Appendix I: Manual

Please refer to the following pages.

Power Monitors Scanner Communications Modes

Rev: 6/20/08

Introduction

A major part of any power quality system is the communications between recorders and a computer in order to retrieve and analyze data. The following sections will discuss how to communicate with PMI recorders and how the communication operates. PMI ProVision software makes it easy to connect, configure, and download data from our recorders.

Communication Modes

Every PMI recorder has at least one way of communicating with the computer. The three primary methods currently used in scanner communications are Bluetooth® Wireless Technology, RS-232 serial communications, and USB.

Bluetooth® Technology

Bluetooth® technology is an industry-wide communications protocol that allows wireless connectivity with many of our PMI recorders at a range of up to 30 feet. This wireless system is a radio standard and a communications protocol primarily designed for low power consumption. Bluetooth® technology provides the advantages of consuming very little power, it is small and compact, and relatively inexpensive. Since this technology operates at a low RF power, its range is affected by walls, boxes, metal objects, etc. Placing a Bluetooth® device in a metal box or panel will severely attenuate the radiated signal. This is overcome, however, by constructing the box of another material such as glass, plastic, fiberglass, or Plexiglas, or by placing small openings in the box if possible, allowing the signal to radiate. Currently, this wireless technology is available in our Eagle products, the Eagle120, and the Revolution.

Prior to using ProVision to communicate with one of our recorders using a Bluetooth® USB adapter, you must discover and connect to the recorder. The first step is to install the manufacturer's software for your Bluetooth® USB adapter. In most cases, this will install Windows' drivers for the device. After you have installed the software, Windows will install the new hardware when you

plug in the Bluetooth USB adapter. When this is completed you are ready to begin connecting to the recorder.

Since the hardware is now installed, you should see icons appear in the Windows XP **Control Panel**. If you are using a computer with an internal Bluetooth connection device, you also should see icons in the **Control Panel**. Double click on **Bluetooth Devices**, bringing up the **Bluetooth Devices** window. In the **Devices** tab, click **Add**. This will bring up the **Add Bluetooth Device Wizard**. Make sure that "My device is set up and ready to be found" is checked, then click **Next**. The computer will now search for any Bluetooth devices detected in range and display them. Select the Bluetooth device that you want to add and click **Next**. The wizard will now ask, "Do you need a passkey to add to your device?" Some Bluetooth adapters require a "passkey," "pairing key," or "password" to establish a trusted relationship between the computer and a PMI recorder. Select **Let me choose my own passkey:,** and type in lowercase letters "pmi" in the respective box, then click **Next**. Windows will then exchange passwords and connect to the recorder. All Eagle, Eagle120, and Revolution recorders use this passkey to communicate. Whenever the Bluetooth device has been successfully connected, the **Finish** window will appear. In the middle of this window the display will read: "These are the COM (serial) ports assigned to your device," and underneath this two COM ports are listed, the outgoing COM port and the incoming COM port. Bluetooth® adapters utilize virtual COM ports to transfer data. Remember (or write down) the number of the outgoing COM port, as it will be needed later, and then click **Finish**. Now click **OK** to exit the **Bluetooth Devices** window. You are now ready to go to ProVision and connect the recorder.

In ProVision, create a new connection by clicking on **Options**, and then click **Communication Port Settings**, which is used to create a new connection for Bluetooth® communications. Now, click the **Add** button to create the connection. Click **Serial**, and type the name that you wish to call the connection in the **Name** box. This will be the connection's name that will eventually be displayed in the **Connection** box. We suggest that you give the connections names that will allow you to easily remember what is connected, such as "Bluetooth1," "Bluetooth2," etc., or use names based on the unit using that connection. Under **Serial port connection properties**, select the appropriate COM port from the list in the **Serial port** box, corresponding to the outgoing COM port determined during the Windows device discovery procedure above.

Next, select **57600** in the **Baud rate** dropdown box. When selecting a baud rate, if you happen to enter a rate that is too high, ProVision will automatically select the appropriate rate when connecting to the recorder. If you select a rate that is lower than the recorder is capable of, ProVision will still connect at the rate that you selected. Now click the **Save** button to store the new connection. You are now ready to communicate with the recorder.

In order to communicate or receive any information using PMI Winscan or ProVision software, the recorder must be powered (from the voltage connected between Channel 1 and COM on Eagle and Revolution products). In ProVision, connect to the recorder by clicking on the **Recorder** menu and then **Connect**, which will display a drop-down menu. From this menu, select the newly-created connection from the list. ProVision will then begin "Discovering devices on Bluetooth," and will display the operation's progress in the **Communications Group** pane. Whenever you are ready to disconnect from the device, simply right-click on the recorder under **Devices** and then click **Disconnect**. Then disconnect the Recorder's power supply.

Serial

Serial communications are much simpler. Many different PMI recorders communicate via RS-232 serial communications. In order to begin communicating with a recorder using an RS-232 serial port, connect the recorder to the computer by attaching one end of the serial cable to the serial port on the recorder and the other end of the cable into a serial port on the back of the computer. Make sure that the unit is powered either by the voltage it is measuring or an external power supply attached to the serial cable. If you are using a serial-to-USB adapter cable, IT IS IMPORTANT to use the cable that PMI provides. Before connecting to the unit in ProVision, it is important to know which COM port number corresponds to the serial port that you are using. In the Windows **Control Panel**, double-click on **System**. Go to the **Hardware** tab and click on **Device Manager**. Under **Device Manager**, go down to **Ports (COM & LPT)** and find the appropriate serial port (it will be named something like "Communications Port"). In parentheses, after the port name, will be the assigned COM port number. Remember this number. Close the **Device Manager** window and click **Cancel** to close the **System** window. Now open ProVision and create a new connection by clicking on **Options**, and then click **Communication Port Settings** to create a new connection for RS-232 serial

communications. Once again, click the **Add** button to create the connection. Click **Serial**, then type "RS-232 Serial Port" in the **Name** box, unless you would rather give the connection a different name. (*Note: All recorders using the RS-232 serial port on the computer will use this connection that you are creating. While you must create a new connection for each individual recorder using Bluetooth, you only need to create this RS-232 connection once. After it is created, it can be used for every recorder connected to the RS-232 serial port.).* Under **Serial port connection properties**, select the correct COM port from the list in the **Serial port** box. Determine the recorder's permissible baud rate from its specifications, and then select this rate from the **Baud rate** dropdown box. If you enter a rate that is too high ProVision will automatically select the appropriate rate when connecting to the recorder. Now click the **Save** button to store the new connection. You are now ready to communicate with the recorder. Once the settings have been selected and the recorder is powered, connect to the recorder by clicking on the **Recorder** menu and then **Connect**. In this menu, select the newly-created connection "RS-232 Serial Port" (or the alternative name that you chose) from the list. ProVision will then begin "Discovering devices on RS-232 Serial Port." The **Communications Group** pane will display the progress of this operation. Once ProVision finds the recorder, it will connect to the device, close the **Discovering Devices** window, and the recorder will appear under **Devices** as shown. Now, you can begin using the device as normal. Whenever you are ready to disconnect from the device, right-click on the recorder under **Devices** and then click **Disconnect**. Then unplug the unit and disconnect the Recorder's power supply.

If you have several recorders connected or within range for Bluetooth, you have already manually created connections for each of them, and you would now like to communicate with the recorders, click on **Recorder** and then **Detect**, and ProVision will begin looking for devices on all COM ports that you have previously added. It will then connect to any recorders that it finds and display them under **Devices**. This is a feature that can be used to save the time of connecting to each recorder individually.

USB

USB communication with PMI recorders is straightforward. The USB connection should already be created whenever ProVision is first installed. ProVision will automatically scan the USB ports once a second for any connected PMI

recorders. If there are any USB-based PMI recorders plugged in, they will automatically be connected and appear under **Devices**. If you plug in a USB PMI recorder you will see it appear in this window in a few seconds. USB PMI recorders can be powered through the USB cable, so no other external power connection is needed. When you are ready to disconnect from the device simply right-click on the recorder under **Devices** and then click **Disconnect**. Then you may unplug the unit from the computer.

Using a Recorder

All PMI recorders function in one of two operation modes: Standby and Ready.

Standby

The Standby mode is used for configuring a PMI recorder in preparation of recording data. The following operations may be performed while in Standby mode:

- Recorder identification
- Recorder initialization
- Data downloading
- Firmware uploading
- Setting date and time
- Retrieving recorder settings.

Ready

The Ready mode is used when a PMI recorder is actively collecting power quality data. The following operations may be performed while in Ready mode:

- Recording power quality data
- Displaying real-time power quality data

Normally, it is not necessary to manually change the operational mode of a recorder as ProVision automatically changes it depending on which mode is

required for the operation you wish to perform. One particular case where it might be necessary to manually change the operational mode of the recorder is when you are actively recording power quality data (in ready mode), and you wish to then upload firmware (which requires standby mode). In this case, when it is necessary to manually change the operational mode, simply right-click on the recorder under **Devices**, and click on **Switch to Standby Mode**, and you should be ready to begin uploading the firmware.

APPENDIX 4: Regulatory Information

U.S. FCC Part 15 and Industry Canada RSS-210 Statements

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

The FCC and Industry Canada (IC) ID numbers applicable to the Revolution product are as follows:

FCC ID: RO9REVOL0608
IC: 4806A-REVOL0608

FCC Warning

Changes or modifications to this product not expressly approved by Power Monitors Inc. could void the user's authority to operate this equipment.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.