



User Manual for RCC Series Controller

MAN1020-01-EN

PREFACE

This manual explains how to use the RCC Controller.

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ABOUT PROGRAMMING EXAMPLES

Any example programs and program segments in this manual or provided on accompanying diskettes are included solely for illustrative purposes. Due to the many variables and requirements associated with any particular installation, Horner APG cannot assume responsibility or liability for actual use based on the examples and diagrams. It is the sole responsibility of the system designer utilizing the RCC controller module to appropriately design the end system, to appropriately integrate the RCC controller module and to make safety provisions for the end equipment as is usual and customary in industrial applications as defined in any codes or standards which apply.

Note: The programming examples shown in this manual are for illustrative purposes only. Proper machine operation is the sole responsibility of the system integrator.

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Visual map of major tasks and key chapters

FIRST STEP of ANY TASK: DATASHEET			
<p>Each RCC unit is sent with a datasheet in the box. The datasheet (MAN0971-02-EN) is the first document to refer to for model-specific information related to RCC models such as pin-outs, jumper settings, and other key installation information. To obtain updates to datasheets, manuals and user documentation, visit a Horner website (US: http://www.heapg.com and Europe: http://www.horner-apg.com.)</p>			
QUICK START	INSTALLATION	PROGRAMMING	TROUBLESHOOTING
Safety / Compliance page 10	Safety / Compliance page 10	Safety / Compliance page 10	Safety / Compliance page 10
Introduction page 12	Introduction page 12	Introduction page 12	Introduction page 12
	Mechanical Installation page 15	Serial Communications page 19	Maintenance page 45
	Electrical Installation page 17	CAN Communications page 20	Troubleshooting page 45
		Ethernet page 22	
		Removable Media page 27	
		General I/O page 30	
		Cscape Config page 33	
	Registers page 41		

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CHAPTER 1: SAFETY / COMPLIANCE

1.1 Safety Warnings and Guidelines

When found on the product, the following symbols specify:



Warning: Consult user documentation.



Warning: Electrical Shock Hazard.

WARNING – EXPLOSION HAZARD – Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous

WARNING: To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.

WARNING: To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the voltage measurement inputs. Be sure to locate fuses as close to the source as possible.

WARNING: Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.

WARNING: In the event of repeated failure, do not replace the fuse again as a repeated failure indicates a defective condition that will not clear by replacing the fuse.

WARNING – EXPLOSION HAZARD – Substitution of components may impair suitability for Class I, Division 2

WARNING - The USB parts are for operational maintenance only. Do not leave permanently connected unless area is known to be non-hazardous

WARNING – EXPLOSION HAZARD - BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS

WARNING - Battery May Explode If Mistreated. Do Not Recharge, Disassemble or Dispose Of In Fire

- a. All applicable codes and standards need to be followed in the installation of this product.
- b. For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG or larger.

Adhere to the following safety precautions whenever any type of connection is made to the module.

- a. Connect the green safety (earth) ground first before making any other connections.
- b. When connecting to electric circuits or pulse-initiating equipment, open their related breakers. Do not make connections to live power lines.
- c. Make connections to the module first; then connect to the circuit to be monitored.
- d. Route power wires in a safe manner in accordance with good practice and local codes.
- e. Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
- f. Ensure hands, shoes, and floors are dry before making any connection to a power line.
- g. Make sure the unit is turned OFF before making connection to terminals. Make sure all circuits are de-energized before making connections.
- h. Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.

1.2 Grounding

Grounding is covered in various chapters within this manual.

1.3 Compliance

To check for compliance and updates, visit the Horner website (US: <http://www.heapg.com> or Europe: <http://www.horner-apg.com>.)

CHAPTER 2: INTRODUCTION

2.1 Visual Overview of RCC

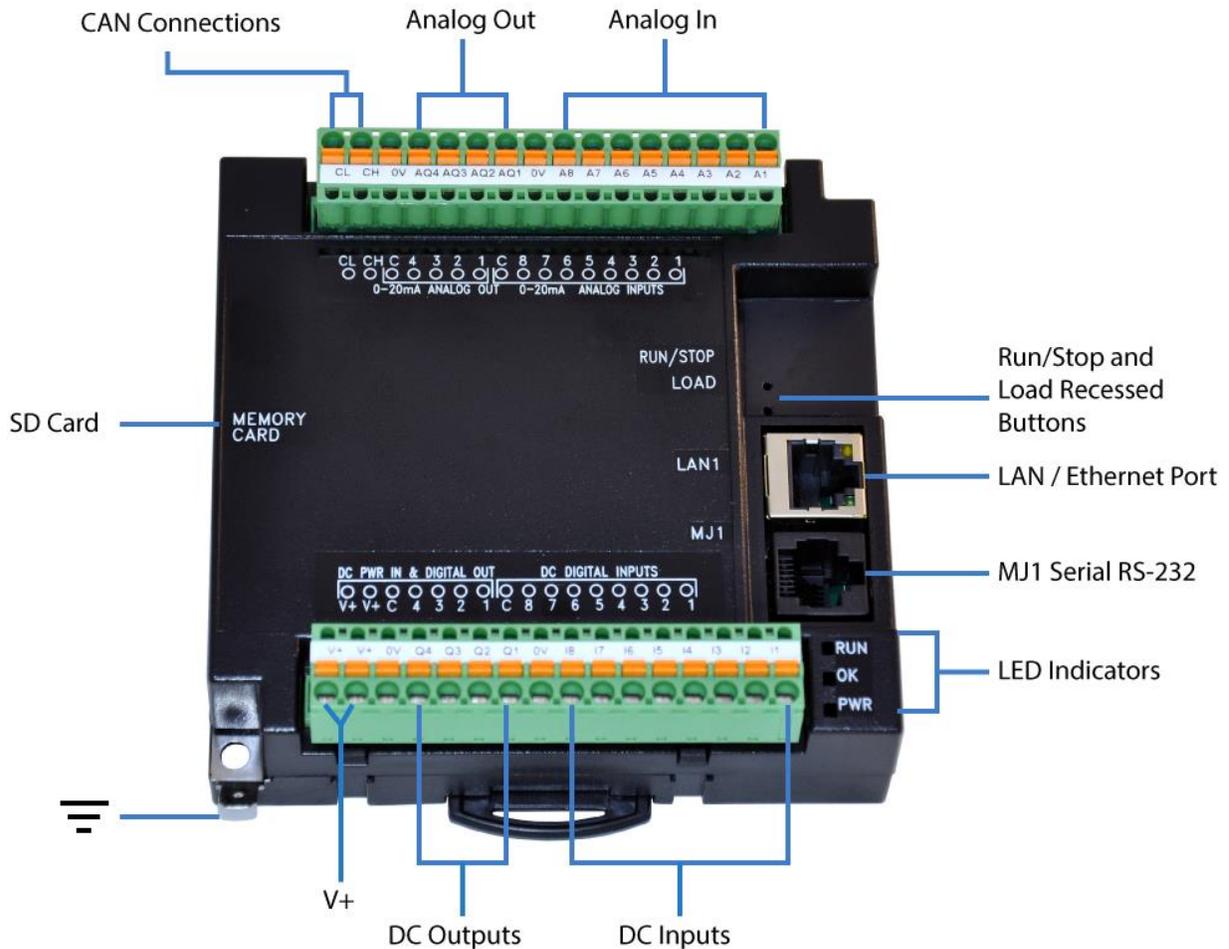


Figure 2.1 – Overview of the RCC

2.1.1 Where to Find Information about the RCC

- a) **Datasheet** - The **datasheet is the first document to refer to for key information** related to specific RCC models.
 - a. The datasheets for all RCC models are available on the Horner websites.
 - b. Datasheets contain pin-outs and other model specific information.
- b) **User Manual** -This manual provides general information that is common to RCC models and can be downloaded from our web. Visit the Horner website (US: <http://www.heapg.com> or Europe: <http://www.horner-apg.com>) to obtain user documentation and updates.

2.1.2 Four main types of information are covered in this manual

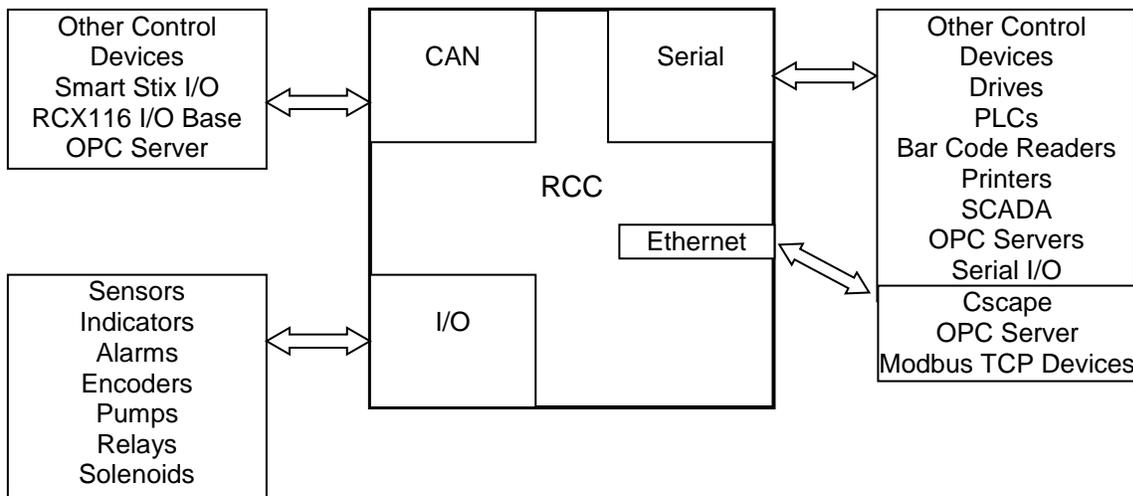
- a) Safety and Installation guidelines / instructions (Mechanical and Electrical)
- b) Descriptions of hardware features
 - a. (Serial ports, Removable Media, Communication Options, etc.)
- c) Configuration and Use of the RCC
- d) Maintenance and Support

2.1.3 Manual Index

Major topics of interest may be found in the [Index](#) towards the end of this manual.

2.2 Connectivity to the RCC

The RCC has excellent capabilities for connecting to a variety of devices. The diagram below shows some examples of devices that can be used with the RCC.



2.3 Features of RCC

The RCC are industrial control devices with built in I/O. They combine control, I/O, and networking into a single, integrated package. Unique features of the RCC include:

- Advanced control capabilities including floating point, multiple auto-tuning PID loops and string handling capabilities.
- Removable media for 32GB of storage of programs, data logging, and on-site updating.
- CsCAN networking port for communication with remote I/O, other controllers or PCs.
- Configurable serial protocols for communication to drives, PLCs, or other serial peripherals.
- Advanced high speed I/O capabilities
- Cscape programming software that allows all aspects of the RCC to be programmed and configured from one integrated application.
- On board Ethernet port (10/100Mbps) for Cscape programming and application defined communication, with Auto MDI/MDI-X.
- Small, compact, din-rail mountable logic controller with flexible built in I/O

2.4 Required and Suggested Accessories

The following list contains a *sampling* of required and suggested RCC accessories. Visit the Horner websites to view updates on new products and accessories.

NOTE: The RCC is not shipped with a programming cable in the box. To obtain a programming cable, order HE500CBL300.

Table 2.1 – RCC Accessories	
Part Number	Description
HECSP	Cscape Software Package on a reusable USB flash drive with symbol library.
HE-XCK	Programming cables, including a USB to serial adapter in a travel case.
HE-CPK	Cscape on a reusable USB flash drive. Programming cables, including a USB to serial adapter in a travel case.

2.5 Useful Documents and References

The following information serves as a *general* listing of Horner controller products and other references of interest with their corresponding manual numbers. Visit the Horner websites to obtain user documentation and updates.

Table 2.2 – CONTROLLER Reference Document numbers	
<p>NOTE: This list is <u>not</u> intended for users to determine which products are appropriate for their application; controller products differ in the features that they support. If assistance is required, refer to Technical Support.</p>	
Manual Description	Manual Number
Datasheet for RCC model	MAN970
User Manual for XLe/XLt OCS models	MAN0878
User Manual for RCC/RCCe OCS models	MAN0883
User Manual for XL4 OCS models	MAN0964
User Manual for QX Series models	MAN0798
User Manual for NX Series models	MAN0781
User Manual for XL7 OCS models	MAN0974
User Manual for ZX OCS Models	MAN1018
Other Useful References	Manual Number
CAN Networks	MAN0799
Spark Quenchers for Arc and Noise Suppression (output protection)	MAN0962
Wiring Accessories and Spare Parts Manual	MAN0347
Ethernet Communications	SUP0740

CHAPTER 3: MECHANICAL INSTALLATION

Note: The datasheet is the first document to refer to for information related to RCC models such as pin-outs, I/O and general specification, and other key installation information. Visit the Horner websites to obtain datasheets, user documentation, and updates.

3.1 Overview

The mechanical installation greatly affects the operation, safety, and appearance of the system. Information is provided to mechanically install the unit such as cut-out sizes, mounting procedures and other recommendations for the proper mechanical installation of the unit.

3.2 RCC Dimensions

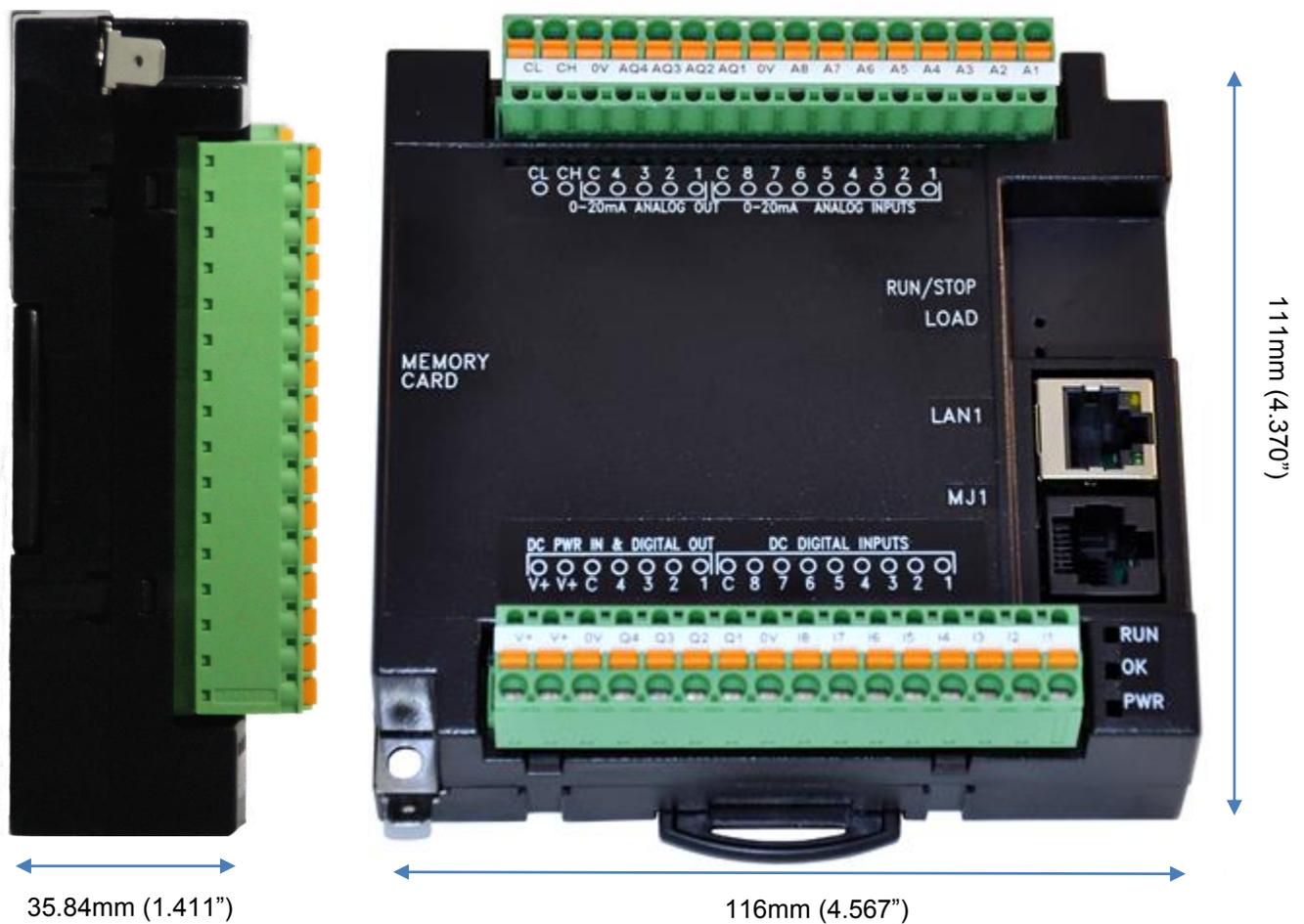


Figure 3.5 – RCC Dimensions

3.6.3 Temperature / Ventilation

Ensure that the DIN Rail layout design allows for adequate ventilation and maintains the specified ambient temperature range. Consider the impact on the design if operating at the extreme ends of the ambient temperature range. For example, if it is determined that a cooling device is required, allow adequate space and clearances for the device in the panel box or on the panel door if DIN rail is mounted inside.

3.6.4 Orientation

RCC should be mounted with locking DIN Tab facing down.

3.6.5 Noise

Consider the impact on the panel layout design and clearance requirements if noise suppression devices are needed. Be sure to maintain an adequate distance between the RCC and noisy devices such as relays, motor starters, etc.

For details on output protection, especially when using contactors, solenoids see MAN0962-01-EN.

3.6.6 Shock and Vibration

The RCC has been designed to operate in typical industrial environments that may inflict some shock and vibration on the unit. For applications that may inflict excessive shock and vibration please use proper dampening techniques or relocate the RCC to a location that minimizes shock and/or vibration.

CHAPTER 4: ELECTRICAL INSTALLATION

Note: The datasheet is the first document to refer to for model-specific information related to RCC models such as pin-outs and other key installation information. Visit the Horner websites to obtain datasheets, user documentation, and updates.

4.1 Grounding Definition

Ground: The term **ground** is defined as a conductive connection between a circuit or piece of equipment and the earth. Grounds are fundamentally used to protect an application from harmful interference causing either physical damage such as by lightning or voltage transients or from circuit disruption often caused by radio frequency interference (RFI). Grounding is also for the safety of the user.

4.2 Ground Specifications

Ideally, a ground resistance measurement from equipment to earth ground is 0 ohms. In reality it typically is higher. The U.S. National Electrical Code (NEC) states the resistance to ground shall not exceed twenty-five (25) ohms. Horner APG recommends less than fifteen (15) ohms resistance from our equipment to ground. Resistance greater than twenty-five (25) ohms can cause undesirable or harmful interference to the device.

4.3 How to Test for Good Ground

In order to test ground resistance, a Ground Resistance Tester must be used. A typical Ground Resistance Meter Kit contains a meter, two or three wire leads, and two ground rods. Instructions are supplied for either a two-point or three-point ground test.

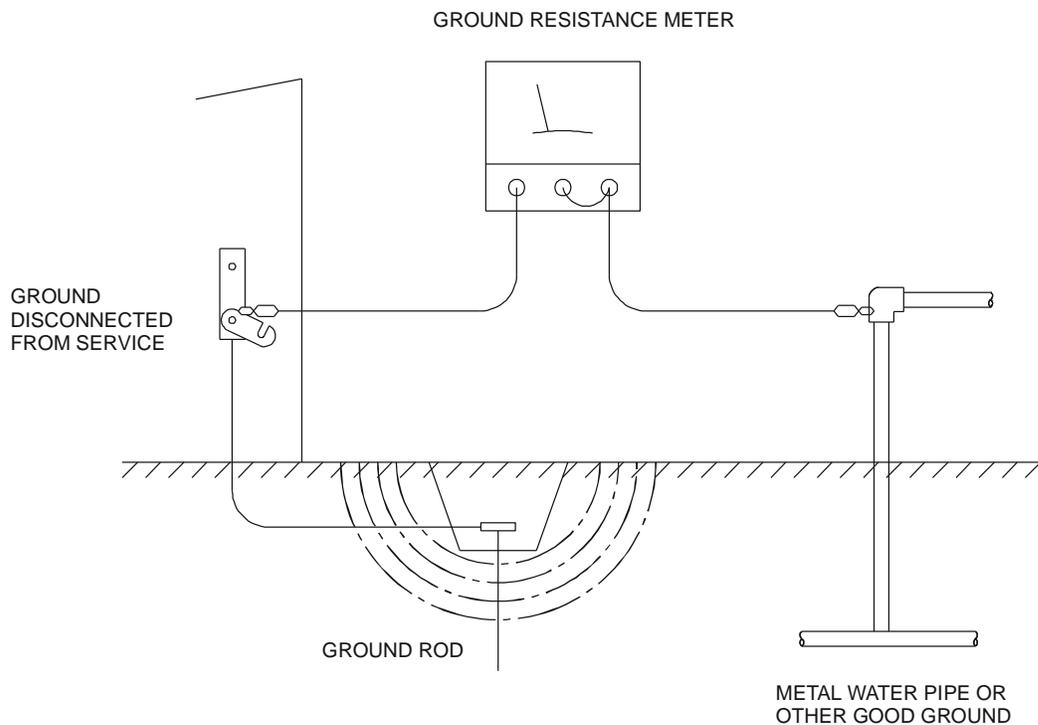


Figure 4.1 – Two-Point Ground Connection Test

4.4 Primary Power Port

To power the RCC unit, V+ and V- wires are directly wired to the terminal strip shown below. Earth Ground is the auxiliary spade at the bottom

Table 4.1 – Primary Power Port Pins		
PIN	Signal	Description
V+	DC IN	Input power supply positive voltage
V+	DC IN	Input power supply positive voltage
0V	0V	Input power supply ground



Figure 4.2 – Power Connector (Primary Power Port)

CHAPTER 5: SERIAL COMMUNICATIONS

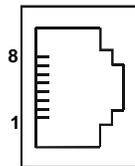
5.1 Overview

All RCC models provide one serial port, on the first 8-pin modular RJ45 connector, which is labeled **MJ1**. The MJ1 serial port is RS232. By default, MJ1 can be connected to the COM port of a PC running Cscape, for controller programming. In addition, MJ1 can be used for application-specific communication, using a variety of standard data exchange protocols.

5.2 Port Descriptions

The MJ1 serial port contains an RS232 interface with RTS/CTS handshaking.

5.3 MJ1 Serial Port Pinout



Pin	MJ1 Pins	
8	TXD	OUT
7	RXD	IN
6	0 V	Ground
5	+5V (60mA Max)	OUT
4	RTS	OUT
3	CTS	IN
2	N/C	
1	N/C	

Figure 5.1 –Port Detail

5.4 Cscape Programming via Serial Port

The RCC MJ1 serial port supports CsCAN Programming Protocol. If a PC COM port is connected to the RCC MJ1 serial port, Cscape can access the RCC for programming and monitoring. Programming can also be done via the CAN connection or Ethernet.

5.5 Ladder-Controlled Serial Communication

Using Serial Communication function blocks, MJ1 supports Generic Modbus Master and Modbus Slave Protocols. In addition, external modems can be connected and accessed using Init, Dial, and Answer Modem function blocks.

5.8 Downloadable Serial Communication Protocols

MJ1 supports downloadable protocols, such as Allen Bradley DF1, CsCAN Master, GE Fanuc SNP and Modbus Master.

NOTE: Refer to the download section of the Horner websites for the list of latest supported protocols.

CHAPTER 6: CAN COMMUNICATIONS

Note: For additional CAN information, refer to the CAN Networks manual (MAN0799) on the Horner websites.

6.1 Overview

All RCC models provide CAN networking options, which are implemented with CL and CH connections at the terminal. The can connections reside next to the Analog outputs on the controller I/O terminal (see below). The CAN connection is terminated (120 ohm resistor) at the end of the network wiring for proper functionality.

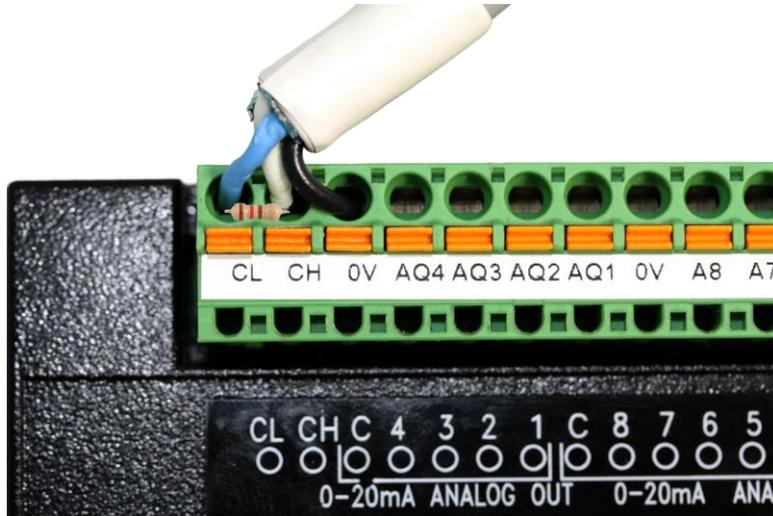


Figure 6.1 – CAN1 Connections Location

Like the MJ1 serial port, the CAN port can be used for RCC programming by connecting it to the CAN port of a PC running Cscope. The CAN port also allows the RCC to exchange global data with other OCS/RCS controllers. CAN supports accessing of remote network I/O devices (SmartStix, SmartBlock and SmartRail Modules.)

6.2 Port Description

The RCC CAN ports implement the ISO 11898-2 physical layer and the CAN 2.0A data link layer standards. Also, since the CAN ports are powered by an internal isolated power supply, external CAN power is not required.

6.3 CAN Port Wiring

Note: The CN L and CN H Communication wires must be terminated with a 120 ohm resistor.

CAN Port Assignments			
1	V-	CAN Ground – Black	-
2	CN L	CAN Data Low – Blue	In/Out
3	SHLD	Shield Ground – None	-
4	CN H	CAN Data High – High	In/Out
5	V+ (NC)	No Connect – Red	-

6.4 Cscape Programming via CAN

The CAN port supports CsCAN Programming Protocol. If a PC has a CAN interface installed (via PCI card or USB), and the PC CAN port is connected to the RCC CAN port, Cscape can access the RCC for programming and monitoring.

In addition, the RCC supports single-point-programming of all RCC and other OCS/RCS devices that are connected to the CAN port network. If the PC COM port is connected to the RCC MJ1 serial port, the RCC can act as a pass-through gateway allowing Cscape to access all RCC and OCS/RCS devices that are attached to the CAN port network.

6.5 Ladder-Controlled CAN Communication

Using Put and Get Network Words function blocks, the CAN port can exchange digital and analog global data with other RCC or OCS/RCS devices (nodes) attached to the CAN port network.

In addition, Put and Get Network Heartbeat function blocks allow nodes on the CAN port network to regularly announce their presence and to detect the presence (or absence) of other nodes on the network.

6.6 Using CAN for I/O Expansion (Network I/O)

Connecting Network I/O devices (SmartStix, SmartBlock or SmartRail) to the RCC CAN port, allows the RCC I/O to be economically expanded and distributed. A variety of modules are available for this purpose.

CHAPTER 7: ETHERNET COMMUNICATION

7.1 Ethernet Module Protocols and Features

The following table describes the Ethernet Module Protocols and features supported by RCC.

Protocol / Feature	Protocol / Feature Description
ICMP Ping	Internet Control Message Protocol
EGD (Peer)	Ethernet Global Data
SRTP Server	Service Request Transfer Protocol
CsCAN TCP Server	Horner APG CsCAN over Ethernet
Modbus TCP Slave	Modbus over Ethernet
Ethernet / IP Server	ODVA CIP over Ethernet
FTP Server	File Transfer Protocol
HTTP Server	HyperText Transfer Protocol (Web Server)

Table 7.1 – Ethernet Module Protocols & Features

7.2 Ethernet System Requirements

Full Ethernet functionality requires:

- PC running Cscape Programming Software Version 9.3 SP6 or later (for configuration).
- RCC controller with onboard Ethernet port.
- FTP & HTTP protocols.

7.3 Ethernet Module Specifications

Speeds	10 BaseT Ethernet (10-Mbps) 100 BaseTx Fast Ethernet (100-Mbps)
Modes	Half or Full Duplex
Auto-Negotiation	Both 10/100-Mbps and Half/Full Duplex
Connector Type	Shielded RJ-45
Cable Type <i>(Recommended)</i>	CAT5 (or better) UTP
Port	Auto MDI/MDI-X (Auto Crossover)

Table 7.2 – Ethernet Module Specifications

7.4 Ethernet Module Configuration

Note: The following configuration is required for all applications regardless of the protocols used. Additional configuration procedures must be performed for each protocol used.

To configure the Ethernet Module, use Cscape Programming Software to perform the following steps

1. On the main Cscape screen, select the **Controller** menu and its **I/O Configure** sub-menu to open the I/O Configuration dialog (Figure 7.1)
2. If configuring a different Product Model than the one shown in the I/O Configuration dialog, click on the topmost **Config** button, select the desired PRODUCT Model, and then click **OK**

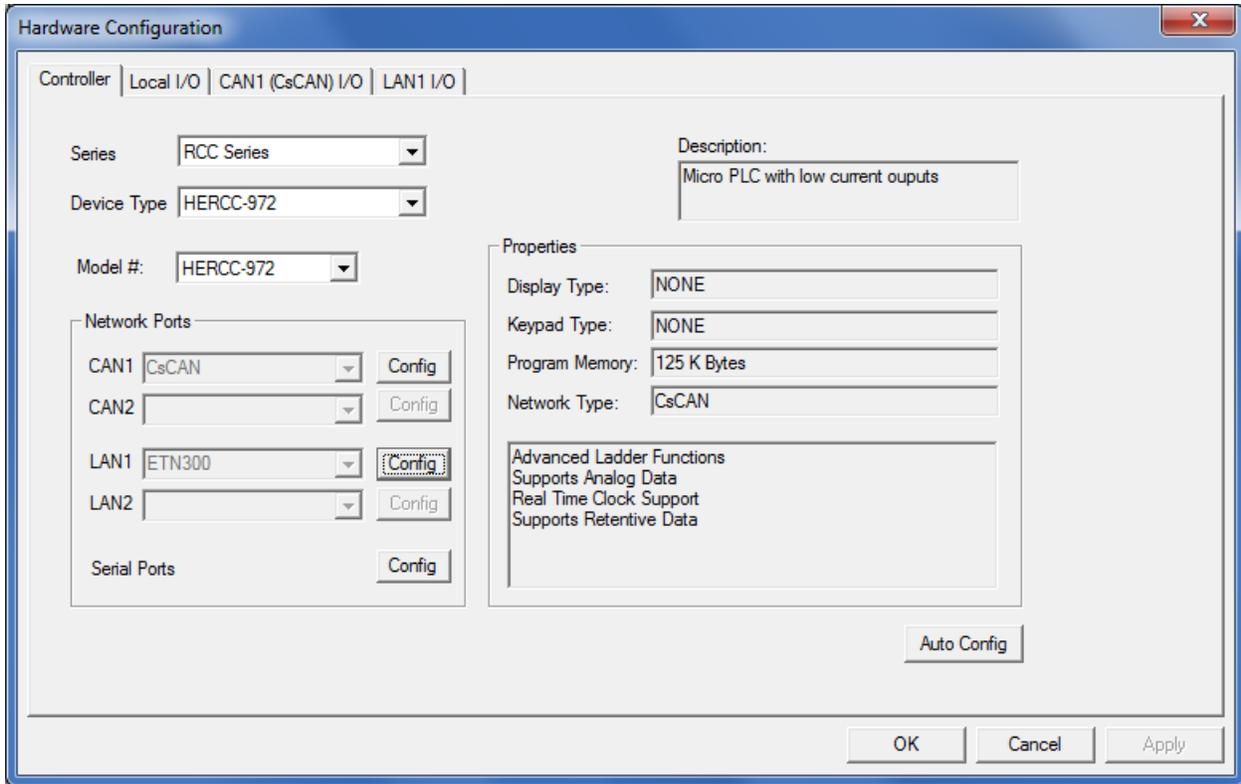


Figure 7.1 – I/O Configuration Dialog

3. Click the **Config** button to the right of LAN1 revealing the Ethernet Module Configuration dialog as shown in figure 7.2

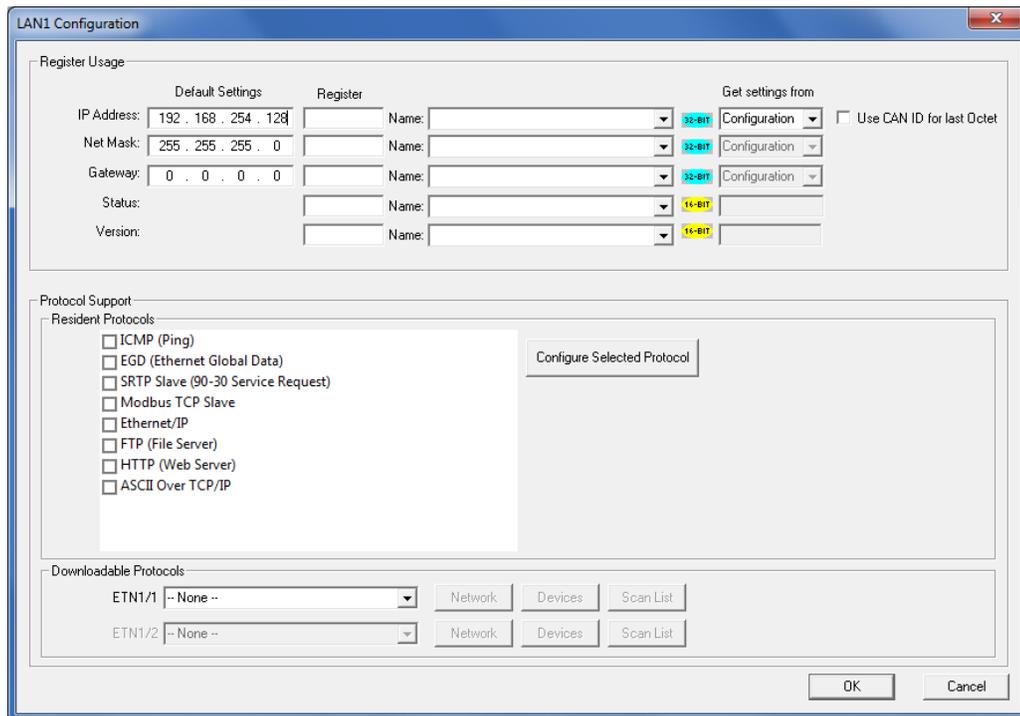


Figure 7.2 – Ethernet Module Configuration

4. Configure the Ethernet Module parameters as follows:

IP Address: Enter the static IP Address for the Ethernet Module being configured.

Note: IP Addresses are entered as four numbers, each ranging from 0 to 255. These four numbers are called octets and they are always separated by decimal points.

Net Mask: Enter the Net Mask (sometimes called Subnet Mask) being used by all nodes on the local network. Typical local networks use Class C IP Addresses, in which case the low octet (rightmost number) is used to uniquely identify each node on the local network. In this case, the default Net Mask value of 255.255.255.0 should be used.

Gateway: Enter the IP Address of a Gateway Server on the local network that allows for communication outside of the local network. To prevent the Ethernet Module from communicating outside the local network, set the Default Gateway IP Address to 0.0.0.0 (the default setting).

Status Register: Enter an Register reference (such as %R100) to indicate which 16-bit register will have the Ethernet Status word written to it. Table 7.3 shows how this register value is formatted and explains the meaning of each bit in the Status Word.

Table 7.3 - Ethernet Status Word Register Format															
High Byte								Low Byte							
Bit 16	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
0	0	Dup	Spd	0	Rx	Tx	Link	TCP Connections							
Status Bit(s)		Status Indication						Status Values							
0		Reserved						Always 0							
Dup		Link Duplex (Auto-Negotiated)						0 = Half Duplex 1 = Full Duplex							
Spd		Link Speed (Auto-Negotiated)						0 = 10 MHz 1 = 100 MHz							
Rx		Receive State						0 = Inactive 1 = Active							
Tx		Transmit State						0 = Inactive 1 = Active							
Link		Link State						0 = Down 1 = Up							
TCP Connections		Total Number of Active TCP Connections (CsCAN, SRTP, Modbus, EIP, FTP, HTTP)						0 40							

Version Register: Enter a Register reference (such as %R101) to indicate which 16-bit register will have the Ethernet Firmware Version written to it. The value stored in the Version Register is: (Ethernet Firmware Version * 100). For example, for Ethernet Firmware Version 4.30, the Version register will contain 430.

Get Settings From:

“Get settings from” allows the programmer to either configure the IP Address, Net Mask, or Gateway for 2 functions: Configuration or Register

Configuration – The configuration for the IP Address, Net Mask, or the Gateway will be assigned using the value in the Default Settings in this window.

Register – The configuration for the IP Address, Net Mask, or the Gateway will be assigned using the values in the registers assigned.

Ethernet Module Protocol Configuration

The Protocol Support area contains a list of all the protocols supported by the platform being configured. To activate a protocol, check its checkbox.

For protocols that require additional configuration, click on a listed protocol to select it and then click the Configure Selected Protocol button. This will open a new dialog with configuration options for the selected protocol.

For detailed information on individual protocol configuration refer latest version of ETN 300 Manual **SUP0740**

NOTES

CHAPTER 8: REMOVABLE MEDIA

8.1 Overview

All RCC models provide a Removable Media slot, labeled **Memory Card**, which supports standard MicroSD Flash memory cards. MicroSD cards can be used to save and load applications, to capture graphics screens and to log data for later retrieval.



Figure 8.1 – Removable MicroSD Memory Card Slot

8.2 MicroSD Cards

Cards labeled either MicroSD or TransFlash, with up to 32 GB of Flash memory, are compatible with the RCC Memory slot (larger sizes were not tested at time of publication).

The Memory slot is equipped with a “push-in, push-out” connector and a MicroSD card can be safely inserted into the Memory slot whether the RCC power is On or Off.

To install a MicroSD card: Align its 8-pin gold edge connector down, facing the front of the RCC unit as shown in **Figure 9.2**; then carefully push it all the way into the Memory slot. Ensure that it clicks into place.

To remove the MicroSD card: Push in on the top of the card gently to release the spring. The card pops out for removal.

8.3 MicroSD File System

The MicroSD Memory slot uses the PC-compatible FAT32 File System. This means that a PC, with a MicroSD-compatible card reader, can read files that have been written by the RCC and can write files that can be read by the RCC.

However, the RCC does not support long filenames, but instead implements the 8.3 filename format. This means that all file and directory names must consist of up to 8 characters, followed by an optional dot, and an optional extension with up to 3 characters.

Directories and sub-directories can be nested up to 16 levels deep as long as each pathname string does not exceed 147 characters.

8.5 Using Removable Media to Log Data

Using Read and Write Removable Media function blocks, an application ladder program can read and write RCC register data in the form of comma-delimited files, with a .CSV extension. These files are compatible with standard database and spreadsheet PC programs. In addition, an application ladder program can use Rename and Delete Removable Media function blocks to rename and delete files.

8.6 Using Removable Media to Load and Save Applications

A special file type, with a .PGM extension, is used to store RCC application programs on MicroSD.

Pressing and holding the **LOAD** button for three seconds upon power up will load the program that is stored on the MicroSD. (more details in Chapter 11)

Cscape can also save an application directly to a MicroSD card, which is plugged into the PC's MicroSD compatible card reader by selecting the Export to Removable Media item on the Cscape File menu.

8.8 Removable Media (RM) Function Blocks in Cscape

NOTE: For detailed information regarding RM function blocks and parameters, refer to the help file in Cscape Software.

The following RM functional blocks are available in Cscape Software. These function blocks will reference - MicroSD when filename is prefixed with 'A:' or nothing

Read RM csv	Allows reading of a comma-separated value file from the MicroSD interface into the controller register space.
Write RM csv	Allows writing of a comma-separated value file to the MicroSD interface from the controller register space.
Rename RM csv	Allows renaming a file on the RM card. The data in the file is not changed.
Delete RM csv	Allows deleting a file on the RM card
Copy RM csv	Allows copying a file on the RM card. The data in the file is not changed.

8.9 Filenames used with the Removable Media (RM) Function Blocks

The RM function blocks support the flash with a DOS/Windows standard FAT-16 file system. All names must be limited to the "8.3" format where the filename contains eight characters a period then a three-character extension. The entire filename including any path must be less than or equal to 147 characters.

When creating filenames and directories it is sometimes desirable to include parts of the current date or time. There are six special symbols that can be entered into a filename that are replaced by the RCC with current time and date information.

Symbol	Description	Example
\$Y	Substitutes the current 2 digit year	2014 = 14
\$M	Substitutes the current month with a 2 digit code	March = 03
\$D	Substitutes the current day	22 nd = 22
\$h	Substitutes the current hour in 24 hour format	4 pm = 16
\$m	Substitutes the current minute	45 = 45
\$s	Substitutes the current second	34 = 34

Note that all the symbols start with the dollar sign (\$) character. Date symbols are in upper case, time symbols are in lower case. The following are examples of the substituted time/date filenames:

Current date and time	= March 1, 2013 3:45:34 PM
Filename: Data\$M\$D.csv	= Data0301.csv
Filename: Year\$Y\Month\$M\aa\$D_\$h.csv	= Year04\Month03\aa01_15.csv
Filename: Month_\$M\Day_\$D\h_\$m_\$s.csv	= Month_03\Day_01\15_45_34.csv

Note: Time/Date requires setting on the RCC972, and is only maintained while the RCC is powered. Time and Date will need to be reconfigured on power cycle.

8.10 System Registers used with RM

%SR175 Status	This shows the current status of the RM interface
%SR176 Free Space	This 32-bit register shows the free space on the RM card in bytes
%SR178 Card Capacity	This 32-bit register shows the total card capacity in kilobytes

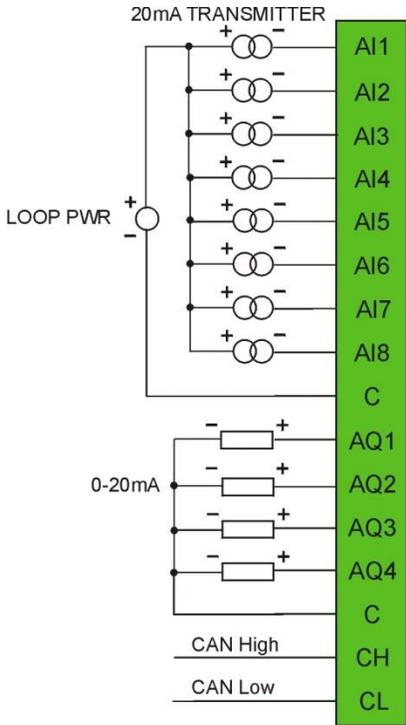
Possible status values are shown in the table:

Table 9.2 – RM Status Values	
0	RM interface OK
1	Card present but unknown format
2	No card in slot
3	Card present, but not supported
4	Card swapped before operation was complete
5	Unknown error

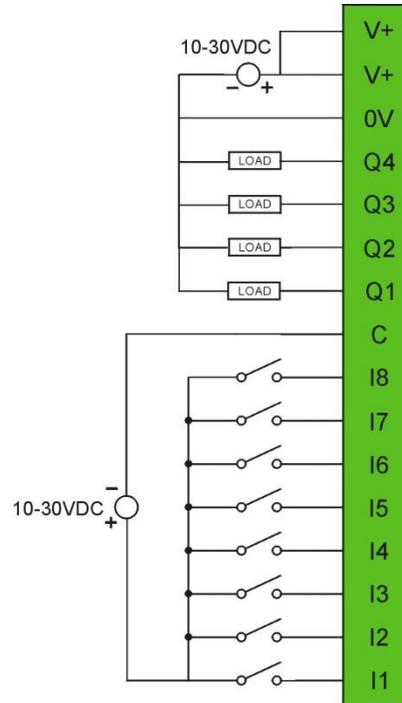
For additional status information, consult the Cscape help file.

CHAPTER 9: GENERAL I/O

Note: Each RCC unit is sent with a datasheet in the box. The datasheet is the first document to refer to for model-specific information related to RCC models such as pin-outs and other key installation information. Visit the Horner websites to obtain datasheets, user documentation, and updates.



RCC971AIO



RCC972-DIO

9.1 Overview

The RCC is a compact unit that contains high density, very versatile I/O. Using the I/O properly requires wiring to the proper terminals unit and configuring Cscape properly. This section will offer some tips and suggestions to configure the I/O properly. For the register mapping of the I/O, refer to the [Index](#) at the end of this manual for the pages referencing register mapping.

9.2 Solid-State Digital Outputs

Solid-state digital outputs are generally used to activate lamps, low voltage solenoids, relays and other low voltage and low current devices.

NOTE: The digital outputs used on the RCC are “sourcing” outputs. This means the output applies a positive voltage to the output pin when turned ON. When turned off, the output applies approximately zero volts with respect to the I/O ground.

The digital outputs used in the RCC have electronic short circuit protection and current limiting. While these electronic protections work in most applications, some application may require external fusing on these outputs.

The digital outputs in the RCC are typically controlled via %Q bits in the register mapping.

When the controller is stopped the operation of each output is configurable. The outputs can hold the state they were in before the controller stopped or they can go to a predetermined state. By default digital outputs turn off. For more information on stop state see the [Index](#) to find pages referencing Cscape settings.

The digital outputs feature an output fault bit. %I32 will turn on if any of the outputs experience a short circuit, over-current or the output driver overheats.

9.3 Digital Inputs

Note: The digital inputs on the RCC are designed for low voltage DC inputs. The inputs are designed to support both positive and negative input modes. The mode is set by a configuration parameter in Cscape. All the inputs on the unit must be configured to the same mode.

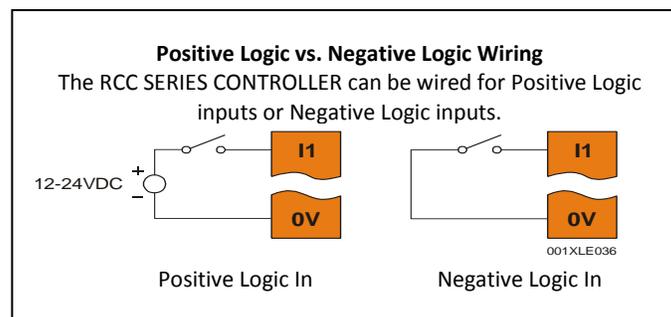


Figure 10.6 – Positive and Negative Inputs

In positive logic mode a positive voltage applied to the input will turn the input. The internal design of this mode is basically a resistor from the input to I/O ground. This mode is sometimes called sourcing.

In negative logic mode, connecting the input to the I/O ground or zero volts will turn the input on. The internal design of this mode is basically a resistor from the input to the positive I/O voltage (usually 12 or 24 volts). This mode is sometime called sinking.

9.4 Analog Inputs

NOTE: See the data sheet for the RCC model being used and see the appropriate page in this manual (see Index) for details on how to use Cscape to configure the digital filtering.

The analog inputs on the RCC allow voltage or current measurement from a variety of devices.

Analog inputs read 0-20mA current only.

The analog inputs have a digital filter that can be used to filter electrical noise that may be unavoidable in some installations. The downside to digital filtering is the inputs will respond more slowly to sudden changes in the actual input.

9.4.1 Common cause of analog input tranzorb failure.

If a 4-20mA circuit is initially wired with loop power but without a load, the analog input could see 24Vdc. This is higher than the rating of the tranzorb.

This can be solved by not connecting loop power prior to load connection or by installing a low-cost PTC in series between the load and the analog input.

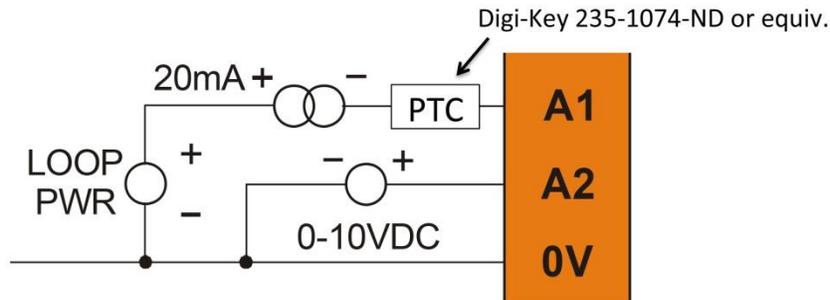


Figure 10.7 – Analog input tranzorb - troubleshooting

9.5 Analog Outputs

Note: Refer to the datasheet for RCC model being used for details on jumper settings.

The analog outputs on RCC devices provide 0-20mA current output.

When the controller is stopped the operation of each output is configurable. The outputs can hold the state they were in before the controller stopped or they can go to a predetermined value. By default analog outputs are set to a value of zero. For more information on Stop State, refer to the appropriate pages (see [Index](#)) for the configuration chapter for Cscape settings.

CHAPTER 10: CSCAPE CONFIGURATION

10.1 Overview

RCC hardware is programmed with a Windows based PC application called Cscape. This application can be used to program, configure, monitor and debug all aspects of the RCC unit. Please see the on-line help provided with Cscape for additional details.

10.2 Cscape Status Bar

When the RCC is connected to a PC using Cscape software a Status Bar appears at the bottom of the screen. The Cscape Status Bar can be used to determine if communications have been established between the RCC and the Cscape program. Components of the Cscape Status Bar are explained below.

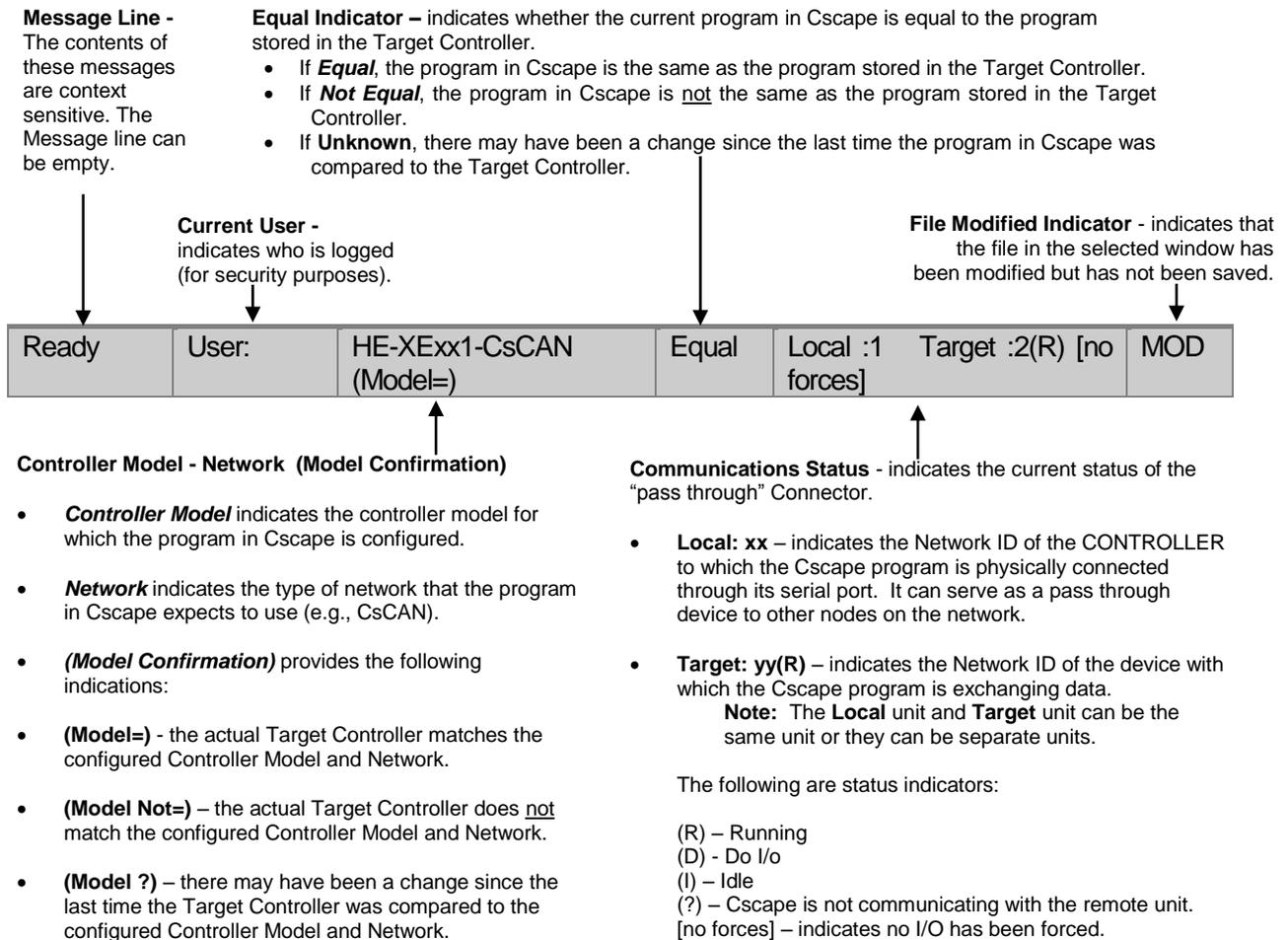


Figure 10.1 - Cscape Status Bar

10.3 Establishing Communications

The preferred method of communicating between Cscape and an RCC is via serial MJ1 port. The RCC can communicate with Cscape using serial port communications via MJ1 Port, Ethernet, and CAN (CsCAN). For communications other than MJ1 port please refer to the manual which ships with the communications adapter hardware being used for programming.

For RCC use Cscape Ver 9.30 SP6 or later.

Connect a PC (Personal Computer running a Windows Microsoft operating system) serial port to the MJ1 port on the RCC. CBL600 adapter and cable can be used to connect the MJ1 port to the PC's USB port

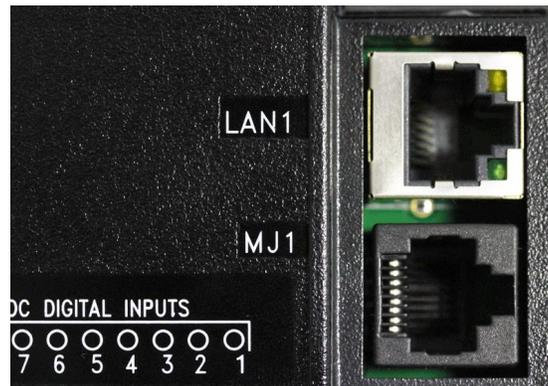
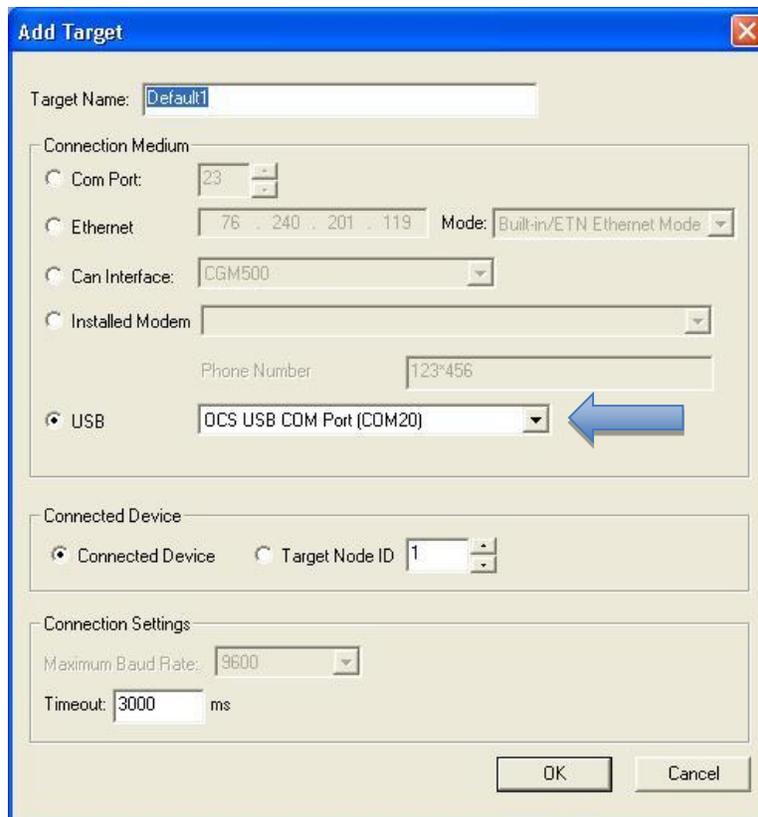
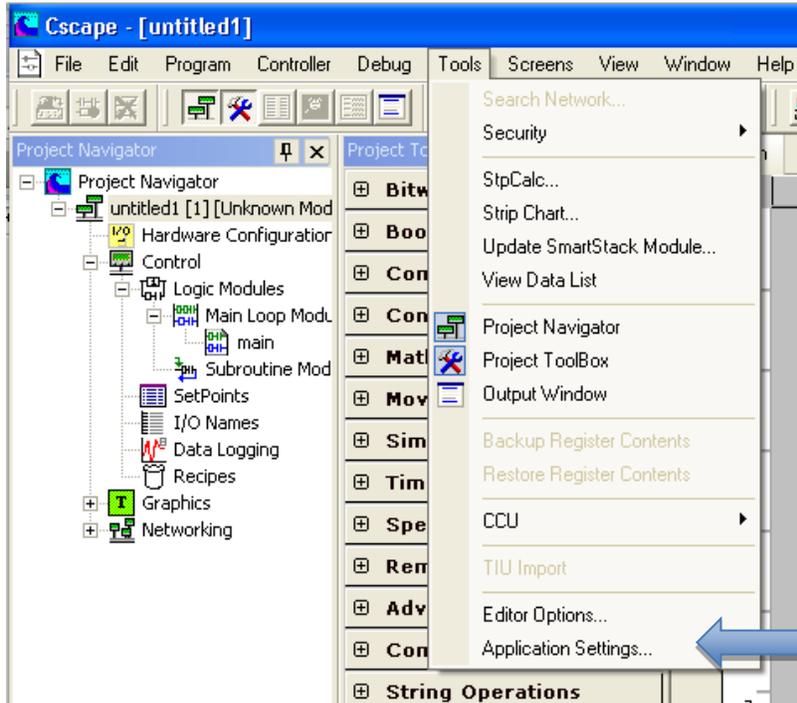


Figure 10.2 – MJ1 Connector to be used via Serial or with Serial to USB adapter to PC

If the recommended CBL600 serial to usb adapter is used, the following dialogs will appear to configure the USB port driver when a powered up unit is connected to the PC:



Now that the RCC is plugged in, go to Cscape, Tools, Application Settings, Communications and choose the USB port (in this example Com 3).



If communication is established, the target indicator will show the mode of the controller **Target: yy(R)** as shown in the status section above in this chapter, section Cscape Status Bar.

If the controller is not communicating, ensure the target ID is set correctly. The **Target ID** allows directing communications to a particular unit when multiple units are connected via a CsCAN network. Units without CsCAN network ports respond to any network ID and do not require the ID to be configured.

To change the RCC target ID in Cscape, go to **Controller→Set Local Network ID**.

10.3.1 Communicating via MJ1 Serial Port

Start by configuring Cscape to use the correct communications port. This can be done using the **Tools→Options→Communication Port** dialog in Cscape.

Connect the PC's serial port to the port labeled MJ1 on the RCC.

If communications are successful, the target indicator should show the mode of the controller **Target: yy(R)** as shown in the status section above.

If the controller is not communicating, it may be required to set the target ID of the controller in Cscape

The Target ID allows directing communications to a particular unit when multiple units are connected via a CsCAN network. Units without CsCAN network ports respond to any network ID and do not require the ID to be configured.

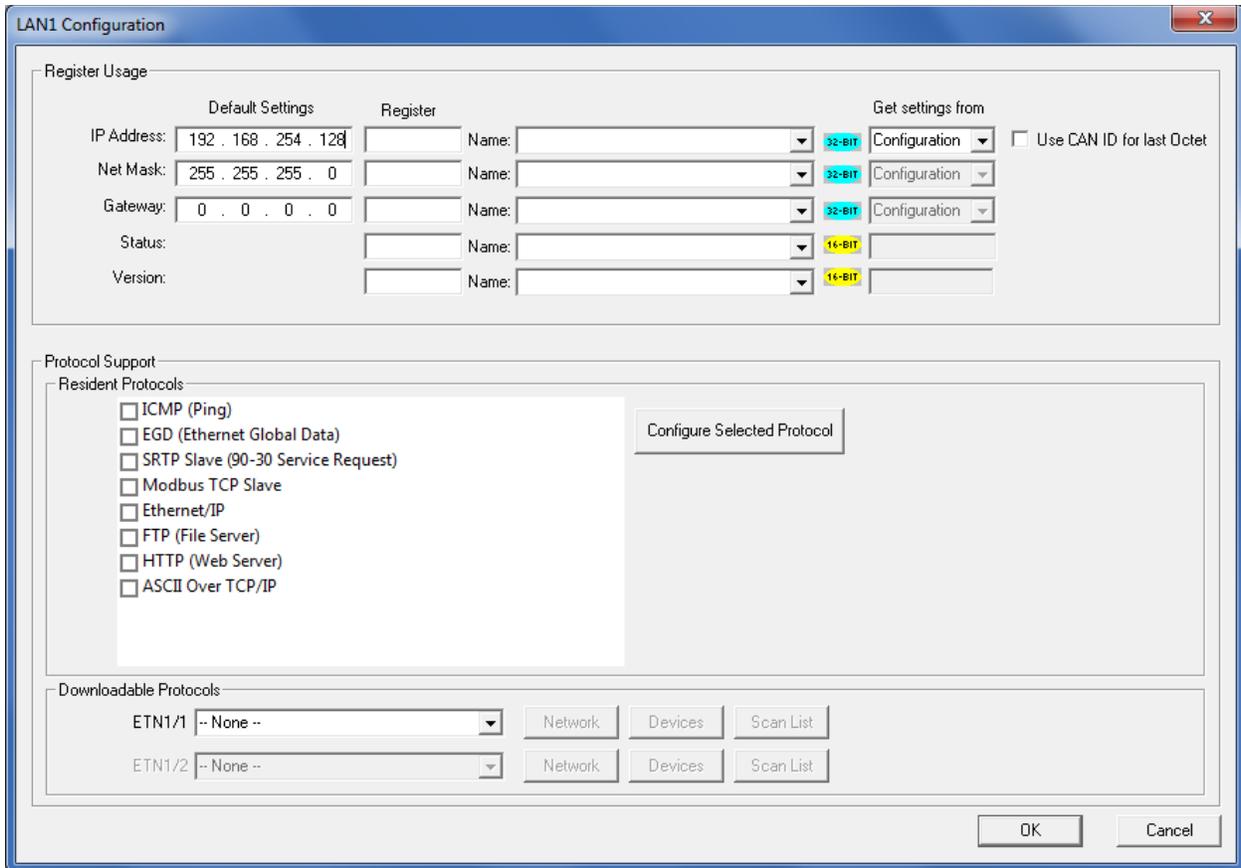
To change the Target ID of Cscape use the **Controller→Set Target Network ID** dialog.

10.3.2 Communicating via On Board Ethernet Port

From Cscape go to Controller -> I/O Configure and do auto configuration for the connected controller, Click on Config of Ethernet & go to Module Setup.

The IP address, Net Mask and Gateway of the controller may be temporarily set from the system menu under the Set Networks menu item. Once running or power cycled the configuration will come from the Cscape configuration stored in the unit.

In Module configuration dialog go to IP Address field enter unused IP Address and configure unused registers in Register field & then click OK. Screen shot for the same as follows:



Download the configuration in to Controller. Connect LAN cable to the Controller in default LAN Port.

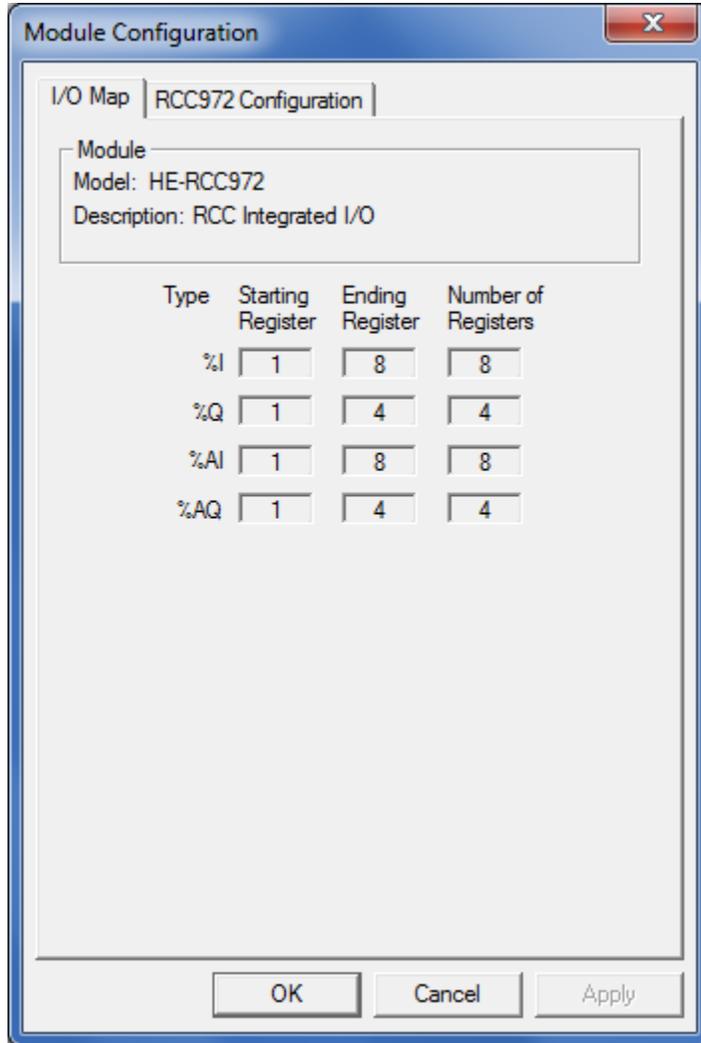
From Cscape go to **Tools**→**Editor Options**→**Communication Port**→**Configure**. Select Ethernet and enter IP address which is configured in the file.

The controller should get connected to Cscape. If communications are successful, the target indicator should show the mode of the controller **Target: yy(R)** as shown in the status section above.

10.4 I/O Configuration

An overview of configuration:

1. Start the configuration by selecting the **Controller | I/O Configure** menu item.
2. If the RCC is connected to the PC press the **Auto Config System** button to automatically detect the Base model, I/O and any communication options.
3. If the RCC is not connected press the **Config** button to the right of the top of the unit. This allows the base CPU to be selected.
4. Select RCC Series from the type drop down box.
5. Click **Local I/O** Tab and then **Configure** to bring up the Module Configuration menu. From here the I/O registers can be viewed.



Module Configuration

I/O Map | RCC972 Configuration

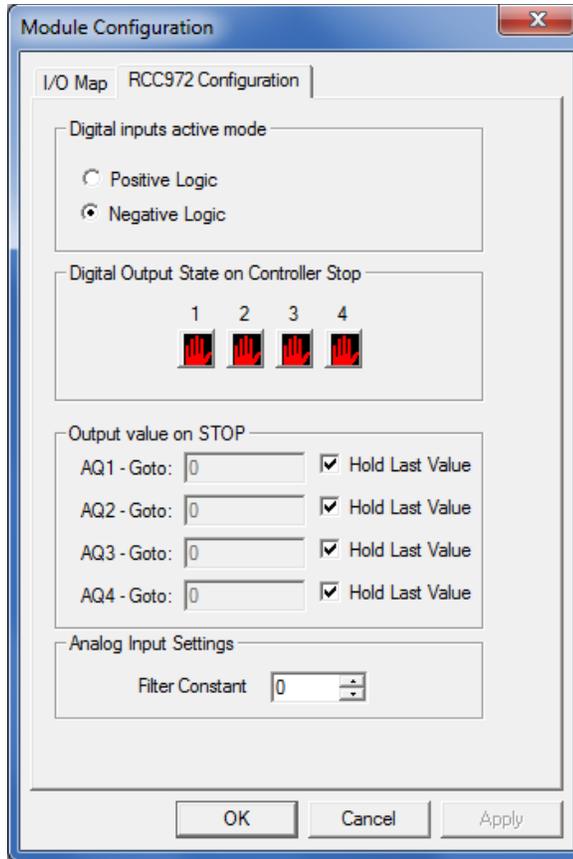
Module
Model: HE-RCC972
Description: RCC Integrated I/O

Type	Starting Register	Ending Register	Number of Registers
%I	1	8	8
%Q	1	4	4
%AI	1	8	8
%AQ	1	4	4

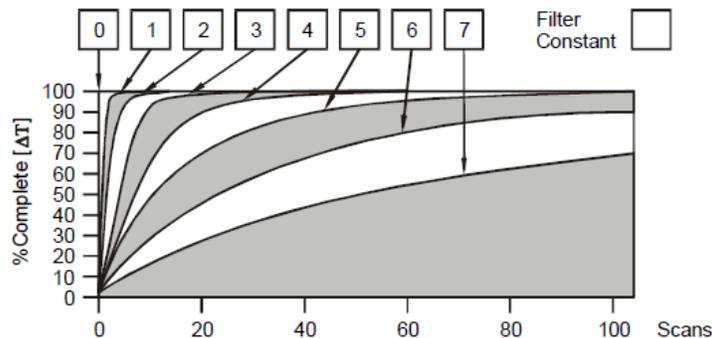
OK Cancel Apply

6. Next, click **RCC972** Configuration to configure:

Digital inputs active mode	Positive or negative
Digital output state on controller stop	High, low, or stop.
Output value on STOP	Contains items that allow the user to specify how the outputs behave when the controller is stopped. These items can either hold their value or default to some value when the controller is stopped.
Analog input settings	Adjust filter constant for system noise.



Filter Constant sets the level of digital filtering according to the following chart. Digital filtering minimizes noise and jitter, improves effective resolution, and provides adequate speed for most temperature monitor control applications.



CHAPTER 11: REGISTERS

11.1 Register Definitions

When programming the RCC, data is stored in memory that is segmented into different types. This memory in the controller is referred to as registers. Different groups of registers are defined as either bits or words (16 bits). Multiple registers can usually be used to handle larger storage requirements. For example 16 single bit registers can be used to store a Word or two 16 bit registers can be used to store a 32-bit value.

Below is a table of the type of registers found in the OCS.

Register	Description
%AI Analog Input	16-bit input registers used to gather analog input data such as voltages, temperatures, and speed settings coming from an attached device.
%AQ Analog Output	16-bit output registers used to send analog information such a voltages, levels or speed settings to an attached device.
%AIG Global Analog Input	Specially defined 16-bit input registers that come from the network.
%AQG Global Analog Output	Specially defined 16-bit output registers that go to the network.
%D Display Bit	These are digital flags used to control the displaying of screens on a unit which has the ability to display a screen. If the bit is SET, the screen is displayed.
%I Digital Input	Single-bit input registers. Typically, an external switch is connected to the registers.
%IG Global Digital Input	Specially defined single-bit inputs that come from the network.
%K Key Bit	Single-bit flags used to give the programmer direct access to any front panel keys appearing on a unit.
%M Retentive Bit	Retentive single-bit registers.
%Q Digital Output	Single-bit output registers. Typically, these bits are connected to an actuator, indicator light or other physical outputs.
%QG Global Digital Output	Specially defined single-bit outputs that go to the network.
%R General Purpose Register	Retentive 16-bit registers.
%S System Bit	Single-bit coils predefined for system use.
%SR System Register	16-bit registers predefined for system use.
%T Temporary Bit	Non-retentive single-bit registers.

11.2 Useful %S and %SR registers

Register	Description
%S1	Indicate First Scan
%S2	Network is OK
%S3	10mS timebase
%S4	100mS timebase
%S5	1 second timebase
%S6	I/O is OK
%S7	Always ON
%S8	Always OFF
%S9	Pause 'n Load soon
%S10	Pause 'n Load done
%S11	I/O being forced
%S12	Forcing is enabled
%S13	Network I/O is OK
%S16	Ethernet COM module is OK

Table 11.2 – %SR Registers				
Register	Name	Description	Min Val	Max Val
%SR1	USER_SCR	Current User Screen Number	1	1023
%SR2	ALRM_SCR	Current Alarm Screen Number (0=none)	0	1023
%SR3	SYS_SCR	Current System Screen Number (0=none)	0	14
%SR4	SELF_TEST	Bit-Mapped Self-Test Result	0	65535
%SR5	CS_MODE	Control Station Mode (0=Idle, 1=Do I/O, 2=Run)	0	2
%SR6	SCAN_RATE	Average Scan Rate (/ 10)	-	1000
%SR7	MIN_RATE	Minimum Scan Rate (/ 10)	-	1000
%SR8	MAX_RATE	Maximum Scan Rate (/ 10)	-	1000
%SR9-10	EDIT_BUF	Data Field Edit Buffer	0	2 ³² -1
%SR11-12	LADDER_SIZE	Ladder Code Size	2	256K
%SR 13-16	Reserved	-	-	-
%SR17-18	IO_SIZE	I/O Configuration Table Size	16	127K
%SR19-20	NET_SIZE	Network Configuration Table Size	34	1K
%SR21-22	SD_SIZE	Security Data Table Size	-	-
%SR23	LADDER_CRC	Ladder Code CRC	0	65535
%SR 24-25	Reserved	-	-	-
%SR26	IO_CRC	I/O Configuration Table CRC	0	65535
%SR27	NET_CRC	Network Configuration Table CRC	0	65535
%SR28	SD_CRC	Security Data Table CRC	0	65535
%SR29	NET_ID	This Station's Primary Network ID (CsCAN)	1	253
%SR30	NET_BAUD	Network Baud Rate (CsCAN) (0=125KB; 1=250KB; 2=500KB; 3=1MB)	0	3
%SR31	NET_MODE	Network Mode (0=network <u>not</u> required; 1=network required; 2=network optimized; 3=network required and optimized)	0	3
%SR32	LCD_CONT	LCD Display Contrast setting	0	255
%SR33	FKEY_MODE	Function Key Mode (0=Momentary; 1=Toggle)	0	1
%SR34	SERIAL_PROT	RS232 Serial Protocol Mode (0=Firmware Update (RISM); 1=CsCAN; 2=Generic (Ladder- Controlled); 3=Modbus RTU; 4=Modbus ASCII)	0	4
%SR35-36	SERIAL_NUM	This Station's 32-bit Serial Number	0	2 ³² -1
%SR37	MODEL_NUM	This Station's Binary Model Number	0	65535
%SR38	ENG_REV	Firmware Rev Number (/ 100)	0000	9999
%SR39	CPLD_REV	BIOS Rev Number (/ 100)	000	255
%SR40	FPGA_REV	FPGA Image Rev Number (/ 10)	000	255
%SR41	LCD_COLS	Vertical Pixel Count		
%SR42	LCD_ROWS	Horizontal Pixel Count		
%SR43	KEY_TYPE	Keypad Type		
%SR44	RTC_SEC	Real-Time-Clock Second	0	59
%SR45	RTC_MIN	Real-Time-Clock Minute	0	59
%SR46	RTC_HOUR	Real-Time-Clock Hour	0	23
%SR47	RTC_DATE	Real-Time-Clock Date	1	31
%SR48	RTC_MON	Real-Time-Clock Month	1	12
%SR49	RTC_YEAR	Real-Time-Clock Year	1996	2095
%SR50	RTC_DAY	Real-Time-Clock Day (1=Sunday)	1	7
%SR51	NET_CNT	Network Error Count	0	65535
%SR52	WDOG_CNT	Watchdog-Tripped Error Count	0	65535
%SR53-54	BAD_LADDER	Bad Ladder Code Error Index	0	65534
%SR55	F_SELF_TEST	Filtered Bit-Mapped Self-Test Result	0	65535
%SR56	LAST_KEY	Key Code of Last Key Press or Release	0	255
%SR57	BAK_LITE	LCD Backlight Dimmer Register 0 = 0% On; 25=25% On; 100-255 = 100% On	0	255
%SR58	USER_LEDS	User LED Control / Status	0	65535

Table 11.2 – %SR Registers				
Register	Name	Description	Min Val	Max Val
%SR59-60	Reserved	-	-	-
%SR61	NUM_IDS	This Station's Number of Network IDs	1	253
%SR62	NUM_IDS	This Station's Number of Network IDs	1	253
%SR63	SS_BASE	SmartStack I/O Base Selector	0	7
%SR64	SS_STATUS	SmartStack I/O Base Status	0	2
%SR65-76	SS_INFO_1	SmartStack I/O Module #1 Information Structure	-	-
%SR77-88	SS_INFO_2	SmartStack I/O Module #2 Information Structure	-	-
%SR89-100	SS_INFO_3	SmartStack I/O Module #3 Information Structure	-	-
%SR101-112	SS_INFO_4	SmartStack I/O Module #4 Information Structure	-	-
%SR113-114	GOBJ_SIZE	Graphics Object Table Size	8	256K
%SR115-116	GSTR_SIZE	Graphics String Table Size	8	128K
%SR117-118	GBMP_SIZE	Graphics Bitmap Table Size	4	256K
%SR119-120	GTX_T_SIZE	Graphics Text Table Size	8	128K
%SR121-122	GFNT_SIZE	Graphics Font Table Size	8	256K
%SR123-124	PROT_SIZE	Protocol Table Size	16	64K
%SR125	GOBJ_CRC	Graphics Object Table CRC	0	65535
%SR126	GSTR_CRC	Graphics String Table CRC	0	65535
%SR127	GBMP_CRC	Graphics Bitmap Table CRC	0	65535
%SR128	GTX_T_CRC	Graphics Text Table CRC	0	65535
%SR129	GFNT_CRC	Graphics Font Table CRC	0	65535
%SR130	PROT_CRC	Protocol Table CRC	0	65535
%SR131-163	Reserved	-	-	-
%SR164.3		Read bit indicating Auto Restore of Register Data has been performed (Fail Safe)		
%SR164.4		Read bit indicating Backup of Register Data has been performed (Fail Safe)		
%SR164.5		Enable AUTORUN (Fail Safe)		
%SR164.6		Enable AUTOLOAD (Fail Safe)		
%SR164.7		Backup trigger bit		
%SR164.8		Clear Backup trigger bit		
%SR164.9		MAKE_CLONE trigger bit		
%SR164.10		LOAD_CLONE trigger bit		
%SR164.11		Status indicating Make Clone Fail (This bit goes high when Make / Create clone fails)		
%SR164.12		Status indicating Load Clone Fail (This bit goes high when Load clone fails)		
%SR165-174	Reserved			
%SR175	Removable Media	Current Removable Media interface status	0	6
%SR176-177	Removable Media	Indicates free space on the Removable Media card in bytes.	0	2 ³¹
%SR178-179	Removable Media	Indicates the total card capacity in bytes.	0	2 ³¹
%SR180	Reserved	-	-	-
%SR181	ALM_UNACK	Unacknowledged Alarm (high bit indicates what group #)		
%SR182	ALM_ACT	Active Alarm (high bit indicates what group #)		
%SR183	SYS_BEEP	System Beep Enable (0=disabled; 1=enabled)		
%SR184	USER_BEEP	Software configurable (0=OFF; 1=ON)		
%SR185	SCR_SAVER	Screen Saver Enabled (0=disabled; 1=enabled)		
%SR186	SCR_SA_TM	Screen Saver Time in minutes (delay)		
%SR187	NET_USE	Average Net Usage of all units on the CAN network		
%SR188	NET_MIN	Minimum Net Usage of all units on the CAN network		

Table 11.2 – %SR Registers				
Register	Name	Description	Min Val	Max Val
%SR189	NET_MAX	Maximum Net Usage of all units on the CAN network		
%SR190	NT_TX_AVG	Average Net Usage of this unit		
%SR191	NT_TX_MIN	Minimum Net Usage of this unit		
%SR192	NT_TX_MAX	Maximum Net Usage of this unit		

For additional information on system bits and registers, refer to the on-line help found in Cscape.

11.3 Register Map for RCC I/O

Registers	Description
%I1 to %I8	Digital Inputs
%I9 to %I15	Reserved
%I16	%Q Fault Status
%Q1 to %Q4	Digital outputs
%AI1 to %AI8	Analog inputs
%AQ1 to %AQ4	Analog outputs

11.4 Resource Limits

Table 11.4 – Resource Limits	
Resource	Value
%S	13
%SR	192, 200-205
%T	2048
%M	2048
%R	4096
%K	5
%D	1023
%I	2048
%Q	2048
%AI	512
%AQ	512
%IG	64 (per ID)
%QG	64 (per ID)
%AIG	32 (per ID)
%AQG	32 (per ID)
Ethernet	CsCAN, Ping, EGD, SRTP, Modbus TCP Master (Downloadable protocol) & Slave, Ethernet IP, FTP, or HTTP @ 10 MBd or 100 MBd
CsCAN	125 kBd, 250 kBd, 500 kBd, or 1 MBd
Serial Ports	2 RS-232 / RS-485 Ports. Software Selectable.
IDs Per CsCAN Network	64 w/o repeat (253 w/ 3 repeaters)
Ladder Code	128 KB

CHAPTER 12: MAINTENANCE

12.1 Firmware Updates

The RCC products contain field updatable firmware to allow new features to be added to the product at a later time. Firmware updates should only be performed when a new feature or correction is required.

Warning: Firmware updates should only be performed when the equipment being controlled by the RCC is in a safe, non-operational state. Communication or hardware failures during the firmware update process can cause the controller to behave erratically resulting in injury or equipment damage. Make sure the functions of the equipment work properly after a firmware update before returning the device to an operational mode.

Load switch

1. Pressing the **LOAD** switch during power-up boots from the Micro SD card. This starts a Firmware Load if the Micro SD is bootable and valid firmware files are found on it.
2. After boot-up, pressing the **LOAD** switch for 3 seconds either starts a Firmware Load or an Application Load depending upon what files are found on the Micro SD. If firmware files are found, a Firmware Load is performed. If firmware files are not found and the DEFAULT.PGM file is found, an Application Load is performed.

CHAPTER 13: TROUBLESHOOTING / TECHNICAL SUPPORT

Chapter 13 provides commonly requested **troubleshooting information and checklists** for the following topics.

- Connecting to the RCC controller
- Local controller and local I/O
- CsCAN Network
- Removable media

In the event that this information is not enough, please contact Technical Support at the locations indicated at the end of this chapter.

LED - NORMAL FUNCTIONALITY

LED	Off	ON	Flash (1Hz)
PWR	No power applied	10-30Vdc applied	
OK	Self test fail	Self test pass	I/O forcing enabled.
RUN	Stop mode	Run Mode	Do I/O Mode.

LED Load Program/Firmware Functionality

LED OK & RUN	Flashing Alternately	Flashing Together	Flashing Stops
Load program or firmwre	Download in Progress	Download fails, number of flashes indicates the error.	Download Complete, unit reboots (allow 30 seconds).

Switch - Normal Functionality

Load switch

- Used for firmware updated, as noted in previous section

Run/Stop switch

1. After boot-up, pressing the **RUN/STOP** switch for 3 seconds toggles the RCC between RUN and STOP modes.

Switch – Erase Program Function

LOAD and RUN/STOP

1. After boot-up, pressing both Load and RUN/Stop switches for 3 seconds performs an “Erase All” function, which deletes all application programs.

LED – Diagnostic Functionality

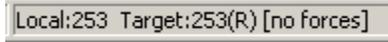
The leds are also used to indicate some fault conditions in the unit. The two leds OK and RUN will flash a number of times depending upon the fault. There will be a two second gap and the pattern will be repeated. The number of flashes and the associated error are as follows:

No. of flashes	Fault Meaning
2	The MAC ID is empty.
3	The internal MAC file is corrupt.
4	The MAC ID TXT file is invalid.
5	The MAC ID file is not found or the uSD card is empty or missing system files.

Diagnostic Led flashing table.

13.1 Connecting to the RCC

Cscape connects to the local controller automatically when the serial connection is made. The status bar below shows an example of a successful connection. This status bar is located in the bottom right hand corner of the Cscape window.



In general the **Target** number should match the **Local** number. The exception to this is when the controller is being used as a "pass through" unit where other controllers on a CsCAN network could be accessed through the local controller.

Determine connection status by examining feedback next to **Local & Target** in the status bar of Cscape.

Local: ###	If a number shows next to Local then communication is established to the local controller.
Local: No Port	Cscape is unable to access the COM port of the PC. This could mean that Cscape is configured for a COM port that is not present or that another program has control of the COM port. Only one Cscape window can access a port at a time. Subsequent instances of Cscape opened will indicate No Port.
Local: No Com	Cscape has accessed a PC COM port, but is not communicating with the controller. This typically occurs when the controller is not physically connected.
Local: ???	Unknown communication error. Close Cscape, power cycle the controller and reopen Cscape with a blank project. Check Local.
Target: #(I,R,D)	If I (idle), R (run), or D (do I/O) shows next to Target number then communication is established to the target controller.
Target: #(?)	Communication is not established to the target controller. Check node ID of controller and set Target to match. Make sure local connection is established.

Table 12.1 – Cscape Target & Local Numbers

13.1.1 Connecting Troubleshooting Checklist (serial port – MJ1 Programming)

1. Programming and debugging must use MJ1.
2. Controller must be powered up.
3. Ensure that the correct COM port is selected in Cscape. **Tools→Editor Options→Communications Port.**
4. Ensure that a straight through (non-null modem) serial cable is being used between PC and controller port MJ1. (proper adapter programming cable alleviates this)

5. Check that a Loaded Protocol or ladder is not actively using MJ1. Using the **STOP** recessed button on the controller will make MJ1 available to Cscape.
6. Make sure the COM port of the PC is functioning. An RS232 serial loopback and Microsoft HyperTerminal can determine positively if the COM port is working. Or connect to an alternate device to determine if the port is working.
7. Successful communications with USB-to-serial adapters vary. If in doubt, Horner APG offers a USB to serial adapter. Part number HE500USB600.

13.1.2 Connecting Troubleshooting Checklist (ETN port programming)

1. Programming and debugging must use MJ1 or Ethernet Port.
2. Controller must be powered up.
3. Ensure that correct IP address is given in the Ethernet field and correct Mode is selected, in Cscape: **Tools→Editor Options→Communications Port**
4. Ensure that the Ethernet Cable is connected between the controller and the Ethernet Hub.
5. Make sure the Ethernet cable is functioning properly.

13.2 Local Controller and Local I/O

The system menu provides the following status indications that are useful for troubleshooting and system maintenance.

- Self-test results, diagnostics.
- RUN and OK status
- Network status and usage
- Average logic scan rate
- Application memory usage
- Loaded firmware versions
- Loaded protocols
- Removable media access

WARNING: Setting outputs ON in Do I/O mode can result in injury or cause machinery to engage in an unsafe manner depending on the application and the environment.

13.3 CsCAN Network

For complete information on setting up a CsCAN network, refer to CAN Networks manual (MAN0799) by visiting the Horner websites for the address to obtain documentation and updates.

Network status, node ID, errors, and baud rate in the controller system menu are all in reference to the CsCAN network. These indications can provide performance feedback on the CsCAN network and can also be used to aid in troubleshooting.

13.3.1 CsCAN Network Troubleshooting Checklist

1. Use the proper Belden wire type or equivalent for the network as specified in MAN0799.
2. The RCC does not provide 24VDC to the network. An external voltage source must be used for other devices such as SmartStix I/O.
3. Check voltage at both ends of the network to insure that voltage meets specifications of attached devices.
4. Proper termination is required. Use 121-ohm (or 120-ohm) resistors at each end of the network. The resistors should be placed across the CAN_HI and CAN_LO terminals.
5. Measure the resistance between CAN_HI and CAN_LO. If the network is properly wired and terminated there should be around 60 ohms.
6. Check for duplicate node ID's.

7. Keep proper wires together. One twisted pair is for V+ and V- and the other twisted pair is used for CAN_HI and CAN_LO.
8. Make sure the baud rate is the same for all controllers on the network.
9. Assure shields are connected at one end of each segment -- they are not continuous through the network.
10. Do not exceed the maximum length determined by the baud rate and cable type.
11. Total drop length for each drop should not exceed 6m (20 feet). A drop may include more than one node. The drop length adds to the overall network length.
12. Network should be wired in "straight line" fashion, not in a "star" pattern.
13. In applications requiring multiple power supplies, make sure the V- of all supplies is connected together and to earth ground at one place only.
14. In some electrically noisy environments it may be necessary to add repeaters to the network. Repeaters can be used to add additional nodes and/or distance to the network and protect the signal against noisy environments. The Horner APG repeater is part # HE200CGM100.\

13.4 Removable Media - Basic Troubleshooting

Description	Action
RCC does not read media card.	Attempt to reformat MicroSD card on PC
RCC will not download project file.	Make sure the project file is saved as a .pgm file and not a .csp file. In addition, to file must be .pgm, the file's I/O configuration must match the RCC configuration for it to download.

Table 19.2 – Removable Media Troubleshooting

13.5 Technical Support Contacts

For manual updates and assistance, contact Technical Support at the following locations:

North America:

Tel: 1-877-665-5666

Fax: (317) 639-4279

www.heapg.com

Email: techspt@heapg.com

Europe:

Tel: (+) 353-21-4321-266

Fax: (+353)-21-4321826

www.horner-apg.com

Email: tech.support@hornerapg.com

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