2. Connect the module to the Remote I/O network.

Step 3. Disconnect the network Master and then re-connect it. The PC Link module now has the configuration packets for all real drops.

Step 4. Use RIODIS to dump the configuration packets to a text file.

Step 5. Edit the text file. Add any virtual (active) drops required. See Figure 1.

```
Reliance Electric PC Link Remote I/O Configuration Display Utility
Copyright 1991 Sutherland-Schultz Limited
This Configuration file for use with \"RIO_CNF.EXE"

Comments always begin with ;

Definition format is as follows:
<drop> <mode> <type> <slot> <in_strt_reg> <in_len> <out_strt_reg> <out_len>
                or  <slotmap>
where <drop> io drop number (1-7)
     <mode> 'V' for active virtual drop, 'P' for passive drop (monitor only)
     <type> drop type - 'R' for remote rack, 'H' for remote head
if type=R
     <slot> rack slot number (0-15)
     <in_strt_reg>  - reg # of first input  register (0-31)
     <in_len>       - # of input regs in slot
     <out_strt_reg> - reg # of first output register (0-31)
     <out_len>      - # of output regs in slot
if type=H
     <slotmap> - a 16 character string defining the inputs and outputs
                 and unused register for the slotmap. the slotmap is
                 arranged as follows: (slot:reg)
<0:0><0:1><0:2><0:3><1:0><1:1><1:2><1:3><2:0><2:1><2:2><2:3><3:0><3:1><3:2><3:3>
                 where each <> is i,o, or x as defined...
                 i = input reg
                 o = output reg
                 x = reg not used
    example:
       'ioxxiiiixxxxoooo' - slot 0 reg 0 is an input, slot 0 reg 1
                            is an output etc.
note: rack input register blocks and output register blocks cannot overlap

drop  mode  type  slot  in_strt  in_len  out_strt  out_len
----  ----  ----  ----  -------  ------  --------  -------);
  1     p     r     2        0       0         0        4
  1     p     r     4        0       5         5        6
  2     v     r     0        0      10        10       10
  4     p     h   xxxxxxxxxxxxxxx
```

Figure 1 - Remote I/O Configuration Display

Step 6. Use RIOCNF to configure the module using the text file previously generated.

3.4.3 Accessing Remote I/O Registers (RIODEM)

RIODEM is a sample program which shows how to access the data table and the status registers on the PC Link module. Figure 2 shows a listing of all the drops on the remote I/O network. Figure 3 shows the data table for the remote I/O network.

```
Network Master is inactive

Parameter              Drp 1  Drp 2  Drp 3  Drp 4  Drp 5  Drp 6  Drp 7
---------              -----  -----  -----  -----  -----  -----  -----
Virtual Drops Enabled         ENAB
Virtual Drops Active          ACTVE
Configured Drops       ENAB   ENAB          ENAB
Active Drops           ACTVE  ACTVE         ACTVE

Press any key to quit
```

Figure 2 - Remote I/O Drop Status

```
                    Display/Edit Data Table

                                Register Offset
Drop Slot Reg      0      1      2      3      4      5      6      7
 1 :  0 :  0    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  0 :  8    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  0 : 16    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  0 : 24    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  1 :  0    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  1 :  8    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  1 : 16    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  1 : 24    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  2 :  0    024F   0063   02A4   103B   0000   0000   0000   0000
 1 :  2 :  8    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  2 : 16    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  2 : 24    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  3 :  0    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  3 :  8    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  3 : 16    0000   0000   0000   0000   0000   0000   0000   0000
 1 :  3 : 24    0000   0000   0000   0000   0000   0000   0000   0000
```

Figure 3 - Remote I/O Data Table

Appendix E

ScreenWare2 Data Acquisition Engine

The ScreenWare2 Data Acquisition Engine (DAE) is a terminate and stay resident (TSR) program. It is accessed by ScreenWare2 through a software interrupt. It is responsible for exchanging data between the PC Link module and ScreenWare2 DAE can be used with ScreenWare2 version 3.x and later.

Configuration File Installation

If you are using ScreenWare2 version 3.10, place the file **RELI.CNF** in the directory **SW2****DESIGN** and rename it **SW.CNF.**

Creating the Application File

Before DAE is installed, the application file must be created. This is done by setting up the data acquisition blocks in the ScreenWare2 logic editor. The application file is created when the selections made in the application file editor are saved.

Use the following method to access a register in a drop on the AutoMax network. Each register in the AutoMax network is one word in length and can be accessed by register or by bit.

<PLC>$<drop>:<register>.<bit>

where:

PLC
: The PLC number does not apply to the AutoMax network, but since it is required for ScreenWare2, the default PLC number of one (1) is used. No other PLC number will be accepted.

drop
: Any number between 0 and 55 is an acceptable drop number. This corresponds to the number of drops on the AutoMax network.

register
: Any number between 0 and 63 is an acceptable register number. This corresponds to the number of registers in a drop on the AutoMax network.

bit (optional)
: Any number between 0 and 16 is an acceptable bit number. This corresponds to the number of bits in each register on the AutoMax network.

DAE Installation

The DAE executable is called RELICOMM.EXE. If you are using ScreenWare2 version 3.10, place this file in the directory **SW2****ANIMATE** and rename it **DAE.EXE.** ScreenWare2 can then access and load DAE from ScreenWare2's master menu.

Use the following command line structure to access the PC Link module:

DAE <file> -d<drop> -h<depth> -a<address>

where:

file (required)
The file argument specifies the application path and file that has been created using the ScreenWare2 logic editor. The application file always has an .APP extension. The file extension does not have to be included in the argument on the command line.

drop (optional)
The drop argument specifies the starting drop number that you want the ScreenWare2 operator station to adopt on the AutoMax network. If there is a conflict with an existing drop on the network, an error message will be generated and DAE will exit.

Note that the drop must be specified if the ScreenWare2 application is to write to the network. If the drop is not specified, ScreenWare2 can only read from the AutoMax network.

depth (required if drop is specified; otherwise optional) The depth argument specifies the number of drops (starting at the drop specified) that you want the ScreenWare2 operator station to adopt on the AutoMax network. If there is a conflict with an existing drop on the network, an error message will be generated and DAE will exit.

address (optional)
The address is a hexadecimal argument which specifies the starting address of the dual port memory with reference to the host memory. This must coincide with the address specified in the command line of the PC Link software loader program. If the address is omitted, the DAE assumes that the PC Link module dual port memory resides at segment D0000 (default address).

For example,

```
DAE ..\SW2FILES\RELI.APP -d10 -h4 -aD000
```

For additional information

1 Allen-Bradley Drive
Mayfield Heights, Ohio 44124 USA
Tel: (800) 241-2886 or (440) 646-3599
http://www.reliance.com/automax

www.rockwellautomation.com

Corporate Headquarters
Rockwell Automation, 777 East Wisconsin Avenue, Suite 1400, Milwaukee, WI, 53202-5302 USA, Tel: (1) 414.212.5200, Fax: (1) 414.212.5201

Headquarters for Allen-Bradley Products, Rockwell Software Products and Global Manufacturing Solutions
Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation SA/NV, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, 27/F Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Headquarters for Dodge and Reliance Electric Products
Americas: Rockwell Automation, 6040 Ponders Court, Greenville, SC 29615-4617 USA, Tel: (1) 864.297.4800, Fax: (1) 864.281.2433
Europe/Middle East/Africa: Rockwell Automation, Brühlstraße 22, D-74834 Elztal-Dallau, Germany, Tel: (49) 6261 9410, Fax: (49) 6261 17741
Asia Pacific: Rockwell Automation, 55 Newton Road, #11-01/02 Revenue House, Singapore 307987, Tel: (65) 6356-9077, Fax: (65) 6356-9011

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