## Table of Contents

INTRODUCTION TO CATHODIC PROTECTION MONITORING ................................................................. 5  
FIELD MANAGER™ QUICK START GUIDE ......................................................................................... 6  
  - CONNECTING TO THE UNIT .................................................................................. 6  
  - COLLECT HISTORY BUTTON ........................................................................... 7  
  - VIEW/CONFIG BUTTON ..................................................................................... 8  
DATABASE – 60630 AND 60631 .................................................................................................... 9  
DATABASE 60630 ....................................................................................................................... 10  
  - OPERATIONS TAB ............................................................................................ 10  
  - INTERRUPTION TAB ......................................................................................... 13  
  - SATELLITE COMMUNICATIONS TAB ............................................................... 18  
  - OPERATIONS TAB ............................................................................................ 21  
CONFIGURATION ITEM LIST ....................................................................................................... 22  
EDITING THE LABELS.................................................................................................................. 24  
RECTIFIER MONITOR ................................................................................................................ 26  
TEST POINT MONITOR ............................................................................................................ 27  
TEST POINT MONITOR WITH CRITICAL BOND ....................................................................... 27  
EXTERNAL WIRING ................................................................................................................... 28  
GPS OPTION ............................................................................................................................. 29  
INSTALLATION ............................................................................................................................. 32  
  - AC SIDE INTERRUPTION ................................................................................... 33  
BASIC TROUBLE SHOOTING TECHNIQUES ............................................................................ 39  
APPENDIX A ............................................................................................................................... 40  
APPENDIX B ............................................................................................................................... 42  
APPENDIX C ............................................................................................................................... 44  
APPENDIX D ............................................................................................................................... 46  
APPENDIX E ............................................................................................................................... 48  
APPENDIX F ............................................................................................................................... 50  

This document pertains to XARTU™ firmware version v4.04/34 and GPS version v2.00/03. The Databases in this document are 60630 Revision 112112 with Edit Form Revision 8/23/2012 and 60631 Revision 112012 with Edit from Revision 8/23/2012.  

NOTE: All Cathodic Protection units require firmware v4.04/31 or later.
Cathodic Protection is a proven technology for preventing the corrosion of metal pipes and metal structures that are subjected to harsh environments or in direct contact with soil. The cathodic protection method uses a complex network of rectifiers and buried anodes to provide a specific voltage to the metal that requires corrosion protection. This network of power sources must be monitored to ensure proper operation. This monitoring is accomplished by monthly or annual manual inspections of predetermined test paths. The significant times between inspections has lead to significant exposure to corrosion during failed conditions. Electronic monitoring reduces this time between inspections from months to seconds and limits the exposure to corrosion resulting from failures by communicating the information back to a host the same day.
Field Manager™ Quick Start Guide

Connecting to the Unit

1. Start the Field Manager™ program on your laptop or host computer.

![Field Manager™ program interface]

2. Click the **Connect** button in the upper left corner, to establish communications with the unit, and enter the **Connection Type** as **Direct**, select the proper **Communications Port** being used by your computer and the **Baud Rate** according to the unit.

![Connect to Remote window]

3. Click **OK**

4. The screen will acknowledge that it connected, and return you to the modified start screen. Notice that the top of the screen displays the SiteID, Site Name and Database Type.
Collect History Button

The Collect History button receives the historical data from the remote unit. It also receives the Edit Form pages configured for the remote unit and will receive audit trail information if the Enable Audit Trail/Events upload during poll flag is set using the Security/Config button.

Note: You must be connected to the unit to perform this task.

To collect History data from the unit:

1. Click the Collect History button.

2. The Receiving History Data box appears and the historical data is stored.

3. The information on the Edit Form Pages will also be received. The Receiving Data box appears when the Edit Form information is being received.

4. You can now generate a report for the remote unit. You can also configure the unit using the Edit Form pages.
View/Config Button

The View/Config button can be used to receive and/or view information using the Edit Form Pages for the remote unit. It will also receive audit trail information if the Enable Audit Trail/Events upload during poll flag is set using the Security/Config button. When connected to the unit, information can be read allowing the user to configure typical parameters and send them to the remote unit.

To view information stored in the remote unit or configure the remote unit:
1. Click the View/Config Button.
2. The Select Remote Unit window appears if you are not connected to a remote unit.
3. Select the station to view and click OK. You may also double click the station. Click Cancel to abort. The Receiving Data box appears if you are connected to the unit.
4. The Edit Form pages window refreshes with the current information.

- Click the **Receive Page** button to receive the current information configured on the active page only.
- Click the **Receive All Pages** button to receive the current information for all Edit Form pages.
- Click the **Send All Changes** button to send all changes to the remote unit when made. Note that the Send All Changes button will turn red when changes are made to an Edit Form.
- Click the **Print** button to send the information on the active Edit Form page to the printer. Note that only the information that is viewed will be printed. Consider making the Field Manager™ window larger before printing.

### Database – 60630 and 60631

There are two databases for the Cathodic Protection units. The 60630 master is for the Rectifier Monitor and the 60631 master is for Test Point Monitoring and Test Point Monitoring with Critical Bond. The only difference between these two databases is the measurement interface. The interruption, communications, historical information, and operation options are identical. The edit forms for each master are very similar with only slight differences.
The Operations tab for the 60630 database shows instantaneous values for the RTU Date, RTU Time, Supply Voltage and Box Temperature from the last sample taken. The values under Rectifier #1 and Rectifier #2 are also instantaneous values from the last sample taken. The minimum and maximum values under Current Day Min/Max are collected from the current day’s measurements.

The Operations tab for the 60630 also has several input values that must be configured for each installation. When using a second Rectifier monitor, the Enable check box beside Rectifier #2 must be checked. The Analog Update Rate drop down menu can be changed to increase the rate at which the values are updated. This value is defaulted to 30 seconds which works with the sleep modes for most
installations. The two seconds update rate can be helpful when a faster update rate is desired, for instance, during installation or troubleshooting. The two shunt options are for defining the value for the rectifier’s shunt value. The drop down menu provides several common options. An edit box is available for nonstandard shunt values that require calculation. This calculation is performed by dividing the current in amps by the voltage in millivolts. The last option matches the firmware to the supply AC voltage. The possible Power Supply Volts are 120 and 240 VAC.

**Comm/Misc Config Tab**

![Comm/Misc Config Tab](image-url)
There are several combinations of settings regarding the communications and power options. The easiest and most reliable way to set these values is to use the Configuration Item List option to select the desired function group. The Configuration Item List is described later in this document. The Information Parameters block contains several items that tell the revision numbers for different parts of the product.

The Unit Parameters box contains items for configuring the processor board. The Wake Up Interval Sec. determines how often the unit will wake up to take a reading. Solar Charger On / Off is used to set up the on board solar charger. Ext. Disp On is used to turn on and off the external display; this can be used to conserve battery life.

The External Cell/Radio Wake Intervals box is used to configure cell/radio communications. This box contains fields to configure wake windows that will power up the radio/cell modem so that it will communicate at certain times. Along with wake windows there are also options on forcing communication equipment on, maximum wake minutes and sleep/wake settings.

The Information Parameters box gives information about the unit and database such as unit serial number, database revision, firmware version, RTU type, station power, sync time and edit form revision. This information can be useful when calling in for support.

The Unit Display box is used to configure the external display.

The Telephone Alarm Dial Out Number box is used to configure the modem.
The GPS Interruption function is divided into 5 sections. The first section titled **GPS Interruption Timing Parameters** contains the parameters that must be set for each interruption. The start date and stop date must be entered as MMDDYY. The start and stop time must be entered as HHMMSS and in military time. For example 4:57pm is 165700. To the right of the start and stop times are a group of check boxes labeled by the days of the week. Use these check boxes to select what days of the week the interruption should occur. See the sample below. Switch On is the time the interrupter allows protective current to flow to the pipe. Switch Off is the time the interrupter is actively preventing protection from reading the pipe. Both switch times are in milliseconds. As an example: setting Switch on to 2500 and Switch off to 500 produces an on time of 2.5 seconds and an off time of 0.5 seconds.

The term On refers to Cathodic Protection applied to the pipe. Off means the Cathodic Protection is interrupted.
Sample Interruption

The date for this example range from Sunday, April 22, 2012 to Saturday, May 5, 2012. Given the days selected interruption will occur between the hours of 8:30AM and 4:00PM on the following days:

Monday, April 23, 2012
Tuesday, April 24, 2012
Wednesday, April 25, 2012
Monday, April 30, 2012
Tuesday, May 1, 2012
Wednesday, May 2, 2012

There are some special items to note when setting the interruption period.

- Interruption will not occur on any other days with these settings. Also there will be no interruption from 4:00PM until 8:30AM of the following morning as is limited by the time selection.
- For near continuous interruption over the course of a day, set the start time to 1. This is 1 second after midnight. Set the stop time to 235959. Any setting wider than these values will have the same result. This forces a resynchronization each day at midnight. As a result there will be about a five second delay at midnight when the unit recalculates its values.
- During an interruption period if the GPS loses its sync with the satellite, the module will turn off the relay. This keeps the interrupter in question from corrupting the measurement of the entire pipe in question.
- The Switch On and Switch off times must be greater than 100 milliseconds and less than or equal to 60 seconds (60000 milliseconds).

The section titled **GPS Interruption Fixed Parameters** contains values that are generally set during installation to match the interruption hardware. The Switch On Adjust ms and Switch Off Adjust ms applies an offset equal to the time it takes for the final relay to turn on and off respectively. This value is in milliseconds. For example, a value of -80 in the Switch On Adjust parameter causes the relay to turn on 80 milliseconds prior to the true turn on time. This enables the end user to minimize the impact of mixing different types of relays. Mercury based relays generally have a delay of about 80 milliseconds between the time the relay is given the open command until the relay actually opens while a solid state relay has a delay near 1 millisecond. These offsets are limited to +/- 100 milliseconds.

First cycle is the cycle (either on or off) when an interruption sequences starts. In other words, if the sequences are to start at 4:00am, the user can specify if they want the relay to turn off at exactly 4:00am or does the program want to observe the Switch On Time starting at 4:00am.
The warm up minutes and cool down minutes turn on the GPS before an interruption sequence in order to give the GPS time to synchronize before a test.

The Local/UTC Hours Adj is the offset from the UTC time. Set this value to a 5 if the Interrupter is located in the Eastern Time zone while observing Daylight Saving Time. For Local/UTC Hours Adj to automatically adjust for Daylight Savings Time, the Auto Daylight Savings Time bit must be set in the EEPROM settings. Refer to Appendix F for more information on setting the Auto Daylight Savings Time bit in the EEPROM.

The Final Relay Type is either normally open or closed. The Final Relay Type inverts the meaning of the Relay LED on the GPS module. If the LED is on, then the Final Relay is being driven. That is, a normally closed relay would be closed when the LED is off. Even when the Final Relay Type is changed, On still refers to Cathodic Protection being applied to the pipe and off means the Cathodic Protection is being interrupted.

The remaining three sections are for troubleshooting. The GPS Hardware Testing Parameters section gives the user the ability to test the hardware while on site. This is normally done during installation. Check Force GPS On/Off to turn on the GPS chip. After 60 seconds, the GPS chip should synchronize and give the GPS time, location and date in the GPS Indicators box. This verifies the GPS module is working correctly. The other two check boxes allow the user to turn on and off the relay. First check the Relay Control Manual/Automatic box to turn on manual mode for the relay. Once that box is checked then check the Relay On/Off box to turn on the relay. Placing the relay in manual mode overrides the interruption period. Please note, the GPS radio is only on during the interruption cycle plus the warm up/cool down minutes or when forced on by checking the Force GPS On/Off box. This box does not automatically clear and there is a significant difference in power consumption for those sites that are power conscious.

The box titled GPS Indicators displays values from the GPS board. These include the date, time, number of satellites in view, and coordinate information. These values will not be valid until the GPS module has synchronized with the satellite system at least once after power up. If the number of satellites in view goes to zero, the other parameters may be estimated.

The GPS Management Information box contains several indicators that give the state of the GPS board and the actual GPS chip on the board. These values are not valid unless the GPS is active and communicating with the satellite. The GPS Firmware is the firmware of the GPS interface board. The Number of Time Syncs gives the number of times the GPS module considered it’s time to be less accurate and elected to change its time to a more accurate time. Given that the GPS is turned off most of the time, it is common for this value to increase once each time the GPS module is enabled. The Old Time Last Sync and New Time Last Sync have the times of the last sync.

The GPS Flag, GPS Time Flag, and GPS Status Lo Word parameters are bitmapped as follows. The GPS Status Hi Word is not used at this time. The top three boxes under GPS Management Information are read outs from the GPS Flag Bitmap and the GPS Time Flag Bitmap. These three boxes indicate if the GPS is on or off, if the GPS is synchronized or not and if the Interruption Cycle is active or not.

GPS Flag
Bit 0: used internally
Bit 1: Power applied to GPS radio
Bit 2: 1 pulse per second timer from the GPS radio is active
Bit 3: not used
Bit 4: GPS radio has sent at least one message to GPS interface board
Bit 5: GPS module’s time is synchronized with GPS satellite
Bit 6: used internally
Bit 7: not used

GPS Time Flag
Bit 0: used internally
Bit 1: one of the user defined times in the GPS Interruption Timing Parameters section is invalid
Bit 2: not used
Bit 3: not used
Bit 4: not used
Bit 5: Interruption cycle is active
Bit 6: Time is estimated, status – the time is currently estimated
Bit 7: Time is estimated, latch – the time has been estimated in the past

GPS Status Lo Word
Bit 0 – Bit 3: not used
Bit 4 – Bit 7: counter that indicates the GPS radio is on and working properly
Bit 8: On/Off Times out of range
Bit 9: On/Off offset times out of range
Bit 10: Start date/time out of range
Bit 11: Stop date/ time out of range

Alarm Limits Tab
The **Alarm** tab gives the user the ability to customize the monitoring system. These alarms can be configured to trigger when dropping low or going above some predetermined limit. A special check box is provided for each alarm that enables transmitting alarms through the satellite system.

**Modbus Setup Tab**
The MODBUS setup tab provides a flexible interface to MODBUS communications which is the primary protocol used in some spread spectrum radio networks and for some cellular applications. These values vary for each customer.

**Satellite Communications Tab**
Rectifier Monitor

Port 1 Communications Setup

Satellite Communications: Enable (Port 1)

Note: When changing between Communication Types On Port 1, it is necessary to cycle the RTU Power.
EEPROM changes must be made as well to properly configure port 1 communications.
Modbus Communications should be disabled if satellite communications are enabled.

Satellite Communications Setup

Satellite Radio Type

SatComm Status: Idle (Last Msg Sent Successfully)

Satellite Visible / RSSI
Outgoing Msg Pending
Num Msgs Sent Today
Weekly Msg Sent
Weekly Msg Failures
Time Adj Threshold Secs
Random Delay Seconds
Low Voltage Limit
Low Voltage Reset
Consecutive Falls
Max Conv Falls

Force Satellite Radio Power On
Send Initial Flow Measurement Records
Manually Send Rectifier #1 Data
Manually Send Rectifier #2 Data

Enable Audit Trail Data

Rect #1 Rect #2

Message Enable/Disable: Enable

Msg Recipient: 1 1

Wind#1 Start (HHMMDD) 5101.1 5101.1
Wind#1 End (HHMMDD) 2400.7 2400.7
Wind#1 Im (In) (Min) 1440 1440
Force Send # Records: 0 0

Operations | Control/ Misc Config | Intermittent | Alarm Limits | Modbus Setup | Satellite Communications | Rectifier #1 Daily History | Rectifier #1 Hourly History
---|---|---|---|---|---|---|---
03/03/2013 | 02:54:04 PM |
The **Satellite Communications** tab provides a method to customize message delivery options for several types of satellite modem supported by the product line. When using a second monitoring option, the second message must be enabled at the bottom of this tab. Under most circumstances, all other items on this page should be configured as ordered from the factory. When trouble shooting, the **Force Satellite Radio Power On** and **Manually Send** check boxes are priceless.
Database 60631

Operations Tab

The **Operations** tab for the 60631 has several input values that must be set for each installation. When using pipe to soil channels 4, 5 or 6, the **Enable** check box on the right hand side of the page must be checked. The analog sampling drop down menu can be changed to increase the rate at which the values are updated. This value is defaulted to 30 seconds which works with the sleep modes for most installations. The two seconds update rate can be helpful when a faster update rate is desired, for instance, during installation.
The values near the top of the page give the last instantaneous values recorded by the monitor from test point channels 1-6. The minimum and maximum values for each channel are listed starting about the middle of the page.

The labels for the third channel show two options. With the 9010475 board, which has three pipe to soil measurements, the third channel is simply an additional pipe to soil measurement meaning the **TP#3 Volts** or **TP#6 Volts** labels apply. When using the 9010482 board which has a critical bond measurement input on the third channel, the **CB#1 mV** or **CB#2 mV** labels apply. Please note that if upgrading a unit from a 9010475 board to the 9010482 board with critical bond measurement, there are configuration files supplied that ease the database changes required to match the new hardware.

## Configuration Item List

The **Configuration Item List** is used to quickly modify the database. Most of the time the **Configuration Item List** is used when communications is added to a site. Options for the Cathodic Protection databases include adding GPS Interruption, Airlink communications, DS100 communications, Iridium Communications and MDS and Freewave Communications.

To use a **Configuration Item List** first connect to the unit using Field Manager™. Once connected click on the **Tools** button.

*Some buttons are only enabled when connected to or disconnected from a remote unit...similarly several of the buttons are disabled when Field Manager is in "Read Only" mode.*
Click on the **Configuration Item List** button. The following screen will appear.

![Configuration Item List](image1)

Click on the drop down box to select the proper Configuration Item List.

![Configuration Item List](image2)

Select the Configuration Item List needed then click on the **View/Edit** button.
This will show all the values that are being changed. Click on the **Send** button to send the changes down to the unit. Once finished click on the **Close** button to exit out of Configuration Item List.

**Editing the Labels**

Before editing the edit labels first make sure Field Manager™ is connected to the unit. In Field Manager™, click on the **Tools** button located along the top of the screen. Next, click on the **Edit Labels/FKeys** button.

To add or remove an item from being displayed click on the **X** located under **Short List Visible** or **Auto Scroll Visible**. Short List Visible are the items being displayed while using the magnet to scroll through the list on the display. Auto Scroll Visible is the items being displayed while the display is scrolling automatically.
Once the changes have been made click on the **Save Changes Only** A message will appear, click **Yes** to continue.

Click on the **Close** button when finished.

**Inside the Box**

The following picture/table combination shows and identifies the different parts in a monitor unit with AC power. Those without AC will commonly substitute a solar charge for the PWR60 Power Supply shown as number 6. Some popular communications options that mount in the area denoted as 4 are listed.
The rectifier interface board, part number 9010474, has one rectifier voltage monitor, one rectifier current monitor, and one pipe to soil monitor. It is common to omit the pipe to soil monitor in lieu of an incoming AC voltage monitor. This board is commonly used with the 60630 database. The general information sheet for this board is provided in Appendix B and a wiring diagram is provided in Appendix E. The measurement range for this board is listed below.
- One Rectifier Voltage – 0-150VDC, ±1% Accuracy
- One Rectifier Current – 0-50mVDC, ±1% Accuracy
- One Pipe to Soil - ±5VDC, ±1% Accuracy

**Test Point Monitor**

The pipe to soil monitor board, also referred to as the test point board, has a part number of 9010475. This board has three pipe to soil measurement channels. Each ranges from +/- 5 Vdc and has an accuracy of +/- 1 %. This board is typically used with the 60631 database and can be paired with either another 9010475 board to give six pipe to soil channels or with a critical bond board which would give a total of five pipe to soil channels and one critical bond channels. The general information sheet for this board is provided in Appendix C.

- Three Pipe to Soils - ±5VDC, ±1% Accuracy

**Test Point Monitor with Critical Bond**

The test point monitor with critical bond board provides two test point (pipe to soil) channels and one critical bond channel. This board has a part number of 9010482. The two pipe to soil channels are identical to those on the 9010475 board. The critical bond channel measures the current flowing through a shunt. The measurement limits for this board are +/- 50 mV. If the voltage exceeds +/- 50 mV, the measurement output will simply read as though the shunt is near 50 mV. The general information sheet for this board is provided in Appendix C.

- Two Pipe to Soils - ±5VDC, ±1% Accuracy
- One Critical Bond Monitor - ±50mVDC, ±1% Accuracy
External Wiring

The internal wiring diagram also shows where to land each of the different measurements of the rectifier monitors. The test point monitors are essentially the same except each channel connects to a pipe to soil input.

The connections between the monitoring equipment and the rectifier are commonly landed at the rectifier as shown in the picture. Some caution should be taken to ensure these landing points are valid, especially with the shunt measurement. The AC power wiring points vary significantly. It is important to know if the AC power is wired as a 120VAC or 240VAC. The PWR60 Power Supply must be adjusted according the voltage input. See the General Information Sheet in Appendix A. Do not connect the PWR60 to 208 volts.
GPS Option

The GPS Interface board, part number 9010458, provides GPS time synchronization for cathodic rectifier interruption. This board has two LEDs to help the user know in which state the board is operating. The first is labeled relay. This LED illuminates when the source applied to the Vbat terminal is connected to the Relay output. The relay LED is off when the Vbat terminal is not connected to the Relay terminal by the GPS Interface board.

The second indicator is labeled as status LED. It gives indication as to which of four states the GPS chip is functioning. The first is sleep mode. When the LED is off then the GPS is in sleep mode. Sleep mode tracks the sleep state of the RTU. In the second state, the status LED blinks at a rate of once for every four seconds. When in this mode the GPS interface board and module are powered but not presently synchronized with the GPS satellite system. This could be a result of several things. For instance the GPS module on the GPS interface board could be turned off, the GPS module may be on but not yet synchronized with the satellite system, or the GPS module may have lost synchronization and the time is being managed by the GPS interface board. In the third state, the status LED blinks every second. This indicates that the GPS module is on and its time is synchronized with the GPS satellite system. When interrupting, the status relay should be in the third state to provide the most accurate timing. In the fourth state the status LED blinks every eight seconds. This indicates that the interface board is still on but the GPS Module is off.

Information on setting up the database to interrupt using the GPS Interface board and information on evaluating the GPS interface board is provided with the 60630 Database Interruption Tab.
Each version of the XARTU™ Monitoring Product series supports GPS. The GPS option can be configured with a start time/date and an end time/date in which the rectifier will be power cycled according to a predetermined rate. Offset parameters are provided to compensate for the power relays on/off times. There are two antenna options available: one box mounted (shown in picture) and one pole mounted.

**Second Monitor Option**

A second monitor can be added to either the rectifier or test point monitor providing a second rectifier monitor or three additional pipe to soil monitors, respectively. The second kit stacks over the first and wires into the processor board as shown.
WARNING: Installation of any item associated with a rectifier must be performed by a licensed electrician as significant risks of personal safety are present. Use all precautions as recommended by the National Electrical Code. If you do not have qualified personnel, please contact Eagle Research Corporation® to arrange installation assistance. If you choose not to contact Eagle Research Corporation® or use a licensed electrician proceed at your own risk.

Proper installation of the Rectifier Monitor is very important in order to achieve the highest levels of accuracy. It is best to run two conduits from the RTU to the rectifier. One is dedicated for the AC power and control signals and the other for measurement. The AC power at a rectifier is typically very noisy and can induce high levels of noise on to the measurement line causing additional error to the signals. In addition to separating the AC lines, the measurement lines should use a properly sized shielded cable grounded at one end.
As shown in the picture, the rectifier current is read from the terminal on the shunt. Connecting the wires anywhere except the measurement terminals (such as the mounting bolts) will cause additional and significant error in this reading. The rectifier voltage is not as sensitive, but similar cautions should be taken to maximize the accuracy.

The installation of a pipe to soil monitor is not as stringent given that AC power is not present. It is still recommended that a quality wire designed to reduce noise susceptibility be used. Also for most accurate readings, wire directly to the measurement posts. For sites with critical bond measurement, use the same level of precaution as required by rectifier current shunt measurement.

**AC Side Interruption**

The GPS synchronized interruption can be easily added to most rectifiers. As shown in the picture above, interruption between the secondary side of the transformer and the input of the rectifier can be accomplished by replacing the metal block between the two modules with a relay. By mounting the relay inside of the rectifier housing, the high currents and voltages do not travel outside of the rectifier. The signal wires controlling the relay should be ran back to the RTU with the other signal/measurement wires – not the AC power wires.

**Installation Steps**

1) Mount the RTU. The RTU can be mounted several different ways. The pictures below demonstrate a few of the different options of mounting the RTU. Note: Make sure the RTU is level when mounted to prevent the battery from falling out.
2) Run conduit from the base of the RTU to the Rectifier

3) Run wire from RTU to Rectifier. For AC wiring use 12 AWG wire. For the control and signal use 1 pair 22 AWG shielded cable.

4) Mount the Interruption Relay. The Interruption Relay can be mounted to a panel inside the Rectifier box or directly to the Rectifier box as shown below. Mounting depends on space availability.
5) Wire the Interruption Relay to the Rectifier.
6) Terminate Signal Wires to the Rectifier.

7) Terminate Power Wires to the Rectifier for 120VAC or 240VAC.

**240VAC Configuration**
120VAC Configuration

8) Terminate all wires in RTU

9) Check all wiring and verify that it is right and that there are no loose connections.
10) Connect battery to RTU.

11) Power up Rectifier and verify that the battery is charging.

12) Check Readings using Field Manager and Multi Meter. For more information on viewing readings using Field Manager, refer to the **Database 60630** section located in this manual.

<table>
<thead>
<tr>
<th>Metering</th>
<th>Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe to Soil</td>
<td>-5 VDC to +5VDC</td>
<td>+/- 1%</td>
</tr>
<tr>
<td>Rectifier Voltage</td>
<td>0VDC to 150VDC</td>
<td>+/- 1%</td>
</tr>
<tr>
<td>Rectifier Current</td>
<td>0mVDC to 50mVDC*</td>
<td>+/- 1%</td>
</tr>
<tr>
<td>AC Voltage **</td>
<td>0VAC to 130VAC</td>
<td>+/- 2%</td>
</tr>
</tbody>
</table>

* The range for the current is in reference to the shunt.
** AC voltage requires the 9010479 PWR60 board.

13) Turn on GPS and verify that it syncs. For more information on how to use this function, refer to the **Interruption Tab** section located in this manual.

14) Manually test Interruption using Field Manager. For more information on Interruption, refer to the **Interruption Tab** section located in this manual.

15) Test and verify that the communications is set up and works properly.
Basic Trouble Shooting Techniques

Given the wide variety of power, measurement, and communications combinations available with the Eagle Research® Monitoring Product series, it is impossible to provide a simple trouble shooting guide. Therefore this section gives the most common failure modes and access to Eagle Research®’s support group for comprehensive, personal service unique to the natural gas industry. When troubleshooting a Monitoring unit, there are three primary modes of failure. The first is power and can usually be isolated to a blown fuse or a failed board with a voltmeter. The second is the cathodic monitoring interface. While this interface can dissipate significant surges of all types, it does have limits. Failures to this board are usually visual. The product as a whole is designed to isolate surge effects to the cathodic input board. The last common failure mode is communications. Outside of antenna and coax damages, this is usually specific to each customer and must be handled by contacting Eagle Research®.

Eagle Research® provides free telephone support from 8AM to 5PM, Monday through Friday at 1-877-757-6565.
Appendix A

GIS – 9010479

PWR 60 Power Supply
Appendix B

GIS – 9010474

Cathodic Protection Rectifier Board
Appendix C

GIS 9010475

Cathodic Protection Pipe to Soil Board
Appendix D

GIS 9010482

Test Point Monitor with Critical Bond
Appendix E

Internal Wiring of Measurement Only Option
Appendix F

Application Note 114

Daylight Saving Time Options in the RTU
APPLICATION NOTE #114
Daylight Saving Time Options in the RTU.

DATE: 3-March-15

APPLICATION: This application note describes the different options for Daylight Saving Time in the RTU.

Description of the Daylight Saving Time Options

The Daylight Saving Time options are located in the EEPROM at address 75 – System Config 1. At this location automatic Daylight Saving Time can be turned on and the user can select the old rules from 1966 or the new rules from 2007. Listed below are the different bit settings for EEPROM Address 75. In this Application Note only the bit values pertaining to Daylight Saving Time will be discussed.

Bit 4 allows the user to turn Auto Daylight Saving Time on and off. To turn Auto Daylight Saving Time on edit EEPROM Address 75 to a 16. This setting will allow the RTU to automatically adjust its time when in and out of Daylight Saving Time.

Bit 6 allows the user to select the old Daylight Saving Time Rules from 1966 or the new rules from 2007. The default setting is 2007 Daylight Saving Time. To set the RTU to use the rules from 1966 edit EEPROM Address 75 to a 64. Note: if Auto DLSTime On and 1966 DLS Time are both desired the EEPROM Address 75 will need to be edited to 80. Listed below shows the differences between the 1966 and 2007 Daylight Saving Time.
Old Rules for 1966
First Sunday in April DST Ends
Last Sunday in October DST Begins

New Rules for 2007
Second Sunday in March DST Ends
First Sunday in November DST Begins

Turning Auto Daylight Saving Time On in the RTU

1) In Field Manager, connect to the unit
2) Click on Tools

3) Click on EEPROM/Config Editor
4) Click on **Advanced Mode** in the upper right hand corner

5) Click on **Read from RTU** in the upper left hand corner
6) Once the EEPROM parameters have been read from the RTU click on **All Items** to expand the selection.

![EEPROM Editor](image)

7) Scroll down to item **75** and double click.

![Edit EE Data](image)

8) Type in **16** to select **Auto DLSTIME ON**.

---

Cathodic Protection Manual  Copyright© 2013 Eagle Research Corporation®  Page | 54
9) Click **OK**
10) This item should now be bold in the EEPROM list.
11) Click on the **Send to RTU** button

![Sending EEPROM Data to RTU]

12) Click the **Close** button in the lower right hand corner

13) The unit will ask “Do you want to unlock from the remote?” select **Yes**
14) For the new EEPROM setting to take effect in the RTU, the power to the RTU must be cycled.
15) The RTU is now set up for Automatic Daylight Saving Time
Appendix A

GIS – 9010479

PWR 60 Power Supply
Appendix B

GIS – 9010474

Cathodic Protection Rectifier Board
PIPE-TO-SOIL
TYPICAL RANGES
-0.85VDC to -2VDC

THIS BOARD IS USED TO MONITOR THE PERFORMANCE OF THE CUSTOMER’S CATHODIC PROTECTION EQUIPMENT, WITH PIPE-TO-SOIL (TEST POINT) MONITORING OF CHANNEL 1, AND RECTIFIER AMP AND VOLT MONITORING ON CHANNELS 2, & 3.

SET VXD ON TIME DELAY TO 1
Appendix C

GIS 9010475

Cathodic Protection Pipe to Soil Board
PIPE-TO-SOIL
TYPICAL RANGES
-0.85VDC to -2VDC

TO CUSTOMER-SUPPLIED
EQUIPMENT FOR
MEASUREMENTS

PROTECTIVE
EARTH GROUND

±5VDC
±1% ACCURACY

PS3
±5VDC
±1% ACCURACY

PS2
±5VDC
±1% ACCURACY

PS1

1 ECND
2 Pipe to Soil -
3 Pipe to Soil +
4 Pipe to Soil -
5 Pipe to Soil +
6 Pipe to Soil -
7 Pipe to Soil +

RLY 1
RLY 2
RLY 3

CATHODIC PROTECTION BOARD

9010475

SBC61

8 - RELAY CONTROL +12
7 - RELAY GND
6 - (nc)
5 - PIPE-TO-SOIL OUTPUT 1
4 - PIPE-TO-SOIL OUTPUT 2
3 - PIPE-TO-SOIL OUTPUT 3
2 - SIGNAL GND
1 - VXD

GRY
VIO
BLU
n/c
GRN
YEL
ORG
RED
BRN

2 COMO
26 GND
43 AI0
46 AI1
49 AI2
44 AI0-
42 AI0+

THIS BOARD IS USED TO MONITOR THE
PERFORMANCE OF THE CUSTOMER’S CATHODIC
PROTECTION EQUIPMENT, WITH PIPE-TO-SOIL (TEST
POINT) MONITORING ON ALL CHANNELS.

SET VXD ON TIME DELAY TO 1

OLa DWG #
N/A

INTERPRET PER ANSI Y14.5
& STD PE-1000

TOLERANCES – UNLESS OTHERWISE SPECIFIED
INCHES ANGLES± 1” MILLIMETERS
X± .02” X± ± .005”
XXX± XXX± XXX±

REV DRFT ENGR CHKFR ECN # DATE
DWG. RELEASE ECN #: N/A

EAGLE RESEARCH CORPORATION
1076 STATE RT. 34, HURRICANE, WV 25526
OFFICE: (304) 757-6865 FAX: (304) 757-3332 WEB: HTTP://WWW.EAGLERESERCHCORP.COM

PROJECT: INTERNAL
DRFT: JVF 04-SEP-13
ENG: SMD 04-SEP-13

DRAWING NUMBER
9010475 GIS

TITLE: CATHODIC PROTECTION PIPE-TO-SOIL BOARD
GENERAL INFORMATION SHEET

SCALE: NTS SHEET: 1
Appendix D

GIS 9010482

Test Point Monitor with Critical Bond
Note:
If a second Pipe-to-soil with critical bond board is added, then the second board will have test point #4 across terminals 6 & 7, test point #5 across 4 & 5, and critical bond #2 across 2 & 3.

This board is used to monitor the performance of the customer's cathodic protection equipment, with pipe-to-soil (test point) monitoring of channels 1 & 2, and critical bond monitoring on channel 3.
Appendix E

Internal Wiring of

Measurement Only Option
XARTU/1CP-009

REV #1 : CHANGED THE POWER 60 FROM A 9010264 TO A 9010479 & CP TO A 9010474

DATABASE: 60630