CWR-264A
EVENT RECORDER

USER MANUAL

MICRO-AIDE

Rail Signal Products

MICRO-AIDE

RAIL SIGNAL PRODUCTS

CWR-264A
EVENT RECORDER
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CHAPTER 1 – GENERAL DESCRIPTION

INTRODUCTION

Since 1988 MICRO-AIDE has provided the rail signal industry with a broad range of Event Recorders that vary in capacity, size and features. As a third generation Event Recorder, the CWR-264A includes many new features not previously found in recorders. These features, several of which are unique to MICRO-AIDE, provide the CWR-264A user with greater ease-of-use and versatility. The CWR-264A is a companion product to the smaller capacity CWR-24A and CWR-72A recorders. It is ideally suited for use at large interlocking facilities.

The CWR-264A is designed to be a direct replacement for MICRO-AIDE's CWR-264XL Event Recorder. The CWR-264A includes all of the features and capabilities of the earlier recorder. However, the CWR-264A utilizes a much faster and versatile M4-class ARM microprocessor chip. The user will quickly note the speed improvements when accessing and dumping data. The initialization cycle completes soon after power application, even when the Event Record memory is full.

Of necessity, all Event Recorders utilize an internal real-time clock for date and time stamping events. Historically, these real-time clocks have been susceptible to drift. Over the course of several months the accumulated drift can exceed several minutes. This factor can greatly complicate incident investigation and reporting. However, the CWR-264A eliminates the problems introduced by clock inaccuracy once and for all. The GPS Receiver option utilizes GPS technology to set the time and date. Alternatively, the Ethernet® Port allows the recorder to communicate with a LAN-based time server. Time servers broadcast time and date information using the SNTP protocol. The CWR-264A is designed to support Unicast and Multicast SNTP messaging. Any of these three methods provide for time stamping that is 100% accurate and drift-free without the need for any user intervention.

To an increasing degree, the logs and data records that are retrieved from wayside systems are being challenged in court on a new front. This data is often crucial to the case, but tends to be in the form of simple text files possibly printed on paper. Unsecured text data can be authored in any word processing application. Accordingly, the integrity of the data submitted into evidence can be easily challenged. However, the CWR-264A allows its user to create an Event Record report and append a unique, tamper-proof digital signature to the resultant electronic data file. The Digital Signature Report Feature (DSRF) was directly ported from MICRO-AIDE's GCS and CAR-24A.

As a convenience to its user, the CWR-264A can copy Event Records directly to a FAT-32 formatted flash drive. The USB Host Port is a standard feature of the recorder. Install a flash drive into the recorder's front panel socket, press a few keypad buttons and in seconds Event Records from any time span are written as a .txt file. The .txt file can then be read, e-mailed or printed as required. At the user's option, a digital signature can be appended to the saved text file.

Every CWR-264A comes equipped with a built-in keypad and display screen located on the front panel. This allows the user to effectively operate the recorder without additional peripheral devices. However, each recorder will support applications that require PC-based storage of Event Records. USB Device, RS-232 and Ethernet Ports are all standard features of the recorder. Collectively they provide for increased flexibility when interfacing with the recorder. The USB Device and Ethernet Ports provide high speed data transfer rates of 4.71 Mbps and 4.70 Mbps, respectively. A PC is then used to retrieve, store and review Event Record data of interest to the user.

The CWR-264A will also operate as a Modbus® compatible server utilizing the Modbus messaging service over TCP / IP. The Ethernet Port allows as many as five concurrent Modbus clients to access live status information from Digital, Analog and Virtual Inputs.

An optional 33,600 Baud internal modem can also be installed. It too allows the user to remotely access and operate the recorder. A standard phone line connection allows the user to gather critical Event Records from any location, however distant. The modem can also be used to provide dial-out alarm reporting to a maintenance facility.

Along with 256 optically isolated Digital Inputs, the CWR-264A is equipped with eight general purpose Analog Inputs. Unlike other systems, the use of Analog Inputs does not reduce the number of available Digital Inputs. The Analog Inputs can be used to monitor both DC and AC signals such as battery levels and commercial power voltages. The Failed Lamp Detector (FLD-2) can be used in conjunction with the CWR-264A to detect burned-out signal lamps.

Ninety-six Virtual Inputs allow the user to create Event Records based upon a specific logical association of several Digital, Analog, Timer and other Virtual Inputs. The Virtual Input feature can be very useful in analyzing failure conditions or in creating alarm indications. Tedious and confusing site-specific profiles are not required when using the Virtual Input feature.

Two-hundred Timer Inputs can be used to measure and report the elapsed time between any two events. As an example, the duration of a relay operation, the time between two relay events or the occurrence of an Analog Input event and a relay event can be reported. Additionally, separate High and Low Limit Values can be assigned for each timer. An event occurrence that is too fast or slow when compared to the Limit Values is identified in a Timer Input Event Record.

All MICRO-AIDE rail signal products, including the CWR-264A Event Recorder, are designed to be easy to use and maintain. Each design is based upon the premise that value and reliability start with attention to detail and a concern for usability rather than needless complexity. Our goal in creating the CWR-264A was to provide the rail signal industry with an instrument maintainers and signal technicians will find easy to operate long after the recorder has been installed and set up.

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Listed in the following are some of the features included with every CWR-264A Event Recorder.

- The USB Host Port allows copying of Event Records to a FAT-32 formatted flash drive. As an option a digital signature can be added to the Event Record data file.

- The 4.71 Mbps USB Device Port can be used in lieu of the serial Terminal Ports.

- The optional GPS Receiver allows the recorder's real-time clock to operate 100 % accurately without any user intervention.

- The internal Ethernet Port allows for remote LAN-based access via an Ethernet connection.

- The Modbus over TCP / IP feature allows five concurrent Modbus clients to acquire the real-time status of any input.

- If the LAN includes a time server, the Ethernet Port also allows the recorder's real-time clock to be precisely controlled using SNTP. Unicast and Multicast protocols are supported.

- Automatic adjustment for Daylight Saving Time (DST) can be enabled or disabled. The DST feature is in full compliance with the Energy Policy Act of 2005 which took effect in 2007.

- The time zone setting of the recorder can be assigned to UTC-0 or any of seven zones used in North America.

- The storage capacity is 221,284 Event Records (expandable to 3,711,844).

- Event Records can be logged for 128 distinct days.

- Event Records are stored in flash memory devices that do not require a battery power source. Records are retained even if power is removed.

- Setup data and Event Record data can be easily and quickly transferred to a PC file.

- A digital signature can be added to an Event Record report resulting in a highly secure data file. MICRO-AIDE's RSA application can be used to verify the integrity of signed reports.

- Attaching the recorder to an event generating circuit is completely non-intrusive to the circuit. This is ensured by the high impedance nature of the design.

- Each Digital Input utilizes opto-isolation technology to provide ground isolation of at least 3800 Vdc.

- Relay signals in the range from 9 to 36 Vdc can be sensed by the Digital Inputs.

- Both positive and negative voltages can be sensed.

- Every Event Record includes a measurement for each of eight Analog Inputs.

- Analog Inputs can range from 51.1 V (.1 V scale) to 255 V (1 V scale), DC or AC.

- Analog Inputs are tested against separate High and Low Limit Values that are assigned by the user. Crossing either Limit Value will create an Event Record.

- Excessive train speed is reported by four separately programmable Train Speed Monitors. Speed violations are reported in the form of Event Records that are saved to memory.

- The FLD-2 Failed Lamp Detector can be used at crossings to detect burned-out bulbs.

- Event Detection Times can be set by the user on an input-by-input basis. Default values are provided as an aid to the user.

- Event Detection Times can be set to a hundredth of a second (.01 seconds) to capture fast, electronically generated control signals.

- Events satisfying the Detection Time criteria are date and time stamped to the nearest hundredth of a second.

- Event Records are reported at the start and end of each flashing sequence.

- The flashing rate of a circuit can be precisely measured. The flash rate in fpm is reported as part of the Event Record for each flash sequence.

- Ninety-six Virtual Inputs can be programmed to create Event Records that identify alarm or fault conditions of special interest to the user.

- Two-hundred Timer Inputs can be used to measure and report intervals between any pair of events.

- Limit Values can be assigned to establish a range of acceptable and unacceptable timed intervals.

- Timer Inputs create Event Records that list the timed interval and its relationship to the programmed Limit Values.

- Installation is quite simple. Input wires are terminated in detachable, tension clamp terminals. Wire sizes as large as 12 AWG can be used.

- Maximum power consumption is less than 5 W. A 9 to 36 Vdc power source can be used to power the recorder.

- The internal temperature of the recorder is measured and reported.

- The user interface provides full cursor control when using a PC.

- Three distinct levels of password security provide protection against unauthorized access.

- Several diagnostic commands can be executed to verify important system operations.

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- Firmware updates can be uploaded to the recorder via any port (i.e., Terminal, modem, USB Device or Ethernet). Additionally, new firmware can be uploaded directly via a USB flash drive.

- MICRO-AIDE's GEA (Graphical Event Analyzer) software is fully compatible with the CWR-264A. GEA can be used to poll, save, review, plot and analyze Event Record data.

COMPARING THE CWR-264A AND CWR-264XL

The CWR-264A was designed to be a direct replacement of the CWR-264XL Event Recorder. It is a "form, fit and function" equivalent of the latter. The two products are distinguished by the following characteristics.

- The CWR-264A utilizes an M4-class ARM microprocessor. Accordingly, they execute different firmware.

- The USB Device and Ethernet Ports of the CWR-264A support data throughput rates approximately five times faster than those of the CWR-264XL.

- The initialization completion time of the CWR-264A is much faster.

- The Dump command executes record searches significantly faster.

In all other regards the products are identical.

FIRMWARE MODIFICATION HISTORY

Features have either been introduced or modified as the result of the following firmware modifications.

V1.00 Initial release.

V1.01 Corrected problem with control of multiple LCD accesses. Reduced slew rate of SPI clock signal to Keypad PCB.

V1.02 Restored SPI clock slew rate to fast setting.

V1.03 Increased delays for data sent to PIC processor.

V1.04 Improved recovery of USB Device Port.

V1.05 Added Digital Signature Report Feature.

V1.06 Corrected missing save option for front panel Digital Signature Report Feature. Improved flash memory diagnostic test.

V1.07 Corrected problem when Modbus and Terminal Port sessions were running simultaneously.

V1.08 Added support for latest Silicon Labs modem. Improved Xmodem error recovery.

V1.09 The Ethernet Port is re-initialized whenever an alteration of the Network settings is detected. If enabled, an SNTP-Unicast message is sent when the recorder or Ethernet Port is re-initialized. An SNTP-Unicast time sync is performed hourly. The number of flash memory devices that are supported has been expanded.

V1.10 Corrected problem with Ethernet Port timeout. Setup Database can be saved and updated via USB Host Port.

V1.11 Corrected watchdog timer problem associated with SNTP-Unicast.

V1.12 Enhanced timing of Digital Input clock characteristics.

V1.13 LWIP is now used to implement all aspects of the Ethernet interface. Five concurrent Modbus sessions are supported.

The introduction of LWIP into the Ethernet interface requires V1.13 or later firmware. MICRO-AIDE recommends that the new firmware be installed using the front panel USB Host Port. This procedure is described in the section entitled .

V1.14   Corrected bugs related to GEA polling and accessing.

V1.15   Corrected date error in Flashing and Timer Event Records.

V1.16   Corrected leap year error in GPS algorithm.

V1.17   Added Terminal Port command to front panel Diagnostic command menu.

SETUP DATABASE COMPATIBILITY

Occasionally, modifications to the firmware of the recorder will result in a new memory map of the Setup Database. When this occurs the previously created Setup Database will be incompatible with the new firmware. Table 1 on page 5 details the compatibility status of each firmware version. A green check mark (☑)in any given column indicates compatibility with the previous Setup Database. A red X (☒)indicates that a new Setup Database will have to be created for the firmware version listed. As noted below, Setup Databases for all versions of the CWR-264XL are fully compatible with V1.17 of the CWR-264A.

Firmware Version	Compatibility
CWR-264XL (all versions)	☑
V1.00	☑
V1.01	☑
V1.02	☑
V1.03	☑
V1.04	☑
V1.05	☑
V1.06	☑
V1.07	☑
V1.08	☑
V1.09	☑
V1.10	☑
V1.11	☑
V1.12	☑
V1.13	☑
V1.14	☑
V1.15	☑
V1.16	☑
V1.17	☑

Table 1: Setup Database Compatibility

When an incompatibility occurs, contact MICRO-AIDE before preparing a new Setup Database. E-mail a copy of the existing Setup Database along with the applicable firmware revision number. MICRO-AIDE will convert the database and return a file that is fully compatible with the new firmware version.

Never attempt to use an incompatible Setup Database. The operation of the recorder can be severely impacted.

ABOUT THIS MANUAL

This document is intended to provide the user with comprehensive, easy-to-read instructions on how to install, set up, operate and maintain the MICRO-AIDE CWR-264A Event Recorder. This document refers to

Version 1.17 of the CWR-264A firmware. Specifically, the sample data and command details depicted were prepared using a Version 1.17 recorder. Wherever possible, step-by-step instructions have been included. In the event the user has questions about any of the described procedures the user should contact MICRO-AIDE for assistance. Additional copies of this manual are available upon request.

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Covina, CA 91722
Tel: 626-915-5502   Fax: 626-331-9484
E-mail: support@micro-aide.com

The MICRO-AIDE "Material Return" and "Limited Warranty" policies can be found on the inside back cover of this manual.

The next chapter describes how to install the CWR-264A.

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CHAPTER 2 – INSTALLATION

INTRODUCTION

This chapter describes how to properly unpack and install the CWR-264A prior to operation. It is advisable to perform the Initial Check-Out Procedure before attempting to set up the recorder.

UNPACKING

Each CWR-264A is packed in a shipping carton that is properly sized for the recorder. Abundant packing materials are provided to minimize mechanical shock to the contents. Before opening the carton inspect it for damage. Damage to the carton should be noted. Carefully remove the recorder. It is advisable to save all packing materials in the event the recorder ever needs to be returned to MICRO-AIDE.

Inspect the recorder for visual damage. It should not be scratched, dented or deformed in any way. If it appears the recorder was damaged in shipment the responsible carrier should be notified immediately. MICRO-AIDE will assist the user in filing a claim in the event damage was sustained during shipment.

INITIAL CHECK-OUT PROCEDURE

Before the CWR-264A is installed at a signal facility it is recommended that an operational check of the recorder be performed. The following materials are required as a part of this procedure.

- 12 Vdc power source.

- Common hook-up wire for power and testing inputs (12 to 22 AWG).

- Wire strippers and small, flat-head screwdriver.

- PC equipped with a communications program (e.g., HyperTerminal®) and either a USB port or serial comm port set to operate at 38,400 Baud.

- Digital Voltmeter (DVM).

Perform each step in the sequence listed in the following. If a problem arises, refer to the sections entitled "Diagnostic Testing" on page 90 and "Trouble-Shooting Guide" on page 96. The front panel of the CWR-264A is illustrated in Figure 1 on page 8. Elements common to most installations are illustrated in Figure 2 on page 8 and Figure 3 on page 9.

1. With the power off, connect the power source positive and negative conductors to either pair of terminals labeled "B" and "N", respectively. They are located near the center of the recorder's top panel.

2. Connect the PC's serial comm port to the DE-9 male connector labeled "Terminal 1" or "Terminal 2". Use the cable provided by MICRO-AIDE or a DE-9 to DE-9 straight-through cable. Figure 11 on page 105 illustrates the proper wiring of the cable. Alternatively, connect a USB A-B cable between the recorder's port labeled "USB Device to PC" and any USB port available on the PC.

| A | 80-character LCD | B | 20-position kepad | C | USB Host Port |
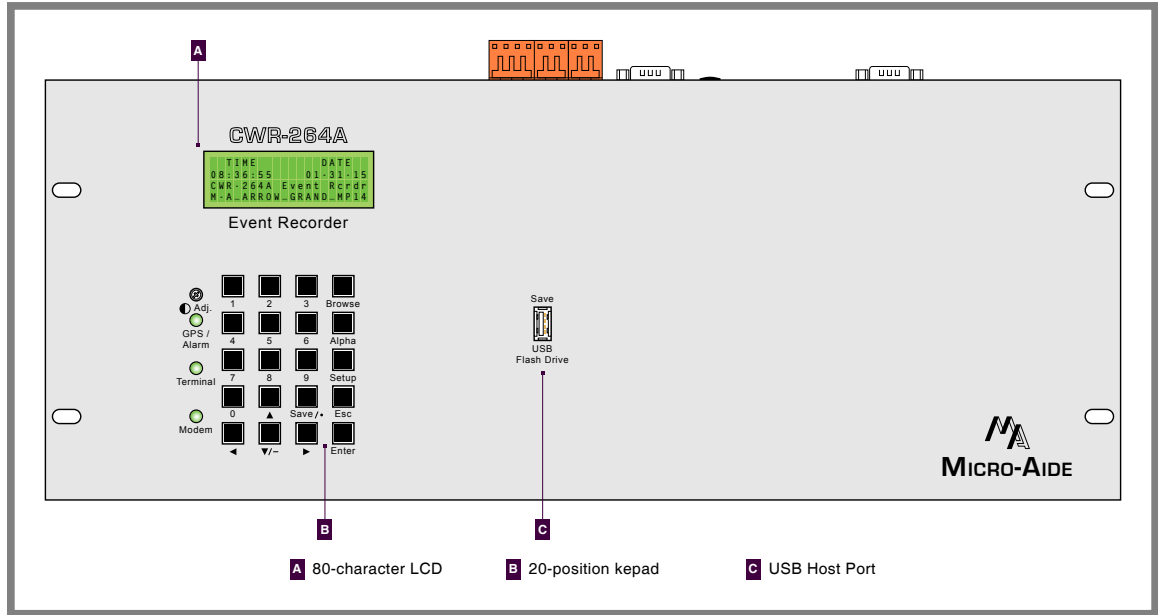
Figure 1: Front Panel View

D Detachable input connectors

E Dual output relays

F Ethernet Port (Telnet, Modbus, SNTP-Unicast & -Multicast)

G USB Device Port

H Terminal Ports (2)

I Optional 33.6K Baud modem

J Optional GPS Receiver
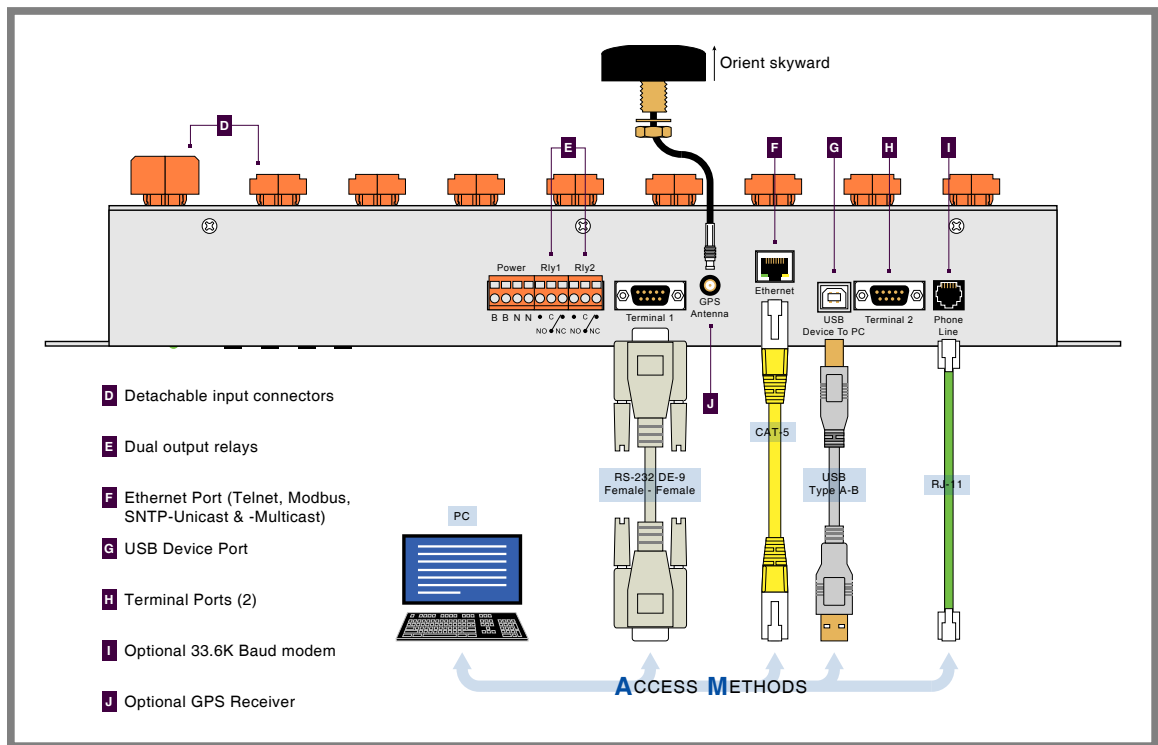
Figure 2: Typical Installation - Top Panel View

To use the recorder's USB Device Port the proper drivers must be installed in the PC. Appendix C describes how to locate and install the correct drivers.

The factory default setting for both Terminal Ports is 38,400 Baud. Refer to the procedure entitled "Terminal Port 1 and 2 Baud Rates" on page 23 for details on changing the Baud rate. The CWR-264A requires 8 data bits, no parity, 1 stop bit (i.e., 8-N-1) and hardware flow control.
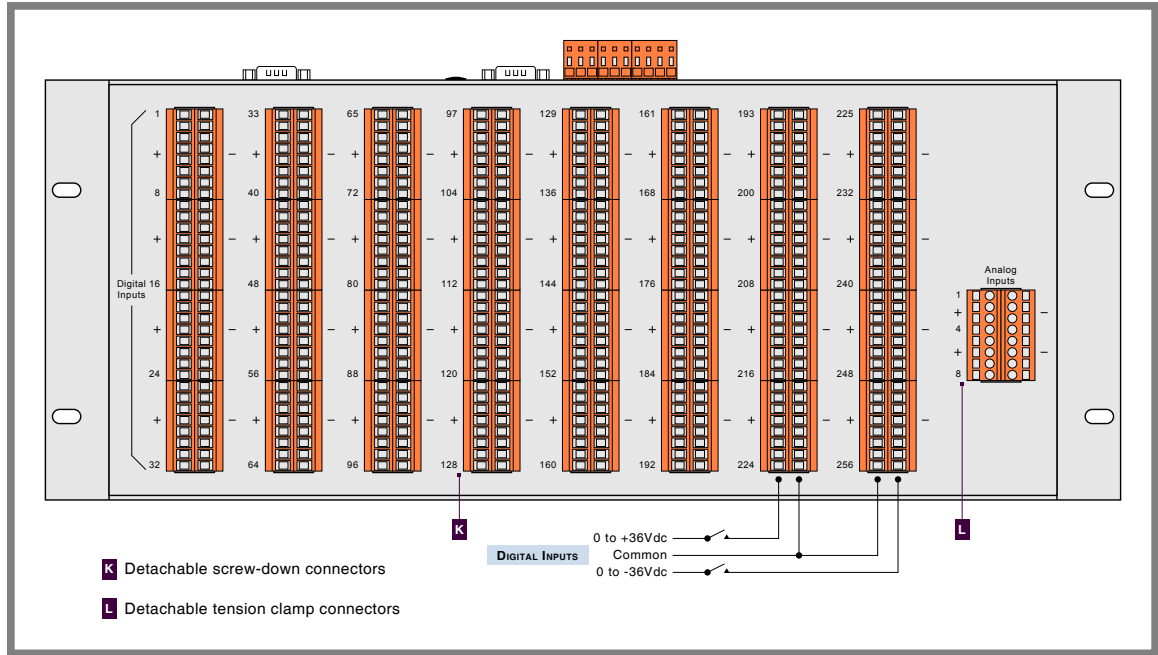
Figure 3: Typical Installation - Rear Panel View

3. Set the PC to emulate an ANSI terminal. In the case of HyperTerminal, click on the File, Properties command. Select the Settings tab. Enable Terminal keys. Select ANSI from the Emulation drop-down list box.

4. Apply power to the PC. Ensure that the communications program is set for a direct connection to the appropriate communications port.

5. Apply power to the CWR-264A. The Liquid Crystal Display (LCD) panel should illuminate. The PC will display the following message (Terminal Port 1 only).

```
Micro-Aide CWR-264a Flash Boot Loader 1.00
Press ESC for boot loader
```

⚠️ The preceding message should be ignored. Do not press the **Esc** key. The user must wait several seconds for the CWR-264A to complete its initialization process.

6. The following password challenge will be displayed.

```
Model CWR-264A Event Recorder. Ver 1.17 (C) 2014 MICRO-AIDE INC.

***** NOT SET *****

Event storage capacity: 221284

Enter password:
```

Password Request

7. If the recorder fails to display the password request, check the power and peripheral connections and Baud rate and communications settings. If the problem can be isolated to the CWR-264A contact MICRO-AIDE customer service for instructions on how to proceed.

ⓘ Repair and return policies are described on the inside back cover of this manual.

8. The remainder of the Initial Check-Out Procedure presumes the recorder is configured to operate with the factory default settings and Event Records have not been logged into memory. If this is not

the case the user may wish to reset the recorder. Refer to the section entitled "Reset System (R)" on page 20 for details.

9. From the PC's keyboard type **PASSWORD** in upper-case letters. This is the default password. Complete the entry by pressing the **Enter** key. The Main Menu, shown in the following, will be displayed.

```
              MICRO-AIDE CWR-264A Event Recorder

                      S Setup
                      L Live Status
                      Q Query Events
                      V View Events
                      M Measure Flash Rate
                      T Transfer Files
                      D Diagnostics
                      X Log Off
```
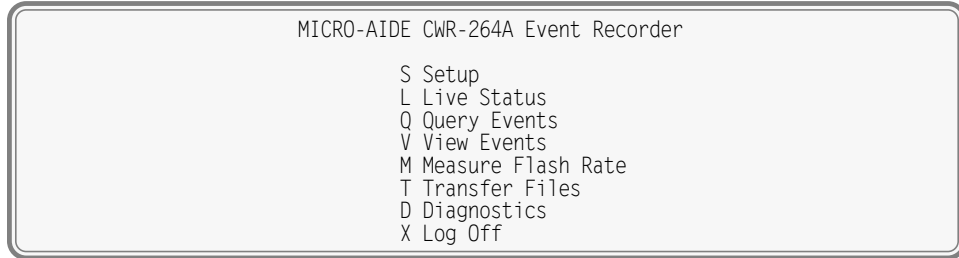
Main Menu

10. Using a short pair of stripped jumper wires place +12Vdc and negative to Digital Input number 1. Refer to the silkscreened labels located near the input terminals. Positive voltage should be placed on the terminal to the left and negative voltage on the right. The voltage should be held for at least .5 seconds before proceeding.

11. Use the same procedure described in the previous paragraph to test additional Digital Inputs.

12. Perform a Query of the Event Records by pressing **Q** at the PC keyboard. Select today's date and then press **Enter**. Finally, press the **F1** function key. Alternatively, press the **Ctrl+W** keys simultaneously. Refer to the section entitled "Query Events (Q)" on page 44 for additional details.

13. Verify that an Event Record is reported for each Digital Input tested. Note any inputs not displayed and test the inputs again, being careful to hold the voltage for at least .5 seconds. A second Query should verify the retested inputs.

14. Press the **Esc** key once to return to the Main Menu. While the Main Menu is displayed, press the **L** key from the PC's keyboard. This will display the unit's Live Status report.

15. Using the same jumper wires, connect the voltage source to Analog Input 1. Refer to the silkscreened labels located near the input terminals. Positive voltage should be placed on the terminal to the left and negative voltage on the right.

16. While voltage is being placed across the terminals of the Analog Input, verify that the Live Status screen is reporting a voltage that is within .15Vdc of the correct value. It takes a few seconds for the measurement to reach its final value.

17. Repeat steps 15 and 16 to test the remaining seven Analog Inputs.

18. Verify the LCD is providing acceptable contrast. If it needs to be improved adjust the potentiometer located at the recorder's front panel. Refer to the section entitled "Adjusting the LCD Contrast" on page 87.

ⓘ The use of the front panel LCD and Keypad is fully described in Chapter 5.

19. Verify that the LCD is displaying a date and time and that the time is being incremented each second. The date and time will likely be incorrect. The procedure for changing the date and time is described in the section entitled "Time / Date (T)" on page 19.

20. Press the front panel key labeled "*Setup*". A request for the Passcode will be displayed. Press the *12345678* front panel keys in the sequence listed. Complete the entry by pressing the *Enter* key.

21. The various front panel commands that comprise the Setup Menu will be displayed.

22. Press the front panel key labeled "*Esc*" to exit the Setup Menu.

This completes the Initial Check-Out Procedure for the CWR-264A. The PC can be disconnected, the unit powered down and set aside. Portions of this procedure may be used at any time to verify that the Event Recorder is operating properly.

In the event that a failure occurs during any part of this procedure a series of diagnostic tests should be performed. Refer to the sections entitled "Diagnostic Testing" on page 90 and "Trouble-Shooting Guide" on page 96. Alternatively, the user may wish to contact MICRO-AIDE customer service. Instructions on how to proceed will be offered. "Material Return" and "Limited Warranty" policies are described on the inside back cover of this manual.

INSTALLATION PROCEDURE

The following sections describe the recommended Installation Procedure. Figure 2 on page 8 and Figure 3 on page 9 illustrate elements that are common to most installations. The illustrations also depict the location of each connector used in the installation.

LOCATION

The location where the CWR-264A is to be installed should comply with a few simple requirements. The ambient temperature near the recorder should be in the range from -40°C to 72°C.

MOUNTING

The CWR-264A is designed to be mounted in a 19″ equipment rack. The front panel sheetmetal includes mounting holes that comply with the standard 1.75″ hole pattern. This 1.75″ hole pattern is comprised of holes that are spaced .625″, .625″ and .5″ apart. The mounting holes of the CWR-264A are each vertically spaced 4.0″ apart. In other words, the mounting holes are spaced two full increments apart plus .5″ (i.e., 1.75″ + 1.75″+.5″).

Before mounting the unit consideration must be given to the RS-232 cables that will likely be connected to the Terminal Ports of the recorder. The space between the top sheetmetal edge of the CWR-264A and the lower edge of the unit above must be 3.0″. These mounting guidelines are illustrated in Figure 4 on page 12.

The CWR-264A should be mounted at approximately eye level. This will make it more convenient to the user when working with the front panel LCD, Keypad and USB Host Port.

Contact MICRO-AIDE in the event 23″ rack mounting brackets are required. Refer to the section entitled "Accessories" on page 107 for ordering details.
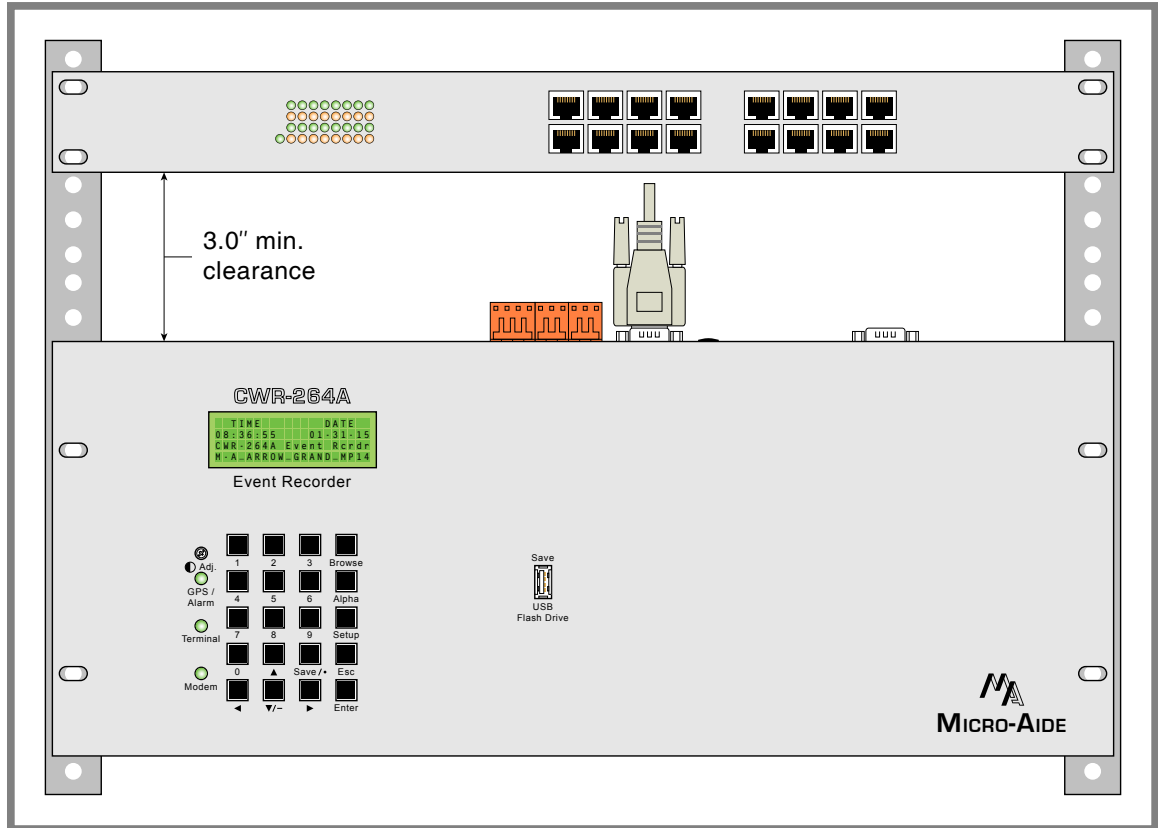
Figure 4: Rack Mounting Guidelines

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SITE PREPARATION

A large number of cables will be required to fully install the recorder. Advanced planning should be taken to properly locate and secure the power and input cables.

The equipment location must have access to a stable 9 to 36 Vdc power source. A pair of wires must be run from the power source to the location where the recorder will be mounted. The wire ends must be stripped approximately 1/4"-3/8". Refer to Figure 5 on page 13. The stripped ends will be secured by tension clamp terminals located along the top panel of the unit. One wire must be connected to the positive voltage of the power source and the other wire must be attached to the return of the power source. The tension clamp terminals will accept wire sizes as large as 12 AWG. The two wires must be properly secured to prevent damage. It is preferable not to run the wires adjacent to electrical equipment such as motors that may generate significant electrical disturbances.

It is likely that the recorder will be monitoring 200 or more relays. They will terminate in the Digital Inputs located at the rear of the recorder. It is recommended, although not mandatory, that these wires be attached to spare contacts at each relay. The other end of each wire will connect to screw-down terminals associated with each Digital Input. Refer to Figure 5 on page 13. The Digital Input connectors are detachable. The cable bundles should be neatly dressed and secured to either side of the rack frame.

The Analog Inputs and Relay Output cables require similar treatment and planning as those for the Digital Inputs. The connectors involved are also detachable. However, each connector uses tension clamp terminals.

Care should be taken to avoid excessively long service loops that might be accidentally snagged by personnel as they perform their duties in and around the system.
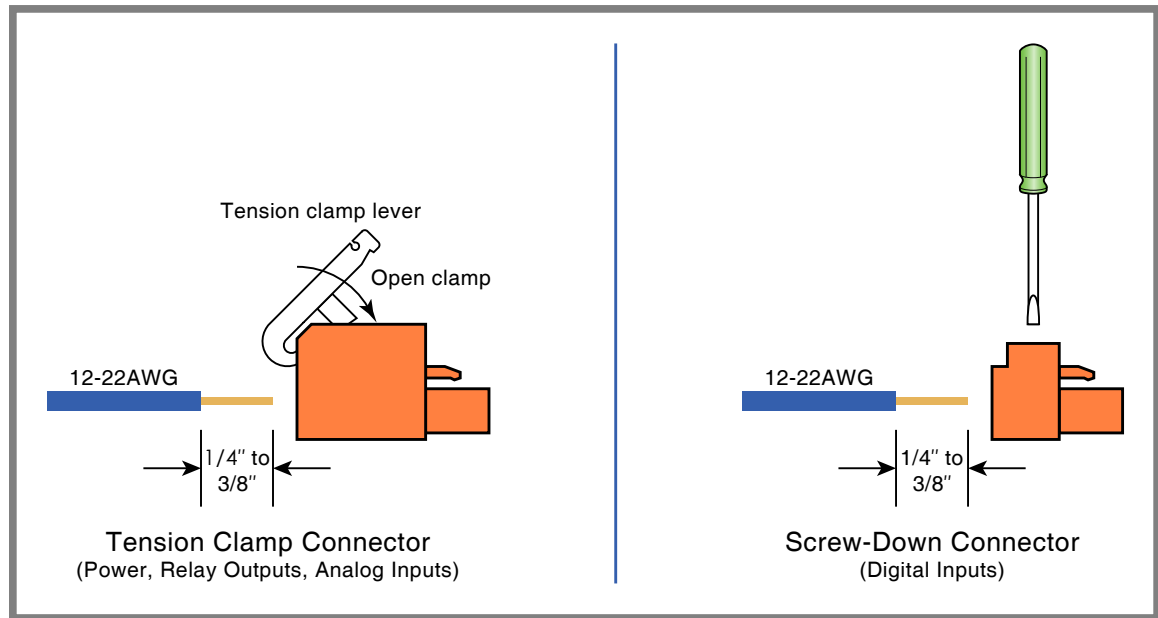
Figure 5: Detachable Connector Types

PERIPHERAL EQUIPMENT

If a PC is to be co-located with the CWR-264A an appropriate AC power source must be available. Additional connections can be made as described in the following sections.

USB DEVICE PORT

If an on-site PC is to be used MICRO-AIDE recommends that the USB Device Port be connected to a USB port of the PC. The USB Device Port will support data transfer rates of 4.71 Mbps. A standard USB Type A-B cable is used for this purpose. Table 14 on page 105 lists the bit transfer rates of each user-accessible port.

To use the recorder's USB Device Port the proper drivers must be installed in the PC. Appendix C describes how to locate and install the correct drivers.

TERMINAL PORTS

As an alternative, the PC can be connected to either of the Terminal Ports. The Terminal Port cable should be kept to a minimum distance, preferably less than 20'. MICRO-AIDE provides, as a standard feature, an RS-232 DE-9 to DE-9 cable. The cable is suitable for use with any PC comm port or USB-to-serial adapter cable.

Each recorder is shipped with a MICRO-AIDE manufactured RS-232 cable. The shield wire in the provided cable is not attached. Consequently, the recorder chassis and peripheral device are electrically isolated. This further improves the isolation properties of the system.

ETHERNET PORT

The Ethernet Port may be used to connect the CWR-264A to a LAN or PC. A standard CAT-5 Ethernet cable is used to connect to the LAN via a hub or switch. The length of either cable must be limited to 50'. Table 14 on page 105 lists the bit transfer rates of each user-accessible port.

INTERNAL MODEM (OPTIONAL)

If the CWR-264A is equipped with the optional internal modem, a standard telephone line can be attached to the recorder. The telephone line must be terminated with an RJ-11 connector like those

commonly used in residential telephone service. Test the telephone line first to ensure that a dial tone is available.

GPS RECEIVER (OPTIONAL)

The GPS Receiver option is the preferred means of precisely controlling the recorder's real-time clock. The optional feature includes a bulkhead-mount antenna designed specifically for use with the receiver module. For improved reception the antenna should be mounted outside of the equipment house or cabinet, as it requires unobstructed skyward access. The antenna is designed to be moisture proof and is rated to operate over a broad temperature range.

The antenna is equipped with a 16' coaxial cable. The antenna end of the cable is non-detachable. The other end of the cable terminates in an MCX-male connector. The MCX connector must be secured to the recorder's connector labeled "GPS Antenna" located along the top panel.

Upon request, an optional magnetic-mount antenna can be supplied. Refer to the section entitled "Options" on page 107 for additional details.

CABLING

Follow the steps listed in the following to complete the cabling installation.

The power, Relay Outputs and input wires all terminate in connectors that are detachable. The cable installation may be performed more easily if the female connectors are first detached from their male halves that remain secured to the CWR-264A circuit board.

POWER

1. Ensure that the power is off at the power source.

2. The two wires from the power source must be secured to either pair of tension clamp terminals labeled "B" and "N", respectively.

3. Connect AC power to the PC (as required).

RELAY OUTPUTS

Wire the alarm indicating device or circuit to the appropriate relay terminals labeled "C", "NO" or "NC" (i.e., common, normally open, normally closed, respectively).

DIGITAL INPUT CIRCUITS

Events will only be recorded if the input circuits are wired properly to the CWR-264A. The correct polarity of each input must be identified.

Digital Input circuits are wired to eight-position, detachable connectors that incorporate screw-down terminals. Individual pairs are wired to horizontally adjacent terminals. The positive lead of the digital circuit to be monitored must be connected to the left-side terminal labeled "+". The common, or return, lead of the digital circuit must be connected to the right-side terminal labeled "-".

Positive and negative voltages can be monitored by a Digital Input, even if they occur from the same circuit. In such cases the circuit is wired to two inputs of the recorder, one for each polarity. Figure 3 on page 9 illustrates how to connect negative voltage circuits.

JUMPER COMBS

As an aid to the installer each CWR-264A is provided with several Jumper Combs (Weidmuller part number (147250). Each Jumper Comb allows ten adjacent screw-down terminals to be connected together. Unwanted points may be removed by cutting them or bending them away from the detachable connector.

ANALOG INPUT CIRCUITS

Analog Inputs are connected similarly to Digital Inputs. The eight Analog Inputs terminate in separate connectors also located at the rear of the recorder. They are labeled as inputs "A1" through "A8".

Event Records will indicate positive and negative polarities for each Analog Input.

APPLYING POWER

Once the cabling is installed the power can be applied. Shortly after power is applied the PC will display the password request. Refer to the sample data entitled "Password Request" on page 9. After the initialization sequence is completed the front panel LCD will indicate the time and date.

Before proceeding to the next chapter the user may wish to verify the proper operation of each input. The "Initial Check-Out Procedure" on page 7 should be used to identify any faulty input wiring.

This completes the CWR-264A Installation Procedure. The Setup Procedure can now be started. This is the subject of the next chapter.

2

USER NOTES

2

CHAPTER 3 – SETUP

INTRODUCTION

This chapter describes how to set up the CWR-264A for use in a typical application. It is assumed that the Setup Database contains the factory default settings.

LOGGING ON

User sessions are initiated only after the log-on procedure is completed. Logging on is described in the section entitled "Initial Check-Out Procedure" on page 7. To log on the user must enter the correct password in response to the password challenge. A typical password challenge message is shown in the sample data entitled "Password Request" on page 9.

The Terminal, Ethernet and USB Device Ports of the CWR-264A incorporate two levels of password security. Each level uses a distinct password. The Restricted Access password allows a user to review all aspects of the Setup Database. The Administrative Access password allows a user full access to all aspects of the recorder. This includes the unrestricted ability to make changes to the Setup Database.

(i) The factory default password is **PASSWORD** in upper-case letters.

The Main Menu, as shown below, will be displayed after the correct password has been entered.

```
               MICRO-AIDE CWR-264A Event Recorder

                    S Setup
                    L Live Status
                    Q Query Events
                    V View Events
                    M Measure Flash Rate
                    T Transfer Files
                    D Diagnostics
                    X Log Off
```

Main Menu

USER INTERFACE CONVENTIONS

The CWR-264A user interface is designed for ease-of-use. Before proceeding further, the user should become familiar with a few simple aspects of the interface.

FIELDS AND COMMANDS

The CWR-264A user interface allows commands and parameter fields to be easily and quickly selected. Commands are listed vertically in a menu. Some commands direct the user to sub-menus containing additional commands (e.g., Setup command). Fields allow the user to either select or enter parameter values. A specific field is always uniquely associated with a particular command.

To select a command from a menu or a field within a command simply move the rectangular highlight to the location of the desired command or field. Pressing the appropriate arrow keys located on the PC keyboard will move the highlight. The left, right, up and down arrow keys may be used in any sequence to position the highlight.

To execute a command that has been previously selected (i.e., highlighted) simply press the **Enter** key. Alternatively, the command may be executed by pressing the single-letter code listed to the left of the command. Upper- and lower-case letters may be used. Every command listed in a menu has a distinct single-letter code that permits immediate execution of that command.

WORKING WITH FIELDS

The CWR-264A utilizes two types of fields. Selection Fields allow the user to select a parameter from a list of predefined values (e.g., Terminal Port1 Baud Rate). Edit Fields can be set to any alphanumeric value desired by the user (e.g., Unit Name).

To change the value of a Selection Field simply press the **Spacebar** on the PC keyboard. The next value from a predefined list of values will be displayed each time the **Spacebar** is pressed. The first value in the list will automatically follow the last value.

Input Names, Detection Times and Limit Values are examples of parameters that are defined by Edit Fields. After the desired Edit Field is highlighted the user may type any combination of alphanumeric characters appropriate to the field. The initial value of the field is completely removed after typing the first character. Consequently, it is not necessary to delete each character that comprises the initial value. Errors in typing can be corrected by using the **Backspace** key. At any time while editing a field the user may press the **Esc** key and thereby restore the field to its previous value.

Upper- and lower-case letters may be used. Limit Values are assigned negative values by preceding the numeric entry with a minus sign. Numeric values that exceed the range of the field are automatically set to the maximum or minimum value (as appropriate) permitted by the range.

To accept the new value assigned to an Edit Field the user can either press the **Enter** key or move the highlight to a new field. The initial value of an Edit Field cannot be restored after the new value has been accepted. When all of the fields contain values suitable to the user the command may be completed.

Once a field has been accepted by pressing the **Enter** key or moving the highlight it may, depending upon the command, be programmed into the recorder as an updated operating parameter. Accordingly, the acceptance may occur before completion of the command.

COMPLETING COMMANDS

Generally, commands are completed by pressing the **Esc** key. However, pressing the **Esc** key will not complete the command if the user is in the process of editing a field. Pressing the **Esc** key prior to accepting the new value will instead restore the highlighted field to its previous value. To complete a command that requires pressing the **Esc** key, first accept the contents of the last Edit Field by pressing the **Enter** key or moving the highlight to another field.

Some commands are completed by responding to a choice listed in a Selection Field (e.g., No or Yes). In these cases the command is completed by highlighting the desired choice and then pressing the **Enter** key. Pressing the **Esc** key is the equivalent of selecting the default choice (generally the No option). As a rule of thumb, executing the No option will abandon any field changes made prior to the completion.

Other commands are completed by pressing the key described in a prompt message displayed with the command. Prompts are frequently listed with commands as an aid to the user. After the command is completed the user will be returned to the menu that was previously displayed.

DATA FLOW CONTROL

A few of the setup and operational commands can generate considerable amounts of displayed data. If the user wishes to observe this data on the screen of a PC it may be helpful to temporarily pause the data stream being sent by the recorder. The Pause and Resume commands may be used to provide the required data flow control.

To Pause the data being sent press the **Ctrl** and **S** keys simultaneously. The data flow will be stopped indefinitely. To Resume data flow press the **Ctrl** and **Q** keys simultaneously. This technique can be used to freeze the data at the PC.

Another useful command is the Abort command. At any time during a lengthy data dump the remaining data can be ignored or aborted by pressing the **Esc** key. The user can then issue another command immediately after the Abort is executed rather than wait until the lengthy data dump is completed.

SETUP PROCEDURE

Before the CWR-264A is ready for use the recorder must be configured to reflect the operation required by the user. The following steps should be performed in the sequence listed. It is assumed that the user intends to access the CWR-264A via a PC which is connected to either the USB Device or a Terminal Port. Succeeding chapters describe how to use the front panel display and keypad, as well as access the recorder via its Ethernet Port and optional internal modem. It is further assumed that the user has not previously altered any of the factory default settings.

> The comm port of the PC must be set to operate at a speed of 38,400 Baud with hardware flow control enabled.

The Main Menu of commands will be displayed immediately after logging on. Refer to the sample data entitled "Main Menu" on page 17. The Setup Procedure described in this chapter will familiarize the user with the Setup, Transfer Files and Log Off commands listed in the Main Menu.

For the remainder of this chapter the Setup, Transfer Files, Log Off commands and their numerous sub-commands will be described in the sequence recommended by MICRO-AIDE for their execution as part of the Setup Procedure. Each command will be identified by its name as listed in the menu where it resides. The single-letter code that executes the command will be listed in parenthesis. The Setup Procedure commences with the execution of the Setup command listed at the top of the Main Menu.

3

SETUP (S)

The following menu of sub-commands will be displayed after executing the Setup command.

```
                              Setup Menu

                    T Time/Date
                    E Event Names
                    I Input Names/Identifiers
                    D Detect Times/Flash Enable
                    G Global Detect Time
                    A Analog Configuration
                    V Virtual Inputs
                    W Timer Inputs
                    M Measure Speed
                    N Network
                    S System Parameters
                    P Print Setup Data
                    R Reset System
```

Setup Commands

TIME / DATE (T)

The CWR-264A time stamps all Event Records. Therefore, the correct time and date must be set. The recorder will automatically account for leap year. The recorder's clock circuitry will continue to keep time even if power is interrupted for a prolonged period.

To manually change the time or date execute the Time / Date command. The sample data listed in the following shows a typical response to the Time / Date command.

```
                          Time/Date

                          HH:MM:SS
                    Time: 13:13:12

                          MM-DD-YY
                    Date: 01-31-15 Saturday
```

Time/Date Command

The highlight may be moved to the hour, minute or second time fields or month, day or year date fields. The CWR-264A utilizes a military-style clock. Accordingly, 12:01:02 AM is defined as 00:01:02 and 12:59:58 PM is defined as 23:59:58. Leading zeros are not required. The day of week is displayed automatically as determined by the date selected by the user.

To complete the command press the **Esc** key. The user can then accept or abandon the changes.

The clock of the CWR-264A can be precisely controlled by three different means. The Clock Sync Mode can be set to GPS or SNTP. Either of two SNTP methods are available. Refer to the section entitled "Clock Sync Mode" on page 24. If the clock cannot be synchronized MICRO-AIDE recommends that the clock be manually set once per month.

Two System Event Records are automatically saved to memory whenever the user manually sets the time or date. This feature is fully described in the section entitled "System Events" on page 93.

Reset System (R)

The Reset System command can be used at any time to restore the recorder to its factory default settings. The command can also be used to clear previously logged Event Records. This step is listed as part of the Setup Procedure since it can be useful in restoring the recorder to a known state consistent with this documentation. Additionally, any programming or Event Records created as a part of the Initial Check-Out Procedure will be erased.

The following menu will be displayed after executing the Reset System command. Both command options are described in the sections that follow.

```
                         Reset System

                    S Reset Setup Data
                    E Reset Event Memory
                    B Reset Both
```

Reset System Command

The time and date settings, along with the Network and several System Parameters, are not affected by either option of the Reset System command.

Reset Setup Data (S)

The CWR-264A utilizes two non-volatile memories. The first, referred to as the Setup Database, contains all of the programmed parameters established by the user. Most of these parameters can be restored to their factory default values by executing the Reset Setup Data command. Table 2 on page 20 lists the values after the reset is performed. Some parameters are unchanged by the reset.

Parameter	Default or Reset Value
Time / Date	(as previously assigned)
Event Names - On	On (1 - 19), Violate (20)
Event Names - Off	Off (1 - 19), Nominal (20)
Input Names - Digital Inputs	Digital Input 001, Digital Input 002, etc.
Input Names - Analog Inputs	Analog Input 01, Analog Input 02, etc.

Table 2: Factory Default / Reset Settings

Parameter	Default or Reset Value
Input Names - Virtual Inputs	Virtual Input 01, Virtual Input 02, etc.
Input Names - Timer Inputs	Timer 01, Timer 02, etc.
Identifiers - Digital Inputs	DInpu001, DInpu002, etc.
Identifiers - Analog Inputs	AInput01, AInput02, etc.
Identifiers - Virtual Inputs	VInput01, VInput02, etc.
Identifiers - Timer Inputs	Timer01, Timer02, etc.
Event Pairs	1, 20 for Timer Inputs
Digital Inputs - Detect Time	.30 seconds
Digital Inputs - Flash Enable	No
Analog Configuration - Range	±25.5 Vdc
Analog Configuration - Filter	Slow
Analog Configuration - Low Limit	-25.6 Vdc
Analog Configuration - High Limit	25.5 Vdc
Virtual Inputs - Variables	--- (not assigned)
Virtual Inputs - Relay 1 and Relay 2	No
Virtual Inputs - Dial Out	No
Timer Inputs - From and To Triggers	--- (not assigned)
Timer Inputs - From and To Events	Off
Timer Inputs - Low Limit	0.0 seconds
Timer Inputs - High Limit	0.0 seconds
Measure Speed - Sensor1	--- (not assigned)
Measure Speed - Sensor2	--- (not assigned)
Measure Speed - Distance	0'
Measure Speed - Threshold	0 mph
Network - IP Address	(as previously assigned)
Network - Subnet Mask	(as previously assigned)
Network - Gateway	(as previously assigned)
Network - Ethernet MAC Address	(as previously assigned)
Network - Port	(as previously assigned)
Network - TCP / IP mode	(as previously assigned)
Unit Name	***** NOT SET *****
Terminal Port Baud Rate (1 and 2)	38,400
Administrative Password	PASSWORD
Restricted Password	LOOKWORD
Passcode	12345678
Ring Count	2
Primary Dial Number	(not assigned)
Secondary Dial Number	(not assigned)
Clock Sync Mode	(as previously assigned)
SNTP Server	0.0.0.0
Time Zone	(as previously assigned)
Daylight Saving Time	(as previously assigned)
High Temp Limit	257 °F
Low Temp Limit	-67 °F
Measure Flash Rate - Input	(as previously assigned)

Table 2: Factory Default / Reset Settings

3

The following precaution will be displayed after selecting the Reset Setup Data command.

```
RESET ALL SETUP DATA TO FACTORY DEFAULTS, ARE YOU SURE?
                        No Yes
```

Select No to abort the reset. Select Yes to proceed.

The Reset Setup Data command will return both Terminal Port Baud rates to their default settings of 38,400 Baud. The PC Baud rate may have to be adjusted.

RESET EVENT MEMORY (E)

The Reset Event Memory command will permanently remove from memory all Event Records that were previously logged. Records from each of 128 possible days will be deleted.

The following precaution will be displayed after selecting the Reset Event Memory command.

```
ERASE ALL EVENTS FROM MEMORY, ARE YOU SURE?
                  No Yes
```

Select No to abort the reset or Yes to proceed. If a reset is performed the following precaution will be displayed.

```
Erasing memory, do not turn power off for 60 seconds,
            Press any key to continue
```

It is important that the user not turn off the power while the CWR-264A is clearing the Event Record memory. Failure to do so may result in corruption to the Event Record set.

RESET BOTH (B)

The Reset Both command allows the user to clear both databases simultaneously. The precaution noted in the preceding paragraph applies to this command as well.

SYSTEM PARAMETERS (S)

System Parameters are those parameters that affect the recorder as a whole. They do not affect individual inputs or their behavior. System Parameters include, but are not limited to, the Unit Name, passwords and modem options. The fifteen System Parameters are defined with a single command containing multiple fields. A typical response to the System Parameters command is shown in the following. The use of each System Parameter is described in the following sections.

```
                    System Parameters
                    -----------------
                Unit Name
***** NOT SET *****
                Terminal Port1 Baud Rate 38400
                Terminal Port2 Baud Rate 38400
                Administrative Password PASSWORD
                Restricted Password     LOOKWORD
                Passcode                12345678
                Ring Count                 2
                Primary Dial Number
                Secondary Dial Number
                Clock Sync Mode         None
                SNTP Server              0.  0.  0.  0
                Time Zone               PST  (UTC-8)
                Daylight Saving Time    Enabled
                High Temp Limit         257 Degrees F
                Low Temp Limit          -67 Degrees F
```

System Parameters Command

UNIT NAME

The Unit Name serves as a comprehensive recorder and site ID. It is included at the top of each report. Data from several CWR-264A recorders can be easily distinguished by providing each unit with a unique

and descriptive name. A total of eighty alphanumeric characters can be used to define the Unit Name. It is assigned using the standard Edit Field techniques described in .

A Unit name can be assigned by the user to suit a variety of requirements. As an example, it may include references to a district, city, milepost number, street and DOT designation.

The front panel LCD has a limited capacity to display information. It is limited to 4 lines of 20 characters. The content of the first 3 lines are fixed by the recorder's firmware and cannot be changed by the user. The content of the fourth LCD line always reflects the first 20 characters of the Unit Name as depicted in the following.

```
    TIME         DATE
18:56:16      01-31-15
CWR-264A Event Rcrdr
M-A_ARROW_GRAND_MP14
```

When Event Records are saved to a USB flash drive the records are contained in a folder. The folder name is created automatically by the Event Recorder. It is a copy of the first 20 characters of the Unit Name just as they appear on the LCD.

Guidelines and prohibitions regarding the first 20 characters of the Unit Name are detailed in the following.

- The first 20 characters must be unique to each recorder. Doing so assures that each USB flash drive folder created by the recorder will also be unique, thereby avoiding confusion in the resultant Event Record data files.

- The following Windows-prohibited characters (11 total) cannot be used / \ ? % * : | " < >.

- The first and last characters cannot be a space, period (.) or control character.

- If a space is required for clarity, use the underscore (_) character instead.

TERMINAL PORT 1 AND 2 BAUD RATES

The Terminal Port Baud rates may be assigned one of ten values. Valid settings are: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 bps. Press the **Spacebar** to select a Baud rate.

The following message will be displayed if the Baud rate was changed.

```
             Change baud rate now, then
             Press any key to continue
```

The user must change the Baud rate of the PC to match the new setting assigned to the CWR-264A.

ADMINISTRATIVE AND RESTRICTED PASSWORDS

Access to the CWR-264A via any port is protected by a dual level password system. Administrative Access permits unrestricted access to all recorder functions. Administrative Access allows the Setup Database to be altered and the Event Record memory to be cleared. The Administrative Password should be known to a limited number of users with a genuine need to know.

Restricted Access permits only limited access to the recorder. It allows the user to review, but not alter, the Setup Database and Event Record memories. The Restricted Password can be shared with users that only need access to Event Record data when investigating an incident or resolving a maintenance issue.

The Administrative and Restricted Passwords are defined similarly. Each may be assigned any combination of alphanumeric characters not exceeding eight total. To defeat the password security system assign one of the passwords a null value. This can be done by deleting all of the characters in the password field and then accepting the empty field. When the password challenge is issued the user will be able to access the system by simply pressing the **Enter** key.

⚠ Care should be exercised in assigning and saving the Administrative Password. If it is lost or forgotten it will be necessary to contact MICRO-AIDE for assistance.

PASSCODE

The CWR-264A can be effectively programmed and operated from its front panel. The Passcode is used to protect the recorder from unwanted access via the front panel. It must be entered when the user attempts to alter the Setup Database. The Passcode can be assigned any combination of digits not exceeding eight total. Alphabetic characters cannot be assigned to the Passcode.

RING COUNT

The Ring Count parameter determines the number of ring cycles that must occur before the modem will answer an incoming call. Setting the Ring Count to a sufficiently large value will allow an on-site maintainer to answer a voice call prior to the CWR-264A answering. The Ring Count can be set in the range from 0 to 99. A setting of 0 will disable the modem's auto-answer feature (i.e., incoming calls will not be answered by the modem).

The following message will be displayed below the last field in the System Parameters command if the optional modem is not installed. No message will appear if the modem is installed.

```
Modem is NOT installed
```

PRIMARY AND SECONDARY DIAL NUMBERS

The Virtual Input feature of the CWR-264A allows users to program a fault reporting capability into the recorder. If the fault is detected and the recorder is equipped with the optional internal modem, the modem can be enabled to dial out to a maintenance facility and transmit an Event Record that specifies the fault.

The telephone number the modem dials is defined by the Primary and Secondary Dial Number parameters. Dial numbers will generally contain numeric values. An exception to this rule is that parentheses, hyphens and space characters can be placed into the number field for clarity. These characters will be ignored by the modem. Additionally, the comma character can be placed anywhere in the field to create an arbitrary two-second delay. A total of twenty alphanumeric characters can be entered for each of the dial numbers.

The CWR-264A attempts to establish a connection by dialing the Primary Dial Number first. If the connection fails the next attempt is made to the Secondary Dial Number. Successive failures will force the modem to dial alternately between the two numbers. The modem ceases further attempts after ten failures to each number have occurred.

ⓘ The CWR-264A modem is programmed to accept only reliable connections. Consequently, the far end modem must be programmed to establish connections that use error correction protocols such as LAP-M and MNP 2-4.

CLOCK SYNC MODE

The CWR-264A contains a real-time clock that allows the recorder to time stamp Event Records to the nearest hundredth of a second. With any clock a small amount of drift can be expected. However, the real-time clock of the CWR-264A can be precisely synchronized by employing either of the following methods.

- SNTP-Multicast or SNTP-Unicast (requires accessible time server)

- GPS time (requires GPS Receiver option to be installed)

The Clock Sync Mode setting controls the synchronization method. Press the **Spacebar** to select one of the following methods.

- None: The real-time clock is not synchronized.

The real-time clock of the CWR-264A (if not synchronized) features an accuracy of ±3 ppm, which is approximately ±8 seconds per month.

- SNTP: If the SNTP Server address is set to 0.0.0.0 the Multicast method is employed. This setting effectively disables the Unicast method in favor of Multicast. Otherwise Unicast is selected. Refer to the section entitled "SNTP Server" on page 25 for additional details.

- GPS: Every hour, on the hour, the real-time clock will be synchronized to GPS time. This occurs provided the GPS Receiver is in acquisition of a valid GPS signal.

As previously stated, the real-time clock can be synchronized automatically by means of a time server. To use this feature the following requirements must be satisfied.

- The time server must be enabled for either Multicast or Unicast operation.

- The various switches, gateways and routers that comprise the LAN must be configured to propagate the required SNTP messaging to and from the time server and recorder.

SNTP time synchronization operates as follows:

- If Multicast operation is selected, the recorder will automatically update its clock upon receipt of a Multicast message. In this case, the updates are under the sole control of the time server. They occur at intervals set by the time server.

- If Unicast operation is selected, five minutes after each hour the CWR-264A will send a time request message to the time server. The latter will respond with a time and date message. The CWR-264A will receive and validate this message and update its clock accordingly.

A System Event Record is logged to memory whenever the real-time clock is synchronized. This occurs irrespective of the synchronization method selected. Refer to the section entitled "System Events" on page 93 for additional details.

SNTP SERVER

The SNTP Server setting operates in conjunction with the Clock Sync Mode setting as follows:

- Set the SNTP Server address to 0.0.0.0 and the Clock Sync Mode to SNTP to enable Multicast operation.

- Set the SNTP Server address to the address of a suitable time server and the Clock Sync Mode to SNTP to enable Unicast operation.

The I.T. group responsible for the LAN will be able to identify an appropriate time server address as well as configure the time server appropriately.

TIME ZONE

The correct Time Zone setting must be assigned when GPS or either SNTP synchronization method is selected. GPS and SNTP time data is relative to UTC-0 time, previously known as GMT. To display the correct local time the Event Recorder must convert the reported UTC time by applying the correct time zone adjustment.

The Time Zone setting can be assigned as UTC-0 or one of seven different values that are commonly used in North America. Each setting is explained in Table 3 on page 26.

Time Zone Code	Description	Shift from UTC (hours)
UTC	Universal Time (GMT)	0
AST	Atlantic Standard Time	-4
EST	Eastern Standard Time	-5
CST	Central Standard Time	-6
MST	Mountain Standard Time	-7
PST	Pacific Standard Time	-8
AKST	Alaska Standard Time	-9
HAST	Hawaii Standard Time	-10

Table 3: Time Zone Settings

DAYLIGHT SAVING TIME

The real-time clock of the CWR-264A can be adjusted automatically to compensate for DST. This feature operates independently of the Clock Sync Mode setting. If enabled, the real-time clock will be shifted by one hour on the second Sunday of March and the first Sunday of November. In both cases the clock is adjusted at 2:00 AM.

The DST feature implemented by the CWR-264A is in full compliance with the Energy Policy Act of 2005 which took effect in 2007.

HIGH AND LOW TEMP LIMITS

The temperature inside the CWR-264A can be measured and reported. If the temperature reaches an extreme value a System Event will be declared and logged to memory. Refer to the section entitled "System Events" on page 93 for additional information. The High and Low Temp Limits are used to define the range of acceptable operation. The settings must range from -67°F to 257°F.

DETECT TIMES / FLASH ENABLE (D)

The Digital Inputs of the CWR-264A will generally be connected to relay-based control circuits. Since relay contacts typically bounce, the recorder must have the ability to de-bounce these inputs. The Detection Time feature allows the user to establish a validation time for each Digital Input.

Each Digital Input can also be set to monitor a flashing circuit. The Detect Time/Flash Enable command allows the user to program each of these features. A typical response to the Detect Time/Flash Enable command is shown in the following. For the sake of brevity, only a few lines of command text are shown.

```
                    Detect Times/Flash Enable
          Detect            Detect            Detect
   Input Time Flash   Input Time Flash   Input Time Flash   Input Time Flash
   ----- ---- -----   ----- ---- -----   ----- ---- -----   ----- ---- -----
   D001  0.30  No     D017  0.30  No     D033  0.30  No     D049  0.30  No
   D002  0.30  No     D018  0.30  No     D034  0.30  No     D050  0.30  No


   [F1/^W]=Next Page [F2/^E]=Prev Page
```

Detect Times / Flash Enable Command

The procedure for programming both parameters is described in the following sections.

DETECTION TIMES

In the sample data shown previously the Detection Times are set to the factory default value of .30 seconds. The range of valid Detection Times is 0 to 327.67 seconds. Use the decimal point key to enter fractional values.

Set the Detection Times to values slightly greater than the longest expected bounce time of the relay contacts. This will insure that noise or transient induced voltage changes are not recorded and that legitimate short duration events will be logged. To prevent a Digital Input from logging events, set its Detection Time value to zero.

The Detection Time of Digital Inputs assigned as sensors in the Train Speed Monitor feature cannot be altered. They are set to a fixed value of .05 seconds.

The Detection Time assigned to a Digital Input enabled for flashing operation represents a special case requiring additional explanation. The correct programming procedure is described in the following.

FLASH ENABLE

A typical flashing event is created by the operation of a crossing light or approach signal. Each time the light flashes a new pulse is seen at the Digital Input. The user may wish to log events only at the start and end of the sequence, not an event for each pulse. When the sequence terminates, an Event Record will then list the measured flash rate in fpm. This feature can be enabled by performing the following steps.

1. Assign the proper Detection Time to the Digital Input.

2. Highlight the Flash setting for the Digital Input.

3. Select the Yes setting by pressing the **Spacebar** once.

Figure 6 on page 27 illustrates a flashing sequence and the events that would be created at the start and end of the sequence.
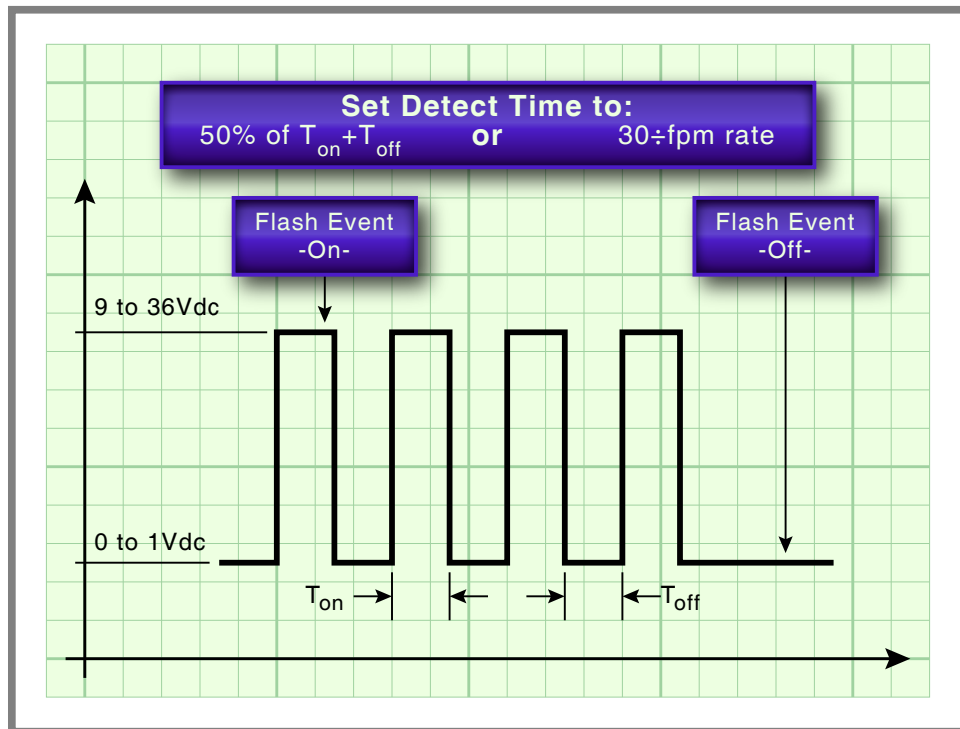
Figure 6: Typical Flashing Pulse Sequence

The Detection Time must be set to the nominal duration of a flash pulse. Pulses are expected to be on and off for the same duration. However, the CWR-264A is designed to allow for some variation in the duration of each pulse. Each on and off pulse must have a duration in the range from 75% to 125% of the assigned Detection Time. Use either of the two methods listed in the following paragraph to determine the correct Detection Time for inputs with non-varying flash rates.

The Measure Flash Rate command can be used to accurately determine the Detection Time for flashing inputs. Refer to the section entitled "Measure Flash Rate (M)" on page 50. Alternatively, the correct Detection Time (in seconds) is equal to 30 divided by the number of flashes per minute (i.e., 30÷fpm).

GLOBAL DETECT TIME (G)

The Detect Times command allows each Digital Input to be set individually. Setting all 256 inputs to values that differ from the factory default setting can be time consuming. Alternatively, the Global Detect Time command can be used to set all inputs to a single Detection Time value.

The following edit field will be displayed in response to the Global Detect Time command.

```
                    Global Detect Time

          Detect Time for All Inputs:   0.00
```

Global Detect Time Command

To set the Detection Time for each Digital Input simply enter a number in the range from .01 to 327.67. To complete the entry press **Enter**.

An initial value of 0.00 is always listed in the edit field. The Global Detect Time command will not alter the setting of Digital Inputs assigned as sensors for any of the Train Speed Monitors.

ANALOG CONFIGURATION (A)

The eight Analog Inputs of the CWR-264A can be used in a variety of applications. Battery voltages and AC voltage levels can be measured and reported by the Analog Inputs. The user can select an entry from a preset menu that best suits the intended application. A typical response to the Analog Configuration command is shown in the following. Default settings are listed.

```
                     Analog Configuration
       Input      Range       Filter*     Low Limit        High Limit
       ----- ----------      ------      ---------        ----------
        A01  +/-25.5Vdc        Slow        -25.6              25.5
        A02  +/-25.5Vdc        Slow        -25.6              25.5
        A03  +/-25.5Vdc        Slow        -25.6              25.5
        A04  +/-25.5Vdc        Slow        -25.6              25.5
        A05  +/-25.5Vdc        Slow        -25.6              25.5
        A06  +/-25.5Vdc        Slow        -25.6              25.5
        A07  +/-25.5Vdc        Slow        -25.6              25.5
        A08  +/-25.5Vdc        Slow        -25.6              25.5

               *Recommend "Slow" for AC
```

Analog Configuration Command

The first column identifies the input. Analog Inputs are consistently labeled by the CWR-264A as "A01", "A02", etc. The A-prefix is always used to distinguish Analog from Digital, Virtual and Timer Inputs. This first column of fields is fixed and cannot be altered by the user. Four parameters can be used to characterize an Analog Input. Each parameter is described in the sections that follow. Table 4 on page 28 lists the Resolution, Filter and Limit Values applicable to each of the five Ranges.

Range	Resolution	Filter	Low Limit	High Limit
±25.5 Vdc	.1 Vdc	Slow or Fast	-25.6 to 25.5 Vdc	-25.6 to 25.5 Vdc
+51.1 Vdc	.1 Vdc	Slow or Fast	0.0 to 51.1 Vdc	0.0 to 51.1 Vdc
±255 Vdc	1 Vdc	Slow or Fast	-256 to 255 Vdc	-256 to 255 Vdc
25.5 Vac	.1 Vac	Slow or Fast	0.0 to 25.5 Vac	0.0 to 25.5 Vac
255 Vac	1 Vac	Slow or Fast	0 to 255 Vac	0 to 255 Vac

Table 4: Analog Input Parameters

RANGE

The Range setting allows the user to configure the Analog Input for DC or AC voltage measurements. The Range setting also selects the span of voltages that will be monitored. Lastly, the Range setting selects the resolution that will be reported by the measurement. The +51.1 Vdc range is particularly useful in monitoring batteries that may exceed 24 Vdc when charging. The 255 Vac range is useful for monitoring the AC power source connected to a battery charger.

Each of the Ranges identified as AC utilize a true RMS method of measurement. Consequently, these settings can also be used when monitoring inputs with variable DC or pulse content.

FILTER

The Filter parameter can be set to either Fast or Slow. The Fast setting utilizes a time constant of .1 seconds. It is generally used when monitoring DC signals. The Slow setting utilizes a time constant of .64 seconds. It should be used when monitoring AC signals in order to smooth out their ripple content. If the user is unconcerned about the Filter time constant it is best to use the Slow (default) setting.

HIGH AND LOW LIMITS

Analog Inputs are constantly compared to two Limit Values. The High and Low Limit Values define ranges of acceptable and unacceptable operation. Outside the acceptable range the input is considered to be in an abnormal state. An Event Record will be created when the Analog Input transitions into or out of either range.

Figure 7 on page 30 illustrates the relationship of the High and Low Limit Values to the Analog Input state. Each range defines the type of Event Record that is created by transitions of the input. The figure depicts an Analog Input configured to monitor a typical 12 Vdc battery source. The figure indicates that the unacceptable range includes all voltages less than 10.2 Vdc and all voltages greater than 14.5 Vdc. The unacceptable range always consists of two portions separated by the acceptable range. If the input is within the range extending from 10.2 to 14.5 Vdc the battery voltage is considered to be acceptable.

Analog Inputs with levels greater than the Low Limit Value but less than the High Limit Value will create Event Records defined by the inactive or Off Event state. Levels found to be outside these limits will create Event Records defined by the active or On Event state.

In the following illustration, when the signal transitions into the unacceptable range an On Event Record is created and identified with an Event Name of BATT_BAD. When the signal transitions into the acceptable range an Off Event Record is created and identified with an Event Name of BATT_OK.
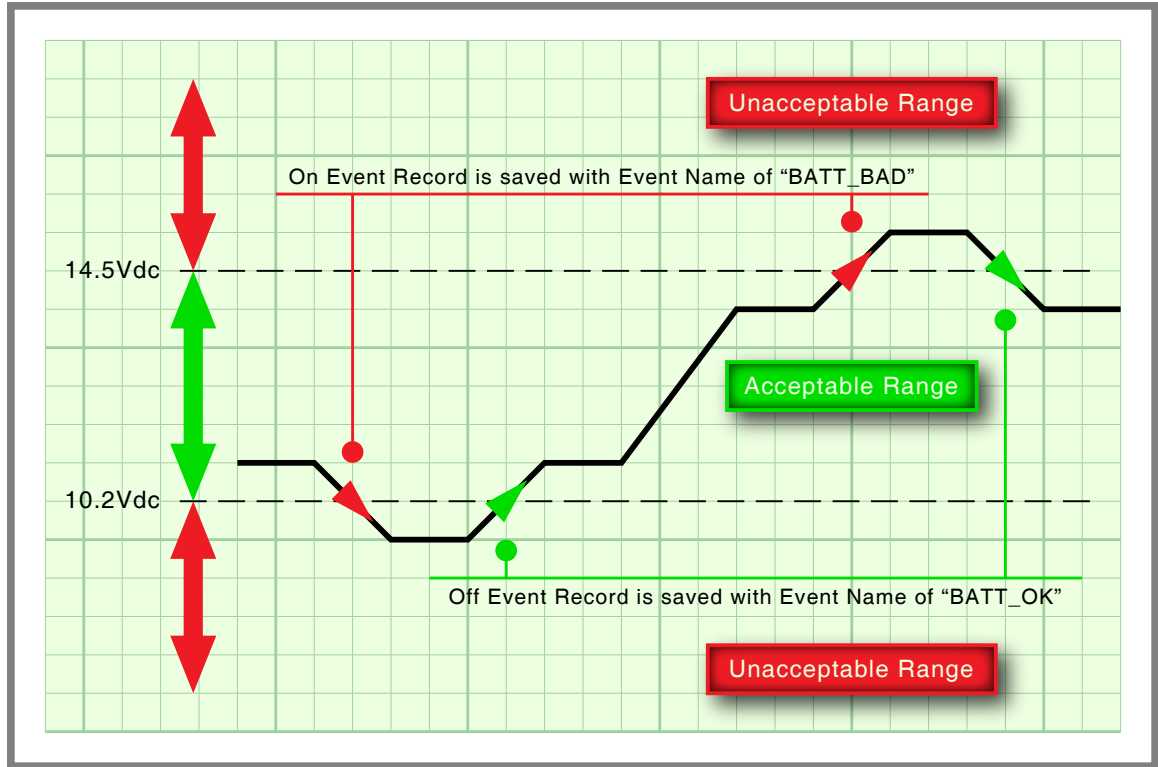
Figure 7: Analog Input Operating Ranges and Limit Values

Tɪᴍᴇʀ Iɴᴘᴜᴛs (W)

The CWR-264A includes 200 general purpose Timer Inputs. Each timer can be programmed individually. A Timer Input can be used to measure the elapsed time between any two events. As an example, the time between two relay events can be measured. The time a single relay is energized or un-energized can be measured. The interval between the loss of adequate BN voltage and a relay operation can be measured. Additionally, the user can assign Limit Values to each Timer Input. In this way, time delays that are unacceptably short or long can be reported. Finally, Timer Inputs will generate distinguishable Event Records like any other input. Included in each record is the measured time value.

The relationship shared by the From trigger source, the To terminating source and various event transitions is depicted in the Figure 8 on page 31.

An array of fields similar to the following will be displayed after selecting the Timer Input command. In the example cited, parameters for the first Timer Input have been entered. The other fields have retained their factory default settings. Only the first three Timer Inputs are listed.

```
                    Timer Configuration
                    -------------------
    Timer  From  Event  To   Event  LowLimit  HighLimit
    -----  ----  -----  ---- -----  --------  ---------
    T001   D032   On    D033  Off      7.5       12.5
    T002   ---    Off   ---   Off      0.0        0.0
    T003   ---    Off   ---   Off      0.0        0.0


  [F1/^W]=Next Page [F2/^E]=Prev Page
```

Timer Inputs Command

To program a Timer Input follow the steps listed in the following.

1. Position the highlight anywhere in the row identified by the Timer Input to be programmed (e.g., T001).
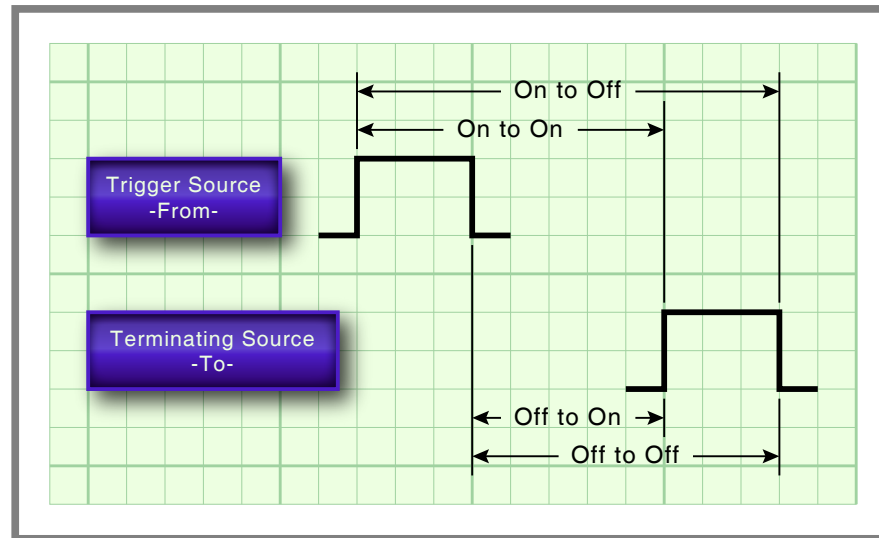
Figure 8: Timer Measurements

2. Move the highlight into the column labeled "From". The From input is used to trigger the timer. Assign it by entering **Dn**, **An** or **Vn** where n is 1 through 256 for Digital Inputs, 1 through 8 for Analog Inputs or 1 through 96 for Virtual Inputs. Leading zeros are not required.

3. Move the highlight to the right into the first column labeled "Event". Assign the trigger event by pressing the **Spacebar** as required to select the On or Off setting.

4. Move the highlight to the right into the column labeled "To". The To input is used to terminate the timer. Assign it by entering **Dn**, **An** or **Vn** where n is 1 through 256 for Digital Inputs, 1 through 8 for Analog Inputs or 1 through 96 for Virtual Inputs. Leading zeros are not required.

5. Move the highlight to the right into the second column labeled "Event". Assign the terminating event by pressing the **Spacebar** as required to select the On or Off setting.

6. Move the highlight to the right into the column labeled "LowLimit". Enter a value within the range of 0 to 999.9 seconds. Any measured time interval that is less than this value will generate an Event Record tagged with an Event Name of Violate.

7. Move the highlight to the right into the column labeled "HighLimit". Enter a value within the range of 0 to 999.9 seconds. Any measured time interval that is greater than this value will also generate an Event Record tagged with an Event Name of Violate.

8. Move the highlight to another row to program an additional Timer Input.

9. After each of the required Timer Inputs are programmed press the **Esc** key to complete the command.

In the example cited previously, the time after Digital Input 32 reaches its On state until Digital Input 33 reaches its Off state will be measured. A measured time interval of 7.5 to 12.5 seconds is considered acceptable. Measured time intervals that are within the range established by the Limit Values will generate Event Records tagged with an Event Name of Nominal. Refer to the section entitled "Event Record Formatting" on page 51 for additional information.

EVENT NAMES (E)

There are two types of Event Records. Active Event Records are created when a Digital Input is found to have sufficient input voltage (greater than 9 Vdc) or when an Analog Input transitions into its unacceptable range as defined by its Limit Values. Conversely, inactive Event Records are created when a Digital Input has less than 1 Vdc or an Analog Input is within its acceptable range of operation.

Event Names allow the user to distinguish Event Records from each other in a quick and unambiguous manner. They should not be confused with Input Names and Input Identifiers (see next section). Event Names always occur in pairs. The On Event and Off Event names form the pair. They in turn distinguish the active and inactive Event Records, respectively.

As many as twenty Event Name pairs can be defined. Once the pairs are defined they can be assigned to inputs of the CWR-264A in any manner that helps the user distinguish Event Records precisely and quickly. By way of example, the Event Records for Digital Input 1 could be labeled "XR_On" and "XR_ Off". The Event Records for Analog Input A1 could be labeled "Bat_Norm" and "Bat_Fail".

A typical response to the Event Name command is shown in the following. In the interest of brevity only four of the twenty pairs are listed (i.e., 1-3 and 20). The factory default Event Names are shown.

```
                    Event Names

          Number  ON Name   OFF Name
          ------  --------  --------
             1    On        Off
             2    On        Off
             3    On        Off


            20    Violate   Nominal
```

Event Names Command

To define a new Event Name simply position the highlight to the desired field and type the new name. Event Names are restricted in length to eight characters. They can be formed by any combination of letters, numbers and syntax symbols.

As an aid to the user Event Name pair 20 is by default labeled "Violate" and "Nominal". Furthermore, pair 20 is by default assigned as the Event Name pair to all Timer Inputs. The pair assignment and names can, however, be changed by the user to better suit the intended application.

3

INPUT NAMES / IDENTIFIERS (I)

The CWR-264A utilizes two types of inputs. The 256 Digital and eight Analog Inputs are referred to as physical inputs because actual circuits are wired to the recorder's input connectors. The CWR-264A also includes 96 Virtual and 200 Timer Inputs. Contrary to physical inputs, Virtual and Timer Inputs are defined by the user for the purpose of detecting failure or alarm conditions among the physical inputs. Refer to the section entitled "Virtual Inputs (V)" on page 33.

All inputs, regardless of type, share one common programming characteristic. The user can define a unique Input Name, Input Identifier and Event Name pair to each input. The Input Name can be any combination of alphanumeric characters not exceeding twenty total. The Input Name appears in each Event Record created by the input in question. It is the primary means by which inputs are distinguished.

The Input Identifier can be thought of as an abbreviated name. It is limited in length to eight alphanumeric characters. It too appears in the Event Record. It is primarily used to distinguish Event Records displayed on the LCD panel of the recorder. Several of the setup commands use the Input Identifier rather than the lengthier Input Name to reference inputs.

The Event Name pairs are described in the preceding section. As many as twenty Event Name pairs can be defined by the user. Each pair is identified by a number ranging from one to twenty. After the pairs are defined the Input Names / Identifiers command is used to assign Event Name pairs to inputs. The Event Name pair can be assigned by using either of two methods. The **Spacebar** can be repeatedly pressed when the highlight is located within the OnEvent / OffEvent field until the desired pair is listed. Alternatively, the number of the required Event Name pair can be entered in the last column.

A typical response to the Input Names / Identifiers command is shown in the following. Only the first three Digital Inputs and Timer Input T200 have been listed. Analog Inputs follow Digital Inputs. The Virtual Inputs follow the Analog Inputs. They are followed by the Timer Inputs.

```
                        Input Names/Identifiers
      Input            Name            ID     OnEvent/OffEvent Event Pair
      -----  -------------------- -------- ------------------ ----------
      D001 Digital Input 001      Dinpu001      On/Off            1
      D002 Digital Input 002      Dinpu002      On/Off            1
      D003 Digital Input 003      Dinpu003      On/Off            1


      T200 Timer 200              Timer200  Violate/Nominal       20
   [F1/^W]=Next Page [F2/^E]=Prev Page
```

Input Names/Identifiers Command

Twenty-eight data screens are required to list all 560 physical, Virtual and Timer Inputs. To advance to the next screen press the **F1** function key. To return to the previous screen press the **F2** function key. Alternatively, the **Ctrl+W** and **Ctrl+E** keys can be pressed simultaneously, respectively.

VIRTUAL INPUTS (V)

Virtual Inputs are a unique feature only found in MICRO-AIDE's family of CWR Event Recorders. The CWR-264A is a powerful, general purpose recording device that can be used to satisfy the data logging demands of a variety of applications. An Event Recorder is frequently used to gather data on a failure condition thought to exist in a relay-based control circuit. The failure condition may occur intermittently. The need to log data over a significant period of time will often impose an additional requirement upon the recorder. The suspected failure can often be defined as the abnormal occurrence of two or more relay states. The normal operation of the circuit predicts that only certain relay states can occur. It follows that any deviation from these normal states suggests a failure that should be flagged and carefully examined.

Identifying failures that occur as the result of abnormal relay states is greatly simplified by using the Virtual Input feature. Each CWR-264A allows as many as 96 Virtual Inputs to be defined. Each Virtual Input is defined by specific logical associations among particular physical inputs or other Virtual Inputs.

Virtual Inputs are defined by two essential properties. The first property concerns the selection of variables. Variables are merely the inputs (physical, virtual or timer) that will be checked to determine if a Virtual Input event is to be logged. The number of variables that define the Virtual Input can range from one to four. Variables can be Digital Inputs, Analog Inputs, other Virtual Inputs or Timer Inputs. Assigning a Virtual Input as a variable to another Virtual Input is referred to as nesting. Nesting allows the user to create a higher level Virtual Input that evaluates more than four variables.

The second property pertains to the state of each assigned variable. A fault condition in a relay-based circuit can only be identified if the state of each variable is properly evaluated. The state of a variable is defined by the CWR-264A as either On or Off. Both states are described in the following.

On–The Digital Input voltage is in the range from 9 to 36 Vdc. The Analog Input level is outside the acceptable range as defined by the region between the Limit Values. Refer to Figure 7 on page 30. The Virtual Input evaluates to a true logic state. The Timer Input has reported a timed interval that is either too fast or too slow as compared to its assigned High and Low Limit Values, respectively. Refer to the section entitled "Timer Inputs (W)" on page 30.

Off–The Digital Input voltage is less than 1 Vdc. The Analog Input level is within the acceptable range as defined by the region between the Limit Values. The Virtual Input evaluates to a false logic state. The Timer Input has reported a timed interval that is within its range of assigned High and Low Limit Values.

The procedure used to define Virtual Inputs is described in the following two sections.

ASSIGNING VARIABLES

An array of fields similar to the following will be displayed after selecting the Virtual Inputs command. In the example cited, only variables for Virtual Input V3 have been entered. The other fields have retained their factory default settings. Only the first six Virtual Inputs are listed.

```
                    Virtual Input Parameters
           Input    Function of:    Relay 1 Relay 2 Dial Out
           ----- ---- ---- ---- ---- ------- ------- --------
            V01  --- --- --- ---    No      No      No
            V02  --- --- --- ---    No      No      No
            V03  D048 D007 A08 ---   No      Yes     Yes
            V04  --- --- --- ---    No      No      No
            V05  --- --- --- ---    No      No      No
            V06  --- --- --- ---    No      No      No


       [F1/^W]=Next Page [F2/^E]=Prev Page [F3/^R]=edit virtual output function
```

Virtual Inputs Command

To assign variables perform the following steps in the order described.

1. Position the highlight anywhere in the row identified by the Virtual Input to be programmed (e.g., V3). Then move the highlight within the row to the extreme left-most column.

2. Assign the first variable by entering **Dn**, **An**, **Vn** or **Tn** where n is 1 through 256 for Digital Inputs, 1 through 8 for Analog Inputs, 1 through 96 for Virtual Inputs or 1 through 200 for Timer Inputs. Leading zeros are not required.

3. Move the highlight to the right. Assign the remaining variables using the previous step. Not all fields need to be assigned a variable. To remove a variable press the **0** key or simply delete all of the characters in the field.

4. Move the highlight to the field in the column labeled "Relay 1" or "Relay 2". Press the **Spacebar** to select the desired setting. The Yes setting will operate the selected internal relay if the Virtual Input definition is satisfied. The internal relays will remain in their energized state for as long as the conditions that define the Virtual Input persist. The No setting leaves the relay unaffected by the Virtual Input. Both relays can be controlled by a single Virtual Input.

5. Move the highlight to the field in the column labeled "Dial Out". Press the **Spacebar** to select the desired setting. The Yes setting will allow the internal modem (if installed) to dial the telephone numbers defined by the Primary and Secondary Dial Number parameters. Refer to the section entitled "Primary and Secondary Dial Numbers" on page 24. If the modem is able to connect with the far end an Event Record for the Virtual Input will be issued.

6. Press the **F3** function key to proceed to the next step. Alternatively, press the **Ctrl+R** keys simultaneously.

A sample response listing three variables is shown in the following. To complete the definition of the Virtual Input the state of each variable must now be assigned.

```
                    Virtual Output Function
           Inputs:                          Output:
            D048      D007      A08     ---    V03
           POK Rly App Lite  Battery        VInput03

           -------- -------- -------- -------- --------
            POK Up   Lite On Bat Norm         Alrm Off
            POK Dwn  Lite On Bat Norm         Alrm Off
            POK Up  Lite Off Bat Norm         Alrm Off
            POK Dwn Lite Off Bat Norm         Alrm Off
            POK Up   Lite On  Bat Bad         Alrm Off
            POK Dwn  Lite On  Bat Bad         Alrm Off
            POK Up  Lite Off  Bat Bad         Alrm Off
            POK Dwn Lite Off  Bat Bad          Alrm On
```

Assigning States to Virtual Inputs

SELECTING STATES

Before proceeding further the table of state selection fields must be understood. Each Virtual Input will have its own data table. However, the basic structure of each table will remain the same. Refer to the sample data entitled "Assigning States to Virtual Inputs" on page 34. Each row lists, from left to right, the Input Numbers that are assigned to each variable (e.g., labeled "D48", "D07" and "A08").

Unassigned variables are labeled "---". The last column of the third line lists the Input Number of the Virtual Input being defined (e.g., labeled "V03"). Directly below the Input Numbers on the fourth line of text is listed the Input Identifier for the variable. For the sample data shown the Input Identifiers are labeled "POK Rly", "App Lite" and "Battery". The Virtual Input has retained its default Input Identifier, labeled "VInput03".

The remaining lines of text will vary with the number of assigned variables. One variable will list two lines of text. Two variables will list four lines of text. Three variables will list eight lines of text. Four variables will list sixteen lines of text. Each line will specify a state for each of the assigned variables (i.e., inputs). Each state is identified by its user-defined Event Name. The states for the variable labeled "POK Rly" are "POK Up" and "POK Dwn". The sample data includes three variables, so eight lines of text lists all of the possible variable states.

The last column of data in each line includes a selection field. The field can be set, line by line, to an active or inactive state. The user decides which state to assign to the Virtual Input for each combination of variable states. For the sample data shown, the Virtual Input is assigned to its active state (labeled "Alrm On") when the variable's states are POK Dwn, Lite Off and Bat Bad. Anytime this combination of states is found to exist among inputs D48, D7 and A8, respectively, an active Event Record for Virtual Input V3 will be created and stored in memory. An additional, inactive Event Record will be created when the variable states no longer satisfy these requirements.

Perform the following steps to complete the Virtual Input programming procedure.

1. Move the highlight to the first line of text that lists the input states.

2. Press the **Spacebar** to select the correct Event Name for that combination of input states.

3. Move the highlight to the next line and repeat the preceding step.

4. When the Virtual Input state is correctly defined for each line press the **Esc** key and return to the variable assignment table.

5. Press the **Esc** key to exit the command or reposition the highlight and select the next Virtual Input. Repeat both of the previously described procedures as required.

MEASURE SPEED (M)

The CWR-264A includes a speed measuring feature that can be used to continuously monitor train speeds and log speed violations. The use of this feature is strictly optional. It is referred to as the Train Speed Monitor feature and it is controlled by the Measure Speed command.

The recorder must be properly configured before the Train Speed Monitor can be used. Regardless of other variations in the configuration the following list of requirements must be satisfied.

● There are a total of four Train Speed Monitors available in each CWR-264A. For each monitor two train sensors must be wired to two spare Digital Inputs of the recorder.

● Each train sensor must reliably indicate the presence of a train.

● The sensor outputs must be either open (no train) or closed to positive battery (nearby train).

● The distance between each sensor must be in the range from 50' to 5280'.

An array of fields similar to the following will be displayed after selecting the command.

```
              Measure Speed Parameters
      Speed# (Event) Sensor1  Sensor2  Distance  Threshold
      ------ ------- -------  -------  --------  ---------
        1    (S08)     ---      ---     0 Feet    0 MPH
        2    (S09)     ---      ---     0 Feet    0 MPH
        3    (S10)     ---      ---     0 Feet    0 MPH
        4    (S11)     ---      ---     0 Feet    0 MPH


           To disable measure speed feature:
           set sensor inputs(s) to none (---),
           or distance or speed limit to zero.
```

Measure Speed Command

The use of each field is described in the following three sections.

ⓘ *The four Train Speed Monitors are always disabled by their factory default settings.*

Excessive train speed is reported in a time stamped Event Record. Refer to the section entitled "Event Record Formatting" on page 51. Figure 9 on page 36 illustrates a typical Train Speed Monitor installation.
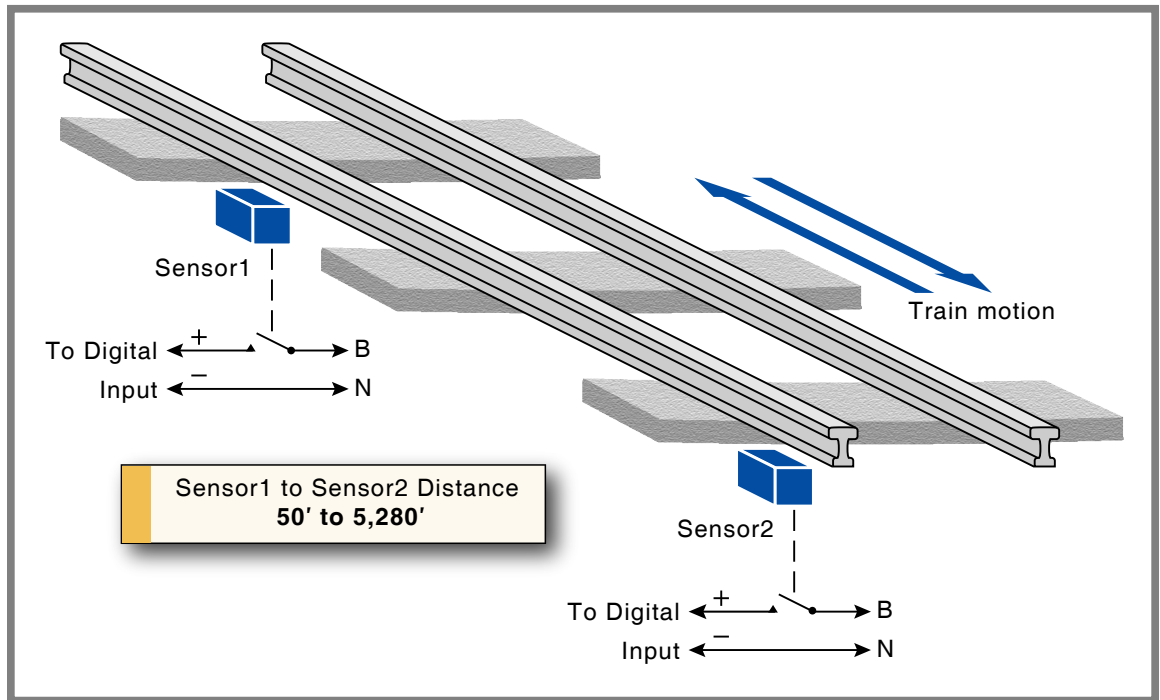
Figure 9: Typical Installation - Train Speed Monitor

FIRST / SECOND SENSOR INPUT

The First and Second Sensor Input fields can be assigned any valid Digital Input number. Leading zeros are not required. The values can be non-consecutive or in ascending or descending order. The Train Speed Monitors report motion in either direction with a positive value.

The two Digital Inputs assigned to the train sensors are subject to the following treatment.

- Previously enabled Flashing Input and Measure Flash Rate settings will be automatically disabled.

- Contact closures from either sensor will not result in Event Records being logged to memory.

- The Detection Time for each input will be automatically set to .05 seconds to de-bounce the sensor output signals.

● The user will not be able to alter the Flashing Input, Measure Flash Rate and Detection Time settings. To regain control of these settings the Train Speed Monitor must first be disabled.

To disable a Train Speed Monitor enter a zero value in the Sensor1 or Sensor2 field.

DISTANCE BETWEEN SENSORS

The distance between each sensor must be known in order to calculate the speed of the train. The value must be in the range from 50′ to 5280′. The value must be entered as a whole number.

Greater values of distance (e.g., 500′ instead of 50′) will result in improved speed accuracy.

THRESHOLD

The Threshold setting establishes a Limit Value which, if exceeded, will result in an Event Record being created. The Threshold setting must be entered as a whole number, in miles per hour. It must be in the range from 5 to 180 mph.

A train found to be in motion at a rate greater than the Threshold value will have its speed reported as a System Event Record. System Events are also used to log power on and off occurrences. System Events are numbered like other inputs. They are identified with an S-prefix. The System Event number is listed in parenthesis to the right of the Train Speed Monitor number. Refer to the section entitled "System Events" on page 93 for additional information.

NETWORK (N)

The Network command is used to configure the Ethernet Port. A set of six user-assigned fields with data similar to the following will be displayed after the command is selected.

```
                        Network Setup
                        -------------
            IP Address              192.168.  0.100
            Subnet Mask             255.255.255.  0
            Gateway                   0.  0.  0.  0
            Ethernet MAC Address    00-08-DC-01-23-45
            Port                              5000
            TCP/IP mode             Raw TCP/IP
```

Network Command

A description of each field follows.

IP ADDRESS

The IP Address must be set in accordance with the requirements of the LAN or the same as the address used by the TCP/IP connection of the PC. The initial setting is typically 192.168.0.100.

SUBNET MASK

The Subnet Mask must also be set in accordance with the requirements of the LAN. A value of 255.255.255.0 should be acceptable for a directly connected PC. The initial setting is typically 255.255.255.0.

GATEWAY

If a Gateway is being used by the LAN it too must be set in accordance with the LAN requirements. A setting of 0.0.0.0 is acceptable for a directly connected PC or a LAN when communications through a Gateway are not required. The initial setting is typically 0.0.0.0.

ETHERNET MAC ADDRESS

The first three numbers that comprise the MAC Address must be 00-08-DC. They must not be changed as they are uniquely associated with the Ethernet module used by the CWR-264A. The remaining three numbers must not be shared by any other Ethernet device on the LAN. The initial setting is 00-08-DC-aa-bb-cc, where aa-bb-cc is the serial number assigned by MICRO-AIDE to the recorder. By way of example, a CWR-264A with a serial number of 12345 will have a factory assigned MAC Address of 00-08-DC-01-23-45. This address is guaranteed to be unique.

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Use extreme caution in modifying the recorder's MAC Address. Serious LAN conflicts will be created if duplicate MAC Addresses are allowed to exist. Also, restoring a Setup Database will alter the MAC Address if the saved database includes a different MAC Address.

PORT

The Port assignment must also be selected in accordance with the requirements of the LAN. For a directly connected PC any value greater than 1024 is acceptable. The initial setting is typically 5000.

TCP/IP MODE

A Selection Field is used to assign the TCP/IP Mode setting. Press the **Spacebar** to select either Raw TCP/IP or Telnet. Generally, the Raw TCP/IP setting is acceptable. However, the Telnet setting must be used when the Setup Database is being uploaded or downloaded using HyperTerminal. These data transfers rely upon the Xmodem protocol which always deals with binary data. To insure data transparency, Telnet mode must be selected for all Xmodem transfers. Raw TCP/IP is the initial setting.

Press the **Esc** key after all of the fields are properly defined. The following message will be displayed if the MAC Address was altered.

```
CHANGE MAC ADDRESS (normally 00-08-DC-xx-xx-xx), are you SURE?
                          No Yes
```

Select Yes to proceed. Finally, the following message will confirm the change(s) to be made.

```
Network settings changed, restart network now?
                      No Yes
```

The six fields that comprise the Ethernet Port settings can only be altered by use of the Network command or by uploading a different Setup Database. The Reset System command will not change any of the Network settings.

If an Ethernet connection is idle for more than five minutes a timeout condition will occur. The timeout will result in a forced disconnection at the CWR-264A end. The user will then have to initiate a new connection procedure to re-establish communications with the recorder. The timeout duration and forced disconnection is performed so that in the event of a connection failure anywhere in the network the recorder will be prepared to complete a subsequent connection attempt. However, to be successful the subsequent connection attempt must occur no sooner than five minutes after the communications disruption. The recorder will automatically recover from communication failures of less than five minutes duration provided the user end does not perform a disconnect.

The Ethernet Port does not require any special configuration settings to support the Modbus interface and SNTP-Multicast feature. As many as five concurrent Modbus sessions are supported. A single Telnet session is supported. Except as previously noted, Modbus, SNTP and Telnet sessions are allowed to occur concurrently.

The Modbus connection is initiated by a Modbus client. The CWR-264A will complete the connection immediately. The connection will only terminate if 10 or more seconds have elapsed between data requests from the client device. In effect, each data request also serves as a keep alive command. If a session timeout occurs the client device must launch a new connection.

PRINT SETUP DATA (P)

The Print Setup Data command can be used to display the setup parameters assigned by the user. The following menu of sub-commands is displayed after selecting the Print Setup Data command.

```
                        Print Setup Data

               P Print All
               E Print Event Names
               I Print Input Names/Identifiers
               D Print Detect Times/Flash Enable
               A Print Analog Configuration
               V Print Virtual Inputs
               T Print Timer Configuration
               M Print Measure Speed Parameters
               N Print Network Settings
               S Print System Parameters
```

Print Setup Data Command

The Print All command can be used at the end of the Setup Procedure to display the entire Setup Database. The remaining commands are used to display specific portions of the Setup Database.

The Print All command will issue a lengthy stream of data that will exceed the viewing capacity of a single terminal screen. The user may wish to temporarily pause the data for better viewing. Refer to the procedure entitled "Data Flow Control" on page 18.

TRANSFER FILES (T)

A CWR-264A will require a considerable amount of data entry if every input is assigned an Input Name, Detection Time, Event Name pair, etc., that differs from its factory default value. In the event of an accidental loss of data memory (e.g., a reset performed by mistake) each Input Name, Detection Time and Event Name pair will need to be re-entered. The Transfer Files command provides the user with a quick and simple data exchange alternative to re-entering the Setup Database by hand.

The Download Setup Data command is used to transmit the Setup Database to a data storage system. A PC running a communications program like HyperTerminal makes an ideal storage system. A file containing the setup parameters can be permanently saved on the hard disk or a flash drive for later retrieval via the Upload Setup Data command.

To initiate a download or upload of the Setup Database, execute the Transfer Files command. The following sub-menu will be displayed. The transfer Setup Database procedures are described in the two sections that follow.

```
                        File Transfer

               D Download Setup Data CWR to PC
               U Upload Setup Data PC to CWR
               F Firmware Upload
```

Transfer Files Command

The Setup Database can also be easily and quickly downloaded and uploaded using the USB Host Port. Refer to the sections entitled "Saving the Setup Database" on page 63 and "Update" on page 80, respectively.

DOWNLOAD SETUP DATA (D) - SAVING THE DATABASE

Before the Setup Database can be saved the PC and communications program must be properly configured. The following list describes the correct configuration.

● Transfer protocol: Xmodem.

● Connection: If the recorder's Terminal Port is being used select Direct connect-Com1 or Direct connect-Com2 (whichever is available). If the modem is being used the host modem must be logged-on with the recorder.

● Baud rate: as required by the Terminal Port and set to 8-N-1 (does not apply when connected via the USB Device Port or modem).

The failure to select the proper transfer protocol (i.e., Xmodem) is the most common mistake made in this procedure.

To save the Setup Database to a PC file select the Download Setup Data command. The following message will be displayed.

```
Sending Setup Data via XMODEM... (Ctrl-X to stop)
```

The steps necessary to complete the download depend upon which communications application is being used. The following example describes the HyperTerminal method. HyperTerminal 7.0 was used in the following procedure. Other versions of this program may be slightly different. However, the fundamental approach will remain valid.

If the recorder's Terminal Port is used in the following procedure, hardware flow control must be enabled at the PC's comm port.

HYPERTERMINAL

1. With the mouse, click on the Transfers command, then the Receive File... command. The Receive File dialog box will open. Verify that the Xmodem protocol is selected.

2. Select the correct disk drive and folder. Click the Receive button. The Receive Filename dialog box will open.

3. Enter a filename (e.g., setup_10.bin). The three-character file extension must be defined. If the various settings are correct click on the OK button.

4. An information box will automatically open. It will indicate the progress of the transfer. After a few seconds (depending upon the Baud rate) the information box will close automatically to indicate a successful transfer.

5. After the successful completion of the transfer the CWR-264A will issue the following message.

```
Transfer complete
Press any key to continue
```

The following message is issued if the file is not promptly opened after initiating the download.

```
Transfer error
Press any key to continue
```

The user can then make a second attempt by selecting the Download Setup Data command again.

UPLOAD SETUP DATA (U) - RESTORING THE DATABASE

Before the Setup Database can be restored to the recorder it must have been previously saved. Refer to the procedure entitled "Download Setup Data (D) - Saving the Database" on page 39. The PC and communications program must be properly configured before the Setup Database can be restored. The following list describes the correct configuration.

● Transfer protocol: Xmodem.

● Connection: If the recorder's Terminal Port is being used select Direct connect-Com1 or Direct connect-Com2 (whichever is available). If the modem is being used the host modem must be logged-on with the recorder.

● Baud rate: as required by the Terminal Port and set to 8-N-1 (does not apply when connected via the USB Device Port or modem).

The failure to select the proper transfer protocol (i.e., Xmodem) is the most common mistake made in this procedure.

To restore the Setup Database to the recorder from a PC file select the Upload Setup Data command. The following message will be displayed.

```
Are you SURE you want to upload new Setup Data from PC to CWR?
                          No Yes
```

Select No to abort the upload. Select Yes to proceed. If the user elects to proceed with the upload the following message will be displayed.

```
Receiving Setup Data via XMODEM... (Ctrl-X to stop)

                                                CCCCC
```

The sequence of C characters indicates the recorder is waiting for the Xmodem file.

The steps necessary to complete the upload depend upon which communications application is being used. The following example describes the HyperTerminal method. HyperTerminal 7.0 was used in the following procedure. Other versions of this program may be slightly different. However, the fundamental approach will remain valid.

If the recorder's Terminal Port is used in the following procedure, hardware flow control must be enabled at the PC's comm port.

HYPERTERMINAL

1. With the mouse, click on the Transfers command, then the Send File... command. The Send File dialog box will open. Verify that the Xmodem protocol is selected.

2. Select the correct disk drive, folder and filename (e.g., setup_10.bin). If the various settings are correct click the Send button.

3. An information box will automatically open. It will indicate the progress of the transfer. After a few seconds (depending upon the Baud rate) the information box will close automatically to indicate a successful transfer.

After the successful completion of the transfer the CWR-264A will issue the following message.

```
Upload completed
Press any key to continue
```

The following message will be issued if the file is not promptly sent after initiating the upload.

```
Transfer error
Press any key to continue
```

The user can then make a second attempt by selecting the Upload Setup Data command again.

LOG OFF (X)

The Log Off command is used to terminate Administrative and Restricted Access sessions. If the previous user logs off of the recorder, access can be regained only by entering the correct password. If the previous user fails to log off, a second user will be allowed access without entering a correct password.

All sessions should be terminated by executing the Log Off command.

To log off of the recorder, access the Main Menu and then press the **X** key. The following message will be displayed.

```
About to Log Off, are you sure?
              No Yes
```

Log Off Command

If the user proceeds with the log off the current session will be immediately terminated.

This completes the Setup Procedure for the CWR-264A Event Recorder. The recorder is now prepared to log events in accordance with the setup performed by the user. Since the installation and setup of the recorder are critical to how the CWR-264A will perform, it is advisable to review the steps taken earlier.

The next chapter describes how to operate the CWR-264A.

3

CHAPTER 4 – OPERATION

INTRODUCTION

This chapter describes how to operate the CWR-264A from a PC running a suitable communications program. Local (i.e., on-site) as well as remote methods of operating the Event Recorder are described. Before the recorder can be operated it must be properly installed and set up. A PC must be online with the recorder. The use of the LCD panel and keypad are described in the next chapter.

MULTI-USER OPERATION

A unique feature of all MICRO-AIDE recorders is their ability to handle simultaneous operation from multiple users via either of the Terminal Ports, Ethernet Port, modem, front panel keypad, or in the case of the CWR-264A, via the USB Device Port. This multi-user capability eliminates the annoying practice in some recorders of one user effectively locking-out a second or third user.

REMOTE OPERATION

The setup procedures and operational capabilities of the CWR-264A can be exercised remotely via the Ethernet Port or the optional internal modem. The Ethernet Port is capable of supporting an Ethernet connection via TCP / IP. The modem will operate at speeds up to 33,600 Baud. It provides industry standard error correction and data compression features. An Ethernet- or modem-equipped PC running a communications program (e.g., GEA or HyperTerminal) makes an ideal remote access system. Event Records and other data from several remote CWR-264A recorders can be easily gathered and saved as a file on a hard disk or flash drive.

There are a few steps the remote user or host system must perform before remote access is possible. Each of these steps is described in the sections that follow.

ESTABLISHING AN ETHERNET CONNECTION

An Ethernet connection can only be established if the recorder's Ethernet Port is properly configured. An IP Address and Port Number must be assigned. The procedure for doing so is described in the section entitled "Network (N)" on page 37. Perform the steps listed in the following to establish an Ethernet connection. The procedure assumes that the user will access the recorder via a LAN.

1. Assign an IP Address and Port Number to the recorder's Ethernet Port in accordance with the requirements of the LAN.

2. Connect the CWR-264A to either a switch or hub device using a CAT-5 cable.

3. Configure the communications application (e.g., HyperTerminal) to connect using TCP / IP (Winsock).

4. Within the communications application enter the recorder's IP Address and Port Number as the target IP Address and associated Port Number. HyperTerminal refers to the target device as a host.

5. Click the appropriate icon that initiates the connection.

The procedure described previously is the same if the PC is connected directly to the recorder. A successful connection is indicated by a log-on password request regardless of the interconnection method employed.

ESTABLISHING A MODEM CONNECTION

A standard telephone line must be attached to the modem of the CWR-264A. To access the recorder the host system must dial the telephone number of the CWR-264A and wait for an answer. The recorder's modem will answer after a predetermined number of rings. Refer to the section entitled "Ring Count" on page 24. The modems will then handshake. The handshake ensures that the modems can communicate with each other at an appropriate speed. A connection is established upon the successful completion of the handshake.

The CWR-264A will only permit reliable connections to be established. The host modem should be programmed for MNP 2-4 or LAP-M operation.

LOGGING ON

Immediately after a connection is established the CWR-264A will issue a password request similar to the following.

```
Model CWR-264A Event Recorder. Ver 1.17 (C) 2014 MICRO-AIDE INC.

***** NOT SET *****

Event storage capacity: 221284

Enter password:
```

Password Request

The host system must issue the correct password followed by an **Enter**. Passwords are defined in accordance with the procedure entitled "Administrative and Restricted Passwords" on page 23.

The default Administrative and Restricted Access passwords are **PASSWORD** and **LOOKWORD**, respectively. Passwords are case sensitive.

The host system is given three attempts to enter the correct password. A third error will result in a disconnect by the recorder. This procedure prevents unwanted users from accessing the recorder. After the password is entered the user will be able to operate the recorder in a manner identical to that specified by local operation. Accordingly, the CWR-264A will display the Main Menu of commands. Refer to the sample data entitled "Main Menu" on page 17.

HOW TO OPERATE THE CWR-264A

An explanation of each operational command is included in the remaining sections of this chapter. Operational commands may be executed in any sequence. The user may wish to perform operations in one sequence and then, depending upon the observed data, perform a different sequence of commands. Each command is listed by its name (as it appears in the Main Menu) followed by its command code contained within parenthesis.

QUERY EVENTS (Q)

The Query Events command provides the principal means by which Event Records are inspected. It allows the user to inspect events for a particular time frame and/or specific set of inputs. Additionally, the Query Events command includes several data output options that can be selectively employed depending upon the user's data display requirements.

The following sample data shows a typical response to the Query Events command.

```
                        Select Range of Dates

01-15-15  01-16-15  01-17-15  01-18-15  01-19-15  01-20-15  01-21-15  01-22-15
01-23-15  01-24-15  01-25-15  01-26-15  01-27-15  01-28-15  01-29-15  01-30-15
01-31-15  02-01-15  02-02-15  02-03-15  02-04-15  02-05-15  02-06-15  02-07-15
02-08-15  02-10-15  02-11-15




           Use arrow keys to move, Space=start selection, Enter=accept, ESC=cancel
```
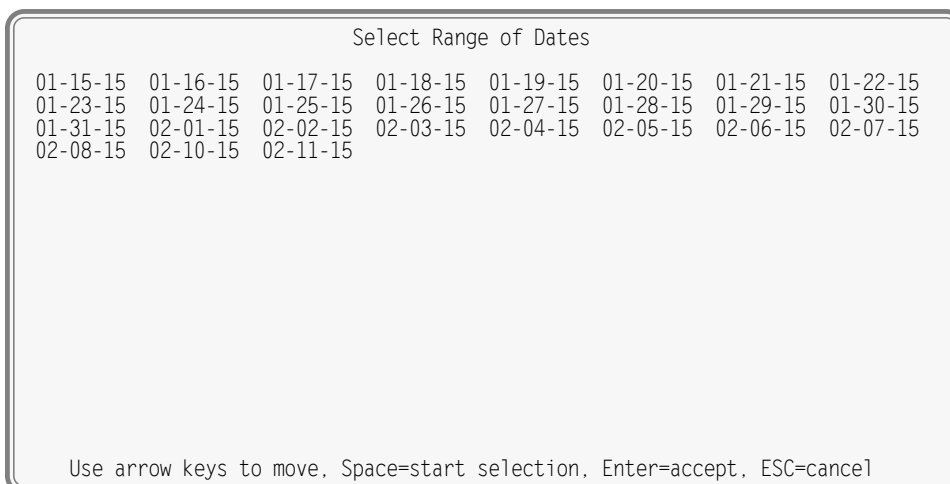
Query Events Command - Table of Dates

The data array forms a table of dates in MM-DD-YY format. The table indicates that at least one Event Record was logged in memory for each day listed. Days where no records were logged will not be included in the table (e.g., 02-09-15). The CWR-264A can store Event Records for 128 different dates provided the event storage capacity is not exceeded.

The CWR-264A utilizes a rotating memory. Records from the 129th day will automatically over-write records from the first day regardless of how many records are stored in memory.

The first step in using the Query Events command is to select the date or range of dates that the user wishes to inspect. Slightly different procedures are used to select a single date or range of dates. Both procedures are described in the following.

SELECTING A SINGLE DATE

1. Using the appropriate arrow keys highlight the single date of interest.

2. Press the **Enter** key.

SELECTING A RANGE OF DATES

1. Using the appropriate arrow keys highlight the first date in the range.

2. Press the **Spacebar** to anchor one end of the range to be highlighted.

3. Press the appropriate arrow keys until each date in the desired range is highlighted.

4. Press the **Enter** key to accept the highlighted range of dates.

The **Esc** key can be pressed at any time to cancel the selection. The user will then be returned to the Main Menu.

QUERY REPORT MENU

After the date(s) is selected an array of Selection and Edit Fields entitled "Query Report" will be displayed. The following sample data shows a typical Query Report.

```
                          Query Report

                Start Date:        01-31-15
                Start Time:        00:00:00

                End Date:          01-31-15
                End Time:          23:59:59

                Record Details:    All Details (5)

                Reverse order:          No
                Report Type:            Dump
      Inputs:
      (blank=all)


                  [F1/^W]=Execute Report, ESC=cancel
```

Query Report Menu

The Event Records of interest to the user can be further qualified by the six fields listed in the Query Report menu. The use of each field is described in the sections that follow.

START TIME

Event Records that are time stamped after the assigned Start Time (for the day selected as the Start Date) will be issued by the Query Command. The Start Time can be assigned any value from 00:00:00 to 23:59:59. The default setting is always 00:00:00. The Start Time must be entered in military format.

END TIME

Event Records that are time stamped before the assigned End Time (for the day selected as the End Date) will be issued by the Query Command. The End Time can be assigned any value from 00:00:00 to 23:59:59. The default setting is always 23:59:59. The End Time must be entered in military format.

RECORD DETAILS

The CWR-264A can format Event Records in five different ways. Press the **Spacebar** to select one of the five formatting options described in the following. As a convenience to the user the last option selected is automatically pre-selected the next time the command is used.

A complete explanation of Event Record formats is included at the end of this chapter. Refer to the section entitled "Event Record Formatting" on page 51. The numbers included in each of the headings listed in the following specify the number of lines of text each formatting option will create.

All Details (5)–The status of each Digital Input in a group of 64, the level of each Analog Input and the status of each Virtual Input is listed with data concerning the input that created the record.

Digital Details (2)–The status of each Digital Input in a group of 64 is listed with data concerning the input that created the record.

Analog Details (2)–The level of each Analog Input is listed with data concerning the input that created the record.

Virtual Details (3)–The status of each Virtual Input is listed with data concerning the input that created the record.

No Details (1)–Only information concerning the input that created the record is listed.

REVERSE ORDER

The Reverse Order option can be set to either No (default setting) or Yes. The default setting will result in the oldest records being issued first. They will be followed by newer records. If enabled, the Reverse Order option will issue the most recent records first. In either case, Event Records are always issued in chronological sequence.

REPORT TYPE

The Report Type field can be set to Dump (default setting), Browse or Comma. The proper selection depends upon the user's requirement. Each option is described in the following sections.

Dump–The Dump option is used if a large number of records are to be inspected or captured to a PC file. Refer to the section entitled "Capturing Event Records to a PC File" on page 55. The Dump option will issue Event Records in a continuous stream. The streaming of records will only cease when the last record is issued or the user executes a Pause or Abort command. Refer to the section entitled "Data Flow Control" on page 18.

Dump+S–This setting is similar to the Dump setting in that it produces a streamed report from start to end. However, a digitally encrypted signature is appended to the end of the report. The signature can be used to determine if the content of the report has been tampered with and therefore no longer reflects the actual data as logged by the recorder. Refer to the section entitled "Creating Secure Reports" on page 56 for additional details.

Browse–The Browse option allows the user to inspect a set of records one screen at a time. It will typically display eleven one-line records, seven two-line records, five three-line records or three five-line records. The same set of records will be displayed indefinitely until the user presses an arrow key to review additional records. The Browse option is most useful when a limited number of records in a narrow time frame need to be reviewed.

A completely new screen of records can be displayed by pressing the up and down arrow keys. The next record in the chronological sequence can be added to the display set by pressing the left and right arrow keys. The last line of text in each screen explains the use of the arrow keys.

Comma–The Comma option formats the Event Record data so that it can be easily imported to a spreadsheet or database application such as Excel® or Access®, respectively. However, the records in question must first be written to a PC file. Refer to the section entitled "Capturing Event Records to a PC File" on page 55. This option takes the various data fields that comprise a record and separates them with a comma. Intervening spaces are eliminated. The processing application will place the record fields into cells or fields that satisfy its own processing requirements. This formatting technique is frequently referred to as Comma Separated Values (CSV). The Comma report option is described in detail in the section entitled "CSV Report Type" on page 54.

ⓘ When the Report Type is set to Comma the Record Details setting is ignored. All Event Records for the selected time period will be issued and similarly formatted.

INPUTS

The Inputs field allows the user to inspect Event Records from specific inputs. The default setting (Inputs field is blank) will issue records from all inputs. To select specific inputs a valid Input Number must be entered. Digital Inputs are entered as **Dn**, where n is 1 through 256. Analog Inputs are entered as **An**, where n is 1 through 8. Virtual Inputs are entered as **Vn**, where n is 1 through 96. Timer Inputs are entered as **Tn**, where n is 1 through 200. System Event Inputs are entered as **Sn**, where n is 1 through 11. Leading zeros are not required.

ⓘ System Event Inputs are another type of non-physical input that can create Event Records. System Event Records are used to report the status of the recorder at a specific moment in time. Refer to the section entitled "System Events" on page 93 for additional details.

Multiple inputs can be selected by using the following methods. Separate two Input Numbers by a single space character. Select a contiguous range of inputs by including a - (hyphen) between two n numbers. The contiguous range option can be applied to all input types.

The set of Input Numbers must be terminated by pressing the **Enter** key. The following example illustrates a typical Inputs field entry.

```
Inputs: D2 d5-8 a3 d256 v96 A6-8
(blank=all)
```

As the example indicates, the input type designator can be entered as an upper- or lower-case letter. Input Numbers can be entered without regard to sequence. Event Records for Digital Inputs 2, 5, 6, 7, 8, 256, Analog Inputs A3, A6, A7, A8 and Virtual Input V96 will be issued.

After the inputs are selected the user must press the **F1** function key to complete the command. Alternatively, press the **Ctrl+W** keys simultaneously. Event Records will then be issued in accordance with all of the settings selected by the user. Event Records will automatically cease being issued when the Report Type is set to Dump or Comma. After the last Event Record a message similar to the following will be displayed.

```
Number of records = 126  Checksum = F515
End of report
Hit any key to continue
```

Record Count and Checksum

The exact number of records included in the report is always specified. A checksum is also included. The checksum is calculated from the first character of the first record through the last character of the last record. Any report that issues the same set of records will always list the same checksum value regardless of when the report was generated. Accordingly, alteration of the record data can be detected provided the original data and checksum are known.

VIEW EVENTS (V)

The View Events command allows the user to display Event Records in real-time. Immediately after an event is detected its corresponding Event Record will be issued to the active user port (i.e., Terminal, Ethernet, USB Device or modem). This command can be very useful in tracking events that are occurring while the user is online with the recorder. It can also be used effectively during the Initial Check-Out Procedure to verify that each input is properly cabled. The records can simultaneously be written to a text file. Refer to the section entitled "Capturing Event Records to a PC File" on page 55.

The following message will be issued after the command has been selected.

```
                    View Events Report

            Include Details:    All Details (5)

Inputs:
(blank=all)

                [F1/^W]=Execute Report, ESC=cancel
```

View Events Command

The Event Records of interest to the user can be qualified by the two fields listed in the View Events Report. The use of each of these fields is described in the following sections.

INCLUDE DETAILS

This setting allows the user to select the level of detail to be included in each Event Record. Refer to the section entitled "Event Record Formatting" on page 51 for additional information regarding the use of this field.

INPUTS

The use of the Inputs field allows the user to review records from specific inputs. The use of this field is described in the section entitled "Inputs" on page 47.

After the selection fields are assigned press the **F1** function key to start the report. Alternatively, press the **Ctrl+W** keys simultaneously. The recorder will continue to issue records as they occur in real-time. Press the **Esc** key to stop the report.

LIVE STATUS (L)

The Live Status command can be very useful in verifying that inputs are wired and labeled correctly. Additionally, it can be used to determine if the inputs are operating properly and if the assigned Detection Times are set in accordance with the characteristics of the monitored circuits.

The Live Status command provides a snapshot of the present state of various recorder inputs (i.e., Digital, Analog and Virtual Inputs). The state or measured value of each input will be continuously and automatically updated. The Live Status report indicates the state of each input by the use of a symbol or its user-assigned Input Identifier and Event Name. Input Identifiers and Event Names are described in "Input Names / Identifiers (I)" on page 32 and "Event Names (E)" on page 31, respectively.

To properly view the Live Status report the PC must be configured to emulate an ANSI terminal.

Three data screens are required to display all 360 Digital, Analog and Virtual Inputs. The following is an example of the first screen used by the Live Status report.

```
             78 Degrees F      Live Status            11:34:59 01-31-15
    D001-D032 X . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

    D033-D064 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

    D065-D096 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

    D097-D128 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

    D129-D160 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

    D161-D192 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

    D193-D224 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

    D225-D256 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

   AInput01  AInput02  AInput03  AInput04  AInput05  AInput06  AInput07  AInput08
    24.3Vdc   0.0Vdc    0.0Vdc    0.0Vdc    0.0Vdc    0.0Vdc    0.0Vdc   13.4Vdc
      Good      Off       Off       Off       Off       Off       Off    Normal

  [ESC]=exit [F1/^W]=next page [F2/^E]=prev page
```

Live Status Report - Digital and Analog Inputs

The first screen of the Live Status report includes a header that lists the present time, date and temperature inside the unit. The state of each Digital Input is listed in the eight lines of text that follow the header. An X or . (period) character is used to indicate the state as either On or Off, respectively. The next three rows of text list Analog Input data. The Input Identifier, measured value and Event Name are listed from top to bottom, respectively.

The sample data indicates that Digital Input 1 is On. The other Digital Inputs are Off. The DC voltage source connected to Analog Input A1 is acceptable at 24.3 Vdc and is therefore reported as being in a Good state. The Battery potential at Analog Input A8 is 13.4 Vdc, which is considered to be Normal.

The second and third data screens are used to display the Live Status of Virtual Inputs 1 through 48 and 49 through 96, respectively. This data can be viewed by pressing either the **F1** or **F2** function keys. Alternatively, the **Ctrl+W** and **Ctrl+E** keys can be pressed simultaneously, respectively. The following shows sample data for the first group of 48 Virtual Inputs.

```
 Alarm_1: Active     VInput02: Off      VInput03: Off      VInput04: Off

VInput05: Off       VInput06: Off      VInput07: Off      VInput08: Off

VInput09: Off       VInput10: Off      VInput11: Off      VInput12: Off

VInput13: Off       VInput14: Off      VInput15: Off      VInput16: Off

VInput17: Off       VInput18: Off      VInput19: Off      VInput20: Off

VInput21: Off       VInput22: Off      VInput23: Off      VInput24: Off

VInput25: Off       VInput26: Off      VInput27: Off      VInput28: Off

VInput29: Off       VInput30: Off      VInput31: Off      VInput32: Off

VInput33: Off       VInput34: Off      VInput35: Off      VInput36: Off

VInput37: Off       VInput38: Off      VInput39: Off      VInput40: Off

VInput41: Off       VInput42: Off      VInput43: Off      VInput44: Off

VInput45: Off       VInput46: Off      VInput47: Off      VInput48: Off
[ESC]=exit [F1/^W]=next page [F2/^E]=prev page
```

Live Status Report - Virtual Inputs 1-48

Each Virtual Input is listed by its Input Identifier. In the sample data cited, an active alarm condition has been reported by Virtual Input V1.

MEASURE FLASH RATE (M)

Typical railroad operating procedures require that the flashing rate of crossing signals be periodically measured and reported. The Measure Flash Rate command allows the CWR-264A user to precisely determine the flashing rate of a circuit.

Enabling the Measure Flash Rate feature imposes several temporary pre-conditions upon the Setup Database of the recorder. The circuit to be measured must be connected to a Digital Input. The selected Digital Input will be assigned a Detection Time of .1 seconds. This will insure that the flashing pulses will not be filtered out by the de-bounce properties of the Detection Time feature. Refer to the section entitled "Detect Times / Flash Enable (D)" on page 26.

ⓘ The CWR-264A will automatically adjust the Digital Input's Detection Time setting to .1 seconds when the Measure Flash Rate command is executed. The original setting will be automatically restored to its prior value when the measurement is concluded.

The following Edit Fields will be displayed after the Measure Flash Rate command is selected.

```
                        Measure Flash Rate

                     Input to Measure: ---

                  [F1/^W] to measure, [ESC] to quit
```

Measure Flash Rate Command

The user must enter a valid Digital Input number in the Input to Measure field. The entry must take the form **Dn**, where n is 1 through 256. Leading zeros are not required. Press the **Enter** key to accept the Input Number. Finally, press the **F1** function key to initiate the measuring process. Alternatively, press the **Ctrl+W** keys simultaneously. A data screen similar to the following will be displayed.

```
                        Measure Flash Rate

                    Input to Measure: D256

                    Measuring...., [ESC] to quit

                    Flashes/Minute:  46.5
                    On Time:         0.65 Sec
                    Off Time:        0.64 Sec
                    Cycle Time:      1.29 Sec

                    Detect Time:     0.64 Sec
```

Measure Flash Rate Report

The lower five lines of text reflect the Measure Flash Rate data. The first line indicates the number of flashes per minute (e.g., 46.5). The second and third lines report the On Time and Off Time durations, respectively. The data listed in the fourth line (referred to as Cycle Time) is the duration of one on/off sequence. It is the sum of the On Time and Off Time durations. Finally, the fifth line specifies the optimum Detection Time to be assigned to inputs using the reported flash rate.

The data listed in the Measure Flash Rate report is updated continuously and automatically. For typical flash rates the data will be updated every several seconds. To stop the measuring process simply press the **Esc** key. The Digital Input can then be connected to another circuit. The original Detection Time setting will be automatically restored.

EVENT RECORD FORMATTING

Event Records provide the user with information about the status of each input at a specified moment in time. Event Records consist of printable ASCII characters. Five different formatting methods are employed by the CWR-264A. The five formatting options create one-, two-, three- and five-line records. All five formatting options are available in the Query Events and View Events commands. In the sections that follow, each of these formatting options are described in order of increasing detail.

NO DETAILS

The one-line form is used to provide event information from a single input. Analog Input levels are not listed in this format. Six sample records are shown in the following.

```
14:57:54.69  01/31/15  NS_Gate_Down_Relay   GateDwn   Up        D001

14:58:03.33  01/31/15  AC_Power_120V        AC_Power  AC_Fail   A01

15:01:17.74  01/31/15  Switch_Delay_R127    R127-3    Violate   T016  15.9s

15:58:32.23  01/31/15  Timer 01             Timer01   Nominal   T001  18.3s

16:02:20.84  01/31/15  Digital Input 256    DInpu256  On        D256

16:02:52.94  01/31/15  Digital Input 256    DInpu256  Off       D256  46.5FPM
```

Event Records with No Details

Time—The time the event was detected is indicated in military-style HH:MM:SS format. The time is identified to the nearest hundredth of a second.

Date—The date the event was detected is indicated in MM/DD/YY format.

Input Name—The twenty-character Input Name identifies the input. The names NS_Gate_Down_Relay, AC_Power_120V and Switch_Delay_R127 are listed in the first three sample records. The remaining records list factory default Input Names.

Input Identifier—The eight-character Input Identifier further identifies the input. The identifiers GateDwn, AC_Power and R127-3 are listed in the first three sample records. The remaining records list factory default Input Identifiers.

4

Event Name – The Event Name identifies the type of event detected at the input. The Event Name listed will always be a member of the Event Name pair assigned to the input. The Event Names Up, AC_Fail and Violate clearly indicate to the user the type of event that was recorded.

Input Number – The Input Number is frequently, but not always, the last data field listed. The record may be from a Digital (D001 through D256), Analog (A01 through A08), Virtual (V01 through V96), Timer (T001 through T200) or System Event Input (S01 through S11).

Measured Time, Flash Rate, Speed or Time Correction – The Measured Time field only appears at the end of a Timer Input Event Record. Refer to the third and fourth records listed in the sample data. The Measured Time will be reported as a value in the range of 0.0 to 999.9 seconds. A value is listed regardless of the Event Name that identifies the record type (e.g., Violate or Nominal).

The CWR-264A can measure and report the rate of flashing associated with a flashing input. The fifth Event Record listed previously was created when a flashing sequence of on/off pulses was detected on Digital Input D256. Approximately 32 seconds later the flashing sequence ceased. During the 32-second-long interval a flashing rate of 46.5 flashes per minute (fpm) was measured and hence reported. Refer to the last record listed previously.

The average train speed in mph will be reported for System Event Records associated with the Train Speed Monitor feature.

Finally, when the real-time clock of the recorder is synchronized the correction in seconds will be reported via a System Event Record.

ⓘ Three sample Event Records are listed in each of the four sections that follow. The sample records are copies of the first three records included in the No Details description.

ANALOG DETAILS

4

The Analog Details format uses two lines of text. The first line is formatted identically to that used by the No Details option. The formatting convention is described in the section entitled "No Details" on page 51. The second line of text lists the measured levels of each Analog Input. From left to right, A1 through A8 are reported. The units of measurement are always displayed to the right of the measured level (e.g., Vdc and Vac). To the right of the units of measurement data is a single-character indicator. It is used to indicate the state of the Analog Input relative to the user-defined Limit Values. There are four symbols used to indicate the state of Analog Inputs. They are described in the section entitled "Symbol Legend" on page 53.

```
14:57:54.69  01/31/15  NS_Gate_Down_Relay   GateDwn   Up        D001
 101Vac   0.0Vdc   0.0Vdc⁻  0.0Vdc⁻  0.0Vdc   0.0Vdc   0.0Vdc   13.6Vdc

14:58:03.33  01/31/15  AC_Power_120V         AC_Power  AC_Fail   A01
 89Vac*   0.0Vdc   0.0Vdc⁻  0.0Vdc⁻  0.0Vdc   0.0Vdc   0.0Vdc   12.9Vdc

15:01:17.74  01/31/15  Switch_Delay_R127     R127-3    Violate   T016   15.9s
 87Vac!   0.0Vdc   0.0Vdc   0.0Vdc⁻  0.0Vdc⁻  0.0Vdc   0.0Vdc   12.8Vdc
```

Event Records with Analog Input Details Only

DIGITAL DETAILS

The Digital Details format uses two lines of text. The first line is formatted identically to that used by the No Details option. The formatting convention is described in the section entitled "No Details" on page 51. The second line of text is used to indicate the state of other Digital Inputs at the time the event was recorded. The other inputs are members of a common group of 64 inputs. The Digital Details record format lists the state of each input in the group applicable to the input that created the event (e.g., input 130 lists group 129 to 192). Analog, Virtual and Timer Input events always indicate the state of Digital Inputs in the first group (e.g., 1 to 64). A pattern of x and . (period) characters are shown in the following sample records. There are four symbols used to indicate the state of Digital and Virtual Inputs. They are described in the section entitled "Symbol Legend" on page 53.

```
14:57:54.69  01/31/15  NS_Gate_Down_Relay    GateDwn  Up       D001
X........x x........ .......... ........x .......... .......... ...x

14:58:03.33  01/31/15  AC_Power_120V         AC_Power  AC_Fail  A01
x........x x........ .......... ........x .......... .......... ...x

15:01:17.74  01/31/15  Switch_Delay_R127     R127-3   Violate  T016  15.9s
x........x x........ .......... ........x .......... .......... ...x
```

Event Records with Digital Input Details Only

VIRTUAL DETAILS

The Virtual Details format uses three lines of text. The first line is formatted identically to that used by the No Details option. The formatting convention is described in the section entitled "No Details" on page 51. The second and third lines of text include a sequence of 96 characters that indicate the state of each Virtual Input at the time the event was logged to memory. A pattern of x and . (period) characters are shown in the following sample records. The left-most character of the first line indicates the state of Virtual Input V1. The right-most character of the third line indicates the state of Virtual Input V96. There are four symbols used to indicate the state of Digital and Virtual Inputs. They are described in the section entitled "Symbol Legend" on page 53.

```
14:57:54.69  01/31/15  NS_Gate_Down_Relay    GateDwn  Up       D001
X......... X........ .......... .......... .......... .......... .........
.......... .......... ......

14:58:03.33  01/31/15  AC_Power_120V         AC_Power  AC_Fail  A01
x......... X........ .......... .......... .......... .......... .........
.......... .......... ......

15:01:17.74  01/31/15  Switch_Delay_R127     R127-3   Violate  T016  15.9s
x......... X........ .......... .......... .......... .......... .........
.......... .......... ......
```

Event Records with Virtual Input Details Only

ALL DETAILS

The All Details format incorporates all of the detail content defined in the Analog, Digital and Virtual Details options. It requires five lines of text. From top to bottom the details include Virtual Input states, Digital Input states and Analog Input measured levels. The following data shows the sample records from the previous sections formatted with the All Details option.

```
14:57:54.69  01/31/15  NS_Gate_Down_Relay    GateDwn  Up       D001
X......... X........ .......... .......... .......... .......... .........
.......... .......... ......
X........x x........ .......... ........x .......... .......... ...x
 101Vac   0.0Vdc   0.0Vdc   0.0Vdc   0.0Vdc   0.0Vdc   0.0Vdc  13.6Vdc

14:58:03.33  01/31/15  AC_Power_120V         AC_Power  AC_Fail  A01
x......... X........ .......... .......... .......... .......... .........
.......... .......... ......
x........x x........ .......... ........x .......... .......... ...x
 89Vac*   0.0Vdc   0.0Vdc   0.0Vdc   0.0Vdc   0.0Vdc   0.0Vdc  12.9Vdc

15:01:17.74  01/31/15  Switch_Delay_R127     R127-3   Violate  T016  15.9s
x......... X........ .......... .......... .......... .......... .........
.......... .......... ......
x........x x........ .......... ........x .......... .......... ...x
87Vac!   0.0Vdc   0.0Vdc   0.0Vdc   0.0Vdc   0.0Vdc   0.0Vdc  12.8Vdc
```

Event Records with All Details

SYMBOL LEGEND

The four symbols used to indicate the state of Digital and Virtual Inputs are described in the following table.

Symbol		Definition
X	Upper-case X	The input has transitioned into its On state. The referenced input is the source of the Event Record. The assigned On Event Name is listed as the Event Name.
x	Lower-case x	The input remains in its On state. The referenced input is not the source of the Event Record.
:	Colon	The input has transitioned into its Off state. The referenced input is the source of the Event Record. The assigned Off Event Name is listed as the Event Name.
.	Period	The input remains in its Off state. The referenced input is not the source of the Event Record.

Table 5: Symbol Legend - Digital and Virtual Inputs

The four symbols used to indicate the state of an Analog Input are described in the following table.

Symbol		Definition
*	Asterisk	The input has transitioned into its unacceptable range of operation. The referenced input is the source of the Event Record. The assigned On Event Name is listed as the Event Name.
!	Exclamation mark	The input remains in its unacceptable range of operation. The referenced input is not the source of the Event Record.
=	Equal sign	The input has transitioned into its acceptable range of operation. The referenced input is the source of the Event Record. The assigned Off Event Name is listed as the Event Name.
	(blank)	The input remains in its acceptable range of operation. The referenced input is not the source of the Event Record.

Table 6: Symbol Legend - Analog Inputs

Event Names and Analog Limit Values are described in the sections entitled "Event Names (E)" on page 31 and "High and Low Limits" on page 29, respectively.

CSV REPORT TYPE

The Query Events command provides an additional formatting option that can be selected by setting the Report Type to Comma. This section includes a description of a typical Comma Separated Value (CSV) report.

CSV SAMPLE REPORT

Listed in the following is a typical response to the Query Events command when the Report Type is set to Comma. In the interest of brevity only three Event Records are listed.

```
22:16:48,01/31/15
"M-A_ARROW_GRAND_MP14"
0,0,0,0,0,0,0,0,0,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1
0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0
14:57:54.69,01/31/15,"NS_Gate_Down_Relay","ON",1
14:58:03.33,01/31/15,"AC_Power_120V","ON",257
15:01:17.74,01/31/15,"Switch_Delay_R127","ON",376,15.9
```

Comma Separated Value Report

Each report includes a fourteen-line header. The content of the header is fully described in the following.

Line 1–Lists the time and date the report was generated.

Line 2–Lists the user-assigned Unit Name.

Lines 3-10–Contain a bit map that indicates the state of each Digital Input at the moment just prior to the first Event Record listed. From left to right, top to bottom, Digital Inputs 1 through 256 are represented. In the sample data previously cited, Digital Inputs 10, 11, 40, 64 and 256 are reported as On. The other Digital Inputs are Off.

Lines 11-14–Specify the state of each Analog and Virtual Input at the moment just prior to the first Event Record listed. Analog Inputs are represented by the first eight positions. Virtual Inputs are represented by the remaining ninety-six positions. In the sample data previously cited, all of the Analog Inputs are in their acceptable range of operation. Virtual Inputs 1 and 11 are On.

Event Records that satisfy the user selected date and time criteria are listed after the header. Records include five or six data fields separated by a single comma. From left to right the fields always include the time, date, Input Name, status and CSV Input Number. The input status is always listed as either ON or OFF. If the record is from a Timer Input, flash enabled Digital Input or one of the Train Speed Monitors a sixth field that lists the measured time, flash rate or train speed value is included, respectively.

By convention, CSVs that contain a comma character will be enclosed by a pair of quotation marks. A name that contains a quotation mark will be indicated by an additional quotation mark.

CSV INPUT NUMBERS

The Input Number listed in a CSV record does not include the normal single-letter prefix (i.e., D, A, V, T and S). Instead they are assigned purely numerical values in sequential order. Table 7 on page 55 cross references Input Numbers and CSV inputs. The S-prefix is used to refer to System Events. They are described in the section entitled "System Events" on page 93.

Event Record Category	Input Number	CSV Input
Digital	D1-D256	1-256
Analog	A1-A8	257-264
Virtual	V1-V96	265-360
Timer	T1-T200	361-560
System Power	S1	561
High Temperature	S2	562
Low Temperature	S3	563
SNTP Clock Sync	S4	564
GPS Clock Sync-correction > 5 seconds	S5	565
GPS Clock Sync-periodic interval	S6	566
Manual Clock Set	S7	567
Train Speed Monitor 1	S8	568
Train Speed Monitor 2	S9	569
Train Speed Monitor 3	S10	570
Train Speed Monitor 4	S11	571

Table 7: CSV Input Numbers

CAPTURING EVENT RECORDS TO A PC FILE

The Query (with the Report Type set to Dump or Comma) and View commands will automatically stream Event Records to the active user port. A PC running HyperTerminal can be used to capture these records as a text file. The .txt file that is created can then be read using any commonly available word processing application (e.g., Notepad® or Word®). The steps necessary to capture the Event Records as a .txt file are listed in the following. HyperTerminal and Windows 7® were used in the following procedure. Later

versions of these programs may be slightly different. However, the fundamental approach will remain valid.

1. Configure the various fields of the Query or View command as desired.

Perform steps 2 through 5 IMMEDIATELY BEFORE pressing the **F1** function key or **Ctrl+W** keys simultaneously.

2. With the mouse, click on the Transfers command, then the Capture Text... command. The Capture Text dialog box will open.

3. Click the Browse button. The Select Capture File dialog box will be displayed.

4. Navigate to or create the desired folder that will contain the .txt file. Enter a filename (e.g., 01-31-15 0915AM). The three-character .txt file extension will be appended automatically. Click the Save button. The user will be returned to the Capture Text dialog box.

5. Verify that the file specification box lists the correct folder and filename. Click the Start button to open the .txt file.

6. Press the **F1** function key to initiate the data transfer. Alternatively, press the **Ctrl+W** keys simultaneously. The recorder will proceed to stream Event Records to the newly created .txt file.

7. In the case of the Query command the record stream will cease automatically when the last record is displayed. A record count and checksum will note the end of the data. Refer to the sample data entitled "Record Count and Checksum" on page 48. In the case of the View command the record stream will cease only when the user presses the **Esc** key.

The Query with Dump+S option requires that the user wait until the digital signature is written before proceeding to the next step. The delay required to calculate the signature can be significant (more than one minute) if hundreds or thousands of records have been Dumped.

8. With the mouse, click on the Transfers command, then the Capture Text... command. Click the Stop option that is displayed.

The .txt file is now closed and available for viewing. To read the file, navigate to the folder. With the mouse, double-click the filename (e.g., 01-31-15 0915AM.txt). The file will open in the default word processing application.

CREATING SECURE REPORTS

The procedure described in the section entitled "Capturing Event Records to a PC File" on page 55 is also used to save a secure Event Record file to a local or remote PC. To create a tamper-proof, digitally signed report do the following.

1. Set the Report Type field to Dump+S. Perform steps 1 through 7 as described in the previous procedure.

2. Immediately after the record count and checksum values are reported, the following message will be displayed.

```
<<END DATA>>
Generating digital signature...
```

The <<END DATA>> marker serves to indicate that only data prior to this point will be used to calculate the digital signature. Accordingly, text data from this point forward is ignored as a part of this process. The calculation of the digital signature may take a few seconds or a few minutes in the case of thousands of dumped Event Records.

Although the process may be lengthy, while the digital signature is being calculated all other recorder functions are being performed.

3. A message similar to the following will be displayed at the conclusion of the calculation.

```
SIGNATURE:a0597846b5f2a9839beada40989be632e2a8082b4c114208b48fbb7bd0239aed
PUBLICKEY:c2081e303c5e08dfe26a205c0eda6f9c70a6eec4245dacf5290e69a0ae9760f3
Hit any key to continue
```

256 - Bit Digital Signature

4. With the mouse, click on the Transfers command, then the Capture Text... command. Click the Stop option that is displayed.

The .txt file is now closed and available for viewing. To read the file, navigate to the folder. With the mouse, double-click the filename (e.g., 01-31-15 0915AM.txt). The file will open in the default word processing application. The introduction of the digital signature makes the resultant data file incorruptible.

The signature process does not encrypt or alter in any way the original report data. The latter remains readable as it was in its unsecured state.

Alterations to the file can be easily detected by using MICRO-AIDE's RSA Validator software. RSA Validator is a small footprint application that can be installed and run on any Windows PC. It can be downloaded by users from the MICRO-AIDE website without restriction or charge. Appendix D describes how to install and use the RSA Validator software.

This completes the chapter on how to operate the CWR-264A from the five peripheral ports. Terminate the current session by using the Log Off command. Refer to the section entitled "Log Off (X)" on page 41.

The next chapter describes the use of the USB Host Port, front panel keypad and LCD.

USER NOTES

4

Chapter 5 – Front Panel Operation

Introduction

The CWR-264A is designed to provide its user with the greatest degree of versatility and functionality. All MICRO-AIDE Event Recorders come equipped with a front panel mounted Liquid Crystal Display (LCD) and keypad. Together these features allow the user to perform all of the setup and operational procedures required to effectively use the recorder. The advantage to the user is that a PC, although helpful, is not required to operate the recorder.

Setup and operation of the CWR-264A from the front panel is somewhat different than operation via a PC. The tasks to be performed and the end results are identical but the methods employed are different. This chapter describes the methods that are unique to front panel operation. Figure 1 on page 8 provides an illustration of the LCD panel and keypad.

Front Panel Description

USB Host Port

The front panel of the CWR-264A includes a USB Type-A female connector. The connector is labeled "Save-USB Flash Drive". It is also illustrated in Figure 1 on page 8. Any USB flash drive can be connected to the port. Once connected, the flash drive can be used to save copies of selected Event Records. The procedure for doing so is described in "How to Use the USB Host Port" on page 60. The saved record files can then be read using any word processing application. Table 14 on page 105 lists the bit transfer rates of each user-accessible port including the USB Host Port.

Liquid Crystal Display

The LCD panel consists of a display approximately 3″ by 1″ in size. It is configured to present four lines of data. Each line can contain twenty alphanumeric characters and symbols. The LCD characters are large and can be viewed easily from several feet away. The super-twist design of the LCD panel provides a viewing angle of ±20° from the level of the display. The contrast level of the display may be adjusted. This can be helpful when the recorder is exposed to very hot or cold temperatures. The single-turn potentiometer that controls the contrast level is accessible through a small hole in the front panel of the recorder. It is labeled "Adj". Use a small flat-head screwdriver to adjust the setting.

Keypad

The keypad contains twenty individual keys. Each key consists of a pushbutton switch. They are clearly labeled as to their various functions. The keys are spaced .65″ apart to minimize double hits. A special editing technique allows alphabetic characters to be entered via the keypad. The directional (▲, ▼, ◄, ►) and *Enter* keys also provide for quick menu item selection. Except while selecting a command or performing the special editing procedure, the left arrow key may be used to backspace over characters when an incorrect number has been entered.

ⓘ Unless otherwise stated, characters shown in italics are used to refer to specific keys on the keypad (e.g., *Browse*). This convention is used throughout the remainder of this chapter.

LED INDICATORS

The front panel of the CWR-264A also includes three LED indicators. The LEDs are used to provide immediate information about activity on various ports of the recorder. The operation of each LED is described in the following three sections.

- GPS / Alarm: This LED is able to illuminate either green or red. If the GPS Receiver option is installed the LED will flash green once per second to indicate that the microprocessor is communicating with the receiver. If the receiver is installed and the LED does not flash a communications failure has occurred. Green flashes do not indicate that the GPS Receiver has acquired a valid time signal. The latter is indicated by an asterisk (*) character to the right of the time as it is displayed on the LCD. This is depicted in the following illustration.

```
     TIME          DATE
  16:35:52*    01-31-15
  CWR-264A Event Rcrdr
  M-A_ARROW_GRAND_MP14
```
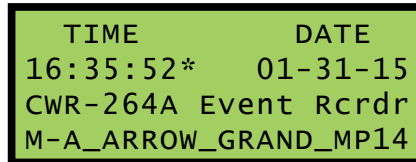
The LED will illuminate red if the Clock Sync Mode is set to GPS and the receiver has failed to acquire a valid GPS signal after seven days. The red alarm status will be extinguished automatically shortly after a GPS signal is once again acquired.

- Terminal: The green LED flashes momentarily whenever data is being sent or received via Terminal Ports 1 or 2.

- Modem: The green LED flashes momentarily whenever data is being sent or received via the modem or USB Device Port.

HOW TO USE THE USB HOST PORT

5

Every CWR-264A is equipped with a USB Host Port designed for use with a FAT-32 formatted flash drive. The port can be used to save copies of selected Event Records to a compact, portable memory. Once saved, the resultant text records can be read and reviewed on any PC. They can also be copied or moved to a PC file on a hard drive. The user has the option of copying selected records with an appended digital signature, as if the Query Events command with Dump+S option had been used. Refer to the section entitled "Creating Secure Reports" on page 56 for additional information.

(i) Saving records to a flash drive is completely non-destructive to the original records. Records can be saved as many times as desired by the user.

(i) In the following illustrations the characters shown with a dark background indicate the initial position of the highlight and therefore, the presently selected command or option.

The USB Host Port can also be used to download and upload the Setup Database. The procedures for doing so are described in the sections entitled "Saving the Setup Database" on page 63 and "Update" on page 80, respectively.

Finally, the USB Host Port can be used to update the recorder's firmware. This procedure is described in the section entitled "Update" on page 80.

SAVING RECORDS TO A FLASH DRIVE

Either of two simple procedures can be used to save Event Records to a flash drive. Typically only a few front panel keystrokes are required. A PC is not required. Both procedures are described in the following.

SAVING EVENT RECORDS FROM A COMPLETE DAY

1. Verify the USB flash drive is formatted FAT-32, not NTFS.

2. Insert the USB flash drive into the connector of the USB Host Port.

3. Press the *Save /.* key. The following message will be displayed.

```
Save to flash drive:
 Records for one day
 Records for a range
 Setup Data
```
Save Command

4. Press the *Enter* key after highlighting the Records for one day option.

5. A table of dates similar to the following will be displayed.

```
013015 013115 020115
020215 020315 020415
020515 020615
```

At least one Event Record will be logged for each date listed. Dates are listed in the MMDDYY format. The Event Records option may list as many as 128 dates. Only eight dates are listed in the example cited previously. The up and down arrow keys can be used to scroll quickly through a large collection of dates.

6. Press the *Enter* key after highlighting a date. The following message will be displayed.

```
Digital Signature?

   Yes   No
```

7. Press the *Enter* key after highlighting a date. The following message will be displayed briefly after the delay required to create the text file.

```
Writing events.txt
Writing events.bin
Writing setupdata
      Success!
```

ⓘ If the digital signature option is selected, the completion of the events.txt file will be delayed significantly (more than one minute) if hundreds or thousands of records are being saved.

8. Records from additional complete days can be saved by repeating this procedure starting at step 3.

9. Remove the flash drive from the USB Host Port after all the required records have been saved.

SAVING EVENT RECORDS FROM A RANGE OF TIMES AND DATES

1. Verify the USB flash drive is formatted FAT-32, not NTFS.

2. Insert the USB flash drive into the connector of the USB Host Port.

3. Press the *Save /.* key. The following message will be displayed.

```
Save to flash drive:
 Records for one day
 Records for a range
 Setup Data
```
Save Command

4. Press the *Enter* key after highlighting the Records for a range option.

5. A table of dates similar to the following will be displayed. The dates represent the available start date of the range.

```
013015  013115  020115
020215  020315  020415
020515  020615
```

At least one Event Record will be logged for each date listed. Dates are listed in the MMDDYY format. The Event Records option may list as many as 128 dates. Only eight dates are listed in the example cited previously. The up and down arrow keys can be used to scroll quickly through a large collection of dates.

6. Press the *Enter* key after highlighting a date. The following message will be displayed.

```
Start time:
Enter=edit, Esc=OK
       00:00:00
```

7. To accept the 00:00:00 midnight setting as the start time, press the *Esc* key. To modify the start time move the highlight to the hours, minutes or seconds position. Press the *Enter* key. Press the number keys as required to create a new value. The CWR-264A utilizes a military-style clock. Accordingly, 12:01:02 AM is defined as 00:01:02 and 12:59:58 PM is defined as 23:59:58. Leading zeros are not required. To accept the new value, press the *Esc* key. Using the same technique, adjust the other values as required. When the start time is correct, press the *Esc* key.

8. A table of dates similar to the following will be displayed. The dates represent the available end date of the range.

```
013015  013115  020115
020215  020315  020415
020515  020615
```

9. Press the *Enter* key after highlighting a date. The following message will be displayed.

```
End time:
Enter=edit, Esc=OK
       23:59:59
```

10. To accept the 23:59:59 setting as the end time, press the *Esc* key. To modify the end time use the procedure described in step 6. When the end time is correct, press the *Esc* key. The following message will be displayed.

```
Digital Signature?

       Yes   No
```

11. Press the *Enter* key after highlighting the desired option. The following message will be displayed briefly after the delay required to create the text file.

```
Writing events.txt
Writing events.bin
Writing setupdata
        Success!
```

ⓘ If the digital signature option is selected, the completion of the events.txt file will be delayed significantly (more than one minute) if hundreds or thousands of records are being saved.

12. Records from other times and dates can be saved by repeating this procedure starting at step 3.

13. Remove the flash drive from the USB Host Port after all the required records have been saved.

FILES WRITTEN TO THE FLASH DRIVE

The first time Event Records are saved via the USB Host Port a folder is automatically written to the flash drive. The name of the folder is taken from the first twenty characters of the Unit Name. Certain restrictions apply to the creation of the Unit Name. Refer to the section entitled "Unit Name" on page 22 for additional details.

After the folder is created, three files are written within the folder. A description of each file is listed in the following sections. All of the record files from a specific recorder will be written to the same folder. Provided the first twenty characters of the assigned Unit Name are not changed, a new folder is never created regardless of how many record files are saved from the recorder.

EVENTS TEXT FILE

The first file written is the text version of the Event Records. The file is assigned a filename formatted as follows: MM-DD-YY@hhmmss-mmddyy.txt. As a text file, this file can be read by any word processing application (e.g., Notepad or Word). Table 8 on page 63 provides a complete description and example of the filename format.

Text and Binary Filename Definition	Description
MM-DD-YY	The date of the first record saved to the flash drive.
hhmmss	The time the records were saved to the flash drive.
mmddyy	The date the records were saved to the flash drive.
.txt	Denotes the file as a text file readable by any word processor.
.bin	Denotes the file as a binary file readable only by GEA.
Example: 01-31-15@120127-021015.txt	The first record is from 01-31-15. They were saved to the flash drive at 12:01:27 pm on 02-10-15.

Table 8: Flash Drive Filenames

EVENTS BINARY FILE

The selected Event Records are also written to the flash drive as a highly compressed binary file. The filename is formatted similarly to the text file; however, the file extension is changed to .bin. The binary version of the record file is used exclusively by GEA for viewing and plotting of the Event Records.

SETUP DATABASE BINARY FILE

In order for GEA to view and plot the saved records a copy of the recorder's Setup Database must be available. The recorder's database file is always named setupdata.bin. This file is automatically overwritten each time a record file is written to the flash drive.

SAVING THE SETUP DATABASE

The Setup Database can be downloaded or saved directly to a USB flash drive. The following steps describe the applicable procedure.

1. Verify the USB flash drive is formatted FAT-32, not NTFS.

2. Insert the USB flash drive into the connector of the USB Host Port.

3. Press the *Save/.* key. The following message will be displayed.

```
Save to flash drive:
 Records for one day
 Records for a range
 Setup Data
```

Save Command

4. Press the *Enter* key after highlighting the Setup Data option.

5. The Setup Database will be immediately saved. The following message will be displayed briefly at the completion of the save operation.

```
 Writing setupdata
     Success!
```

6. The flash drive can now be removed from the USB Host Port.

How to Use the Keypad

After power is applied, the CWR-264A will perform a firmware boot-up procedure. The LCD will remain blank for 10 to 15 seconds while the recorder is booting. The following message will be briefly displayed at the completion of the boot-up procedure.

```
     MICRO-AIDE
   Model CWR-264A
   Event Recorder
    Version 1.17
```

The reference to firmware version 1.17 may vary. The firmware version number should be recorded and saved in the event service ever needs to be performed on the unit. After the boot-up procedure is completed the recorder will automatically enter Idle Mode. There are three operational modes, each is described in the following sections.

Idle Mode

Except as noted in the following, the real-time clock and Unit Name are displayed during Idle Mode. It is the at rest condition of the recorder. An example of the real-time clock display is shown in the following. The first twenty characters of the Unit Name are listed in the fourth row. Refer to the section entitled for additional information.

ⓘ Throughout the remainder of this chapter, the characters shown with a dark background indicate the initial position of the highlight and therefore, the presently selected command or option.

```
   TIME        DATE
16:35:52*   01-31-15
CWR-264A Event Rcrdr
M-A_ARROW_GRAND_MP14
```

LCD During Idle Mode

The CWR-264A utilizes the 24-hour, military time convention (e.g., 7:00 PM is shown as 19:00:00). The date and time display is altered once every minute for five seconds. Alternating messages referring to the Setup and Browse Modes are displayed during this period.

ⓘ An asterisk (*) to the right of the displayed time indicates that the optional GPS Receiver is locked onto a verified GPS signal.

The real-time clock display is also interrupted in Idle Mode when new Event Records are logged. Each new event will be displayed only briefly. This process is useful in verifying that the recorder is continuing to detect events. The Event Record format used by the LCD is described in the following section.

EVENT RECORD FORMAT

Event Records consist of four lines of text. Sample records for several input types are shown in the following.

```
14:57:54.69 01-31-15
D001      1x........x
NS_Gate_Down_Relay
GateDwn       Up
```
LCD Event Record - Digital Input

```
14:58:03.33 01-31-15
A01     89Vacx.......
AC_Power_120V
AC_Power     AC_Fail
```
LCD Event Record - Analog Input

```
15:43:27.24 01-31-15
V96      91.....x
Security:_North_Door
N_Door       DoorOpen
```
LCD Event Record - Virtual Input

```
15:01:17.74 01-31-15
T016    15.9s
Switch_Delay_R127
R127-3       Violate
```
LCD Event Record - Timer Input

The first line of text always specifies the time and date the event was logged to memory. The date is listed in MM-DD-YY format.

The second line of text lists the Input Number. It is generally followed by a sequence of x and . (period) characters. An x indicates an input with an active or On Event state. A . (period) indicates an input with an inactive or Off Event state. In the case of Analog Inputs the state indicators are preceded by the measured Analog Input level (e.g., 89 Vac in the second sample record). In the case of Digital and Virtual Input records all 256 Digital and 96 Virtual Input states cannot be depicted in the second line of text. Only a group of ten are shown. The number that precedes the state field is the Input Number of the first state indicator. For Analog Inputs the state indicators, from left to right, pertain to A1 through A8. The Measured Time value is listed in the case of Timer Input records.

The third line always lists the twenty characters of the assigned Input Name (e.g., AC_Power_120V in the second sample record).

Finally, the eight characters of the assigned Input Identifier and Event Name are listed in the fourth line from left to right, respectively. Input Identifiers and Event Names are described in "Input Names/Identifiers (I)" on page 32 and "Event Names (E)" on page 31, respectively.

BROWSE MODE

Browse Mode is most commonly used to view Event Records via the LCD panel. Event Records may be viewed in either forward or reverse chronological order. Events are selected by date and time and optionally by Input Number. However, two additional features allow the user to inspect the current status of an input or to measure the flash rate of a flashing circuit.

To access any of the Browse options press the *Browse* key. The following message will appear.

```
Browse:
Event Records
Input Status
Flash Rate
```

Browse Command

Each of the three options are described in the sections that follow.

EVENT RECORDS

After selecting the Event Records option a table of dates similar to the following will be displayed.

```
013015 013115 020115
020215 020315 020415
020515 020615
```

Browse Command-Event Records Option

At least one Event Record will be logged for each date listed. Dates are listed in the MMDDYY format. The Event Records option may list as many as 128 dates. Only eight dates are listed in the example cited previously. The up and down arrow keys can be used to scroll quickly through a large collection of dates. Press the *Enter* key after highlighting a date. The display will then specify a start time as shown in the following.

```
Browse Start Time:
Enter=edit, Esc=OK
       00:00:00
```

Press the *Esc* key if records starting from midnight are to be inspected. To inspect records starting later in the day perform the following steps.

1. Using the left and right arrow keys position the highlight in the hour, minute or second field.

2. Press the *Enter* key to select the highlighted field.

3. Enter the required hours, minutes or seconds by pressing the appropriate numeric keys. Leading zeros are not required.

4. Press the *Enter* key to complete the entry.

5. Repeat the previous steps to adjust the remaining fields.

After the correct starting time is specified the *Esc* key should be pressed. The following message describing the use of the arrow keys will be briefly displayed.

```
Use ←→↑↓ to scroll,
Browse to select
input to query
```

Provided the *Browse* key has not been pressed, the first Event Record meeting the specified date and time criteria will be displayed. Refer to the section entitled "Event Record Format" on page 65. The left and right arrow keys can be used to review Event Records in forward or reverse chronological order.

Holding down an arrow key allows the user to search through the record set very quickly.

The limits of the record set will be indicated by a message stating either Start of Data or End of Data. To exit Browse Mode and return to Idle Mode press the *Esc* key.

Press the *Browse* key any time after the start time is specified to inspect records for a particular input. This procedure is referred to as Query by Input Number.

QUERY BY INPUT NUMBER

To inspect Event Records for a specific input press the *Browse* key after the starting time is specified. The following message will be displayed.

```
Input to query,
(--- selects all)
            ---
```

A flashing highlight will be positioned in the Input Number field located in the third row of text. To specify an input follow the steps listed in the following.

1. Press the *Alpha* key repeatedly until the desired input type (i.e., D, A, V, T, or S) is displayed.

2. Press the appropriate number keys to enter the Input Number. Leading zeros are not required.

3. Press the *Enter* key to display the first Event Record satisfying the date, time and Input Number criteria. Several seconds may be required to locate the first record.

4. Use the arrow keys to inspect additional records for the specified input.

The *Browse* key can be pressed again at any time if a different input is to be inspected. Press the *Esc* key to exit the Query by Input Number procedure and return to Idle Mode.

The CWR-264A will log an Event Record to memory when the power is turned off as well as on. Additionally, a record will be logged if the measured temperature is outside the Temp Limits assigned by the user. These records are referred to as System Records and are associated with S-type inputs. Refer to the section entitled "System Events" on page 93 for additional details.

INPUT STATUS

The Input Status option allows the user to inspect the current state of each input. The status of Digital, Analog and Virtual Inputs is indicated by their assigned Event Names. Voltage measurements are reported for Analog Inputs. The Input Status feature can be of great use when setting up the recorder. Without a peripheral device the user can verify that inputs are assigned proper Input Identifiers and Event Names. Each input can be checked to verify that it will report a change of state. Additionally, the command provides a DVM-like function for each Analog Input.

After selecting the Input Status option the following message will be displayed briefly.

```
Use ←→↑↓ to scroll,
Browse=select input
```

Browse Command‐Input Status Option

The arrow keys can be used to scroll from one input to the next. Digital Inputs are followed by Analog Inputs. They are followed by Virtual Inputs. Rather than use the arrow keys to scroll sequentially through each input the user can jump to a specific input by pressing the *Browse* key. Select the input using the procedure described in "Query by Input Number" on page 67.

Sample status data for each input type is listed in the following.

```
D001
NS_Gate_Down_Relay
GateDwn      Up
```

LCD Input Status‐Digital Input

```
A01
AC_Power_120V
AC_Power    AC_Fail
                89Vac
```

LCD Input Status‐Analog Input

```
V96
Security:_North_Door
N_Door       DoorOpen
```

LCD Input Status‐Virtual Input

The Input Number and Input Name are listed in the first and second rows, respectively. The Input Identifier and Event Name are listed in the third row. The fourth row is used to report analog levels. The data listed is updated automatically and in real-time. Without the aid of a PC the user can check the sequence of events at a crossing or while a control function is being exercised. Press the *Esc* key to exit the Input Status feature and return to Idle Mode.

FLASH RATE

The third option included with the Browse command allows the user to measure the flash rate of a circuit. The following request for a Digital Input number will be displayed after selecting the Flash Rate option.

```
Measure Input:D256
```

Browse Command‐Flash Rate Option

The user must enter the number of the flashing input (1-256). Leading zeros are not required. Press the *Enter* key to complete the entry. Flash rate data similar to the following will be displayed.

```
Measure Input:D256
Flashes/Min:  46.5
On/Off:  0.65/  0.64
Cycle Time:  1.29
```

Measured Flash Rate

The Input Number and flash rate, measured in flashes per minute, are listed in the first two rows. The average on and off intervals of each flash pulse, measured in seconds, are listed in the third row. The lesser value is the optimum value to be assigned as the Detection Time for inputs using the reported flash rate. The sum of the average on and off intervals is reported as the cycle time in the fourth row.

Press the *Esc* key to exit the Flash Rate command and return to Idle Mode.

SETUP MODE

Setup Mode allows the user to set up the CWR-264A to a specific set of application requirements. The various commands that can be executed from the keypad form a subset of those performed via a peripheral device. Only a few commands are not applicable to the keypad (e.g., Transfer Files, Network). The results from any keypad-performed command are indistinguishable from those performed from a peripheral device. Accordingly, the setup descriptions that are a part of Chapter 3 may be used to provide a more detailed explanation of their keypad counterparts.

To enter Setup Mode from Idle Mode press the *Setup* key. The following message will be displayed. The user must enter the correct Passcode before any setup command can be executed.

```
Enter the passcode:
```
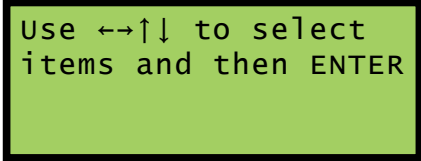
Passcode Request

ⓘ The factory default Passcode is *12345678*.
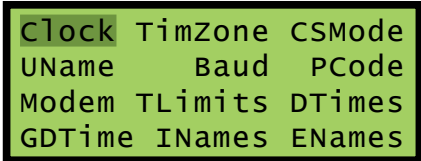
Passcodes are assigned numeric values only. Press the *Enter* key to complete the entry. If the user fails to enter the correct Passcode an error message will be displayed.

Assuming the correct Passcode is entered the following message will be briefly displayed.

```
Use ←→↑↓ to select
items and then ENTER
```

The Setup Menu of front-panel-accessible commands will then be displayed as shown in the following.

```
Clock  TimZone  CSMode
UName     Baud   PCode
Modem  TLimits  DTimes
GDTime  INames  ENames
```

LCD Setup Commands-Screen 1

Moving the highlight beyond the limits of the first menu will display the following additional commands.

```
Analog  Virtual  Timer
Speed   Update    Diag
RESET
```

LCD Setup Commands-Screen 2

The Setup Menu consists of nineteen commands. Table 9 on page 70 provides a brief explanation of each command. To select a command advance the highlight to the desired command and press the *Enter* key. The use of each command is explained in the final sections of this chapter.

Name	Description
Clock	Set date and time
TimZone	Select Time Zone and enable / disable Daylight Saving Time
CSMode	Select Clock Sync Mode
UName	Assign Unit Name
Baud	Select Terminal Port 1 and 2 Baud rates
PCode	Assign Passcode
Modem	Assign Ring Count and Dial Numbers
TLimits	Assign High and Low Temperature Limits
DTimes	Assign Detection Times and enable / disable Flashing
GDTime	Assign Detection Time to all Digital Inputs
INames	Assign Input Names, Identifiers and Event Name pair number
ENames	Assign Event Name pairs
Analog	Configure Analog Inputs
Virtual	Configure Virtual Inputs
Timer	Configure Timer Inputs
Speed	Configure Train Speed Monitors
Update	Update Setup Database and firmware from USB Host Port
Diag	Perform system diagnostics
RESET	Erase all Event Records Restore Setup Database to factory default values

Table 9: List of LCD Setup Commands

Before proceeding the user should note that several of the commands require alphabetic characters to be used in the creation of a name or label (e.g., Input Name). The keypad, however, contains only numeric and function keys. A special Alphanumeric Editing Procedure which is a feature of all MICRO-AIDE Event Recorders allows the user to create names and labels from an extensive set of characters. This procedure is described in the following.

ALPHANUMERIC EDITING PROCEDURE

The first step in the Alphanumeric Editing Procedure is to select the parameter that is to be edited (e.g., Input Name or Input Identifier). A flashing highlight is used to indicate a specific parameter. To select the highlighted parameter press the *Enter* key. A blank field of characters will be displayed. An underscore (i.e., _) will be positioned in the first character location. The underscore character is used as a cursor in the Alphanumeric Editing Procedure. The left and right arrow keys can be used at any time to position the cursor as required. To create an alphanumeric name perform the following steps.

1. Press the *Alpha* key. The following list of characters will be displayed.

```
ABCDEFGHIJKLMNOPQRST
UVWXYZ !"#$%&'()*+,/
abcdefghijklmnopqrst
uvwxyz:;<=>?@[]^_{|}
```

Alphanumeric Characters

2. Using the arrow keys reposition the highlight until the desired character is highlighted. A total of eighty characters plus ten numbers are available for selection.

3. Press the *Enter* key to select the highlighted character. The selected character is placed into the name at the present location of the cursor. The cursor is then automatically moved one position to the right.

4. To enter a number into the name press the appropriate number key. To correct an error reposition the cursor under the character in error and overwrite it with a new character. To insert a space, assuming

no characters have been inserted to the right, simply move the cursor to the right. The space characters follow the upper-case Z in the character set.

5. Repeat the previous steps until the name is completed.

6. Press the *Enter* key to accept the newly defined name. Alternatively, press the *Esc* key to retain the previously assigned name or to start again by ignoring all of the character entries.

CLOCK

The Clock command is used to change the date or time. The time is always listed in 24-hour, military-style format (e.g., 7:00 PM is listed as 19:00:00). In accordance with this convention the user must enter the time by using the same format. The date is always listed in MM-DD-YY format as shown in the following.

```
Time: 16:07:09
      MM-DD-YY
Date: 01-31-15
      Saturday
```

Clock Command

To change the date or time position the highlight in one of the numeric fields. Press the *Enter* key. Enter a valid one- or two-digit number (leading zeros are not required). Press the *Enter* key to accept the new value. Adjust the other fields as required. The day of week is automatically calculated by the CWR-264A based upon the day, month and year selected by the user.

Press the *Esc* key after the changes have been made. The following message will be displayed.

```
Change the clock now

     Yes   No
```

To complete the command, select the desired option and then press the *Enter* key.

The clock of the CWR-264A can be precisely synchronized using any of three different methods. The Clock Sync Mode can be set to SNTP or GPS. The recorder supports SNTP-Unicast and SNTP-Multicast time syncing. Refer to the section entitled "CSMode" on page 72. If the clock cannot be synchronized MICRO-AIDE recommends that the clock be manually set once per month.

Two System Event Records are automatically saved to memory whenever the user manually sets the time or date. This feature is fully described in the section entitled "System Events" on page 93.

TIMZONE

The TimZone command is used to assign the Time Zone and control the Daylight Saving Time (DST) setting. A message similar to the following will be displayed after selecting the TimZone command.

```
TimZone:PST (UTC-8)
Daylight Saving Time
Enabled
```

Time Zone Command

The highlight will initially be placed in the TimZone field (e.g., PST (UTC-8) in the example cited previously). To select a new Time Zone setting press the *Enter* key repeatedly until the correct setting is displayed. There are eight Time Zone settings. They are described in the section entitled "Time Zone" on page 25.

To enable or disable the automatic adjustment for DST, position the highlight in the third row. Press the *Enter* key to change the current setting.

Press the *Esc* key to accept the current settings and complete the command.

CSMODE

Four different methods can be used to control the recorder's real-time clock. The Clock Sync Mode command allows the user to select manual, SNTP or GPS methods. The following message will be displayed after selecting the CSMode command.

```
Clock Sync Mode:
None
SNTP
GPS
```

Clock Sync Mode Command

Listed in the following are usage instructions regarding the three options.

NONE

The recorder's clock is not synchronized. MICRO-AIDE recommends that the clock be manually set once per month. The clock can be expect to drift approximately ±8 seconds per month.

SNTP

SNTP-Unicast–The Clock Sync Mode must be set to SNTP. A time server on the LAN must be accessible to the recorder via its Ethernet Port. The time server must support SNTP-Unicast. The SNTP Server parameter must be set to the IP address of the time server. The SNTP Server IP address is assigned by the System Parameters command. Refer to the section entitled "SNTP Server" on page 25 for additional details.

SNTP-Multicast–The Clock Sync Mode must be set to SNTP. A time server on the LAN must be accessible to the recorder via its Ethernet Port. The time server must be enabled for SNTP-Multicast operation. The SNTP Server parameter must be set to 0.0.0.0. The SNTP Server IP address is assigned by the System Parameters command. Refer to the section entitled "SNTP Server" on page 25 for additional details.

ⓘ Setting the SNTP Server IP address to 0.0.0.0 automatically disables Unicast operation in favor of Multicast. Conversely, a non-zero IP address disables Multicast operation in favor of Unicast. However, for proper operation all of the other conditions described previously must be met.

GPS

The optional GPS Receiver must be installed and it must acquire a valid GPS signal. Provided these conditions are met, the GPS signal becomes the synchronizing source. Once an hour the clock is synchronized.

UNAME

The UName command is used to assign a unique name to each CWR-264A recorder. The first twenty characters of the Unit Name must be assigned in accordance with various rules. These are described in the section entitled "Unit Name" on page 22. A message similar to the following will be displayed after selecting the UName command.

```
Unit name:
***** NOT SET *****
```

Unit Name Command

The first twenty characters of the existing Unit Name are displayed in the second line of text. The default Unit Name is displayed in the sample data cited previously. To change the name press the *Enter* key. Assign a new name or modify the existing name by using the "Alphanumeric Editing Procedure" on page 70. Press the *Esc* key to complete the command.

Due to restrictions in the size of the LCD panel the UName command can be used to assign a Unit Name limited in length to twenty characters. Lengthier Unit Names (up to eighty characters) must be assigned by using the System Parameters command.

BAUD

The Baud command allows the user to change the Baud rate assigned to Terminal Port 1 and 2. The following port selection menu will be displayed.

```
Select port:
     PORT1   PORT2
```

Baud Command

Move the highlight to the required port. Press the *Enter* key. The following array of Baud rates will be displayed.

```
Port1 baud rate: 300
    600    1200    2400
   4800    9600   19200
  38400   57600  115200
```

List of Terminal Port Baud Rates

It is likely that the 38,400 setting will be highlighted. It is the default setting used by the recorder. To assign a new Baud rate move the highlight to the desired setting by pressing the arrow keys. Press the *Enter* key to accept the new selection. The Baud rate of the peripheral device attached to the selected Terminal Port must be changed to match the new setting.

PCODE

The Passcode feature prevents unauthorized users from altering the Setup Database via the front panel. Passcodes can contain any combination of numeric values not exceeding eight total. A message similar to the following will be displayed after selecting the PCode command.

```
Passcode: 12345678
```

Passcode Command

In the sample data cited previously the Passcode is set to its default value. To change the Passcode press the *Enter* key. A blank field with the cursor in the left-most position will be displayed. Assign a new Passcode by pressing the appropriate number keys. To assign a null Passcode press the *Enter* key instead. This will effectively disable the Passcode protection feature. Access to the recorder will be permitted by simply pressing the *Enter* key when the request for Passcode message is displayed.

Accept the new Passcode by pressing *Enter*. Press the *Esc* key to complete the command.

If the user forgets the assigned Passcode the System Parameters command should be executed. It will display the current Passcode assignment. Refer to the section entitled "Passcode" on page 24.

MODEM

The CWR-264A can be equipped with an optional, internal 33,600 Baud modem. The modem option allows remote users to access the recorder. Additionally, the modem's dial-out feature allows Event Records from Virtual Inputs to be transmitted to a remote maintenance center.

There are three parameters that control the operation of the modem. The Ring Count determines the number of rings that must occur prior to the modem answering an incoming call. The Primary and Secondary Dial Numbers identify the number to dial when attempting to transmit a Virtual Input record. Refer to the section entitled "Primary and Secondary Dial Numbers" on page 24 for additional information regarding these parameters.

Data similar to the following will be displayed after selecting the Modem command.

```
Modem ring count: 2
Prim/Sec Dial Number
```

Modem Command

To change the Ring Count setting move the highlight to the appropriate field and press the *Enter* key. Enter a number in the range from 0 to 99. Accept the new value by pressing the *Enter* key.

A Ring Count setting of zero will prevent the modem from answering incoming calls.

To assign a Primary or Secondary Dial Number move the highlight to the third or fourth row, respectively. The existing assignment will be highlighted. Press the *Enter* key. A blank field with the cursor in the left-most position will be displayed. Enter a valid dial number by pressing the appropriate number keys. The "Alphanumeric Editing Procedure" on page 70 can be used to insert non-numeric characters such as a comma to insert a two-second pause. Press the *Enter* key to accept the new assignment. Complete the command by pressing the *Esc* key.

TLIMITS

The TLimits command allows the user to assign a High and Low Limit against which the internal temperature of the recorder is compared. If the temperature is found to be outside the acceptable limits of operation, a System Event Record will be logged to memory. A second record will be logged when the temperature recovers to a normal level.

Data similar to the following will be displayed after selecting the TLimits command.

```
Temperature Limits:
High Limit:      257
Low Limit:       -67
```

Temperature Limits Command

The default Limit Values are listed in the sample data. To change a Limit Value move the highlight to the appropriate field and press the *Enter* key. Enter a number using the number keys. Negative values can be entered. Accept the new value by pressing the *Enter* key.

The internal temperature and Limit Values are reported in degrees Fahrenheit.

DTIMES

The Detection Time feature of the CWR-264A is used to prevent relay contact bounce from logging false Event Records. The Detection Time can be set to any value in the range from .00 to 327.67 seconds. A value of zero prevents the input from detecting events. The DTimes command is used to establish a unique Detection Time for each Digital Input. The command is also used to enable an input as a Flashing Input. Refer to the section entitled "Detect Times / Flash Enable (D)" on page 26.

Data similar to the following will be displayed after selecting the DTimes command.

```
Inp DetTime Flashing
D001    0.30     No
D002    0.30     No
D003    0.30     No
```

Detect Time Command

The default settings are displayed in the sample data cited previously. The Digital Input number is listed at the start of each line. Press the up or down arrow keys repeatedly to select a different input. Alternatively, press the *Browse* key to jump to a different input. Specify the Input Number by pressing the appropriate numeric keys. Leading zeros are not required. Press the *Enter* key to jump directly to the selected input. To change the Detection Time for the selected input press the *Enter* key while the existing value is highlighted. A blank field with a cursor in the left-most position will be displayed. Enter a value by pressing the appropriate number keys. Use the decimal point (labeled "Save/.") to enter a fractional value. Leading zeros are not required. Press the *Enter* key to accept the new value.

To set an input as a Flashing Input position the highlight in the Flashing field. Press the *Enter* key to change the existing setting. Yes enables the input as flashing. No disables the input.

After all of the new settings have been assigned press the *Esc* key to complete the command.

GDTIME

Use the Global Detect Time command to assign a common Detection Time value to all Digital Inputs. Data similar to the following will be displayed after selecting the GDTime command.

```
        GLOBAL
Detect Time:   0.00
```

Global Detect Time Command

To change the Detection Time for all inputs press the *Enter* key. A blank field with a cursor in the left-most position will be displayed. Enter a value by pressing the appropriate number keys. Use the decimal point (labeled "Save/.") to enter a fractional value. Leading zeros are not required. Press the *Enter* key to accept the new value. Press the *Esc* key to complete the command.

(i) The Detection Time of Digital Inputs assigned as sensors for the Train Speed Monitor feature cannot be altered by the DTimes or GDTime commands.

INAMES

The INames command is a multi-purpose command that allows the user to assign Input Identifiers, Input Names and Event Name pairs to each input of the recorder. Input Identifiers and Input Names allow the user to interpret Event Records more precisely by referring to inputs with labels that are unambiguous (e.g., Track_Switch_Control vs. Digital Input 20). Refer to the section entitled "Input Names/Identifiers (I)" on page 32 for additional details.

Data similar to the following will be displayed after selecting the INames command. In all cases default values are assigned.

```
D001     ID: Dinpu001
Digital Input 001
Event ON/OFF pair:
01 On        Off
```

Input Names Command

The Input Number is always displayed in the upper left-most corner. To select a different input press the up or down arrow keys repeatedly. Alternatively, press the *Browse* key to jump to a different input. Press the *Alpha* key repeatedly until the desired input type is displayed (i.e., D, A, V or T). Enter an Input

Number by pressing the appropriate number keys. Leading zeros are not required. Press the *Enter* key to jump directly to the selected input.

The field labeled "ID" will initially be highlighted. Move the highlight to the second row to select the Input Name. Press the *Enter* key to modify the highlighted assignment. A blank field with a cursor in the left-most position will be displayed. Use the "Alphanumeric Editing Procedure" on page 70 to create a new Input Identifier or Input Name.

To assign an Event Name pair to a specific Input Number move the highlight to the fourth row. Press the *Enter* key repeatedly until the desired Event Name pair (i.e., 1 to 20) is displayed. Each time the *Enter* key is pressed the fourth line of text will be automatically updated to reflect the contents of the selected Event Name pair. Pressing the *Enter* key while pair number twenty is displayed will return the user to pair number one. After all of the names and pairs are assigned press the *Esc* key to complete the command.

In the following example the Input Name and Identifier have been assigned as NS_Gate_Down_Relay and GateDwn, respectively. Event Name pair number 3 states that an Event Name of Up will indicate an On Event. An Event Name of Down will indicate an Off Event.

```
D001      ID: GateDwn
NS_Gate_Down_Relay
Event ON/OFF pair:
03 Up        Down
```

Input Name Command-Example

ENames

Event Names are created by the user to uniquely identify Event Records. By way of example, the state of an input can be labeled as "Up" or "Down" or "GateUp" or "GateDwn". Event Names add clarity to Event Records that would otherwise not be possible if input states were only labeled as "On" or "Off". Event Names are always assigned in pairs to identify the active and inactive state of an input. As many as twenty Event Name pairs can be assigned. Refer to the section entitled "Event Names (E)" on page 31 for additional details.

Data similar to the following will be displayed after selecting the ENames command.

```
Event ON          OFF
01 On         Off
02 On         Off
03 Up         Down
```

Event Names Command

Three Event Name pairs are displayed at one time. The number (i.e., 1 to 20) of the pair is listed at the start of each row. It is followed by the currently assigned active or On Event Name (e.g., Up) and the existing inactive or Off Event Name (e.g., Off). To create a new name or modify an existing name select the Event Name pair by pressing the up or down arrow keys to advance through the list of twenty pairs. Use the left and right arrow keys to select either the on or off field. Press the *Enter* key. A blank field with a cursor in the left-most position will be displayed. Use the "Alphanumeric Editing Procedure" on page 70 to create a new name. Use the same procedure to modify additional names.

After all of the Event Name pairs are defined press the *Esc* key to complete the command.

ANALOG

The Analog command is used to configure the eight Analog Inputs of the CWR-264A. Each Analog Input can be used to monitor AC or DC voltages. Like a DVM, the CWR-264A can report its measurements using several different scales and resolutions. Analog Inputs that vary beyond an acceptable range of operation can be reported by setting appropriate Limit Values. Refer to the section entitled "High and Low Limits" on page 29 for additional details.

Data similar to the following will be displayed after selecting the Analog command.

```
A01 Range:+/-25.5Vdc
Filter:         Slow
High Limit:     25.5
Low Limit:     -25.5
```

Analog Command

The Analog Input number is displayed in the upper left-hand corner. To select a different Analog Input press the up or down arrow keys repeatedly. Alternatively, press the *Browse* key to jump to a different input. Specify the Input Number by pressing the appropriate numeric keys. Leading zeros are not required. Press the *Enter* key to jump directly to the selected input. The first row also indicates the Range setting. The Filter setting and High and Low Limit Values are listed in the remaining rows.

To change the Range setting, highlight the existing setting and press the *Enter* key until the desired Range is displayed. The sequence of possible Range settings is ±25.5 Vdc, +51.1 Vdc, ±255 Vdc, 25.5 Vac, and 255 Vac.

The Filter setting controls the amount of smoothing the measured signal is subjected to. AC signals require the Slow setting to remove their ripple content. DC signals can generally use either the Slow or Fast setting. To toggle the existing setting simply press the *Enter* key.

ⓘ All AC voltage measurements are reported in RMS units.

The Limit Values can be set separately. They cannot exceed the bounds of the Range setting. To change an existing setting highlight the value and press *Enter*. Use the number keys to enter the new value. Enter fractional and negative values by using the decimal and minus keys, respectively.

After the new settings have been assigned press the *Esc* key to complete the command.

VIRTUAL

Virtual Inputs allow the CWR-264A to identify and report a variety of signal conditions that may be of interest to the user. Generally, these conditions will refer to anomalies in the state of several relay circuits. High or low analog levels may also be of special concern to the user. The 96 Virtual Inputs of the CWR-264A are configured by use of the Virtual command. Refer to the section entitled for additional information.

Data similar to the following will be displayed after selecting the Virtual command.

```
V01 (SETUP=function)
---    ---    ---    ---
Relays:  1=No   2=No
Dial Out:      No
```

Virtual Command

In the sample data cited previously, Virtual Input number 1 has not been assigned. It retains its default settings. The Virtual Input number is displayed in the upper left-most corner. To select a different Virtual Input press the up or down arrow keys repeatedly. Alternatively, press the *Browse* key to jump to a different input. Specify the Input Number by pressing the appropriate numeric keys. Leading zeros are not required. Press the *Enter* key to jump directly to the selected input.

The second line of text includes four place holders for variables. Variables are Digital, Analog, other Virtual or Timer Inputs. The procedure for assigning variables is described in the following.

Each Virtual Input can selectively operate the two internal relays of the CWR-264A. Position the highlight in the Relay 1 or Relay 2 location. Press the *Enter* key to toggle the Relay setting from No to Yes or vice versa. Virtual Input records can be transmitted to a remote maintenance facility provided the recorder is equipped with an internal modem. *Press* the Enter key to toggle the existing Dial Out setting.

ASSIGNING VARIABLES

A variable can be any valid Digital, Analog, other Virtual or Timer Input. To assign variables complete the steps listed in the following.

1. Press the left and right arrow keys to locate the highlight in a place holder field.

2. Press the *Enter* key.

3. Press the *Alpha* key until the desired input type designator appears (i.e., D, A, V or T).

4. Enter the desired Input Number by pressing the appropriate number keys.

5. Accept the new entry by pressing the *Enter* key.

6. Repeat the preceding steps if additional variables are required.

The final step is to select the states that each variable assumes in defining a Virtual Input.

SELECTING STATES

A Virtual Input can be thought of as a logical relationship shared by one to four inputs. Accordingly, the state a Virtual Input assumes is dependent upon the state of each assigned variable. It follows that a Virtual Input dependent upon one variable is defined by a combination of two states. Two variables yield a combination of four states. Three variables yield eight states. Four variables yield sixteen states. Selecting states involves the assignment of a Virtual Input state for each combination of variable states.

Press the *Setup* key after all of the variables have been assigned. Data similar to the following will be displayed.

```
Virtual Output Funct
-----Inputs----- V03
D256 D007 A08   ---
Off  Off  Off      0
```

Virtual Command - Assigning States

For the sample data cited previously, three of four possible variables have been assigned to Virtual Input V3. The third line of text lists the assigned variables by Input Number. The fourth line of text lists a specific combination of states for the assigned variables. The right-most field indicates the state the Virtual Input assumes for the combination of variable states listed.

Variables (i.e., Digital, Analog, other Virtual and Timer Inputs) always assume either of two states. Each state is described in the following.

On – The Digital Input voltage is in the range from 9 to 36 Vdc. The Analog Input level is outside its acceptable range as defined by its assigned Limit Values. Refer to Figure 7 on page 30. The Virtual Input evaluates to a true logic state. The Timer Input has measured a delay that is less than its assigned Low Limit Value or greater than its assigned High Limit Value.

Off – The Digital Input voltage is less than 1 Vdc. The Analog Input level is within its acceptable range as defined by its assigned Limit Values. The Virtual Input evaluates to a false logic state. The Timer Input has measured a delay that is within the range of its assigned Limit Values.

The Virtual Input will assume the state defined by the setting in the lower right-hand corner. The number 0 is used to identify the Off state. The number 1 is used to identify the On state. Press the *Enter* key to toggle the state of the Virtual Input from 0 (Off) to 1 (On) or vice versa. This setting will apply only to the combination of variable states displayed in the fourth line. Press the down arrow key to define the Virtual Input state for the next combination of variables.

Listed in the following are the eight variable state combinations associated with the Virtual Input described previously. Each combination can be selected in the sequence listed by pressing the up or down arrow keys.

```
                          V03
D256 D007 A08    ---
off  off  off        0
On   off  off        0
off  On   off        0
On   On   off        0
off  off  On         0
On   off  On         0
off  On   On         0
On   On   On         0
```

In the sample data cited previously, the state of the Virtual Input is set in all cases to its initial value of Off (0). Change the state of the Virtual Input as required by the remaining variable states. Press the *Esc* key to accept the new settings and complete the command.

TIMER

The CWR-264A is equipped with 200 general purpose Timer Inputs. Refer to the section entitled "Timer Inputs (W)" on page 30 for additional information. To configure a Timer Input via the front panel select the Timer LCD command. Data similar to the following will be displayed.

```
T001Frm:---   Evt:Off
     To:---   Evt:Off
 LowLim:  0.0
HighLim:  0.0
```

Timer Command

The presently selected Timer Input is always displayed in the upper-left corner (e.g., T001). To change the input press the up or down arrow keys repeatedly. Alternatively, jump to a specific input by pressing the *Browse* key and then the appropriate number keys. Complete the entry by pressing the *Enter* key.

To select the From and To Inputs move the highlight to the appropriate field and press the *Enter* key. Press the *Alpha* key repeatedly until the desired input type designator appears (i.e., D, A, V or T). Press the appropriate number keys. Complete the entry by pressing the *Enter* key.

Timer Inputs can be assigned as the From Input. This allows a Timer Input to trigger another Timer Input. However, a Timer Input cannot be assigned as the To Input.

Select the desired event setting by moving the highlight to the correct field and then pressing the *Enter* key. The current setting will be toggled between On and Off. Assign the High and Low Limit Values by locating the highlight as needed and pressing the *Enter* key. Press the appropriate number and/or decimal keys to assign a value. Complete the entry by pressing the *Enter* key.

The Limit Values can be assigned in the range from 0.0 to 999.9 seconds.

Select another Timer Input and repeat the preceding steps as necessary. After all of the required Timer Inputs are configured terminate the command by pressing the *Esc* key.

SPEED

The Speed command is used to configure the four Train Speed Monitors. Once parameters that comprise the feature are set the recorder will report train speeds and instances of excessive speed. Refer to the section entitled "Measure Speed (M)" on page 35 for additional information regarding these parameters. Train speeds are reported via Event Records that are logged to memory.

Data similar to the following will be displayed after selecting the Speed command.

```
01: Sensor1:  ---
    Sensor2:  ---
Distance:     0 feet
Threshold:    0 MPH
```
Speed Command

There are four distinct parameters that must be assigned per monitor. The selected monitor (1 through 4) is always displayed in the upper-left corner. To change the selected monitor press the up or down arrow keys repeatedly. Alternatively, jump to a specific input by pressing the *Browse* key and then the appropriate number keys. Complete the entry by pressing the *Enter* key.

Both sensors must be assigned a valid Digital Input number. To assign a Digital Input highlight the appropriate field. Press the *Enter* key followed by the *Alpha* key. Enter a numeric value from 1 to 256. Leading zeros are not required. Complete the input assignment by pressing the *Enter* key.

The separation between the two sensors is used to set the Distance parameter. It can be set to any value in the range from 50' to 5280'.

Trains with monitored speeds in excess of the Speed Limit Value will be identified by a unique Event Record. The Speed Limit Value (labeled "Threshold") must be in the range from 5 to 180 mph. Setting either the Distance or Speed Limit parameters to zero will disable the selected Train Speed Monitor. Complete the command by pressing the *Esc* key.

U<small>PDATE</small>

The USB Host Port can be used to save a copy of selected Event Records in an easy to read text format. Refer to the section entitled "Saving Records to a Flash Drive" on page 60. The port can also be used to update the Setup Database and firmware used by the CWR-264A. Both procedures are described in the following sections.

S<small>ETUP</small> D<small>ATABASE</small>

Before the current Setup Database can be updated a valid database file must be saved to the USB flash drive. MICRO-AIDE recommends that the file be named SETUPDATA.BIN. The file must have a file extension of .bin and it must be saved to the folder named for the targeted recorder.

The USB Host Port cannot be used with NTFS formatted flash drives.

To update the Setup Database follow the steps listed in the following.

1. Verify the USB flash drive is formatted FAT-32, not NTFS.

2. Insert the flash drive into the USB Host Port.

3. Select the Update command. The following message will be displayed.
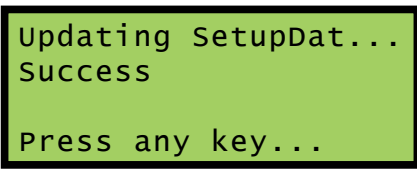
```
Item to Update
Setup Data
Firmware
```
Update Command

4. Select the Setup Data option to proceed. The following message will be displayed.

```
Insert flash drive
with setup file and
select OK
CANCEL     OK
```

5. Select the OK option to proceed. The LCD will indicate that the new Setup Database file is being transferred. A single-line progress bar is used to indicate transfer activity. After a few seconds the transfer will automatically terminate and the following message will be displayed.

```
Updating SetupDat...
Success

Press any key...
```

Successful Update

6. Press the *Esc* key to complete the transfer. The recorder will immediately operate in accordance with the new Setup Database.

FIRMWARE

MICRO-AIDE will periodically make available to its customers new firmware that either expands or improves upon the capabilities of its products. The new firmware will be available for downloading from our website. Visit: www.micro-aide.com/support/downloads.html.

Once the appropriate firmware file is downloaded and unzipped it will yield a .hex file. This file can be saved to a flash drive and then later used to update the recorder's firmware.

The USB Host Port cannot be used with NTFS formatted flash drives.

The USB Host Port operates in strict accordance with various Microsoft standards that apply to filenames and folders. Accordingly, the .hex file name must not be altered to include several illegal characters. All .hex files downloaded from the MICRO-AIDE website are, after they are unzipped, guaranteed to be compliant with applicable Microsoft and USB Host Port standards.

Occasionally a new firmware release will be incompatible with the recorder's existing Setup Database. When this happens the existing database will have to be erased and a new one created. Incompatibilities, if any, are listed in Table 1 on page 5. It should always be reviewed before proceeding with an update.

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To update the firmware follow the steps listed in the following.

1. Verify the USB flash drive is formatted FAT-32, not NTFS.

2. Insert the flash drive into the USB Host Port.

3. Select the Update command. The following message will be displayed.

```
Item to Update
Setup Data
Firmware
```
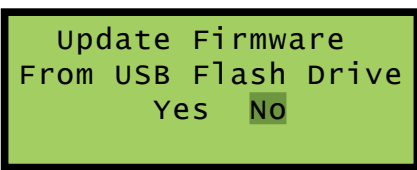
Update Command

4. Select the Firmware option to proceed. The following message will be displayed.

```
Update Firmware
From USB Flash Drive
Yes   No
```

5. Select the Yes option to proceed. The following message will be displayed.

```
Insert flash drive
with HEX file and
    select OK
CANCEL     OK
```

6. Select the OK option to proceed. Information similar to the following will be displayed.

```
Select hex file:
CWR-264A V117.hex
CWR-24A V109.hex
CWR-72A V107.hex
```

File Selection

7. The Update command allows the user to select a file from a list of nine. The first group of three are depicted in the example. To navigate to the second or third group, press the up or down arrow keys.

8. Once the correct file is highlighted, select it by pressing the *Enter* key.

9. The LCD will indicate that the new firmware file is being transferred. A single-line progress bar is used to indicate transfer activity. After approximately 30 seconds the transfer will automatically terminate and the following message will be displayed.

```
Updating Firmware...
Success!

Press any key...
```

Successful Update

10. Press the *Esc* key to proceed. Finally, the following message allows the user to run or ignore the new firmware. Refer to the closing note. Select the Yes option to execute the new firmware by restarting the recorder. The Update procedure has been completed.

```
Restart Recorder?

Yes  No
```

Restart Option

At the completion of the transfer, the new firmware is saved in the non-volatile memory of the recorder. However, the new firmware is not executed until such time as a restart is performed.

Dɪᴀɢ

The Diag command can be used to test nine critical recorder functions. Included are tests of the program memory, Event Record memory, internal relays, internal temperature, Ethernet Port and optional GPS Receiver and internal modem. Each test can be performed at any time and is completely non-destructive. The contents of the Setup Database and Event Record memories will remain unmodified.

The following data will be displayed after selecting the Diag command.

```
Select test: ProgMem
FlashMem     GPS Rcvr
Ethernet       Modem
Relay      Temperature
```

Diagnostics Command - First Screen

```
Select test:
Terminal1  Terminal2



```

Diagnostics Command - Second Screen

The highlight will initially be positioned over the ProgMem field. To select a different test, position the highlight in the desired field. Press the *Enter* key to perform the test. Each test is described in the sections that follow.

PROGMEM

A checksum of the entire program memory will be calculated and displayed after a few seconds. The following example shows the results of a typical ProgMem test.

```
Program Memory
Checksum=9b95 (GOOD)

Hit any key...
```

Program Memory Test

The labels GOOD or BAD will indicate the success of the test.

The reported checksum value will vary depending upon the version of the installed firmware.

FLASHMEM

The results of a typical FlashMem test are listed in the following.

```
Flash Mem
#1:4096K  #2:0K
#3:0K     #4:0K
Hit any key...
```

Flash Memory Test

The test verifies that the microprocessor can properly access the Event Record memory. The reference to 4096K, 8192K or 16384K indicates the size in bytes of the memory device. A value of 0K indicates that a memory chip is not installed in the identified position or a failure has been detected.

GPS RCVR

The GPS Rcvr test will check for the presence and operability of the optional GPS Receiver. A typical test result is displayed in the following.

```
GPS Rcvr Test: Okay
17:14:42.087 Valid
34.1043,-117.8784
Hit any key...
```

GPS Receiver Test

At the end of the first line either Okay or NONE will be reported. Okay indicates that the GPS Receiver is installed and the microprocessor is communicating with the receiver. NONE indicates that the receiver is either not installed or has experienced a severe failure.

At the end of the second line either Valid or Invalid will be reported. Valid indicates that the GPS Receiver has achieved a signal lock with at least one satellite and that an accurate UTC-0 time is being reported. Invalid indicates that a satellite lock has not been achieved.

The third line will list the latitude and longitude coordinates if they are available. In order to report latitude and longitude the GPS Receiver must achieve a signal lock with a minimum of four satellites.

Depending upon the location of the GPS antenna this may not be possible. In such cases coordinates of 0.0000,0.0000 will be listed.

Irrespective of the reported latitude and longitude coordinates, if the test reports Valid the GPS Receiver option is reporting accurate date and time data.

Ethernet

The Ethernet test will verify that the microprocessor is able to communicate with the Ethernet Port. A typical test result is displayed in the following.

```
Ethernet Test: Okay


Hit any key...
```
Ethernet Test

If the recorder's microprocessor is able to communicate with the Ethernet Port, Okay will be reported. Otherwise, NONE will be reported.

The Ethernet test does not test for LAN communications. For this reason, MICRO-AIDE recommends that a ping test also be performed.

Modem

Either of two results should normally be expected from the Modem test. The following response verifies that the optional modem is installed and that the microprocessor is able to communicate with the modem. A typical test takes a few seconds for the microprocessor to complete.

```
Modem Test...
Modem found:D

Hit any key...
```
Modem Test

The D (or C) reference listed previously indicates that the CWR-264A is equipped with a 33,600 Baud Silicon Labs modem. A "NONE" reference indicates that a modem is not installed or it has failed.

Relay

The following message will be displayed after the Relay test is selected.

```
Relay 1: 1=ON, 2=OFF
Relay 2: 4=ON, 5=OFF
Press ESC to exit
```
Relay Test

Press the *1* or *4* key to energize the selected relay. Press the *2* or *5* key to un-energize the selected relay. The selected relay and any circuitry attached to the relay contacts will be tested. Press the *Esc* key to complete the test. Each relay will immediately reassume its previous state when the *Esc* key is pressed. Press any key to exit the test.

Temperature

The Temperature test reports the temperature inside the recorder. A typical response follows.

```
Temp  88 Degrees F


Hit any key...
```
Temperature Test

The temperature is always reported in degrees Fahrenheit.

The temperature reading should never exceed 180°F. The temperature inside the CWR-264A will generally be about 5°F to 10°F warmer than the surrounding ambient temperature.

The user may wish to contact MICRO-AIDE customer service if a failure occurs as the result of any diagnostic testing. Instructions on how to proceed will be offered. "Material Return" and "Limited Warranty" policies are described on the inside back cover of this manual.

TERMINAL1 AND TERMINAL2

The Terminal1 and Terminal2 options allows the user to display the status of the selected Terminal Port. A successful and active connection to the selected Terminal Port will always display the following status.

```
Terminal1 PortStatus
IN:  DTR=ON   RTS=ON
Out: DSR=ON   CTS=ON
ESC to quit
```
Terminal1 Test

The recorder automatically asserts the DSR and CTS output control signals as On. The user's connection must assert the DTR and RTS input signals as On. The status of the control signals is updated in real-time. If the connection is lost the DTR and RTS signals will be reported as Off.

If a Terminal Port connection cannot be made to the recorder, the Terminal1 or Terminal2 test should be performed to check the status of the DTR and RTS signals. An incorrect cable or configuration problem with the USB-to-serial adapter will likely be the cause of the failure.

RESET

The Reset command should be used with caution. It allows the user to selectively restore the entire Setup Database to its factory default values or to clear the Event Record memory. Refer to the section entitled "Reset System (R)" on page 20 for additional information.

The following message will be displayed after the Reset command is selected.

```
Select Item to Erase

Set Factory Defaults
Erase Event Memory
```
Reset Command

To restore the entire Setup Database to its default settings highlight the Set Factory Defaults field and press the *Enter* key. Select Yes to perform the reset or No to ignore the reset.

To completely erase all of the Event Records from the event memory highlight the Erase Event Memory field and press *Enter*. Select Yes to perform the reset or No to ignore the reset.

It is important that the user not turn off power to the CWR-264A for 60 seconds after initiating a reset of the Event Record memory.

This completes the chapter on how to operate the recorder from the front panel. Since the setup of the recorder is critical to how the CWR-264A will perform, it is advisable to review any changes that may have been made to the Setup Database.

The next chapter describes general maintenance techniques that may benefit the user in case a problem symptom is ever encountered.

5

CHAPTER 6 – MAINTENANCE

INTRODUCTION

The primary purpose of this chapter is to describe the recommended trouble-shooting methods to be used with the CWR-264A. It should be referred to if ever a questionable symptom arises during the operation of the recorder.

The CWR-264A is designed to provide its user with many years of trouble-free operation. There are no user serviceable parts inside the unit. There are no consumable items or supplies that need to be replaced or replenished. The user may occasionally need to wipe dust away from the external surfaces of the unit. This should be done with a clean, dry cloth. The mechanical design of the chassis provides the internal electronic assemblies with a nearly sealed environment. Due to the low power consumption of the unit ventilation holes are not required. The inside of the recorder should remain clean indefinitely. Additionally, MICRO-AIDE printed circuit boards (PCBs) are sealed with a moisture and fungus resistant conformal coating.

ADJUSTING THE LCD CONTRAST

The contrast level of the LCD panel may occasionally need to be adjusted to compensate for extreme variations in ambient temperature or viewing angle. To change the contrast level simply adjust the potentiometer labeled "Adj". It is accessible through a small hole in the front panel.

WORKING INSIDE THE RECORDER

The user may have occasion to work inside the unit to add an optional equipment item. The following sections describe tasks involving work that may be performed inside the recorder. Observe the steps listed in the following before attempting any task. Refer to Figure 1 on page 8 and Figure 2 on page 8. They illustrate the front and top sides of the recorder, respectively.

1. Remove power from the recorder by detaching the connector labeled "Power" located along the top side of the recorder.

2. Remove all of the Analog and Digital Input connectors and peripheral cables.

3. Remove the recorder from the equipment rack.

4. Remove the six 6-32 1/4" screws from the top and bottom sides of the front assembly. The front and back portions of the recorder can then be completely separated.

The task can now be performed safely. After the work is completed reassemble the recorder by reversing the steps listed previously.

The Processor PCB is equipped with two potentiometers that are set and sealed at the factory. Do not attempt to alter these settings. Electrostatic discharges can cause serious damage to electronic components. When handling circuitry inside the recorder it is recommended that the user wear a wrist grounding strap.

Replacing the Fuses

There are three fuses mounted on the Processor PCB. The fuses are designed to protect the input power source and the contacts of the two output relays. Each are rated at 1 A and conform to the 2AG size standard. Before replacing a fuse the cause of the blown fuse should be ascertained and cleared if possible. The fuses are illustrated in Figure 10 on page 89.

Installing the Optional GPS Receiver

The CWR-264A can be equipped with a GPS Receiver that is used to provide a 100% accurate, drift-free clock. Once installed and enabled the operation of the receiver is completely automatic. The GPS Receiver option is comprised of a small L-shaped PCB, plastic grommet and antenna.

Generally, the GPS Receiver is ordered at the time the recorder is purchased and is pre-installed at the factory. If the receiver was not previously ordered, it can be installed by the user. To install the receiver follow the steps listed in the following. The GPS Receiver PCB is illustrated in Figure 10 on page 89.

1. Completely remove the recorder's front panel assembly in accordance with the procedure entitled "Working Inside the Recorder" on page 87.

2. The hole in the recorder's top panel labeled "GPS Antenna" is capped with a plastic plug. Using a small screwdriver, carefully pry the plug off. Replace it with the plug that was shipped along with the GPS Receiver PCB. The new plug includes a hole and serves as an insulating grommet.

3. Locate the 6-pin female socket labeled "J9" near the top-center edge of the Processor PCB. The socket is illustrated in Figure 10 on page 89.

4. Carefully align the MCX connector with the top panel hole and the six pins on the GPS Receiver PCB with their socket counterparts. Press lightly on the edges of the PCB to insure it is seated properly and fully into the socket. The PCB should snap into place as it is secured by a pair of plastic stand-offs.

6

Do not, under any circumstances, press down on the center of the GPS Receiver PCB. Located in the center of the PCB is a metal encased component. The metal, if bent, can damage the electronic circuitry it protects. When installing the PCB snap it into place by pressing lightly and only along its edges.

5. Reassemble the recorder.

6. The GPS antenna is housed inside a watertight enclosure at the end of a 16' long coax cable. Snap the cable end into the mating MCX connector located at the recorder's top panel.

7. The antenna can be secured to any surface less than 3/8" in thickness. For best reception it is best to locate the antenna outdoors and pointed skyward.

After power is reapplied to the recorder and the firmware is initialized, the Clock Sync Mode must be set to GPS. Refer to the section entitled "Clock Sync Mode" on page 24.

Installing the Optional Modem

The CWR-264A can be equipped with a 33,600 Baud internal modem. The optional modem provides accessibility to remote users of the recorder. Unlike commercially available external modems, the CWR-264A modem will operate over the entire temperature range applicable to the recorder. It uses the internal power of the CWR-264A rather than commercial AC power.

Generally, the modem PCB is ordered at the time the recorder is purchased and is pre-installed at the factory. If the modem was not previously ordered, it can be installed by the user. To install the modem follow the steps listed in the following. The modem is illustrated in Figure 10 on page 89.

1. Completely remove the recorder's front panel assembly in accordance with the procedure entitled "Working Inside the Recorder" on page 87.

2. Locate the 16-pin female socket labeled "J5" along the left edge of the Processor PCB. The socket is illustrated in Figure 10 on page 89.

3. Temporarily remove the 6-32 1/4" screw and lock washer secured to the hex stand-off located to the right of the socket.

4. Install the modem PCB by mating its sixteen-pin female connector with the Processor PCB socket. Use the 6-32 screw and lock washer to secure the modem to the hex stand-off.

5. Reassemble the recorder.

When the CWR-264A is reinitialized the firmware will automatically detect the modem's presence and configure it for auto-answer and originate operation.

RECONNECTING THE INTERNAL CABLES

There are three ribbon cables inside the CWR-264A. A ten-conductor cable is used to connect the Keypad PCB to the Processor PCB. A fourteen-conductor cable is used to connect the Input PCB to the Processor PCB. To reconnect a cable simply seat its end into its respective connector. The connector end of each cable is keyed. Do not force the connector end into place. It should fit snugly but easily.

⚠ The third ribbon cable connects the Keypad PCB to the LCD panel. It is easily damaged if improperly removed. Unless otherwise instructed by MICRO-AIDE service personnel, this cable should never be disconnected.

ETHERNET PORT

All CWR-264A Event Recorders are equipped with an Ethernet Port. Accordingly, this is no longer an item that can be installed by the user.
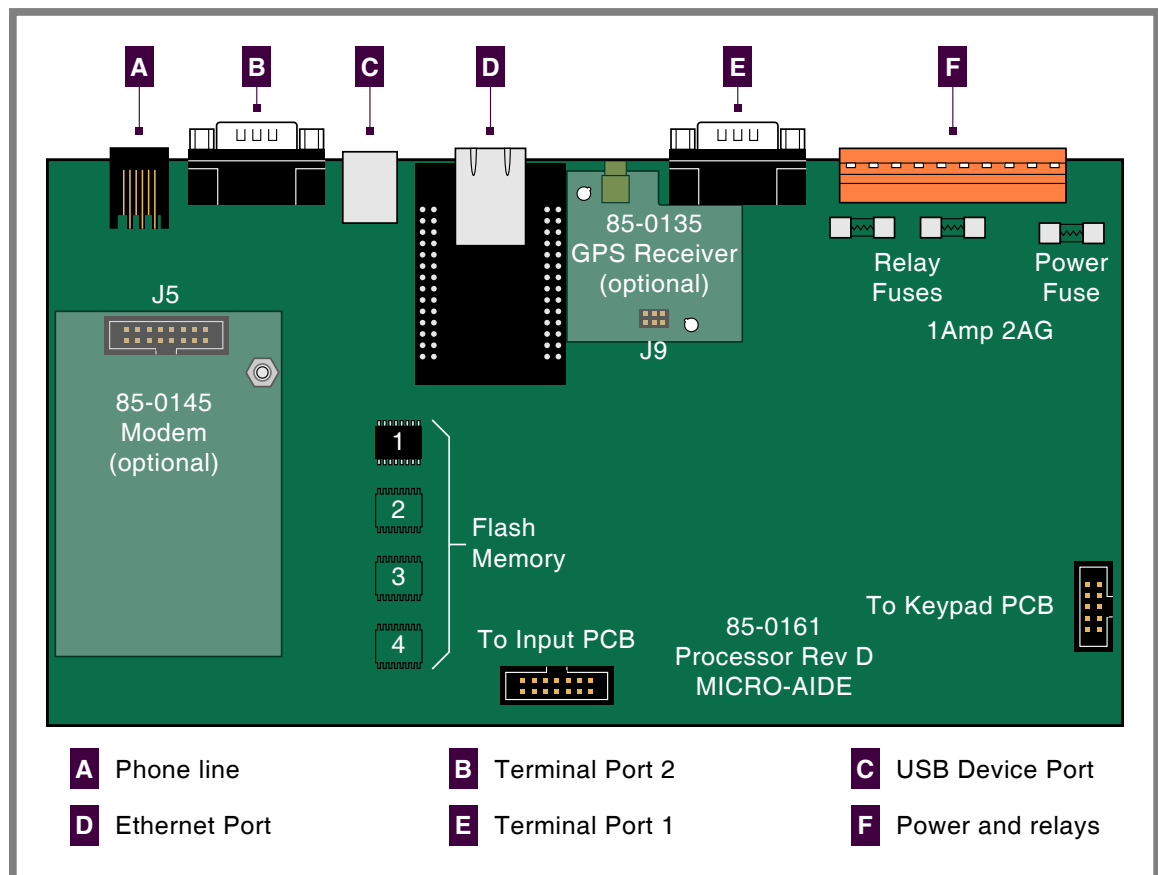
Figure 10: Processor PCB

MEMORY EXPANSION

The amount of non-volatile flash memory used for storing Event Records is optionally expandable. The amount can vary considerably. However, the memory components required by any given expansion cannot be installed by the user. If the memory needs to be expanded the recorder will have to be returned to MICRO-AIDE. Memory expansion options are listed in section entitled "Options" on page 107.

DIAGNOSTIC TESTING

The Main Menu of commands for the CWR-264A includes the Diagnostics command. Refer to the sample data entitled "Main Menu" on page 17. The Diagnostics command can be used to quickly verify the operational integrity of several hardware elements of the CWR-264A. Each of the eight tests can be performed at any time. They are non-destructive and therefore will not alter the contents of the Setup Database or Event Record memories.

The following menu of commands will be displayed in response to selecting the Diagnostics command.

```
                    System Diagnostics

            C Checksum Test Program Memory
            F Flash Memory Test
            G GPS Receiver Test
            E Ethernet Test
            M Modem Test
            K Keypad Test
            R Relay Test
            T Temperature
```
Diagnostics Command

Each command performs a specific test. The tests are described in the following sections.

CHECKSUM TEST PROGRAM MEMORY (C)

The Program Memory Test reads every memory address location used to store the program code. As part of the reading process a checksum is calculated and displayed at the completion of the test. The same checksum must be calculated each time the test is performed. Either GOOD or BAD will be reported at the completion of the test.

A typical response to the Program Memory Test is listed in the following.

```
            Program Memory Checksum=9b95
                                    GOOD

                    Test Complete
            Press any key to continue
```
Program Memory Test

The checksum takes only a few seconds to be calculated. The checksum value of 9b95 in the previous example will vary with the version of the firmware installed in the recorder.

FLASH MEMORY TEST (F)

The Flash Memory Test is performed on the memory chip(s) used to store Event Records. The test verifies that the microprocessor can access the Event Record memory.

A typical response to the Flash Memory Test command is listed in the following.

```
                Flash Memory #1: 4096K
                Flash Memory #2: OK
                Flash Memory #3: OK
                Flash Memory #4: OK

                    Test Complete
            Press any key to continue
```
Flash Memory Test

If the recorder has been equipped with larger amounts of Flash Memory the single reference of 4096K will be replaced by one or more references of 4096K, 8192K or 16384K. A failure has been detected if 0K is reported in a Flash Memory position that should have memory installed. The readings should be compared to the known memory capacity of the recorder.

GPS Receiver Test (G)

The GPS Receiver Test will check for the presence and operability of the optional GPS Receiver. The test will report several different messages depending upon the state of the receiver.

If the GPS Receiver has achieved a signal lock with at least four satellites, valid UTC-0 time and latitude and longitude coordinates similar to the following will be reported.

```
GPS Time: 20:42:57.068 is Valid
Location: 34.1044°, -117.8783°


Test Complete
Press any key to continue
```

GPS Receiver Test - Signal Acquired

A signal lock with one to three satellites allows the GPS Receiver to report a valid UTC-0 time. In such cases latitude and longitude coordinates of 0.0000° will be reported. Irrespective of the reported latitude and longitude coordinates, if the test reports Valid the GPS Receiver option is reporting an accurate UTC-0 time.

If the GPS Receiver is installed but has not as yet achieved, or is unable to achieve, a signal lock with any satellite, the following will be reported.

```
GPS Time: 23:59:44.000 is Not Valid
Location: 0.0000°, 0.0000°

Test Complete
Press any key to continue
```

GPS Receiver Test - Signal Not Acquired

If the GPS Receiver has failed completely or is not installed the following message will be reported.

```
GPS Receiver not installed

Test Complete
Press any key to continue
```

GPS Receiver Test - Not Installed

Ethernet Test (E)

The Ethernet Test can be performed at any time to verify that the microprocessor can communicate properly with the Ethernet Port. The test can be performed while the port is active or idle.

Assuming the Ethernet Port is operating properly, the following message will be reported.

```
Ethernet Okay

Test Complete
Press any key to continue
```

Ethernet Test

Okay is used to indicate a successful test. Not installed is used to indicate a failure.

The Ethernet Test does not test for LAN communications. For this reason, MICRO-AIDE recommends that a ping test also be performed.

MODEM TEST (M)

The Modem Test can be performed at any time to verify that the microprocessor can communicate properly with the internal modem. The test can be performed while the modem is idle or while a call is active.

Assuming that a modem is installed and it is operating properly the following message will be reported.

```
          Modem Test in progress...
          Modem found: D

                Test Complete
          Press any key to continue
```
Modem Test

The D (or C) reference indicates that a Silicon Labs modem is installed. If a modem is installed but NONE is indicated, a problem has occurred and must be corrected.

KEYPAD TEST (K)

Each of the twenty keys that comprise the front panel keypad can be checked by using the Keypad Test. The following instructions are displayed after selecting the command.

```
Keypad test, press ESC to cancel
```
Keypad Test

A single unique character is displayed in response to pressing a key. The correspondence between non-numeric keys and displayed characters is listed in Table 10 on page 92.

Key	Browse	Alpha	Setup	Esc	Enter	Save / .	▲	▼ / -	◄	►
Displayed	B	A	S	E	N	.	^	v	<	>

Table 10: Keypad Test Characters

To exit the test, press the **Esc** key located at the keyboard of the peripheral device that is communicating with the CWR-264A.

RELAY TEST (R)

The Relay Test allows the user to verify the operation of the internal relays and any alarm or indication circuitry connected to the contacts of the relays.

The following message will be displayed in response to the Relay Test command. Press the appropriate numeric key to change the state of a relay. To energize the relay select the Relay ON option. To un-energize the relay select the Relay OFF option.

```
                Relay Test

          1 Relay 1 ON
          2 Relay 1 OFF
          4 Relay 2 ON
          5 Relay 2 OFF
```
Relay Test

To exit the test press the **Esc** key. Both relays will automatically reassume their pre-test state.

TEMPERATURE (T)

The Temperature Test simply reports the temperature inside the recorder.

A typical response to the Temperature Test command is listed in the following. The temperature is always reported in degrees Fahrenheit.

```
                    Unit Temperature  77 Degrees F


                          Test Complete
                     Press any key to continue
```
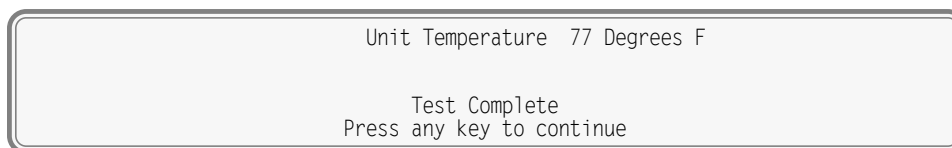
Temperature Test

The measured temperature inside the CWR-264A will generally be 5°F to 10°F warmer than the surrounding ambient temperature. Temperature readings should never exceed 180°F.

The user may wish to contact MICRO-AIDE customer service if a failure occurs as the result of any diagnostic testing. Instructions on how to proceed will be offered. The MICRO-AIDE "Material Return" and "Limited Warranty" policies are described on the inside back cover of this manual.

SYSTEM EVENTS

Event Records are normally created by a change in state of an input. Exceptions to this rule concern the cycling of power to the recorder, variations in the measured temperature and events related to the Train Speed Monitor feature. The latter feature is described in the section entitled "Measure Speed (M)" on page 35.

Each time power to the CWR-264A is turned on or off an event will be logged into memory. If the temperature transitions into or out of the acceptable range of operation or the speed of a train is reported, an event will also be logged. Additionally, each time the SNTP Clock Sync feature sets the recorder's real-time clock an Event Record is logged. These events are classified as System Events. To distinguish them, the Input Number always includes an S-prefix (e.g., S01). Additionally, the Input Name, Identifier and Event Name fields within the record are uniquely labeled. They cannot be changed by the user. Table 11 on page 93 lists the various fields used by each System Event Record.

Input Number	Input Name	Identifier	Event Name Pair
S01	System Power	Power	ON / OFF
S02	High Temperature	HighTemp	ON / OFF
S03	Low Temperature	LowTemp	ON / OFF
S04	Sntp Clock Sync	SntpSync	OFF / OFF
S05	GPS 5 Sec Correction	GPS 5Sec	OFF / OFF
S06	GPS Clock Record	GPS Rec	OFF / OFF
S07	Clock Set	ClockSet	ON / OFF
S08	Speed Monitor 1	SpeedLim	ON / OFF
S09	Speed Monitor 2	SpeedLim	ON / OFF
S10	Speed Monitor 3	SpeedLim	ON / OFF
S11	Speed Monitor 4	SpeedLim	ON / OFF

Table 11: System Event Records - Assigned Labels

System Events can be reviewed using any of the five formatting options. Record formats are described in the section entitled "Event Record Formatting" on page 51. Listed in the following are eight sample Event Records as they would appear at the PC. In the interest of simplicity only the No Details, single-line form is shown.

```
12:52:35.52  01/31/15  System Power        Power    OFF    S01
12:53:07.45  01/31/15  System Power        Power    ON     S01
13:01:05.00  01/31/15  High Temperature    HighTemp ON     S02
13:49:12.00  01/31/15  High Temperature    HighTemp OFF    S02
14:39:40.83  01/31/15  Speed Monitor 4     SpeedLim ON     S11   16MPH
16:00:00.14  01/31/15  GPS Clock Record    GPS Rec  OFF    S06   0.01SEC
20:54:35.06  01/31/15  Clock Set           ClockSet OFF    S07
20:55:00.00  01/31/15  Clock Set           ClockSet ON     S07
```

Sample System Event Records

The first two records indicate that power was off to the recorder for approximately 32 seconds. Later in the same day the measured temperature was found to be excessive for 48 minutes. A train speed violation of 16 mph occurred at 14:39:40.83. At 16:00:00.14 the GPS Receiver synchronized the recorder's clock. It corrected the clock by .01 seconds.

The last two Event Records deserve special examination. The first of these indicates that the clock was set manually by the user. An OFF Event Name identifies this occurrence. The time was changed as listed in the second record. An ON Event Name identifies this occurrence. In summary, the following can be stated. On 01/31/15 the time was changed from 20:54:35.06 to 20:55:00.00. The date was not changed, although had it been the records would have indicated the change.

> Manually setting the clock always creates a pair of Event Records with an assigned Input Name of Clock Set.

> With the Clock Sync Mode set to SNTP or GPS the user will never have to manually set the clock.

The GPS Receiver sync record listed previously is shown in the following as it would appear at the front panel LCD.

```
16:00:00.14 01-31-15
S06   0.01SEC
GPS Clock Record
GPS Rec      OFF
```
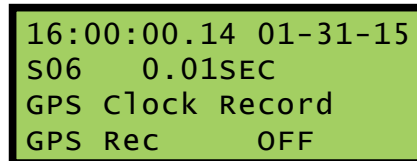
LCD System Event Record

System Events can be Queried and Browsed just like other Event Records. Instead of selecting a D, A, V or T input type designator, select the S-type.

> System Events are always logged to memory in chronological sequence. The power on event will immediately follow the power off event. The time between the two Event Records indicates the period during which no logging was possible. All of the Analog Input measurements for S1 records will be reported with a zero value. This is done to eliminate erroneous readings.

UPDATING THE FIRMWARE

Like any microprocessor-based product, the CWR-264A executes a stored memory program. The program, referred to as firmware, is saved in a Flash Memory chip. Flash Memory chips are uniquely characterized by their permanent storage and multiple write properties. Their use allows the CWR-264A firmware to be updated to a newer version by simply uploading a new program file. The once common practice of shipping and replacing a Programmable Read Only Memory (PROM) chip does not apply to the CWR-264A. Consequently, there is no need to open the unit to gain access to the Processor PCB.

The firmware update procedure, described in this section, must be performed via a PC connected to one of the Terminal Ports, USB Device Port, Ethernet Port or internal modem (provided the latter is

installed). At the request of the user, MICRO-AIDE support personnel can perform the update via the modem. A firmware update can also be performed very easily by using the USB Host Port. The instructions for doing so are described in the section entitled "Update" on page 80.

Occasionally a new firmware release will be incompatible with the recorder's existing Setup Database. When this happens the existing database will have to be erased and a new one created. Incompatibilities, if any, are listed in Table 1 on page 5. It should always be reviewed before proceeding with an update.

The steps necessary to complete the firmware update depend upon which communications application is being used. The following example describes the HyperTerminal method. HyperTerminal 7.0 was used in the following procedure. Other versions of this program may be slightly different. However, the fundamental approach will remain valid.

If the recorder's Terminal Port is used in the following procedure, hardware flow control must be enabled at the PC's comm port.

1. The user must be online with the recorder and the Main Menu should be displayed. Refer to the sample data entitled "Main Menu" on page 17.

2. From the Main Menu select the Transfer Files command. The following sub-menu of commands will be displayed.

```
                       File Transfer

              D Download Setup Data CWR to PC
              U Upload Setup Data PC to CWR
              F Firmware Upload
```
Transfer Files Command

3. Select the Firmware Upload command. The following warning will be displayed.

```
           Are you SURE you want to upload new Firmware?
                            No Yes
```

4. To proceed select Yes. The following additional warning will be displayed.

```
        OK to erase Firmware and upload new Firmware in Intel HEX format?
                            No Yes
```

5. To proceed select Yes. A final precaution will be displayed as follows.

```
               Do you want to ABORT this operation
                            No Yes
```

6. To proceed select No. After a short delay the following message will be displayed.

```
    Please send Intel HEX file now.
```

7. Within the HyperTerminal window, click on the Transfers command, then the Send Text File... command. The Send Text File dialog box will open.

8. In the drop down list box select All files (*.*) as the type of file to display.

9. Select the correct disk drive, folder and filename (e.g., CWR-264A V117.hex). If the various settings are correct click on the Open button.

10. The progress of the upload will be indicated by a sequence of period (.) characters.

11. The update will terminate automatically after about 80 seconds (at 38,400 Baud). The following message will indicate a successful file transfer.

6

```
Done!
Press ESC to continue
```

12. Press the **Esc** key as instructed. The following message will be displayed.

```
Do you want to restart the CWR-264A event recorder now?
                          No Yes
```

13. Select Yes to initialize the new firmware. At the conclusion of the initialization the user will be asked to log on.

After completing the firmware update procedure it may be necessary to execute the Reset System command. A reset should be performed only if recommended by MICRO-AIDE customer service technicians. Refer to the section entitled "Reset System (R)" on page 20.

TROUBLE-SHOOTING GUIDE

The following guide is provided to assist the user in resolving problems that may occur with the operation of the CWR-264A. It can be especially helpful when attempting to operate the recorder for the first time. Procedures for resolving both local and remote problems are listed. Where multiple steps are indicated it is recommended that they be performed in the order listed. Corrective actions to be performed inside the CWR-264A must be carried out in accordance with the procedure entitled "Working Inside the Recorder" on page 87.

If the user is unable to resolve the problem, MICRO-AIDE customer service technicians should be contacted. The user will be asked to state the problem, related symptoms, and indicate any operations or conditions that have a bearing on the problem. If available, the results of any diagnostic tests should be reported. If the recorder has an installed modem it may prove to be helpful in diagnosing the problem from the MICRO-AIDE factory. The user will be asked to provide the appropriate telephone number and correct password.

Symptom or Problem	Resolution
No indication of power.	Verify 9 to 36 Vdc at B and N power terminals. Inspect fuse on Processor PCB.
PC will not connect via USB Device Port.	Verify USB Type A-B cable is being used. Verify correct USB device driver is installed. Refer to Appendix C.
PC does not display data when connected to either Terminal Port.	Check cable connection to Terminal Port. Verify cable is assembled per Figure 11 on page 105. Check Baud rate setting. Check if Terminal LED on front panel illuminates. Perform Terminal Diagnostic test. Refer to "Terminal1 and Terminal2" on page 85.
Terminal Port data at PC is garbled.	Check Baud rate setting. Verify following settings: 8 data bits, no parity, 1 stop bit, hardware flow control is enabled.
Highlight cannot be moved using PC arrow keys.	Set PC for ANSI emulation.

Table 12: Guide to Trouble-Shooting Techniques

Symptom or Problem	Resolution
PC does not communicate via Ethernet Port when directly connected.	Verify recorder's IP Address and Port Number are correctly assigned.
	Verify PC's Ethernet Port is configured properly.
	Verify PC's communications application is set up for TCP/IP protocol.
	Verify CAT-5 cable is being used.
Setup Database transfer fails via Ethernet Port connection.	Use Network command to change TCP/IP mode setting to Telnet.
GPS Receiver fails to provide accurate clock control.	Verify GPS antenna is plugged in.
	Verify location of GPS antenna provides good skyward access.
	Verify Clock Sync Mode is set to GPS.
	Verify GPS Receiver diagnostic test reports Valid.
GPS Receiver diagnostic test reports Invalid time and/or 0.0000° coordinates.	Wait 60 minutes while GPS Receiver attempts to achieve signal lock with satellite(s).
	Relocate GPS antenna for improved reception.
SNTP fails to provide accurate clock control.	Verify Clock Sync Mode is set to SNTP.
	Verify time server is transmitting SNTP-Multicast (or see next).
	Verify time server is transmitting SNTP-Unicast and SNTP Server address is valid.
Real-time clock is incorrect by one or more hours even with GPS Receiver or SNTP control.	Verify correct Daylight Saving Time and Time Zone settings.
Cannot save Event Record files to flash drive.	Verify the USB flash drive is formatted FAT-32, not NTFS.
	Verify flash drive is fully seated into USB Host Port.
	LED on flash drive should flash as files are being saved.
	Test integrity of flash drive by plugging it directly into a PC and copying files from the PC.
	Try another flash drive.
Unable to update firmware using USB Host Port.	Verify the USB flash drive is formatted FAT-32, not NTFS.
	Verify flash drive is fully seated into USB Host Port.
	Verify flash drive contains an unzipped firmware file.
	Verify firmware filename ends in .hex.
	Verify firmware filename does not include illegal characters.
	Verify length of firmware filename does not exceed 20 characters.
Initial Check-Out Procedure fails on all inputs.	Verify polarity of test voltage is applied correctly.
	Verify Detection Times are not set to zero or too long.
	Check inputs using View Events command.
Event Records are not being created on some inputs.	Check wiring, especially polarity.
	Set Detection Time to shorter value.
	Verify Detection Times are not set to zero.

Table 12: Guide to Trouble-Shooting Techniques

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Symptom or Problem	Resolution
Flashing inputs create multiple Event Records.	Enable flashing status for inputs. Set Detection Time, in seconds, to value of 30÷fpm rate.
Analog Input AC source measures 0.	Analog Input is configured for DC, change to AC.
Analog Input DC source measures correctly but reports AC units.	Analog Input is configured for AC, change to DC.
Negative Analog Input voltage is not reported, measures 0.	Analog Input Range is set to +51.1 Vdc, change to ±25.5 Vdc or ±255 Vdc setting.
AC analog readings are not stable.	Reassign the analog Filter setting to Slow.
DC analog readings are not tracking voltage changes.	Reassign the analog Filter setting to Fast.
Timer Input is not reporting an Event Record.	Verify valid inputs are assigned in the From and To fields. Verify the assigned inputs are each generating state changes.
Upload/Download of Setup Database fails.	Verify Xmodem protocol is being used. Verify hardware flow control is enabled if either Terminal Port is being used.
Update of firmware and/or Upload/Download of Setup Database fails using either Terminal Port.	Verify hardware flow control is enabled.
Modem does not answer.	Check phone line connection. Verify Modem Ring Count is not set to zero.
Modem answers but fails to connect.	Verify host modem is enabled for error corrected operation. Check noise levels on phone lines. Test host modem with another auto-answer system.
Modem will not dial out alarms.	Test phone line for dial tone. Perform Modem Test command. Verify modem is enabled by Virtual Input settings for dial out. Check Primary and Secondary Dial Numbers.
Internal relays will not operate.	Perform Relay Test command. Verify relay is enabled by Virtual Input. Disconnect the external circuit attached to the relay contacts, test again.
Visibility of LCD characters is poor.	Adjust LCD contrast.

Table 12: Guide to Trouble-Shooting Techniques

The next chapter describes the Modbus feature.

CHAPTER 7 – MODBUS

INTRODUCTION

Modbus is a communications protocol originally developed by Schneider Automation. It has been in use for many years and has now become a commonly accepted method of facilitating communications among various devices and systems. In the rail signal industry it is frequently used by PLC systems. Although Modbus includes many capabilities, it is primarily designed to support the exchange of status-related data. The real-time status of inputs and registers can be determined using Modbus. The status of various inputs and registers can also be controlled using Modbus. Modbus defines two basic types of system entities. A Modbus Client requests status data or issues input and/or register data to a Modbus Server. The Modbus Server responds to these requests in accordance with the protocol standards.

The CWR-264A is designed to operate as a Modbus Server. More specifically, Modbus over TCP / IP has been implemented.

USAGE

Modbus can be used to exchange a variety of data between compliant devices. However, many of these data types do not apply to an Event Recorder. The CWR-264A has been designed to support only those aspects of the Modbus protocol that are appropriate to an Event Recorder application.

The CWR-264A includes Digital, Analog and Virtual Inputs. The status of individual Digital and Virtual Inputs is binary in nature. A Digital Input is either On or Off. A Virtual Input evaluates as either true or false. The same can be said of an Analog Input when its measured level is compared to its High and Low Limit Values. The Analog Input is either within its acceptable range of operation or it is not. Analog Limit Values are described in the section entitled "High and Low Limits" on page 29.

There are a total of 360 Digital, Analog and Virtual Inputs. As described previously, the instantaneous status of each of these inputs can be indicated as either a 1 or a 0. For Digital Inputs the input is either On (1) or Off (0). For Analog Inputs the input is either outside its normal limits of operation (1) or it is within its normal limits (0). For Virtual Inputs the input evaluates to a true (1) or false (0) condition. It follows that at any given instant the state of all 360 inputs can be specified by 360 individual bits.

Function Codes are used by a Modbus Client to request data from a Modbus Server. The CWR-264A firmware supports two of these Function Codes. The first is referred to as Read Discrete Input (RDI). A Modbus Client can issue an RDI code for any or all of the 360 inputs of the CWR-264A. The Event Recorder will validate the received data message and respond with the requested status information. The operation is such that any Modbus Client with network access is free to issue RDI requests at will. In essence, the RDI can be used to provide a snapshot of various input states.

The response to an RDI Function Code is an array of data bits that represent the instantaneous status of selected inputs. The response does not provide information pertaining to when an input assumed its reported status. Only the Event Records saved in the memory of the recorder contain precise date- and time-stamped information. The Modbus protocol cannot be used for this purpose.

The second Function Code supported by the CWR-264A is referred as Read Input Register (RIR). The RIR code allows a Modbus Server to respond with a 16-bit register value. In the case of the CWR-264A the measured level of an Analog Input is reported as a sign extended 16-bit register value. A Modbus Client

can query the measured value of all eight Analog Inputs at once. The value of each register is interpreted as a whole number multiple of the Analog Input's resolution setting. As an example, if the resolution setting is .1 Vdc then a register value of 00FE (hexadecimal) is 254 times .1 Vdc or 25.4 Vdc. Refer to the section entitled "Analog Configuration (A)" on page 28 for additional details regarding the resolution setting of Analog Inputs.

The CWR-264A will honor all valid Modbus Client queries. It is assumed, however, that approximately twice per second a Modbus Client will request status or register data from the recorder. Provided the rate of queries does not significantly exceed this level the Event Recorder will remain responsive to each request.

It is important to also note that the Modbus Server feature available in the CWR-264A implements a purely machine-oriented interface. As such, the user has no access to any of its operational, performance or configuration aspects. It cannot be controlled or altered in any way by the user.

If the Modbus over TCP/IP connection is idle (i.e., no data is being received or transmitted) for more than ten seconds a timeout condition will occur. The timeout will result in a forced disconnection at the CWR-264A end. The Modbus Client will then have to initiate a new connection procedure to re-establish communications with the recorder. The short timeout duration and forced disconnection is performed so that in the event of a connection failure anywhere in the network the recorder will be prepared to promptly complete a subsequent connection attempt.

IMPLEMENTATION DETAILS

The Modbus Server implementation within the CWR-264A is predicated upon several important factors. A summary of these factors is provided in the following.

- Modbus over TCP/IP has been implemented. Neither the RTU nor ASCII versions of Modbus are supported.

- The Modbus Client must access the Event Recorder at its preassigned IP Address. Refer to the section entitled "Network (N)" on page 37 for additional details regarding the Ethernet Port.

- By Modbus convention, each query and response must occur over Port 502.

- The RDI and RIR Function Codes are fully supported by the Event Recorder.

- Function Codes applicable to the control of coils and registers have not been implemented.

- The measured value of an Analog Input is encoded within the Event Recorder as a signed 9-bit integer. This value is translated into a sign extended 16-bit value when it is reported as a Modbus compliant register value. As an example, -25.6 Vdc is reported with a register value of FF00 (hexadecimal).

- Digital, Analog and Virtual Inputs are numbered as Discrete Inputs as follows:

Input Type	Recorder Numbering	RDI Numbering
Digital	D001 to D256	0 to 255
Analog	A01 to A08	256 to 263
Virtual	V01 to V96	264 to 359

Table 13: RDI Numbering

- Analog Inputs A01 to A08 are numbered as registers 0 to 7.

The Modbus-IDA is a regulatory committee responsible for all the technical aspects of the Modbus protocol. A PDF document that details the Modbus over TCP/IP standard can be found at the following Internet address. The CWR-264A Server feature has been designed to be compliant with the standards as set forth in the referenced document.
www.modbus.org/docs/Modbus_Messaging_Implementation_Guide_V1_0a.pdf

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This completes the User Manual for the CWR-264A Event Recorder. As an aid to the user three appendices have been provided. They include detailed specifications and options applicable to the CWR-264A. Instructions on how to install the Windows drivers that support the USB Device Port feature are included in Appendix C. The installation and use of MICRO-AIDE's RSA Validator software is the subject of Appendix D.

Any comments the reader may have on how to improve this manual are welcomed. Comments should be forwarded to the Director of Marketing, MICRO-AIDE Corporation.

7

USER NOTES

SPECIFICATIONS

Physical

Size

Length: 19.0″

Height: 8.1″ (requires 10.5″ of rack space)

Depth: 3.4″

Weight

7.0 lb.

Environmental

Storage

Temperature: -50 °C to 85 °C

Humidity: 0 to 95 %, non-condensing

Operating

Temperature: -40 °C to 72 °C

Humidity: 0 to 95 %, non-condensing

Mounting

Standard: mounts in 19″ rack

Optional: 23″ rack mounting brackets available

Construction

Chassis

Fully enclosed, anodized aluminum

Externally accessible keypad, LEDs and connectors

Electrical

All components mounted on conformal coated, internal PCBs

Power

Voltage

Range: 9 to 36 Vdc

Consumption

Typical: 4 W

Maximum: 5 W (with GPS Receiver and Modem options)

Isolation

Power

Minimum: 3800 Vdc from B and N terminals to chassis and inputs

Digital Inputs

Minimum: 3800 Vdc to any terminal

Analog Inputs

Minimum: 3800 Vdc to any terminal

Input to Adjacent Input

Digital: minimum 3800 Vdc

Analog: minimum 3200 Vdc

Ethernet Port

Minimum: 3800 Vdc to any terminal

USB Host and Device Ports

Minimum: 3800 Vdc to any terminal

Internal Modem (optional)

Designed to meet FCC part 68 standards

Capacities

Inputs

Digital: 256, all optically isolated

Analog: 8, voltage only

Virtual: 96, user-assigned

Timer: 200, user-assigned

Train Speed Monitor: 4, user-assigned

Outputs

Relay: 2, form C, rated for 2 A at 24 Vdc or 1 A at 125 Vac, maximum switching capacity of 125 VA or 60 W, service life 1 million electrical (typical)

Event Storage

Standard: 221,284 records

Maximum: 3,711,844 records

Liquid Crystal Display

Characters: 80 total on 4 lines

Viewing Area: 2.8″ by .8″

Front Panel Keypad

Quantity: 20 keys

Physical Inputs

Input Impedance

Digital: minimum 10 KOhms, optically isolated

Analog: minimum 10 MOhms

Range

Digital Input - On: 9 to 36 Vdc

Digital Input - Off: 0 to 1 Vdc

Analog DC Voltage: 3 scales, ±25.5 Vdc, +51.1 Vdc, ±255 Vdc

Analog AC Voltage: 2 scales, 25.5 Vac, 255 Vac

Event Validation Times

Digital: .01 to 327.67 seconds, compatible with fixed rate flashing circuits

Analog: fast and slow filter settings

Analog Limit Values

High and Low Limits: in multiples of .1 V or 1 V

Analog Input Accuracy

Typical Vdc: ±.15 Vdc or ±1.5 Vdc

Typical Vac: ±.15 Vac or ±1.5 Vac

Virtual Inputs

Definitions

Any logical association shared by 1 to 4 variables (i.e., Digital, Analog, Timer or other Virtual Inputs)

Assigned by defining the state of the Virtual Input for each combination of variable states

Reporting

Creates standard Event Records

Relays can be controlled by each Virtual Input

Modem (optional) can be enabled to dial out Event Records

Timer Inputs

Programming

Any input can be assigned as a trigger or terminating source

On or Off events can be assigned as a trigger or terminating source

Limit Values

High and Low Limits: in multiples of .1 seconds

Range: 0.0 to 999.9 seconds

Reporting

Measured Time is reported in each Timer Input Event Record

Violation of Limit Values are also reported

Temperature Sensing

Usage: measures and reports internal temperature of recorder

High and Low Limits: -67 °F to 257 °F

Train Speed Monitor

Operation

Reports excessive train speed

Logs standard Event Record

Sensors

Digital Inputs: 2 required

Distance: 50′ to 5280′

Limit Values

5 to 180 mph

Memory

Type

Non-volatile, Event Records and Setup Database are stored in flash memory chip

Newest data over-writes oldest data, 129th day over-writes first day

Storage Longevity

Infinite with power off

Rated for 100,000 write operations

Ports

RS-232

Quantity: 2, for use with a PC

Terminal Emulation: ANSI

Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200

Bit Format: 8-N-1

USB Host

Compatible with any FAT-32 formatted flash drive

Can create a text file of Event Record data from any time span

Can be used to update firmware

USB Device

Eliminates need for serial comm port, data transfer rates of 4.71 Mbps

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Ports (continued)
Ethernet
Type: 10 / 100 Base-T

Protocols: TCP / IP, Telnet, Modbus, SNTP-Unicast and -Multicast,

Concurrent Sessions: Modbus (5), Telnet (1)

Provides remote or local access via TCP / IP

Data transfer rates of 4.70 Mbps

User-assignable IP Address, port, sub-net mask, Unicast IP Address

Modem (optional)
Provides remote access, auto-answer

GPS Receiver (optional)
Used to provide precise, real-time clock control, latitude and longitude coordinates

Connectors
Power
Detachable, tension clamp, 4-position, 12 to 22 AWG

Dual B and N terminals

Digital Inputs
Detachable, screw-down, 8-position, 12 to 22 AWG

Analog Inputs
Detachable, tension clamp, 8-position, 12 to 22 AWG

Relays (2)
Detachable, tension clamp, 6-position, 12 to 22 AWG

Normally open, normally closed and common terminals per relay

Terminal Port (2)
DE-9 male, configured as modified DCE

USB Host Port
USB Type A female

USB Device Port
USB Type B female

Ethernet Port
RJ-45 female

Telephone Line
RJ-11 female

GPS Receiver (optional)
MCX female

Indicators
LCD Panel
Includes LED back lighting for enhanced visibility

Displays numerous command menus for configuring the recorder and retrieving data

Front Panel LEDs (3)
GPS / Alarm: green, red for failure

Terminal: green, flashes with send and receive data

Modem: green, flashes with send and receive data and ringing

Ethernet Port LEDs (2)
Green: link established

Yellow: data activity

Controls
Keypad
Located on front panel, below LCD

Keys: 0-9, Browse, Alpha, Setup, Esc, Enter, Save / ., left, right, up, down / -

LCD Contrast Adjust
Single-turn pot., accessible from front panel

Internal Clock
Accuracy
Typical: ±8 seconds per month (3 ppm) when not synchronized

Volatility: maintains accuracy for minimum of 30 days with loss of power

Resolution: .01 seconds for all Event Records

Sync
SNTP-Unicast: via time server, 5 minutes past each hour

SNTP-Multicast: per time server schedule

GPS: once per hour (requires GPS Receiver option)

Operation
Time Zones: selectable from 7 different North American settings and UTC-0

Daylight Saving Time: enable or disable automatic adjustment

Leap Year: automatically adjusted

GPS Receiver (optional)
Includes PCB and external antenna

PCB
Plugs into mating connector inside recorder

Antenna
Size: diameter 1.8″, height .6″ (not including mounting screw)

Weight: 2 oz. (less cable)

Operating Temperature: -40 °C to 85 °C

Mounting: bulkhead mountable to any surface less than 3/8″ thick

Location: unobstructed skyward orientation, for use outdoors

Password Protection
Administrative Level
Access: unrestricted to all functions

Length: 8 characters

Restricted Level
Access: Event Record and Setup Database viewing only

Length: 8 characters

Passcode
Access: limited modifications to Setup Database via front panel

Length: 8 digits

Internal Modem (optional)
Type
V.34, 33,600 Baud, data compression and error correction

Usage
Remote access via auto-answer operation

Allows dial-out alarm reporting of Virtual Input records

Compliance
Designed to meet FCC part 68 standards

Dial-out Alarms (optional)
Calling Method
Primary and secondary dial numbers, multiple attempts

Tone or pulse dialing

Data
Issues Virtual Input Event Records if enabled by Virtual Input definition

MICRO-AIDE reserves the right to make changes, at its sole discretion, to any specification listed herein.

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TRANSFER RATES

Table 14 on page 105 lists typical bit transfer rates for each of the CWR-264A's user-accessible ports. In each case the same 20,000 Event Records with no-detail formatting were either dumped to a PC file or saved directly to a flash drive. The times listed are normalized relative to 1,000 Event Records. If speed is a concern, using the USB Device Port is highly recommended.

Port	Time to transfer 1,000 Event Records (sec)	Actual transfer rate (bps)	Relative speed compared to 38,400
Terminal Port (38,400)	19.0	38,396	Used as reference
Internal modem	19.4	37,649	1.0 times faster
Terminal Port (115,200)	6.4	114,845	3.0 times faster
USB Host	.8	n/a	22.4 times faster
Ethernet Port	.2	4,704,075	122.5 times faster
USB Device Port	.2	4,714,063	122.8 times faster

Table 14: Bit Transfer Rates by Port

TERMINAL PORT CABLE

The following cable is included with every CWR-264A.
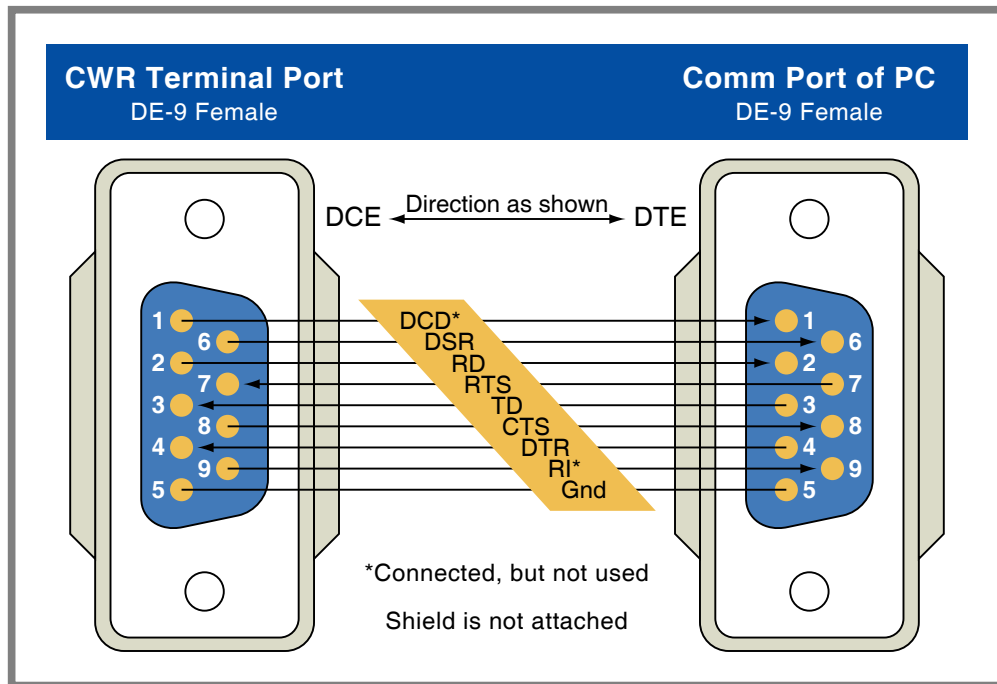
Figure 11: Terminal Port Cable - Wiring Diagram

USER NOTES

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OPTIONS

GPS Receiver Module
85-0135
Provides precise, non-drift control of recorder's real-time clock, includes bulkhead-mount antenna with 16′ of cable

L 56237-5/00
Replaces bulkhead-mount antenna with magnetic-mount antenna

Internal Modem
85-0145
33,600 Baud, V.34, V.32bis, V.32, V.22bis, V.22 and V.21

V.42bis and MNP 5 data compression

MNP 2-4 and LAP-M error correction

Memory Expansion
40-0416
453,988 Event Records

40-0616
686,692 Event Records

40-0816
919,396 Event Records

40-1016
1,152,100 Event Records

40-1216
1,384,804 Event Records

40-1416
1,617,508 Event Records

40-1616
1,850,212 Event Records

40-1816
2,082,916 Event Records

40-2016
2,315,620 Event Records

40-2216
2,548,324 Event Records

40-2416
2,781,028 Event Records

40-2616
3,013,732 Event Records

40-2816
3,246,436 Event Records

40-3216
3,711,844 Event Records

ACCESSORIES

Current Sensor
HCS-4
High Current Sensor, 4 inputs, 1 to 20 Adc or Aac

Battery Charger Monitor
CSI-1
Charge Status Indicator, single input, monitors voltage and current

Voltage Detector
FVD-2
Failed Voltage Detector, 2 inputs, .5 to 48 Vdc, .5 to 36 Vac, High and Low Limit Values, selectable timing

Light Out Detector
FLD-2
Failed Lamp Detector for incandescent, halogen or LED lamps, 2 lamp circuits, DC or AC lamp current

Mounting
31-0002
23″ rack mounting brackets

31-0003
Wall mounting brackets

Cables
DE-9 to DE-9 (included)

USB A-B cable (for use with USB Device Port)

B

Contact MICRO-AIDE when ordering any options or accessories
Purchase orders should list part numbers as listed above

U<small>SER</small> N<small>OTES</small>

B

APPENDIX C – USB DEVICE DRIVERS

INTRODUCTION

Every CWR-264A is equipped with a USB Device Port. The device port can be used to directly connect the recorder to a PC that does not include a serial comm port. The port also provides a substantially higher speed connection. Bit transfer rates of 4.71 Mbps can be achieved. Table 14 on page 105 lists the bit transfer rates of each user-accessible port.

This appendix provides a detailed description of how to select and install the proper drivers for the USB Device Port. Separate procedures for Windows XP® and Windows 7 are listed in the sections that follow.

The following procedure requires access to several files. The correct files are available for downloading from the MICRO-AIDE website at: www.micro-aide.com/support/downloads.html

Do not attempt to install driver files from any source other than the MICRO-AIDE website.

The correct files to be used are contained in a zip file named "stm_device_drivers.zip". Do not use the zip file named "usb_device_drivers.zip".

PREPARATION

The following pre-installation steps must be completed before the driver installation procedure can be started.

- Download the file named "stm_device_drivers.zip" from the MICRO-AIDE website. Unzip the downloaded file. The two extracted files must then be saved to a known location (e.g., to a new folder located at the PC desktop).

- The extraction will yield two files named "STM32_V1.3.1_Setup.exe" and "STM64_V1.3.1_Setup.exe". The first is intended for use in 32-bit Windows systems. The latter is for 64-bit systems.

- A USB Type A-B cable is required.

- Apply power to the recorder and insure that it has completed its initialization cycle.

INSTALLING THE DRIVERS

WINDOWS XP PROCEDURE

The following procedure applies to Windows XP computers. Complete the following steps in the order listed.

1. Launch the 32-bit installer by double-clicking the STM32_V1.3.1_Setup.exe file. A screen similar to the following will be displayed.

2. After a few seconds the previous screen will close automatically. After several more seconds the following screen will be displayed.

3. Click the button labeled "Next>". The following screen will be displayed.

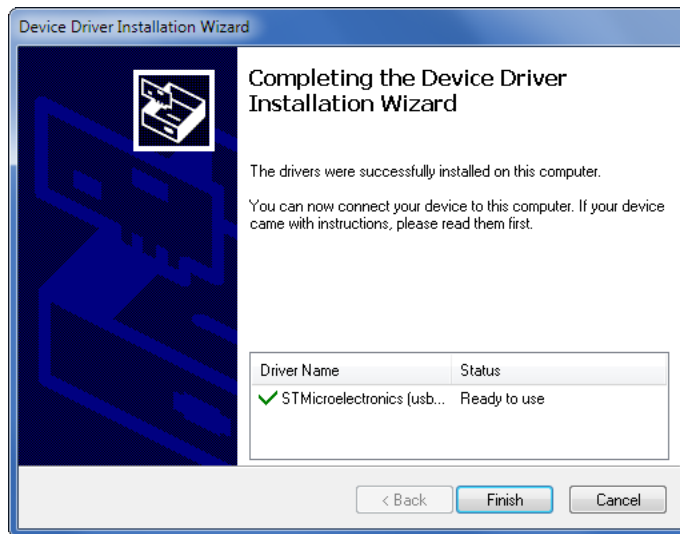4. Click the button labeled "Next>". The following screen will be displayed briefly.

5. The previous screen will close automatically. The following screen will be displayed.


6. Click the button labeled "Next>". The following screen will be displayed briefly.

7. The previous screen will close automatically. The following screen will be displayed.

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8. Click the button labeled "Finish". The required drivers are now installed. A new HyperTerminal connection can now be created. Follow the procedure entitled "Making a USB Device Port Connection" on page 115.

WINDOWS 7 PROCEDURE

The following procedure applies to Windows 7 computers. Complete the following steps in the order listed.

1. Launch the 64-bit installer by double-clicking the STM64_V1.3.1_Setup.exe file. A screen similar to the following will be displayed.

2. After a few seconds the previous screen will close automatically. After several more seconds the following screen will be displayed.

3. Click the button labeled "Next>". The following screen will be displayed.

4. Click the button labeled "Next>". The following screen will be displayed briefly.
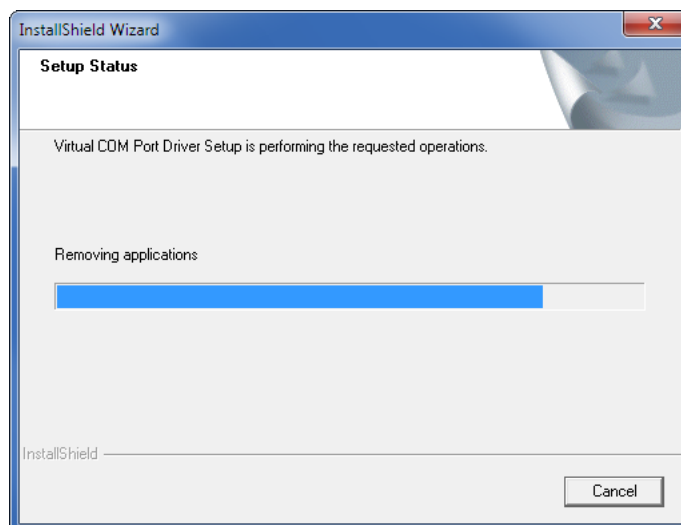
5. The previous screen will close automatically. The following screen will be displayed.

6. Click the button labeled "Next>". The following screen will be displayed briefly.

7. The previous screen will close automatically. The following screen will be displayed.

8. Click the button labeled "Finish". The required drivers are now installed. A new HyperTerminal connection can now be created as described in the next section.

MAKING A USB DEVICE PORT CONNECTION

After the PC has restarted per the preceding instructions, the user should test the USB device connection by performing the following steps. This procedure applies to both Windows XP and Windows 7.

1. Connect the USB Type A-B cable to the recorder's USB Device Port and an available USB port at the PC.

2. Launch HyperTerminal. A dialog box named "Connection Description" will be displayed. Assign the new connection a descriptive name like "USB Device Port" as shown in the following. Click the button labeled "OK".
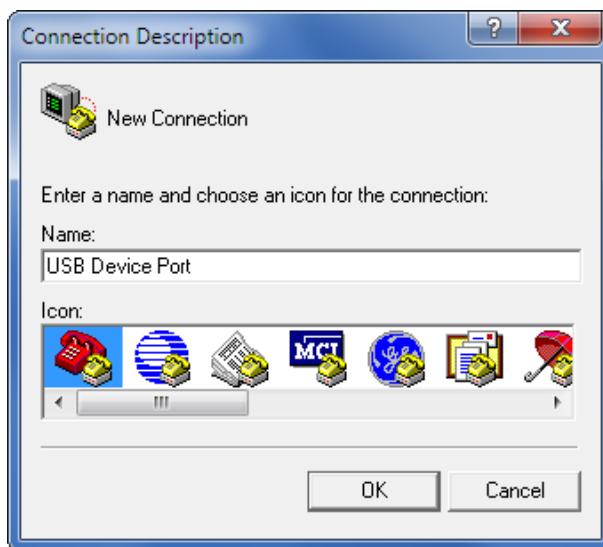
3. A dialog box named "Connect To" will be displayed. Click the down arrow to the right of the drop down list box named "Connect using:". Select the virtual comm port that was recently created (e.g., COM15). Click the button labeled "OK".
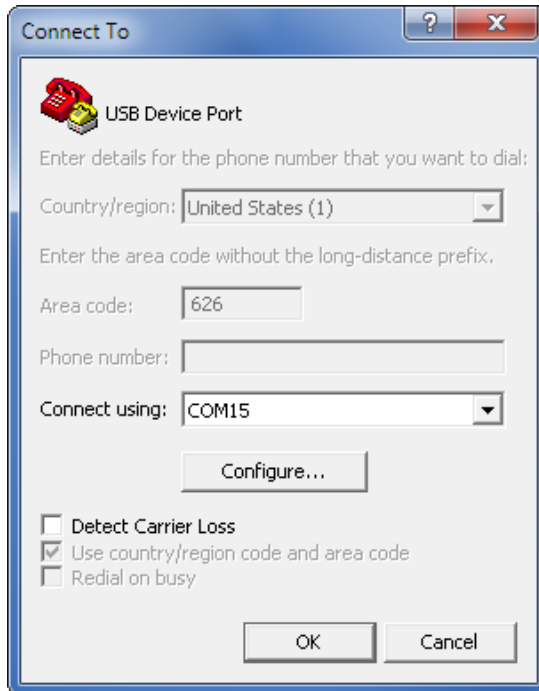
4. A dialog box labeled "COM15 Properties" will be displayed. The reference to COM15 will be replaced by the port number selected in step 3. Close the dialog box by clicking the button labeled "Cancel".

The COM15 Properties dialog box referenced in the previous step can be ignored. Baud rate and bit format settings do not apply to USB connections of this type.

5. A blank HyperTerminal Window will be displayed. In the lower left-hand corner of the screen, the word Connected should appear.

6. Verify that the connection is active by pressing the **Enter** key at the PC keyboard. The password challenge will be displayed. The user is now able to access the recorder in accordance with the password that is entered. Refer to the section entitled "Administrative and Restricted Passwords" on page 23 for details regarding the use of passwords.

7. Finally, save the new connection. Within the HyperTerminal window, click on the File command, then the Save As... command. The Save As dialog box will open. Save the new connection to a convenient location such as the desktop. For the example cited herein, the new connection will appear as a new desktop icon labeled "STM Device Port.ht".

Appendix D – RSA Validator

Introduction

The Query Events command with Dump+S option provides for the creation of a secure electronic data file. This appendix describes how that file can be verified as unaltered. MICRO-AIDE's RSA Validator software is used for this purpose. The proper use of RSA Validator involves several simple steps. Each step is described in the following sections.

The following procedure requires access to several files. The correct files are available for downloading from the MICRO-AIDE website at: www.micro-aide.com/support/downloads.html

Installing the Required Software

The RSA Validator software is available to all MICRO-AIDE users. It can be downloaded, installed and used without restriction or charge. It is available at the MICRO-AIDE website as noted in the previous paragraph.

The downloaded software consists of two files that have been zipped together. The zipped file should be saved to a temporary location and unzipped from there. The decompressed files are named "SetupRSAValidator.exe" and "SetupQt4Lib.exe". The former is the RSA Validator application, the latter includes all of the runtime support library files that are required by the RSA Validator software. The procedures for installing the required files are described in the following two sections.

Installing RSA Validator

Install the RSA Validator software by performing the following steps.

1. Double-click the SetupRSAValidator.exe file. The following dialog box will be displayed.
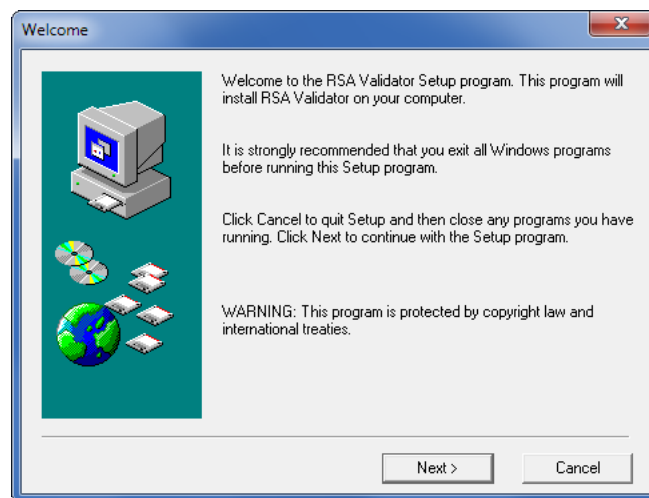
2. Click the button labeled "Next >". The following dialog box will be displayed.
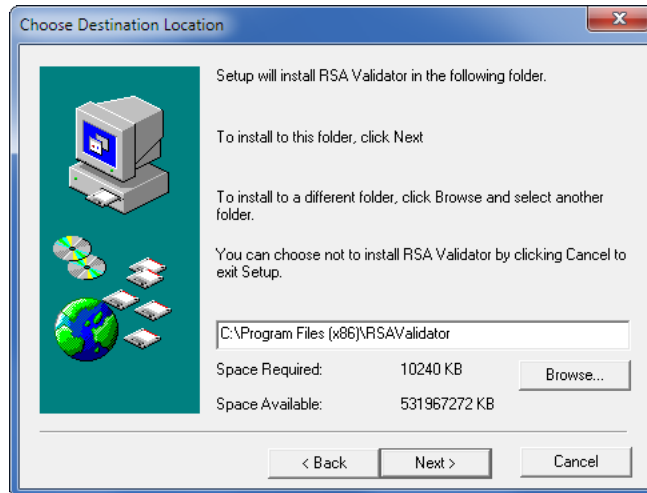
3. Accept the default location by clicking the button labeled "Next >". The following dialog box will be displayed.
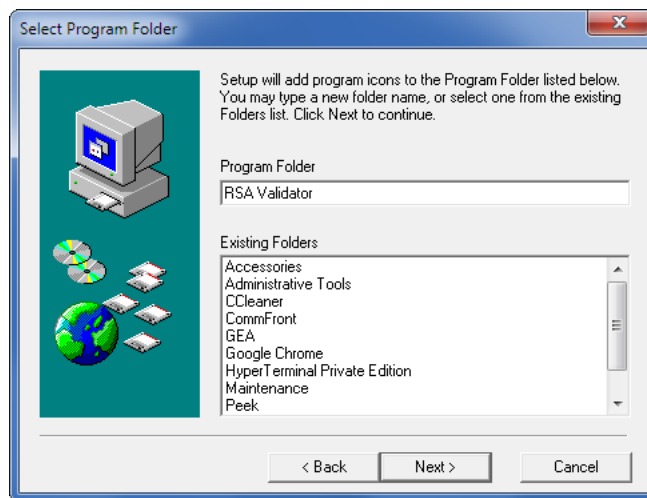
4. Accept the default folder name by clicking the button labeled "Next >". Click the button labeled "Next >" in the succeeding dialog box labeled "Start Copying Files".

5. Several files will then be installed. The installation process will end automatically after several seconds as noted by the following dialog box.
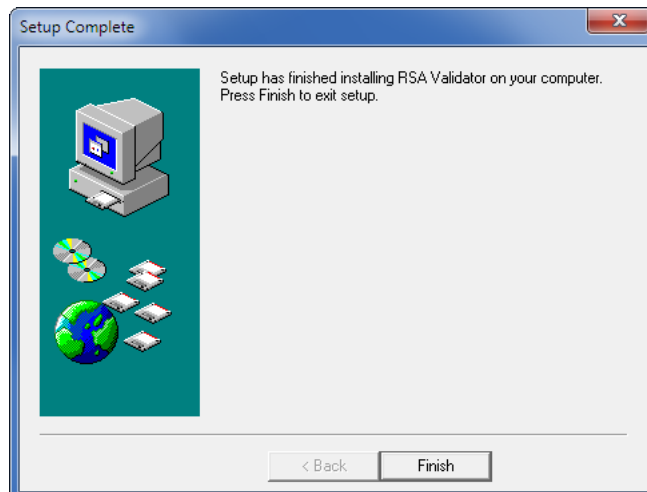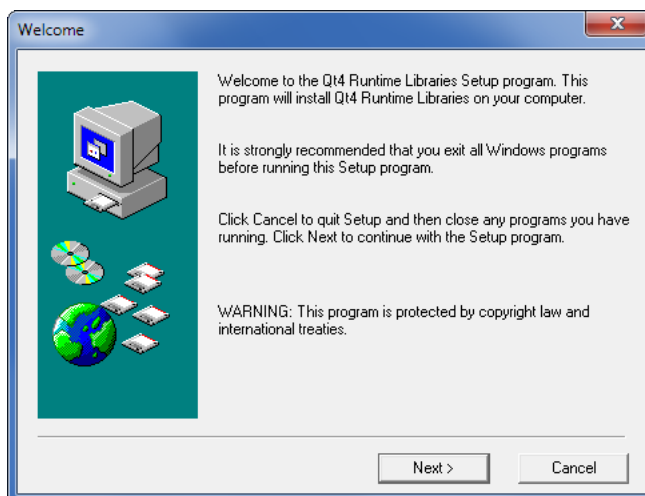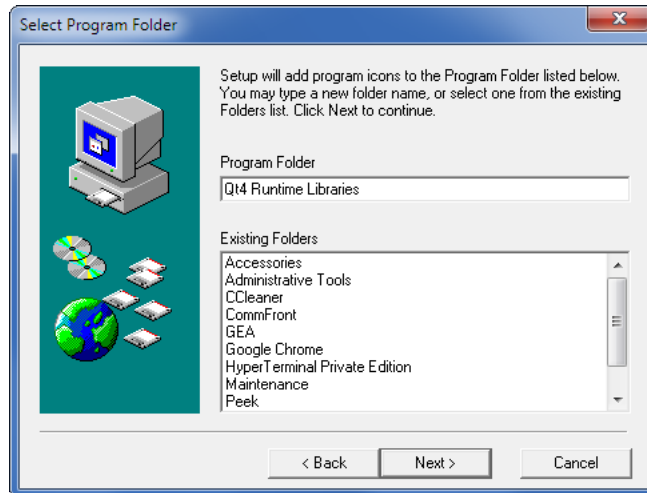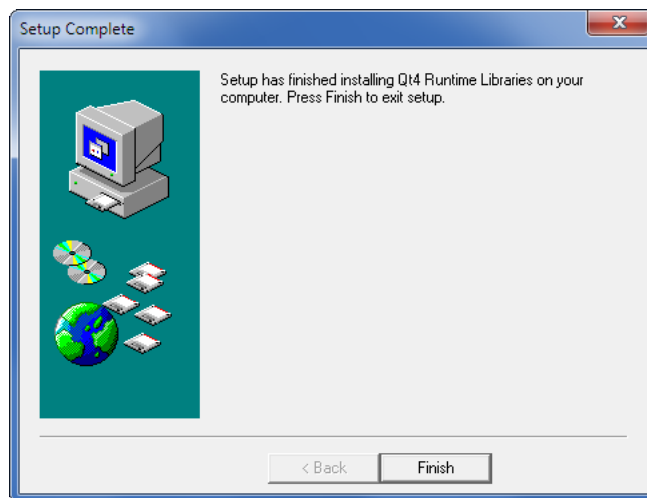
6. Complete the installation of RSA Validator by clicking the button labeled "Finish" and the "OK" button in the succeeding and final dialog box.

INSTALLING THE RUNTIME LIBRARIES

Like all applications, various runtime files are required to support RSA Validator. Perform the steps listed in the following to install the runtime support library files.

1. Double-click the SetupQt4Lib.exe file. The following dialog box will be displayed.

2. Click the button labeled "Next >". The following dialog box will be displayed.
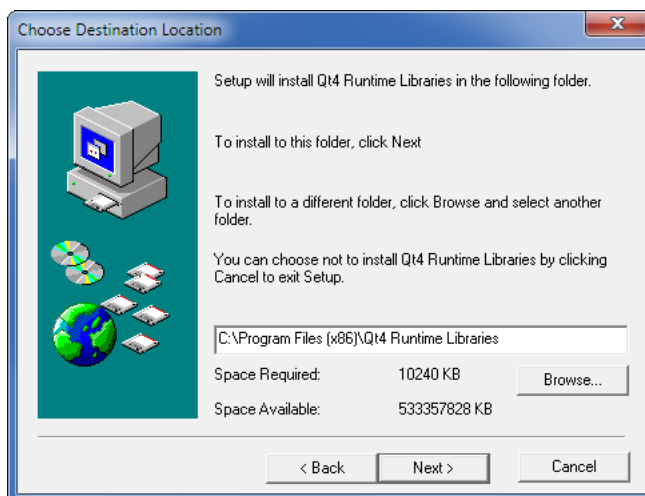
3. Accept the default location by clicking the button labeled "Next >". The following dialog box will be displayed.

4. Accept the default folder name by clicking the button labeled "Next >". Click the "Next >" button in the succeeding dialog box labeled "Start Copying Files".

5. Several files will then be installed. The installation process will end automatically after several seconds as noted by the following dialog box.

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6. Complete the installation of the runtime support files by clicking the "Finish" button and the "OK" button in the succeeding and final dialog box.

RSA Validator can now be launched and used as described in the next section.

USING RSA VALIDATOR

VALIDATING A FILE

RSA Validator can be launched from the Windows Start Menu or a desktop icon. The following dialog box will be displayed after it is launched.
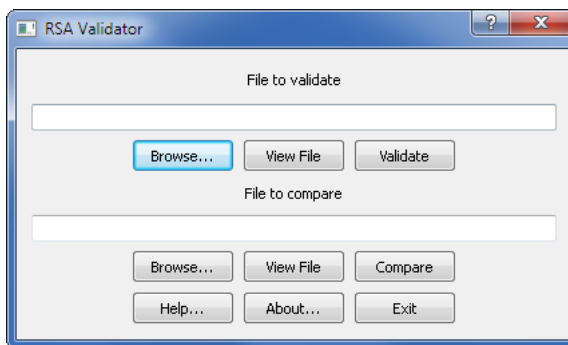
A previously created or copied electronic data file can be verified as unaltered by performing the following steps.
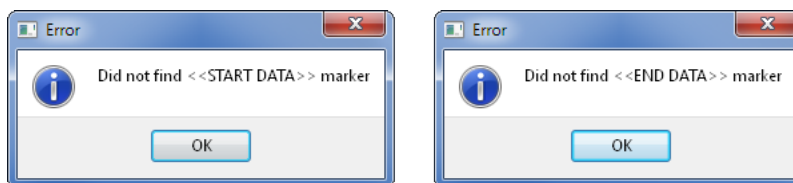
1. In the File to validate section, click the button labeled "Browse...".

2. In the succeeding dialog box labeled "Open Digitally Signed Capture File", navigate to the location where the electronic data file of interest is located. Click the button labeled "Open" once the proper file is selected.

3. To view the file in Notepad as simple text, click the button labeled "View File".

4. To validate the file click the "Validate" button. The following dialog box will confirm that the file has not been altered.
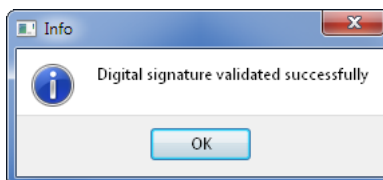
If the data content of the file has been altered, even if by a single bit, the following dialog box will instead be displayed.
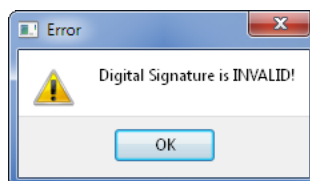

Finally, if the Start Data or End Data markers are corrupted or not found within the file, either of the following messages will be displayed.


COMPARING FILES

In many cases the electronic data file will need to be shared among various parties. In a hearing or court proceeding, the file may need to be passed to the plaintiff's counsel. In such circumstances it is important that both parties are reviewing the same data file. The file compare feature of the RSA Validator software allows a comparison to be made as described in the following steps.

1. RSA Validator can be launched from the Windows Start Menu or a desktop icon. The following dialog box will be displayed after it is launched.
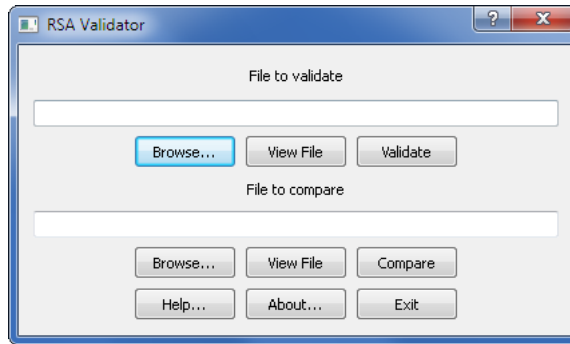
2. In the File to validate section, click the button labeled "Browse...".

3. In the succeeding dialog box labeled "Open Digitally Signed Capture File", navigate to the location where the first electronic data file of interest is located. Click the button labeled "Open" once the proper file is selected.

4. To view the first file in Notepad as simple text, click the button labeled "View File".

5. In the File to compare section, click the button labeled "Browse...".

6. In the succeeding dialog box labeled "Open Digitally Signed Capture File", navigate to the location where the second electronic data file of interest is located. Click the button labeled "Open" once the proper file is selected.

7. To view the second file in Notepad as simple text, click the button labeled "View File".

8. Finally, click the button labeled "Compare". If the two files are identical, the following dialog box will be displayed.

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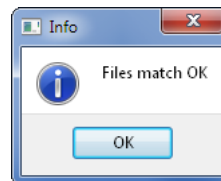
If the two files differ, even slightly, the following message will indicate a mismatch.
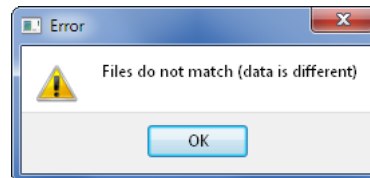
Using these techniques, Event Record data files created with the Dump+S option of the Query Events command can be validated and compared any number of times.

Material Return

In the event the customer identifies a malfunction in any product, call or write MICRO-AIDE and obtain a Return Material Authorization (RMA) number from the customer service department. Return the product to MICRO-AIDE, freight prepaid, with a note (in-warranty repair) or a purchase order (out-of-warranty) for the repair listing the following information:

- RMA number issued by MICRO-AIDE

- Return shipment address

- Name and e-mail address or telephone number of person familiar with the problem

- Brief description of the problem (include any printouts that may have a bearing on the problem)

- Method of payment for repair costs (out-of-warranty)

- Send product to the following address:

MICRO-AIDE CORPORATION
685 Arrow Grand Circle
Covina, CA 91722
Tel: 626-915-5502   Fax: 626-331-9484
E-mail: support@micro-aide.com

Limited Warranty

MICRO-AIDE warrants its products to be free from defects in material and workmanship for a period of five (5) years from the date of shipment. This warranty is in lieu of any other warranty, expressed or implied. In no event shall MICRO-AIDE be held liable for incidental or consequential damage resulting from (1) the use of any of its products, or (2) any alleged breach of this warranty provision. MICRO-AIDE's liability shall be limited to repairing or replacing, at its sole discretion, any defective product which is returned in accordance with the MICRO-AIDE Material Return Policy.

Product that has been subjected to abuse, misuse, alteration, accident, lightning damage, neglect or unauthorized installation or repair shall not be covered by this warranty. MICRO-AIDE reserves the right to make a final decision as to the existence of any failures and the cause of such failures. No warranty is made with respect to custom equipment or products produced to buyer's specifications except as mutually agreed upon in writing.

Any additional or different warranty provisions proposed by the buyer in any purchase order or other document are rejected by MICRO-AIDE and notice of objection to them is hereby given. Any such proposed warranty provisions shall be void and the conditions herein shall constitute the complete and exclusive statement of the warranty contract between MICRO-AIDE and the buyer. Neither MICRO-AIDE's acknowledgment of a purchase order nor MICRO-AIDE's failure to object to conflicting, different, or additional warranty provisions in a purchase order shall be deemed an acceptance of such warranty provisions or a waiver of the conditions hereof.