

# User's Manual PLC09 Arbitrator Unit Modbus<sup>1</sup> Interface

Calta Computer Systems Limited  
Firmware Revision 1.83 – July 28, 2003

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## 1.0 Introduction

The MODBUS Interface Unit is equipped with four serial asynchronous ports. It is designed to connect between the serial ports of three host computers and a MODICON PLC or Modbus device. The Interface unit's software allows access to the controller on a round robin basis. If one host is currently accessing the controller and a request is received from another other host, its request is queued until the initial host's interrogation and subsequent PLC response is complete. The unit is equipped with battery backed up RAM which holds the configurable parameters.

### 1.1 Features

- Power Up Check* Upon power up, the unit checks EPROM and RAM memory for validity. If a fault occurs, the LED on the front of the unit will blink once every 1.5 seconds for an EPROM problem, twice every 2.0 seconds for a RAM problem, and three times every 2.5 seconds if the default configuration has been restored. If there are no errors, the LED is on steady if characters are not being output to a PLC (or as configured). If the LED is out, and the unit is not in configuration mode, the unit is faulty.
- Message Detection* The unit uses time-outs to determine the end of messages. Messages are checked for all station requests that don't invoke a response from the controller.
- Protocols* The unit can be configured to communicate with all hosts in ASCII protocol, RTU protocol, or to one host in RTU protocol, and the other two hosts in ASCII protocol. In the latter case, the unit converts the ASCII to RTU protocol.
- Output Indication* If the power up checks indicate that RAM and EPROM are fine, the LED on the front panel goes on steady. However, the front LED can be configured to indicate output is currently in progress via one of the ports. A parameter is available to select which port output to monitor using the LED.
- Programming Lock* A configurable option allows host ports to be locked out if another host port is issuing programming commands to the PLC. Note - Some Modicon PLC internal status commands are considered programming commands so this feature

should be used with caution.

*RTS Control*

Host port 1 can control RTS for a 202 type modem or Radio in order to turn carrier on/off.

## 2.0 Installation

### 2.1 General

The rear of the MODBUS Interface Unit contains four female connectors, a male connector, and a pushbutton switch. The first connector (a dc power jack) on the left is for power (9 to 15 volts D.C.). Next is the pushbutton used for initiating the configuration mode. This is followed by a telco RJ12 connector for Host 3. The third connector (male 9 pin) is for connection to the Modicon PLC or Modbus device. The remaining two female 9 pin connectors are for Hosts 2 and 1 respectively. The Host 1 connection is also used for configuration.

For MODBUS ASCII protocol all ports can be configured for 1 start bit, 7 data bits, even or odd parity, and 1 or 2 stop bits. For MODBUS RTU protocol, all ports can be configured for 1 start, 8 data, even, odd, or no parity and 1 or 2 stop bits.

The current default rate for all four ports is 9600 baud. Each port baud rate can be configured for 110, 300, 1200, 2400, 4800, 9600, and 19200 baud.

## 2.2 Port Connector Pin Assignment

### 2.2.1 HOST 1/CONFIG. (9 pin female DB9 connector)

- Pin 2 RX data (input)
- Pin 3 TX data (output)
- Pin 4 DTR (output) Held high through 3 K. res. to 5 V.
- Pin 5 Ground
- Pin 7 RTS (output)

### 2.2.2 HOST 2 (9 pin female DB9 connector)

- Pin 2 RX data (input)
- Pin 3 TX data (output)
- Pin 4 DTR (output) Held high through 3 K. res. to 5 V.
- Pin 5 Ground

### 2.2.3 PLC (9 pin male DB9 connector)

- Pin 2 RX data (input)
- Pin 3 TX data (output)
- Pin 4 DTR (output) Held high through 3 K. res. to 5 V.
- Pin 5 Ground
- Pin 7 RTS (output)

### 2.2.4 HOST 3 (6 pin Telco RJ-12)

- Pin 1 Ground
- Pin 2 DTR (output)
- Pin 3 RX data (input)
- Pin 4 TX data (output)

### 2.2.5 DC POWER (female DC power jack 2.5mm)

- Tip 9 to 15 VDC (24 VDC optional)
- Ring Ground

### 3.0 Mode of Operation

The MODBUS Interface Unit utilises time-outs to determine the end of request and response messages. It assumes the start of a message as soon as the first character is received from a host, and calls the message complete whenever the inter character time exceeds a configurable value or a response is received from the Modicon PLC or Modbus device. The unit uses an internal 1 millisecond clock to resolve time-outs. There are separate time-outs that can be altered for each port.

The message from a host to the PLC is checked to determine if it is a broadcast type (all station). If it is a broadcast type, no response is expected. If it is not, a safety timer is invoked to abort the request in case the PLC does not respond. This default time-out value is set to 10 seconds (10000 milliseconds) and can be altered.

The unit does not expect a response from the PLC for messages of less than three characters from a host.

There is a configurable option to detect a programming message with a function code of 9,13,18, or 126 on a host port. If this option is selected "ON", messages from other host ports will be ignored for ten (10) seconds to allow for uninterrupted multiple programming messages. Each subsequent programming message will extend the lock out.

## 4.0 Configuration

Parameters such as time-outs, protocol type, and baud rates may be altered in the unit via the Host 1 port and saved in battery backed up Random Access Memory (RAM). Any terminal or PC equipped with a terminal emulator package may be used to respond to the configuration dialog. The default configuration baud rate is 9600 and an asynchronous format of 1 start, 8 data, and 1 stop bit. The configuration software handles X-ON/X-OFF flow control. A stand-alone DOS software program (TERM.EXE) supplied with the unit on 3-½ inch floppy disk will allow configuration from a PC with a serial communication port. TERM.EXE will work under DOS and the DOS prompt under Windows 3.1, 95, and 98. It will not work under NT or 2000. For NT and 2000, the file PLC09.HT is supplied for use in configuring HyperTerminal which replaces TERM.EXE. HyperTerminal is included without charge with Windows 95/98/NT/2000. See TERM.TXT and PLC09.TXT on the supplied Terminal Emulator floppy disk for operating instructions with TERM.EXE and HyperTerminal respectively.

Pressing the pushbutton (for approximately 1 second) on the back of the unit until the Front Panel Led is extinguished will put the unit into configuration mode. At this time the message "PLC09 MODBUS ARBITRATOR – 2000-DEC-20 REV. 1.8 CONFIGURATION MODE - PRESS ENTER OR CR TO PROCEED, CONTROL R TO RESET TO UNIT DEFAULT PARAMETERS, OR ESCAPE TO RETURN TO NORMAL OPERATION" is repeatedly sent out the Host 1 port. If the message is sent out ten times without a response, the unit will return to Normal Operation automatically. Once "ENTER" is input the configuration dialog begins.

The configuration method is of the question and answer type. The description of the configurable parameter and it's current value followed by a "?" is output. If the value is only to be viewed, pressing carriage return or "ENTER" will leave the value unaltered and display the next parameter or pressing "CONTROL B" will display the previous parameter. If the value is to be altered, the new value is typed, followed by "ENTER". Typing the "BACKSPACE" or "DELETE" keys can erase erroneous input.

After configuration is complete or to abort the dialog at any time, the "ESCAPE" key should be pressed. The message "RETURNING TO NORMAL OPERATION!" will be output and the unit will begin operation with the new parameters.

If "CONTROL R" rather than "ENTER" is pressed, the message "RESTORE DEFAULT CONFIGURATION (Y,N)?" is asked. If "Y" followed by "ENTER" is entered, the unit will reset all its parameters to the default values.

#### 4.1 HOST 1 INTER CHAR. AND MSG. COMPL. T.O.

This parameter is the inter character time-out for messages from Host 1 to the PLC. The minimum value should be at least 3 times the time to receive a single character from the host. For instance, if the baud rate is 9600, and the host can send characters continuously, a value of 3 should be sufficient. If the host does not send characters at this rate, the time-out's value should be increased accordingly. This value should be made larger than required as it is mainly to start the response safety timer if the "HOST 1 CHARS. O/P TO PLC" option is not selected. If the complete message is passed to the PLC, and the timer is still active and the PLC responds, the unit will automatically assume the message was complete anyway. However, if the "HOST 1 CHARS. O/P TO PLC" option is selected (section 4.21), this time-out determines when to begin sending the buffered message to the PLC and in this case should not be made larger than required. Values from 1 to 9999 milliseconds are allowed.

The current default time-out is 100 milliseconds.

#### 4.2 HOST 2 INTER CHAR. AND MSG. COMPL. T.O.

This parameter is the inter character time-out for messages from Host 2 to the PLC. The minimum value should be at least 3 times the time to receive a single character from the host. For instance, if the baud rate is 9600, and the host can send characters continuously, a value of 3 should be sufficient. If the host does not send characters at this rate, the time-out's value should be increased accordingly. This value should be made larger than required as it is mainly to start the response safety timer if the "HOST 2 CHARS. O/P TO PLC" option is not selected. If the complete message is passed to the PLC, and the timer is still active and the PLC responds, the unit will automatically assume the message was complete anyway. However, if the "HOST 2 CHARS. O/P TO PLC" option is selected (section 4.22), this time-out determines when to begin sending the buffered message to the PLC and in this case should not be made larger than required. Values from 1 to 9999 milliseconds are allowed.

The current default time-out is 100 milliseconds.

### 4.3 HOST 3 INTER CHAR. AND MSG. COMPL. T.O.

This parameter is the inter character time-out for messages from Host 3 to the PLC. The minimum value should be at least 3 times the time to receive a single character from the host. For instance, if the baud rate is 9600, and the host can send characters continuously, a value of 3 should be sufficient. If the host does not send characters at this rate, the time-out's value should be increased accordingly. This value should be made larger than required as it is mainly to start the response safety timer if the "HOST 3 CHARS. O/P TO PLC" option is not selected. If the complete message is passed to the PLC, and the timer is still active and the PLC responds, the unit will automatically assume the message was complete anyway. However, if the "HOST 3 CHARS. O/P TO PLC" option is selected (section 4.23), this time-out determines when to begin sending the buffered message to the PLC and in this case should not be made larger than required. Values from 1 to 9999 milliseconds are allowed.

The current default time-out is 100 milliseconds.

### 4.4 PLC INTER CHAR. AND MSG. COMPL. T.O.

This parameter is the message complete time-out from the PLC to a host. It's value should be the larger of the inter character time-outs from the PLC to the unit or from the unit to either host. The time-out will be aborted if the host currently receiving a message from the PLC sends another message immediately. However, if this is the case, and another host has a pending message, it will gain access to the PLC. Values from 1 to 9999 milliseconds are allowed.

The current default time-out is 100 milliseconds.

### 4.5 HOST 1 RATE

This parameter is used to set the baud rate from Host 1 to the unit. Values allowed are 110, 300, 600, 1200, 2400, 4800, 9600, and 19200 baud.

The current default rate is 9600 baud.

#### 4.6 HOST 2 RATE

This parameter is used to set the baud rate from Host 2 to the unit. Values allowed are 110, 300, 600, 1200, 2400, 4800, 9600, and 19200 baud.

The current default rate is 9600 baud.

#### 4.7 HOST 3 RATE

This parameter is used to set the baud rate from Host 2 to the unit. Values allowed are 110, 300, 600, 1200, 2400, 4800, 9600, and 19200 baud.

The current default rate is 9600 baud.

#### 4.8 PLC RATE

This parameter is used to set the baud rate from the PLC to the unit. Values allowed are 110, 300, 600, 1200, 2400, 4800, 9600, and 19200 baud.

The current default rate is 9600 baud.

#### 4.9 PLC PROTOCOL - RTU (0), ASCII (1)

This parameter specifies the protocol from the unit to the PLC. If ASCII protocol is selected, all three hosts must also communicate in Ascii protocol. If RTU protocol is selected, Host 1 must communicate in RTU protocol and Hosts 2 and 3 can communicate in either RTU or ASCII protocol.

The current default type is 0 (RTU protocol).

#### 4.10 PLC RTU FORMAT 8 DATA

This option is available only if the unit has been configured for RTU protocol (section 4.9). For RTU protocol, the unit can only communicate to the PLC with a format of 1 start, 8 data, odd, even, or no parity, and 1 or 2 stop bits.

The current default is 0 (1 start, 8 data, even parity, and 1 stop bit).

#### 4.11 PLC ASC. FORMAT 7 DATA

This option is available only if the unit has been configured for ASCII protocol (section 4.9). For ASCII protocol, the unit can only communicate to the PLC with a format of 1 start, 7 data, odd, or even parity, and 1 or 2 stop bits.

The current default is 0 (1 start, 7 data, even parity, and 1 stop bit).

#### 4.12 HOST 1 RTU FORMAT 8 DATA

This option is available only if the unit has been configured for RTU protocol (section 4.9). For RTU protocol, Host 1 can only communicate to the unit with a format of 1 start, 8 data, odd, even, or no parity, and 1 or 2 stop bits.

The current default is 0 (1 start, 8 data, even parity, and 1 stop bit).

#### 4.13 HOST 1 ASC. FORMAT 7 DATA

This option is available only if the unit has been configured for ASCII protocol (section 4.9). For ASCII protocol, Host 1 can only communicate to the unit with a format of 1 start, 7 data, odd, or even parity, and 1 or 2 stop bits.

The current default is 0 (1 start, 7 data, even parity, and 1 stop bit).

#### 4.14 HOST 2 PROTOCOL - RTU (0), ASCII (1)

This option is only available if the unit has been configured for RTU protocol (section 4.9). If the unit has been configured to communicate with the PLC using RTU protocol, it is possible to configure the Host 2 port to communicate with the PLC using ASCII or RTU protocol. If ASCII is selected, the unit will translate the host's protocol to RTU to the PLC and vice versa. If the unit detects a LRC error, it will invalidate the computed CRC passed on to the PLC and vice versa. Selecting RTU protocol results in the messages from Host 2 being passed on unaltered.

The current default is 0 (RTU protocol).

#### 4.15 HOST 2 RTU FORMAT 8 DATA

This option is available only if the unit has been configured for RTU protocol (section 4.9). For RTU protocol, Host 2 can only communicate to the unit with a format of 1 start, 8 data, odd, even, or no parity, and 1 or 2 stop bits.

The current default is 0 (1 start, 8 data, even parity, and 1 stop bit).

#### 4.16 HOST 2 ASC. FORMAT 7 DATA

This option is available if the unit has been configured for either RTU or ASCII protocol (section 4.9). Host 2 can only communicate to the unit with a format of 1 start, 7 data, odd, or even parity, and 1 or 2 stop bits.

The current default is 0 (1 start, 7 data, even parity, and 1 stop bit).

#### 4.17 HOST 3 PROTOCOL - RTU (0), ASCII (1)

This option is only available if the unit has been configured for RTU protocol (section 4.9). If the unit has been configured to communicate with the PLC using RTU protocol, it is possible to configure the Host 3 port to communicate with the PLC using ASCII or RTU protocol. If ASCII is selected, the unit will translate the host's protocol to RTU to the PLC and vice versa. If the unit detects a LRC error, it will invalidate the computed CRC passed on to the PLC and vice versa. Selecting RTU protocol results in the messages from Host 3 being passed on unaltered.

The current default is 0 (RTU protocol).

#### 4.18 HOST 3 RTU FORMAT 8 DATA

This option is available only if the unit has been configured for RTU protocol (section 4.9). For RTU protocol, Host 3 can only communicate to the unit with a format of 1 start, 8 data, odd, even, or no parity, and 1 or 2 stop bits.

The current default is 0 (1 start, 8 data, even parity, and 1 stop bit).

#### 4.19 HOST 3 ASC. FORMAT 7 DATA

This option is available if the unit has been configured for either RTU or ASCII protocol (section 4.9). Host 3 can only communicate to the unit with a format of 1 start, 7 data, odd, or even parity, and 1 or 2 stop bits.

The current default is 0 (1 start, 7 data, even parity, and 1 stop bit).

#### 4.20 PLC RESPONSE SAFETY T.O.

The unit checks all messages from a host to see if they are of the all station type. If they are, a response is not expected. If a response is expected, a safety timer is invoked to abort a request in case a response is not received. The time-out value is the time in milliseconds until the first character is received from the PLC after a message is sent.

The current default time-out is 10000 milliseconds.

#### 4.21 HOST 1 CHARS. O/P TO PLC

The unit ordinarily sends out characters to the Modicon PLC or Modbus device from a host as soon as received if another host is not active. The unit can however be made to wait for a complete message from a host before passing it out the PLC port. This will allow characters to be sent out the PLC port without inter character gaps which may be introduced by a host. With RTU protocol, the newer MODICON PLCs will only tolerate a 3 character inter character time-out before invalidating a request. If the "WHEN ALL RECVD." option is selected, characters begin to be sent to the PLC only upon expiration of a particular host's inter character time-out. If the host baud rate is less than that to the PLC, the "WHEN ALL RECVD." must be selected for newer PLCs.

The current default is 0 (AS RECVD.).

#### 4.22 HOST 2 CHARS. O/P TO PLC

The unit ordinarily sends out characters to the MODICON PLC or Modbus device from a host as soon as received if the other host is not active. The unit can however be made to wait for a complete message from a host before passing it out the PLC port. This will allow characters to be sent out the PLC port without inter character gaps which may be introduced by a host. With RTU protocol, the newer MODICON PLCs will only tolerate a 3 character inter character time-out before invalidating a request. If the "WHEN ALL RECVD." option is selected, characters begin to be sent to the PLC only upon expiration of a particular host's inter character time-out. If the host baud rate is less than that to the PLC, the "WHEN ALL RECVD." must be selected for newer PLCs.

The current default is 0 (AS RECVD.).

#### 4.23 HOST 3 CHARS. O/P TO PLC

The unit ordinarily sends out characters to the MODICON PLC or Modbus device from a host as soon as received if the other host is not active. The unit can however be made to wait for a complete message from a host before passing it out the PLC port. This will allow characters to be sent out the PLC port without inter character gaps which may be introduced by a host. With RTU protocol, the newer MODICON PLCs will only tolerate a 3 character inter character time-out before invalidating a request. If the "WHEN ALL RECVD." option is selected, characters begin to be sent to the PLC only upon expiration of a particular host's inter character time-out. If the host baud rate is less than that to the PLC, the "WHEN ALL RECVD." must be selected for newer PLCs.

The current default is 0 (AS RECVD.).

#### 4.24 HOST 1 CONFIGURATION RATE

This parameter is used to set the default baud rate from Host 1 to a terminal or PC for configuring the unit. This is a completely separate parameter from the "HOST 1 RATE" in section 4.5. When the configuration pushbutton is pressed, this parameter selects the baud rate at which the unit will communicate. Values allowed are 110, 300, 600, 1200, 2400, 4800, 9600, and 19200 baud.

The current default rate is 9600 baud.

#### 4.25 LED O/P

As a diagnostic aid, the front panel LED can be used for indicating when characters are being sent out one of the four ports. If characters are being sent, the LED will blink 10 times a second. It will continue to blink up to 1 second after a character is sent. Specifying "NONE" can disable this feature.

The default condition is 0 (PLC port output monitoring).

#### 4.26 PROGRAMMING PLC LOCKOUT

This option allows the unit to detect a programming message with a function code of 9,13,18, or 126 on a host port if selected "ON". When a programming message is detected, messages from another Host port will be ignored for ten (10) seconds to allow for uninterrupted multiple programming messages. Each subsequent programming message will extend the lock out. Caution is required when enabling this feature, as some Modicon PLC internal status requests are interpreted as programming commands.

The default condition is 0 (OFF, which means the unit will not detect programming messages in order to lockout a Host).

#### 4.27 HOST 1 RTS CONTROL - OFF (0), ON (1)

This option allows RTS to be set high (modem carrier on) during output from the Arbitrator to Host 1. Option 4.28 sets the time from RTS going high until the first character of a PLC response is sent out the Host 1 port. This time can be used for 202-modem carrier stabilisation before transmission occurs. Option 4.29 sets the time from the last bit transmitted until RTS is turned off. If control is OFF, RTS is always asserted.

The default option is 0 (OFF).

#### 4.28 RTS TO HOST 1 TX DELAY T.O.

This option is only available if option 4.27 is selected ON. This timeout specifies the time to begin sending characters to Host 1 after RTS is set high. RTS is set high when the first character of a response from the PLC is received and is not set low (modem carrier off) until all characters are sent out plus an additional time specified in option 4.29. Timeout values from 1 to 2000 milliseconds may be specified.

The default timeout is 1 millisecond.

#### 4.29 RTS TO HOST 1 OFF DELAY T.O.

This option is only available if option 4.27 is selected ON. This timeout specifies the time to drop RTS after the last bit is transmitted. Timeout values from 2 to 255 milliseconds may be specified.

The default timeout is 2 milliseconds.

#### 4.30 HIGHEST VALID PLC NO.

The unit can be configured to wait for replies only from a selected range of PLC addresses. This option specifies the largest PLC address for which the Arbitrator can expect a response. The message is sent out the PLC port, but the unit does not wait for a reply. This option is important when a Host port is on a multidrop communications link.

The highest valid PLC address is 255. The default range of PLC addresses is from 0 (see section 4.31) to 255.

#### 4.31 LOWEST VALID PLC NO.

The unit can be configured to wait for replies only from a selected range of PLC addresses. This option specifies the lowest PLC address for which the Arbitrator can expect a response. This option is important when a Host port is on a multidrop communications link.

The default lowest valid PLC address is 0. The default range of PLC addresses is from 0 to 255 (see section 4.30).

#### 4.32 PLC RTS CONTROL - OFF (0), ON (1)

This option allows RTS to be set high (modem carrier on) during output from the Arbitrator to the PLC. Option 4.33 sets the time from RTS going high until the first character of a PLC response is sent out the PLC port. This time can be used for 202-modem carrier stabilisation before transmission occurs. If control is OFF, RTS is always asserted. The default option is 0 (OFF).

#### 4.33 RTS TO PLC TX DELAY T.O.

This option is only available if option 4.32 is selected ON. This timeout specifies the time to begin sending characters to the PLC after RTS is set high. RTS is set high when the first character of a message for the PLC is received and is not set low (modem carrier off) until all characters are sent out plus an additional time specified by option 4.34 has elapsed. Timeout values from 1 to 2000 milliseconds may be specified.

The default timeout is 1 millisecond.

#### 4.34 RTS TO PLC OFF DELAY T.O.

This option is only available if option 4.32 is selected ON. This timeout specifies the time to drop RTS after the last bit is transmitted. Timeout values from 2 to 255 milliseconds may be specified.

The default timeout is 2 milliseconds.

#### 4.35 UNSOLICITED HOST

This option allows unsolicited characters received on the PLC port to be sent to a designated Host. Host ports 1, 2, or 3 can be selected.

The default option is 0 (no Hosts selected) and unsolicited characters are ignored.

#### 4.36 IGNORE HOST 1 COMMAND MSG

This option allows all command messages (function codes 5, 6, 15, and 16) to be invalidated from Host 1. The Arbitrator still sends the message out the PLC port, but invalidates the CRC code. This feature can be turned ON (1) or OFF (0).

The default option is 0 (OFF).

#### 4.37 IGNORE HOST 2 COMMAND MSG

This option allows all command messages (function codes 5, 6, 15, and 16) to be invalidated from Host 2. The Arbitrator still sends the message out the PLC port, but invalidates the CRC code. This feature can be turned ON (1) or OFF (0).

The default option is 0 (OFF).

#### 4.38 IGNORE HOST 3 COMMAND MSG

This option allows all command messages (function codes 5, 6, 15, and 16) to be invalidated from Host 3. The Arbitrator still sends the message out the PLC port, but invalidates the CRC code. This feature can be turned ON (1) or OFF (0).

The default option is 0 (OFF).

#### 4.39 PRIORITY HOST

This option allows a Host to be designated as a priority Host. This means as long as the priority Host is active it is allowed exclusive use of the PLC port. Once the priority Host port is idle for the timeout specified by item 4.40, other Hosts can access the PLC port. Host ports 1, 2, or 3 can be selected as priority.

The default option is 0 and therefore no Host is selected as the priority one.

#### 4.40 PRIORITY HOST T.O.

This option sets the time out for a priority Host port. This option is only available if option 4.39 has a priority Host (1, 2, or 3). For example, if Host 1 is selected as the priority one, messages from Hosts 2 and 3 will be ignored once Host 1 sends a message. If Host 1 ceases to send messages for the duration of this timeout, the lock out will be disabled until Host 1 begins sending messages again.

The default timeout is 15000 milliseconds.

#### 4.41 1<sup>ST</sup> RX CHAR. MATCH 1<sup>ST</sup> TX CHAR. – OFF (0), ON (1)

This option when selected ON allows the PLC09 to begin passing PLC receive characters to a Host when the first transmitted character matches a receive character. This option is only available if option 4.42 is not selected ON.

The default value for this option is 0 (OFF - no match required).

#### 4.42 1<sup>ST</sup> RX CHAR. MATCH DESIG. CHAR. – OFF (0), ON (1)

This option when selected ON allows the PLC09 to begin passing PLC receive characters to a Host when a received character matches the entered designated receive character in option 4.43. This option is only available if option 4.41 is not selected ON.

The default value for this option is 0 (OFF - no match required).

#### 4.43 1<sup>ST</sup> RX CHAR. DESIGNATED CHAR.

This option is only available if option 4.42 is selected ON. It allows a designated match character to be specified. The character value is entered in decimal and is a number from 0 to 255.

The default designated character is 0.

## 5.0 Hardware

The MODBUS Interface Unit contains a HC68B09 Hitachi microprocessor, 8192 bytes of battery backed up RAM, 65536 bytes of EPROM (Erasable programmable read only memory), a status LED, and two 88C681 DUART (Dual universal asynchronous receiver/transmitter) used to communicate with the Hosts and PLC. Internal TTL to RS232C signal conditioning is provided by RS232 and RS237 interface ICs. Any D.C. voltage from 9 to 15 volts can power the standard unit. A calculator power supply rated at 9 volts D.C. and 500 milliamps is supplied. As an option, units can be supplied with 24 volt D.C. capability and a power cable is substituted for the calculator power supply.

All ICs are CMOS type allowing the unit to operate in a wide variance of operating conditions. The unit's current drain is 70 milliamps.

## 6.0 Radio Frequency Information

PLC09 ARBITRATOR has been tested and found to comply with the limits of a Class A computing device in accordance with the specifications in part 15 of the FCC rules, which are designed to provide reasonable protection against RF interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or TV reception, the following measures may be attempted:

- Reorient the antenna of the device detecting interference.
- Relocate the device away from the PLC09 ARBITRATOR.
- Use different branch outlets to power the device.

The booklet "HOW TO IDENTIFY AND RESOLVE RADIO-TV INTERFERENCE PROBLEMS" prepared by the FCC may also be helpful.

## **7.0 Contact Information**

For any further assistance and suggestions for future enhancements concerning the PLC09 ARBITRATOR - MODBUS INTERFACE please contact

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### 8.0 Cable Interconnect

